

# Cooling India

India's foremost Monthly dedicated to the growth of HVACR Industry



## Opportunities Galore for HVAC

- Cold Chains on a Hot Streak
- Freezing of Foods
- IoT for Reshaping HVAC Industry



**ACREX**  
India 2017  
23 - 25 FEBRUARY • 2017  
IEML • GREATER NOIDA • DELHI

Visit us at  
Hall 14-15, Stall F-8





**Series 616KD**  
Dwyer Differential Pressure Transmitter



**Series SAH**  
Dwyer Smart Air Flow Hood  
**ALM** is the Ambassador for Smart Air Hood in India.



**Series DPT-Flow**  
Aerosense Differential Pressure cum Air Flow Transmitter with Multipoint averaging flow sensor



**Series AVT**  
Aerosense Air Velocity cum Temperature Transmitter



**Series UHH**  
Dwyer Universal Handheld Instrument measures Differential Pressure, Temperature, Air Velocity, Volume flow & RH & can be connected to Apple, Android phones & tabs.



**Model VP1**  
Vane Thermo Anemometer



**Series 160 - Pitot Tube**



**Pyclone**  
Handheld Thermo-Hygrometer



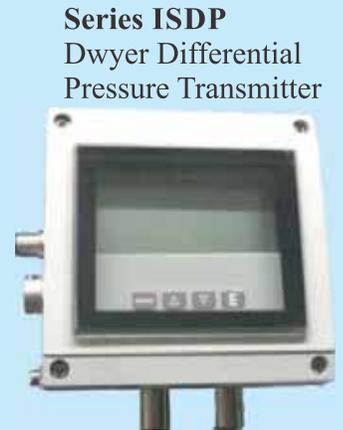
**Series TTD/TTW**  
Aerosense Temperature Transmitter



**Series 477AV**  
Dwyer Handheld Digital Manometer



**Series HHT**  
Dwyer Hazardous Area Humidity/Temperature Transmitter



**Series ISDP**  
Dwyer Differential Pressure Transmitter

Visit us at –



**A L M ENGINEERING & INSTRUMENTATION PVT. LTD.**

304, Damji Shamji Industrial Complex, L.B.S. Marg, Kurla (W), Mumbai-400070. INDIA  
Tel.: +91 22 25126500 • Email: info@almonthazar.com • sales@almonthazar.com  
Internet: www.almonthazar.com

# Cooling India

India's foremost Monthly dedicated to the growth of HVACR Industry



## COMING TOGETHER IS THE BEGINNING

- Ventilation products • HVLS solutions • Acoustic solutions
- Pumping solutions (Lubi, India) • Energy efficient products (RENSON, Belgium) • Simulation services

**GAPS Engineering Solutions**



+91 98 715 66 133 - North & East  
+91 976 53 90 584 - West & South



[gaurav@gapsenco.com](mailto:gaurav@gapsenco.com)  
[kedar@gapsenco.com](mailto:kedar@gapsenco.com)



## Air Cooled Condensing Unit



## Water-Cooled Condensing Unit



## Evaporator



## Panel



## Consumables



Axial Fan



Ethylene  
Generator



Refrigerant



Controls

## Dixell Controls



# Technology Components for Efficient Cold Chain



+91 - 9716717172

+91 - 9999311204

## Standard Refrigeration Pvt Ltd

3732-34, Netaji Subhash Marg, Darya Ganj, New Delhi -110002.

Phone: +91-11 23257290, 23261231, & 33, Fax: +91-11-23276126,

E-mail: [office@standardref.com](mailto:office@standardref.com), [ashish@standardref.com](mailto:ashish@standardref.com)

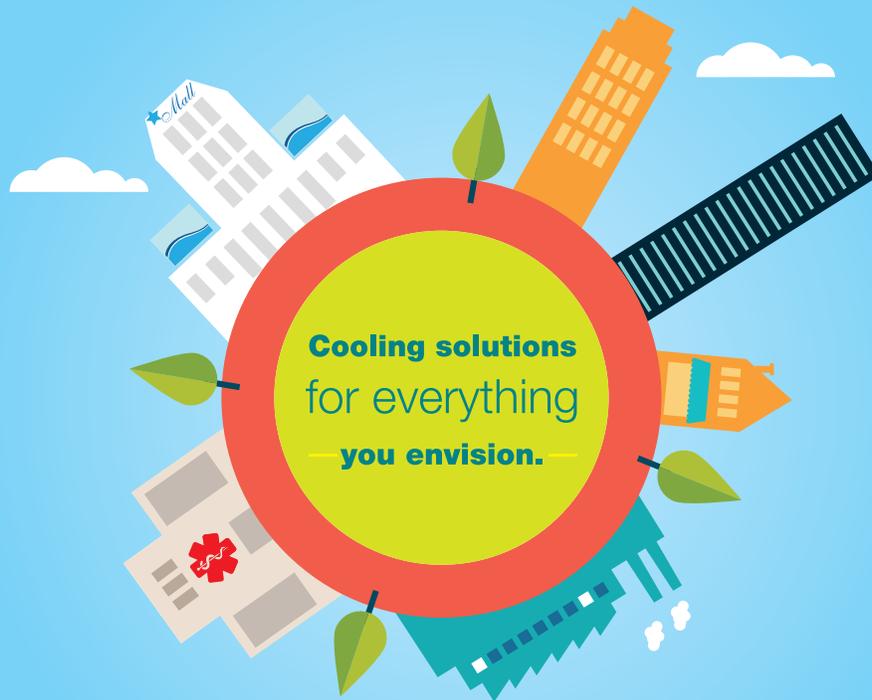


EMERSON Copeland



dixell





Hitachi's range of cooling products for an array of building projects and all kinds of end-to-end solutions.



Water-Cooled Chiller



Air-Cooled Chiller



VRF System (Top Flow)



VRF System (Front Flow)



Ductables



Cassette



Split AC



Window AC

Hitachi also undertakes complete project installations and maintenance.



Johnson Controls-Hitachi Air Conditioning India Limited  
(Formerly known as Hitachi Home & Life Solutions (India) Limited)

**Head Office:** Hitachi Complex, Karan Nagar, Kadi, Dist.- Mehsana - 382727, Gujarat, India. Tel: (02764) 277571. Fax: (02764) 233425.  
Email: [sales@jci-hitachi.com](mailto:sales@jci-hitachi.com); Website: [www.jci-hitachi.in](http://www.jci-hitachi.in)

**North Region:** New Delhi: 011-26991361/62/63/66; Gurgaon: 0124-3211974/75; Noida: 0120-2823138/39; Lucknow: 0522-3249561, 4048260; Chandigarh: 0172-5019213; Ludhiana: 0161-3223879; Jaipur: 0141-5115700/01. **East Region:** Kolkata: 033-22653383/9248, 22265647/7434; Bhubaneswar: 0674-2550147, 2552242; Patna: 0612-2344500. **West Region:** Mumbai: 022-28470617/19/21; Pune: 020-32943755; Nagpur: 0712-3222623; Ahmedabad: 079-26402024, 26401128; Surat: 0261-3110063; Indore: 0731-4050707. **South Region:** Chennai: 044-24935534/24953904; Coimbatore: 0422-3221343; Bangalore: 080-26851193; Hyderabad: 040-64549828, 27951027/28; Kochi: 0484-2779826/27/28.





**WHO WE ARE ?**

AT TRANQUIL SYSTEMS WE TAKE UP TURNKEY PROJECTS FOR HVAC AND REFRIGERATION. WE ARE WORKING TOWARDS GREENER ALTERNATIVE TO HEATING, VENTILATION, AIR-CONDITIONING AND REFRIGERATION. SYSTEMATIC APPROACH AND TECHNICAL EXPERTISE HELP US ACHIEVE HIGHEST CUSTOMER SATISFACTION. WE CATER TO RESIDENTIAL, COMMERCIAL, INDUSTRIAL AND CUSTOM BUILT SOLUTIONS IN THE INDUSTRY. WE BELIEVE IN PRODUCT AND SERVICE QUALITY.

**WORLD CLASS DIRECT, INDIRECT AND HYBRID EVAPORATIVE COOLING SYSTEMS**

NOW MADE IN INDIA .. MADE FOR THE WORLD

TRANQUIL AIR BREEZER | DIRECT (SINGLE STAGE) EVAPORATIVE COOLING UNITS

TRANQUIL AIR AMBIATOR | INDIRECT DIRECT (TWO STAGE) EVAPORATIVE COOLING UNITS

TRANQUIL CLIMATIZER | HYBRID AIR CONDITIONING UNITS

TRANQUILHRV | HEAT RECOVERY VENTILATORS

TRANQUILTFA | SIMPLE TREATED FRESH AIR UNITS

TRANQUILHYBRID TFA | HYBRID TREATED FRESH AIR UNITS

TRANQUIL PRE COOLER | CONDENSOR PRE-COOLING UNITS

**APPLICATIONS :**

- PUBLIC BUILDINGS
- HOSPITALITY / HEALTH CARE
- TRANSPORT SECTOR
- INSTITUTIONAL BUILDINGS
- MECHANICAL MANUFACTURING INDUSTRY
- PAPER / PRINTING INDUSTRY
- TEXTILE INDUSTRY
- MEDIA & ADVERTISING FACILITIES
- METAL INDUSTRY
- CEMENT INDUSTRY
- AGRICULTURE / HORTICULTURE/ FLORICULTURE INDUSTRY
- POULTY/ DAIRY/ BARN
- ELECTRICAL / COMMUNICATIONS / DATA CENTRES
- MANY MORE APPLICATIONS

**OTHER SERVICES :**

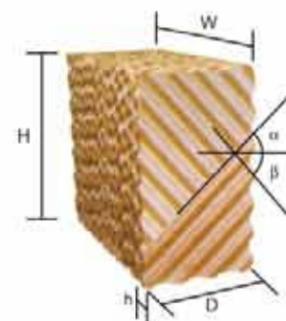
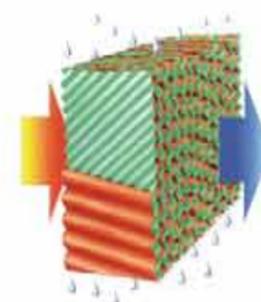
- DUCT DESIGN & INSTALLATION
- COMPLETE HVAC PROJECT INSTALLATION & COMMISSIONING
- UPGRADATION / RETROFITING OF EXISTING HVAC SETUP FOR BETTER PERFORMANCE

**ADVANTAGES :**

- ENGINEERED DESIGN
- HIGH ON EFFECIENCY
- LATEST TECHNOLOGY
- EASE ON MAINTENANCE
- HIGHEST RETURN ON INVESTEMENT
- FASTEST PAY BACK PERIOD

**OTHER PRODUCTS :**

- AIR DISTRIBUTION PRODUCTS
- DUCT MANUFACTURING
- EVAPORATIVE COOLING PADS
- INDUSTRIAL FANS
- VENTILATION SYSTEMS



Evaporative Cooling pads is made of fluted cellulose sheet those are glued together. Cellulose sheet is treated with unique ingredients to achieve high cooling efficiency and degradation resistance. As hot air passes through the EVAPORATIVE COOLING PADS, a stream of cool and refreshing air is produced. Model 5090, 6090 & 7090 evaporative cooling pads are developed to provide exceptional wetting properties and airflow to achieve optimum cooling capacity and maximum durability. Our cooling pads are your best choice!

**MODELS & PARAMETER**

	7090	6090	5090
H(mm)	1200, 1500, 1800	1200, 1500, 1800	As per requirement
W(mm)	300, 600	300, 600	As per requirement
D(mm)	25, 50, 75, 100, 150, 200, 300	25, 50, 75, 100, 150, 200, 300	25, 50, 75, 100, 150, 200, 300
h(mm)	7	6	5
α	45°	45°	45°
β	45°	45°	45°

H : Pad Height    W : Pad Width    h : Flute Height  
D : Pad Depth    α : Flute Angle    β : Flute Angle



**FEATURES**

- Excellent wetting properties
- Strong and supporting
- No water carry-over
- ECO friendly
- High evaporation & cooling efficiency
- Long life span
- Self cleaning
- Easy to install
- Low Pressure drop
- Dirt resistant
- Low operation cost

**WHY CHOOSE US ?**

- Highest quality standards
- Custom sizes and colors on request for larger quantities
- Custom pad configurations, for required cooling performance
- Standard packaging with corrugated boxes for easy and safe shipping
- Special pricing for larger quantities and OEM's

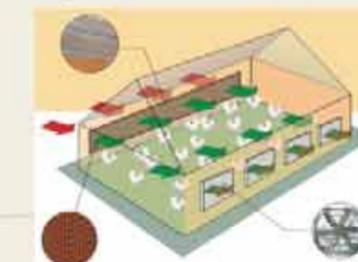


**APPLICATIONS**

- Greenhouses & Horticulture industry
- Vegetable storage
- Mushroom farming
- Seed farming
- Floriculture



- Poultry and Livestock industry
- Poultry farms
- Livestock hatcheries
- Dairy farms



- Industrial and comfort cooling
- Cooling fan
- Precoolers
- Industrial humidification
- Residential cooling



Note : all technical specifications, images, illustrations are for reference only and are subject to change without prior notice



# An unbeatable package.

Flow-optimized axial fans for compact installation.



All applications benefit from our HyBlade® module series.

- Compact modular system in sizes 200–910 mm
- Complete with GreenTech EC motor, electronics and impeller
- Perfect for air conditioning and refrigeration technology – and heat pumps as well
- Includes FlowGrid air-inlet guard and accessories

It's your turn now: [ebmpapst.com/hyblade](http://ebmpapst.com/hyblade)

## ebmpapst

The engineer's choice



# Top performance throughout.

Compact EC fan modules for ventilation systems.



Our RadiPacs offer high performance in all sizes.

- High-efficiency GreenTech EC technology
- Sizes from 250 to 900 mm
- Control electronics from 500 W to 12 kW
- Up to 25,000 m³/h at 1,000 Pa

More information for your application: [ebmpapst.com/radipac](http://ebmpapst.com/radipac)

## ebmpapst

The engineer's choice

# Publisher's Letter



## Publisher's Letter

### Growth Momentum

**H**ello and welcome to another issue of Cooling India. In the previous issue I had mentioned about the urgent need for robust cold chains in the country. In this issue, which will be distributed to the visitors at our booth at ACREX 2017 in Noida, I would again like to dwell upon the importance of cold storage and the need to have many such stations across the country.

India is a country which produces abundant food and we are the leaders in milk production. Having said that we still are ranked quite high in the list of Global Hunger Index, as mentioned in my previous note. Cold chain technologies have been in use for more than six decades now. In the US and Europe it has been used since the fifties in the development of agricultural supply chains for meat, fish, horticulture and dairy products. This was along with the growth of mechanical refrigeration industry. The story is completely different, however, in developing countries.

The produce of fresh fruits and vegetables have to be stored for a longer period of time in temperate countries, where production is confined to short growing seasons. With growing industrialisation and people showing more interest in converting their agricultural land to real estate business, and with increasing cost of fuel and fertilizer, there is more than 25 to 30% wastage of food produced -- they being perishable. This is all the more reason for countries like India to have more cold storage facilities.

Hopefully, there will be more interest on cold storage facilities by visitors at the upcoming exhibition in Noida. Interestingly, this year's focus of the exhibition is "Make in India – Infinite Opportunities for HVAC&R and the Building Services Industry" envisioned around promoting the infinite potential the HVAC & R sector has to offer and the tangible benefits various sectors can avail of through a robust public-private partnership. As always, Cooling India will be present at the exhibition. Our stall No. is F-8 in Hall 14 & 15. Our team, led by Jigar, will be there at our booth to help manufacturers in branding their products, be it through the print media, online or through various social media forums of Cooling India.

I wish all the participants at the exhibition and the visitors a great success and I hope industry and government will come together in developing a robust system for developing and innovating the HVACR industry in general and cold storage industry in particular.

Please send your comments at [pravita@charypublications.in](mailto:pravita@charypublications.in)

**Pravita Iyer**

*Publisher & Director*

*Member, Indoor Air Quality Association (IAQA)*



# LOUVER TYPE MIST COOLING SYSTEM

For

## CHILLERS

A Superior Alternative to Cooling Tower



▲ Louver Type MCS

**Assured Approach of 1°C to WBT.  
Guaranteed Power Saving with Small Foot Print...  
Not a miracle, a reality!**

### Other Superior Features of LTMCS

- **NO FILLS / NO FINS, NO FANS**
- Zero Maintenance due to all Non-moving parts, Choke-less Nozzle design and Special non-corrosive MOC
- Extremely easy operation
- Life of more than 15 to 20 years

Over 300  
installations

### Typical case study data of a 1200 TR Chiller

Sr. No.	Parameter	Cooling Tower (Induced Draft)	LTMCS
1	Wet Bulb Temperature	29°C	29°C
2	Chilled Water Temp in °C (Assumed)	5°C	5°C
3	Supply Temp. from CT / LTMCS	33°C	30°C
4	Approach to WBT	4°C	1°C
5	<b>ΔT for Chiller</b>	<b>28°C</b>	<b>25°C</b>
6	Chilled Water Compressor Motor Kw for 1200 TR	720	643
7	Energy Saved in %	-	10.7%
8	<b>Energy Saved in Kw</b>	-	<b>77 Kw/Hr</b>
9	Total Running Hours per Annum	8640	8640
10	<b>TOTAL POWER SAVED PER ANNUM</b>	-	<b>6,65,280 Kw</b>



*Mist Resonance Engineering Pvt. Ltd.*

Regd Office : 'Anandi', 1304-1/7, Shukrawar Peth, Bajirao Road, Pune - 411 002. INDIA.

Tel : (+ 91 20) 2447 2726 / 2447 1184 ■ Fax : (+91 20) 2447 4972

E-mail : mistcreation@gmail.com ■ mistcool@vsnl.com ■ Website : www.mistcreation.com



# Contents

Vol. 12 No. 7, February 2017

## Articles

- Cold Chains on a Hot Streak** **40**  
– Binaifer F Jehani
- Freezing of Foods** **44**  
– Mahesh Kumar, B V C Mahajan, Maninder Kaur
- A Concept Started 4040 Years Back** **56**  
– Firoj Jena
- IoT for Reshaping HVAC Industry** **64**  
– Dr OmPrakash G Kulkarni
- Life Expectancy of Solar Cooling Systems** **70**  
– Ritesh J Mistry
- Ventilation Retrofit** **74**  
– Aneesh Kadyan
- Next Generation Refrigerants** **74**  
– Dr S S Verma
- Opportunities Galore** **90**  
– Sasidhar Chidanamarri
- Solar Refrigeration** **100**  
– S D Bandal
- Enhancing Energy Efficiency** **104**  
– P Babu
- Design Elements for Energy Efficiency** **108**  
– Samhita M
- Biogas Refrigeration** **114**  
– N L Panwar, Pradip Narale



## Interviews



“For us it is all about customers, understanding their needs and implementing the best solution to answer their challenges”

**48**

**Abhijit Pujari**

Temperature Control (TC) Business Manager- South Asia, Aggreko



“Indian Government initiatives help to drive growth”

**60**

**Ajit Venkataraman**

Managing Director, APM Terminals India Pvt. Ltd.



“Construction boom will hike demand for HVAC equipment”

**80**

**Baswaraj Patil**

Managing Director, Calpeda Pumps





# Kaalflex

## FLEXIBLE AIR DUCT

[www.kaalflex.com](http://www.kaalflex.com)



**FAST**  
Installation

**EASY**  
Handling

**ECONOMICAL**  
★★★★★

Manufacturing Capacity of over  
**20,000 FT. per Day**

Looking for more Distributors

<b>Ahmedabad</b>	Abad Insulation	+91 99989 44477	+91 79 6521 9467	<a href="mailto:info@abadinsulation.com">info@abadinsulation.com</a>
<b>Gandhidham</b>	Abad Insulation	+91 99989 44475		<a href="mailto:kutch@abadinsulation.com">kutch@abadinsulation.com</a>
<b>Vadodara</b>	Fairflow Ventilation	+91 98245 01982	+91 265 263 0551	<a href="mailto:info@fairflow.co.in">info@fairflow.co.in</a>
<b>Surat</b>	Abad Insulation	+91 99989 44489		<a href="mailto:surat@abadinsulation.com">surat@abadinsulation.com</a>
<b>Mumbai</b>	Annu Insulation Traders	+91 98705 59597	+91 98690 11490	<a href="mailto:annuinsulation2001@yahoo.com">annuinsulation2001@yahoo.com</a>
<b>Pune</b>	ACR Services	+91 83789 58501	+91 20 2698 0014	<a href="mailto:acrservices@gmail.com">acrservices@gmail.com</a>
<b>Bangalore</b>	Fairflow Ventilation	+91 93437 46445	+91 80 2845 3246	<a href="mailto:sales@fairglow.co.in">sales@fairglow.co.in</a>
<b>Mangalore</b>	ACME Refrigeration	+91 93433 49683	+91 824 426 5282	<a href="mailto:acmemangalore@ymail.com">acmemangalore@ymail.com</a>
<b>Secundrabad</b>	Fairflow Ventilation	+91 98499 03098		<a href="mailto:mktg@faiflow.co.in">mktg@faiflow.co.in</a>
<b>North India</b>	<b>Pine Air Pvt Ltd</b>	<b>+91 95608 44477</b>	<b>+91 11 4330 5202</b>	<a href="mailto:mkorpal@pineair.in">mkorpal@pineair.in</a>
<b>Indore (M.P.)</b>	Abad Insulation	+91 9099088403		<a href="mailto:project@abadinsulation.com">project@abadinsulation.com</a>

## KAALFLEX PVT. LTD.

In Association with *Thermafex*®(USA)

488/K, Tundav, Savli-Manjusar Road, Vadodara 391 775, Gujarat, INDIA.  
Mobile : +91 97277 56906 E-mail : [sales@kaalflex.com](mailto:sales@kaalflex.com)

# Contents

Vol. 12 No. 7, February 2017



## Features

- 42** 2016 is the Warmest Year: NASA
- 50** Ice Make Refrigeration Acquires Bharat Refrigerations
- 52** BITZER Update on BEST Service Tool
- 62** Reducing India's Power Consumptions
- 66** James Ham Appointed as Managing Director of Carel Korea
- 78** Excellent HVAC System for An Excellent Hospital
- 85** Hybrid Cooling System
- 86** Building Automation System Market to be worth USD 100.60 bn by 2022
- 89** HVAC Equipment Market Worth US\$ 155.0 bn by 2022
- 93** Upgraded Processing Line for Blakeman
- 94** Product on Shelves from Testo
- 99** Growth of CO<sub>2</sub> in Commercial Refrigeration
- 102** Bry-Air BrySmart® Series (BBS) Dehumidifiers
- 103** Centrifugal Chiller with Sustainable Refrigerant
- 111** Shop Energy Efficiency in Danfoss Smart Store

## Interviews



**"Practice Ancient Architectural Designs using Natural Ventilation"**

**96**

**Dinesh Semwal**  
Managing Director, Ensavior



**"Optimisation is must to have sustainable buildings"**

**112**

**Gaurav Vasudev**  
Managing Director, GAPS Engineering



**"Govt need to formulate policy on cold chain industry"**

**116**

**Mahendra Swarup**  
President, Federation of Cold Storage Associations of India

## Departments

- 10** Publisher's Letter
- 12** Contents
- 18** News
- 34** Appointments
- 36** Awards
- 117** Statistics
- 118** Product Profile
- 119** Event Calender
- 119** Index to Advertisers
- 120** Cooling Museum

## 25 Years Of Extreme Performance. Year after Year.

For the last 25 Years, we have always delivered the best-in-class cooling solutions, tested in the most extreme environments internationally.

Choose from the widest variety of Air conditioning & Refrigeration products and parts, customised solutions & manufacturing services. Invest in high quality engineering, invest in peace of mind. Invest in Yourself.

Experience Cruise at Acrex India 2017,  
23-25 February 2017 @ Hall no. 10, Stall D-15.

Toll Free No: 1800-123-8800



1992 -2017

Inverter | Split | Window | Portable | Cassette | Floor Standing Air Conditioners  
Fan Coil Units | Condensing Units & Kits | Refrigeration ODU's | HVAC Accessories

**CRUISE APPLIANCES PVT LTD | SEAGULL COOLING PVT LTD**

G-2 Industry House, Mahakali Caves Road, Andheri (E), Mumbai 400093, India  
T: +91-22-42422222 | E: info@cruiseac.com | W: www.cruiseac.com

For more information, simply search for "Cruise ac" or log onto [www.cruiseac.com](http://www.cruiseac.com)



[www.facebook.com/cruiseac](http://www.facebook.com/cruiseac)



[www.twitter.com/cruise\\_ac](http://www.twitter.com/cruise_ac)



[www.instagram.com/cruise\\_ac](http://www.instagram.com/cruise_ac)



[www.linkedin.com/company/cruise-appliances](http://www.linkedin.com/company/cruise-appliances)

25

Visit us at  
**ACREX**  
 Stall No. A-27  
 Hall No. 9  
 23 - 25th Feb 2017



# FLOWCON international

### Key Features

- Continuous Display of Flow Rate
- LCD Display
- Optional Fail-Safe Power Storage Feature
- Communication with BMS thru RS- 485
- BACnet Compatible
- 51 Different Maximum Flow Rate Settings
- 100% Valve Authority

- ◆ Pressure Independent Control Valves
- ◆ Adjustable Cartridge Automatic Balancing Valves
- ◆ Pre-set Automatic Balancing Valves
- ◆ Temperature Control Valves
- ◆ Differential Pressure Controller
- ◆ 3 Way By-Pass Modules
- ◆ Actuators
- ◆ Automatically Balanced Temperature Control Valves
- ◆ Externally Adjustable Automatic Balancing Valves
- ◆ Pre-set Automatic Balancing Valves
- ◆ Thermostatic Control Valves



# xylem

Let's Solve Water

### Xylem Water Solutions

#### Pumps & Package Pumping System on Variable & Constant Speed

- **Bell & Gossett:** HVAC (Primary - Secondary, Tertiary, Condenser Water Variable Speed Pumping).
- **Lowara:** Water & Waste water pumps (Hydro-pneumatic Booster, Submersible, Drainage Pumps).
- **Flygt:** Submersible Pumps, Mixers and Mechanical Aeration equipment.
- **AC Fire Pump:** UL/FM approved Fire Pumps and skids.
- **Goulds:** Centrifugal and Turbine pumps

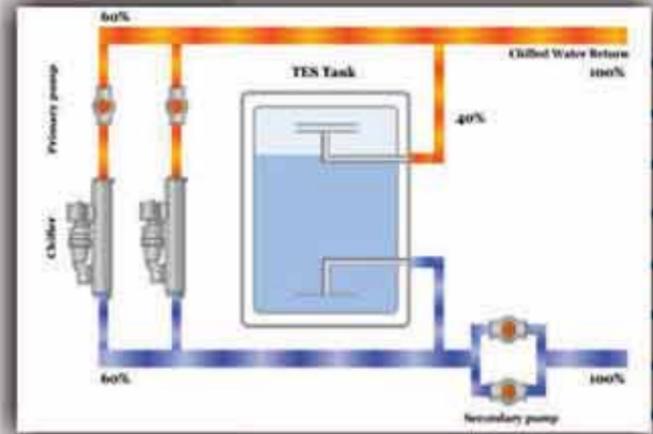


## FT EnE, Inc.

### Chilled Water Thermal Energy Storage System

Utilizes only the sensible heat of water for cooling energy storage in a chilled water storage tank and discharges the stored coldness for air-conditioning during on peak time. This operation scheme reduces the total energy consumption and operation cost.

Ideally suitable for District Cooling and backup of chilled water for mission critical facilities like Data Centers and High Tech Manufacturing.



### Aeropure UV Systems

#### Ultra Violet Germicidal Irradiation (UVGI) For cooling coil in HVAC System

- Energy Savings
- Maintenance Savings
- Improved Indoor Air Quality
- Extended food shelf life
- Faster Return on investment
- Green Building Contribution



# Ensavior Technologies Pvt. Ltd.

D-466, First Floor, Shiksha Bharti School Road, Ramphal Chowk, Sector-7, Dwarka, New Delhi - 110075 (INDIA)  
 Phone +91-11-47350382 E-mail : info@ensavior.com Web : www.ensavior.com

## Panasonic Expands its Business in Asia

Panasonic Corporation announced it is increasing its local production in Asia in order to further expand its business in the rapidly-growing room air conditioner market in the region. Panasonic, through manufacturing based on "local production for local consumption" utilizing locations close to the market, has been offering products that meet customer needs in a timely fashion. By further boosting local production capacity, the company will take advantage of the growing Asian room air conditioner market to drive its business in the region.



Panasonic has been producing air conditioners in Asian countries with Panasonic Appliances Air Conditioning Malaysia Sdn Bhd positioned as the global mother factory for the air conditioning business in Asia. In the end of January 2017, Panasonic has started production of air conditioners in Thailand to increase sales and meet the expanding demand in the country by utilizing existing facility of Panasonic Appliances Refrigeration Devices (Thailand) Co, Ltd, which manufactures heat exchangers for cooling and air conditioning. Production of air conditioners at the Thai facility for 2017 is expected to be about 500,000 units, which could be expanded in the future depending on market demand.

The newly-added production in Thailand will further increase the pace of the company's localization strategy in manufacturing and sales, while further lifting its presence in the Asian market. Panasonic will continue to actively engage in business expansion focused on Asia as a major driver of growth for the entire group. ■

## Ingersoll Rand to Acquire Thermocold

Ingersoll-Rand, a world leader in creating comfortable, sustainable and efficient environments, announced its intent to acquire the business of Thermocold Costruzioni S r l, a privately held Italian company that manufactures and distributes heating, ventilating and air-conditioning (HVAC) systems and solutions for residential, commercial and industrial buildings in Europe.

"Trane and Thermocold have been innovating new products and serving customers together for several years," said Dave Regnery, President, Commercial HVAC North America, Europe, Middle East and Africa. "This announcement is the next step in strengthening our portfolios to take advantage of the large market opportunity in Europe, and expanding distribution of Thermocold technologies to other parts of the world where demand is growing rapidly."

One of Thermocold's signature solutions includes the innovative multi-pipe HVAC system for high efficiency, simultaneous heating and cooling. This system recovers energy by shifting use from a separate boiler and chiller to one single, simplified multi-pipe unit that simultaneously delivers hot and chilled



water. This system repurposes rejected energy, or uses renewable energy, for heating the facility delivering a more sustainable solution that reduces the amount of investment costs, use of floor space and total operating expenses. The multi-pipe system further contributes to lower the environmental footprint due to significant lower energy use.

"Thermocold is pleased at the idea of being part of Ingersoll Rand," said Giovanni Renna, president, Thermocold. "We know that with the support and investments from Trane and Ingersoll Rand, Thermocold can serve new and existing customers and distributors better than ever before."

Thermocold operates from one location in Bari, Italy. Upon closing of the transaction, Ingersoll Rand will welcome the Thermocold brand into the Ingersoll Rand family of brands. The acquisition is expected to close subject to certain closing conditions and third party approvals. ■

## Bitzer Opens Office in Senegal

German compressor manufacturer Bitzer has opened an office in Senegal to support its presence in West Africa. The new Bitzer Senegal branch in the capital Dakar is

structurally and legally connected to Bitzer France. The German compressor specialist has been represented by local company sales partner ICE since 2004 and is looking to reinforce that collaboration to expand into various West African markets from its new location. Plans include, for instance, closer cooperation in the area of condensing units.



Bitzer is also working on building a certified service centre in Senegal, so that users have access to other Bitzer services, including spare parts and maintenance. In addition, Bitzer says it

is developing special training programmes for local installers and users.

"The best product can only be as good as the staff who operates it, which is why Bitzer has developed training measures which have proven their worth all over the world," said Jean-Pierre Baleyrier, Managing Director of Bitzer France. "We'll also offer these courses in Senegal in the future." ■

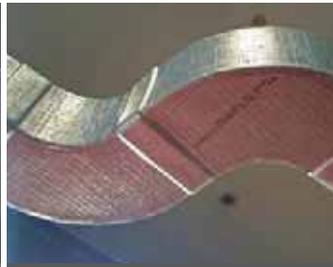
# THERMOBREAK<sup>®</sup>

Thermal Insulation

## SETTING THE STANDARD FOR OVER 25 YEARS



**PIPE  
INSULATION**



**DUCT  
INSULATION**



**ACOUSTIC  
INSULATION**



**EXTERNAL  
INSULATION**

Our Thermobreak insulation range is often copied, but never equalled.

As the pioneer company in cross-linked foam technology, we have been setting the Standard for polyolefin insulation for over 25 years.

Our products, made using Sekisui physically crosslinked technology, are designed to offer supreme performance in all environments and meet the highest fire and smoke standards in the world, including FM 4924 approval.

Thermobreak insulation offers the lowest thermal conductivity of any flexible insulation. Combined with factory applied reinforced aluminium foil and acrylic adhesive, Thermobreak offers fast, trouble free installation and significant energy savings over the life of the project.

**SEKISUI**

**FOAM  
INTERNATIONAL**  
Global Foam Solutions

For further details contact:

Sekisui Foam International Representatives

Bangalore. Tel.: 080-26538257 Fax: 080-26538273 Mob.: 09880666600

Website: [www.sekisuifoam.com.au](http://www.sekisuifoam.com.au)

**PHYSICALLY  
CROSSLINKED**  
SEKISUI TECHNOLOGY

M/s. Thorobuildcare, Pune. Tel.: 080-40542000 Fax: 30525952

Orient Traders, Bangalore. Tel.: 080-40542000 Fax: 40542005

Seven Star Aircon Ancillaries Pvt. Ltd., Chennai. Tel.: 044-42124014 Fax: 044-42124016

M/s. Revolve Engineers Pvt. Ltd., Hyderabad. Tel.: 040-44545113 Fax: 040-44545125



## Manitowoc Foodservice Changing Name to Welbilt

**M**anitowoc Foodservice, a leading global supplier of commercial foodservice equipment, announced that it is rebranding the company, its logo and its brand identity to Welbilt, Inc. The ticker symbol will change to "NYSE:WBT" on March 6, 2017. The new name and brand represents a long-standing commitment to put customers' needs first. The change is part of the company's strategic repositioning after it spun off from its former parent company, The Manitowoc Company, in March 2016.

"We are excited to announce the changing of our name to Welbilt, Inc, which further strengthens our corporate identity as a stand-alone company," said Hubertus M Muehlhaeuser, President and CEO of Manitowoc Foodservice,



"Welbilt reflects our promise and commitment to bringing innovation to the table. Rooted in the Hirsch brothers' innovative stove in 1929, Welbilt developed to become the first company in the industry pursuing a complete systems approach. Our primary objective is to continue offering a complete solution for the entire kitchen with high-quality products supported by excellent service that help our customers' kitchens reach their full potential."

Josef Matosevic, Chief Operating Officer commented, "Welbilt is synonymous with great quality and reliability in everything we do. We have significantly improved our operations to live up to that promise.

"Finally, we are intelligently connected and create seamless solutions in the kitchen to get the highest operator benefits and help our customers achieve the return on their investment faster," he further added.

## Poultry Processor to Pay Penalty of \$242,980

**T**he US Environmental Protection Agency announced a settlement with Pitman Farms for violations of federal chemical safety and reporting requirements following three ammonia releases at its poultry processing facility located in Sanger, Calif. Pitman Farms, which sells poultry from its Sanger facility, will pay a \$242,980 civil penalty and perform two local environmental projects valued at nearly \$200,000.

EPA's action is a result of its November 2014 inspection that uncovered violations of the federal Clean Air Act's Risk Management Program, designed to prevent the accidental release of extremely hazardous substances to the air. The inspection was prompted by a release of 2,700 pounds of anhydrous ammonia at the facility in September 2014 that led to the hospitalization of 15 employees. Additional smaller releases of anhydrous



ammonia occurred in May 2016 and July 2016. "Companies using hazardous chemicals must take steps to ensure the safety of nearby residents and their workers," said Alexis Strauss, EPA's Acting Regional Administrator for the Pacific Southwest. "We appreciate Pitman Farms' recent efforts to install new refrigeration equipment to reduce the chance of ammonia releases."

During its inspection, EPA found that Pitman Farms violated the Risk Management regulations by failing to:

- Provide training to employees to assure they understand and adhere to the operating procedures.
- Ensure that employees were properly fitted for personal protective equipment.
- Perform annual inspections and tests of the ammonia refrigeration system, and correct deficiencies in equipment in a timely manner. ■

## BPMA Maintains Pressure for Market Surveillance Delivery

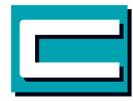
**M**arket Surveillance is a key element of a fair and efficient single market. Its role is to ensure that products placed on the community market comply with EU regulations and do not pose any safety or environmental threats for users and the public at large. This should ensure a level playing field and fair competition within the market as well as safeguarding the coherence of the European regulatory framework, the consistency of which depends on effective enforcement. However, there continues to be evidence of illegal pump imports entering the UK from other countries (particularly Asia) that do not meet the strict demands of the EU Energy Related Products Directive (ErP Directive). As such, the BPMA continues to press the National Measurement Regulatory Office (NMRO), in their role as UK Market Surveillance Authority, to take all appropriate action to ensure that such illegal pumps are removed from the

market, and that all future imports are curtailed with immediate effect.

On 7<sup>th</sup> December last year, BPMA representatives again met with NMRO Executives at their headquarters in London and again conveyed its Members' frustration that to-date no discernible progress has been made. This is despite numerous previous meetings between the two organisations, and several written assurances that market surveillance is regarded as an important issue. During this meeting, the NMRO confirmed that several 'suspect' circulator pumps had now been purchased in order to be tested, although no information could be given as the source of these pumps, as this activity was another department's responsibility. The results of the testing were initially due to be published early in 2017. One of the key concerns raised by the BPMA is that Circulator Pumps were the first to be regulated under the ErP Directive. ■

Delivering water with passion, everywhere  
since

1959

 **calpeda**<sup>®</sup>

**ITALIAN MADE**

QUALITY • COMMUNITY • ENVIRONMENT



### Pumping Solution for

- | Industrial | HVAC | Ground Water |
- | Domestic & Residential |
- | Agriculture & Irrigation | Fire Fighting |
- | Swimming pools | Drainage & Sewage |



## Calpeda Pumps India Pvt. Ltd.

#953/A, 3rd Floor, 2nd Main, 4th Block, Rajajinagar, Bangalore-560010. Tel : +91 80 2315 9678,

Fax : +91 80 2315 9655, E-mail: [info\\_india@calpeda.it](mailto:info_india@calpeda.it), [service\\_india@calpeda.it](mailto:service_india@calpeda.it) [www.calpeda.com](http://www.calpeda.com)

## Australian Brewer Renews Faith in Ammonia

**A**delaide-based Coopers Brewery has signed an AUD 3.5m contract with local refrigeration company Cold Logic for the supply and installation of a refrigeration plant at its new Regency Park malting facility. The malting plant is expected to open later this year. It will boast a water chilling system to circulate five million litres of water every day for the purposes of temperature regulation, according to the Shout, which reports Australian hotel, bar, club and liquor industry news.



Coopers Managing Director Tim Cooper said the new malting plant would produce approximately 54,000 tonnes of malt a year, with two thirds available for export. "The new plant will guarantee the long-term supply of high-quality malt for our future growth," Cooper told the Shout.

Cold Logic partner Eddie Lane said his firm had played an instrumental role in the design and installation of the new refrigeration plant. "Typically, refrigeration makes up 40-60% of a brewery's energy use. We are passionate about helping Coopers to overcome higher energy costs and improve their efficiencies," he said.

The Regency Park system is based on ammonia, a natural refrigerant, alongside glycol coolant. Ammonia has no global-warming or ozone-depleting potential. Cold Logic has worked with Coopers for over 25 years and played an instrumental role in the company's relocation from Leabrook to Regency Park brewery. ■

## WEEE2 Directive to Come into Force in UK

**I**n August 2018 the WEEE2 Directive (Waste Electrical & Electronic Equipment) will come into force in the UK. Under the existing WEEE Directive, pumps (other than garden pumps) have not been included within scope. However, this first revision of the Directive has now brought into play many products that were previously out of scope, including pumps. Following a meeting between BPMA, BEIS (Business, Energy & Industrial Strategy) and the Environment Agency in July last year, which was convened to clarify whether 'pumps' should be within the scope of WEEE2, it was agreed that the BPMA would produce and submit its own 'position paper'. This course of action was



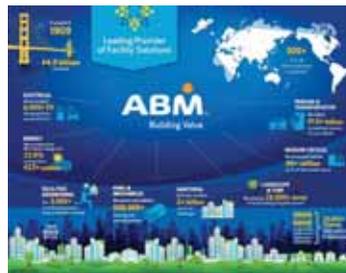
determined primarily because BEIS had been overwhelmed with the amount of items that required clarification, but also because BPMA was best placed of draft such a document, given its in depth knowledge of the subject matter. As such, and having formed a dedicated Working Group to fully assess the Commission Guidance documents for both domestic and non-domestic pumps, the BPMA produced and submitted its proposals. Unfortunately, due to a number of factors, the initial draft of the 'position paper' was rejected by BEIS & the Environment Agency and so the BPMA have been asked to revisit certain aspects and re-submit a second draft in due course. ■

## ABM Expands HVAC and Energy Solutions Presence in Dallas

**A**BM, a leading provider of facility solutions, announced that its ABM Technical Solutions group has acquired Mechanical Solutions, a provider of HVAC services, plumbing and building automation in the Dallas, TX area. The transaction was completed on December 1, 2016.

Mechanical Solutions has been providing high quality HVAC services and solutions to commercial and industrial clients in the Dallas/Fort Worth region for almost 20 years. MSI strengthens ABM's suite of services with its line of specialty mechanical services, including technical chiller expertise, vibration analysis and testing, controls for building automation, and commercial plumbing service. By combining the existing operations of MSI and ABM in Dallas, ABM is better positioned to broaden existing vertical and geographic market offerings.

Paul Robinson, previous owner of MSI, will now serve as Vice President of Business Development for ABM Technical Solutions Group. Robinson was



responsible for MSI's growth since 1997 and has more than 30 years of experience in the facilities services market.

"We value ABM's position in the marketplace and believe our skilled employees

align with ABM's high caliber team," said Robinson. "We are confident that ABM will ensure a smooth transition for our employees, as well as our clients, facilitating uninterrupted service while expanding 'best-in-class' opportunities and solutions. I am proud of what the employees of Mechanical Solutions have built over the last 20 years and look forward to a thriving future for us all as part of ABM."

"MSI bolsters our technical service delivery capabilities in the Dallas/Fort Worth region," said Scott Giacobbe, President of ABM Technical Solutions. "Strengthening our operations in this market continues to enhance ABM's goal of Building Value by expanding our reach and enabling us to provide comprehensive facility solutions to more clients." ■

High  
Efficiency  
Solutions.

CAREL



# pRACK

## Cutting edge range of compressor rack controllers

Visit us at

ACREX  
India 2017  
23 - 25 FEBRUARY • 2017  
IEML • GREATER NOIDA • DELHI

Stall - M2  
Hall - 9&12

pRack is the new CAREL solution for the complete compressor rack management. Based on pCO<sup>3</sup> sistema, it includes various innovative features with particular attention to energy saving and ease of use.

ADSPREIACH

### CAREL ACR Systems India Pvt. Ltd.

Mumbai: Office No.s 402 & 403, Vikas Commercial, Bhakti Marg, Next to Tridev Apartment, Mulund (West) 400 080, India, phone (+91) 22 4119 2929 - fax (+91) 22 4119 2930  
Delhi: 312, Prakashdeep, Tolstoy Marg, Connaught Place, New Delhi 110001  
Tel : (+91) 11 43629500



## Aggreko Acquires TuCo Industrial Products

Power generation and HVAC specialty rental company, Aggreko plc, has acquired TuCo Industrial Products, Inc ('TuCo') of Lynnwood, Washington for an undisclosed amount.

Founded in 1979, TuCo specialises in providing temporary heat and air conditioning equipment to the construction, industrial, commercial and special events industries. The company has built a strong reputation within its target industries and serves a loyal customer base throughout the greater Pacific Northwest region including Washington, Oregon, Alaska and lower British Columbia, including Vancouver. The acquisition will add more than 2,000 specialized assets to Aggreko's fleet.



"Our growth strategy is focused on continued expansion throughout North America including the Pacific Northwest, and through targeted acquisitions such as that of TuCo," said Mel Parker, Managing Director, Aggreko. "TuCo's skilled management team and technicians will provide an exceptional level of expertise and service that customers have come to expect from Aggreko."

Jeff Cohen, owner of TuCo, said, "We are excited to join the Aggreko organization and provide our customers with a platform for expanded rental solutions and service capabilities in the Pacific Northwest."

Following the acquisition, Aggreko plans to fully integrate the operations of TuCo into its North America business by the end of Q2 2017. ■

## Emerson's New Screw Line Compressor Selection App

Emerson announced it has launched a mobile app for its Vilter™ Select software, an online tool that allows users to determine capacities of all Vilter reciprocating and screw compressor lines. The mobile app is an extension of Emerson's technician-focused selection software, providing in-the-field analysis capabilities necessary to select the most efficient compressor.

Vilter Select, currently available, was developed to help customers predict compressor performance based on inputs for site conditions and operating parameters. The software provides compressor ratings and allows users to print reports. The Vilter Select Lite mobile app, available for Androids and iOS devices, offers access to information generated by the software on the go.

"As we develop new tools to provide our customers with the means of making

the most informed decisions on equipment selection, mobile options are becoming an integral part of any new tool," said Tom Hoopes, Business Development Director,

Vilter for Commercial and Residential Solutions. "This app supports the need for quick and easy access to data in the field at a time when the shortage

of technicians creates pressure to provide a well-evaluated solution that reduces analysis and maintenance time."

Vilter Select Lite uses the same registration information as the online software tool, provides up-to-date compressor ratings for all Vilter compressors, can be used without an internet connection, allows users to save and edit recent projects, and enables projects to be shared between the online tool and the app. ■



## Ingersoll Rand Commits to Reduce CHGs

Ingersoll Rand, a world leader in creating comfortable, sustainable and efficient environments, continues to significantly reduce the greenhouse gas (GHG) emissions of its products and operations, while also convening industry leaders to develop long-term solutions aimed at solving global climate challenges.

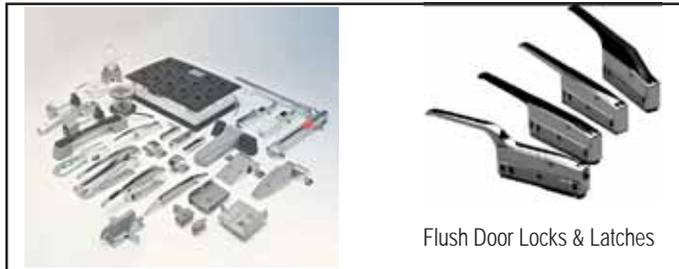
Since announcing the commitment in 2014, it has led to the avoidance of approximately 2 million metric tons of CO2e globally, which is the equivalent of avoiding annual CO2 emissions from energy used in more than 270,000 homes or more than 2.1 billion pounds of coal burned. "Announcing our commitment to increase energy efficiency and reduce the GHG emissions related to our operations and products was a major milestone for Ingersoll Rand," said Paul Camuti, Senior Vice President of Innovation and Chief Technology Officer of Ingersoll Rand. "Our progress to date proves we have the expertise to meet our targets while

simultaneously providing innovative and sustainable products to our customers and helping them achieve their own sustainability goals." As part of the Climate Commitment Ingersoll Rand launched EcoWise™, a portfolio of products designed to lower environmental impact with next generation, low-global warming potential refrigerants and high-efficiency operation. The company has introduced six products under the EcoWise label, including the Series R RTWD chiller in – launched in November – used for commercial buildings and industrial applications.

Other successful commitment-led initiatives include the design and implementation of a proprietary tool to measure emissions reductions against GHG-related targets across its product portfolio and employee-led programs to identify facility upgrades and integrate sustainability modules within the product design process. ■

# Fci

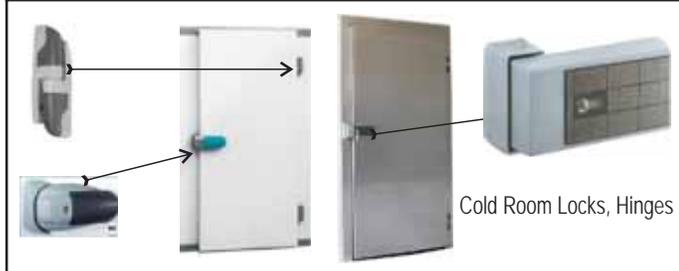
## Quality Hardware for Commercial Refrigeration and Cooling Equipments



Flush Door Locks & Latches



Telescopic SS Drawer Slides



Cold Room Locks, Hinges



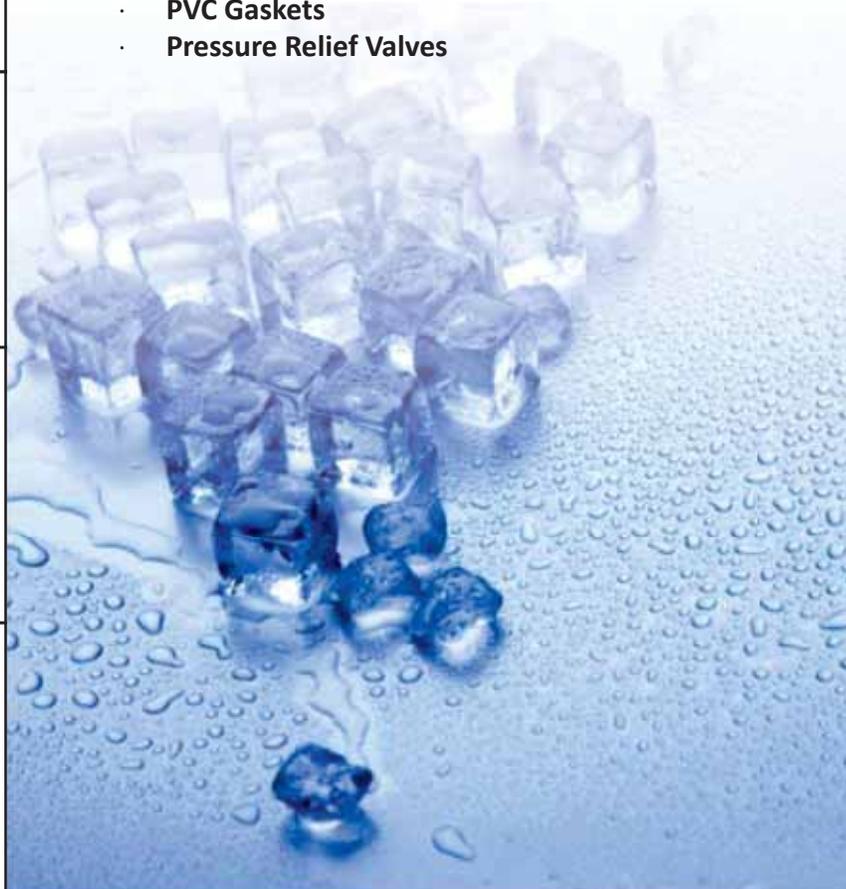
Pressure Relief Valves



PVC Coverings

Cooling with a warm touch, for the last 20 years Freeze Controls is offering Hardware Components for the refrigeration Industry, representing some of the world's leading brands and working with the Indian manufacturing Industry to collaborate and add value to their products. We offer :

- Door Locks, Hinges for- Hinged doors both flush as well as overlap type
- Hardware for Sliding Doors
- Telescopic SS slides for Commercial Refrigeration Equipments
- Drain Heaters, Door Heaters
- PVC Covings
- PVC Gaskets
- Pressure Relief Valves



### Freeze Controls (India)



D-19, Ranjit Nagar Commercial Complex, Ranjit Nagar, New Delhi-110008

Phone : +91 11 45034975, Mobile: +91 98100 97151

Email: tarun\_tarun@hotmail.com

## GBCI Launches New Technology Venture

A new technology company, Arc Skoru Inc, officially has been launched by Green Business Certification Inc (GBCI). This new venture will be the official host for Arc. Arc allows any project — whether a single building, a community or an entire city — to measure improvements and benchmark against itself and projects around it.

Scot Horst, who has overseen and led the development of LEED since 2005, has been appointed as the CEO of Arc. “GBCI developed Arc as a way to provide new and more transparent ways to share information,” said Mahesh Ramanujam, President and CEO, US Green Building Council and GBCI. “Scot Horst brings many years of leadership and expertise to Arc, and we celebrate him in his new role as the CEO. For the past 11 years, Scot has led the evolution of LEED through LEED 2009 and LEED v4.”

The goal of Arc is to support the missions of USGBC and GBCI. LEED-certified buildings can use Arc to improve and benchmark against other certified buildings around them. Existing buildings that have not certified can use Arc to make incremental sustainability improvements to eventually achieve LEED certification.

“Arc allows buildings, communities and cities to compare their performance against their peers and also connect to vetted green building strategies,” said Scot Horst, CEO, Arc. “Over the last two decades LEED certification has become a symbol of leadership, signifying that a project is saving energy, resources and water, and is healthier for occupants and the community. Now through the Arc platform, all buildings can improve and work toward LEED certification.” ■



## Honeywell Puts Building Controls in Occupants' Hands

Building occupants long have grappled with who to call when their work area is too cold, or how to gain access to a facility when they forget their access card at home. Honeywell announced a new mobile software application for building occupants that addresses these common frustrations. The Honeywell Vector Occupant App combines the convenience of today's mobile devices with connected building features to give users more control over their comfort levels and ability to securely move about the work place. The new software is the latest example of Honeywell's leadership in the IoT around connected buildings. The new app provides digital identification and integrates with core building functions, including access and comfort control, to enhance building occupants' experience with the touch of a screen. The app's access



control capability eliminates the need for physical cards or fobs and gives users secure access via their smart phones. Occupants can quickly and easily communicate temperature discomfort for real time adjustments instead of the

more time-consuming process used of seeking out a facility manager or making a phone call to request temperature changes.

Facility managers, in turn, benefit from immediate insight into where and how comfortable occupants are, so they can make adjustments more quickly and easily. The app's digital identification and access control capabilities make it easier to manage occupant credentials, eliminating the need for keeping track of and replacing misplaced access cards. “Occupant engagement is an increasingly important aspect of intelligent building solutions,” said Casey Talon, Principal Research Analyst, Navigant Research. ■

## Microsoft Technology Company Gets Zero Waste Certification

GBCI announced that Microsoft has achieved Zero Waste Facility Certification at the Gold level at its global headquarters in Redmond, Washington, where more than 44,000 employees work in 125 buildings. Through the certification, Microsoft is helping to protect the environment by diverting 90 percent of its waste from its headquarters from landfills and incineration.

GBCI audited the zero waste diversion processes at Microsoft and found the facility is successfully reducing, reusing, recycling and composting at an unprecedented rate. “Companies pursuing Zero Waste Facility Certification must meet very stringent standards in order to achieve Gold certification,” said Stephanie Barger, Director of Market Development at GBCI. “Microsoft has demonstrated not only tremendous leadership in successfully

implementing zero waste strategies, but also an inspiring commitment to achieve still higher levels of performance.”

The goal of businesses participating in the Zero Waste Facility Certification program is to divert all end-use material from landfill, incineration and the environment, while achieving a minimum of 90 percent diversion. “Protecting the environment is something that Microsoft and our employees believe in strongly. We are grateful for this recognition by GBCI and look forward to building on our work to reduce waste at our Redmond headquarters,” stated Susan Wagner, Senior Director of Microsoft Real Estate and Facilities. Though the Microsoft Redmond campus has successfully achieved a high level of certification, there is still more to be accomplished by increasing diversion. ■



# Increase people productivity with 100% fresh cool air

End-to-end solutions with expertise in factory shed cooling



World's largest IEC  
installation base of over  
**22 million CFM**

**HMX's patented indirect direct evaporative cooling provides not just employee comfort, but also a host of ecological & economic benefits**

- 100% fresh air
- Environment friendly
- Upto 60% less moisture addition compared to conventional air washers
- Excellent indoor air quality
- Dust free environment
- Upto 60% energy saving compared to conventional air conditioners

**A.T.E. ENTERPRISES PRIVATE LIMITED**

(Business Unit: HMX)  
T: +91-20-3088 1100  
E: [comfort@hmx.co.in](mailto:comfort@hmx.co.in)  
W: [www.ategroup.com/hmx](http://www.ategroup.com/hmx)



## Danfoss' New Medium Voltage Drive Solution

**D**anfoss has introduced the VACON® 3000. Medium-voltage drive solutions are ideal for applications in segments such as Mining, Marine, Oil and Gas, Energy and Metals. Within these segments, the client will find similar applications and similarly driven equipment as in the low-voltage (LV) drives market, but those that have a greater need for power, or where long motor cables are required in the application. These applications are, amongst others, propulsion, pumps, blowers, fans, conveyors, ball mills, compressors, extruders, mixers, centrifuges, excavators, test stands and soft starters for large DOL motors.

The VACON® 3000 is available in a power range between 2 MW and 6 MW. As an easy-to-integrate drive solution, the VACON® 3000 features:

- Making the VACON® 3000 ideal for adverse ambient conditions. Single-phase modules with a grounded heat sink simplify the solution's serviceability
- Flexible front-end configuration options and an active front end (AFE) option for regenerative braking and low harmonics

A fully graphical user interface (the same one as the VACON® 100 INDUSTRIAL drive) for faster setup and use, and with the latest technology built in and a wide choice of control options.

Passive components for the drive system, including L, C and common mode filters for AFE variants, DC chokes for 12-pulse variants and output dU/dt and sine filters

A simplified pre-charge unit design: a compact solution for space-sensitive applications that needs no pre-charging resistors and limits the inrush current for fast, safe start-up

Basic configurations have a power of 2 MW or 3 MW. To provide the user and system integrator with design flexibility, those configurations can be paralleled for systems of 4 MW and 6 MW. ■

## Embraco Launches Toolbox Application

**E**mbraco, focussing on innovation and one of the largest manufacturers of hermetic compressors for refrigeration, offers innovative solutions not only in products but also in services, especially those aimed at facilitating the day to day of industry professionals, with the launch of Toolbox, a digital tool that combines several features focused on providing support to contractors in a single application.

Embraco Toolbox App is the latest tool to make the contractor's work easier. "The set of features reaffirms our technological leadership and allows us to further strengthen our relationship with contractors and partners," explains Guilherme de Almeida, Marketing Manager, Embraco.

Available in all countries and in more than 10 languages, the Embraco Toolbox App has, initially, seven features to facilitate the contractors' day to day. These



are: search tool for the nearest distributor, Embraco product catalog, cross-reference product guide, unit converter, refrigerant ruler, tool to identify causes of the main cooling system problems, as well as all Refrigeration Club content.

The application's launch will ensure access to practical and efficient information and it can be accessed, at first, via smartphones with iOS and Android operating systems, available for download in the App Store and Play Store. The Product Selection Software replaces the electronic catalog and assists customers in selecting the most appropriate solutions for different refrigeration systems, providing more autonomy for contractors, retailers and manufacturers. The tool makes it possible to search for a solution that best fits the intended application's parameters. ■

## Climaveneta Units Installed At Ikiya Airport

**M**itsubishi Electric Hydronics & IT Cooling Systems, through its brand Climaveneta has recently supplied eight high efficiency chillers at the new terminal of Ikiya Airport, in Iran. Tehran Imam Khomeini International Airport, also known as IKIA, is the main international airport of Iran and is the eleventh busiest airport by international passenger traffic in the Middle East. It went about a major expansion in 2016, with the construction of the new Salam terminal.

In order to improve the quality and the capacity of it as well as to satisfy the comfort needs of an increasing number of travellers, the new terminal required an advanced HVAC system based on high

efficiency and reliable chiller technology.

Taking into consideration the peculiar needs of the infrastructure and the challenging climate conditions in Tehran, the designers decided to install eight FOCS2/K air source, high efficiency chillers. In fact the HVAC system was expected to work 24 hours a day and very



often at full loads. Hence the advantages in terms of continuity of operation, reliability and energy efficiency, especially at full loads, offered by this chiller technology were ideal to provide high quality of comfort and reduce operating costs. ■



INFRARED GUIDED  
MEASUREMENT



MR176  
Moisturemeter

MR160  
Moisturemeter

TG167  
Spotmeter



## Let IGM™ be your guide

Infrared Guided Measurement (IGM) uses the power of a FLIR thermal imaging sensor to guide you to the precise spot that may require further testing or investigation.

Our tools equipped with IGM will help you identify the precise location of a problem that's behind a wall, under the floorboards, in a ceiling, ...

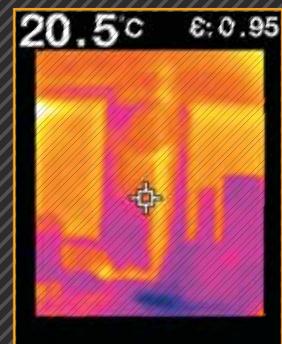
They are designed to save you time and keep you working and not guessing where to look. They can also ensure that you're safe from potentially dangerous situations.

Know where to measure, use FLIR tools equipped with IGM.

Visit [www.flir.in/IGM](http://www.flir.in/IGM)  
for more information



Air leakage



Pipe in wall

Images used for illustrative purposes only.

For demo & more info call us on: +91-11-4560 3555 or write to us at [flirindia@flir.com.hk](mailto:flirindia@flir.com.hk)

FLIR Systems India Pvt. Ltd.  
1111, D Mall, Netaji Subhash Place, Pitampura, New Delhi - 110034  
Fax: +91-11-4721 2006 | Website: [www.flir.in](http://www.flir.in)



The World's Sixth Sense®

## HVAC Market to be \$ 31 bn by 2022 in Europe: Report

According to TechSci Research report, 'Europe HVAC Market By Product Type, By End Use Sector, By Country Competition Forecast & Opportunities, 2012 – 2022', HVAC market in Europe is projected to surpass USD31 billion by 2022. Rising demand for HVAC systems from residential, commercial, industrial and institutional sectors in the region are the major factors boosting growth in Europe HVAC market. Europe's construction sector stood at around USD1,222.71 billion in 2013, which further increased to around USD1,305.41 billion by 2015.

Thus, expanding construction sector is one of the major demand generating end use sector for HVAC systems in the region. Tourism sector in Europe stood at USD451 billion in 2015, which is further forecast to surpass USD548 billion by 2021. Therefore, fueling construction of new airports and hotels across the entire region is expected to propel installation of HVAC systems in these new facilities. Furthermore, rising technological advancements and aggressive marketing strategies by leading HVAC manufacturers operating in the region are expected to drive demand for HVAC systems in Europe through 2022.

Bosch, Thermoteknik, Daikin, Valliant Group and Danfoss are the leading players operating in Europe HVAC market, and these companies are further expected to continue to lead the market during the forecast period as well. Moreover, these companies are increasing their focus on manufacturing HVAC systems that would work on green technology and are also compatible with smart devices. HVAC systems can be categorized into direct expansion HVAC systems and central HVAC systems. Direct expansion HVAC systems dominated Europe HVAC market in 2016, as it occupies less space and is cheaper than centralized cooling systems.

## District Cooling Market worth \$ 9.54 billion USD by 2021

The report 'District Cooling Market by Production Technique (Cooling, Absorption Cooling, Chillers), Application (Commercial, Residential & Institutional), Region - Global Forecast to 2021', published by MarketsandMarkets. The market for district cooling is projected to grow from USD 5.14 billion in 2016 to USD 9.54 billion by 2021, at a CAGR of 13.19% from 2016 to 2021.

Factors such as high temperature in the region, increased investments in infrastructure projects, and rapid urbanization are driving the market. Rising energy prices, growing environmental concerns, and rising demand for low cost and high-efficiency cooling systems are some of the other factors fueling the demand for district cooling.

The absorption cooling segment is estimated to be the most widely used production technique for meeting cooling demand as it utilizes waste energy. The absorption cooling segment accounted for the largest share in 2015 and is projected

to grow at the highest rate during the forecast period. Absorption cooling helps reduce the use of electrically driven cooling in the energy system and also reduces CO<sub>2</sub> emissions. The commercial segment accounted for the largest market share in 2015, owing to increasing demand for energy efficient cooling technologies for commercial buildings. Concerns over impact on the environment and rising energy prices has made the use of energy-efficient district cooling system a favourable solution in commercial spaces.

On the basis of region, the district cooling market is segmented into the Americas, Europe, Asia-Pacific, and the Middle East & Africa. The Middle East & Africa is a key market for district cooling. Development in the economies and the investment on infrastructure projects in this region has led to the high growth of this market. Growing affluent population, hot weather, and climate change concerns are some of the factors driving the district cooling market in the region. ■

## Chemours Plans New Production Facility for Opteon Refrigerants

The Chemours Company, a global chemistry company with leading market positions in titanium technologies, fluoroproducts and chemical solutions,



announced that it has broken ground on the company's new HFO-1234yf production facility. The new facility, located at the Chemours Corpus Christi plant in Ingleside, Texas, will triple the company's world-leading capacity for its HFO-1234yf-based-products, which are low global warming potential (GWP) and better for the environment. Chemours will sell the low global warming potential refrigerant products and blends manufactured at this new plant under its Opteon™ trade name.

"This new facility represents a significant step forward for Chemours, as it demonstrates our commitment to providing low GWP solutions to the

refrigerants industry," said Mark Vergnano, Chemours President and CEO. "We see our Opteon™ products as the future for this industry since they provide the optimal

balance of properties necessary to transition the world away from HFCs."

"It's estimated that by the end of 2017, there will be over 50 million cars on the road globally using low GWP HFO-1234yf refrigerant," said Paul Kirsch, President of Chemours Fluoroproducts. "Our Opteon™ refrigerants could be used in well over 10,000 supermarket and commercial refrigeration systems by 2020." This new facility will use an innovative, patented process to manufacture Opteon™ YF, Chemours'HFO-1234yf mobile refrigerant product used in automotive air conditioning, and Opteon™ refrigerant blends which are used across a range of applications. ■

# ARCTIC™ Central Air Coolers



**100% Fresh & Cool Air**  
**Direct Evaporative**  
**Coolers**

Range Available upto 1,70,000 CMH (1,00,000 CFM)



**Indirect Evaporative**  
**Coolers**

**(No Humidity added)**

Meet us at  
Booth # D3



**RoHS**  
compliant

**DRI™ ECGOOL™**

**Evaporative Cooling**  
**Pads (ECPs)**

Desiccant Rotors International Pvt. Ltd.

100-101, Udyog Vihar, Phase-IV, Gurgaon-122015, India, Phone : +91 124 4188888, Email : drimarketing@pahwa.com, Web : www.drirotors.com

CIN : U74899DL1984PTC017497

**PAHWA** GROUP  
Innovation is life

**Bry-Air**  
Leaders in Dehumidification...  
Worldwide

**DRI™**  
Innovative Air Solutions

**delair®**  
The Compressed Air Treatment  
System Company

**TDS**  
Air Solutions on Rent

**ACCENTUM**  
IT Portals

## BITZER Acquires ElectraTherm

**B**ITZER, the world's largest independent manufacturer of refrigeration compressors, announces the acquisition of ElectraTherm, a leader in distributed, waste heat to power generation. ElectraTherm's Power Generator™ utilizes waste heat on applications such as internal combustion engines, biomass boilers, flare gas, geothermal/co-produced fluids, and more. ElectraTherm's Power+ fleet exceeds 50 machines in operation in 12 countries and has surpassed 75 years of runtime.

ElectraTherm's Power+ Generator uses Organic Rankine Cycle (ORC) technology to capture waste heat and convert it to clean electricity. Hot water is the only fuel consumed by the Power+. The waste heat is used to produce a high pressure vapor that



expands through ElectraTherm's twin screw power block, spinning an electric generator to produce fuel-free, emission-free power. After turning the expander, the vapor is condensed back into liquid through a liquid loop radiator. The Power+ produces power from an unutilized resource, increases site efficiency and can also reduce site cooling loads. "Developing energy-efficient solutions is one of our main goals," says Peter Narreau, President of BITZER North America. "ElectraTherm's ORC technology enables us to make better use of waste heat. This builds on BITZER's commitment of responsible climate protection. With BITZER's expertise, ElectraTherm is a natural fit," says John Fox, ElectraTherm's Managing Director. ■

## Daikin Introduces 'Neat Heat' To London's Westend

**D**aikin's new integrated air conditioning system is set to revolutionise the aesthetics of many commercial buildings in high streets throughout the UK. M&E contractor, Synecore, installed its first 'invisible' HVAC system, the Daikin VRV IV i-Series at Leon Restaurant, Central London, to overcome tight space restrictions and achieve maximum climate control efficiency. Air conditioning systems most commonly require an outside space - either a back alley or roof space - to accommodate the bulky condenser unit, but Daikin have created a unique system that is entirely installed indoors with only grilles visible from the outside, which can be discretely disguised within the existing architecture, or signage.

One of the first application of this all-new patented system was by Synecore



Synecore has been the contractor of choice for HVAC design and installation for Leon sites over several years.

Through using the all-new Daikin VRV IV i-Series, the new Leon site in Fenchurch Street could open sooner, thanks to the system's unobtrusive design and low operating sound, making planning permission simpler. Not only is the new Daikin integrated system quieter and more discreet, it is also quicker and more cost effective to install, as the unit is split into two elements - a heat exchanger and compressor. ■

## Latest Generation of Copeland Scroll from Emerson

**E**merson announced the latest generation of its Copeland Scroll two-stage compressor at AHR Expo in Las Vegas. The new compressor will include an expansion in the capacity range up to 10 HP and will offer comfort and efficiency at an affordable price. The Copeland Scroll two-stage compressor has been redesigned for improved performance and reliability in residential and commercial air conditioning systems with an offering to support 1.5 to 10 ton systems.

"The Copeland Scroll two-stage compressor provides contractors with an ideal way to help homeowners get the comfort and efficiency they want at an accessible price," said Joe Linsenmeyer, Director Marketing, Residential Air Conditioning for Emerson's Commercial and Residential Solutions platform. "And in commercial applications, this compressor



will help facility managers meet the 2018 rooftop efficiency regulations at an affordable cost."

Emerson designed the latest generation of this technology to operate at ~65% capacity, delivering efficiency gains in full-load of up to 5% and up to 5% more efficiency in part-load. These improvements are enabling affordable solutions for OEMs in 15/16 SEER applications allowing OEMs to more easily meet CEE tiers, while also providing additional comfort benefits such as better humidity and temperature control. ■

# AEROFOAM<sup>®</sup> XLPE

INSULATION SOLUTIONS

CLASS 0

ASTM E84



CROSS LINKED CLOSED CELL  
POLYOLEFIN FOAM SUITABLE FOR  
CONDENSATION CONTROL  
THERMAL INSULATION  
SOUND ABSORPTION  
DUCT INSULATION  
ROOF, WALL INSULATION  
LOW VOC EMISSION  
DUST AND FIBRE FREE

**Hira**  
TECHNOLOGIES

www.rhira.com  
www.aerofoam.co.in



**HIRA TECHNOLOGIES PVT. LTD.**

Plot No. I-02, (Part - II), Khed Industrial Park DTA, Village, Kanhersar, Tal- Khed, Dist - Pune (India) Pin code 410505  
Tel: 7767809341 / 7767809350 | Email: info@rhira.com Website: www.aerofoam.co.in



Impulse Jet Fan

Induction Jet Fan

Smoke Spill  
Axial Fan

Axial Roof Fan

Axial Bifurcated  
Fan

Axial Upblast  
Roof Extract

Acid Proof  
Fan



Centrifugal  
Roof Fan



Inline Fan



Box Inline Fan



DIDW- Cabinet  
Fan



SISW- Backward  
Curved Fan

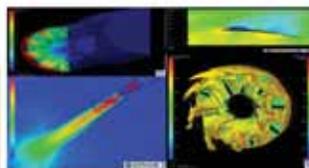


SISW- Forward  
Curved Fan



Window/ Wall  
& Duct Inline  
Mounted Fans

## TESTING AND R&D FACILITIES



## CERTIFICATIONS



Applus<sup>®</sup> Exova



## CONTACT US

Plot I-02, (Part-I), Khed City, Zone DTA, Kanhersar, Tal - Khed, Rajgurunagar, Pune - 410505  
Tel: 7767 8000 15 / 16 | Email: info@maico.co.in | Web: www.maico.co.in

### Airedale Appoints New Customer Services Manager

Global air conditioning manufacturer Airedale has strengthened its management team with the appointment of Patrick Cotton as Customer Services Manager. The appointment follows the recent promotion of Adam Yarrington, the previous holder of the post, to Product Development Director in December 2016.

Patrick joined Airedale in 2009 after having completed a BEng in Mechanical Engineering from Leeds University, where he graduated with First Class Honours. He originally started at Airedale as a design engineer in the Product Development team where he worked for five years, before acquiring the role of Research Team Leader in the Research division of the R&D team in 2014 which was dedicated to investigating new technologies and determining



Patrick Cotton

their potential for application in Airedale's product ranges.

In his new role, Patrick's remit includes responsibility for the Applications Engineering, Contracts, Sales Order Processing, Project Engineering and Drawing Office teams. He will also head up the design of customised units for complex projects.

Commenting on his new role, Patrick said, "I am excited to become part of Airedale's continuous commitment to both our customers and process improvement throughout the business. We have a dedicated Customer Services team, which I am thrilled to now be a part of, and we plan to make further strides forwards in satisfying our client base."

Patrick will commence his new role with immediate effect. ■

### New Director for DencoHappel UK

DencoHappel is pleased to confirm the appointment of Yan Evans as Managing Director for DencoHappel UK Limited. Yan has been Vice President for the Fläkt Woods UK Sales Unit since 2014 and joins the DencoHappel Board to lead the combined businesses in FläktGroup. "Along with the existing team of David Pritchard (Finance Director) and David Hearne (Sales Director) I am committed to a strategy of continued growth for our two strong brands DencoHappel and Fläkt Woods. Together we will endeavour to sustain the momentum of recent years and further develop our market presence."

Yan Evans – Managing Director DencoHappel UK Ltd is one of the leading technology innovators in the field of air treatment, air conditioning, and filter technology as well as cooling



Yan Evans

process air. With its premium brands, DencoHappel has repeatedly set technological standards through innovation capability for over a century, and can satisfy nearly every conceivable customer wish. DencoHappel in the UK offers a complete range of HVAC products for the precise control of office and critical space environments. As long term partners DencoHappel provides an excellent choice of planned maintenance options along with essential

emergency cover. Highly trained, regionally based specialist service engineers are fully conversant with all legislative and environmental aspects relating to HVAC and combustion systems. FläktGroup is the new European market leader for energy efficient indoor air technology solutions, providing the highest quality standards for improved air comfort. ■

### Harwood Elected as AIRAH President

Ian Harwood, an Associate Director with contractor Norman Disney & Young, has been elected president of Australian professional body AIRAH (Australian Institute of Refrigeration, Air Conditioning and Heating). Following a special meeting of AIRAH's board, Ian Harwood has been elected to the prestigious position of President. He replaces Ania Hampton who has stepped aside from the position due to ill health. An AIRAH board director for the past two years, Perth-based Harwood has been an AIRAH member for more than a decade. He previously served as President of AIRAH's WA division committee, helping to re-energise its monthly seminar program and to grow its membership. AIRAH CEO Tony Gleeson, M.AIRAH, says Harwood's director experience and knowledge of the



Ian Harwood

industry will serve the 97-year-old Institute very well. "Having worked with Ian over the past 12 months, I've seen the passion, experience and strategic nous he brings to the board," Gleeson says. "I have no doubt his energy, ideas and oversight will serve him and AIRAH well as he assumes this essential role." The first female president in AIRAH's storied history, Hampton has reluctantly left the post. Recently diagnosed with Ross River Fever, she has stepped

aside from all her official Institute duties in order to recover as quickly as possible. "AIRAH owes Ania a debt of gratitude for her commitment, competence and enthusiasm she brought to the role, especially in the sponsorship of the new website and membership platform, and the introduction of the Women of AIRAH initiative," Gleeson says. ■



## Keep Processes Up With Reliable Cooling That Won't Let You Down

Aggreko has got you covered. Be it cooling and ventilation for raw material storage and cold storage produce to interim chillers during emergency breakdowns and maintenance, or supplemental cooling in summer for overhead chillers to comfort cooling for events. We understand what our customers want, which is why we've designed our equipment to deliver maximum performance and fuel efficiency. Our ready fleet of high-spec chillers, cooling towers and air-conditioners can be deployed anytime, to service projects of every scale and industry – no matter how remote or challenging the location and need.

So whatever challenges you're facing, our dedicated team goes all out to provide you with customised service and support to ensure that everything goes as planned.

### **Aggreko, Cooling Specialists In India**

**Aggreko Energy Rental India Pvt Ltd**

**T: +91 20 66237200**

**E: [rentals@aggreko.in](mailto:rentals@aggreko.in)**

---

Aggreko operates from over 200 locations throughout the world.  
For the location nearest you, please go to: [www.aggreko.com/contact](http://www.aggreko.com/contact)

[www.aggreko.in](http://www.aggreko.in)

## Taco Wins 'Product of the Year' at 2017 AHR Expo Innovation Awards

Taco received 'Product of the Year' at the 15<sup>th</sup> annual AHR Expo Innovation Awards competition during a ceremony recently. The Innovation Awards program honors the most inventive and original products, systems and technologies showcased at each year's show in 10 product categories. The Taco SmartPlug Smart Hot Water Recirculation Control was the Innovation Award winner in the plumbing category. The plug-in 115 V control features technology to learn and record a homeowner's hot water use pattern, and employ the resulting data to operate a home's hot water recirculation pump precisely when hot water is typically required. "This is awesome," said Taco Chief Executive Officer Wil VandeWiel, who accepted the Product of the Year Award. "Taco always wants to move forward. This confirms that we are moving in the right direction." In addition to Taco's SmartPlug, there were nine other innovation award winners.

"The innovative and creative product development



demonstrated by this year's award winners has served to confirm the HVACR Industry's ongoing vitality and forward thinking. It is exciting to see all the emerging technologies that are bringing about better and better solutions to the challenges we face," said Clay Stevens, President of International Exposition Company. ■

## Winners of Don Miller Award for Thermo-Fluid Design Excellence

Mentor Graphics Corporation announced the winners of its second annual Don Miller Award for Excellence in System-Level Thermo-Fluid Design. The award is named after Don Miller, former Research Director for British Hydromechanics Research (now BHR Group) in the UK, who served as one of the judges. Miller is also the author of *Internal Flow Systems*, the book which served as the foundation for Mentor Graphics FloMASTER™ software technology. Award submissions were received from around the world, including entrants from India, China, and Brazil.

The 2016 Don Miller Award winners were selected based on their demonstration of excellence for a range of thermo-fluid design applications, including automotive engine cooling, two-phased refrigeration processes, and rail transport passenger comfort. A team comprising Soujanya Chintalapudi, Sundaram Veeraraghavan, and Sampath Sathish Kumar from Chrysler India Automotive, Pvt Ltd received the first place award for their design featured in their SAE paper, *Simulation of Split Engine Cooling System*. Their design used a FloMASTER simulation model for a new method of developing a split engine cooling system.

Two runners up were selected by the panel of judges. Thiago Rubens Viera Ebel from the Federal University of Santa



Catarina, Department of Mechanical Engineering in Brazil received his award for a unique application of the FloMASTER tool used to understand the water hammer effects that can occur in a novel refrigeration system. The application was described in his thesis, *Viability Analysis and Computational Simulation of a Hydraulic Circuit for a Magnetic Refrigeration System*.

The second joint runner-up award went to the team of Yifei Zhu, Yugong Xu, and Xiangdong Chen from the School of Mechanical Electronic and Control Engineering, Beijing Jiao Tong University in Beijing, China. They investigated the interaction between the external environment and the internal air flow through the ventilation of a high-speed train during operation. They described it in their paper, *Study On the One-Dimensional Carriage and Ventilation System of High-Speed Train*.

"We congratulate this year's winners of our annual Don Miller Award for excellence in thermo-fluid design applications, and we are impressed by the broad range of submissions from our FloMASTER customers worldwide," stated Roland Feldhinkel, general manager of Mentor Graphics Mechanical Analysis Division. "We are proud of the innovations made possible by the use of our technology, and we look forward to reviewing next year's FloMASTER award submissions." ■

# Complete Refrigeration Solution

- Designing
- Manufacturing
- Installation
- Servicing

## Fully Automatic Rotary Twin Screw Compressor Packages

**FULLY AUTOMATIC  
VARIABLE VOLUME  
RATIO CONTROL**



**Capacity Range :**  
434 m<sup>3</sup>/hr. to  
3400 m<sup>3</sup>/hr  
@ -5 Deg C SST & 40 Deg C CST.  
2950 RPM

## Ammonia Air Handling Units



"A" Series : Aluminum Coils with Aluminum Fins



**Capacity Range :**  
17.9 KW to 108 KW  
1.7 TR to 35 TR  
@ 7 deg C TD

"F" Series : Stainless Steel Coils with Stainless Steel Fins



"S" Series : Stainless Steel Coils with Stainless Steel Fins

## Fully Automatic High Speed Reciprocating Compressor Packages



**Capacity Range :**  
84 m<sup>3</sup>/hr. to 550 m<sup>3</sup>/hr  
@ -5 Deg C SST & 40 Deg C CST.  
2950 RPM

## Evaporative Condensers



**Capacity Range :**  
36 TR to 455 TR  
@ 28 deg C Wet Bulb Temp.

## Frick India Automation System



**Frick India Ltd.** ( AN ISO 9001:2008 COMPANY )  
809, "SuryaKiran", 19 K. G. Marg, New Delhi-110 001  
Ph: 23322381/84/91 Fax: 011-23322396 email: delhi@frick.co.in  
Factory : 21.5 Km., Main Mathura Road, Faridabad - 03  
Ph: 2275691-94 Fax: 0129-2275695. email: fbd@frick.co.in

[www.frickweb.com](http://www.frickweb.com)

### BRANCHES :

- Ahmedabad: gujarat@frickmail.com
- Bangalore : bng@frickmail.com
- Chennai : chennai@frickmail.com
- Cochin : cochin@frickmail.com
- Jalandhar : jalandhar@frickmail.com
- Kolkata : kolkata@frickmail.com
- Mumbai : mumbai@frickmail.com
- Patna : patna@frickmail.com
- Hyderabad : hyd@frickmail.com
- Vizag : vizag@frickmail.com



**You Still can't beat the System when it's all FRICK INDIA**

## Bradford University Receives Top Building Performance Prize

The University of Bradford has been named Building Performance Champion, for the second time, for its pioneering Ecoversity programme at the Chartered Institution of Building Services Engineers (CIBSE) Building Performance Awards 2017.

The university's department of estates and facilities came out on top at a tightly contested awards thanks to transformational work on its aging estates infrastructure over the last decade – reducing its carbon footprint by a stunning 35%, and becoming the only university in the world to maintain three 'BREEAM Outstanding' rated buildings in its portfolio.

Other winners on the night included AECOM in Building Performance Consultancy of the Year (over 1000 employees), Elementa Consulting in Project of the Year – International, and HLM in Project of the Year – Residential. The new Test of Time category was claimed by previous Champions British Land, who have demonstrated continued high performance since their 2012 win. A consistent finalist at the Building Performance Awards, AECOM's award is down to their outstanding commitment to improving industry best practice through guidance and training. Judges praised HLM's winning entry, a house in central



Scotland, for a commitment to innovation and sustainability that also featured stunning design, whilst Elementa Consulting were awarded for their commitment to sustainability through their 'deep green engineering' philosophy.

Also victorious in the Facilities Management Team Award, the University of Bradford entry was commended for its approach to tackling inherent problems within its large stock of legacy buildings dating from the 1960s and 70s, including poor thermal performance, asbestos and large expanses of single glazing.

By overcoming practical and organisational challenges, the University cut utility costs by 27% in a market that has risen 90%, and saved £8 million over ten years.

The judges were also impressed with the University's long-term strategy, which involves engaging stakeholders from all areas of the campus and implementing an extremely robust Building Energy Management System, which delivers high quality in-use performance data. Other features of the strategy include LED lighting and controls installation; replacing transformers and pumps; engineering and control improvements to the district heating network; expanding the BEMS, and reviewing and optimising compressed air. ■

## Star Refrigeration Gets ASHRAE Award

Dr Andy Pearson, Group Managing Director of Star Refrigeration and Azane Inc, has won an award for designing the world's largest ammonia heat pump. Star Refrigeration's Dr Pearson, the lead engineer behind the biggest ammonia heat pump for any district heating and cooling scheme, won the American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE) prestigious 'Comfort Cooling Award for Project Excellence' at the Society's Winter Meeting in Las Vegas on January 28.

The high-temperature district heating and cooling system uses a water-source 13 MW heat pump to deliver cooling and heating to businesses, schools, hospitals and buildings in the coastal town of Drammen in Norway. The town of 65,000 inhabitants also receives hot water pumped directly into the mains by the heat pump. The system works by extracting warmth from the cold waters of a local river and then heating it to 90°C for heating.

Dr Pearson oversaw the first ammonia project, at Star Refrigeration headquarters in Glasgow, to use the natural refrigerant in such a large high temperature district-heating



Dr Andy Pearson

scheme. Norwegian energy supplier Drammen Fjernvarme AS, who operates the project, reports that the heat pump has served 85% of the city's heat demand and delivered over 400 GWh of clean heat since its installation in 2011. The electricity consumed by the heat pump mainly comes from hydropower, reducing the system's carbon footprint to virtually zero, according to Star Refrigeration.

Jon Ivar Bakk, CEO of Drammen Fjernvarme AS, said, "the system has been working uninterrupted for over five years and has delivered savings of €10m and 75,000 tonnes of carbon emissions to date. Our system's technology offers a reliable and sustainable source of clean energy to meet the town's heating needs."

Collecting the award, Pearson said, "I am honoured to accept this award from my fellow members of ASHRAE on behalf of all of the team at Star Refrigeration who worked hard to deliver Drammen's vision of a community-wide, carbon free heating system". "The award not only credits innovation but offers an insight to the considerable scope for the environmental and economic benefits that district heating and cooling systems can offer to entire communities," he said. ■

# Introducing Testo's Newest Products that will **wow** you !



## Electrical Family

The world of measurement  
now in your smart phone

- Measure temperature, pressure, humidity & air velocity - all wirelessly using a smart phone
- Get six measurement values at a time
- Monitor changes with graph or table
- Save & send measured values as PDF or Excel sheet

Uniquely different  
**electrical measuring instruments**

- First multimeter with automatic parameter recognition
- Clamp meter with unique & safe grab mechanism
- Voltage tester with patented 360° LED display
- Voltage tester that also measures current



## Smart Probes



## Thermal Imagers

Best in class Thermal Imaging  
**with unique features**

- High Resolution upto 320 X 240 pixels
- Automatic emissivity setting with testo  $\epsilon$ -Assist function
- Objectively compare images with testo Scale Assist function
- IFOV Warner for improved analysis on-site

### Testo India Pvt Ltd

**Head Office:**  
Plot No. 23, Sind Society, Baner Road, Aundh, Pune - 411007, Maharashtra, India.  
Tel: +91 20 6560 0203 | Fax: +91 20 2585 0080 | Email: info@testoindia.com

**Regional Offices / Representatives:**  
Ahmedabad | Baroda | Bengaluru | Chandigarh | Chennai | Guwahati  
Hyderabad | Indore | Kolkata | Mumbai | New Delhi | Raipur

[www.testo.in](http://www.testo.in)



# Cold Chains on a Hot Streak

Growing urbanisation and rising per capita income are spurring growth of organised retail in the country, with purchases of frozen meats and vegetables at malls and retail outlets rising. That has sharpened focus on supply chain management and cold storages...

**A**s more and more processed food is wolfed down. Surging demand for processed foods, riding on a visible proliferation of quick-service restaurants (QSRs) and organised retail, has given a huge impetus to the cold chain industry. Government policies and schemes in the form of capital subsidies, grant of infrastructure status and viability-gap funding have also helped.



CRISIL research estimates the cold chain industry to log a compound annual growth rate (CAGR) of 13-15% in revenue from Rs 225 billion in 2015-16 to Rs 450 billion in 2020-21. That compares with a growth of 11-13% in the previous five years.

## TCW Segment to Drive Revenues

Bulk of the growth will come from the temperature-controlled warehouses (TCW) segment, which comprises 90% of the cold chain industry revenue, and is expected to grow 14-16% a year (CAGR) to Rs 420 billion by 2020-21.

Within this segment, multi-purpose cold storages dominate, and their share of segment revenue is seen rising from 77-79% in 2015-16 to 84-86% by 2020-21.

CRISIL Research estimates investments of Rs 150-200 billion in the industry (comprising TCW and

temperature-controlled vehicles, or TCVs) between 2016-17 and 2020-21, as demand for cold storage space and refrigerated transport (reefer) vehicles surges. Predictably, about 90% of the total investment is expected to flow into the TCW segment – primarily multi-purpose cold storage, which offers the prospect of early payback.

Growing urbanisation and rising per capita income are spurring growth of organised retail in the country, with purchases of frozen meats and vegetables at malls and retail outlets rising. That has sharpened focus on supply chain management and cold storages. Modern retailing formats require multiple sourcing and a centralised holding and dispatch system, followed by a decentralised sales network. Hence, strong growth in organised retail is expected to be a key growth driver.

Processed fruits, vegetables and meat products – the main users of cold storage facilities – form about half of India's total exports. Exports of animal products include buffalo meat, sheep or goat meat, poultry products, animal casings, seafood, etc. Imports include raw materials for the chocolate and pharmaceutical industries, which are highly sensitive (especially pharma drugs regulated by importing countries), and hence, meeting quality through modern cold storages is of utmost importance.

Demand is surging as time-constrained urban consumers veer towards ready-to-eat products. This is benefiting the cold chain industry, whose services are being utilised by leading fast food chains such as Dominos Pizza, McDonald's, Pizza Hut and Subway.

The organised QSR industry, according to CRISIL Research estimates, stood at Rs 136 billion in 2015-16 and is projected to accelerate at 18-21% CAGR to Rs 235 billion by 2018-19, driven by both established players and relatively new entrants potentially opening new outlets.

## TCVs to See Moderate Growth

All this is also benefiting the TCV segment, which accounts for around 10% of the total industry in value terms. CRISIL Research expects TCV revenue to increase

to Rs 26 billion in 2020-21 from Rs 17 billion in 2015-16, at a CAGR of 8-10%. Meat, dairy products and pharmaceuticals are expected to remain the drivers.

As per our interactions with players, there are around 15,000 reefer vehicles in the country today. A National Centre for Cold-chain Development (NCCD) study, released in September 2015, has indicated a requirement of 62,000 reefer vehicles. However, despite this huge requirement, we believe investments in reefer vehicles would be limited, mainly because this is a highly fragmented segment and the margins are typically low.

## Government Schemes Aid Investment...

On its part, the government has taken a number of steps in recent years to improve investment in cold chains, including exempting customs duties on refrigeration units and equipment, setting up mega food parks, providing tax benefits on investments and creating the NCCD.

The cold chain industry has been accorded infrastructure status to ensure it is able to access low-cost funds for longer tenures. To attract foreign capital, 100% FDI was allowed under the automatic route in 2010-11. In May 2015, RBI classified loans to cold chain companies under 'agriculture activities' for priority sector lending, subject to a sanctioned limit of Rs 1 billion per borrower. Then, capital investment in creation of modern storage capacity has been made eligible for viability gap funding (PPP-VGF) scheme of the Ministry of Finance – with funding capped at 40% of overall project cost. A host of other schemes to boost investments in cold chains are also operational, including those of the Ministry of Food Processing Industries, Agricultural and Processed Food Products Export Development Authority and Mission for Integrated Development of Horticulture.

## But capex, Fuel Costs Among Dampeners

However, most large potential investors still remain on the sidelines, awaiting improvement in the retail environment, especially since cold chain operations in





India can cost more than double that in many other countries. India lacks proper infrastructure facilities for storage of fruits and vegetables, meat and seafood, etc and the lack of adequate back-end infrastructure has resulted in the produce not reaching markets for consumption.

Among other challenges, energy infrastructure is extremely lacking and serves as a huge impediment to integrating cold chain capabilities across the supply chain.

Low awareness on modern cold storage facilities also makes it difficult for players to charge higher rentals. Organised

multi-purpose players (vis-à-vis unorganised players) use environment-friendly refrigerant products.

Another impediment is taxation. Current tax and subsidy rules prevent large logistics companies from creating economies of scale through efficient hub-and-spoke type distribution systems. Instead, logistics companies are encouraged to create small stocking facilities in every state. Given the expected implementation of GST by July 2017, it may be possible to create infrastructure on the basis of logistics requirement rather than taxation requirements. ■

**Binaifer F Jehani**  
Director  
CRISIL Research



## 2016 is the Warmest Year: NASA

**T**wo key climate change indicators – global surface temperatures and Arctic sea ice extent – have broken numerous records through the first half of 2016, according to NASA analyses of ground-based observations and satellite data.

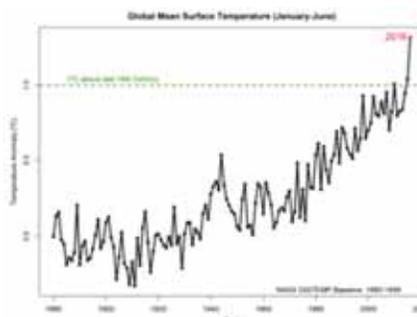
Each of the first six months of 2016 set a record as the warmest respective month globally in the modern temperature record, which dates to 1880, according to scientists at NASA's Goddard Institute for Space Studies (GISS) in New York. The six-month period from January to June was also the planet's warmest half-year on record, with an average temperature 1.3 degrees Celsius (2.4 degrees Fahrenheit) warmer than the late nineteenth century.

Five of the first six months of 2016 also set records for the smallest respective monthly Arctic sea ice extent since consistent satellite records began in 1979, according to analyses developed by scientists at NASA's Goddard Space Flight Center, in Greenbelt, Maryland. The one exception, March, recorded the second smallest extent for that month.

While these two key climate indicators have broken records in 2016,

NASA scientists said it is more significant that global temperature and Arctic sea ice are continuing their decades-long trends of change. Both trends are ultimately driven by rising concentrations of heat-trapping carbon dioxide and other greenhouse gases in the atmosphere.

The extent of Arctic sea ice at the peak of the summer melt season now typically covers 40 percent less area than it did in the late 1970s and early 1980s. Arctic sea ice extent in September, the seasonal low



point in the annual cycle, has been declining at a rate of 13.4 percent per decade.

“While the El Niño event in the tropical Pacific this winter gave a boost to global temperatures from October onwards, it is the underlying trend which is producing

these record numbers,” GISS Director Gavin Schmidt said. Previous El Niño events have driven temperatures to what were then record levels, such as in 1998. But in 2016, even as the effects of the recent El Niño taper off, global temperatures have risen well beyond those of 18 years ago because of the overall warming that has taken place in that time. The first six months of 2016 were the warmest six-month period in NASA's modern temperature record, which dates to 1880.

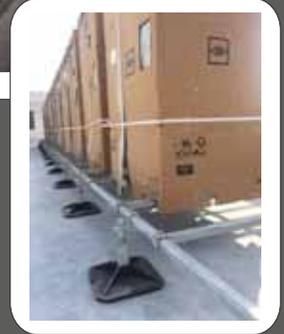
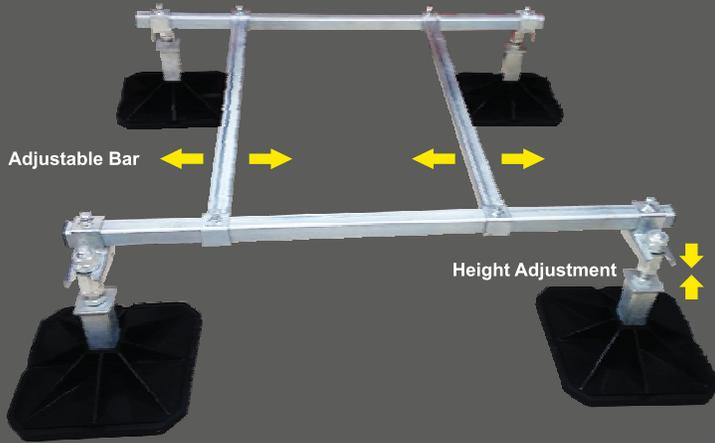
The global trend in rising temperatures is outpaced by the regional warming in the Arctic, said Walt Meier, a sea ice scientist at NASA Goddard.

“It has been a record year so far for global temperatures, but the record high temperatures in the Arctic over the past six months have been even more extreme,” Meier said. NASA tracks temperature and sea ice as part of its effort to understand the Earth as a system and to understand how Earth is changing. In addition to maintaining 19 Earth-observing space missions, NASA also sends researchers around the globe to investigate different facets of the planet at closer range. ■

# The Mighty Launch Of 2017!

## mighty foot

Modular Framework for HVAC Equipment



- No penetration of roof slab
- Includes Anti vibration pads

- ✓ PIPEWORK / SOLAR PANELS / CABLE TRAYS / VRV'S / VRF'S
- ✓ EVAPORATORS / SPLITS / CHILLERS / CONDENSERS

Watch mighty foot demo video at- <https://youtu.be/ZhzMeNr5VNE>

### Poseidon Tank Pump



- Floor or wall mounting location available.
- Thermally protected.

### Mercury Mini Pump



- Fits to any ready-made straight conduit.
- Thermally protected.

### EconoMini™

The No-Nonsense Drain Pump!



- Compact pump can retrofit around existing pipe work, cornering trunking & ceiling void.

Distributed All India by:



**INFINITY**  
HVAC TOOLS

Our finest tool, is choice.

DADAR  
022-24168382/ 443

THANE  
022-25446111/ 16333

PUNE  
020-26061002/ 2666

NASHIK  
0253-2597111

Customer Care: 9223521222 / 022 23070999

[www.ihvac.in](http://www.ihvac.in) enquiry@ihvac.in

Buy online at - [www.hvacmall.in](http://www.hvacmall.in)

# Freezing of Foods

The storage life of foods can be extended by several months by freezing and storing them at sub-freezing temperatures, usually between -18 and -35°C, depending on the particular food...

**M**icroorganisms such as bacteria, yeasts, molds, and viruses are widely encountered in air, water, soil, living organisms, and unprocessed food items, and cause off-flavors and odors, slime production, changes in the texture and appearances, and the eventual spoilage of foods. Holding perishable foods at warm temperatures is the primary cause of spoilage, and the prevention of food spoilage and the premature degradation of quality due to microorganisms is the largest application

area of refrigeration. The first step in controlling microorganisms is to understand what they are and the factors that affect their transmission, growth, and destruction.

Of the various kinds of microorganisms, bacteria are the prime cause for the spoilage of foods, especially, moist foods. Dry and acidic foods create an undesirable environment for the growth of bacteria, but not for the growth of yeasts and molds. Molds are also encountered on moist surfaces, cheese, and spoiled foods.

Specific viruses are encountered in certain animals and humans. Poor sanitation practices such as keeping processed foods in the same area as the uncooked ones and being careless about hand washing can cause the contamination of food products.

When contamination occurs, the microorganisms start to adapt to the new environmental conditions. This initial slow or no-growth period is called the lag phase and the shelf life of a food item is directly proportional to the length of this phase (Figure 1).

The adaptation period is followed by an exponential growth period during which the population of microorganisms can double two or more times every hour under favorable conditions unless drastic sanitation measures are taken. The



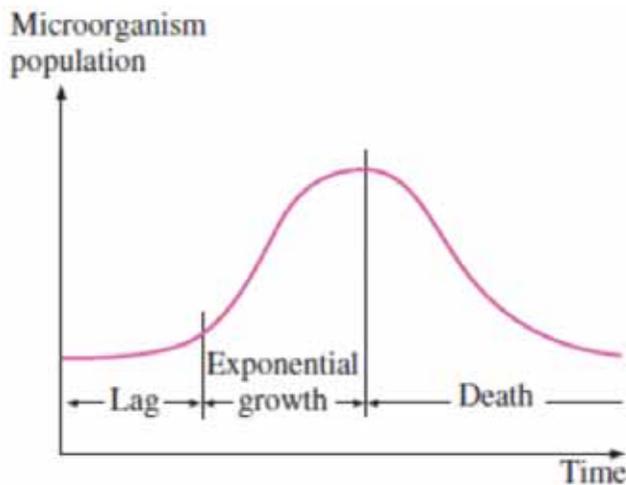


Figure 1: Microbial growth curve

depletion of nutrients and the accumulation of toxins slow down the growth and start the death period. The rate of growth of microorganisms in a food item depends on the characteristics of the food itself such as the chemical structure, pH level, presence of inhibitors and competing microorganisms, and water activity as well as the environmental conditions such as the temperature and relative humidity of the environment and the air motion (Figure 2).

Microorganisms need food to grow and multiply, and their nutritional needs are readily provided by the carbohydrates, proteins, minerals, and vitamins in a food. Different types of microorganisms have different nutritional needs, and the types of nutrients in a food determine the types of microorganisms that may dwell on them. Microorganism growth in a food item is governed by the combined effects of the characteristics of the food and the environmental factors. We cannot do much about the characteristics

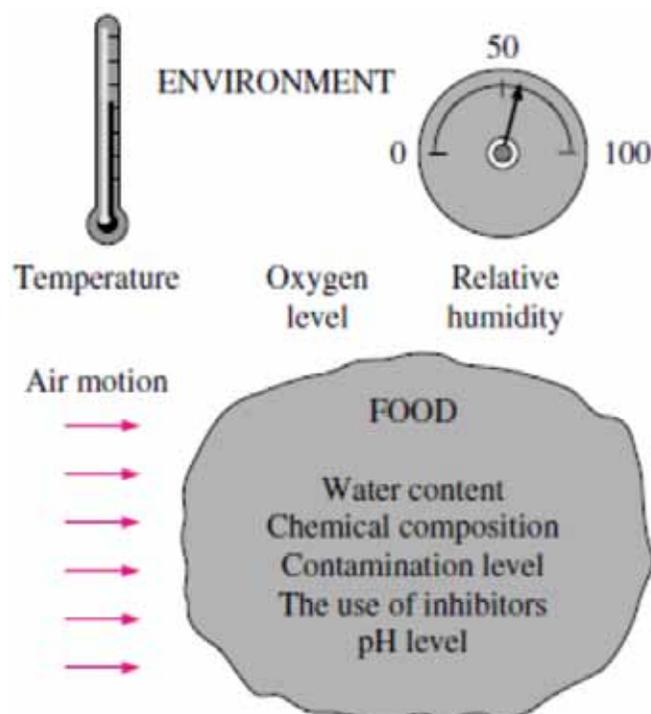


Figure 2: Environmental parameter that influence microbial growth

of the food, but we certainly can alter the environmental conditions to more desirable levels through heating, cooling, ventilating, humidification, dehumidification, and control of the oxygen levels. The growth rate of microorganisms in food is a strong function of temperature, and temperature control is the single most effective mechanism for controlling the growth rate. Microorganisms grow best at “warm” temperatures, usually between 20 and 60°C. The growth rate declines at high temperatures, and death occurs at still higher temperatures, usually above 70°C for most microorganisms. Cooling is an effective and practical way of reducing the growth rate of microorganisms and thus extending the shelf life of perishable foods.

### Microorganisms in food products can be controlled by

1. preventing contamination by following strict sanitation practices,
2. inhibiting growth by altering the environmental conditions, and
3. destroying the organisms by heat treatment or chemicals.

The storage life of foods can be extended by several months by freezing and storing them at subfreezing temperatures, usually, between -18 and -35°C, depending on the particular food (Figure 3).

It was determined that the rate of freezing has a major effect on the size of ice crystals and the quality, texture, and nutritional and sensory properties of many foods. During slow freezing, ice crystals can grow to a large size, where as during fast freezing a large number of ice crystals start forming at once and are much smaller in size.

A crust forms rapidly on the outer layer of the product and seals in the juices, aromatics, and flavoring agents.

### Quality and Safety

Quality and safety are not the same. High quality food tastes, smells and looks good. A safe food will not make you sick. People need to be careful because an unsafe food may look and smell fine, but contain microbes that cause illness. For example, a huge pot of hot chili in the refrigerator will not cool quickly and may support bacterial growth that will make someone sick. On the other hand, chicken with freezer burn is safe, yet poor in quality. Refrigerated foods should be cold with packages sealed and clean. Frozen foods should be frozen solid.

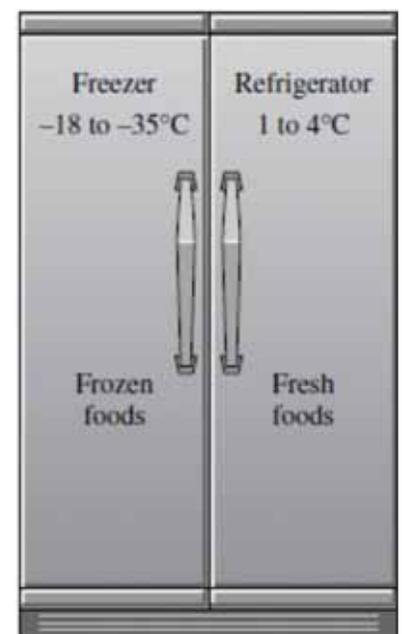


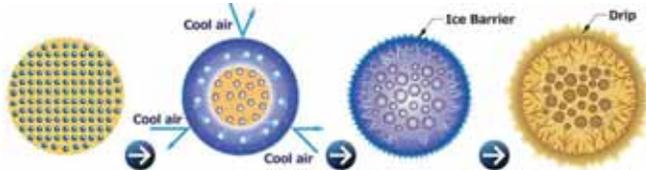
Figure 3: Temperature for refrigerated and frozen storage of food

Table1: Refrigerator – freezer storage chart

S. No.	Product	Refrigerator	Freezer
1	Egg (fresh in shell)	4 to 5 weeks	Don't freeze
2	Buttermilk	1-2 weeks	3 months
3	Butter or margarine	1-3 months	6-9 months
4	Milk	1 week	1 month
5	Yogurt	7-14 days	1-2 months
6	Cheese (hard)	3 months	6 months
7	Ice cream, frozen yogurt	NA	2 months
8	Berries	1-2 days	12 months
9	Cherries	1 week	12 months
10	Grapes	1 week	1 month
11	Papayas	1 week	12 months
12	Apple or Cider	6 Days	Don't freeze
13	Carrots	2 weeks	12 months
14	Cauliflower	5 days	12 months
15	Mushrooms	3-7 days	10-12 months

## Magnetic Field Assisted Freezing

The quality of frozen food is related to its freezing rate. In the conventional methods of freezing, freezing rate is slow with low degree of super cooling, the speed of ice nucleation is slower than the speed of ice growing, thus resulting in the formation of big ice crystals in the frozen food and their distribution in the extracellular region. But the focus now-a-days is on enhancing the freezing rate. Freezing with induced magnetic field is one of them. In this system, magnetic field energy generating equipment generates weak energy evenly in the freezing equipment so as to produce good tasting food with original flavor and without any drip loss.



Food products, especially, the perishable fruits and vegetables contain a large amount of water. The water contained is constituted of bound water tied to protein or other molecules and free water without being tied. With the application of magnetic field (Figure 4), vibration is supplied to water molecules which prevents them from clumping together and keep them under super cooling condition.

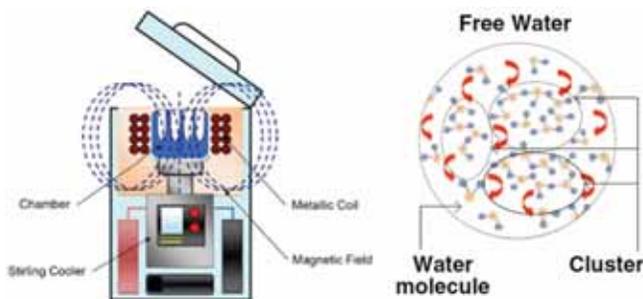


Figure 4: Application of magnetic field

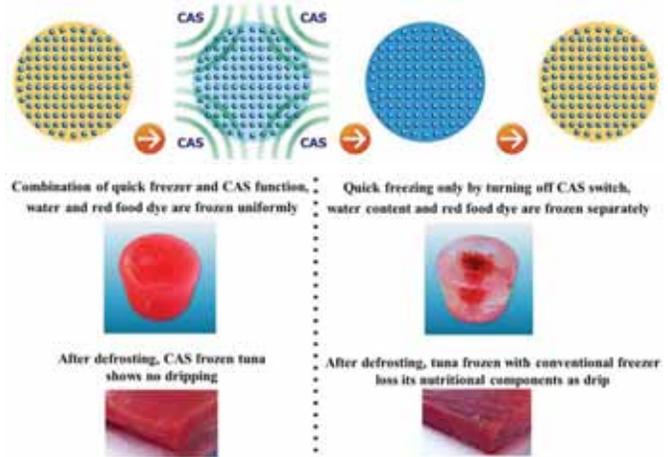


Figure 5: Comparison of freezing with and without magnetic system (Cells Alive system; CAS)

By doing so, fast freezing generates small and uniform ice crystals, with their distribution mainly in the intracellular region. As a result, the microstructure of food is protected, preventing the destruction of cells in the food material and producing highly fresh and high quality frozen product.

## Foods That Don't Freeze Well

### a. Because of flavor changes

- Garlic (uncooked)
- Onion (raw; better cooked or as ingredient)
- Spices – clove, sage (flavor is stronger or bitter)

### b. Because of texture changes

- Cake icing - soft or boiled (butter cream freezes well)
- Cream sauces
- Custard or cream filling
- Egg whites (cooked) & meringue
- Fried foods (homemade)
- Gelatin
- Mayonnaise or salad dressing
- Lettuce
- Pasta (cooked, unsauced)
- Potatoes

### Mahesh Kumar

Department of Processing and Food Engineering  
Punjab Horticultural Post Harvest Technology Center  
Punjab Agricultural University, Ludhiana



### B V C Mahajan

Department of Processing and Food Engineering  
Punjab Horticultural Post Harvest Technology Center  
Punjab Agricultural University, Ludhiana



### Maninder Kaur

Department of Processing and Food Engineering  
Punjab Horticultural Post Harvest Technology Center  
Punjab Agricultural University, Ludhiana





Supreme Always Value Efficient

**Supreme**<sup>®</sup>  
People who know plastics best

## Contribute to a greener planet with every HVAC insulation



# INSUflex

Nitrile Foam Tubing for Pipe insulation

'INSUflex' (NBR tubing) is a fire retardant (FR) closed cell, flexible, elastomeric pre-formed thermal insulation tubing for pipe insulation. It is an environment & user friendly product, than conventional fibrous products.

**Features:** • High water vapour diffusion resistance ensures thermal efficiency during low temperature operations  
• Chemically inert • Low thermal conductivity • Operating temperature range from  $-55^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$  • Light weight and flexible tubing • Fire retardant material quality ensures safety & protection • Odourless • Fiber free and zero O.D.P.

**Insulation applications:** HVAC piping • Split and window A/Cs piping • Chiller pipe • Insulation of plumbing and waste water drainage pipes • Solar piping • Cold storage • Clean room piping and many more...

**Suitable for:** • MS Pipes • Copper Pipes • PVC Pipes • PPR Pipes



### Other products from the INSU Range:

**INSUshield:** Non-fibrous, fire retardant (FR), closed cell, tri-dimensional chemically crosslinked polyethylene foam for thermal insulation applications

**INSUreflector:** Fire retardant (FR) polyethylene bubble material encased with aluminium foil on one or both sides that reflects 96 to 99 percent of radiant heat beneath slated roofs

**INSUmelfoam:** Unique, flexible, non-fibrous open cell foammade from Melamine resin ideal for acoustic insulation applications

**Corporate Office Mumbai :** Tel. : (+91-22) 40430000 / 67710000 / 30840000 Fax : (+91-22) 40430099 / 67710099 / 30840000  
**Ahmedabad :** Tel. : (+91-79) 27681361 / 27680043 / 27680903 Fax : (+91-79) 27680064 **Bengaluru :** Tel. : (+91-80) 22215475 / 22104698 Fax : (+91-80) 22104697 **Chennai :** Tel. : (+91-44) 43851500 / 39811176 / 39811174 Fax : (+91-44) 43850498  
**Noida :** Tel: (+91-0120) 6660060 / 6660065 **Hyderabad :** Tel.: (+91-40) 23221140 Fax : (+91-40) 23221120 **Kolkata :** Tel.:(+91-33) 24858837 / 24858839 / 24858833 Fax : (+91-33) 24858838 **Pune :** Tel.: (+91-20) 25890538 **E-mail:** insulation@supreme.co.in  
**Website :** www.supreme.co.in



**“For us it is all about customers, understanding their needs and implementing the best solution to answer their challenges”**

Around the world, people, businesses and countries are striving for a better future. A future that needs power and the right conditions to succeed.

That’s why at Aggreko, we work round the clock, making sure you get the electricity, heating and cooling you need, whenever you need it – all powered by our trademark passion, unrivalled international experience and local knowledge. From urban development to unique commercial projects and even humanitarian emergencies, we bring our expertise and equipment to any location, from the world’s busiest cities to some of the most remote places on earth.

Every project is different, so we listen first and design a system around you, delivering our service and support anywhere, to any scale. Transforming the lives and livelihoods of individuals, organisations and communities across the globe.

**Abhijit Pujari, Temperature Control (TC) Business Manager- South Asia, Aggreko** re-assures Aggreko’s commitment to customers and promises the quality of solutions in an exclusive chat with **Cooling India...**

### **How is the temporary cooling market evolving in India compared to the global market?**

The market in India is opening up as many industries and end users become increasingly aware of the benefits of renting cooling equipment from a specialist temperature control provider. Sectors like manufacturing, petrochemical and refining, food & beverage, pharma, fertilizers, mining, events, and facilities management are among those that have reaped the rewards of rental.

In mature markets customers realise that renting helps them retain their capital for much-needed operational activities, as there it doesn’t need the heavy upfront investment for the outright purchase of equipment. They can also get their

operations up and running much quicker, often within weeks or even days, which helps start generating profits earlier, and maintains production. And there is a safety aspect too. In mines, for instance, we can get temperature control equipment where it is needed fast, so miners can work in controlled conditions.

We are turn-key providers so we take care of everything – from planning, through installation, operating, monitoring, maintenance and finally decommissioning, so we give that peace of mind. We also generate power, using a variety of available fuels, so we can also provide the power for cooling equipment, if needed. Our equipment is made to our own specifications, and owned by us, so we know exactly what it can do, which means

we can create bespoke solutions for customers, based on their unique needs.

India has leaned towards outright purchase and it will take time to change this tendency, but many are already seeing that tying up their capital and waiting months for their own equipment to arrive and then for it to perhaps spend time sitting idle and taking up space on their property, is all unnecessary.

### **What are the temporary cooling solutions offered by the company?**

At Aggreko we have a global team of temperature control (TC) experts and an extensive portfolio of state-of-the-art equipment. We have been providing power and TC for more than 50 years and have operations in more than 100 countries, around the world.

We have chillers, cooling towers, air-conditioners, air handling units, heat exchangers and accessories, in a range of sizes, for an enviable breadth of applications. All are owned and operated by us. In India, at present we have about 10,000 TR of cooling capacity, which can be offered for various process cooling or space cooling applications. This equipment is modular and mobile, which means it is purpose-built for rental, so it is easy to transport, and quick to install and commission. These solutions are crucial during turnarounds, seasonal spikes in temperature, performance improvement, pilot testing, maintenance outages, seasonal demands, emergency failures in permanent set-ups, early project commissioning, delay in delivery of permanent cooling equipment, etc.

We stepped in when there was severe flooding that damaged gas generators at one of our customers in Chennai in late 2015, for example. This meant that one of India's largest commercial complexes was unable to operate their VAM chillers and we quickly provided power and about 1000 TR of cooling to ensure that operations could continue.

### **The Government of India launched 100 Smart Cities project. What opportunities do you look forward for your company?**

The Smart Cities programme will definitely create opportunities both for India and for us as the promised investments start to materialise in commercial and infrastructure segments. Our TC packages totally support industry and growth, by maintaining production, minimising downtime, creating controlled working and maximising capital expenditure.

We are well placed to provide customised cooling solutions, thanks to our world-class fleet and service capability, as well as the power generating capacity we also have available. We can support anything from a small production facility to a power gap in a major grid. We have the experience, the expertise, the local knowledge that is backed up by global reach, best-in-class equipment, and network of depots and service centres that mean we can get the



Aggreko's chiller installation for process cooling application

job done cost-effectively, efficiently, safely and quickly.

### **What are the USPs and growth drivers of your temperature control business? Which sectors generate the maximum demand for your services?**

There are so many differentiators, many of which I have already discussed. They include our best-in-class equipment that is designed and built to fit our rental model, to our exacting standards. We own and maintain our fleet, which runs on a variety of fuels. We employ and train experts in their fields, who operate and monitor our fleet. We also employ a local workforce wherever we can. We have an extensive network of depots and service centres around the world. Our people are knowledgeable and passionate about what they do and how they do it. We pay attention to detail and work in partnership with our customers to understand their

business and their challenges, however unique they may be. And we never stand still, which means we are constantly innovating, bringing in new equipment and looking at way to bring power in the most cost-effective and efficient ways.

All of these things have helped us become the global market leader. As far as sectors are concerned, we deal with many. We helped one of India's leading underground coal mines with a flexible cooling package so the company could continue extraction, after high temperatures kept tripping its coal cutting shearer machines. And when a smelter company needed interim cooling towers urgently to supplement their faulty existing ones, our team worked round the clock to engineer a complete cooling tower system within eight days. Data centres are a current growth area where TC and power are needed. This sector is growing quickly and it may take time to address such additional demands.

## What stumbling blocks/challenges are faced by the company during providing your solutions? How do you overcome the same?

The biggest challenge for us in India is reversing the mindset that outright ownership is better than rental. This is really the most effective option for customers and we will work hard to illustrate that. We want to help organisations to maximise their potential for growth, production and profit.

## Why Aggreko is considered as a first option when it comes to process cooling applications or commercial segments?



Aggreko's modular cooling tower.

Aggreko believes in building sustainable partnerships with customers based on knowledge, transparency, reliability, safety and cost efficiencies. We partner with them not only when they are coming up with new or expansion plants or projects for construction power or cooling needs, but once their plants are operational we also help during production and operation. We are proud to see how positively customers respond to our successful implementation of projects.

Aggreko has capable teams, who not only understand cooling load calculations but also unique industrial applications in a range of sectors, including those we have

already mentioned. By supporting them, through understanding their challenges, and working with them as a team, we create an effective solution that lets them get on with

their operation and process improvements. As far as commercial segments are concerned, we undertake almost all major events not only in India but also worldwide. We have supported too many projects to mention for commercial complexes. For us it is all about customers, understanding their needs and implementing the best solution to answer their challenges.

## What is your outlook for HVAC industry for 2017-18?

The HVAC industry in India is still unorganised. However, we anticipate growth in end markets, such as construction, manufacturing and services. This gives us scope to bring in our rental model as rental frees businesses from the heavy CAPEX commitments needed for outright purchase and helps retain liquidity in their business.

We will continue to support India and the world with power and temperature control. We know that nothing happens without this. We know that our rental model works and brings real benefits, so we will continue to bring those benefits. We will continue to innovate and research new products, and support communities. ■

## Ice Make Refrigeration Acquires Bharat Refrigerations

**I**ce Make Refrigeration Pvt Ltd and Bharat Refrigeration Pvt Ltd announced that Ice Make Refrigeration Pvt Ltd has acquired Bharat Refrigeration Pvt Ltd business effective, December 15th 2016.

"We are thrilled and energized about joining forces with Bharat Refrigeration Pvt Ltd Bharat's differentiated and reputed products will offer Ice Make's customers a range of product options with increased value, while preserving the legacy of customer satisfaction that both companies prioritize," said Chandrakant Patel, Managing Director, Ice Make.

Since its founding as Bharat Refrigeration in the late 80s, Bharat Refrigeration has grown from its Chennai roots to become a widely renowned, integrated refrigeration equipment manufacturer across the South. Along

the years, Bharat Refrigeration Pvt Ltd has remained a true family business and, under the leadership of its founder T M Venu, has achieved stature as a highly reliable and technically competent player in South India.

Patel said, "This acquisition will allow Bharat Refrigeration to continue as the leader of Refrigeration Equipment Manufacturer in the South, while leveraging Ice Make's advanced capabilities and systems across our refrigeration equipment's value chain. I believe that time has come for Ice Make to truly become one of the strongest players in the refrigeration arena that not only brings a dynamic change in commercial refrigeration market but also drive customer's profitability through highly efficient and effective value added product line."

T M Venu, Founder, Bharat Refrigeration said, "Ice Make's support will enable

Bharat Refrigerations to grow faster, introduce new product designs and models more rapidly, and expand on our history of success by reaching a broader array of customers and markets. I am excited that our employees have joined the Ice Make family. Having seen how Ice Make truly 'lives' its core values, and because of this and its compelling vision of providing unrivaled, highly productive refrigeration products to customers, I believe that our mutual goal to anticipate, nurture and drive positive change in the refrigeration industry will be delivered through our synergy."

"Apart from other core products, our latest Patent Protected Cold Plate Reefer Product Line under the flagship TRANSFREEZ, is projected to spread extensively across the nation catering to last-mile cold chain requirements of customers. ■

This section displays two types of sub-zero controllers. On the left, a 'Cold Room' controller is shown in a white enclosure with a red LED display showing '28'. Next to it is a smaller green controller. On the right, a 'Process Chiller' controller is shown with a black face and red LED display showing '12.7' and '1.19'. Below these are two more controllers: a black touch-sensitive keypad with a red display showing '17.9' and a white 'HANDICELL' controller with a blue LCD display showing 'LIQ. TEMP 27.5°C' and 'COMPRESSOR ON'.

**Cold Room**

**Process Chiller**

This section features two main products. On the left is an 'Electrical Cold Room Panel', a large white metal cabinet with a digital display. On the right is a 'Screw Compressor Chiller', which includes a control panel with a large color touchscreen displaying a green schematic of a compressor system.

**Electrical Cold Room Panel**

**Screw Compressor Chiller**

This section highlights a 'TOUCH SENSITIVE KEYPAD Temperature Controller'. The image shows a black keypad with a red LED display showing '-17.7°C'. The keypad has several function buttons including a power button, a fan icon, and directional arrows.

**TOUCH SENSITIVE KEYPAD  
Temperature Controller**

This section shows two products. On the left is a 'Datalogger', a blue metal cabinet with a touchscreen display showing data graphs. On the right is a 'Humidifier', a white and blue industrial-style device with a large curved nozzle.

**Datalogger**

**Humidifier**

This section is for 'CASTLE Valves for Industrial Refrigeration'. It features the company logo and four different types of valves: a red-handled ball valve, a black-handled ball valve, a blue-handled ball valve, and a blue industrial valve with a large handle.

## BITZER Update on BEST Service Tool

The compressor specialist BITZER is presenting the latest update to its electronics service tool (BEST software). Refrigeration and service engineers can quickly and easily operate all BITZER IQ products from their PC using the BEST software.

The BEST software provides users with a complete overview of the operating status of BITZER compressors and condensing units, showing their configuration and permitting troubleshooting. BEST makes service engineers' work much easier, as they can use it to quickly and reliably set device parameters, analyse errors, view data logs and update firmware, for example.

At the end of last year, BITZER updated the tool which is used to commission, monitor and service compressors and their electronic components to version 2.7, adding important innovations. Amongst other options, it allows the compressor's current operation as well as historical data logs to be shown graphically. In addition to this, the units can now be switched to the American and imperial system of measurements. With Chinese and Finnish, the number of available languages has now been extended to eight.

### Larger Selection of Refrigerants & Compressors

In the new version 2.7, additional refrigerants can now be selected for BITZER components – for example, R450A, R513A, R1234yf and R1234ze in connection with CS compact screw compressors and with the protection device SE-i1 or R513A and R1234yf for the configuration of frequency-controlled CSV compact screw compressors. The update also includes the compressors

CSVH26-200MY-40M, CSVW37-240Y-40A and CSVW38-290Y-40A from the same series. For the CM-RC-01 operating module in combination with ECOLINE reciprocating compressors, the refrigerants R1234yf and R1234ze have been added. For the condensing units of the ECOSTAR series, the help text for the list of alarms has also been optimised.

If an earlier version of the BEST

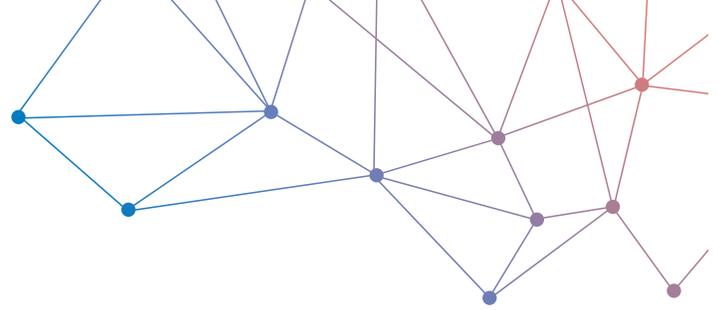
software has already been installed on the PC, then it is quite easy to update it via the software's automatic update function. If a new version is available, this will be shown in the lower right corner of the open software. Otherwise, the update can be downloaded directly from the BITZER home page, where there is also a video explaining the BEST software.



Image 1: The most important innovation in the BEST software is the option to graphically display the operation of the compressor as well as its data logs



Image 2: The software supports VARISPEED reciprocating compressors, CSV compact screw compressors, the external frequency inverters in the VARIPACK series, the LHV5E and LHV7E ECOSTAR condensing units as well as the protection, monitoring and operating units CM-RC-01, CM-SW-01 and SE-i1



# HVACR MEASURING INSTRUMENTS MANUFACTURER

**Temperature / Humidity / Pressure / Gas analysis / Air velocity  
Airflow / Air quality / Water pressure / Tachometry**



HVACR portables / Data loggers / Sensors transmitters and data acquisition system  
Portable airflow meter / Temperature probes

Join us at ACREX India 2017  
Hall-11 / Booth U-40

# A Concept Started 4040 Years Back

One has to study the details executed in those cities years back considering the need of people at that time and the infrastructure required now to make a smart city as per the need of the people of today...

**S**mart Cities, a term well used now-a-days as a feature of smartness, a symbol of developed world and symbol of future growth. The word itself steps up for the next century. We all should know that, the actual smart city

concept started long back in India. It started nearly 4040 years back in Harappa and Mahenjo Daro cities on the bank of Sindh River, which are the first signs of civilization. One has to study the details executed in those cities years back

considering the need of people at that time and the infrastructure required now to make a smart city as per the need of the people of today. It has to take care of essential infrastructure required to fulfill the need of people and how those infrastructure can be well maintained by those people only.

One very important fact is that while making the main city smart city, the adjacent cities have to be given equal attention as the main city is very much dependent on the adjacent cities. So,



smart villages, smart panchayats, smart nagar palikas are equally important to make the complete smart city.

Following points need to be considered while making footprint of a smart city:

- **Selection of cities:** While selecting a city among thousands of developing cities, we first consider its geographical location, resources available, earthquake zone and acceptance of local people towards modernization.
- **Open space availability or chances of redevelopment:** It is very much easy to find a location with good open space available compared to a congested area. But only open space availability cannot be the only criteria. While making new infrastructure, the open areas will help, but it is very difficult to generate revenue from such a city. One can make the city infrastructure ready by appointing good contactors and investing money



in time, but making it business friendly is very difficult. One can find that 80% of India's current business getting done in heavily populated locations (or say congested areas) such as Mumbai, Old Delhi, Surat, Lucknow, and so on. In this scenario, making a new location and diverting the entire business to that location is not that much easy. It will take years for people to get adjusted to a new location. In fact, it is always easy to develop a business friendly city into smart city.

- **Connectivity:** Today, every town in India is having a rail connectivity and road network. Government needs to make this rail and road network stronger and increase number of trains and increase road length between cities. Water transport and air ways also very important for carrying goods and business delegates respectively.
- **Connectivity within the City:** It is seen that 30% of our daily valuable time goes in travelling from our home to the workplace. In all major cities in the world, people prefer to stay at a walking distance from the office. We understand that staying at a walking distance is not possible but the distance should be covered within 30 to 40 minutes. Secondly, for the service industry, one has to travel within the city itself. So, it is very important to have local transport for travelling within the city. It will increase efficiency as the time consumed in travelling can be utilized in valuable works.
- **Pocket development:** While developing a smart city, care has to be given to reduce the travelling time within city. To facilitate this, pocket developments have to be done within the city. We can call it as small cities within a big city. Every pocket should comprise of one or two commercial activity and ten core functional businesses such as textile plaza, it hubs, automobile hubs, insurance hubs, pharma and healthcare units, tourism hubs, building services hubs with system providers of basic services in any building etc. The above

list can be move on considering the need of the market. While defining these locations we need to respect past history of each locality of the city such as if some area is well-known for silver threading works or some area might well known for bronze statue works and so on. While making new commercial hubs, these old traditional business units should be given respectable position. It will help in gaining local people's support in making the smart city.

- **Media and Cultural Units:** In today's cash flow ratio, media and cultural units also play a very important role. This not only gives better cash flow to the market, it attracts youth towards the city and give revenues to the government also. So, in every smart city, space should be provided for movie shooting, sound recording, movie production, and local entertainment proposals and so on. It will help in making hundreds of Bollywood units and local actors will get opportunity in their area itself.
- **Educational Hub:** Every smart city should have a dedicated educational hub which will have schools, colleges, management schools, engineering colleges, pharmaceutical institutes etc. So, all the local students will get their education and the local entrepreneur can take education as a profitable business.
- **Development of nearby cities:** In the history of civilization, it is seen that whenever a smart city gets developed up to some extent, the support comes from the nearby areas such as food, milk, education, man power supplies etc. However, less importance was given to these sectors. This discrepancy ended up in loading the main city and its infrastructure. By the time people realized, the main city get loaded and collapsed. This widely seen when city like Mumbai collapsed when local train halted somewhere or Chennai came to a standstill when there was heavy rain for three days. So, when we develop city 'X' as smart



city, the other populated cities within 100 kms of the smart city to be given proper thought so that milk production units, processing houses, food production units don't rush to the main city to open their units to get their customers where the actual demand is. In fact, they should remain in the nearby 'Y' or 'Z' cities and keep supplying services to the main city. It reduces the burden on the infrastructure of the main city such as water demand, drainage, electrical receiving stations etc. it will help the smart city grow much faster and the nearby cities keep growing along with the main city.

### Requirements of a Smart City

For self and uninterrupted functioning of a smart city, adequate quantum of water storage and distribution, electrical distribution and availability in the inter state grid, proposed requirement of water and electricity for next 30 years has to be in place for proper functioning of the smart city.

### Energy efficiency and water saving models

While structure of the building gets ready in few years and all the building get structural guarantee of 50 years, the other

services has to be guaranteed for same period too. This can be possible only when proper energy efficient and water saving models get installed in the building. Maximum losses have found in past buildings in terms of water losses, water leakages, electricity losses which resulted in heavy losses to the building. Once the structure is finished, there is no running cost into it. But the basic supplies such as water and electricity have a running cost. So, while installing these services, proper design has to be done. MEP services costs one third of the structure cost. But if not checked properly, it might have to be replaced 10 times in 50 years of lifespan of the building. Energy audit needs to be conducted within a span of three years.

### Fire detection and protection system

While designing a smart city, firefighting system plays very important role. This starts from the fire generations. Fire may take place from electrical units or from cooking gas or man-made fire such as physical fire by negligence. Second is the detection. When there is a fire, it has to be detected within seconds of the fire so that occupants get an alert. Proper fire evacuation system and preserve open space is very important in each cluster of the smart building. The city should be

given with proper fire stations. One fire station should be there in each 10 km of area or 20 minutes of travelling time.

Now, at each building level, proper firefighting system should be provided for each building as per national building code guide lines.

The city should be ready for operation after fire as well. Once there is a fire, the system should work along with fire brigade officer and from next day the building should be operational again so that the regular business doesn't get affected.

### Conclusion

From the brief, we all have understood the different factors of a smart city. We will have more idea when we will study each chapter separately. The basic thing is that we need to give equal preferences to each and every aspect of a smart city and adjacent cities should also be developed as support system of the smart city. It may take 20 years to make a smart city but it should work for 200 years ahead. ■

**Firoj Jena**  
CEO  
Clancy Global Consulting  
Engineers  
Mumbai



Freshness is in season.

So too is  
**breakthrough**  
energy efficiency.



Food quality is important to meet your customer's needs, but so is keeping control of your operational cost. Emerson's advanced compressors, condensing units, refrigeration components, control systems and electronic controls assist retailers in food preservation while actively managing the energy consumption of their stores. So now is the time to keep your customers happy while making your business more efficient, with Emerson solutions providing freshness for less. For more information go to [EmersonClimate.com/India/refrigeration](http://EmersonClimate.com/India/refrigeration)



The Emerson logo is trademark and a service mark of Emerson Electric Co. © 2016 Emerson Electric Co.

**EMERSON. CONSIDER IT SOLVED.**



## “Indian Govt initiatives help to drive growth”

APM Terminals Inland Services, South Asia’s container services division, provides extensive and specialized, dry as well as refrigerated container services with a presence in Chennai, Dadri, Panvel, Pipavav, Tuticorin and a recently commissioned reefer services facility in Dighode, Nhava Sheva. The incorrect loading of refrigerated cargo into a reefer container or an error in temperature setting can prove disastrous for the consignment, informs **Ajit Venkataraman, Managing Director, APM Terminals India Pvt Ltd** in an interaction with **Supriya Oundhakar...**

### Please take us through your reefer business program.

APM Terminals Inland Services, South Asia’s container services division, provides extensive and specialized, dry as well as refrigerated container services with a presence in Chennai, Dadri, Panvel, Pipavav, Tuticorin and a recently commissioned reefer services facility in Dighode, Nhava Sheva.

Unlike the dry container business, refrigerated container operations are far more complex. The sensitive nature of refrigerated cargo demands in-depth technical knowledge and expertise. Our refrigerated container services program is designed around customers’ needs and delivers end-to-end solutions including

storage, repairs and maintenance, pre-trip inspection and malfunction resolution.

### How has the reefer business evolved over the years in India?

The business in India has evolved to a more professionally organized marketplace and there are three clear trends:

First, refrigerated imports have significantly grown. The scenario has transformed from a traditionally strong export market to a considerably large import market as well, thanks to the expanding demands of the Indian consumer.

Secondly, the business now reaches farther inland. With infrastructure and industry development, more and varied commodities from the Indian hinterland are now being exported. For example,

grape exports from Nashik have witnessed a 180% growth.

Third, the refrigerated container business has expanded from handling primarily agricultural produce to a much wider product basket, including pharmaceuticals, confectionaries, horticulture, chemicals and meat among others.

### According to you, what are the key growth drivers for the reefer segment?

The growth of sectors requiring temperature control and sensitive cargo such as agriculture, horticulture, poultry, seafood and pharmaceuticals, directly impact this segment. Increased disposable income, and exposure to global food



products have impacted consumption patterns. This has led to emergence of an increasingly organized and expanding retail and food processing industry. The availability of necessary infrastructure in transportation and world-class cold storage capabilities are critical drivers of India's global reefer trade. Indian Government initiatives including various infrastructure-related subsidies and the establishment of a National Centre for Cold Chain Development (NCCD) also help to drive this growth.

**What are the USPs of APM Terminals Inland Services when it comes to reefer services?**

APM Terminals Inland Services offers best-in-market refrigerated container services of global standards. People,

safety, infrastructure and transparency are the major USPs. Modern tools and container handling equipment, as well as integrated IT systems are deployed to deliver world-class services with speed and efficiency. The exclusive and specialized reefer services facility recently opened at Dighode is the first-of-its-kind in India. Safety is a paramount concern, and APM Terminals Inland Services conforms to our corporate global safety standards. Our people are our biggest assets and we are driven by customer focus. International Institute of International Container Lessors (IICL) qualified surveyors, Other Equipment Manufacturers (OEM) certified technicians, offer an ability to create customized solutions for our customers. We offer transparency to our customers

supported by well-established processes and systems.

All this combined, is what gives us credibility with customers and end users, and makes the real difference.

**You have recently launched a new reefer services in Dighode, Mumbai. Please elaborate on the facilities offered at the facility.**

A real need existed for dedicated refrigerated container solutions in India. The Dighode facility is a state-of-the-art facility capable of handling over 3,000 containers, and was established in close proximity to JNPT – the busiest port in India.

With storage, maintenance, heavy body repairs, machinery repairs, training, pre-trip inspections, cleaning of containers and managing software related issues, this facility is a one-stop shop for refrigerated container providers and users. The facility houses world-class diagnostic equipment, and a talent pool of IICL qualified surveyors and OEM certified technicians. A 24X7 reefer technical assistance desk ensures we are just a call away for our customers in case of emergency.

**What challenges do you face in maintenance and services of reefer containers? What actions have you initiated to tackle them?**

The incorrect loading of refrigerated cargo into a reefer container or an error in temperature setting can prove disastrous for the consignment. We organize training programs for end users' workforce at the loading site to develop skills pertaining to infrastructure requirements, the avoidance of 'hot stuffing', and optimum utilization of a refrigerated container.

Another concern is the availability of genuine spare parts for refrigerated containers. These are of high value and need to be imported, leading to long lead times. We have assumed dealerships of various genuine spare parts manufacturers including an exclusive dealership for Starcool in India. This helps us restore refrigerated containers to perfectly working condition in a very short time. ■

Use of natural refrigerants is already a reality in the Indian commercial refrigeration market...

## Reducing India's Power Consumptions

**E**mbraco, an innovation-focused multi-national and one of the world's largest manufacturers of hermetic compressors for refrigeration, has used natural refrigerants for more than 20 years in its portfolio of compressors for commercial use. Compressors equipped with propane refrigerant (R290) are more energy efficient and align, in a sustainable manner, economic and environmental needs.

In a recent partnership with an Indian company, Embraco is the first enterprise to supply high efficiency compressors using natural refrigerants for the country's refrigeration market. With the world's second largest population, high electricity costs and poor food conservation, the Indian Government has encouraged development of the refrigeration market through tax reform in addition to tax and product cost reduction.

### Legislation

Governments and entities have been working strongly on mechanisms to reduce energy consumption. New legislation in both Europe and the United States is advising manufacturers to be increasingly more concerned about launching high-efficiency products, which means more attention is aimed at designing solutions that meet these new requirements.

"Regardless of the current legislation in the various countries where Embraco operates and the imminent ban on the use of HFCs, the company is prepared to attend the global refrigeration market, which seeks to migrate to natural

refrigerants," highlights Esequias Pereira, Embraco's Commercial Senior Manager for Asia.

Embraco has as a guideline to use the least possible amount of energy in its compressors and this way of thinking is responsible for the constant evolution in its product lines. An example of this is Fullmotion technology, variable capacity compressors which use propane refrigerants that can save up to 40 % of the energy when compared to conventional compressors.

Another example that we can mention is the EM2X compressors. With single speed, using natural propane refrigerant (R290), they are designed to serve a diverse range of equipment, including beverage coolers, vending machines and reach-ins. Since they have a smaller platform, these compressors have greater cooling capacity and can substitute larger compressors, freeing internal space in the equipment.

### Benefits of R290

Besides all the economic and environmental benefits that using R290 provides Embraco compressors, it's important to highlight its safety. Regarding the flammability of the propane refrigerant, its use is safe, since the entire electric circuit of compressors using this refrigerant is designed to prevent generating sparks. Added to this is the fact that the charge used in applications is small, between 40g and 150g for commercial systems.

### Success Cases

To prove the efficiency of its

compressors, Embraco constantly conducts tests with its customers. In the case of R290, we can illustrate three applications that attested to its effectiveness in replacing R404A for natural refrigerant. A test carried out in a glass door freezer for point of sale, the R290 achieved a 32 % energy reduction, a real gain of US\$ 38 per year and, according to projections, would no longer emit 2,277 kg of CO<sub>2</sub> in 10 years. When the test was performed with a vertical freezer, the savings were even higher, a 43 % reduction in electric energy consumption and a savings of US\$ 226 per year, with proven benefits to the environment, since changing the refrigerant indicated that 12,764 kg of CO<sub>2</sub> would no longer be released into the atmosphere in 10 years. In an ice cream freezer, there was a 16 % reduction in energy costs, which means a real gain of US\$ 26 per year for the consumer and 1,954 kg less CO<sub>2</sub> in the atmosphere in 10 years, also proving an environmental gain.

Embraco is a multinational in the sector of hermetic compressors for refrigeration focused on innovation. The compressor is the main component responsible for producing cold in the refrigeration system. With global operations and annual production capacity of 40 million units, Embraco offers solutions that are differentiated for their innovation and low energy consumption. Its more than 11,000 employees work in factories and offices located in Brazil, China, Italy, Slovakia, Mexico, United States and Russia. ■



**C.R.I. PUMPS**

Pumping trust. Worldwide.

# HVAC & R

EXCHANGING HOT AND COLD



## Pumping Solutions, Engineered

CRI pumps offers world class flow management solutions with an impressive range of high performance pumps to take on the "tall challenges of high raising infrastructure like skyscrapers, apartment complexes hotels ect. these pumps, powered by innovation and backed by the CRI brand ensure high performance and efficiency.

**Less downtime | Low operating cost | Readily available technical support**



E-mail : [bcsmkt@cripumps.com](mailto:bcsmkt@cripumps.com) [www.crigroups.com](http://www.crigroups.com) Toll Free 1800 200 1234

# IoT for Reshaping HVAC Industry

The Internet of Things is truly revolutionizing the commercial HVAC industry in nine pivotal ways, from remote diagnostics to increased efficiency...

When you think of the Internet of Things and the heating, ventilation and air conditioning (HVAC) industry, what first comes to mind? It might be the infamous Nest Learning Thermostat, the first connected heating and cooling system of its kind. According to Emerson Climate Technologies, 33 percent of thermostats sold in 2014 were wifi-enabled. This number will climb to a whopping 75

percent by 2019. But the IoT's reach extends far beyond residential applications, whether you realize it or not. The Internet of Things is truly revolutionizing the commercial HVAC industry in nine pivotal ways, from remote diagnostics to increased efficiency.

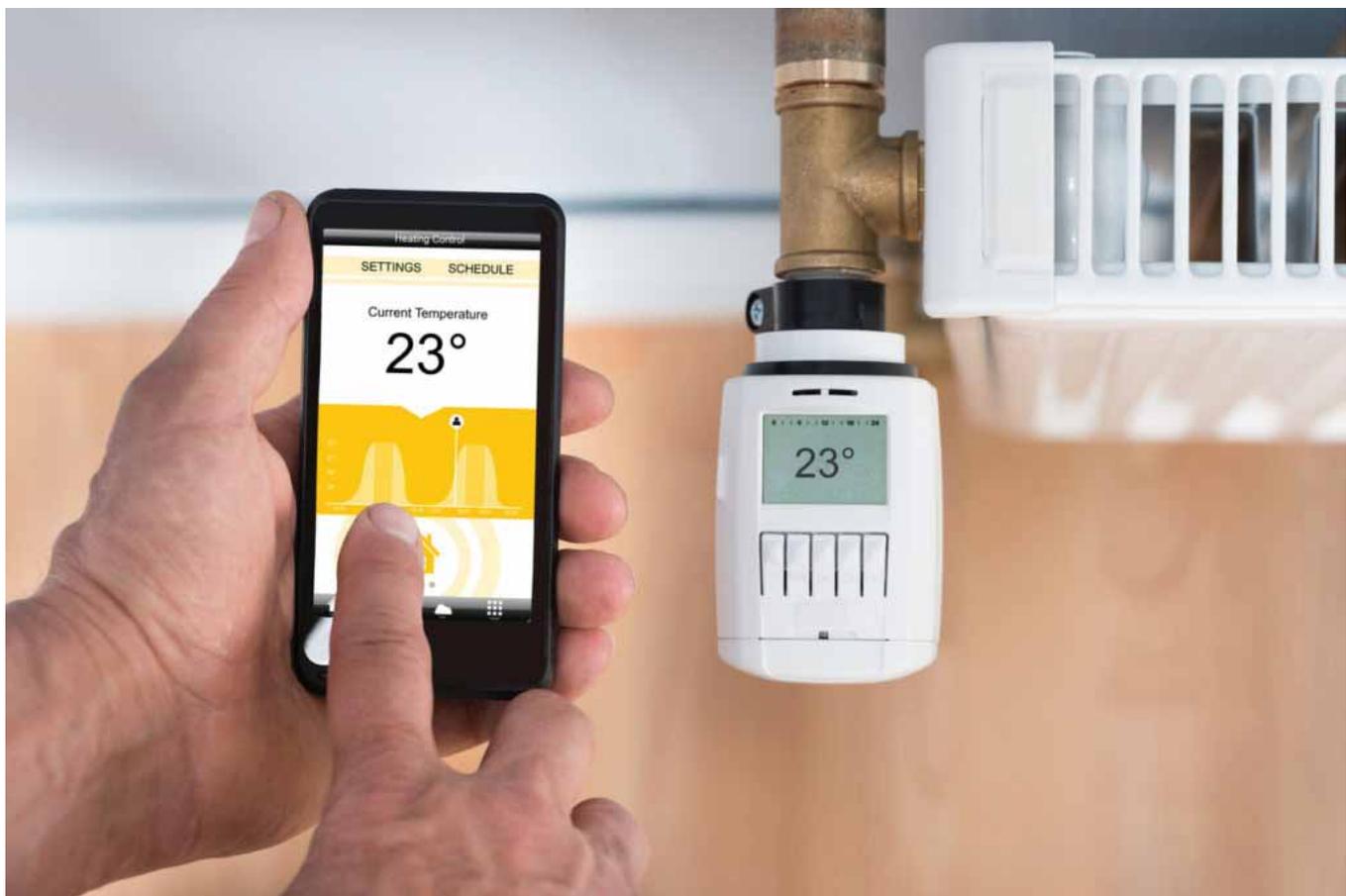
## Real-Time Monitoring

Internet-connected heating and cooling systems have the ability to continuously

monitor conditions and system functionality with the help of smart sensors. Once information is gathered, it can immediately be shared with system managers, engineers, technicians and so on. IoT, which is powered by a proper OS and an Intel processor, allows users to monitor and control equipment with real-time data that's delivered to them in an easily digestible format.

## Predictive Maintenance

As retrieving the data is one thing – making use of it is where the value lies. Connected systems are able to analyse the information they gather and actually alert managers to unusual equipment behaviour or system failure, which results in quicker



response times and the ability to avoid potentially devastating problems. Additionally, internet-based systems help reduce maintenance and repair costs over time.

## Remote Diagnostics

This point goes hand-in-hand with predictive maintenance. Without the help of the Internet of Things, a problem must be recognized (in person) and subsequently diagnosed once an analysis has been performed (by a human). However, a connected system can detect a change or issue and send a notification within minutes of the occurrence. This process allows the user to review the data and issue a diagnosis from anywhere (maybe on an iPad or a smart phone) at any time (say, over the weekend) so the situation can be addressed immediately, ultimately saving both time and energy costs.

## Total Controllability

Consumers in our soon-to-be-IoT-ridden world don't just want a 'smart' system. No, that's not quite enough. What they really want is total control (world domination is presumably next). Back to residential thermostats for a second climate technologies allows users to create upto nine different weekly temperature schedules and control multiple thermostats (in the same house or off-site locations) from a single app. These days you no longer need to physically touch the systems in your house to manage them.

## System Adaptation

Sure, internet-based systems can be entirely controlled by their users, but the coolest part is that they don't need to be. The most advanced systems have actually been designed to adapt to their surroundings like never before. With the help of smart sensors, systems can measure temperature; humidity and air flow throughout an entire building as well as determine external factors such as the weather forecast and current utility rates. With this rich information in hand (or in "brain"), the system adjusts its settings to plan for upcoming situations, thus boosting

efficiency. By learning how to alter its behaviour based on current or upcoming situational factors, it's able to proactively create a comfortable environment instead of reacting to changes after they occur.

Example: Let's say a heat wave is due to hit your area in two days. A connected system will note this temperature spike and cool your office building down overnight – when it's most cost-effective to do so – to save energy costs and ensure the climate is comfortable when workers arrive in the morning.

## Continuous Comforts

Comfort is subjective. However, there is some science behind it. While you may think a comfortable room is driven solely by temperature, humidity is a major player in this equation. Humidity levels affect the amount of latent heat present in the air, and that can determine the level of comfort. As mentioned in the point above, these web-based systems are incredibly receptive. They observe and learn. They gather information and adapt. Not only are they shooting for optimum efficiency – they're also maintaining a comfortable environment (based on user behaviour and external factors) at all times.

## Increased Efficiency

HVAC units and buildings outfitted with smart, connected sensors simultaneously track both external sources and interior performance to optimize efficiency. Remember the Daikin Applied equipment I mentioned earlier? The company has said their system can offer at least 20 percent reduction in energy costs by utilizing a technology called "demand response." Although several factors are fueling the ubiquity of IoT in this industry, the potential energy savings alone are enough to keep the fire fueled, so to speak.

Another example of energy-saving equipment is Wellington's Smart Control Solutions (SCS). The SCS product line includes intelligent electronic thermostats and energy management devices (EMDs) for commercial refrigeration systems. See the visual below to read about how this system offers cost-savings through energy efficiency.

## Inherent Connectivity

These smart sensors I keep mentioning don't simply pick up clues and collect data. They also enable systems to communicate directly with other systems and devices in a building without the use of a controller. IoT-capable options are replacing traditional building automation systems (BAS). BAS provide controllability, but web-based alternatives add the benefit of sophisticated data collection, analytics and greater connectivity opportunities.

Communication and connectivity are not limited solely to heating and cooling functions. Other systems, including security and lighting, could share a set of occupancy sensors with an HVAC system so all are in sync and communicating seamlessly.

One consideration when it comes to investing in new, connected systems is compatibility with older ones. While integration is possible in many cases, it could be more work than it's worth in the end. Upgrading your entire system to newer, smarter technology is probably your best bet.

## Focus on UX

The technologies emerging today are extremely user-friendly. Those that gloss over User eXperience (UX) will not thrive. Period. Connected systems are collecting massive loads of data that is then made available to users, so the ease of accessing and understanding this data is critical. If information cannot be properly digested, then what's the point? Good data is timely, accurate and comprehensible.

HVAC contractors are hearing more and more about the IoT these days. Some installers in the construction industry are already at the forefront of using the technology associated with it. So, what is the IoT? Simply put, it means the Internet of Things and refers to the vast network of objects or "things" that are connected together using the Internet. Each "thing" is assigned an IP (Internet Protocol) address, a series of numbers divided by periods or dots that is (hopefully) unique.

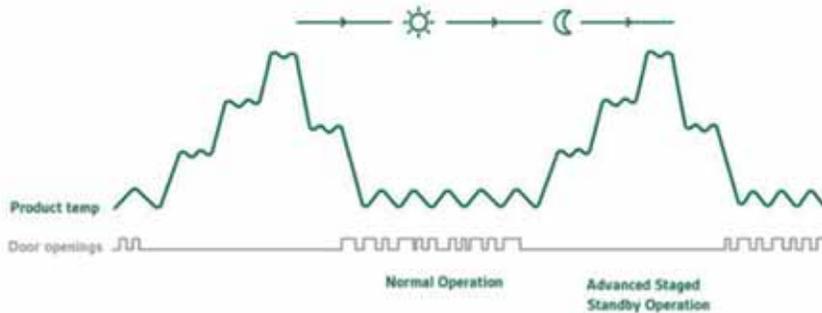
The term Internet of Things was first used in 1999 by Kevin Ashton, Executive

### Save Energy in the Real World

Our multi-stage automatic standby mode maximises your ability to save energy. Temperature, light levels for multiple zones, and fans can be independently controlled.

We have also made it easy to optimise refrigeration efficiency, with continuously variable fan speeds (when used with EC motors), dimmable lighting, and a large range of easy to adjust control parameters.

With the SCS Connect System, real world energy savings can be monitored and cooler behaviour can be optimised to suit specific store needs. Real world energy saving can be easily shown to store owners, due to the SCS controller's built in power measurement capability.



Director of the Auto-ID Center at MIT. He had been involved with installing chips into product packaging to improve tracking of inventory by communicating wirelessly with computers.

There is now a new Internet Protocol called IPv6. This features an extremely large address space that could potentially allow every single thing on the planet to have a unique ID. This, coupled with the expansion of broadband Internet and the drop in price of smart devices has led to an explosion of things being added to the IoT.

### Smart Company, Smart Home

One of the most successful companies in this field has been Nest Labs. In 2011 the small company introduced their Nest Thermostat. This attractive looking device was controlled wirelessly by a smart phone, and it learned what temperature settings and timing building occupants preferred. It wasn't long before the company was gobbled up by Google and now all kinds of companies are jumping onto the IoT bandwagon.

The IoT lends itself really well to the HVAC industry as sensors have already been used in a lot of equipment for years. The next logical step was to connect these sensors to the Internet either through wired connections or, more likely, wirelessly by WiFi to a central router or through mobility service. Once the data enters the Internet it can be stored in databases and monitored by applications.

Equipment maintenance has been an obvious area for IoT connection. An example is software from a new startup called Augury. According to their website: "Every mechanical system can be characterized by the sound that it makes – machines 'talk' and we understand their language."

Their system uses data from vibration and ultrasonic sensors in HVAC equipment. It compares current data with previous data from the same machine, as well as data collected from similar machines. Their platform can detect the slightest changes and warn of developing malfunctions. This analysis is done in real-time and the results can be displayed on a smartphone within seconds.

They also provide an online management platform accessible from any Internet-connected computer that displays the status of all monitored equipment and assists in making informed, accurate and efficient maintenance decisions.

Another of the most important aspects of HVAC to be monitored is ductwork. Sensors can be placed in ducts to measure airflow, static pressure and temperatures.

In an article for Contracting Business, Rob Falke, President of the National Comfort Institute explains that static pressure allows installers to "see" the system in a new perspective. "Airflow becomes visible. The result of measuring static pressure is the ability to prescribe duct renovation work. You begin to see

that the duct system is what controls comfort and efficiency. Only by getting the ducts operating properly can you assure the system as a whole is operating properly."

Not only does this data prescribe the diameter of ducting but the best termination methods, such as which grille or diffuser to use. The IoT promises to improve many aspects of the HVAC industry from preventive maintenance, responsiveness and increased energy efficiency to improving contractors' work processes and the comfort of their customers.

### Will the Internet of Things (IoT) Revolutionise HVAC Business?

During the last couple of years our lives have been filled with more and more devices that are connected through the internet. Fitness monitors, lightbulbs, door locks and many more things in our homes can now be controlled using the internet. The research company Gartner forecasts that there will be 6,4 billion connected things in the world during 2016 and that the number will increase to 20,8 billion in 2020. We have discussed Internet of Things and smart buildings as a mega trend in an earlier post, but this time we'll go a bit deeper.

### Remote Control Systems not new, Why This Hype?

Systems for controlling different functions of a building (locally or remotely) are not new. They traditionally go by the name Building Management Systems (BMS) or Building Automation Systems (BAS). The differences between the traditional systems and systems harnessing Internet of Things are mainly two – cost and usage of data.

As broadband, sensors and smartphones get cheaper only your imagination limits what can be connected. Today it's possible for almost anyone to automate parts of their living environment. It's obviously a bit more complex when it comes to automating an entire building or city compared to a one family home, but the same mechanic is in motion. And it

# BLAST FREEZING MACHINE USING BITZER SCREW COMPRESSORS



FAST BLAST FREEZING TIMES  
TRUST BITZER COMPRESSOR

BITZER high technology German refrigeration compressors & units are ideally suited to Blast, Trolley & Tunnel freezers for the Indian Meat & Chicken Industry.

The heart of any refrigeration system is the compressor, BITZER screw compressors offer unrivalled performance & capacity in single refrigeration condensing packages complete with electrical, control and operational components for trouble free service.

BITZER INDIA PVT.LTD.  
R-708/1, TTC Industrial Area, Rabale,  
Navi Mumbai,- 400 701, India  
Tel: +91 22 71071000  
Fax: +91 22 71071031  
[office@bitzer.in](mailto:office@bitzer.in)  
[customercare@bitzer.in](mailto:customercare@bitzer.in)



THE HEART OF FRESHNESS

has already started, read about South Korean city Songdo that was built from the ground up to be an intelligent city.

When it comes to data, BMS and BAS systems generate a lot of data but they don't really utilise that data to the same effect as a cloud based system have the ability to do. A system based on IoT can collect data from many different sources and act upon that data to optimise indoor climate, lighting and energy use without the need for big integration projects or for system operators to maintain the system.

### From Smart Homes to Intelligent Cities

In the report The Internet of Things: Mapping The Value Beyond the Hype by McKinsey & Company it is stated that while consumer applications like fitness monitors and self-driving cars get the most attention, there is actually a bigger potential in B2B applications with a potential economic impact between \$4 trillion and \$11 trillion. McKinsey estimates that as much as 70 %

of the potential value enabled through IoT will be generated from B2B.

### How will IoT Change HVAC?

As with all shifts in technology, changes will happen in the ways we live and do business. With the actions being taken for more energy efficiency in construction and managing of buildings there is a big potential through Internet of Things. HVAC systems that can make their own intelligent decisions based on presence, weather and lots of other indicators have a great potential to cut energy use and cost.

We are also certain that new business models will emerge. HVAC systems using IoT will be able to predict situations from collected data and have automated alarms for service and maintenance that can facilitate new services.

So will there be a revolution in HVAC? Yes and it is already on-going!

### Conclusion

The Internet of Things is shaping the

way we interact with objects as well as each other, and its impact spans a wide range of business sectors. For the HVAC industry, IoT means better managed, maintained, connected and efficient systems. But it actually means more than just a connected system – it means a smarter environment engaged in constant communication. The opportunities look pretty promising, at least from where we're sitting.

Speaking of the subjectivity of comfort, did you know that a recent study shows corporate offices are heated and cooled using a formula based on the metabolic rates of men? This might explain why I (a woman) run a space heater beneath my desk even in the dead of Atlanta summers, but I digress.....

#### Dr OmPrakash G Kulkarni

Scientist, Mentor, Adviser, Technology Provider & Consulting Engineer in Automation, Instrumentation, Energy Management, IPR, CDM & Renewable Energy



## James Ham Appointed as Managing Director of Carel Korea

**J**ames Ham has taken over as Managing Director of CAREL Korea, the CAREL subsidiary operating in South Korea since 2010. The subsidiary is based in Seoul, and provides sales support and technical service to customers throughout South Korea with regard to projects and solutions. The subsidiary employs a dedicated team of service and support personnel.

James Ham was the first to join the subsidiary and has guided its sales development since its foundation. In recent years, James has worked as National Sales Manager for the HVAC market, under the supervision of Alberto Catullo, North AAPAC Region Chief Executive Officer and until now CAREL Korea MD ad interim.

In his new role, James will be responsible for overall management of CAREL's business in the South Korean market. "We are certain that the passion and dedication that James Ham has



shown over the years will help him in leading our South Korean team to achieve CAREL's ambitious growth objectives on the local market", Alberto Catullo stated.

"I am honoured to have the opportunity to lead the South Korean team," James

Ham commented. "Starting from the success we have achieved in recent years, our aim is to strengthen the CAREL brand in South Korea and make our high-efficiency solutions increasingly accessible to the local market".



## High density storage achieved with Schaefer Orbiter System.

Many logistics managers are unaware of the potential optimisation and streamlining of homogenous goods storage that modern warehouse systems can offer. The Schaefer Orbiter System allows you to compress your storage and speed up operations with storage and retrieval speed at 1m/second. Contact us today, we can show you how you can achieve effective storage needs.



# Life Expectancy of Solar Cooling Systems

To ensure a good quality and avoid any backlashes from low – or non-performing systems, quality requirements need to be developed soon, as solar cooling technology is developing very fast and high expectations are put in it. Solar cooling systems require high investments and therefore, any kind of guarantees on life expectancy, performance or durability are welcome to convince or reassure customers and investors...

Several factors are driving the market for solar cooling solutions. On one hand, the exploding demand for cooling and consequently, the demand for electricity to drive the conventional cooling machines is becoming not only very expensive but also endangering the stability of electricity grids. In several European countries, the peak electricity demand has already shifted from winter to summer and the demand for more comfort

and cooling is rapidly increasing even in more moderate climates. Furthermore, the trend of larger solar thermal systems and higher solar fractions lead to more available solar heat output in summer than what is actually needed. These factors make solar thermal cooling a more and more attractive option. The number of installed systems has increased tremendously during the past few years and several new thermally driven cooling machines, especially,

designed for smaller capacities and lower driving temperatures have entered the market. As this is a very new market, there are hardly any standards regarding the durability of solar thermal cooling systems so far. To ensure a good quality and to avoid any backlashes from low – or non-performing systems, quality requirements need to be developed soon, as solar cooling technology is developing very fast and high expectations are put in it. Solar cooling systems require high investments and therefore, any kind of guarantees on life expectancy, performance or durability are welcome to convince or reassure customers and investors.

## Common Technical Problems

Some of the frequently detected technical problems which have been emphasized are:

- Solar collectors overheating due to insufficient thermal energy demand or





- difficulties to match solar energy availability and energy demand with the result of serious damages in solar collector field: leakages, degradation of the thermal insulation and absorbers, etc...
- Control and regulation sensors located in not suitable positions causing control failures and low system performance.
- Heat storage higher than necessary causing delay to start up the solar assisted cooling system and reduction of operating hours in solar cooling mode.
- Lack of suitable technical maintenance. Risk points are basically the solar collector field and the heat rejection system.

- Difficulties to combine the control of the conventional cooling system with that of the solar cooling system.
- System performance deviations against predicted performance due to failures in operation of the control system and the heat rejection system, resulting in an insufficient cooling capacity.

### Seasonal Operation of Solar Assisted Cooling Systems

Chiller manufacturers state that seasonal operation of solar assisted cooling systems does not produce technical problems if during each commissioning, suitable regulation of all

internal parameters is made according to the instructions provided by the manufacturer, although there is evidence that this could have influence on the switching valves. On the other hand it is also unlikely that the medium and large chiller can be operated as a heat pump for heating due to its low coefficient of performance (COP).

In terms of cost-effectiveness of solar cooling systems, seasonal operation leads to less operation hours per year and makes it more difficult to get the investment recovery. Anyway regarding to cost-effectiveness, seasonal operation is only an additional issue because the main problem is the actual high investment costs of the systems.

In case of long-term shutdown of absorption chillers, some manufacturers recommend to pressure the vapour space with nitrogen above atmospheric pressure so that oxygen cannot enter the equipment through any possible leakage caused by corrosion. Usually, chiller parameters are controlled during each annual commissioning at the beginning of operation, but they are not taken into account during idle operation.

### Maintenance Requirements

Depending on the system, solar cooling systems can require exhaustive technical maintenance. Because different elements (solar thermal circuit, heat rejection circuit, chiller circuit and distribution circuit) need to be combined, the complexity of the hydraulic connections is higher for a solar cooling system than for a solar thermal systems to produce heat. Maintenance must be periodic and it cannot be neglected because the consequences are complex to solve afterwards.

The maintenance effort for chillers is usually low. Absorption machines, for example, are robust and inherently stable, its solution concentration adjusts to the imposed temperatures according to its thermodynamic properties to provide trouble free operation for the user and no active controls are required with the exception of controls to deal with crystallization issues. However their



maintenance, in most of the cases, requires technicians trained by the own chiller manufacturer. As a result, it is usually expensive and the access to this maintenance uses to be difficult to get in some regional markets where chiller manufacturers have few products or there is no presence at all. After-sales management should be guaranteed.

Corrosion is usually the ultimate failure of absorption chillers. Because the life of the chiller is limited by corrosion, for long life, great attention must be paid to avoid introduction of air into the equipment and to ensure the corrosion inhibition regime is strictly followed. Maintenance of absorption chillers usually includes purging of non-condensable gases, addition of octyl alcohol (if it is used), addition of corrosion inhibitor and addition of pH buffer. The frequency of these tasks depends on variables such as the size of the chiller or the purging system and is specified by the chiller manufacturer.

Heat rejection systems such as cooling towers require exhaustive maintenance and in the case of wet cooling towers, periodic controls, regular water treatment and periodic water analysis depending on the national regulations are required. On the other hand, heat rejection systems such as geothermal probes, basically, require the checking of hydraulic pressure in the pipes. The solar collector field imposes an annual basic maintenance load. Air vents should be installed and periodically checked.

## Critical Elements Regarding System Durability

Elements which need special attention regarding system durability are the heat rejection system at the top, the chiller and controls. Many technical problems with chillers are associated with improper

maintenance on the heat rejection system. Insufficient heat rejection air flow due to dirt accumulation in the filters is frequently reported. Hence, the heat transfer capacity of the heat rejection system decreases and the return temperature of the chiller rises resulting in a decrease of the performance of the chiller.

In such situations, a safety control should be active to protect absorption chillers against crystallization. It is absolutely necessary to avoid or minimize the accidental introduction of oxygen during maintenance procedure. If vacuum must be broken for any reason, the vapour space should be filled with nitrogen or other inert gas to avoid introduction of oxygen. Regarding absorption chillers using silica gel, the return temperature provided by the heat rejection shall be above the temperature of the cooling circuit. Otherwise condensation may occur in the absorber. Critical components are the vacuum chamber and switching valves which have to switch every 5-10 minutes.

For desiccant systems, the air filters have to be cleaned or changed regularly, in order not to have accumulation of dust in the passages of the desiccant wheel resulting in performance degradation. Potential air leakage between the supply and exhaust air stream in the desiccant wheel has to be checked and prevented.

Additional to the maintenance procedures, it is strongly recommended to carry out a periodic assessment of performance against the values declared by the manufacturer in order to detect potential technical problems.

Overheating during periods without cooling demand (weekends, holidays, etc.) produces a great degradation of the solar collector field. Special caution has to be paid to release trapped air inside the circuits and collectors.

Since solar cooling systems are more complex than e.g. solar thermal systems for heating support, more effort has to be made for regular maintenance and system checks. Some aspects that should be tested or checked to improve the durability of solar cooling systems are:

## Aspects to Promote Solar Cooling Installations

Even though the level of technological solutions of solar assisted cooling systems can be considered as quite mature, their penetration is mainly limited to demonstration and research installations.

At present the costs of solar assisted cooling systems are high as compared to other cooling technologies. The low degree of standardization and the lack of know-how in system design and of trained installers, technicians and designers are additional obstacles. Training of the installers, planners, etc... should be part of a quality assurance system.

For these reasons, economic support and incentives are still required to improve the market penetration of the technology. More demonstration projects for practical use with high quality should be installed. Their operating performance and energy savings should be analysed. Such information should be easily accessible by interested people. ■

Reference: QaiST – Quality assurance in solar heating and cooling technology Task Report 5.3.2  
Date: 21/05/2012

Ritesh J Mistry  
M.E Cryogenic  
L. D. Engineering Ahmedabad.  
Zamil Air Conditioners India  
Pvt. Ltd. Ahmedabad



**Now  
Subscribe / Renew  
Online**

**Cooling India**

Just Log on to: [www.coolingindia.in](http://www.coolingindia.in)

# *E-Cool*

EVAPORATIVE COOLING PADS

**S.S. LIFESTYLE PVT. LTD.**

Off.: 43/44, 1st Floor, Vijay Nagar Bldg.,

Dadar (W), Mumbai - 28, India

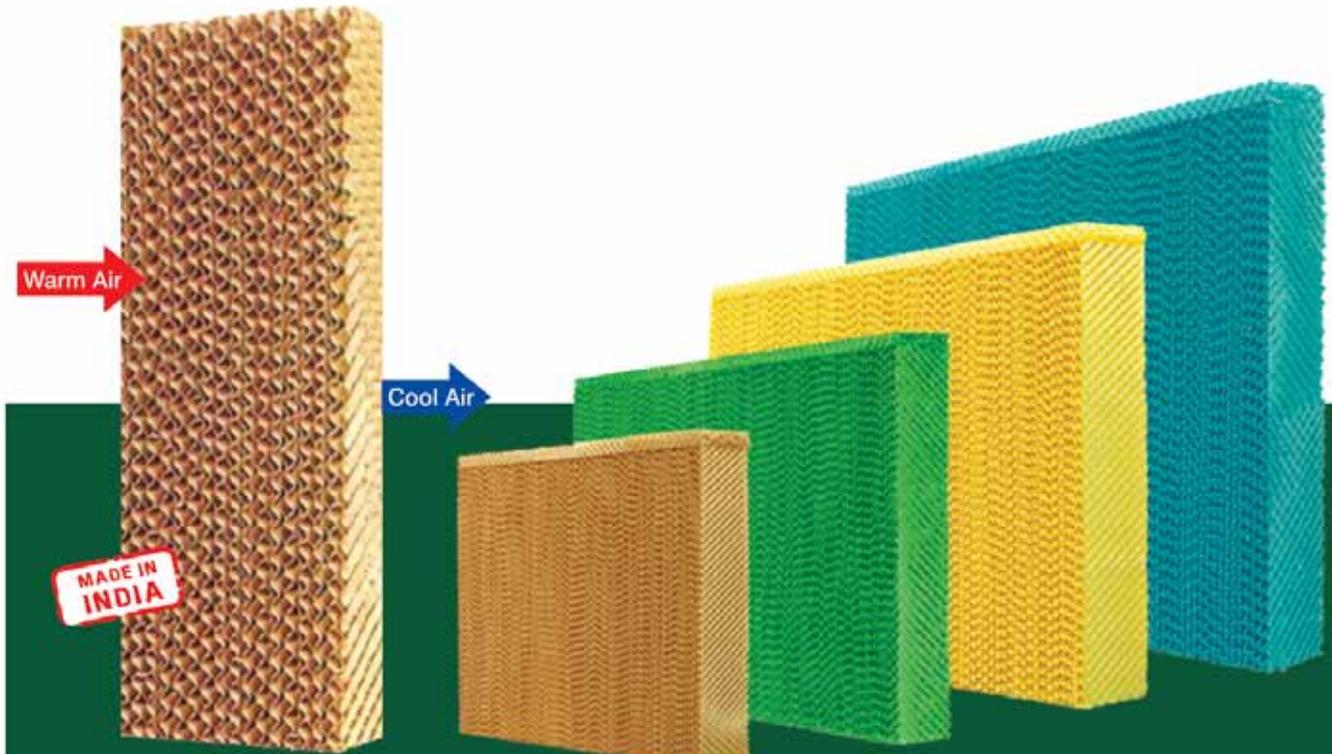
Tel.: 91-22-66611177, Fax.: 91-22-24326880

Email : shyam@sslifestyle.in

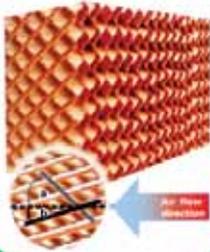
Website: www.sslifestyle.in

## PROFESSIONAL

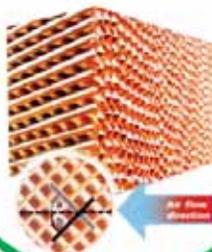
### COOLING PAD & AIR COOLER MANUFACTURER



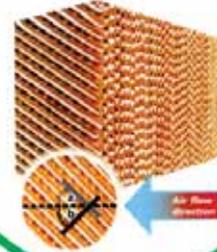
for maximum efficiency



for excellent Pressure drop



for Portable evaporation cooler



# Ventilation Retrofit

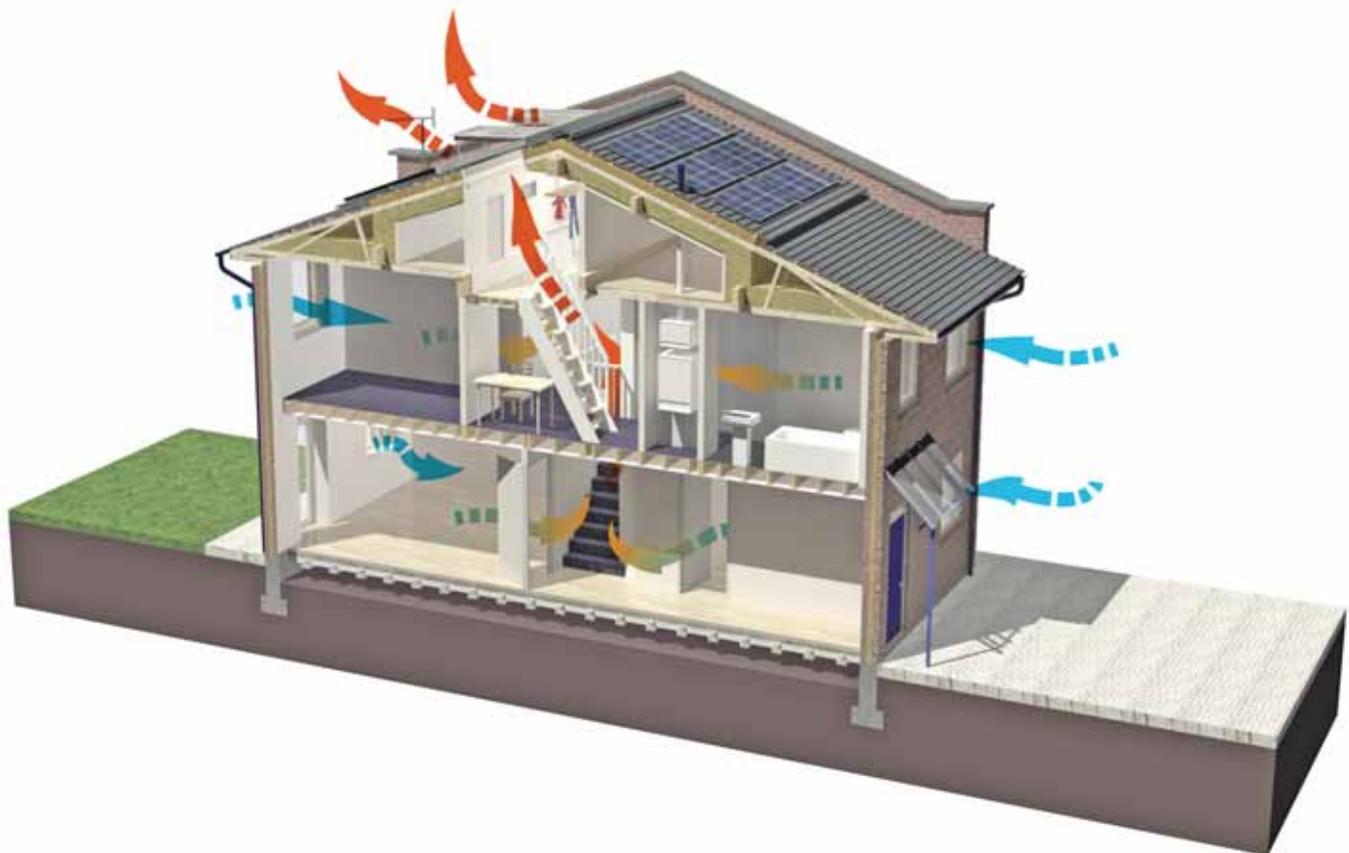
The article describes a case study of a retrofit undertaken at a large IT office building, which had been impacted by corrosive external environment leading to high incidence of equipment failure and how the problem was addressed through innovative ventilation design...

Air conditioning systems in buildings have a dual purpose – thermal comfort for the occupants and providing a desirable temperature for the equipment that the work force uses. In IT/ITES offices, the main equipment that requires optimal temperature are the computers, server and other IT hardware as well as the power back up systems (Uninterrupted Power Systems – UPS). While modern IT equipment are designed for a wider range of operation temperatures and environmental conditions, the life of the

equipment reduces in case the systems operate at optimal values. The cost of the IT infrastructure, including the servers, desktops, laptops etc. can be up to 15-18 % of the overall building cost. In addition, the equipment is central to the working of the business and any failures to the equipment will negatively impact operations, leading to down time as well as business revenue loss.

Another key role of the HVAC system in an office building is to provide adequate ventilation to the occupants. This would include both the right amount of air

circulation but also the quality of air. Since outside air is introduced into the ventilation systems for maintaining air quality, the impact of poor outside air will affect the quality of the air inside the building. Poor indoor air quality will thus effect the human occupants by way of respiratory problems leading to lower productivity. Another major impact of poor indoor air quality is the effect the indoor environment will have on the IT equipment in cases where the air has high levels of corrosive pollutants such as Sulphur or nitrous oxides. Standard designs of filtration systems usually do not cater for such corrosive gases leading to high rates of equipment failures. This article describes a case study of a retrofit undertaken at a large IT office building which had been impacted by corrosive external environment leading



CLASS	REACTIVITY RATE	AIR QUALITY CLASSIFICATION	PURAFIL COUPONS
G1	<300 Å/30 DAYS	MILD- Corrosion is not a factor	
G2	<1000 Å/30 DAYS	MODERATE- Corrosion is measurable	
G3	<2000 Å/30 DAYS	HARSH- High probability that corrosion attacks will occur	
GX	>2000 Å/30 DAYS	SEVERE- electronic/electrical equipment is not expected to survive	

Figure 1

to high incidence of equipment failure and how the problem was addressed through innovative ventilation design.

### Problem At Hand

A large IT services firm had a developmental center located in an area surrounded by an industrial belt. Due to the air pollution arising from the industrial units in the vicinity of the IT services building, the air had high levels of corrosive constituents such as Sulphur and nitrous oxides. The corrosive air caused pitting on air conditioning system pipes as well as the utility systems installed for supporting the building operations. The Operations and Maintenance (O&M) team had to develop a specialized maintenance plan to counter the corrosion issues impacting the operations.

The IT department also started reporting a higher than normal failure of the IT equipment in the building - server, laptops, desktops etc as compared to similar operations in other parts of the city. The initial assessment was that the IT equipment was defective but a further study showed that there was no difference in the IT equipment in this building as compared to similar equipment used in other locations. The failure rate had become so high that the business operations were impacted leading to productivity loss for the firm.

### Problem Analysis

The O&M team and IT teams undertook a detailed analysis of the failure of IT equipment over a six month period, sending equipment to specialized labs and also getting inputs from the OEMs on the failures. Air quality was checked using the coupon testing process based on ANSI/ISA Standard 71.04-1985 Environmental

Conditions for Process Measurement and Control Systems: Airborne Contaminants (ISA 1985). Copper strips are placed in the work space for a duration of time and amount of corrosion developed is analyzed to assess level of corrosive gases. The standard lists down 4 levels of environment contamination as shown in figure 1.

Indoor air analysis based on the coupon testing process revealed that the air had a severity level of GX which meant that the standard IT equipment would not be able to withstand the effects of the corrosive environment. The printed circuit boards of the IT equipment were analyzed and signs of sever corrosion were observed, ratifying the findings of the air quality tests. Figure 2 shows some of the corrosion on the PCB.

### Solution

Based on the air quality analysis and the equipment failure assessments, the root cause was identified as the high level of corrosive gases H<sub>2</sub>S, SO<sub>2</sub>, SO<sub>3</sub>, CL<sub>2</sub>, NO<sub>2</sub>, HF, NH<sub>3</sub>, & O<sub>3</sub> and particulate matter in the air. The two options that were assessed to address the high level of failure of the IT equipment's were

#### Option 1

Relocate the business operations to another building where the air quality was superior. This option involved a high capital

expenditure as well as a long time frame was needed in view of the relocation of the IT assets as well as the more than 7,000 employees.

#### Option 2

Improve the air quality of the work space so that the corrosive gases are eliminated and equipment do not get impacted by corrosion at the circuit board level. This approach would require the entire air inside the work space to be treated with specialized filters and hence would be an expensive activity. The management decided to go ahead with this option keeping in mind the large investments already made to set up the facility and the tradeoff calculated between relocation expenses and cost of the filtration system.

Since the entire work space had to be provided with clean, pollutant free air unlike traditional systems where only the critical spaces such as server and switch rooms are provided with higher levels of filtrations, the design had to be simple but effective. A two pronged approach was undertaken:

- Treat the air coming into the work space, eliminate the corrosive gases and circulate this treated air using the existing Air Handling Units (AHU)
- Prevent external air from entering the work spaces by maintaining a higher static pressure and also preventing outside air from entering at ingress locations.

#### Getting in Clean Air

A 6 stage Air Purification Unit (APU) was used to filter out the gases and pollutants from the outside air. The multi-stage air purification system is shown in figure 3. The treated air was directed to the

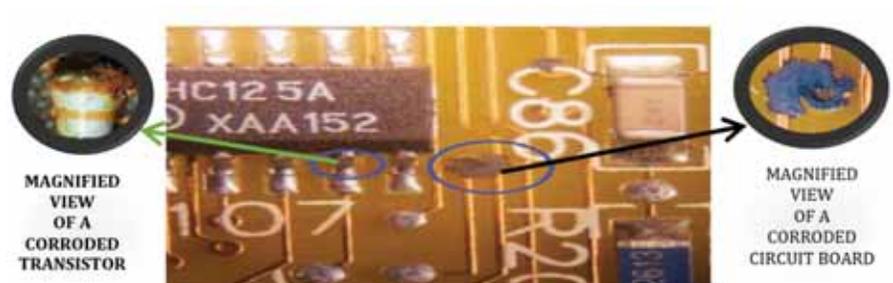


Figure 2

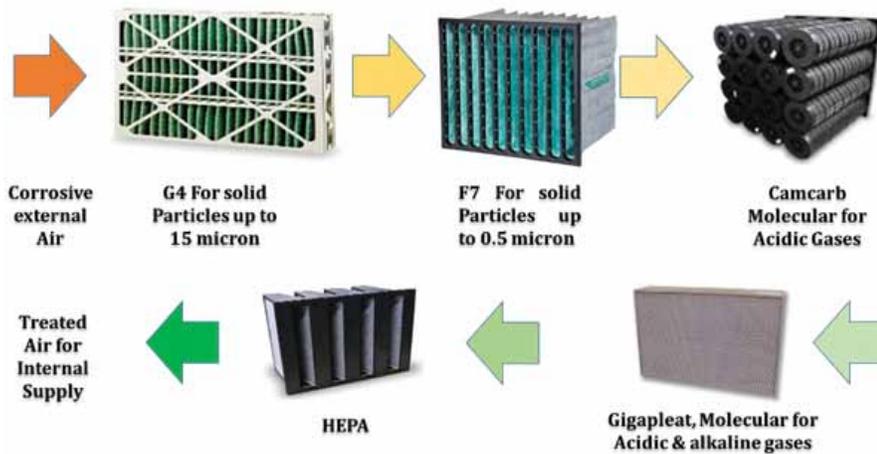


Figure 3: Air Purification Process

AHU's on each floor for circulation within the work space. The hub rooms and server rooms were provided with dedicated filtration systems to provide enhanced level of air quality. Additionally, these rooms were also provided with dehumidifiers. The air purification units were also installed with dehumidifier coils to keep the humidity level below 55%.

**Maintaining Air tightness integrity**

To prevent any contaminated air

coming into the building, the following was carried out

- Air curtain installed at all ingress points
- Double door system at employee entrance points
- Non return dampers installed in the return air system as well as lift pressurization system. This was undertaken to have only one direction of air flow.

**Outcome**

Post installation of the system, the O&M team carried out an assessment of the air quality using the coupon test method. The air quality was found to be at G1 level post the installation of the APU which is the most preferred air quality level. The defects in the IT hardware were also tracked to see the impact of the retrofit. Figure 4 shows the drastic reduction in the number of defects in the IT equipment post installation of the APU.

**Conclusion**

Poor air quality was having an impact on the business operations of a large IT services client. An innovative and cost effective solution was arrived at after understating the root cause of the problem, identifying suitable design options and then quickly executing the retrofit. The changes in the building ventilation system enabled the number of defects of the IT hardware to reduce drastically and helped improve the uptime and availability of the IT systems. The key take away from this case study is that the environment that engineers work in is not always optimal. The task of the HVAC engineer is to find cost effective solutions for the problems encountered so that business operation can function effectively and efficiently. ■

No of Defects in IT systems

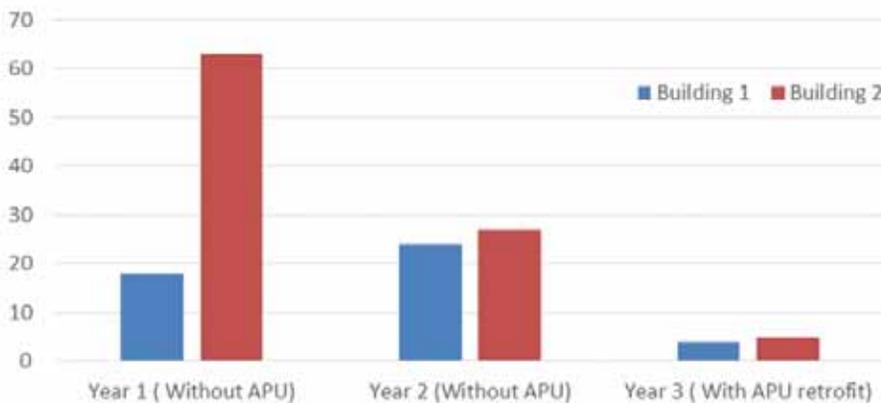


Figure 4: Reduction of Defects



**Now Subscribe / Renew Online**

**Cooling India**

Just Log on to: [www.coolingindia.in](http://www.coolingindia.in)

**Description:**

- Stand alone / BMS Compatible range of BACnet/MODBUS thermostat.
- Full range of with/without display, modulating or ON/OFF type, 24V or 230V power supply.
- Input Signal for occupancy sensor & energy saving mode.
- Thermostat with Co<sub>2</sub> sensor connectivity and ventilation controls.
- BMS Compatible range of BACnet/MODBUS VAV Controller.
- Suitable for pressure Dependent/Independent VAV boxes.
- Complete range of WiFi Thermostat & RF Wireless Thermostat.



## BACnet/MODBUS Room Thermostats and VAV Controller



FCU Thermostat



Room Thermostat



I-colour Touch Screen Thermostat



Pressure Dependent / Independent VAV Controller with Room Thermostat



WiFi intranet Thermostat for Hotels



Co<sub>2</sub> / Fresh Air Controller



Stand Alone Thermostat



**kahan controls**  
HVAC - R Controls & Technologies



# Excellent HVAC System for An Excellent Hospital

The air conditioning system is, especially, in newly constructed buildings, a real auxiliary system for medical activity, thus it assumes paramount importance...

**T**he reorganization plan of the Apulian hospital network has been approved earlier this year. The idea was developed to adapt the healthcare

delivery in the region to the new standards established by national legislation. This is not aimed at cutting the number of beds, but rather to reorganize the existing

structures, streamlining small regional centers and especially by strengthening the main hub. Among these is the University Hospitals of Foggia, the second largest hospital of Puglia.

With the reorganization plan in mind, this facility aims to achieve the ambitious goal of a hospital of 'Excellence', understood as a health facility where there all the functions of modern medicine are present. To achieve this goal, work is underway to build a new emergency-





urgent complex. The structure, which will be completed by the spring of next year, will host First Aid, Emergency Surgery, CICU (cardiac intensive care unit), Intensive Care, Stroke Unit, a total of 250 beds.

In health-care structures, air conditioning systems must not only guarantee the well-being of patients, but also meet the needs of the processes related to medical activities, such as operating rooms. The operating department represents one of the most technologically advanced nuclei within the hospital. The environmental parameters on which the system must be constantly monitored are; the temperature, the relative humidity, the degree of contamination of the air, and the supply air speed. For these reasons, the air conditioning system is, especially, in newly constructed buildings, a real auxiliary system for medical activity, thus, it assumes paramount importance.

### Focus On HVAC System

The new complex of the Hospitals of Foggia was, therefore, fitted with an air conditioning system based on 5 Climaveneta chillers and heat pumps with high efficiency, combined with 31 WIZARD air handling units. In more detail, there are; 1 multi-purpose heat pump ERACS-Q / SL-CA 3222, 1 reversible heat pump FOCS-N / SL-4822 and 3 liquid refrigerant FOCS2 / SL-CA-E 4822. All the units are air-cooled, in

the super silent version of class A, with considerable total cooling and heating capacity: 3183 kW for cooling and 1909 kW for heating. Hospital HVAC systems should always be slightly oversized, first to ensure continuous operation in case of failure or maintenance of a unit, because when it comes to hospitals, and second because hospitals are often characterized by continuous evolution, linked to the development of medical technology, the possible changes in user requirements, and also possible future expansions. Furthermore, as hospitals hold continuous operations every day and throughout the year, the air conditioning unit must be convenient to access and easy to maintain, thus minimizing interference with medical activities. The reliability of Climaveneta units, their flexible operation, the multi-purpose units' ability to simultaneously satisfy the cold and hot demand requirements without implementing any operating mode settings, the possibility to produce hot water at 55 ° by the selected heat pumps, are all features that allow a simplified system, which reduces maintenance and at the same time maximizes the efficiency of the entire building.

As for the air treatment units, it should be noted that the 31 WIZARD units were selected with the internal parts made of complete stainless steel, as required by the hospital applications. The AHU is serviced by service operators, where

contamination between air streams needs to be avoided. In addition, the units are also equipped with high efficiency dual battery recovery systems. All AHU provided have the silent version to maximize the acoustic comfort of the patients, and with variable flow to reduce energy consumption of the building. It should be highlighted that the Climaveneta units comply with ErP, also known as Eco-design, the framework directive which, through national regulations governs the eco-design requirements for all energy-using products.

Cristiano Dal Seno, Climaveneta's AHU Development Manager says "The CTA WIZARD was born from the vast Climaveneta experience in the HVAC industry. It is a reliable and efficient product, successfully installed in numerous applications in hospitals around the world, where in addition to the comfort of patients and doctors it is necessary to ensure reliability and efficiency for air conditioning and air treatment." He continues "In hospitals it is necessary to ensure the highest air quality, especially in environments where there is a high level of attention to patients and health operators. For this reason, we seek constructive solutions that facilitate the operation of a sanitizing unit with smooth surfaces and with minimal fissures. In addition, it is important to use of high quality materials capable of withstanding frequent cleanings with aggressive chemicals."

Efficiency, low noise, and reliability, these are the characteristics of a Climaveneta supply for the new emergency-urgency complex of the Hospitals of Foggia, which will be delivered by the end of this year to allow the start-up to be completed in time for the opening of the structure planned for spring 2017. ■

**Russ Air**  
ENVIRONMENT YOU TRUST!

GLOBAL LEADERS IN TECHNOLOGY

INDUSTRIAL AIR CURTAINS & AIR DOORS  
PVC STRIP CURTAINS & ROLLS  
INSECT KILLERS & ARRESTORS

Projects In Pharma | Food & Beverage | Cold Storages | Automotive | Chemical | Real Estate | Retail | Hospitality | Healthcare

Tel: +91 22 2600 7979 | +91 8691912000 | Email: sales@russairtec.com | Web: www.russairtec.com



## “Construction boom will hike demand for HVAC equipment”

Calpeda is committed to develop, manufacture and industrialize pumping systems. **Baswaraj Patil, Managing Director, Calpeda Pumps** says investment in material and human resources makes Calpeda the leader for quality, reliability and efficiency across the world in an interaction with **Supriya Oundhakar...**

### How has been the journey in India so far?

Calpeda India was founded in 2009 initially by a staff of engineers dedicated to research and development. Subsequently, their duties widened towards supporting the production of catalogues. Before our direct entry, we started our operation via agency in 2000. We got good response in the Indian market which leads our steps ahead. Our expansion in 2010 the company hired a marketing and sales manager with the objective of growing Calpeda market and servicing Indian markets. The company offers a wide range of pumps for a large variety of applications like groundwater, solar pumping, domestic pressure booster,

swimming pools and spa baths, hydro pneumatic system, HVAC, fire fighting, industrial, water treatment, wastewater and sewage, etc to our clients.

We are focused on flexible and personalized customer service. The market is completely dynamic. We have been selling Calpeda pumps in India since last seven years. We have the quality, so we are different from the others.

### What are the products offered by Calpeda catering to HVAC&R segment? How do you envisage the growth keeping in mind rising need for cooling due to global climate change?

We offer the range consisting of close

coupled, end suction back pull out centrifugal pumps, vertical inline pumps, horizontal and vertical split case pumps for HVAC. Most commonly this type of pump required for the flow rates that range from 100 l/m to 5500 l/m along with head ranging from 15 metre to 45 metre.

Advance Turbo Machinery Research and Development Centre, in collaboration with leading Italian universities and other international research centres, guarantees that Calpeda products always encompass the latest technological advances, thus saving energy and safeguarding the environment.

International regulations impose energy saving. This can be achieved

with motors that consume less energy and with research in hydraulics in order to obtain higher efficiency. On 1<sup>st</sup> August 2015, the European Directive for energy related products new limits of Regulation 641/2009 with regard to ecodesign requirements of circulating pumps will come into force. These limits impose an energy efficiency index of  $EEL < 0.23$  for all circulating pumps. Calpeda, ahead of the entry date of the new limits set by the directive, introduces a new and wider range of circulating pumps.

### How is Indian HVACR pump market shaping?

India is witnessing significant interest from international investors in the infrastructure space. Many companies are keen on collaborating with India on infrastructure, bullet trains, and developing smart cities. The boom in construction industry will also lead to increase in demand of HVAC equipment. Upcoming projects from Central Government in terms of processing food grade items will contribute to growth of the industry in next couple of years.

### What are the major areas where you are catering to?

In India, Calpeda is catering to OEM and building sectors. We have remarkable presence in OEM markets. Every year our share is increasing gradually by 20-30% per year. This business is boosting due to lower cost and professional skill labourers. This group of customer such as manufacturer of temperature controller, industrial chillers, and other machinery manufacturer will be a growing potential.

### How competitive and energy efficient are your products as compared to your competitors? Do you have any expansion plans in India?

Our products are acknowledged for quality. Our clients are well aware of

the surplus value in the product that they are buying. When our customer and retailers come to visit Calpeda Production Facility, they are especially impressed by the productive methodology of the company. The investment in material and human resources makes Calpeda the leader for quality, reliability and efficiency across the world.

At Calpeda, we have implemented many energy efficient products. As a part of European community project for reduction in energy consumption, we have already adapted by introducing its own series of high energy saving products. Calpeda meet the EC 640/2009 directive demanding eco-compatible design requirements in electric motors. This regulation is a part of a greater project that the European community has conducted for reducing energy consumption.



India is witnessing significant interest from international investors in the infrastructure space. Many companies are keen on collaborating with India on infrastructure, bullet trains, and developing smart cities. The boom in construction industry will also lead to increase in demand of HVAC equipment.

Calpeda India is expanding its footprint to other states of India. Our strategy is to focus 100% of our efforts on catering to industry and building sector. It is great to see that Calpeda continues to emphasise on the importance of R&D. We are maintaining our high levels of production quality whilst developing our market orientation strategy. We expect to quickly develop and maintain a leadership position.

### What is the USP of your products? Do you have R&D activities in India in order to give better quality of the products?

Our products are acknowledged for quality. We believe in technology,

which creates value for both ourselves and for those who choose us. Calpeda has counteracted towards the technological challenge investing 10% of its resources in research and development. Even in a moment of crisis, this division has never been set aside. There cannot be delays as far as research in a time when arriving first is priority. It is for this reason that, in order to protect our achievements, we have purposely structured a patent office in India.

### What are your suggestions to potential clients from HVAC&R industry?

We suggest that putting themselves at the service of research and contributing to technological innovation is a characteristic. The innovation consists like of a heating technology that can produce thermal energy by exploiting

the cavitation, a phenomenon that usually considers harmful to pumps and plumbing. Among the possible applications are heating for agricultural greenhouses, swimming pools, pasteurizing of alimentary liquids, as well as any industrial application requiring use of heating.

We are looking forward to future opportunities in the clients who are involved in development of smart cities, IT malls, hotels, etc. Particularly in refrigeration space, we are hoping to get clients those are involved in preserving food grade items for supplying within the country & exports like mango pulp, tomato chops, meat, fish etc. ■

# Next Generation Refrigerants

While selecting a new refrigerant, a comprehensive assessment from various perspectives is necessary. Any substance must be carefully evaluated for ozone layer depletion effects and global warming potential (GWP), to check if it has a low overall impact on the global environment. It must also be assessed for energy efficiency, cost performance, safety, efficient use of natural resources and other factors...

Refrigerant based refrigeration & air conditioning industry has progressed in leaps and bounds in the last few decades as these equipment are providing the desired comfort and quality lifestyle to a large fraction of our populace. Environmental concerns (Montreal and Kyoto Protocols) related to the use of various refrigerants have become the hot topics for people with the degrading environmental health and its side effects on human, animals and vegetation on Earth. Since measures of the global warming are becoming urgent issues, various technical innovations and

social system reformations are being promoted. In the engineering fields of heating, refrigerating, and air-conditioning, the global warming caused by the refrigerants is a big problem that must be solved. With strict climatic regulation enforcements in order to replace the refrigerant based refrigeration & air conditioning equipment as a whole and at once is a difficult task so efforts are always directed to develop new refrigerant free refrigeration & air conditioning technologies along with to develop new generation refrigerants with less potential towards environmental degradation.

As existing HFC or HCFC systems can't be retrofitted to utilize the new refrigerants, so an outright ban on HFCs would be premature at this stage. New technologies and applications are constantly being developed that cater to HFOs. Over the course of the next several years or so, equipment will be developed for the use of next generation refrigerants, as more and more businesses phase out the use of HFC-oriented products in both design and construction. At the present stage, however, there are no perfect solutions for next generation refrigerants and heat pump or refrigeration systems by which the global warming is successfully prevented. Therefore, we have to search possible ways to the next generation. If there is to be a next generation of refrigerants in stationary equipment beyond hydrofluorocarbons (HFCs), it appears they will be hydrofluoroolefins (HFOs). And if that transition is to take place, it could be because of regulations or better energy efficiencies - or both. As



the industry continues its evolution, one thing is for certain, refrigerant reclamation and recycling services are going to be even more vital in the near future. The transition to newer refrigerants will only be successful if the industry safely disposes of HFCs and HCFCs.

### Next Generation Refrigerant

When selecting a new refrigerant, a comprehensive assessment from various perspectives is necessary. Any substance must be carefully evaluated for ozone layer depletion effects and global warming potential (GWP), to check if it has a low overall impact on the global environment. It must also be assessed for energy efficiency, cost performance, safety, efficient use of natural resources and other factors. Recent studies have confirmed that there is no single perfect refrigerant for all applications. It is therefore necessary to focus on selecting the best refrigerants for particular applications based on an overall assessment. Although there are various types of refrigerants, R-32 is a new refrigerant currently receiving the most interest. While R-32 also has an ozone depletion potential of 0, the refrigerant has only approximately 1/3 of the GWP of R-410A. Consequently, investigation of this promising next generation refrigerant has increased. At present, it is believed that, based on the refrigerant balance compared to other refrigerants, in some cases there is no better alternative than R32 (HFC32). According to research on split systems, HFC32 is currently considered to be the most promising substance for use as a next-generation refrigerant in both residential and commercial air-conditioners. Although it is an HFC, it has only about one-third the GWP of currently used HFC410A or HCFC22. It is also possible to improve energy efficiency of equipment by 10 % and to reduce the charging volume by 30 % compared to HFC410A. The use of R32 offers end-users the opportunity to benefit from class-leading energy efficiencies, excellent air quality and high comfort levels, while lowering the environmental impact of their

heat pump system. As countries around the world look for suitable alternatives to HFCs, HFOs are set to become the new industry standard. Carbon dioxide (CO<sub>2</sub>) is also in consideration as a potential substitute; a number of supermarkets have already shifted to CO<sub>2</sub> for their refrigeration systems, but the technology doesn't yet exist for numerous systems that are more readily commercially available.

At present, HFOs remain the best option for most businesses and consumers alike. With the shift to a new generation of refrigerants, HFOs are set to become the new industry standard. However, because R-32 had been an extremely difficult refrigerant to handle, its use was not practical until now. Daikin became the world's first company to succeed in applying R-32 to air conditioners by leveraging its expertise as the only manufacturer that develops and manufactures both air conditioners and refrigerants. Currently, R-410A is the refrigerant most commonly used in developed countries. However, if all R-410A were converted to R-32, the impact to global warming from HFCs in 2030 would be reduced by the CO<sub>2</sub> equivalent of approximately 800 million tons (19%) compared to the continued use of R-410A. Cooperation with governments and international organizations has expanded technical assistance for emerging countries to each region and aims for widespread use of the refrigerant R-32 throughout the world. Aiming for widespread use throughout the world, company not only manufactures and sells R-32, but it also provides technical assistance in emerging countries in cooperation with governments and international organizations. In India, verification tests were conducted for inverter type R-32 air conditioners. In executing training for the proper handling of R-32, the technical level also improved.

### Next step

For the replacement of R-22, with a further milestone to help reduce the environmental impact of R&AC systems is possible with the development of a new

lower GWP refrigerant technology for use in commercial refrigeration systems. Development work has revealed that XP10 offers the opportunity to be used alongside CO<sub>2</sub> in hybrid systems - XP10 for medium temperatures and CO<sub>2</sub> for low temperatures. Studies show that such a solution would provide retailers with a 90 percent reduction in direct carbon emissions and a minimum 50 percent reduction in the total carbon impact of retail commercial refrigeration systems when compared to the current global industry standard direct expansion (DX) technology based on HFC-404A. Retailers in some countries are already migrating from R-404A DX technology to 134a/CO<sub>2</sub> hybrid systems in order to improve system energy efficiency and to reduce their overall carbon impact. XP10 is an efficient and logical choice in making a further step change reduction in carbon impact. It was stated that XP10 can also be used in stand-alone systems for smaller applications where hybrid systems are not practical, such as in discounter applications. A further benefit, it was reported, is that by adopting this new refrigerant technology in combination with systems using other low-carbon refrigerants such as CO<sub>2</sub> or hydrocarbons, retailers can make a significant contribution to achieving the climate targets.

### In Indian Context

India has a small carbon footprint at the individual level and its sustainable lifestyle results in low contribution of the country to overall emissions of greenhouse gases and ozone-depleting substances, as compared with other developed countries. However, there is an urgent need for developing new technologies indigenously as alternatives available today are patented apart from being expensive. A research based programme to look for cost effective alternatives to the currently used refrigerant gases is, therefore, essential. By establishing an effective collaboration between all important stakeholders, the initiative is focused on prioritizing areas of research in new refrigerant technologies and natural



refrigerants. This shall help the country leapfrog from the current technology high GWP HydroFluoroCarbons or HFCs to technologies with lower climate impact.

The Ministry of Environment, Forest and Climate Change (MoEFCC) has announced an ambitious collaborative research and development programme to develop next generation, sustainable refrigerant technologies as alternatives to HFCs. This initiative will bring government,

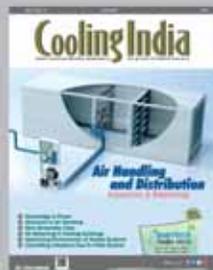
research institutes, industry and civil society together to develop long-term technology solutions to mitigate the impact of current refrigerant gases on the ozone layer and climate. With this initiative, India reaffirms its commitment to working with all other nations to safeguard the Earth's natural ecosystem. Some of the key players of the initiative include the Council of Scientific and Industrial Research (CSIR) and its allied institutions;

Department of Science and Technology; Centre for Atmospheric and Oceanic Sciences; as well as key industry players in the sector. ■

Dr S S Verma  
Department of Physics  
S L I E T  
Longowal, Punjab



Your brand needs to appeal all consumers...  
We make your brand presence  
strong & distinct.



Make your  
brand  
aggressive  
in this  
competitive  
world...

Be  
Distinguished  
and noticed

To know more go to  
[www.charypublications.in](http://www.charypublications.in)

Chary Publications offers you  
Print + Digital version of its magazines

## Hybrid Cooling System

Johnson Controls has developed a unique, innovative and industry-leading solution – the BlueStream Hybrid Cooling System – to help customers address water and energy challenges in facilities through more efficient cooling tower operations. BlueStream features a groundbreaking technology – thermosyphon hybrid cooling – to reduce water consumption in traditional cooling tower systems by 25 to 80 percent compared to all-evaporative heat rejection systems. It also maintains peak process output and energy efficiency on summer days.

Like fanning away sweat on a hot day, open cooling towers reduce the temperature of water heated in chillers, industrial processes, data centers and other high-heat practices. Through a wet process, the warm water is sprayed over the fill in a cooling tower to increase the contact area, and the heat is removed through evaporation.



A constant supply of water is needed to replace the water evaporated from the cooling tower, but in many regions, continuing droughts and increasing competition for this essential resource limit water availability. Additionally, some water is continuously bled from the system to reduce the buildup of undissolved solids as water is evaporated. This generates a large wastewater stream, often containing many additional water treatment chemicals.

Used in conjunction with a traditional cooling tower, the BlueStream system offers “dry” cooling through a thermosyphon process in which refrigerant circulates naturally, with no need for a pump or compressor. Intelligent, web-connected controls coordinate the operation of both the wet and dry system components and adjust in all weather and thermal load conditions for optimum efficiency, utilizing “wet” cooling when it’s hot and “dry” cooling when it’s not.

“Johnson Controls is concerned about the world’s water resources and how energy and water – the energy-water nexus – are closely linked,” said Clay Nesler, Vice President, Global Energy and Sustainability, Johnson Controls. “BlueStream offers a cost-effective way to reduce water use while simultaneously reducing operating costs in heat rejection systems.”

To develop BlueStream, Johnson Controls combined the best technologies in the heat rejection industry. The company worked with the Electric Power Research Institute to evaluate BlueStream in a wide range of cooling conditions in thermoelectric power plants. The project demonstrated Blue Stream’s ability to significantly reduce annual water use in plants while still maintaining peak plant output on the hottest summer days. ■





# Finned heat exchangers “Made in Germany”

Industrial and commercial  
applications in refrigeration  
and air conditioning







[www.thermofin.de](http://www.thermofin.de)

thermofin GmbH • Am Windrad 1  
08468 Heinsdorfergrund (GERMANY)

Phone: +49 (0) 3765 3800-0  
E-Mail: info@thermofin.de



Hall no. 11 - Stand H-14

The research report categorizes the global building automation system market on the basis of protocols, standards & communication technologies, products, applications, and geography...

## Building Automation System Market to be worth USD 100.60 bn by 2022



According to the new market research report Building Automation System Market - by Product Segments (HVAC controls, lighting control system, video surveillance, biometric access control, fire sprinkler, fire alarm), communication protocol application and geography - global forecast to 2022, the building automation system market is expected to reach USD 100.60 billion by 2022, at a CAGR of 10.65% between 2016 and 2022. The ability of the building automation system to increase the energy efficiency and enhance the security and safety in buildings is one of the major driving factors for the market. Moreover, the advancements in the wireless communication technologies and convergence of IoT and building automation further drive the growth of the building automation system market.

### Security & access control systems to lead

The market for security & access control systems is expected to lead the global building automation system market

during the forecast period. It is very difficult to manually monitor the activities and keep track of people entering and exiting a building, especially in large organizations. Thus, the need for automatic systems to increase the security level, monitor activities, and control the access has led to the rise in demand for security and access control systems.

### Commercial buildings sector expected to hold largest share

The market for the commercial buildings application is expected to hold the largest share of the global building automation system market during the forecast period. This sector has the highest demand for energy conservation and reducing the overall operating cost. This is one of the major driving factors for the growth of this market.

### APAC expected to witness rapid growth

The APAC region is expected to play a key role in the building automation system market and grow at the highest rate during

the forecast period. The rapid growth of the construction industry in this region as well as the government initiatives have contributed to the growth of the building automation system market in the APAC region. The major players in this market include Honeywell International Inc (US), United Technologies Corporation (US), Johnson Controls Inc (US), Hubbell, Inc (US), Schneider Electric SE (France), Siemens AG (Germany), Legrand SA (France), Ingersoll Rand PLC (Ireland), ABB (Switzerland), and Robert Bosch GmbH (Germany) among others.

This research report categorizes the global building automation system market on the basis of protocols, standards & communication technologies, products, applications, and geography. This report describes the drivers, restraints, opportunities, and challenges for the growth of the building automation system market. The Porter's Five Forces analysis has been included in the report with a description of each of the force and its respective impact on the building automation system market. ■

(Source: MarketsandMarkets)

## HVAC Equipment Market Worth US\$ 155.0 bn by 2022

**M**arket Research Engine adds a new research study on the report, titled 'HVAC Equipment Market (Equipment Type: Heating (Heat Pumps, Furnaces, Unitary Heaters, Boilers), Air Conditioning (Room Air Conditioners, Unitary Air Conditioners, Coolers and Others), Ventilation (Ventilation Fans/Air Pumps, Humidifier/Dehumidifiers); End-use Application: Residential, Commercial, Industrial) - Global Industry Analysis, Size, Share, Growth, Trends and Forecast 2015 – 2022', it states that the HVAC market will register a healthy growth rate of 6.20% CAGR between 2014 and 2022, the HVAC equipment market is likely to rise from a value of US\$91.3 billion in 2013 to US\$155.1 billion by 2022.

Heating, Ventilation, and Air Conditioning (HVAC) equipment is an indoor and vehicular technology for environmental comfort. It is a sub-division of mechanical engineering involving thermodynamics, fluid mechanics, and heat transfer. Now-a-days, HVAC equipment is essentially installed at large industrial and commercial infrastructures to regulate temperature and humidity. It then provides fresh outdoor air and eliminates contamination. The heating, ventilation, and air conditioning (HVAC) equipment market has further been segmented based on type such as heating (heat pumps, furnaces, unitary heaters and boilers), air conditioning (room air conditioners, unitary air conditioners and coolers and others) and ventilation (ventilation fans/air pumps and humidifiers/

dehumidifiers. The study provides forecast and estimates market for each type in terms of revenue and volume during the forecast period from 2015 to 2021. Each type has been further analyzed based on regional and country levels from 2014 to 2021 in terms of volume and revenue. The heating, ventilation, and air conditioning (HVAC) equipment market has been segmented based on applications such as residential, commercial and industrial. The study provides forecast and estimates market for each application in terms of revenue and volume during the forecast period from 2015 to 2021. Each application has been further analyzed based on regional and country levels from 2014 to 2021 in terms of volume and revenue.

In terms of geography, the heating, ventilation, and air conditioning HVAC equipment market has been segmented into regions such as North America, Europe, Asia Pacific, Latin America, and Middle East & Africa. The study provides a detailed view of country-level aspects of the market on the basis of application segments and estimates the market in terms of revenue and volume during the forecast period. The report also offers a competitive landscape of the overall market with company profiles of players such as AB Electrolux, Daikin Industries Ltd, Haier Inc, Lennox International Inc., LG Corporation, Panasonic Corporation, Samsung Electronics and United Technologies Corporation (Carrier). ■

**ICE MAKE REFRIGERATION PVT. LTD.**  
 Commercial & Industrial Refrigeration Equipment Manufacturer & Exporter  
 ISO 9001:2015, ISO 14001:2004, BS OHSAS 18001:2007, CE & CRISIL CERTIFIED COMPANY



**ICE MAKE**  
Trusted Cooling Partner

Cold Room / Walk in cooler (Full and Part Solution)

Evaporator Unit



Condensing Unit



Control Unit



Sliding Door



Ice Cream Industry | Vegetable Storage | Horticulture / Floriculture Industry  
 Dairy Product Industry | Fruit Ripening | Pharmaceutical Industry





**ACREX**  
India 2017  
23 - 25 FEBRUARY • 2017  
IEMIL • GREATER NOIDA • DELHI  
Hall-10, Stall No. U/24

Factory: Survey No. 226/227, Dantali Industrial Estate, Gota-Vadsar Road, Nr. Ahmedabad City, At-Dantali, Ta: Kalol, Dist.: Gandhinagar - 382721, Gujarat, India.  
 Phone: +91 9879107881/884 | E-mail: info@icemakeindia.com | Web: www.icemakeindia.com

# Opportunities Galore

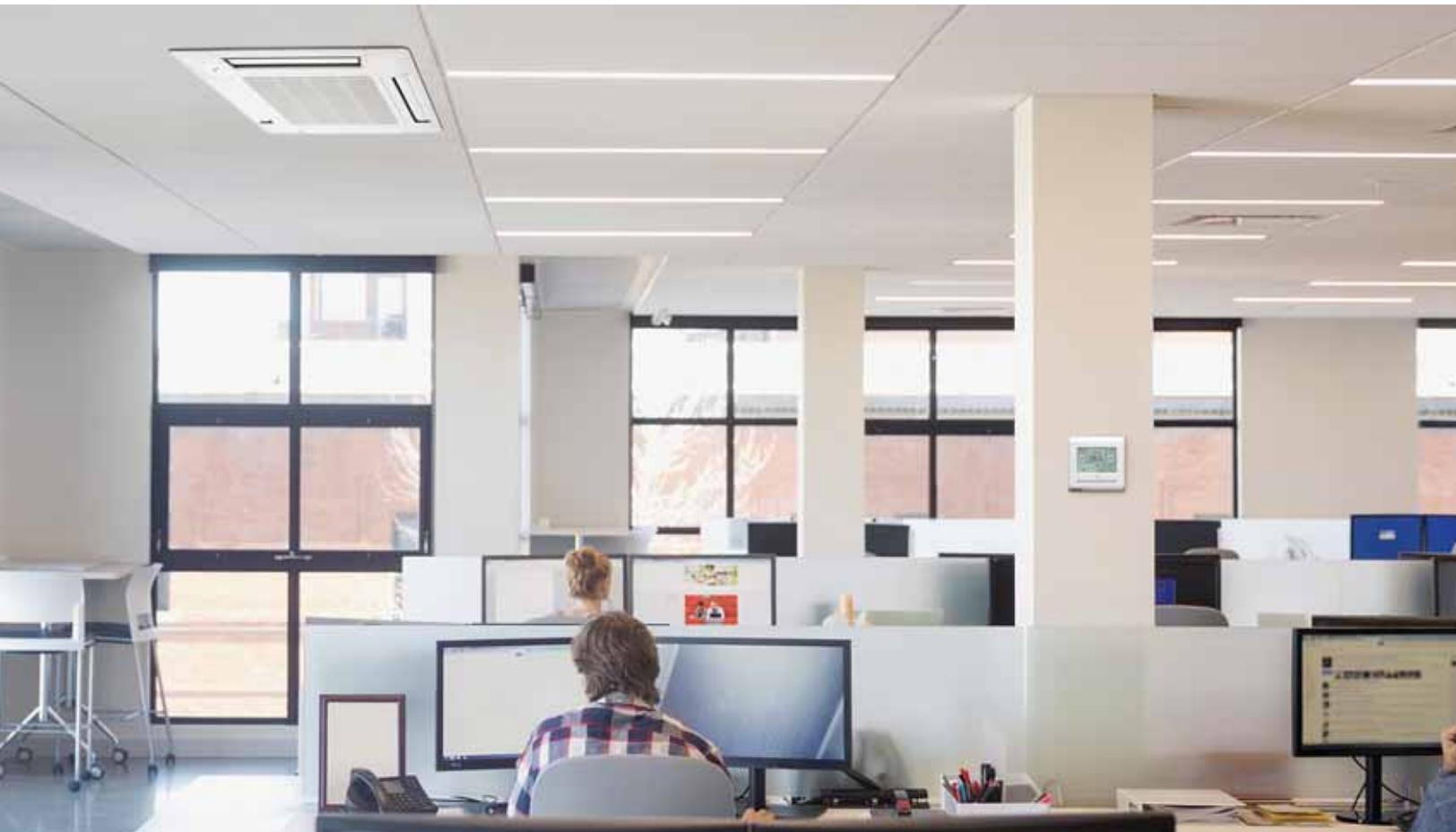
Companies must embark on an exercise to assess the growth opportunities, which could form the building blocks of a competitive strategy. This analysis will also help understand which new technology-based growth areas are best suited for exploitation by your company. The bottom line is that the Indian HVAC market has abundant opportunities...

**E**nergy consumption is on the rise globally and is a pertinent issue, especially, in a fast-developing nation like India. The total installed capacity of power generation in India stands at 310,000 megawatts (MW) as of December 2016 according to the Central Electricity Authority. The growth in overall generation stood at 5.69% in 2015–2016 and is expected to be 6.61% in 2016–2017.

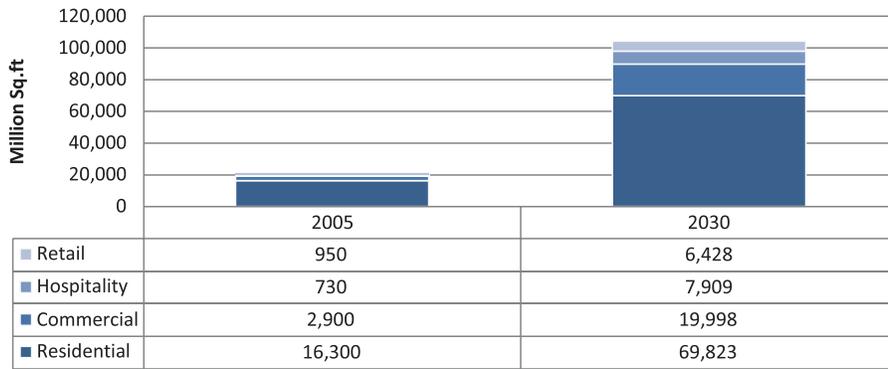
Similar growth rates can be expected as the real estate sector grows on the back of reforms and initiatives such as Good & Services Tax (GST), Real Estate Regulation Act (RERA) and the Real Estate Investment Trust (REIT) regulations are expected to attract institutional investors and developers and transform the sector into a more formal structure. The demand for HVAC&R systems is directly derived from

the growth of the commercial and residential real estate sector, and air conditioning is one of the most energy-guzzling systems in a building. Currently, HVAC or cooling makes up 30-40% of a commercial and 10% of a residential building's annual energy consumption. However, these percentages are expected to touch 50-60% as people become acclimatized to air-conditioning, along with the affordability of the systems. As per the 'Make in India' website, the Indian real estate market size is expected to touch \$140 billion by 2017.

Exhibit 1 shows that by 2030 the growth of total building stock in million square feet across different user segments - retail, hospitality, commercial offices, and residential, is expected to touch about



**Exhibit 1: Growth in Total Stock of Space across Segments, 2005–2030**



Source: Make in India: Growth of Indian Building Sector (Climate Works Foundation, 2010); Building Energy Efficiency in India: Compliance Evaluation of Energy Conservation Building Code by Pacific Northwest National Laboratory; and Frost & Sullivan

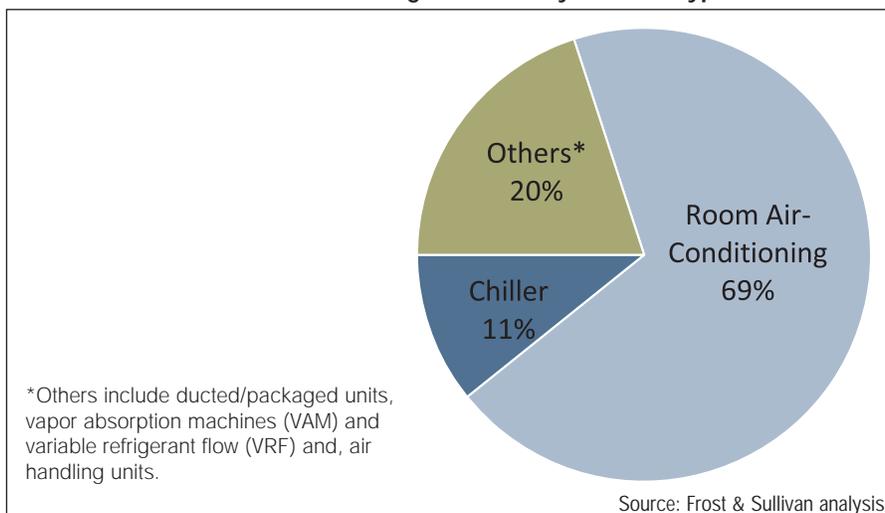
100,000 million square feet.

Buildings today account for 35% of total energy consumed, and the consumption is growing at 8% annually. Construction of other infrastructure, such as development of city-side infrastructure at 13 regional airports, modernization and upgradation of non-metro airports, development of railway stations and metro stations, will spur the demand for HVAC systems. The market for HVAC systems in India is estimated to be Rs 160,000 Million (Rs 16,000 crores) in 2016. The market is expected to grow at a CAGR of 10-12% over the next five years.

Room air conditioners, chillers, and variable refrigerant flow (VRF) are the major segments that are likely to contribute to the steady growth of the market. VRF is expected to outperform ducted/package units and pose a threat to scroll chillers when used in multiple modules, due to

scalability of operation and efficiency factors. The growth of room air conditioners is largely driven by the affordability and rising income levels of families in India. According to National Council of Applied Economic Research (NCAER) findings, the number of middle-class households is expected to touch 113.8 million households by 2025. And, only 52% of middle-class households in India possess air conditioners, suggesting that there is a whole 48% that has not been penetrated. This bulging base of middle-class families represents an immediate opportunity to a majority of air conditioner manufacturers in India. The demand for other products such as AHUs, packaged units, chillers, and VRFs is witnessing growth in India due to the rise in construction activities and industrial expansion where cooling is a must, from both the comfort and process application points of view.

**Exhibit 2: HVAC Market Segmentation by Product Type, 2016**



## Strong Demand Drivers for the Cooling Segment

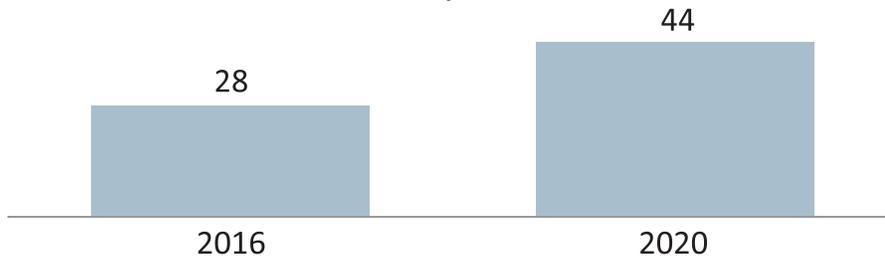
The demand for office space in India was 26 million sq. ft. in 2015 and is expected to reach 28 million sq. ft. in 2016 in eight major cities (Chennai, Hyderabad, Mumbai, Kolkata, NCR, Bengaluru, Pune, and Ahmedabad) mainly due to demand from IT/ITeS, BFS, e-Commerce, telecom, healthcare companies, and start-ups. The demand for office space is expected to grow at 12-13% over the next 5 years.

India has more than 300 malls, with more than 250 malls coming up in the last decade. The total stock of mall space is expected to grow to 107 million sq. ft. by 2017. Another key driver of commercial air conditioning systems are the multiplexes. India has witnessed 15% growth in terms of screen additions that reached 2,100 in 2015. At the same time, over 2,000 single screens have shut down or converted into multi-screen complexes, as single screen are burdened with higher cost of operations and falling occupancy rates. Given the size, population and low penetration of multiplexes, India can have about 7,500 to 10,000 multiplex screens. India's infrastructure development requires approximately \$1.5 trillion in investment over the next 10 years to bridge infrastructure gap. The Airports Authority of India (AAI) plans to develop city-side infrastructure at 13 regional airports across India with hotels, car parks, and other facilities, thereby boosting non-aeronautical revenue. There are about 18 to 20 metro rail projects in Vijayawada, Noida, Hyderabad, Varanasi, etc. with an investment commitment of \$30 billion. Recently, proposals put up by the ministry of urban development were cleared to launch metro rail across 50 cities with an estimated cost of \$500 billion (\$74 billion)'.

## Strategic Growth Options

Local manufacturing is certainly an idea whose time has come. It has been observed that prices of room ACs are going up by 3-5% year-over-year due to escalations in raw material prices. Imported units have seen much higher

Exhibit 3: Growth in Office Space in India, 2016 and 2020



Source: Frost & Sullivan

price escalations than companies that have local sourcing or manufacturing set up. Even in case of applied systems like chillers and VRF units, it makes business sense to have a local manufacturing unit to avoid cost escalations and to be competitive.

Provision of value-added services, such as building management systems (BMS), optimizes the functioning of HVAC equipment like chillers and VRFs. According to the Indian Society of Heating, Refrigeration and Air Conditioning Engineers (ISHRAE), most commercial buildings have an Energy Performance Index (EPI) of 200 to 400 kWh/sq. m. per year. The Bureau of Energy Efficiency (BEE) has proposed an ambitious target through its voluntary Energy Conservation Building Code (ECBC) that 75% of new commercial buildings connected to 100kW or having contract demand of 120 KVA

and above, need to meet minimum energy standards. It has been proposed that 20% of the existing commercial buildings reduce their energy consumption through retrofits. The implementation of ECBC could reduce the energy consumption in buildings by 25-40%. BMS is one of the solutions that can help achieve savings by reducing energy costs.

In the case of Room ACs, there is utmost emphasis on companies to expand their dealer and distribution network to smaller towns and cities. Currently, semi-urban and rural areas contribute to up to 20% of the overall market, thus, there is a lot of market to be covered in addition to major cities. Likewise, in the case of applied systems, companies need to strengthen their service network to provide timely after sales support. This will also help in capturing the third-party services market for AMC of chillers.

It is very important for HVAC manufacturers/companies to devise a long-term business strategy in India, given the changing market scenario. Gathering information on customer's existing and emerging needs, preferences, and behavior that affects purchase decisions and satisfaction should be high on the agenda. It will help identify areas of disconnect with the customers and create best practices by adjusting internal processes to comply with the company's value proposition. Companies must also embark on an exercise to assess the growth opportunities, which could form the building blocks of a competitive strategy. This analysis will also help understand which new technology-based growth areas are best suited for exploitation by your company. The bottom line is that the Indian HVAC market has abundant opportunities, provided companies can profitably build a value proposition that would cultivate customer loyalty over time. ■

<sup>1</sup> <http://www.metrotrainnews.in/50-cities-to-get-metro-rails-for-rs-500000cr/>

**Sasidhar Chidanamarri**  
Associate Director, Energy  
& Environment Practice,  
Frost & Sullivan



# The best reason to subscribe

# Cooling India

- Technological updates
- Trending news from the industries
- Versatile topics covered
- Wide exposure
- Eminent writers from the industries

**Print + Digital**  
**Contact Ms Khan - 27777180**

[www.coolingindia.in](http://www.coolingindia.in)

## Advertise in Cooling India & Engage yourself in growing market

- ~ Pitch new clients
- ~ Reach nationwide
- ~ Boost sales
- ~ Increase Company visibility
- ~ Standout in industry
- ~ Be ahead in competition

**For Advertising details call – Jigar +91 22 27777177 / 7666496328**

# Upgraded Processing Line for Blakeman

One of Europe's leading manufacturers of sausage and meat products, James T Blakeman & Co invests in freezing equipment upgrade with its fourth Helix spiral system from IQF equipment specialist Starfrost. James T Blakeman & Co is a family run business that supplies sausage and meat products to the catering and ready meal industry manufacturing 21,000 tonnes of production per year. The company has a continuous commitment to growth and improvement within the business and recently built a 40,000 square foot state-of-the-art manufacturing facility at its site in Staffordshire, UK.



Blakeman's latest development was to increase capacity and efficiency of its existing aging system. The firm also wanted to optimise hygiene procedures and increase flexibility of its processing line to provide opportunities for long-term business planning. British manufacturer Starfrost has worked closely with James T Blakeman & Co for a number of years, successfully installing three spiral freezing systems over the last decade as the meat manufacture extended its processes. For Blakeman's most recent project, Starfrost was once again selected as preferred

freezing equipment supplier.

Starfrost, together with parent company Star refrigeration, designed, manufactured and installed a Glacier Spiral system for Blakeman's. The latest freezing system upgrade combines Helix Spiral Freezer technology and a unique low carbon ammonia refrigeration plant in one complete package. The Glacier pack included a custom designed Helix Spiral Freezer with a processing capacity of 900 kg per hour of cooked sausages. The system features a stainless steel dual conveyor belt

around a single rotating drum, with 28 tiers in total. The dual twin belt is equipped with optional side guards; this allows the customer to process various products simultaneously, giving increased flexibility to the processing line. Blakeman's Spiral Freezer features a 'Clean in Place' system, the CIP System is an automated cleaning system using rotating spray nozzles and spray bars for targeted application of the detergent and sanitizer in major operating zones. Its unique design enables the process to be a repeatable, cost effective means of cleaning and sanitising the equipment. ■



world class condensate drain pumps for HVAC applications



The Hi-wall is discreet and excellent for areas where regular ease of inspection and maintenance is needed.



Heavy Duty tank pumps are ideal for temperature critical environments. Keeping equipment and data safe.



The largest rooftop free-standing frame manufacturer in the world!

NO UNIT TOO LARGE TO SUPPORT! Total flexibility so that plant equipment can be positioned anywhere on a roof and ensures no leaks as the frames do not penetrate the waterproof layer.



AHUs



GENERATOR



CHILLER



Standard Frame



Custom Frame



HD Beams



see you there!

We offer technical advice and we stock locally.

Call us today on 09999003240



Distributor presence in New Delhi, Mumbai, Kolkata, Hyderabad, Bangalore, Chennai, Kochi. To find your nearest distributor, contact Dheeraj Jagga, India Country Manager: Dheeraj@aspenspumps.com



Visit our websites to see our full range of products available: www.aspenpumps.com and www.bigfootssupport.com

## Product on Shelves from Testo

Testo has launched various products for various applications...

### New Testo 745 - Non-contact voltage tester

The testo 745 non-contact voltage tester with a voltage range of upto 1,000 V AC is particularly well-suited to fast initial checking of any suspected fault sources. When the presence of alternating current is determined, the testo 745 gives a warning via a clear visual and acoustic signal. In order to increase reliability, the voltage tester has a filter for high-frequency interference signals and is also waterproof and dustproof according to IP 67.

**Filter for high-frequency interference signals**

- Adjustable sensitivity
- Visual and acoustic signal
- Waterproof and dustproof according to IP 67
- Measuring point illumination



### New Testo 750 - Voltage tester - Voltage tester With Best Display On Market

The three models in the testo 750 voltage tester family are the first instruments with an all-round LED display. The display can be seen from any position and guarantees an ideal voltage indication thanks to its unique fibre optics. All three models meet the latest voltage tester standard EN 61243-3:2010 and have a safety specification according to CAT IV. They have the most important functions for voltage testing, continuity testing and rotating magnetic field measurement. The testo 750-2 is also suitable for single pole voltage testing and has a torch along with an RC trigger function. Vibrating load buttons ensure that the trigger test cannot be carried out accidentally. In addition, the testo 750-3 is fitted with an LC display to show the current reading.

- Clear, patented all-round LED display
- Fibre-optic technology for optimum voltage indication
- Anti-slip ring for secure grip
- Ergonomic handle shape
- Measuring point illumination



### NEW Testo 755 – Current/voltage Tester - The first voltage tester that also measures current

Both instruments in the testo 755 current/voltage tester family are the first of their kind: voltage testers which meet the latest standard and which can also measure current. This means they are suitable for virtually all daily electrical measuring tasks. Each time they are used they automatically select the right settings and therefore prevent dangerous incorrect settings. Both instruments have all the important functions for determining voltage/de-energization, for measuring current and resistance, as well as for continuity tests. In addition, the integrated torch enables dark spots to be illuminated. The measuring tips can be changed easily, so that the whole instrument does not need to be replaced in the event of damage. The testo 755-2 model is differentiated by the larger current range of up to 1,000 V and special functions, such as the single pole phase testing and rotating magnetic field measurement.

- Automatic measurement parameter detection
- Certified according to voltage tester standard
- DIN EN 61243-3:2010
- Measurement result without any switching on or selection
- Measuring point illumination
- Exchangeable measuring tips



## New Testo 760 - Digital Multi-meter – Multi-meter with Automatic Measurement Parameter Recognition

The testo 760 digital multi-meter family comprises three models for all important electrical measuring tasks. Function keys replace the traditional dial on all three instruments, which means easier operation and greater reliability. In correct settings are now impossible, because the measurement parameters are detected automatically via the assignment of the measuring sockets and also shown by the illumination of the appropriate function keys. The testo 760-1 model is the standard version for virtually all daily measuring tasks. The testo 760-2 is differentiated by a larger current measurement range, the true root mean square measurement - TRMS - and a low-pass filter. The testo 760-3 is the model with the highest specification and, in addition to the features of the other two models; it has a voltage range of up to 1,000 V, along with higher measuring ranges for frequency and capacitance.

- Easy, modern operation with function keys instead of a dial
- Measurement parameter detection and selection via the socket assignment
- Prevents incorrect settings
- True root mean square measurement - TRMS
- Large, backlit display



## New Testo 770 – Clamp Meter - First Clamp Meter With Revolutionary Clamp Mechanism

The three instruments in the testo 770 clamp meter family are ideally suited for current measurement in switching cabinets. One of the two pincer arms can be fully retracted into the instrument. This unique grab mechanism means that cables in tight switching cabinets can be easily grabbed. The automatic measurement parameter detection also ensures reliable work: in the current and voltage area, all three instruments detect direct and alternating current and select other parameters such as resistance, continuity, diode and capacitance automatically. The testo 770-1 model is the standard version for daily measuring tasks, including starting current measurement.

In addition, the testo 770-2 contains both a  $\mu\text{A}$  area as well as a temperature measurement by means of an optional thermocouple adapter type K. The testo 770-3 also calculates all output ratings, has a bluetooth interface and the possibility of connecting to the testo Smart Probes App to show the measuring profile as a graph or to document it directly in a report.



- Unique grab mechanism makes it easier to work at tight measuring points
- Auto AC/DC for current and voltage
- Large two-line display
- True root mean square measurement - TRMS
- With additional functions, such as starting current, power and  $\mu\text{A}$  measurement
- Bluetooth and testo Smart Probes App

For more info: Write to [info@testoindia.com](mailto:info@testoindia.com) or visit [www.testo.in](http://www.testo.in)

India's foremost magazine  
dedicated to HVACR  
Industry

- ~ Pitch new clients
- ~ Reach nationwide
- ~ Boost sales
- ~ Increase Company visibility
- ~ Standout in industry
- ~ Be ahead in competition

Move your  
business forward...

Advertise in

Cooling India

Contact - Jigar 7666496328

[www.coolingindia.in](http://www.coolingindia.in)

# “Practice Ancient Architectural Designs using Natural Ventilation”



Ensavior is a comprehensive solutions provider company engaged in design, engineering, sales, marketing and service of HVAC Products & Services, Ventilation & IAQ Services. **Dinesh Semwal, Managing Director, Ensavior** sheds light on steps for improving energy efficiency and indoor air quality, services and products offered by the company, growth drivers of the sector in an e-mail interaction with **Cooling India...**

## What are the steps need to be taken to improve energy efficiency and indoor air quality?

### Energy Efficiency

HVAC systems consume about 40% of the energy in buildings. To achieve a significant reduction in energy consumption apart from the standard energy-efficiency methods, innovative technologies should be implemented, including renewable energy. High efficiency chillers, variable speed drives, variable air volume boxes, and right sizing of chilled water and condenser pumps, deploying high efficiency compressors, demand-based controls, thermal storage systems are some of the energy efficient techniques that can be adopted to achieve higher efficiency. Such measures can help reduce energy

consumption of a HVAC system.

### Indoor Air Quality (IAQ)

Indoor air quality is a major concern to businesses, building managers, tenants and employees because it can impact the health, comfort, well-being and productivity of building occupants. Most of us spend up to 90% of our time indoors and many spend most of the working hours in an office environment. Studies show that indoor environments sometimes can have levels of pollutants that are actually higher than levels found outside.

Indoor air quality is not a simple, easily defined concept; it is a constantly changing interaction of complex factors that affect the types, levels and importance of pollutants in indoor environments.

Controlling indoor air quality involves

integrating three main strategies:

- Manage the sources of pollutants either by removing them from the building or isolating them from people through physical barriers, air pressure relationships, or by controlling the timing of their use.
- Ventilation helps remove or dilute indoor airborne pollutants coming from indoor sources. Carefully evaluate using ventilation to reduce indoor air pollutants where there may be outdoor sources of pollutants.
- Filtration to clean the air of pollutants. Advanced designs of HVAC system have started to incorporate UVGI (Ultra Violet Germicidal Irradiation) system that destroys airborne microbes and odor. This reduces the level of

contaminants and improves indoor air quality (IAQ).

### What are the solutions and services offered by the company keeping in mind rising global warming?

Global warming and climate change have been wreaking havoc with weather and temperatures across the planet. Temperatures are on the rise in summers, winters may be warmer in certain places, rainfall patterns are changing and the use of air-conditioners is on the rise. Worldwide power consumption for air conditioning alone is forecast to surge 33-fold by 2100.

Ensavior is offering the following energy saving equipment and systems for the HVAC industry:

#### Thermal Energy Storage (TES) Systems

Conventionally, chillers are selected for peak air-conditioning load to satisfy the maximum cooling demand, which occurs only for a few hours per year on real time basis, and thus spend majority of their operational life at reduced capacity and low efficiency.

TES systems, on the other hand, use optimum capacity chillers for using cheap off-peak electricity to store chilled water at night which can be used for meeting the peak cooling demands during the day.

While TES shaves off the peak connected demand due to significant reduction in installed chiller capacity, this in turn results in a healthy plant load factor, as well as reduced connected demand load. This on a large scale collectively contributes to a better demand management at grids and subsequently reduces the requirement of setting-up new power plants.

The TES system helps lower operational costs by enabling the shifting of energy consumption of chillers from peak hours (day) to off peak cost hours (night). It is prudent to note that chillers perform with much better efficiency and lower power consumption when operated at low

ambient temperatures during night time as compared to day time. This contributes to a considerable energy and operational cost savings on ongoing basis.

Chilled Water Thermal Storage systems



Indoor air quality is a major concern to businesses, building managers, tenants and employees because it can impact the health, comfort, well-being and productivity of building occupants. Most of us spend up to 90% of our time indoors and many spend most of the working hours in an office environment. Studies show that indoor environments sometimes can have levels of pollutants that are actually higher than levels found outside.

are ideally suitable for provision of chilled water backup for mission critical facilities like data centers and high tech manufacturing.

#### Ultra Violet Germicidal Irradiation (UVGI) Systems

UVGI systems are installed in air handling units of HVAC to overcome the following usual problems encountered with air-conditioning.

#### Increasing Electricity Consumption

The condensation of moisture around the cooling coils permeates growth of algae, mold, mildew bacteria and viruses, thus reducing the heat transfer efficiency and airflow of the AHU; which in turn increases the power consumption.

#### Deteriorating Indoor Air Quality (IAQ)

The contaminated air while passing over the coil and further contamination from the work place deteriorates the IAQ leading to Sick Building Syndrome and increased sickness of the inhabitants of the building. In case of cold storage, it leads to contamination and deterioration of food products.

#### Increased Operation and Maintenance Cost

Due to contamination of coils, difficulties are experienced to maintain clean and contamination free air.

#### Cleaning of Cooling Coils

The installation of UVGI, practically, eliminates cleaning of cooling coils, thereby, leading to reduction in maintenance cost and elimination in down-time of air-conditioning system.

#### Pressure Independent Control Valves (PICV) and Automatic Balancing Valves

An effective and efficient HVAC system must provide correct energy output when and where required. Water circuit balancing is essential to ensure that chilled water system delivers correct flows to all terminal units in an HVAC circuit. Proper hydronic balancing is the key to making an HVAC system

perform efficiently and most cost-effectively. To cater to this critical feature we are offering PICV and Automatic Balancing Valves.

#### Pumping System

Variable-speed pumps significantly reduce energy use by precisely matching a HVAC system's level of operation to the cooling load, which can vary throughout the day based on the building's needs. They can maintain occupant set point without resorting to inefficient full-on, full-off system cycles.

This on/off cycle, which is a common function of popular fixed-speed systems, means the system is always running at full load for a given ambient condition, whereas an air-conditioning system utilizing variable-speed pumping technology is capable of operating under much more efficient part-load conditions.

#### What are major areas where you are contributing to?

- Chilled Water Backup for Mission Critical Facilities
- Demand Side Management
- Energy Efficiency
- Indoor Air Quality.
- 'Chilled Water Backup for Mission Critical Facilities and Demand Side Management',

#### Could you cite an example on how

## your assistance has helped the industry in achieving the same?

### Chilled Water Backup for Mission Critical Facilities

In data centers with high power and heat densities, a power outage can cause rapid temperature increases. This is because cooling systems temporarily shut down, while servers keep producing heat because they are on UPS.

The response of mechanical cooling equipment to power disturbances varies, depending on the size and duration of the disturbance. Once chillers shut down, it can take several minutes for them to resume cooling after power is restored—too long to prevent damage to IT equipment.

Data centers provide standby generators for chillers. However, they take several seconds to start up, after which it can take several minutes to restart the chillers. Chilled Water Thermal storage can extend the ability to cool data center IT equipment in the event of a power failure by using thermal reserves to provide temporary cooling during a power outage.

In a prestigious Data Center of Bengaluru, an online Chilled Water Thermal stratification storage system with Radial Diffusers of 375 RT-Hr capacity (Six numbers of insulated storage tanks holding 2,40,000 liters chilled water) has been successfully installed to provide 30 minutes chilled water storage backup.

### Demand Side Management

In a District Cooling Plant project in India, where Chilled Water Thermal Storage Tank of 10000 RT-Hr capacity is installed, is our landmark installation. Out of the total HVAC load requirement of 10000 RT, 2535 RT load is catered by Thermal Storage thereby reducing the Installed Chiller Capacity down to 7500 RT.

Each 2500 RT Chiller accounts for approximately 1482 KW, its primary pump approximately 125 KW, and its cooling tower condenser pump around 188 KW of electrical load. Hence, considering the elimination of 2500 RT chiller and its related equipment, the subsequent downsizing of connected electrical

demand saved is about 1795 KW (1994 KVA) which would have been required otherwise.

This has not only benefitted them in saving about 2805 KVA DG back-up capacity but also allows them to use only 2 Nos. 2500 RT Chillers with CHW TES, operating mostly around the year. Only during peak months (May-June-July) they use their third chiller which facilitates them massive demand management on monthly basis.

### Please elaborate on technological innovations incorporated in your products.

**TES Systems:** The state-of-the-art radial diffuser design for TES Tanks ensures



Practice Ancient Architectural Designs using Natural Ventilation and Evaporative Cooling techniques to best possible extent.

proper stratification of hot and cold zone throughout the cycles keeping tank volume (water requirement) to a minimum. Radial diffusers made from stainless steel are self-supported type and installed during tank erection. Strong structural design of the radial disc diffuser is able to handle the shocks of the water hammering and surging etc. They are 100% maintenance free. The octagonal diffusers are made from PVC and hanged from roof structure of the tank, are weak to absorb the shocks of water hammering and surging etc., resulting in periodic maintenance checks.

**PICV:** The FlowCon SM PICV, is the most advanced PICV on the market today, which can secure points for the building's LEED certification. Here's how the FlowCon SM valve can improve the green credentials of today's building projects.

- Commissioned either through the valve display or via the feedback signal. The data can be used to verify the flow through each unit is as specified.

→ Guaranteeing the prevention of overflow in fully open and part open conditions, have 100% authority at all times and is independent of pressure

fluctuations. This leads to reduced system pressure drop and a consequential reduction in pump energy use. The accurate control of flow rates at all conditions result in temperature differences across the coils being closer to design therefore increasing chiller efficiency and reducing pump frequency.

→ Increases the accuracy in water flow control with the pressure independent feature preventing flow rate fluctuations and consequentially temperature changes with variations in pressure. The FlowCon PICV feedback option ensures that the valve can be integrated into a permanent monitoring system to ensure that the building performance meets the required comfort criteria.

→ Possible to link the FlowCon SM valve to the VFD pump and thereby ensure the optimal operation. It has an innovative feature, that it can correspond directly the actual flow rate to the BMS system without considering the exact differential pressure. It further more holds the option of direct verification of actual valve performance, settings and possible error codes, which can be used for easy building maintenance.

### What are your suggestions to the Indian HVAC system managers?

- Practice Ancient Architectural Designs using Natural Ventilation and Evaporative Cooling techniques to best possible extent.
- Correct implementation of solar shading systems can greatly contribute to reduced heat gains and subsequently lower the overall HVAC System sizing.
- Focus beyond Net Zero Energy to Net Positive Energy buildings.
- Those who are already skilled in HVAC systems will find that "greening" their knowledge simply requires that they become familiar with the latest technology. ■

## Growth of CO<sub>2</sub> in Commercial Refrigeration

**D**anfoss recently conducted an online survey to gauge industry acceptance of CO<sub>2</sub> refrigeration systems in North America. Intended to serve as an industry indicator, the survey collected input from commercial and industrial refrigeration OEMs, consultants, contractors, and end users.

### CO<sub>2</sub> in Commercial Refrigeration

According to the survey, the commercial refrigeration industry continues to see CO<sub>2</sub> as a viable mainstream technology for refrigeration (82 percent of OEMs; 91 percent of consultants and end users), and about half of OEMs responding see CO<sub>2</sub> refrigeration as being at least 16 percent of their business within the next five years. In a similar study conducted in 2012, less than 20 percent of OEMs saw CO<sub>2</sub> comprising at least 16 percent of their business. The majority of commercial refrigeration consultants and end users are today engaged in CO<sub>2</sub> projects, citing pending legislation or regulations and corporate sustainability goals as key drivers in the decision to use CO<sub>2</sub>. However, at the same time, they identified the high initial system cost as a primary barrier to deployment. "The results of this survey validate the ongoing growth we are seeing in CO<sub>2</sub> projects across North America," said Peter Dee, Sales and Services Director – Food Retail, Danfoss. "Globally, Danfoss has been involved in more than 10,000 CO<sub>2</sub> refrigeration projects, and we are using this

experience to continue investing in technologies like our new CTM multi-ejectors that help to minimize the challenges and application barriers to CO<sub>2</sub>. We have also recently launched our CO<sub>2</sub> Mobile Training Unit to address the critical need for training."

### CO<sub>2</sub> in Industrial Refrigeration

The survey also identified similar acceptance in the industrial refrigeration market. Fifty-seven percent of responding OEMs and contractors and forty-three percent of consultants and end users indicated they have already either been involved in a CO<sub>2</sub> refrigeration project or have plans to be. However, OEMs and contractors do not see CO<sub>2</sub> becoming a significant part of their business in the near future. OEMs and contractors identified the removal of ammonia, in terms of improved safety and reduced ammonia charge, as key drivers in using CO<sub>2</sub>. Consultants and end users agreed, but also cited pending legislation or regulation as important factors. In contrast to the commercial refrigeration industry, industrial refrigeration respondents said the primary barrier to further CO<sub>2</sub> use is the result of end user and contractor familiarity and training. This industry indicator on CO<sub>2</sub> was conducted as a follow up to a similar survey conducted by Danfoss in 2012 to gauge the market acceptance of CO<sub>2</sub> refrigeration. The survey was distributed via email to approximately 1,100 people that do business in commercial or industrial refrigeration applications. ■

## Superior Performance, Quality & Durability








**Sam Products Pvt Ltd**

B-137, Sector-6, Noida, U.P. 201301, India | Email: [samproducts@vsnl.com](mailto:samproducts@vsnl.com), [samproducts1992@gmail.com](mailto:samproducts1992@gmail.com)  
 Mobile: +91 9810065139 | Website: [www.samproducts.net](http://www.samproducts.net)

**Our Products**

- Air Curtains
- Laminar Flow Bench
- Clean Rooms
- Air Shower
- Fan Filter Units
- Air Cooling
- Air Filters
- Pass Box

# Solar Refrigeration

From a sustainability perspective, directly using solar as a primary energy source is attractive because of its universal availability, low environmental impact, and low or no ongoing fuel cost. Research has demonstrated that solar energy is an ideal source for low temperature heating applications such as space and domestic hot water heating...

**R**efrigeration systems that use environment-friendly refrigerants provide a sustainability advantage when compared to other refrigerant selections. However, the energy use associated with refrigeration system operation and the environmental impacts associated with its generation and distribution often outweigh the choice of refrigerant. To minimize environmental impacts associated

with refrigeration system operation, it is reasonable to evaluate the prospects of

a clean source of energy. From a sustainability perspective, directly using solar as a primary energy source is attractive because of its universal availability, low environmental impact, and low or no ongoing fuel cost. Research has demonstrated that solar energy is an ideal source for low temperature heating applications such as space and domestic hot water heating.

Photovoltaic-based vapor compression, is presently a viable solar refrigeration technology.

## Vapor Compression Refrigeration

Prior to discussing how solar energy could potentially provide refrigeration, it is appropriate to review the basic principles of operation for vapor compression refrigeration cycles that form the foundation for nearly all conventional refrigeration. A schematic of the vapor compression cycle is shown in Figure 1a and a corresponding enthalpy-pressure diagram for the refrigerant is shown in Figure 1b.

In the vapor compression cycle, cooling is provided in the evaporator as low temperature refrigerant entering the evaporator as a mixture of liquid and vapor at State 4 is vaporized by thermal input from the load. The remaining equipment in the system reclaims the refrigerant and restores it to a condition in which it can be used again to provide cooling. The vapor exiting the evaporator at State 1 in a saturated (1a) or slightly superheated (1b) condition enters a compressor that raises the pressure and, consequently, the temperature of the refrigerant. The high pressure hot refrigerant at State 2 enters a condenser heat exchanger that uses ambient air or water to cool the refrigerant to its saturation temperature prior to fully condensing to a liquid at State 3. The high-pressure liquid is then throttled to a lower pressure, which causes some of the refrigerant to vaporize as its temperature is reduced. The low temperature liquid that remains is available to produce useful refrigeration.

## Photovoltaic Operated Refrigeration Cycle

Photovoltaics (PV) involve the direct conversion of solar radiation to direct current (dc) electricity using semiconducting materials. In concept, the operation of a PV-powered solar refrigeration cycle is simple. Solar



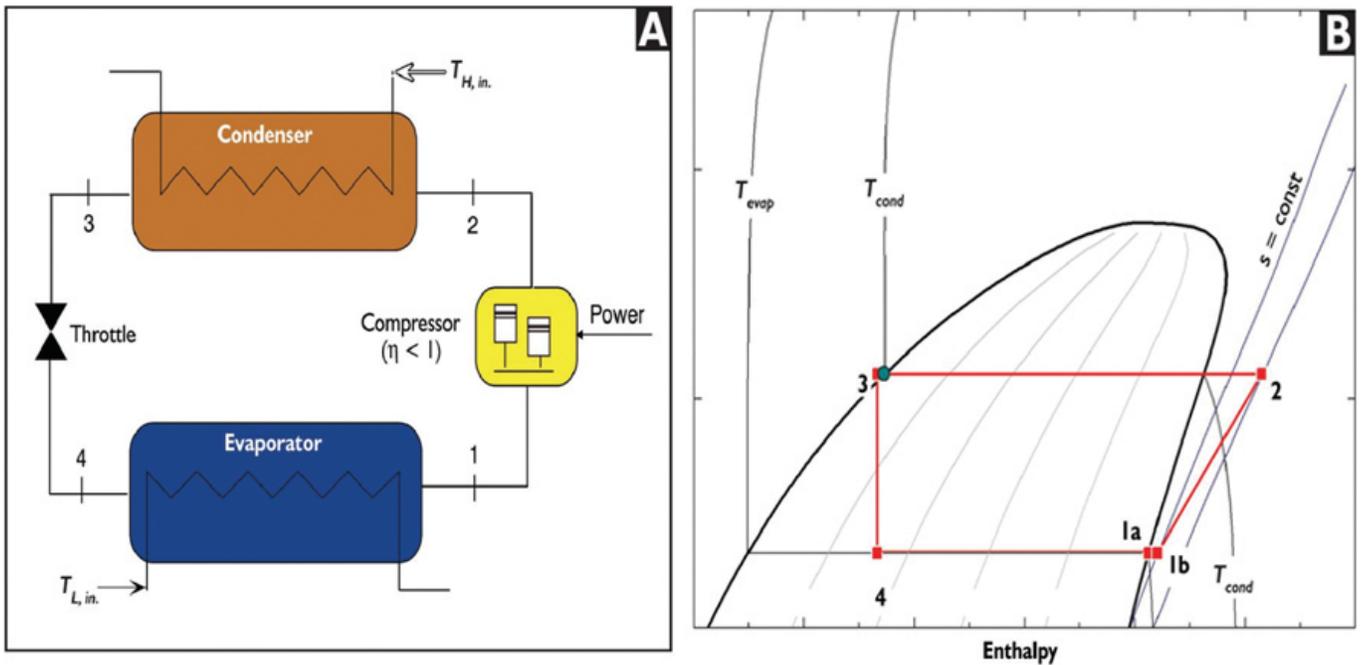


Figure 1(a): Schematic of a vapour compression refrigeration system. Figure 1b: Pressure-enthalpy diagram for the cycle.

photovoltaic panels produce dc electrical power that can be used to operate a dc motor, which is coupled to the compressor of a vapor compression refrigeration system. The major considerations in designing a PV-refrigeration cycle involve appropriately matching the electrical characteristics of the motor driving the compressor with the available current and voltage being produced by the PV array.

The rate of electrical power capable of being generated by a PV system is typically provided by manufacturers of PV modules

for standard rating conditions, i.e., incident solar radiation of 1,000 W/m<sup>2</sup> (10 800 W/ft<sup>2</sup>) and a module temperature of 25°C (77°F). Unfortunately, PV modules will operate over a wide range of conditions that are rarely as favorable as the rating condition. In addition, the power produced by a PV array is as variable as the solar resource from which it is derived. The performance of a PV module, expressed in terms of its current voltage and power-voltage characteristics, principally depends on the solar radiation and module

temperature. Figure 2 shows current (solid lines) and power (dotted lines) vs. voltage for a 1.32 m<sup>2</sup> (14 ft<sup>2</sup>) single crystalline PV module at the reference condition and four operating conditions. At any level of solar radiation and module temperature, a single operating voltage will result in maximum electrical power production from the module. The module represented in Figure 2 shows the voltage that yields maximum power ranges between 30 and 35 volts for this PV array.

The efficiency of the solar panels,

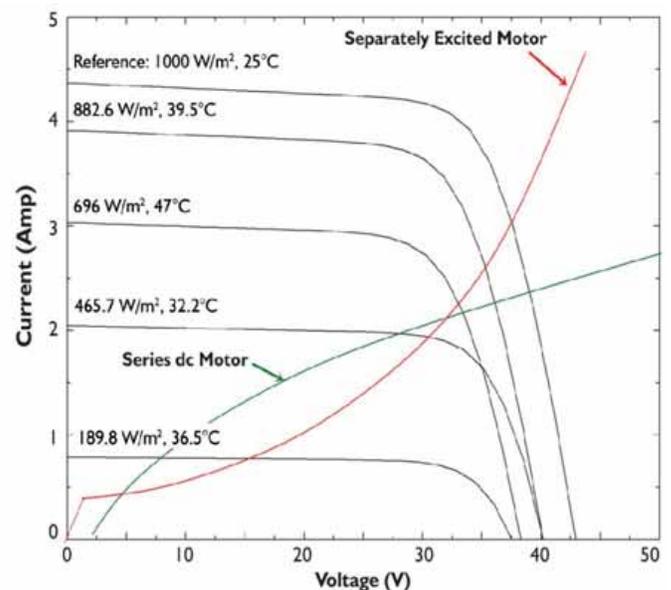
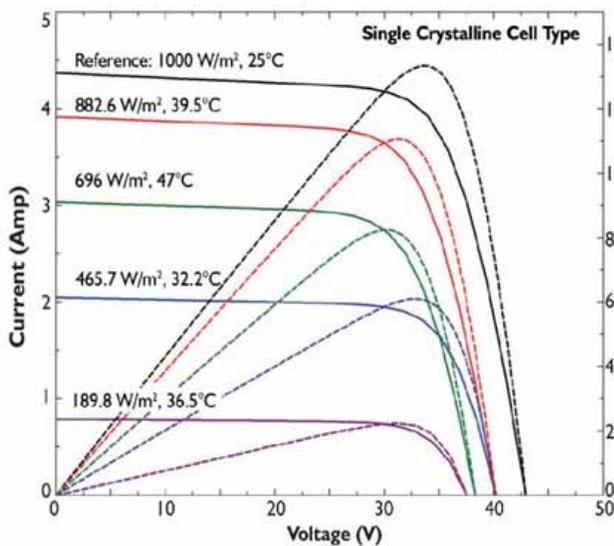


Figure 2(left): Current (solid lines) and power (dotted lines) vs. voltage for a single crystalline PV module at different operating conditions. Figure 3(right): current-voltage characteristics for a PV module and two dc motor types.

defined as the ratio of the electrical power produced to the incident radiation is between 8% to 10% at maximum power conditions for the PV array represented in Figure 2. If the PV refrigeration system is to operate at high efficiency, it is essential that the voltage imposed on the PV array be close to the voltage that provides maximum power.

This requirement can be met in several ways. First, a maximum power tracker can be used which, in effect, continuously transforms the voltage required by the load to the maximum power voltage. If the system includes a battery, the battery voltage will control the operating voltage of the PV module. PV panels can then be chosen so that their maximum power voltage is close to the voltage for the battery system.

The battery also provides electrical storage so that the system can operate at times when solar radiation is unavailable. However, the addition of a battery increases the weight of the system and reduces its steady-state efficiency. Electrical storage may not be needed in a solar refrigeration system as thermal storage, e.g., ice or other low temperature phase storage medium, may be more efficient and less expensive.

A final option for systems that do not use a maximum power tracker or a battery is to select an electric motor having current-voltage characteristics closely matched to the maximum power output of the module.

Figure 3 superimposes the current-voltage characteristics of a series dc motor and separately excited motor on the

photovoltaic module. In this case, the separately excited motor would provide more efficient operation because it more closely matches the maximum power curve for the photovoltaic module. However, neither motor type represented in Figure 3 is well-matched to the characteristics of the PV module over the entire range of incident solar radiation. Studies of solar-powered motors have shown that permanent magnet or separately excited dc motors are always a better choice than series excited dc motors in direct-coupled systems that are not equipped with a maximum power tracker. ■

S D Bandal  
Solar Electronics  
Solapur



## Bry-Air BrySmart® Series (BBS) Dehumidifiers

**T**he BBS is the all new, forward looking and intelligent dehumidifiers. It is simple yet cost effective solution, for all humidity related problems across diversified industries. It integrates trends like Industry 4.0 and ISO 50001 that help dehumidifier customers take a giant leap ahead in the quest for technology upgradation and energy conservation. The product is embedded with the patented BrySmart® and BryTherm™ technologies and is capable of delivering upto 48% energy saving, plus an additional 20% through the customized rotor which reduces initial react energy input for equivalent performance of standard dehumidifiers.

The dehumidifier not only optimizes the specific performance but also optimizes the specific performance on a dynamic basis with constantly changing loads and environmental conditions.

The product modulates various critical components to optimize the energy consumption on a continuous basis. It uses Variable Frequency Drives (VFDs) on various motors, thyristor control for heaters and also includes mobile connectivity for sensor

monitoring, controlling and data logging.

The BBS dehumidifiers come in the range BBS40 (4000 CMH) to BBS250 (25000 CMH). It includes a 7 inch colour touch panel for easy operation or control



and additional features like Bacnet/Modbus communication protocol, Ethernet port, RS232 and RS485 communication ports, start or stop access from a remote location using android devices and at the same time remote fault warning output. A special algorithm to collectively modulate rotor speed, reactivating airflow, temperature and process bypass is installed. No top-up heater is required and is designed aesthetically for ruggedness and long life.

The eco-friendly dehumidifier is a step

forward in energy conservation through enhanced technology (on real time). The user has the option to control parameters and ensure maximum flexibility in operation with the patented BryTherm™ technology. It also has an option to incorporate predictive failure or maintenance tool for continuously diagnosing and forecasting the component failures - Bry-Air Prognos™, as an add-on.

Bry-Air, the leader in dehumidification...worldwide, is a global solution provider for humidity control, moisture removal, product drying, gas phase filtration, plastics drying, conveying & blending, high temperature heat recovery and adsorption cooling. Bry-Air Dehumidifiers are designed to meet the most stringent moisture/humidity control needs and are available from compact models to very complex engineered systems. A Pahwa Group company, Bry-Air Asia has 3 state-of-the-art manufacturing facilities in India and fully owned subsidiaries in Malaysia, China, Switzerland, Brazil and Nigeria and an associate plant in USA, supported by a worldwide sales and service network. ■

## Centrifugal Chiller with Sustainable Refrigerant

Today, Carrier officially launched its latest innovation, the new AquaEdge™ 19DV centrifugal chiller with Greenspeed™ intelligence and PUREtec™ low Global Warming Potential (GWP) refrigerant. The new product, which was previewed at the China Refrigeration Expo earlier this year, was unveiled at Shanghai Yileng Carrier Air Conditioning Equipment Company Limited, a local Carrier entity. The breakthrough technology is now commercially available for the first time and delivers on customer demands for excellent performance, leading efficiency and environmental responsibility, due in part to the use of environmentally sustainable refrigerant R1233zd(E), which has a GWP of 1.34. "The AquaEdge 19DV centrifugal chiller is illustrative of Carrier's ongoing commitment to innovation and technology leadership through the development of energy-efficient, reliable and environmentally-responsible solutions to serve different segments," said Gaurang Pandya, President, Asia Pacific, UTC Climate, Controls & Security.

### High Efficiency Ideal Energy-Saving Solution

The AquaEdge 19DV features advancements in refrigeration, mechanical design, aerodynamics and heat transfer to provide efficiency improvements of upto 7.0 COP full-load and 11.8 IPLV. IP as rated in accordance with and certified by AHRI 550/590-2015 at standard rating conditions. In particular, the back-to-back

compressor offers excellent compression efficiency with an optimized design and simultaneously cuts down 75 percent of the mechanical transmission loss by using a high-speed direct driven motor, as compared to that driven by gears.

Equipped with Carrier's latest achievement in PIC5+ intelligent controls, and integrated with the Carrier lifecycle data management system, the AquaEdge 19DV allows users to easily track and analyse the chiller's operational data which helps to identify potential risks or areas for upgrading. The control system can also be linked to the user's building automation system, enabling remote access to the chiller's running data in real time.

### High operational Flexibility

The AquaEdge 19DV adopts multiple technologies to optimize itself for robust operation in various demanding scenarios. For instance, the Greenspeed intelligence, together with the unique compressor design that deploys one inlet guide vane for each of two stages, supports stable chiller operation at all times, even at 10 percent part load. This means consistent performance during off-peak hours in office buildings where computers operate at night. Also, PIC5+ controls allow swift restart in just 30 seconds in case of an unexpected power failure. This is extremely important for businesses like data centers where downtime can negatively impact their operations and bottom line. ■

# Cut Cooling Cost up to 99%



Harness  
 .....**waste heat**  
 from DG set jacket water  
 to produce  
**chilled water**  
 for low cost process cooling  
 and air-conditioning .....

to produce  
**chilled water**

for low cost process cooling  
 and air-conditioning .....

**Bry-Air**

## Adsorption Chiller

The magical link between waste heat and chilled water



- Harnesses waste heat for energy-efficient cooling
- Results in up to 99% reduction in electricity cost for chilling
- Environment-friendly, with ultra-low energy consumption
- Life expectancy: Over 25years
- Noise-free operation with minimal maintenance
- Almost no moving parts

**BRY-AIR (ASIA) PVT. LTD.**

ISO 9001:2008 & 14001:2004 CERTIFIED

Phone: +91 124 4184444 • E-mail: bryairmarketing@pahwa.com • Web:www.bryair.com

Hot water in  
50°C to100°C

Chilled water out  
5°C to15°C



RBB/1646HHCA1

**PAHWA GROUP**  
 Innovation is life

# Enhancing Energy Efficiency

Heat pumps help to increase heat recovery within the processes, ultimately, enhancing the energy efficiency of the system. If heat pump integration is considered meticulously during the plant process design stage itself, design loads for hot water generating systems, boilers, fin-fanned coolers, condensers or cooling towers can be optimized...

As the name suggests, heat pumps are equipment which pump heat from a lower temperature heat source to a comparatively higher temperature heat sink. As the direction of heat flow is against the natural course, external work has to be supplied to achieve

the required pumping.

The vapour absorption based heat pump essentially operates with three utilities

- Low temperature heat source – from which heat is absorbed
- Driving heat source – which supplies

work for the pumping

- Product hot water stream – to which heat is added in the heat pump

Depending on the relative temperatures of the low temperature heat source, driving heat source and desired hot water temperatures, the heat pump is operated using different cycles to cater to the altered requirement.

Accordingly, Heat pumps can be classified into:

- Heat Pump Type I
- Heat Pump Type II (Heat Transformer)

In Type I Heat Pump, a low-grade heat source (40°C - 35°C), typically cooling

### Heat Pump Type I

Waste heat source  
40°C - 35°C

Driving heat source  
180°C - 160°C

Product hot water  
60°C - 90°C

For every 1.7 Kcal of heat added to the hot water by heat pump 0.7 Kcal is free i.e. 40% savings in Heating

### Heat Pump Type II

Waste heat source  
80°C - 150°C

Product  
Dry Saturated Steam  
(1 - 8 barg)

OR

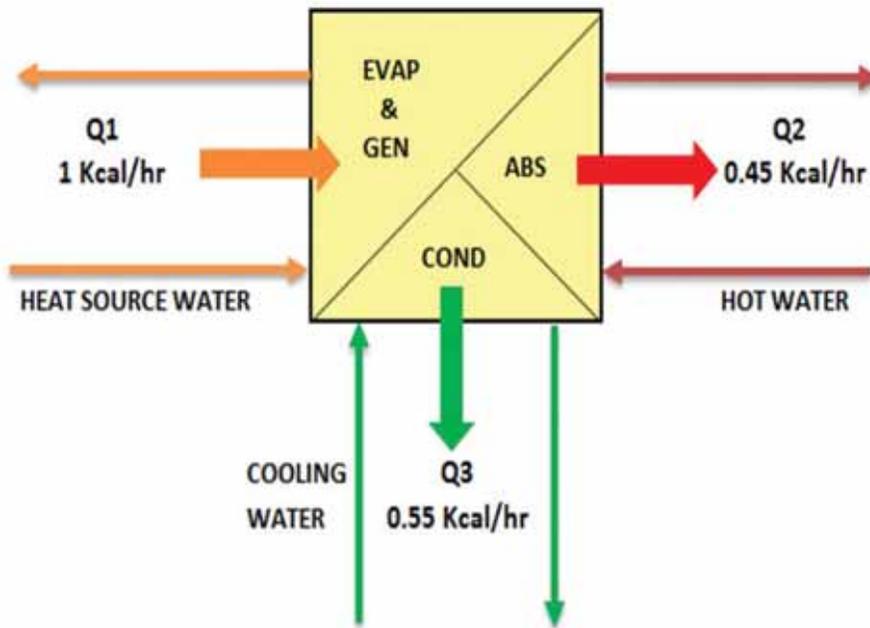
Hot water  
(110°C - 175°C)

45% conversion of waste heat to useful heat

Reduction in Dry coolers/fin fanned cooler heat duties



Image Courtesy: www.puaf.org.uk / Danfoss



Heat Balance equation  
 $Q1 = Q2 + Q3$

Co-efficient of performance  
 $COP = Q2/Q1$   
 $= 0.45$

water is circulated in the evaporator. A high-grade driving heat source (180°C - 160°C) is utilized in the generator by means of which heat rejection is done to a medium grade heat medium (60°C - 90°C).

That is, the heat absorbed in the evaporator from the low-grade heat source & the heat absorbed in the generator from a high-grade driving heat source is rejected to medium grade heat medium circulated in the absorber and condenser.

### Heat Pump Type II

Heat pump Type II, better known as Heat Transformer, transforms a waste heat source to a more useful heat source by raising its temperature. A medium grade heat source (110°C - 100°C) is circulated in evaporator as well as generator, where heat is absorbed into the heat pump.

Part of this absorbed heat is rejected to a higher-grade heat medium (150°C - 160°C) in the absorber which is the actual output of the heat pump, and the remaining heat is rejected to cooling water (30°C) circulated in the condenser.

That is, medium grade waste heat is added to high-grade heat utilizing medium grade waste heat source.

That is, 45% of waste heat that was initially rejected to atmosphere can be pumped to a useful heat source (product

hot water/steam), thus enhancing overall process efficiency greatly. The heat pump output hot water can be flashed in a flash tank to provide steam as per the desired pressure.

### Heat Pump Type II Cycle Description

In the evaporator, refrigerant evaporates by absorbing heat from the waste heat source circulated through the evaporator tubes.

The vapour thus generated is absorbed by the strong LiBr solution being sprayed in the absorber. This absorption of water vapour by LiBr solution is an exothermic process; that is, heat is released during dilution of the LiBr solution. The hot water which is circulated through the absorber tubes

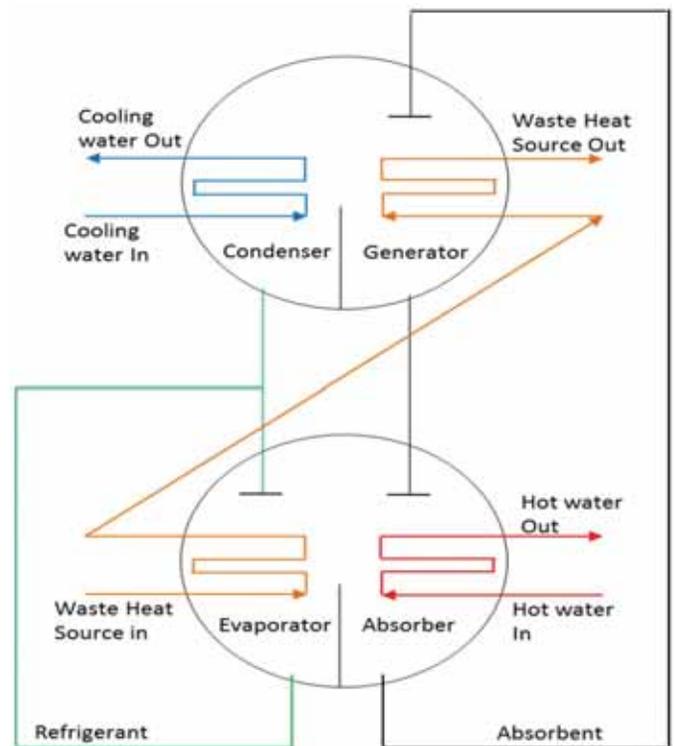
absorbs the heat released during dilution of LiBr solution. As such, the hot water temperature increases.

Once the LiBr solution has absorbed water vapour in the absorber section, its concentration reduces; the dilute LiBr solution is then pumped to the generator where the absorbed water vapour is boiled off and the concentration of LiBr solution is increased; the heat for boiling is provided by the waste heat source circulated through the generator tubes; the strong LiBr solution is then brought back to the absorber for spraying.

The water vapour boiled off in the generator is condensed in the condenser by rejecting heat to the cooling water circulated through the condenser tubes. The condensed water vapour, refrigerant, is brought back to the evaporator for cycle continuation.

As cooling water is acting as a heat sink for condensation, the condensing temperature is lower and as such generator pressure (generator and condenser are in the same shell, and hence at equal pressure) is also low.

As boiling point is a function of pressure, for the lower generator pressures, LiBr solution boils at lower



temperatures and as such the lower temperature waste heat source can provide the required heat.

## Advantages of Heat Pump Type II:

- 45% of waste energy is converted to useful energy.
- That is, energy efficiency of the process or system shall increase due to internal heat recovery.
- Correspondingly, the heat rejection to atmosphere of the process/system shall also reduce, which means fin fanned coolers/ dry coolers/ Cooling tower heat duties shall reduce.



- Further, benefit of reduction in CO<sub>2</sub> emissions (carbon credits) can be attained due to higher energy efficiency and lower energy requirements.
- Additionally, vapour absorption machines attract higher rate of depreciation as an energy conservation device and hence the feasibility can be further improved due to tax savings.

## Applications

### Poly film manufacturing process for photovoltaic cells

Thermax has successfully commissioned a heat transformer in Poly film manufacturing process for photovoltaic cells for a customer based in China.

The manufacturing process requires 100°C water. During the process, this water temperature increases to 110°C. For reutilization, the 110°C water leaving the process was cooled to 100°C in a dry cooler where the heat was simply rejected to the atmosphere.

Using Heat Pump Type II, the available heat was utilized for generation of 4 barg steam, which finds use within the manufacturing process.



### Operating Parameters

#### Heat source

Medium (waste) heat source inlet temp = 108°C

Medium (waste) heat source outlet temp = 100°C

Medium (waste) heat source flow rate = 1000 m<sup>3</sup>/h

#### Product

Hot water inlet temp = 152°C

Hot water outlet temp = 157°C  
 Hot water flow rate = 765 m<sup>3</sup>/h  
 Flash steam generation = 6.5 TPH @ 4 bar(g) (from hot water)

## Food industries

### Pasta Manufacturing Process

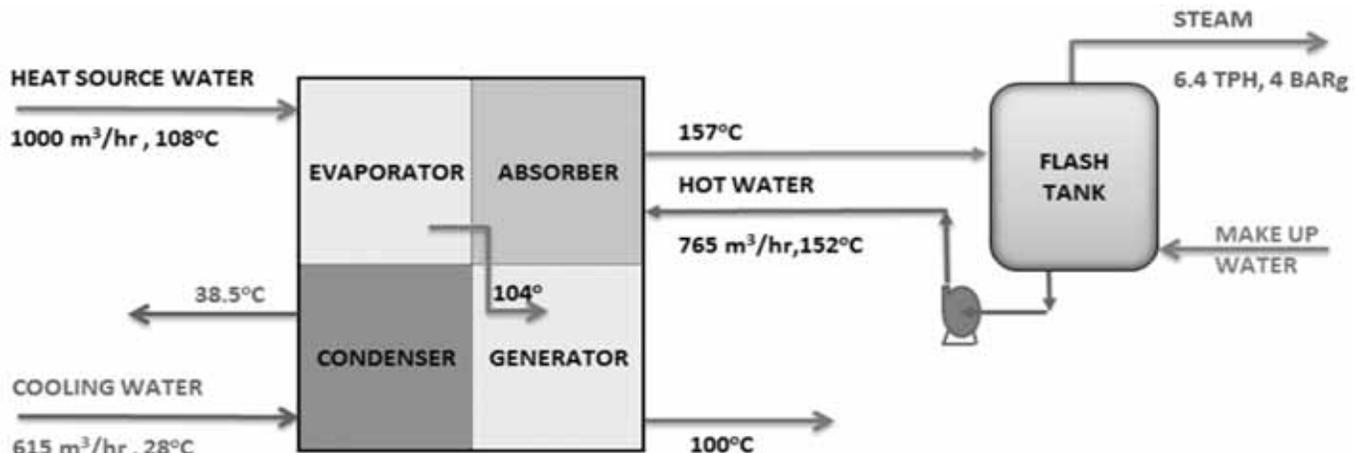
In this application, Gas engine's jacket water is cooled in the Type II heat pump. Using the 93°C jacket water as heat source, hot water of 125°C is heated to 135°C. This hot water of 135°C is then used in a pasta manufacturing process.

Heat source water		
Inlet temperature	°C	93
Outlet temperature	°C	75
Flow	m <sup>3</sup> /h	127.3
Cooling water		
Inlet temperature	°C	24
Flow	m <sup>3</sup> /h	238
Hot water		
Inlet temperature	°C	125
Outlet temperature	°C	135
Flow	m <sup>3</sup> /h	108.6

### Pre-cooked Meal Manufacturing Process

In this application also, Gas engine's jacket water is cooled in the Type II heat pump. Using the 90°C jacket water as heat source, hot water of 95°C is heated to 105°C. This hot water of 105°C is then used in Pre-cooked Meal manufacturing process.

Similarly, in food & beverage industries, many product streams are at elevated temperature after processing and have to be cooled before packing & storage. Also, the heat sources for the same processing



would normally include hot water or steam up to 2-4 bar g. In such cases, Heat Pump Type II can be used for heat recovery from the product streams and enhance the overall efficiency of the process.

Heat Source Water		
Inlet temperature	°C	90
Outlet temperature	°C	80
Flow	m <sup>3</sup> /h	84
Cooling Water		
Inlet temperature	°C	24
Flow	m <sup>3</sup> /h	60
Hot Water		
Inlet temperature	°C	95
Outlet temperature	°C	105
Flow	m <sup>3</sup> /h	40

**Refineries & Petrochemicals**

The product streams of many processes in refineries are at elevated temperatures, these have to be cooled before taking to filling & storing on account of high volatilities to avoid evaporation losses. Also, high temperature heat sources i.e. steam @ 4-8 bar are required in substantial quantities for innumerable processes. Here, Heat pump Type II can be used to pump heat from the medium temperature streams to higher temperature, to provide steam @ desired pressure.

This will not only reduce steam costs but also reduce the costs incurred for product cooling which may include use of dry coolers or any other such indirect heat

exchangers where effectively the heat is rejected to the atmosphere.

Heat source water			
Inlet temperature	°C	120	
Outlet temperature	°C	100	
Flow	M <sup>3</sup> /h	450	
Cooling water			
Inlet temperature	°C	32.5	
Flow	M <sup>3</sup> /h	615	
Hot water			
Inlet temperature	°C	151.8	7.2 TPH 4 Bar(g) Steam
Outlet temperature	°C	159.8	
Flow	M <sup>3</sup> /h	540	

**Engine jacket water cooling**

Normally, the jacket water @ 93°C-95 °C has to be cooled up to 78°C-80°C. This heat can be used to generate steam 1 bar(g) – 1.5 bar(g) steam depending on the available cooling water temperatures.

For GE 1.063 kW el. Engine

Heat source water			
Inlet temperature	°C	90	
Outlet temperature	°C	75	
Flow	m <sup>3</sup> /h	51.8	
Cooling water			
Inlet temperature	°C	30	
Flow	m <sup>3</sup> /h	100	
Hot water			
Inlet temperature	°C	120.2	580 kg/h 1 Bar(g) Steam
Outlet temperature	°C	130	
Flow	m <sup>3</sup> /hr	52	

**Epilogue**

Heat pumps help increase heat recovery within the processes, ultimately, enhancing the energy efficiency of the system. Obviously, heat rejections to the atmosphere reduce, making the systems more environment-friendly. Also, if heat pump integration is considered meticulously during the plant process design stage itself, design loads for hot water generating systems, boilers, fin-fanned coolers, condensers or cooling towers can be optimized. Accordingly, the capital investment for these equipment shall reduce along with the ensured operational savings. Again, heat pumps are compact like chillers, they are easy to erect, commission and operate; supplied as single unit, erection simply encompasses connecting the utility circuits to the Heat pump; The Evolved PLC controlled operation allows single command start-stop and fully automated operation. As such, Heat pump is a simple solution to increase the energy efficiency of the process. ■



**P Babu**  
Head – Technology & Innovation, Thermax

Your brand needs to appeal all consumers...  
**We make your brand presence strong & distinct.**

**Make your brand aggressive in this competitive world...  
 Be Distinguished and noticed**

To know more go to [www.charypublications.in](http://www.charypublications.in)  
 Chary Publications offers you Print + Digital version of its magazines

# Design Elements for Energy Efficiency

While architectural design is influenced by numerous criteria and design philosophies and forms a complex web of design decisions, this article focuses on the parameters that solely define and enhance the energy efficiency of buildings...

**D**rastic climatic changes and a perceptible increase in natural disasters coupled with depleting natural resources has made it imperative for us to reconsider our practices and lifestyles including our building parameters. Economic growth has led to better and extensive infrastructure to serve the varied needs of an increasing population. Buildings form an important component of this infrastructure and energy efficient buildings

play a key role in creating environmentally sustainable structures. Focus on energy is not just a local industry trend but is part of a global push to create Sustainable infrastructure that will support growth.

While architectural design is influenced by numerous criteria and design philosophies and forms a complex web of design decisions, this article focusses on the parameters that solely define and enhance the energy efficiency of buildings.

Through the various projects that we have worked on carrying out the energy analysis, we have identified the critical components and design elements that create buildings which are energy sensitive.

## Energy Goals in Building Design

The primary goal in any sustainable design process would be to increase energy efficiency. However, along with this primary goal, the design must allow easy integration of energy efficient technologies. This fundamentally involves a whole-building analysis that treats a building and site as a complete system. The design must not only take into account the interactions among all of the building's systems but must also provide opportunities for dynamic, interactive



Symbiosis International University – Shape which encourages the use of daylight/ natural ventilation  
Architect: Murty&Manyam Architects and Engineers | Green Consultant: Ela Green Buildings



T-Hub, Hyderabad – use of climbers on the façade.

Architect: W Studio | Energy Consultant: Ela Green Buildings

lessons on energy efficiency and renewable energy. Supply off-grid power and back-up power over and above efficient design is essential.

## Elements of Energy Efficiency Design

The primary aim is that the design must be able to modulate conditions such that the building is close to comfort zone naturally. Based on our case studies and analysis, modulations can be introduced in design by landscape, planning and built form and shading devices.

### Landscape

A study by the US Department of Energy indicates that carefully positioned trees can save up to 25% of a household's energy consumption for heating and cooling. Shading and evapotranspiration from trees can reduce surrounding air temperatures by 9°F (5°C). Studies by the Lawrence Berkeley Laboratory indicate that air temperatures under trees can be as much as 25°F (14°C) cooler than air temperatures above nearby blacktop. Trees can be selected with appropriate sizes, densities, and shapes for almost any shading application. Climbers, groundcover plants & turf can also shade walls and roof. Non roof paved areas shaded by landscape will mitigate the heat island effect. This reduces heat radiation and cools the air before it reaches walls and windows.

The T Hub building in Hyderabad which is the first ECBC compliant building in the

State of Telangana has effectively used creepers on the façade over a mesh designed for the purpose to reduce the direct heat gain into the building. Shilpa Architects office building 'The Muse' on the south façade has additional shading through the vertical green wall which is planned for the exterior of this façade. The green wall is supported on an MS framework which is mounted on the surface of the building and has appropriate planting that is grown on the ground and then allowed to "climb up" the entire southern surface of the glazing. This feature provides additional shading on the



Coal India Corporate Office – Initial Designed WWR was greater than 50%. Based on energy analysis, the WWR was further reduced to 38%.

Architect: Raj Rewal Associates | Green Consultant: Ela Green Buildings

southern façade which is the second most vulnerable to heat gain amongst the four cardinal directions.

## Planning and Built Form

Various aspects of the building plan, shape and orientation impact the building performance. A building plan which places functions in locations that minimize the need for applied energy would be more sensitive to the building energy needs. The planning of internal spaces such that the functions are placed in appropriate locations based on energy requirement is essential.

The Symbiosis International University Campus in Hyderabad has ensured that all the classrooms are appropriately located facing a central courtyard with adequate daylighting and ventilation allowing them to be naturally ventilated spaces. The administrative areas and computer labs have been so designed to be located in a separate block.

The Coal India Corporate Office Building in Kolkata has been so designed to locate all the open office areas on the periphery as well as facing the central courtyards.

The orientation of the building plays a critical role. Understanding the optimal orientation for the building in the planning through simulation analysis and balancing of daylighting forms an integral part of the



Symbiosis International University – Design studios in the academic block have skylights oriented towards the East  
 Architect: Murty&Manyam Architects and Engineers | Green Consultant: Ela Green Buildings



Auxilium Navajeevana Home for Street Girl Children Windows planned on the North and South façade of the building with appropriate shading devices.  
 Architect: Ela Green Buildings | Green Consultant: Ela Green Buildings

initial concept design.

The Design studios at Symbiosis in the academic block have skylights oriented towards the East. The backs of these angled skylights which face west will have solar panels to capture the heat and harsh light from the west. The CPCL Dining hall had large glazing elements planned on the North and East façade of the building. The

east façade was planned with high performance glazing and shading devices. The Auxilium Navajeevana Home for Street Girl Children was designed with windows planned on the North and South façade of the building with appropriate shading devices.

The optimal Window to Wall ratio needs to be designed to reduce solar heat

gain to the least extent while maximizing daylight. The Energy Conservation Building Code allows a maximum of 60% as WWR. However, the optimal WWR would depend on the daylighting and the energy analysis and iterations on design accordingly.

The WWR in the SSC 3 Rajala Centre Commercial Complex was redesigned after the simulation analysis to ensure adequate daylighting. Similarly the WWR in the Coal India office building was redesigned to ensure maximum energy savings from façade design.

There may be various design approaches and options to achieve the energy goals of a building. The essential approach would be to base all design decisions and thinking on a scientific analysis backed by appropriate energy, lighting and other studies based on environmental considerations of the site.

A holistic design approach taking into account the synergies between the design outcomes of the various team members, the architect, the MEP consultants, the landscape consultant, the energy or green consultant and other is critical to the success of the project. ■



SSC 3 Rajala Centre – Option 1 was analyzed and further redesigned to Option 2 to increase the WWR from 29% to 36%  
 Architect: Vista Architects | Green Consultant: Ela Green Buildings

**Samhita M**  
 Managing Director  
 Ela Green Buildings &  
 Infrastructure Consultants  
 Pvt. Ltd.



A wide range of technologies all tied together by a genuine intent to create sustainable supermarkets based on innovative concepts for improved operational and energy efficiency...

## Shop Energy Efficiency in Danfoss Smart Store



**W**ith smart and integrated solutions from pack to HVAC, Danfoss Smart Store opens its doors to operational and energy efficiency. The Smart Store at EuroShop 2017 provides the latest updates on CO<sub>2</sub> refrigeration, smart grid integration, and experience how intelligent control optimizes operation 24/7.

At EuroShop 2017, Danfoss invites visitors to enter a supermarket of systems and components for next generation food retail solutions. A wide range of technologies all tied together by a genuine intent to create sustainable supermarkets based on innovative concepts for improved operational and energy efficiency.

- Explore compressor racks with heat recovery, variable speed drives and

- new ejector technology
- Discover how the supermarket is transformed from energy consumer to energy producer with a new heat recovery unit and connection to local smart grids
- And how digitalization and electronic controllers open new opportunities for one-view store management and predictive maintenance
- See and experience the new controller tray that handles up to 300 different control variants
- And discuss with Danfoss experts whether remote, semi plug-in or plug-in is the right solution

"With smart and integrated solutions for compressors, refrigerated display cases, cold rooms, HVAC, lighting and

connections to external grids we can prove energy savings of up to 50 percent. With our Smart Store concepts we demonstrate that connected and sustainable stores are not a future dream, but highly feasible and profitable solutions today," says Henrik Schurmann, VP, Danfoss Food Retail.

### Focus on CO<sub>2</sub> Refrigeration with Ejector

One of the special highlights presented by Danfoss at EuroShop 2017 is the mobile training unit for CO<sub>2</sub> refrigeration. Here, visitors can get hands on experience with CO<sub>2</sub> systems and simulations of refrigeration systems optimized for CO<sub>2</sub>; notably the brand new Ejector technology that brings profitable CO<sub>2</sub> solutions with high energy efficiency to warmer climates.

On show is also the next generation cold chain management system. Cool.it that offers seamless, cloud-based monitoring of the entire value chain.

### Facts about Danfoss Smart Store

Danfoss Smart Store has been developed based on more than 30 years of close cooperation with the global community of food retailers and more than 80 years in the HVAC/R industry. The solution is running in more than 8,000 stores worldwide and the proven savings are up to 50 % per store. ■



“Optimisation  
is must to  
have  
sustainable  
buildings”

GAPS Engineering and Consultancy deals in HVAC products and services. The company offers all type of ventilation products e.g. demand control ventilation, smoke and heat extractions.

**Gaurav Vasudev, Managing Director, GAPS Engineering** states that the market needs to understand that price should not be the only criterion that is controlling the projects in an interaction with **Cooling India...**

### What are the services and products offered by the company pertaining HVAC industry?

GAPS Engineering and Consultancy deals in HVAC products and services. We provide all type of ventilation products e.g. demand control ventilation, smoke and heat extractions and infrastructure projects. With our in house capabilities and experience today we can offer design & built products apart from services for all kind of acoustic problems. For optimising air-conditioning loads, we have external shading devices & many more state-of-the-art and modern products from RENSON Belgium.

### With emphasis on fire & life safety, how do you envisage the growth of fire & life safe buildings concept in India?

Trends of building designs in India are changing very rapidly. Today, we are witnessing a shift in hospital designs as an example. We are building many 50m+ high hospitals which have special needs when it comes to fire & life safety. We are having as big as 3000 beds government hospitals coming in different parts of India. Gaps Engineering is working very closely with governmental bodies, fire consultants in this regard and being part of this shift in building designs. It has been observed that Indian Government is taking a lot of initiatives today to make the buildings fire and life safe. This focus of government and governmental bodies will force Indian builders to look at fire and life safety as one of the main aspect of building design.

### What are sustainable design considerations adopted during the construction of fire & life safe buildings?

Optimisation is must to have sustainable buildings. We target to work towards the optimisation of the

product capacities, locations and use in the buildings to have best results during the normal & emergency conditions. The solution should take care of both normal applications as well as emergency requirement.

### What kind of potential do you look forward for your company with the government's initiative of rolling out of '100 smart cities'?

With the government initiative of smart cities, its combined outlay is about USD 22.5 billion to construct 100 smart cities and further rejuvenation of 500 cities. Any development leads to infrastructure and sustainable balance of nature and development will be giving an excellent growth opportunity for the industry. We are looking forward to play our role in these projects.



India is very price sensitive market. Also applied science and its actual implementation is being controlled by price for many projects. When science is being converted into products, the price plays a vital role. The market needs to understand that price should not be the only criterion that is controlling the projects.

### What are sectors that bring business to your company?

GAPS Engineering works on new projects and existing retrofit areas. Hospitals, infrastructure, automobiles, railways and metro rail are key focused sectors. We offer ventilation, fire & life safety products, services & pumping solutions to these projects.

### What are challenges faced by the company during providing your solutions?

India is very price sensitive market. Also applied science and its actual implementation is being controlled by price for many projects. When science is being converted into products, the price plays a vital role. The market needs to understand that price should

not be the only criterion that is controlling the projects.

### How do you overcome the same?

With team work, propagation of our engineering solutions in the right way, convincing our clients for the implications of same keeping future trends and upcoming evolution in mind has definitely helped us to overcome the challenge. We have credible and trustworthy association with our customers in terms of our colleagues. The customers we deal with have trust on us looking at our competence of handling their challenges.

There has been a significant contribution of new technologies, ISHRAE and its efforts in bringing in change in the mindset of industry. The customer rather than going ahead only

with prices are giving value to many important aspects of their project needs before making final decisions.

### What is your outlook for HVAC industry for 2017-18?

The government's initiatives like Make in India, competitive federalism, Smart cities project, regulatory framework, 110 million houses by 2022, digital India and ease of doing business has helped to generate the opportunities. Definitely these will help in for progress of the sector.

The government's focus on the development of sustainable infrastructure along with increasing awareness towards energy efficient solutions is creating opportunities for HVAC&R industry. ■

# Biogas Refrigeration

In India approximately 70% of population is associated with agriculture. Horticultural crop significantly contributes in overall GDP of India. To store the horticultural product for better return a cold storage system is desirable. In the remote areas, irregular supply of electricity restrict the use of conventional cold storage system. Biogas is the one of the feasible option to operate cold storage system. Government should take initiative to promote the same and improve the living standard for marginal farmers...



Powering milk chilling units with biogas

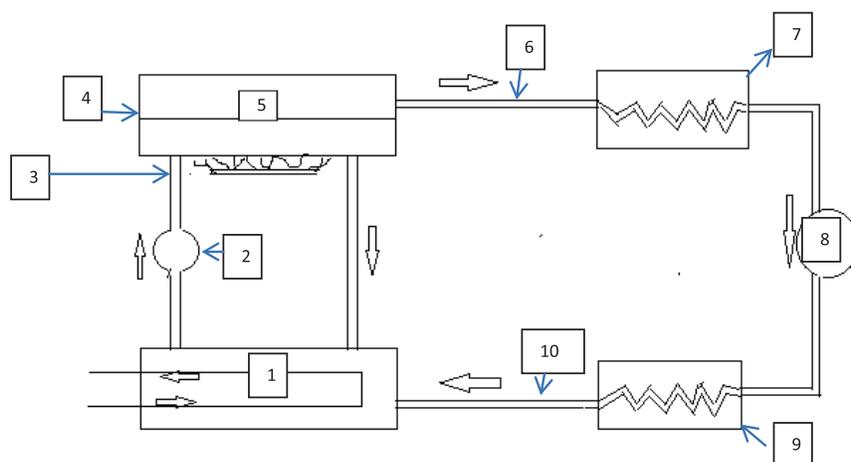
India is now the second largest producer of fruits and vegetables in the world and is the leader of several other major horticulture crops [1]. During 2015-16, the production of horticulture crops was about 283.36 million tons [2]. This large quantity of horticulture production is not utilized in the country therefore it needs advance cold storage structures for its later utilization. Biogas

offers a renewable and economical feasible energy source for large scale cold storage of these produced fruits and vegetables in the country. Biogas can be produced from agriculture waste, animal waste, fruits and vegetables waste, slaughterhouse waste, municipal solid waste etc. Large quantity of these biodegradable wastes is available in the country for biogas production. Biogas

produced from these waste materials offers sustainable solution for refrigeration of horticulture products. There is high demand for cold storage of fruits and vegetables in many parts of the world including India. In many parts of rural India, conventional electricity is not available and it is not economical viable option for small holding farmers in India. Biogas based refrigeration system helps to reduce losses of fruits and vegetables during post-harvest operation. Vaccines, medicines and stored blood need to be kept at low temperature during transportation and storage. Biogas can be used as a source of energy to drive refrigeration cycle. Till now biogas is little utilized commercially for refrigeration but in future it could be used in large scale as renewable source for cold storage of horticulture crops. Biogas refrigerators replace conventional refrigerators or other kerosene fueled cooling devices which ultimately helps to reduce greenhouse gas emissions in the environment. Biogas based refrigeration system could play a vital role in achieving millennium development goals. Therefore, there is huge demand of non-conventional energy based economical feasible refrigeration system for preservation of horticultural products and storage of lifesaving vaccines.

## Biogas based vapour absorption refrigeration system

Biogas based vapour absorption refrigeration system consists of absorber, generator, condenser, throttle valve, evaporator and heat source from biogas as shown in following figure. In absorber there is solution of water and ammonia refrigerant at low temperature. This low temperature mixture of ammonia and water is sent to the generator through pump where it is heated externally using



Biogas based vapour absorption refrigeration system

1. Absorber 2. Pump 3. Heat from biogas 4. Ammonia with high pressure 5. Generator 6. High pressure ammonia vapour 7. Condenser 8. Throttle valve 9. Evaporator 10. Low Pressure ammonia vapour

biogas. Due to heat from biogas, ammonia gets separated from ammonia-water mixture and converts into high pressure ammonia vapour. This high pressure ammonia from the generator is sent to the condenser where it rejects heat to the atmosphere and becomes high pressure liquid ammonia. High pressure liquid ammonia is throttled and passed to the evaporator. At evaporator low pressure ammonia refrigerant absorbs heat from the place where cooling is to be done. After heat absorption from the cooling room low pressure ammonia liquid gets evaporated and passed again to absorber in the form of vapour ammonia. This vapour ammonia gets mixed with ammonia and water mixture and cycle continues again. Refrigeration effect is due to absorption of heat at evaporator from the room.

### Development Status

The application of biogas based refrigeration system is restricted to places where biogas is available or can be



produced from waste resources. Generally in rural areas there is availability of animal dung and agricultural residues for biogas production, so it can be utilized for refrigeration of agriculture produce such as perishable fruits and vegetables. Technology of biogas refrigeration is little used commercially in the field. The technology has significant potential for its development and simultaneous application for power generation and heat along with refrigeration utility. Research is needed to know the refrigeration potential, technology development, efficiency improvement and for marketing of developed technology for its widespread utilization.

### Scope for Improvement of Technology

There is scope to improve efficiency of biogas refrigeration system and possibility of multiple application of biogas energy to fulfill need of electricity, heat and refrigeration. Commercialization of small as well as large scale models of biogas refrigerators is the key research area for technology development and its widespread application. Biogas refrigeration system provides non-conventional based feasible alternate option to unelectrified rural areas. Therefore, it is necessary to work on cost

reduction options to make economic feasibility of complete technology package.

### Environment issues

Biogas refrigeration system can save emission of harmful greenhouse gases in the environment and contribute to climate change mitigation. Refrigerant such as ammonia and water used in the biogas refrigeration cycle is not providing any harm to environment. The introduction of biogas refrigeration system provides alternate non-conventional economical feasible option which replaces existing conventional cooling devices.

### Conclusions

Biogas refrigeration system provides economical feasible renewable option for cold storage of horticulture crops to rural India. Technology reduces emission of hazardous greenhouse gases in the atmosphere and helps in climate change mitigation. The refrigeration system helps to reduce post-harvest losses of perishable fruits and vegetables and contribute to food security and nutritional availability. Large scale cold storage structures can store bulk quantity of agricultural produce for longer time and can give additional surplus income to grower. Biogas refrigeration system is little implemented commercially in the field therefore key research is needed for its efficiency improvement, advance technology development and marketing of developed system in the field for its widespread utilization. ■

### References

1. Horticulture statistics at a glance.2015. Government of India
2. 3rd advance estimate of area and production of horticulture crops, 2015-2016, National Horticulture Board, Government of India.

**N L Panwar**

Assistant Professor  
Maharana Pratap University  
of Agriculture & Technology  
Udaipur, Rajasthan



**Pradip Narale**

Research Fellow  
Maharana Pratap University  
of Agriculture & Technology  
Udaipur, Rajasthan





## “Govt need to formulate policy on cold chain industry”

The Federation of Cold Storage Associations of India (FCAOI) is all India association with members in most of the states in the country. There is a huge need for cold storage facilities in India leading to the formation of state level associations who look after their concerns. **Mahendra Swarup, President, Federation of Cold Storage Associations of India**, hopes that the Government’s plans for setting up 100 new cold chains will help Indian cold chain industry in future in an interaction with Cooling India.

### **What are the services provided by Federation of Cold Storage Associations of India?**

We are bringing member states of the Federation together by informing them about the developments in each state. This may be in technology, expansion in cold storage capacity, making efforts in other groups of the cold supply chain. Also market information is provided to members so that they may adjust themselves as per the stock position.

### **What are challenges faced by Indian Cold Storage industry? What kind of infrastructure would you suggest for the industry in order to reduce food, grain or crop losses?**

We are facing the basic challenge of electricity. Either there is very less power or very expensive power. Apart from this, power supply in most parts of India is not a quality power like excess of interruptions, low or high voltage and sometimes changing frequency. The cold chain industry has to equip itself with a developed logistics of refrigerated vans. Publicity is needed to spread awareness among

people for purchasing goods stored in cold storages. At present Indian population is not market friendly with stocks stored in cold storages.

### **How do you envisage the growth of Indian cold storage industry with the government’s plans of setting up of 100 new cold chains of Rs 12,000 crore to Rs 13,000 crore?**

The Government’s plans for setting up 100 new cold chains will help Indian cold chain industry in future.

### **What are technological innovations introduced by the Federation in order to preserve fruits, vegetables or grains? What innovations would you like to bring in the industry in order to make it globally competitive?**

Now-a-days, ripening plants for bananas, mangoes, etc have come up. Vegetables like carrots, onions are being stored. Food grains like pulses, rice, wheat, spices are stored and their quantity is being maintained. At present, we don’t have any global competitor in India. Despite the fact, we are offering our services at cheapest rates in India. We are charging less as

compared to China or other countries. The development in cold storage industry has gained momentum with setting up of lot of cold storage projects in the country.

### **What are the projects of cold storage under implementation?**

Approximately 100 new cold storages are coming up in Uttar Pradesh, 40 in Gujarat, 30 in Madhya Pradesh, 15 in West Bengal and approximately 15 in Bihar. Other states are also in the midst of developing cold storages.

### **What are your expectations from the government in terms of policy, financial aid?**

Government should formulate a National Policy on Cold Chain Industry. Need to pass on special incentives in power rates and substantial subsidy for solar power generation.

### **What is your advice to the cold storage industry professionals?**

Future for the cold storage industry is very bright. Cold storages need to equip themselves with latest technologies, maintain with the insulation quality and control on expenses on power. By this they may be controlling their total expenses and be competitive in the market. ■

# Global Top 25 List of Refrigerated Warehousing & Logistics Providers

The International Association of Refrigerated Warehouses (IARW) publishes the IARW Global Top 25 List of the largest refrigerated warehousing and logistics providers in the world. The list is determined by total capacity of temperature-controlled space operated by IARW Warehouse Members.

## IARW Global Top 25 List

	COMPANY NAME	LOCATIONS	CUBIC FEET	CUBIC METERS
1	Americold Logistics	Argentina, Australia, Canada, China, New Zealand, and United States	992,032,503	28,091,186
2	Lineage Logistics	United States	609,276,429	17,252,759
3	Swire Group[i]	Australia, China, Sri Lanka, United States, Vietnam	409,818,004	11,604,734
4	Preferred Freezer Services	China, United States, and Vietnam	325,393,595	9,214,105
5	AGRO Merchants Group, LLC[ii]	Austria, Brazil, Chile, Ireland, Netherlands, Spain, and United States	219,057,422	6,203,005
6	Nichirei Logistics Group, Inc.[iii]	France, Japan, Netherlands, and Poland	157,209,593	4,451,673
7	Kloosterboer	Canada, France, Netherlands, Poland, and United States	150,581,775	4,264,000
8	VersaCold Logistics Services	Canada	115,203,748	3,262,201
9	Partner Logistics	Belgium, Netherlands, and United Kingdom	101,021,075	2,860,594
10	Interstate Warehousing, Inc.	United States	100,227,481	2,838,122
11	Cloverleaf Cold Storage Co.	United States	74,776,899	2,117,442
12	Burris Logistics	United States	62,329,576	1,764,974
13	Frialsa Frigorificos S.A. De C.V.	Mexico	60,892,278	1,724,274
14	NewCold Cooperatief U.A.	France, Germany, Netherlands, Poland, and United Kingdom	55,338,134	1,566,999
15	Gruppo Marconi Logistica Integrata	Italy	55,090,931	1,559,999
16	Henningsen Cold Storage Co.	United States	53,756,309	1,522,207
17	Congebec Logistics, Inc.	Canada	49,660,000	1,406,212
18	Hanson Logistics	United States	43,818,540	1,240,801
19	Conestoga Cold Storage	Canada	39,526,536	1,119,265
20	Oxford Logistics Group	Australia	38,431,920	1,088,269
21	Montague Cold Storage Pty Ltd	Australia	34,149,879	967,016
22	Bring Frigo	Finland, France, Netherlands, Norway, Spain, and Sweden	33,787,112	956,743
23	CCS Logistics	South Africa	30,534,558	864,641
24	Allied Frozen Storage, Inc.	United States	29,455,115	834,075
25	Trenton Cold Storage, Inc.	Canada	28,335,972	802,384

Source: [www.gcca.org](http://www.gcca.org)

## Exttech HDV600: High definition Videoscope Inspection Camera

**E**xtech offers new generation high-definition inspection cameras HDV600 series. Best to see more, find more and inspect more. Designed for ruggedness, upgradable versatility with high-definition clarity. Featured a large color display, SD memory, LED illuminated handset probes and glove-friendly controller handsets.

HDV600 designed for use in practically any environment. The rugged, waterproof and drop-proof industrial videoscope capture image and video to quickly find and document problems, deliver high quality images and video with remarkable



sharpness and clarity, record nearly 14,600 images and four hours video with voice annotation and that can be stored in SD memory card. Probes available in different sizes to fit your application.

Ideal Applications are Home Inspection,

Industrial Manufacturing, Automotive/Aerospace, HVAC/Environmental and Safety/Security.

### Key Features

- 5.7" color LCD TFT with high definition 640 x 480 resolution
- SD memory card included to store more than 14,600 images
- Video recording (up to 4 hours) with voice annotation
- AV output for viewing images and video directly on a monitor
- Video and images can be transferred to a PC via the SD card or USB output
- One-year warranty.

## Mighty Foot – VRF Installation in Minutes

**T**he Mighty Foot Modular Framework for HVAC Equipment helps the client to install a VRF outdoor unit in a matter of few minutes.

- Simple, Easy & Sturdy.
- No penetration of roof slab is needed, hence no damage to water proofing.
- It includes anti-vibration pads and is perfectly suitable for VRV, VRF, Evaporators, Condensers, Splits, Chillers, Pipe & Ductwork, etc.

- Available in various sizes as well as for customized designs; Modular design allows units to be added later also.
- Hot Dip Galvanized Metalwork.
- The legs can be removed individually for re-roofing or other works without dismantling the machine.
- Includes adjustable condenser clamps to keep the unit tightly in place.
- The height of the bars & horizontal



distance between bars can be adjusted according to individual unit size. No welding needed. ■

## New VRF System

**C**arrier is pleased to announce the release of the new variable refrigerant flow (VRF) two-pipe heat pump and heat recovery systems line offering the most flexible, efficient and comprehensive portfolio of VRF products to customers. Carrier, a world leader in high-technology heating, air-conditioning and refrigeration solutions, is a part of UTC Climate, Controls & Security, a unit of United Technologies Corp. The new two-pipe heat pump and heat recovery VRF systems line offers a modular design and the industry's most compact 20-ton heat recovery unit, which will save valuable space.

These new products will offer a tonnage range of up to 36 tons for heat pump systems, up to 28 tons on heat recovery systems, and multiple styles of indoor units with a variety of controls offerings. The heat pump is a modular design available as single, dual and triple modules while the heat recovery system is a single-cabinet design with small, medium and large cabinet offerings. The systems are equipped with direct-drive, inverter-driven asymmetric scroll compressors with backup capability available on some



models based on tonnage. "AHR Expo is the ideal venue for Carrier to introduce our latest VRF product and to reassert our position as the leader in this growing field of the heating and cooling industry," says Meredith Emmerich, managing director, Carrier, Ductless & VRF. "Two years ago here at AHR Expo, we announced our expansion into this field and this year we are here to demonstrate that our focus remains on innovation and meeting customer's exacting requirements." ■

## Godrej BKC Earns LEED Platinum Certification

**G**odrej BKC, the commercial project in Mumbai, for Godrej Properties Limited (GPL), one of India's leading real estate developers, has received the Leadership in Energy and Environmental Design (LEED) platinum certification.

With the achievement, Godrej BKC becomes the only multi-occupant building in BKC to be certified LEED platinum, according to a press release. At 1.3 million square feet, Godrej BKC is one of the largest luxury commercial projects in Mumbai. The building received its occupation certificate in May 2016. The development



aspires to be among the most sustainable in the world, the release said. Cutting-edge sustainability features throughout the building design ensures that energy requirements are minimized and water is conserved. Godrej Properties collaborated with several of the world's most renowned architects and engineering consultants to design this project.

"Commitment to sustainability is a key tenet of our company's vision and for this important project we wanted to ensure the absolute highest level of sustainability," said Pirojsha Godrej, managing director and CEO of Godrej Properties. ■

## Le 1500 Building Receives LEED Certification

**I**vanohe Cambridge is proud to announce that Le 1500, an office building on Robert-Bourassa Boulevard in Montreal, is now LEED certified in the category 'Existing Buildings: Operations & Maintenance' by the Canada Green Building Council. "We are especially proud of this certification, which positions Le 1500 as one of Montreal's most energy-efficient buildings," said Johanne Marcotte, Vice President, Operations, Retail, Ivanohe Cambridge.

The building features multiple nearby amenities, easy access via the major commercial thoroughfares, and direct connections to the city's underground network as well as McGill metro station. Le 1500 offers a gross leasable area of 49,016 m<sup>2</sup> (527,604 ft<sup>2</sup>).



Over the years, Ivanohe Cambridge has implemented improvement processes to meet the criteria for LEED certification, including:

- Addition of a recovery-mode chiller, reducing in natural gas consumption;
- Addition of a condensation boiler;
- Integration of a preventive maintenance system;
- Addition of automated boiler control;
- Automation of water treatment systems;
- Integration of a Metasys energy management system;
- New higher-performance light fixtures;
- Addition of a monitored main water meter;
- New higher-performance plumbing equipment that contributes to reduced water consumption. ■

## Elevators Market Leveraging Green Building Trend

**E**scalators and elevators are considered integral to the urban landscape and are installed across various public and private places. The vendors operating in the global elevator market are competing on the basis of modernization, installation and maintenance services for establishing stronghold in the market.

Rapid urbanization and the increasing geriatric population, combined with the modernization of the existing elevators are the primary factors responsible behind the strong growth of the global elevators market. According to Transparency Market Research (TMR), the global elevators market is poised to exhibit annual growth of 7.4 percent through 2023. Expanding at this pace, the



market is likely to reach \$330.45 billion by that point; it had a valuation of \$181.50 billion in 2015, according to a press release. The emerging trend of green building is boosting the installation of energy-efficient elevators around the world. Considering this, as commercial

and residential buildings worldwide become more intelligent, the demand for efficient elevator and escalator systems will continue rising, thereby, driving down costs incurred on maintaining building operations. Furthermore, with leading players in the market operating new technologies such as coated steel belts intended to enable easy replacement of conventional cable ropes thus allowing more efficient operations. ■

## A ONE STOP SOLUTION FOR INSULATION PROTECTION



- ▶ It can be applied on insulation materials where high abrasion resistance, weather resistance, dusts free and hygienic conditions are needed
- ▶ It can be used very effectively in Air-condition duct, Chill water lines, Refrigerant lines, Trench piping, VRF Piping etc.,
- ▶ Solar systems hot water plumbing & dual temperature piping
- ▶ Excellent resistance to UV rays
- ▶ Applied in two coats of Polyshield insulation Coating with 7 mil reinforcing glass fabric embed between coats



### SHARON INSUL INDIA LIMITED

H.O. Sharon towers, Seaport - Airport Road , Kochi, Kerala, India - 682 021  
Phone : 91-484-2427241, 2427212, 2391154, 6589442, Fax : 91-484-2424385  
Email:sharon@sharoninsul.com www.sharoninsul.com

BANGALORE : Ph: +91 9844022586 COIMBATORE : Ph: +91-422-2230445, 9633275189

CHENNAI : Ph: +91-44-26200104, 9940486484 MUMBAI : +91-22-8520730

# EMBRACO, LEADER IN INNOVATION OVER 45 YEARS.



Embraco is a global company focused in innovation and one of the world's largest manufacturers of hermetic compressors for refrigeration. With operations in 3 different continents and 8 business units, Embraco has an annual production of approximately 40 million units and it is present in over 80 countries. The company offers solutions that stand out for their innovation and low energy consumption such as the compressors with natural refrigerants.

**REMEMBER TO CHOOSE EMBRACO AND R290 GAS FOR REFRIGERATION SOLUTIONS.**



**LOW ENERGY  
CONSUMPTION**



**LOW COST  
REFRIGERANTS**



**ZERO OZONE  
LAYER DEPLETION**



**R290** Learn more at [www.naturalrefrigerants.info](http://www.naturalrefrigerants.info)

[www.embraco.com](http://www.embraco.com)

**embraco**

POWER IN. CHANGE ON.

# Forthcoming Events At A Glance

## IIAR Natural Refrigeration and Heavy Equipment Show

**Venue:** San Antonio

**Date:** 26th February to 1st March, 2017

**Website:** [www.iiar.org](http://www.iiar.org)

## Climatización Y Refrigeración 2017

**Venue:** Feria de Madrid, Madrid, Spain

**Date:** 28th February to 3rd March, 2017

**Website:** [www.ifema.es/climatizacion\\_06/](http://www.ifema.es/climatizacion_06/)

## HVACR Vietnam

**Venue:** Saigon Exhibition and Convention Centre (SECC), Vietnam

**Date:** 29<sup>th</sup> to 31<sup>st</sup>, March 2017

**Website:** [www.hvacrseries.com](http://www.hvacrseries.com)

## China Refrigeration 2017

**Venue:** Shanghai New International Expo, China

**Date:** 12th to 14th April, 2017

**Website:** [www.cr-expo.com](http://www.cr-expo.com)

## Energy Efficiency Global Forum

**Venue:** Washington, D.C.

**Date:** 11th & 12th May, 2017

**Website:** <http://eeglobalforum.org>

## EA International Heat Pump Conference

**Venue:** Rotterdam, Netherlands

**Date:** 15th to 18th May, 2017

**Website:** [www.hpc2017.org](http://www.hpc2017.org)

Cooling India invites HVACR professionals and industry experts to write articles on their area of expertise and interest.

We would love your involvement in your favourite magazine!

Think no further just e-mail your interest to [editorial@charypublications.in](mailto:editorial@charypublications.in)

**SHARE**

Company Name	Page No.
A. S. Controls	51
Aggreko Energy Rental India Pvt. Ltd.	35
ALM engineering & Instrumentation Pvt. Ltd.	IFC 1
Aspen Pumps	93
Bitzer India Pvt. Ltd.	67
Bry-Air (Asia) Pvt. Ltd.	103
C.R.I. Pumps Pvt. Ltd.	63
Calpeda Pumps India Pvt. Ltd.	21
Carel ACR Systems India Pvt. Ltd.	23
Cruise AC	15
Desiccant Rotors International Pvt. Ltd.	31
ebm-papst India Pvt. Ltd.	8 & 9
Embraco	BC
Emerson Electric Co. (India) Pvt. Ltd.	59
Ensavior Technologies Pvt. Ltd.	16 & 17
Flir Systems India Pvt. Ltd.	29
Freeze Controls (India)	25
Frick India Ltd.	37
GAPS Engineering & Consultancy	FC 2
Hira Technologies Pvt. Ltd.	33
Hitachi Air Conditioning India Limited	5
HMX (A.T.E. Enterprises Pvt. Ltd.)	27
Ice Make Refrigeration Pvt. Ltd.	89
Infinity HVAC Tools	43
Kaalflex Pvt. Ltd.	13
Kahan Control	77
Kimo Electronic Pvt. Ltd.	55
Mist Ressonance Engineering Pvt. Ltd.	11
Russ Air	79
S S Lifestyle Pvt. Ltd.	73
Sam Products Pvt. Ltd.	99
Schaffer Systems International Pvt Ltd	69
Sekisui	19
Sharon Insul India Limited	IBC
Standard Refrigeration Pvt. Ltd.	IFC 2
Testo India Pvt. Ltd.	39
The Supreme Industries Ltd.	47
Thermofin GmbH	85
TropiKal Comfort Pvt. Ltd.	6 & 7