Vol. 11 No. 12 July 2016 ₹ 100

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- Increasing energy efficiency in dairy industry
- Evolution of Latest Technology In Individual Quick Freezing
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Publisher's Letter

Demand From Dairy Industry— A Bit Distant Dream

From a global perspective, there are some economic and political issues that are affecting the prosperity of the dairy industry – leading to a slow growth in overall demand of refrigeration in the dairy segment. However, technological innovations are still on – and the foci of all initiatives concentrate on cost reduction, maintenance of freshness, increasing shelf-life and efficient end-point delivery in the most economic way.

According to a recent Fitch Ratings' analysis, growth in global milk supply continues to delay a recovery in milk prices, and it has been compounded by weak demand growth globally, mainly due to subdued Chinese demand and a Russian embargo on major Western dairy exporters.

Fitch communicates that the recent volatility in global dairy prices is likely to continue in the medium term. Prices reached record highs in the 2013/14 season that ended 31st May 2014, but the average Global Dairy Trade price fell by around 38% in 2014/15 and around 20% in the 2015/16 season to 15th March 2016.

Although, as Fitch feels, the fundamentals of dairy demand remain strong for long-term, the immediate scenario is a bit clumsy. In their words, "Changes in regulation, geo-political factors and global demand patterns since 2014 have created an imbalance in global demand and supply of milk. The absence of short-term incentives and only a modest supply response so far are likely to prolong a recovery in prices beyond 2016."

According to Fitch,the removal of milk production quotas in Europe is the main reason milk supply has been slow to decrease. However, the ray of light lies in the facts that EU exports increased by 6% in milk equivalent in 2015, even though Russia, which used to import about 1.5% of European milk output, closed its doors.

European manufacturers are continuing to increase production to utilise manufacturing capacity and expand international market share. A decline in supply remains unlikely in the short-term with the European Commission forecasting further growth in milk production in 2016 of around 1.4%. The EU remains the world's largest dairy exporter, accounting for 32% of global export sales on a milk equivalent basis. Thus, although temporarily there is a cumbersome situation, the major chunk of the players in the global dairy industry is quite hopeful. Let us hope to see the bright sun soon at best by the turn of this year!

Please send your comments at pravita@charypublications.in

Pravita Iyer
Publisher & Director

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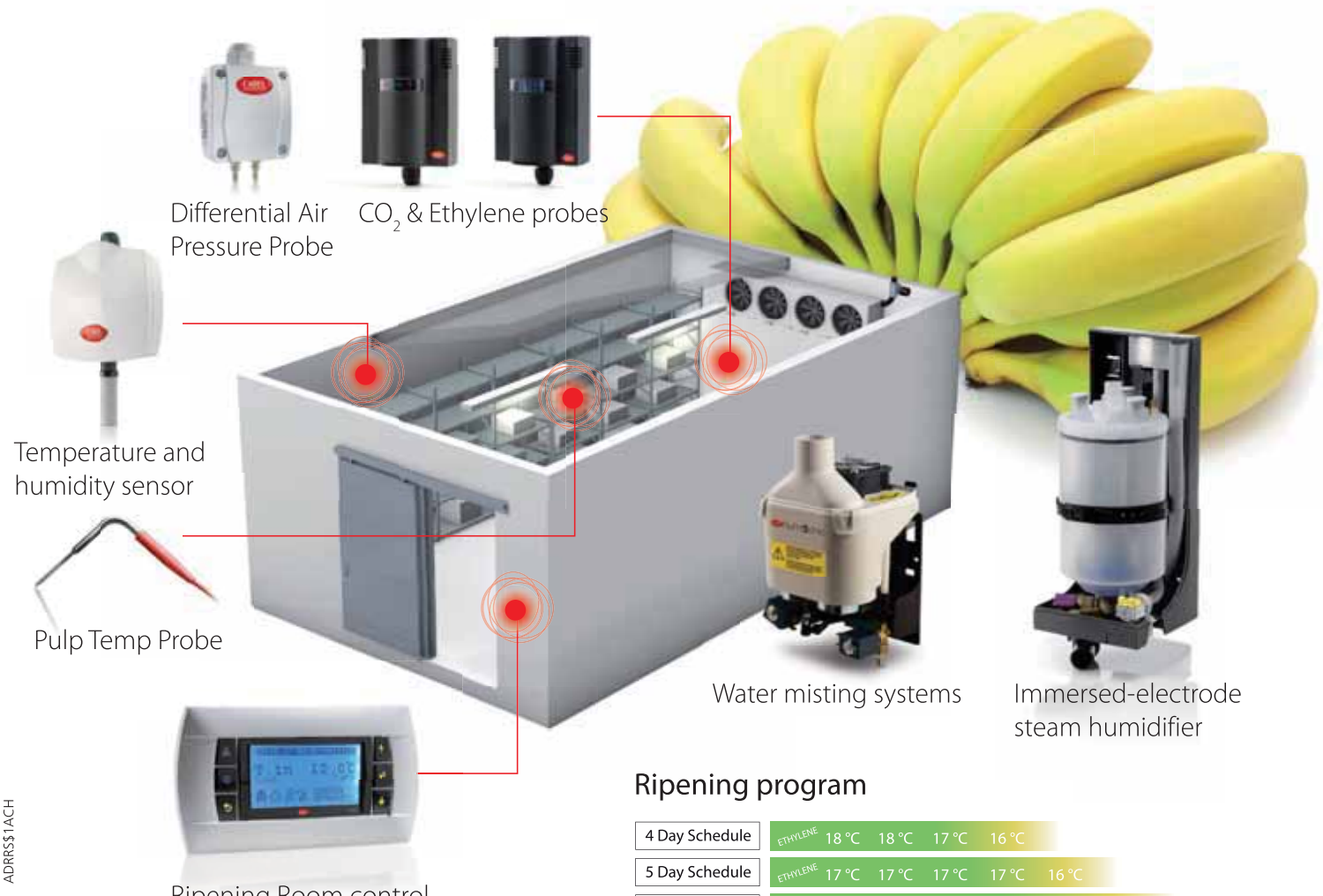

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5 Day Schedule	ETHYLENE	17 °C	17 °C	17 °C	17 °C	16 °C		
6 Day Schedule	ETHYLENE	17 °C	17 °C	16 °C	16 °C	16 °C	14 °C	
7 Day Schedule	ETHYLENE	16 °C	16 °C	16 °C	16 °C	16 °C	14 °C	14 °C
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FROM THE EDITOR

Opportunities Galore

Although, there is an air that taxation on the Indian dairy products may be rationalised via value-added activities of the milk produced – as the industry is strongly in demand for excise duty cuts, nothing has categorically been stated so far from the Government's end. Also, the Indian dairy owners are at this moment afraid of losing economic viability of their businesses subject to inclusion of the industry under GST, whereby another (anticipated) 18% of their profit may be eroded off.

Also, according to the global practice, unproductive cows are sent to slaughter houses, whereby the dairy companies earn back 50 to 60% of their total investment on these animals. In India, this is a far off dream. So, foreign investors are hesitant to enter the Indian dairy sector in both ways: as an investor as well as a farm owner.

Governments' favour to the dairy cooperatives is also another reason behind keeping the foreign investors off – as they are not very confident of the profitability. Thus, under such circumstances, dairy owners of Indian origin have an open ground to continue with their businesses.

India is the largest milk producing country in the world. But milk production is still highly scattered among large number of individual milk producers living in far off villages. So, maintaining milk quality from the milking point to the processing zone is still a big challenge, where infusion of modern technologies is very essential. Again, milk storage and distribution areas offer a bouquet of opportunities to the dairy equipment manufacturers, automation and IT vendors.

Looking at the confused and/ or overburdened status of some very big milk co-operatives, it will not be an exaggeration to say that the sector needs re-engineering and further infusion of money to upgrade its operational activities. Not only technological upgrades but also proper long-term planning is absolutely essential for the overall steady growth of the Indian Dairy industry.

Last but not the least is: dairy and agriculture are two areas that should be kept free from the political influence. India has drastically failed in this ground. Examples are not rare that some of the big, highly organised and profitable dairy ventures of post-independence era have gone astray just because of political interference. Some of them can still be revived with modern technology and strategic management tools free from political pollution.

Pl. send your views at pkchatterjee@charypublications.in

P. K. Chatterjee

Looking at the confused and/ or overburdened status of some very big milk co-operatives, it will not be an exaggeration to say that the sector needs re-engineering and further infusion of money to upgrade its operational activities...

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Godrej Appliances to prevent waste of vaccines

Godrej Appliances, which is well known for its home appliances, has partnered with Sure Chill, a UK-based company to introduce medical refrigerators with Sure Chill technology. These specialised refrigerators have been designed to address the prime need of providing precise cooling solutions for vaccines and blood, regardless of long power outages – common in upcountry remote areas in developing and underdeveloped countries. The range has been designed to handle extremities with holdover time of 13 days and just two and a half hours of power requirement per day.

(L2R) Peter Saunders and Jamshyd Godrej

The home appliances company has expanded and strengthened its medical portfolio further by launching a range of six new models. Considering the needs of urban and peri-urban areas where power outages are infrequent, the new Lite series has been designed with a holdover period of three days that will give sufficient time to service and fix the product in case of any downtime. This series offers 50% reduction in costs. In light of the inadequate budgets common to developing economies, this optimised series is likely to boost adoption of the superior Sure Chill Technology presented by Godrej Medical Refrigerators.

The company has plans to build manufacturing capacity for 30,000 units from the current capacity of 10,000 units over the next two years. It is expecting to generate Rs 200 crore revenue from the medical refrigerator portfolio by 2020. ■

Blue Star launches Inverter Room ACs with anti-corrosive condensers

Indian company Blue Star Limited has launched a new range of inverter room air conditioners, equipped with the latest technology of anti-corrosive, green fin copper condensers, which is a customised offering for the Maldives market.

Blue Star is India's one of the well known engineering conglomerates with the core businesses of air conditioning, commercial refrigeration, Mechanical, Electrical & Plumbing (MEP) contracting and after-sales service.

With over seven decades of experience in providing expert cooling solutions, the company has a network of 35 offices in India, presence in 15 countries, 5 modern manufacturing facilities, 2500 employees and a turnover of nearly USD 500 million.

Blue Star's International Business Group is a dedicated business vertical of the company, which runs the airconditioning and refrigeration products business outside India through its Global Products Sales Division. Blue Star has tied up with Reefside Co Pvt Ltd as its distribution partner in Maldives in December 2013, and currently enjoys a market share of around 12% in the country. ■

Micromax enters Air Conditioning segment

Micromax Informatics Ltd. has rolled out its new range of Air Conditioners comprising three split ACs and one window AC in the first phase, which are engineered to deliver exceptional cooling, increased efficiency and lower operating & maintenance costs. The company entered the consumer electronics category two years ago with the launch of LED Televisions and with this launch, the company is expanding its product portfolio, offering consumers more innovative products and build a stronger business case in the consumer electronics industry.

As per the company, these ACs will be completely manufactured at its facility in Uttarakhand. Micromax has also set up dedicated service centres for the new product segment to provide its customers with the best product and service experience.

Developed especially for the diverse Indian weather, Micromax ACs come with ECCO Blu Technology. It is a kind technology that protects the condenser coil from humidity and moisture as well as prolongs the life of the condenser by up to three times. ■

India Air Purifiers market to reach $209mn by 2021

Growing urbanization, rising health concerns, increasing consumer spending on lifestyle products and deteriorating air quality will drive sales of air purifiers in India. According to TechSci Research report, named "India Air Purifiers Market By Filter Type, By End User Sector, By Region & By Company Forecast and Opportunities, 2011-2021," air purifiers market in India is forecast to reach $209 million by 2021, due to rising awareness about the impact of indoor and outdoor pollution on human health and growing consumer awareness about benefits of using air purifiers.

Eureka Forbes' Dr. Aeroguard range of air purifiers...

Image Courtesy: Eureka Forbes

Increasing air pollution across the country due to expanding vehicle fleet size is leading to higher emission of harmful particulate matter. Additionally, tourism and healthcare and other institutional places such as embassies, hospitals, corporate office, government buildings, schools and colleges, etc., are the major demand generators for air purifiers in the country. During 2010-2014, tourist footfall in India grew at a CAGR of over 7.3%, and this has been driving demand for air purifiers from the hospitality sector in the country.

Air quality in various cities such as New Delhi, Hyderabad, Mumbai, Chennai, Bangalore, Pune, etc., is deteriorating due to high level of particulate matter and poisonous gas emissions. Surging demand for air purifiers from residential sector, especially in these cities, can be attributed to increasing indoor pollution and growing health concerns among people. A majority of the demand for air purifiers in India is addressed through imports by companies such as Eureka Forbes, Panasonic, Crusaders, Atlanta Healthcare and Kent among others. With increasing pollution levels and rising disposable income, Southern region dominated India air purifiers market in 2014, followed by Northern and Western states. ■

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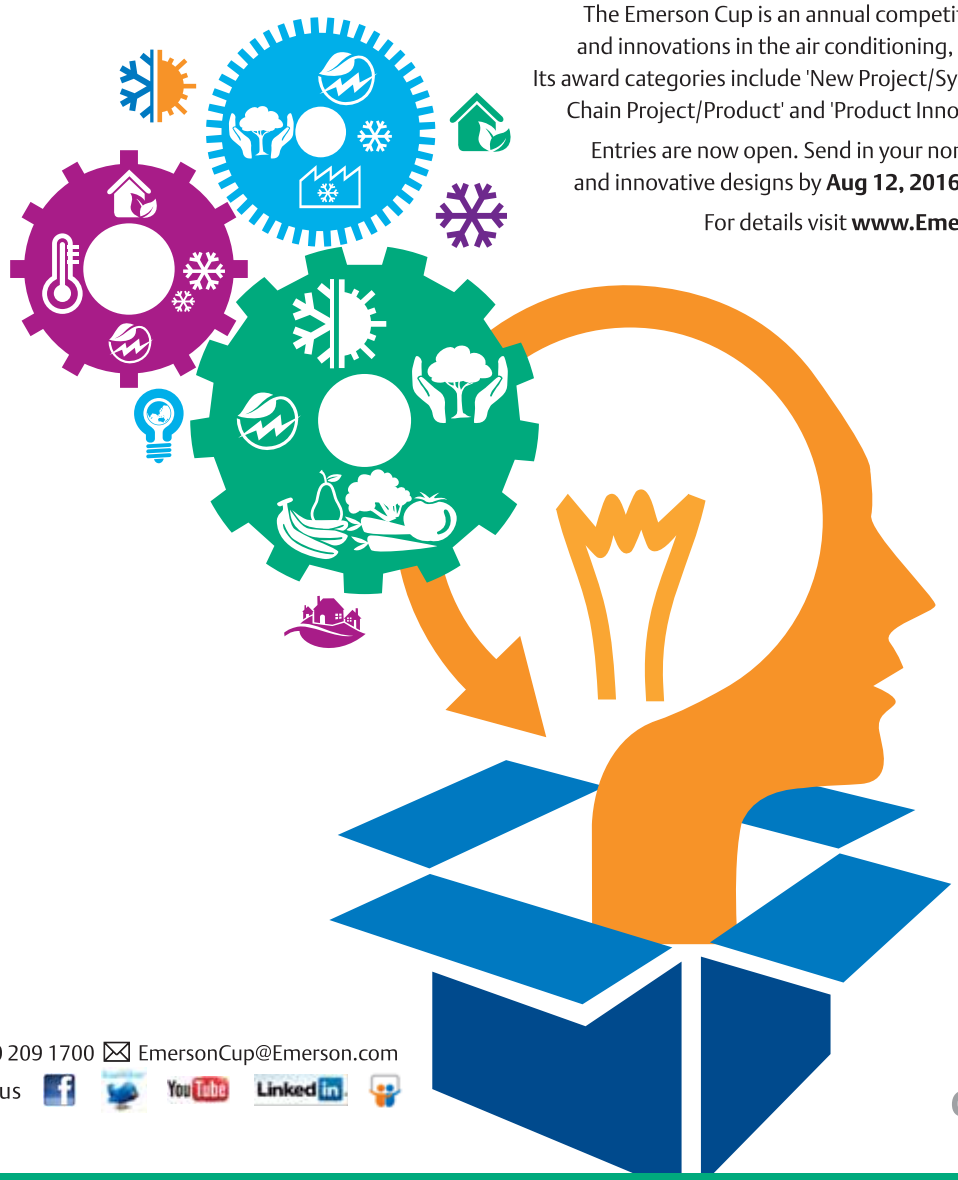

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Mitsubishi Heavy Industries launches TEJ100AM all-electric refrigeration unit for big trucks

Mitsubishi Heavy Industries, Ltd. (MHI) has developed the TEJ100AM, a new model in its range of all-electric Truck/Trailer Reefers (known as the TEJ Series). The unit is compatible with large-scale trucks such as hybrids that are capable of supplying power to ancillary equipment. Sales will begin through the domestic (Japan) Truck/Trailer Reefers sales company Ryoju Cold Chain Co., Ltd., a 100% subsidiary of MHI.

Image Courtesy: Mitsubishi Heavy Industries

A reefer with TEJ100AM…

In addition to demonstrating stable cooling capability that is independent of the vehicle's speed, the new model features high reliability, reduced operating costs and improved environmental performance.

TEJ100AM has the highest class of refrigeration capability, able to handle transportation of frozen food and ice cream, and has a built-in demand function that controls operating power according to requests to limit power consumption from the power source, making it suitable for use in a wide range of trucks with power supply functionality.

The compressor applies MHI's proprietary 3D scroll harmetic inverter compressor featuring an axial compression mechanism, and by using the 1 COMP 2 WAY multi-circuit to connect one compressor to two evaporators, full performance is attained at all times regardless of operating conditions. Additionally, as an industry first, the new model makes use of the low global warming potential refrigerant R410A. ■

Babcock & Wilcox Enterprises completes acquisition of SPIG

B has completed its acquisition of SPIG S.p.A., a global provider of custom-engineered cooling systems and services. The acquisition is based on an enterprise value of Euro 155 million, subject to certain adjustments. SPIG will retain its management team and operate as Babcock & Wilcox SPIG (B&W SPIG), a subsidiary of B&W based in Arona, Italy.

"I'm pleased to welcome SPIG and its employees to B&W. SPIG's long heritage of engineering excellence is a natural fit with our organisation, and this acquisition will broaden our technology-based offerings to industrial and power generation customers, while providing SPIG new paths for growth through B&W's customer base and geographic footprint," said B&W Chairman and Chief Executive Officer E. James Ferland.

SPIG will be integrated with B&W in the coming months, allowing its approximately 250 employees located around the world to take advantage of B&W's global sales, operations and business development resources. SPIG's products and services include air-cooled (dry cooling) systems, mechanical draft wet cooling towers and natural draft wet cooling hyperbolic towers, as well as end-to-end aftermarket services, including spare parts, upgrades/ revamps for existing installations and remote monitoring.

SPIG provides comprehensive cooling solutions and services to the power generation industry, including natural gas-fired and renewable energy power plants. ■

VitalMetric releases new patent application

VitalMetric LLC has rolled out a patented application for the environmental control of animal enclosures. The technology uses Microwave Doppler Radar to measure the respiration rate of animals in the enclosure.

The accumulated data so obtained is used as a Proxy for heat stress – leading to control the environmental cooling systems to maximise animal comfort while minimising energy usage.

The purpose of the invention is not only to iimprove animal productivity, but also as iimportantly, it will improve the living conditions of the animals. The first planned application of the product will be in controlling the cooling systems in dairy barns on large commercial dairy farms – where heat stress in the southern llatitudes is not only an economic issue but also harmful to the animal.

The VitalMetric's motto continues to be… Always Do What Is Best For The Cow…while at the same time making the dairy farmer enhance his/her profit. ■

GE Appliances initiates connectivity to its products

GE Appliances' new connected window air conditioners overcome the heat with the capacity to control the unit from virtually anywhere with the touch of a smartphone screen. Simply one can turn the unit on from one's phone on the way home to cool the space – diminishing the waste of cooling an empty room and escalating comfort when one steps inside.

Image Courtesy: GE Appliances

Connected Air AEC12AV…

Mark Evans, Product Manager, Room Air Products, said, "Connectivity is on the minds of many consumers, and we saw a need to offer this in our window air conditioners. Our new 115-Volt window air conditioners are the largest connected residential units on the market that offer free app connectivity, making it easy to control the temperature of a room from anywhere."

GE Appliances' new Comfort app control the AEC12AV 12,050 BTU and AED10AV 10,000 BTU units by allowing customers to effortlessly, create their own cooling schedule, monitor and control their air conditioner from anywhere, choose from available cooling modes, control multiple units from one app and get reminders to clean or change the air conditioners' filters.

Besides the Wi-Fi capabilities, both connected air conditioners are ENERGY STAR compliant and come with a remote control. Such options facilitate turning a sticky, hot home into a cool and comfortable escape from the outdoor elements. ■

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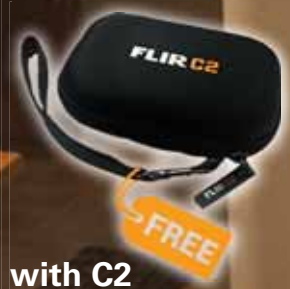

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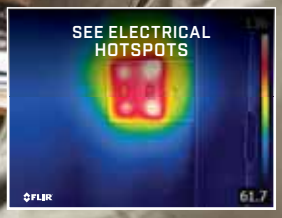

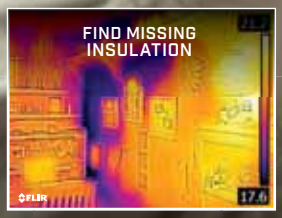

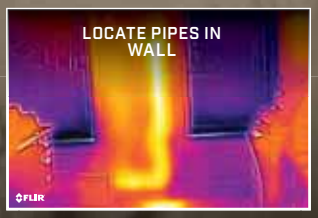

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Intertek widens HVACR testing services in the US

In order to further enhance its testing capabilities to the HVACR industry, Intertek has invested in expanded laboratory space and equipment. The company making these investments in testing equipment, which is beneficial and unique to North America, continues to build on its status as the chief global network of third-party testing facilities, helping clients bring a variety of HVACR products to market more swiftly and efficiently.

A futuristic 65-ton psychometric testing chamber in Plano, Texas, tests cooling or heating capacity output and energy efficiency of large commercial rooftop air conditioners and heat pumps. This out-and-out facility for large equipment allows the company to complete testing of large equipment in a more proficient, less labour-intensive manner. This in turn will permit for a more complete approach to the testing and certification process.

A new balanced ambient calorimeter has been installed in Cortland, New York, for testing the output and efficiency of room air conditioners, packaged terminal air conditioners and packaged heat pumps. It is considered as second such component installed, which will help in reducing lead times for consumers and enhance the capacity of the lab.

Tim Corcoran, Vice President, Intertek, said, "At Intertek, we are committed to partnering with the industry to ensure air conditioning and heating equipment meets ever-evolving standards such as those regulating energy efficiency."

"Investing in this new equipment allows us to offer more resources and options to customers and trade associations alike, providing the industry as a whole assurance and peace of mind," he added.

Regulation changes in the industry have made it necessary for manufacturers to adhere to new standards and requirements regarding energy output and efficiency. The new equipment makes it possible for customers to enhance their work with a third party lab to verify their products meet these standards. The investment will also assist trade associations in administering their certification and verification programs. Intertek is well known in the industry for its experience in HVACR equipment testing, independent performance verification, electrical safety testing, outsourced testing for overflow, witness testing, chemical compatibility testing and more. ■

Karnataka's CM inaugurates Hoskote Dairy and Product Block

Inauguration of Hoskote Dairy and Product Block at Bangalore Milk Union...

Chief minister of Karnataka, Siddaramaiah has inaugurated Hosakote Dairy and Mega Dairy Products Block on 30.06.2016 at Bangalore Milk Union. His other colleagues including other ministers and MLAs and MPs like H S Mahadeva Prasad, Ramalinga Reddy, A Manju, D K Shivakumar and D K Suresh graced the occasion.

KMF has 13 Milk Unions throughout the state, which procure milk from Primary Dairy Cooperative Societies (DCS) and distribute that to the consumers in various urban and rural markets in the Karnataka State.

Karnataka Co-operative Milk Producers' Federation's (KMF's) Chairman P Nagaraju and Bangalore Milk Union Ltd's (BAMUL's) President K Ramesh were also present in the occasion. ■

Panasonic forms a new enterprise

Panasonic, in order to strengthen the organisational structure of its cold chain business in China has consolidated two companies handling its refrigeration business: the Panasonic Appliances Compressor (Dalian) Co. Ltd. (PAPCDL) and Panasonic Appliances Cold Chain (Dalian) Co. Ltd. (PAPCCDL) to form a new company, the Panasonic Appliances Refrigeration System (Dalian) Co., Ltd. (PAPRSDL).

The newly formed undertaking will be in charge for the development, manufacturing, sales, construction, maintenance as well as servicing.

It is believed that the new business enterprise will be drawing on the competitive edge of both PAPCDL and PAPCCDL to facilitate the food distribution and low temperature distribution business chiefly catering to super markets and convenience stores, the demand for which is anticipated to rise in China.

It also aspires to become the No.1 refrigeration company in China and usher the market with new cooling systems, energy-savings, and in safety. ■

GEA supports development of Dairy Campus

With the theme 'Dairy is the future,' the official opening of Dairy Campus, a cooperation project of Wageningen University and various partners, took place from 26 to 28th of May in Leeuwarden, Netherlands. With the combination of stalls with educational, research and innovative functions and extensive reception facilities the Dairy Campus is a very unique project.

During the open days, it was possible to enter the stables, visit knowledge sessions and meet interesting people from the dairy network. Dairy Campus is made possible by a number of premium partners, including GEA, which supplied the AutoRotor PerFormer, a milking carrousel suited for 40 cows, and barn equipment.

Dairy Campus is a Dutch Development Park where all the parties in the milk and dairy chain come together. This unique location has been created on the former site of Nij Bosma Zathe. Boasting 500 dairy cattle, more than 300 hectares of land, training and conference facilities, It is an inspiring meeting place for anyone involved in the dairy sector.

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Global commercial refrigeration equipment market to go up

Commercial refrigeration equipment is specifically meant for commercial use with an extensive range of temperature control and with self-contained or remotely operated condensing units. It is used for the storage of food and beverages and for merchandising purposes.

According to a market study published by Transparency Market Research, the global commercial refrigeration equipment market was valued at US$33.61 bn in 2014. Analysts now predict that this market will expand at a CAGR of 9.1% between 2015 and 2022 to be valued at nearly US$66.89 bn by 2022. The report is titled "Commercial Refrigeration Equipment Market - Global Industry Analysis, Size, Share, Growth, Trends and Forecast 2015 – 2022.

The changing food habits and increasing international food trade are major factors fuelling the growth of the commercial refrigeration equipment market. Across the world, the expansion of the food service industry that includes hotels, restaurants, supermarkets and fast food chains, is fuelling the demand for commercial refrigeration solutions for storing food and beverages.

Product development and regulations for commercial-grade refrigeration standards will further trigger the replacement of obsolete commercial refrigeration equipment over the forecast period. Thus, it is anticipated that the rising demand for new energy-efficient equipment will boost the growth rate of commercial refrigeration equipment market until the end of the forecast period. ■

Report finds refrigerated coffee creamers market sees its peak

The refrigerated coffee creamers market is once again rising to the top after years of stagnant growth. Among the prominent factors bolstering sales are newer-generation products that meet the clean label criteria for ingredients: fewer, simpler, and pronounceable. Some of these products also offer other features and claims associated with clean labels, such as organic, allergen-free, non-GMO, and vegan.

Recent year-to-year sales increases for existing products are testament to the vitality of this burgeoning niche, and marketers' confidence in its continued growth is evidenced by their investment in new products.

Research and Markets' recent report titled, "United States Refrigerated Coffee Creamers Market Trends Report 2016," states that the US Market Trends focuses on the dynamic market for refrigerated coffee creamers, particularly with respect to the impact of current product, marketing, and consumer trends. ■

ProFood Tech is to be held in April 2017

ProFood Tech, a new event that will focus on processing technologies and innovations serving the food and beverage industry, will make its debut from April 4 to 6, 2017, at McCormick Place in Chicago. It is powered by IDFA and two of the world's trade show leaders — PMMI, The Association for Packaging and Processing Technologies, and Koelnmesse. With an expansive show floor and enhanced conference program, ProFood Tech will attract high-level buyers from every food and beverage sector.

"The opportunities for new ideas and breakthrough solutions are amazing when executives from related businesses come together to discuss, review and experience the innovations, products and services available today. IDFA is developing a blockbuster conference program that will help food industry professionals discover profitable business solutions, as well as new technologies and innovations that are abundant in the food and beverage industry," said Neil Moran, IDFA Senior Vice President of Finance, Administration and Trade Show. ■

Energy Efficiency Yatra of Danfoss to redefine industrial motor efficiency in India

Danfoss, India has launched its flagship campaign 'Danfoss Energy Efficiency Yatra' highlighting that a better tomorrow is determined by drives in an effort to promote and educate industrialists and policy makers on the need for implementation of better standards of industrial motors. The multi-city tour aims to empower industries to implement brand new innovations in energy efficient technology. Commencing its journey in NCR Delhi, the bus covers 11,000 kms through Ludhiana, Patnagar, Satna, Jamshedpur, Durgapur, Kolkata, Rourkela, Angul, Raigarh, Vizag, Guntur, Hyderabad, Chennai, Pondicherry, Cuddalore, Salem, Coimbatore, Bellary, Gulbarga, Kolhapur, Pune, Raigad, Nagpur, Indore, Vapi, Surat, Ahmedabad and Jamnagar in duration of four months.

Ravichandran Purushothaman, President, Danfoss India, said, "This initiative is primarily aimed at raising awareness on the need for stringent regulations and standardisations that have the potential to not just reduce overall carbon emissions from heavy industries but also catalyse productivity and thus profitability. Reports have suggested that energy efficiency measures like equipment and appliance standards along with building performance standards have the capacity to reduce CO_2 emission by half, which can go a long way helping us reduce greenhouse gas emissions. The IEA reports that targeted energy efficiency measures would reduce global energy-related emissions by 1.5 gigatons in 2020."

Soren Kvorning, Vice President, Head of Asia, Pacific and India Region, Danfoss Drives, Sales, Marketing and Service said, "In India, industries consume nearly 42% energy of which manufacturing sector contributes more than 60% of consumption. Heavy industries like metals, cement and pulp & paper fertilizer are the major contributors for this high energy consumption. We want to tap this huge opportunity that we have in heavy industries which are energy intensive. With our established leadership in the drives division and with an installed base of 18.5 Million drives, we believe by 2025 more than 5 billion people worldwide will benefit directly or indirectly by Danfoss Drives in their everyday lives. We will also be able to save the equivalent of 60 hours of global electrical energy consumption." ■

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Embraco includes Arup Majumdar on board as the new Head of Asia Pacific

Arup Majumdar

He has lived in Malaysia, India, Hong Kong, France and now lives in Beijing (China)...

Arup Majumdar has recently taken over the position of the Head of Asia Pacific for Embraco. Prior to Embraco, he spent three years with Danfoss in Lyon, France as the Vice President of Marketing, Srategy and Inverter Scroll for the Danfoss compressor business globally.

During his 25 years of career in this industry, he assumed increasing position of responsibility at Emerson Climate Technologies and United Technologies Carrier.

He has lived in Malaysia, India, Hong Kong, France and now lives in Beijing, China. Arup holds a B.Tech in Mechanical Engineering from IIT Kanpur and an MBA from IIM Ahmedabad.

He is a customary speaker and writer in technical forums and has published a case study on industrial marketing that is taught at IIM Ahmedabad.

Founded in Joinville (SC), in southern Brazil, Embraco began producing in 1971 initially, to supply the Brazilian refrigerator industry, which at that time relied on imported compressors. Over the next decade, it was selling its products on five continents. In anticipation of economic globalisation in the early 1990s, EMBRACO initiated the process of opening production bases outside of Brazil and the consequent expansion of its global sales, consolidating its global leadership. ■

AHRI inducts Vitor Gregorio from Bosch Thermotechnology Corp.

Vitor Gregorio

In 2015, he was named the North American Regional President of Bosch Thermotechnology Corp...

Vitor Gregorio, the Regional President of Bosch Thermotechnology Corp. has been appointed as Director-At-Large on the Board of the Air-Conditioning, Heating, and Refrigeration Institute (AHRI). He as a member of the board now, has joined other industry leaders in setting association policy and charting the association's course as the global leader in HVACR and water heating standards, certification and advocacy.

In the year 2015, he was named the North American Regional President of Bosch Thermotechnology Corp. The sales department in the US and Canada as well as Florida Heat Pump (FHP) manufacturing under a joint venture was managed by him. He was also responsible for the performance of more than 500 associates with respect to strategy, business development, engineering, sales and financial controlling. Prior to this, he was the Vice President of Sales for Robert Bosch Latin America's Power Tools division. Previously, he was a Regional Director for Bosch's Automotive Aftermarket Division in Brazil and Argentina from 2004-2011.

Stephen Yurek, AHRI President and CEO, said, "We are pleased to welcome someone of Vitor Gregorio's energy and enthusiasm to the AHRI Board of Directors, and we look forward to having the benefit of his knowledge and insight as the Board considers the many challenges and opportunities facing our industry."

Vitor Gregorio said, "I am exceptionally gratified to serve on the Board of AHRI. With the rapid advancement in efficiency, control technology and connectivity of HVAC systems and home appliances, the industry is challenged with maintaining sales growth while ensuring consumers and building owners enjoy a positive long-term experience with their comfort systems." ■

Annette Clayton to lead Schneider Electric's North American operations

Annette Clayton

In her dual capacity, she will remain a member of Schneider Electric's Executive Committee...

Schneider Electric has appointed Annette Clayton as President and CEO, North America Operations. Annette will be based in Schneider Electric's North America headquarters in Andover, Mass. She will be responsible for driving business strategy and execution for the region. With her new role as President and CEO of Schneider Electric's largest operating region, she will continue to serve as the Group's Chief Supply Chain Officer leading the Global Supply Chain organisation. In her dual capacity, she will remain a Member of Schneider Electric's Executive Committee.

"Annette has been a transformational leader in our business. She has led our supply chain to become one of the most efficient, safe and reliable in the world – transforming it into a strategic advantage for our business and our partners. I am excited to see her bring her leadership skills to our largest region, and one of our biggest market opportunities," said Jean-Pascal Tricoire, Schneider Electric Chairman and CEO. She joined Schneider after serving as VP, Global Operations, Dell. She also spent 23 years at General Motors, in many roles, including President of Saturn Corporation. ■

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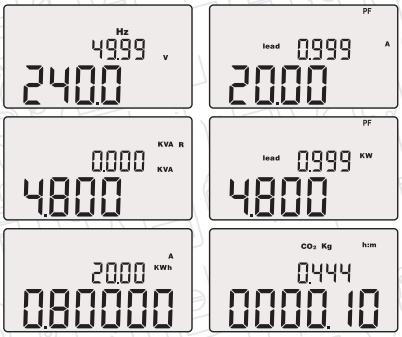

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RAC Cooling Awards shortlists Arcus this year

RAC Cooling Awards has shortlisted Arcus in four categories for this year's awards. The Cooling Awards are designed in order to recognise the cooling industry's environmental achievements and its commitment to innovation. The elements that signify the Cooling Awards are extremely sought-after and greatly regarded. The categories rejoice products and projects, team performance and individual achievement, all underpinned by growth towards a better environment.

Arcus' solutions have been shortlisted for the following categories:

- Retail Initiative of the Year – This a brand new award introduced this year.
- Refrigeration Innovation of the Year
- Refrigeration Product of the Year
- Retail Project of the Year

Around the UK, other companies and finalists from engineering, services and facilities management companies will be present at the awards night on 28th September 2016 at London Hilton, Park Lane, where the winners will be decided and presented with their awards. ■

Bryant proclaims Dealer of the Year, Medal of Excellence Winners

During the annual Bryant Dealer Rally in Indianapolis, IERNA's Heating & Cooling Inc. of Lutz, Florida, was named the Bryant Dealer of the Year. Besides the Dealer of the Year, Bryant proclaimed its 15 Medal of Excellence winners, consisting of Bryant Factory Authorised Dealers from throughout North America – who were assessed based on overall sales growth, high-efficiency and IAQ equipment sales, customer satisfaction and participation in dealer programs and promotions.

Matthew Pine, Vice President, Marketing, Bryant, said, "Bryant dealers continue to raise the bar as some of the most professional and technically proficient ones in the HVAC industry."

"Our 2016 award winners are the very best of that esteemed group. The entire Bryant family of dealers can look toward to our Dealer of the Year, IERNA's Heating & Cooling Inc., and our Medal of Excellence winners as examples of how to take care of customers and run a successful business," he further added.

Charlene Ierna, Owner of IERNA's Heating & Cooling, said, "Being named Bryant's Dealer of the Year is an amazing feeling and I am extremely humbled to accept this award. We've worked so hard to get here and this honour is dedicated to the entire IERNA's team. Our staff is so passionate about what they do and their effort speaks volumes to what we've accomplished with this award." ■

RWTA Chairman chosen as Vice Chairman of the International Association of Refrigerated Warehouses (IARW)

The Refrigerated Warehouse and Transport Association of Australia Ltd (RWTA) pass on good wishes to RWTA National Chairman – David O'Brien on his election to the position of Vice Chairman of the International Association of Refrigerated Warehouses (IARW). He has served as IARW Treasurer for twelve months, and has been appointed to his new position as Vice Chairman at the 125th IARW-WFLO Annual Convention held in Las Vegas, USA. Other Officers and Board Members were appointed to new positions.

David O'Brien

The Refrigerated Warehouse & Transport Association of Australia Ltd (RWTA) represents both the warehousing and transport sectors involved in the storage, distribution and transportation of temperature controlled products in what is known as the Australian Cold Chain. ■

Cooltech Applications Launches Its MRS In US

Besides eliminating the use of pollutant refrigerant gases and noisy compressors, MRS cuts energy consumption by up to 50%, and boosts reliability and safety...

Image Courtesy: CoolTech

A view of the Cooltech's booth at FMI connect show in Chicago...

Recently, Cooltech Applications and Structural Concepts have exhibited their products to major food retail chains at the FMI connect show in Chicago.

Cooltech Applications S.A.S. (Cooltech) – a well known magnetic refrigeration company, has forged a partnership with Structural Concepts – a well known display cases manufacturer in Michigan (USA), to integrate Cooltech's Magnetic Refrigeration System (MRS) into some of Structural Concepts' display cases.

The MRS utilises a water coolant instead of a refrigerant gas – a major contributor to climate change – resulting in an eco-friendly solution.

Besides eliminating the use of pollutant refrigerant gases and noisy compressors, MRS cuts energy consumption by up to 50%, and boosts reliability and safety.

"As the leader in manufacturing the foodservice market's most energy efficient and environmentally-friendly refrigerated food display cases, our company is thrilled to announce our partnership with Cooltech as our next major investment in disruptive technology," said Dave Geerts, President of Structural Concepts.

He further added, "Our partnership with Cooltech and their MRS technology will give us the unprecedented opportunity to be on the leading edge of a refrigeration revolution."

"After successful product integrations in Europe, we are delighted to introduce the technology in the USA. Due to new and stricter regulations and the perpetual quest for reducing the energy bill, we are convinced magnetic cooling can disrupt the refrigeration and air conditioning markets and become a true green alternative to vapour-compression refrigeration," said Christian Muller, President of Cooltech. ■

Increasing Energy Efficiency In Dairy Industry

The current dairy market is very dynamic and competitive. A rise in milk availability, systematic marketing network and increase in per capita income has led to the modernisation of the indigenous dairy sector...

Presently, 80% of the market is dominated by unorganised sector and focuses on processes and equipment for manufacturing, and packaging to increase the shelf life of the products. The Indian Dairy Market Report and Forecasts 2012-2017, projects that the market for milk products in India will exceed USD 163 billion by 2017.

Now, let us look at the various challenges that stand together as a cause of concern for the dairy sector. The processes of the dairy industry are very critical right from procurement through value addition and packaging to marketing. The reason behind this is the perishable nature of the raw material and its by-products. This calls for continuous low temperature in the manufacturing plants, which is enabled by temperature monitoring and control, which must be automated to avoid delayed response to temperature increase, thereby, saving the milk from getting perished. Hence the need for technological innovations and new automation solutions for manufacturing, quality assurance, packaging and process engineering to meet the current marketing and consumer requirements.

The dairy industry must be competitive to thrive in today's market. Breakdowns and malfunctions lead to downtime. Problems must be anticipated well ahead to make timely and right decisions. Slow, out dated and costly methods of production cannot quickly adapt to the ever-changing demands. Unskilled personnel lead to safety problems of plant operations and performance. Frequent innovation of new products by improvising the old formulations is critical to sustain in the competitive market. Traditional mechanical/ manual packaging is unattractive and not appealing and presentable to the customers. They must be replaced by newer, attractive technologies. Maintaining and monitoring the quality of raw materials and finished products is crucial to the dairy industry. It is impossible to identify the source of contamination in the dairy industry, which may be the source animal, feed, vehicle, people, and so on. At times of non-compliance with quality, it is impossible to trace the genealogy of each batch of product with the details of the respective raw material. This lowers the confidence of the consumers and eventually the market, thereby affecting the business.

All these issues need intervention of technological adoptions. Monitoring of different process parameters and overall control of the process should be automated to avoid process disruption. There has to be uninterrupted power solution during power outage and the DG must be synchronised for ensuring continuous process to avoid loss. The capacity and efficiency of the entire architecture must meet the requirements.

Schneider Electric is a global specialist in food and beverage solutions and energy management with operations in more than 130 countries. Their solutions help customers standardise machines and processes, reduce costs, stay connected at all times, and tap into an ultra-pure, secure and uninterrupted power supply. Their proven power, control and automation products are the foundation of a solution that collects relevant data from across the enterprise. This data can then be used by their SCADA, Historian and MES systems to produce easy-to-understand, real-time intelligence for productivity analysis, data mining, querying and reporting.

The solutions can also be used to understand, evaluate and make decisions about process, plant and enterprise operations to identify bottlenecks, analyse production downtime causes, calculate key performance indicators, deliver accurate views of production inputs and outputs, understand your work-in-process, track the real costs of production and many more operational performance issues. They dedicated experts to help you with your application, product and technical needs.

The organisation has started with a dedicated team of experts catering only to dairy customers. R&D lab in Bangalore has a state-of-the-art Liquid Food Library that our customers can experience and leverage. Besides this, some of the key innovations from Schneider Electric in India have been in dairy segment (quality monitoring during procurement process, all the way from village collection centres to bulk milk coolers) and tailor-made hybrid DCS (branded as PES) for niche dairies (anywhere from 1 LLPD to 10 LLPD).

This helps increase in overall equipment effectiveness, yield and process efficiency, ensure uptime, reduce waste and scrap, helps you measure the quality of your operation and reinforce continuous improvement. ■

Urvil Modi
Director
Food & Beverages Segment
Schneider Electric, India

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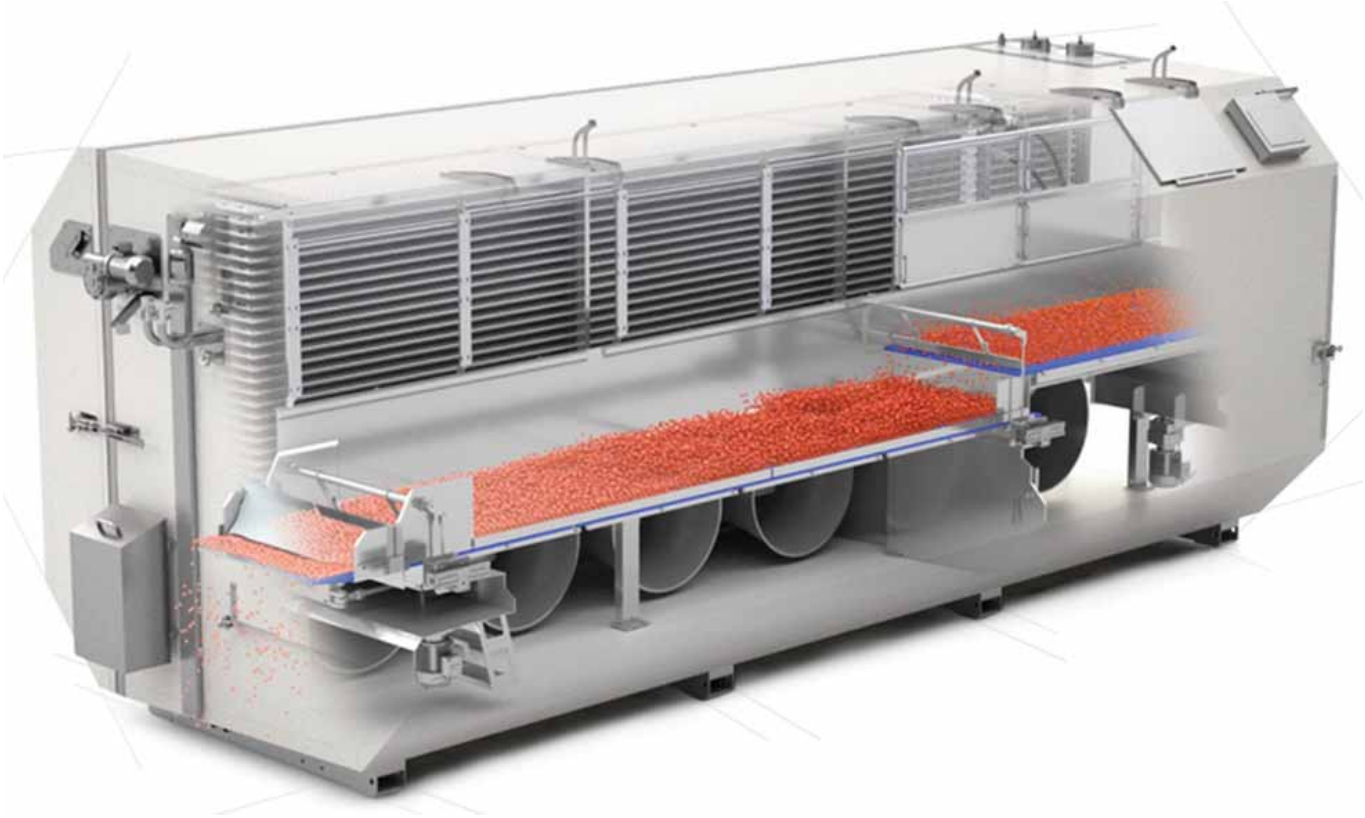
Evolution Of Latest Technology In Individual Quick Freezing (IQF)



With India's food production likely to double in the next decade, there is an opportunity for large investments in food and food processing technologies, skills and equipment, especially in areas of Canning, Dairy and Food Processing, Specialty Processing, Packaging, Frozen Food/ Refrigeration and Thermo Processing...

Individual Quick Freezing (IQF) technology used will be latest and indigenous. It is a freezing method of choice for seasonal products such as fruits and vegetables – and over the years it has further developed to cover a broader range of other product such as diced meat, shrimps, pasta and rice, dairy products and etc. IQF is a technology originally developed by Frigoscandia Equipment as a specific solution to block or cluster-freezing of small-sized products, to preserve quality and to give unparalleled convenience to end-users. Quick Freezing is the only process whereby, virtually all the properties of most of the parent food stuffs can preserved.

India is the world's second largest producer of food next to China, and has the potential of being the biggest within the food and agricultural sector. With India's food production likely to double in the next decade, there is an opportunity for large investments in food and food processing technologies, skills and equipment, – especially in areas of Canning, Dairy and Food Processing, Specialty Processing, Packaging, Frozen Food/ Refrigeration and Thermo Processing.

This system involves the use of a blast of cold air which, when directly on the food products, quickly freezes them. The vegetables are also frozen in air blast tunnel (chamber freeze) in which cold air at –40 degree C is rapidly moved around the product giving it a cryogenic shock and freezing it instantly. This type of freezing results in the product free rolling and not clotting into lumps.

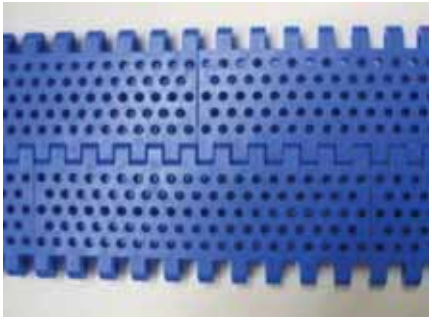
The Evolution of IQF Technology

IQF stands for Individual Quick Freezing – and is a technology used in the food processing industry. As the term suggests, it stands for the quick freezing of individual pieces of product, as opposed to bulk or block freezing.

IQF technology has its roots back in the 1960s when the freezing tray freezer was introduced on the market. It was an immediate success as the prior freezing methods were block freezing of products (or even packaged products) which degraded the overall quality due to its long freezing time. Tray freezer performed well on 'easy to freeze' products like pea, corn or carrots. The transportation of the product was based on the fluidization principle. However, for rather delicate and light weight products like broccoli, raspberries, herbs, etc., the air speed needed to achieve transportation was too high and products would get destroyed or flown over the bed. Therefore, the flexibility of this type of freezer was limited.

In 1970s the engineers came up with a solution and introduced the transportation belt. With this innovation it was possible to transport the product at lower air speeds, as the belt was in charge of transporting the product. However, by introducing a belt in the freezer the number of moving parts increased which is a hazard for food safety. In addition, a belt-take-up mechanism was necessary to be introduced due to temperature variations.

Since 1970s, stainless steel type of mesh-belt was used in IQF freezers. Many freezers today use the same type of technique even if belt configuration can vary. The disadvantage of this belt is that it cannot produce true fluidisation, as the holes in the mesh are too big. In addition, such belts would always leave belt marks on relatively fragile products such as strawberries. An efficient cleaning of such type of belt is difficult which is another important drawback.



As a response to these challenges, in 1980s plastic belts were introduced in the IQF freezers, a technology which significantly improved the freezing results. The challenge for this type of belts is that only 64% of the surface of the belt has active fluidisation while the rest of 36% is a dead zone as the air flow is hindered by the connection pins.

The latest innovation in terms of beds used for IQF freezers is the perforated bed plate designed which is a successful replacement for the belts used before. Transportation of the product is based on a patented principal which consists of an asymmetric movement of the bedplate in the direction of transportation using static friction between the bedplate and the product to be frozen. In the case of the modern IQF freezer bed plate – almost 100% of the surface of the bed has active fluidization. The possibility of configuring the diameter and shape of the perforated holes contributes to the impressive freezing results while the cleaning of the beds can be made easy and fast outside the IQF freezer. This new technology of bedplates have marked an impressive technological progress in the IQF industry.

Additionally, the Modern IQF tunnel is equipped with a Clean In Place system and a foam system for disinfection and cleaning between production.

Cooked meat, as well as challenging products like raw or minced meat or sticky marinated meat, can be frozen by freezer with good separation using the features of the bed vibrator or pulsator. Despite any other technologies, the modern IQF tunnel freezer ensures more performance, at lower power consumption.

Manufacturing Process & Technology

Oxidation (rancidity) can occur during freezer storage causing off flavours through exposure of frozen product to air. Using high quality plastic bags or containers designed for freezing can prevent rancid flavour development as well as protect against freezer burn which is a result of moisture loss. The process of

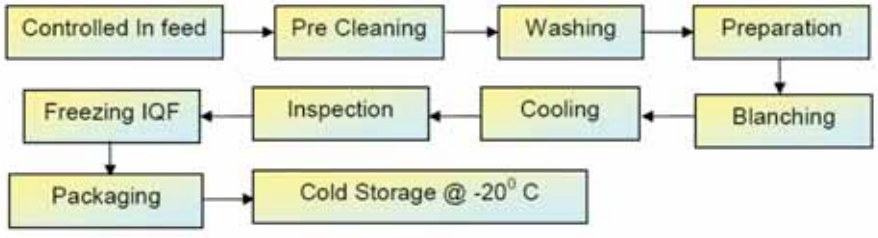


Figure 1: Process flow diagram of IQF..

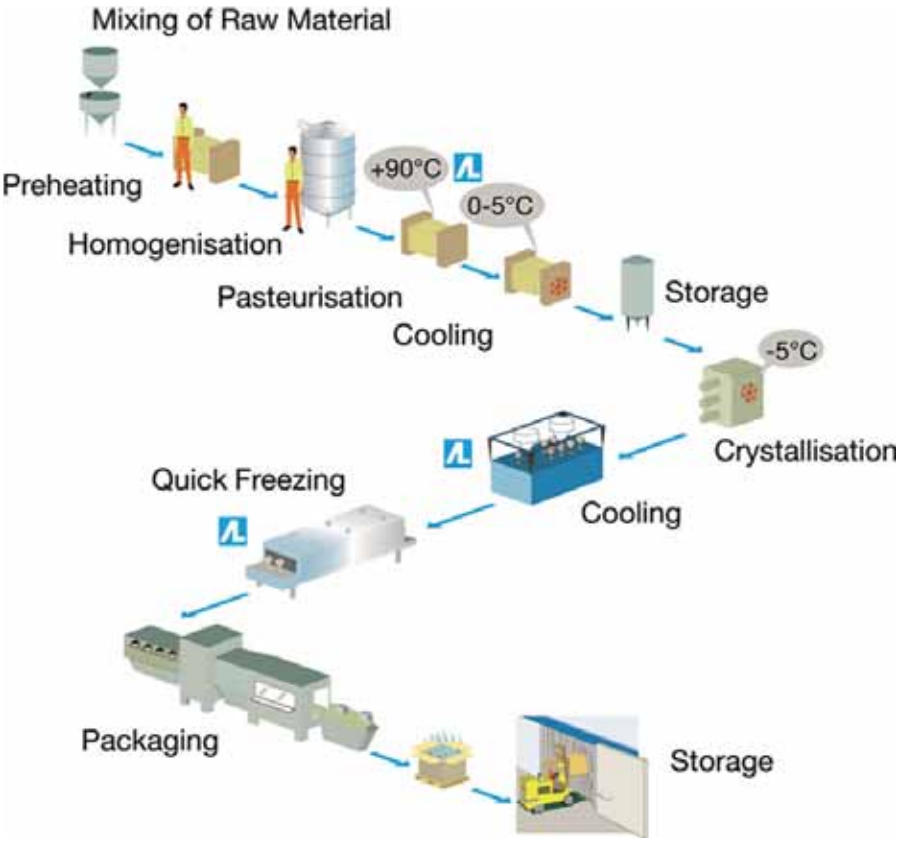


Figure 2: A typical process flow for ice-cream manufacturing...

freezing involves freezing the water in the cellular spaces of fruit tissue. As this water freezes, it expands forming ice crystals that rupture cell walls resulting in softer texture once fruit is thawed. To reduce cellular damage chill and freeze fruit quickly so that the ice crystals formed are smaller. Process flow of IQF & typical flow for ice cream manufacturing is given in figure 1 & 2.

Technology

The technology of IQF involves three sub sections:

1. Processing Equipment
2. Individual Quick Freezing Equipment
3. Auxiliary Equipment

Processing equipment involves Pea Podder, cross collection conveyor for peas, waste collection conveyor, bucket elevator, Winnower, Fruit/Vegetable washer, Inspection Conveyor, Pea blancher, After cooler, dewatering conveyor, grain recovery system and potato dicer etc.

Freezing equipment is with Polyethylene product belting. High efficiency SS coils, air foil fans. It consists of Conveyor System, Defrost system, refrigeration evaporator, freezer enclosure, Belt washer and dryer and electrical control panel, Caycore IQF soft, Dual Defrost Mechanism and refrigeration machine etc.

Auxiliary Equipment consists of Boiler, Reverse Osmosis plant, Laboratory Equipment, Fire Fighting equipment, ETP, Electrical infrastructure and accessories etc.

Applications

- **FRUITS AND BERRIES**
- **TROPICAL FRUITS**
- **VEGETABLES**
- **CHEESE**
- **PASTA & GRAIN**

- **FRUITS**

One of the most challenging aspects when freezing fruits, especially tropical fruits like banana and mango, is the separation and keeping their taste, smell and texture intact. Some products are extremely sticky due to their naturally high sugar content and they will easily stick together in lumps or blocks.

The benefits of IQF tunnel freezer is that it is designed with up to five (5) freezing zones that control the circulating, bubbling and fixed bed fluidisation. This enables quick freezing of the surface of the products to avoid dehydration and lump formation. The aerodynamics and movement of the bedplates ensure that there will be no belt marks on the product surface, nor damage on the product corners.

- **BERRIES**

Delicate berries are sensitive to mechanical impact and must be handled with care, to avoid damage or marks. Some soft berries, like raspberries, are extremely sensitive in a frozen state, but quality equipment shows very good results due to the adjustable freezing zones. The optimal aerodynamics in each zone, and gentle bedplate movements of IQF freezing tunnel, separate the products with a minimum of crumbles and fines.

Low dehydration and no lump formation also add to the natural appearance of the berries, preserving color, size and shape.

- **TROPICAL FRUITS**

One of the most challenging aspects when freezing tropical fruits such as banana and mango is to achieve good separation and preserve their taste, smell and texture. Some products are extremely sticky due to their naturally high sugar content – and they will easily stick together in lumps or blocks.

Depending on the ripeness of the product, the additional features of the pulsator, bed vibrator or the wave plate will effortlessly

separate the products, creating a perfect output and keeping the fruits' delicate natural colour and shape.

- **VEGETABLES**

Frozen vegetables maintain their natural appearance, texture and colour when frozen in an IQF freezing tunnel. For some type of vegetables, the fluidisation inside equipment even enhances their appearance. This is possible with the optimal bedplate configuration and the easily controlled freezing process in the IQF freezer. Delicate and fragile vegetables like broccoli, spinach or asparagus require gentle handling in order not to get damaged. But even more solid vegetables like beans, mushroom, peas, brussels sprouts and carrots benefit from the unique airdynamics in the IQF freezer.

The individual quick freezing tunnel developed by Octofrost has some additional features, like the pulsator, bed vibrator or the wave plate that will contribute to the product's separatation so that the fresh-frozen products will preserve their delicate natural colour and shape.

Additionally, the low snow formation and dehydration level during the IQF freezing process in Freezer will increase the output of frozen products without spending additional resources on raw material, manpower or power consumption.

- **MEAT & POULTRY**

Food safety is a top priority for customers in a modern food processing industry. With bacteria like listeria, salmonella and E. coli that can be found in meat and poultry, the mono-block design, rounded corners and no joints of the IQF freezing tunnel ensure that bacteria have nowhere to hide.

The open access and exchangeable bedplates for easy efficient cleaning further boosts the level of food safety.

Additionally, the Modern IQF tunnel is equipped with a Clean In Place system and a foam system for disinfection and cleaning between production.

- **CHEESE**

The uniform and gentle fluidisation in IQF freezing tunnel ensures there is no damage on cheese corners and no formation of fines.

With five days of production without defrosting and 100% separation you can rest assured of a natural appearance of your cheese, even on sticky products like shredded mozzarella.

The minimum of fines gives a commercial high-quality IQF frozen product that can be sold at a premium price.

Food safety is key for customers in a modern dairy processing industry. The mono-block design, rounded corners and no joints ensure that freezer meets the highest requirements on food safety. The open access and exchangeable bedplates for easy efficient cleaning further heighten the level of food safety control.

The low snow formation and low dehydration level during the freezing process will increase the output of frozen products without spending any money on raw material, manpower or power consumption.

- **PASTA & GRAIN**

Freezing delicate and sensitive pasta is optimal in an IQF tunnel units. The benefits of individual quick freezer is that it is designed with up to five (5) freezing zones that control the circulating, bubbling and fixed bed fluidization. This enables quick freezing of the surface of the products to avoid dehydration and lump formation. The aerodynamics and movement of the bedplates ensure that there will be no belt marks on the product surface, nor damage on the product corners. With low dehydration and no lumps your pasta will keep its natural appearance in volume and shape, and will fill the bags better.

BENEFITS

- **NATURAL APPEARANCE**

The unique fluidisation method of the IQF tunnel enhances the products' natural colour and shape. Floating freely on the freezers powerful circulating or gently bubbling air currents, the products recapture the true beauty of nature.

HIGH VOLUME

Products which are floating freely on a circulated fluidised bed, release inner tensions and retake their natural volume and shape. Bigger volume of equipment fills bags and boxes better. It is a win-win situation as the customers and consumers will enjoy the intact products with their natural volume maintained.

COLOUR

The combination of optimal air distribution and minimal dehydration in the freezer preserves the natural colour of the frozen products. The surface of the product is protected by a transparent frozen coat which preserves the products' appearance as well as prolongs their shelf life. These are just a few of the main advantages achieved by innovative IQF freezing tunnel.

NATURAL APPEARANCE

Beautiful appearance sells. A product frozen in circulated fluidised airstream preserves its natural form. There are no damages to the product such as freezer feet or belt marks. The thin reglasing of the product protects the colour of the frozen product. All because modern IQF tunnel is designed to ensure reliable food safety and natural appearance.

- **FOOD SAFETY**

Latest IQF freezer is designed as an easy accessible hermetic unit with rounded corners and sloping surfaces. The bedplates are removable for easy cleaning, minimising the risk of cross contamination between products. In combination with an effective Clean In Place (CIP) system, helps to maintain high food safety standards.

CLEANABILITY

When designed individual quick freezing technology, we have to keep in mind two main features: Food safety and cleanability. Unit can be cleaned with impeccable results, even with limited available time. Easily removed and cleaned outside the freezer, the bedplates decrease downtime without compromising food safety.

EASY ACCESS

Never before has a freezer been easier and faster to clean. In the modern IQF freezer developed has every surface on each detail is easily accessible thanks to the completely open design.

The bedplates are cleaned outside the freezer and all other parts can be effortlessly accessed for thorough cleaning and bacteria control inspections.

MONOBLOCK DESIGN

Made of non-hygroscopic material, the IQF freezer features a unique octagonal monoblock design. Designed as one ready to install unit, the freezer has rounded corners and even surfaces which slope towards the drain area.

IMPORTANCE OF FOOD SAFETY

A Food Safe freezer proves its performance when it can be washed and disinfected in short time during peak season. Totally clean, free from bacteria's, microbes or listeria that could circulate around when the fans are running full.

- **HIGH YIELD**

Higher yield means more kilos of frozen products on invested raw material, man power and energy. A latest technology IQF freezer boosts up yield with at least 1.5–3%, and for many products the figure might be even higher.

With the vast volumes of products which passes through the freezer every year, a higher yield is without doubt the most efficient way to increase the profit – from day one and for all the years to come.

DEHYDRATION

The complex air flows and pressure ratios have been combined to reduce product dehydration and prevent snow formation in the freezer. Applied on all application areas, the snow formation is below 0.5%.

REDUCTION OF LUMP FORMATION AND FINES

With the powerful and controlled circulated fluidisation in the IQF freezer, in combination with its unique bedplates, even sticky products are prevented from lumping together in blocks. Further in the freezing process, the bubbling fluidisation ensures a safe transportation of the product avoiding any damages and reducing the amount of fines.

IMPORTANCE OF HIGH YIELD

Nothing has more importance to the return of investment than high yields. Each percent of increased yield means one percent of increased yearly incomes without spending money on raw material, man and electrical power.

- **ENERGY EFFICIENCY**

The latest unit in IQF technology ensures lower energy consumption and waste for IQF production. The main reason is the compact octagon body with efficient aerodynamics throughout the freezer and especially the fluidising freezing zone. Compact body and less turbulence require less fan power consumption.

BEDPLATES INSTEAD OF CONVEYOR

The worldwide patented use of OctoFrost bedplates instead of conveyor belt inside the freezer, not only facilitates cleaning and food safety but also allows better adjustment of fluidisation, which keeps the natural shape of the products and allows less fan speed.

FREQUENCY INVERTER CONTROLLED MOTORS

Fans and bed drive motors inside the latest individual quick freezing tunnel, are controlled with inverters. This allows lowest energy consumption. Modern motors specialised for running in cold environment are supplied from leading manufacturers.

TIME BETWEEN DEFROST

PLC operated SRS system keeps the front of the coil clean during production and substantially prolongs the number of production hours between defrost/cleaning. This minimises downtime and water consumption for defrosting.

MINIMISING DEHYDRATION

The unique design of the individual quick freezing tunnel prevents snow formation. All snow that builds up during production inside a freezer is considered a direct waste of energy.

EFFICIENT PLC OPERATION FOR DEFROST AND CLEANING

PLC operated coil cleaning system controls the consumption of water needed to de-frost the coil – and eliminates the risk of wasting water.

IMPORTANCE OF ENERGY EFFICIENCY

With frequency convertors on every energy efficient axial vane fan, the total energy savings are substantial. On top of this, setup requires less refrigeration to cool down the fans. A total energy saving is up to 20 to 30%. ■

Reference -

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Ritesh. J. Mistry
M.E. Cryogenic
Zamil Air Conditioners India Pvt. Ltd., Ahmedabad

Philips India Expands Its Air Purification Portfolio

The Philips Air Purifier Series 3000 provides most accurate real-time PM 2.5 feedback, which helps you to monitor the air quality. The latest Philips Air Purifier Series 6000 is a heavy duty air purifier designed for larger spaces...

The two new products from Philips India, namely: Philips Air Purifier Series 3000 and Philips Air Purifier Series 6000 have come with Philips' Aerasense technology that offers real time numerical PM 2.5 LED display. Aerasense is a cutting edge technology exclusive to Philips with the accuracy and performance benchmark against a professional sensor, senses and delivers superior purification against the PM2.5 and common allergens like pet dander and dust mite.

While the Air Purifier Series 3000 is designed for domestic use, the Air Purifier Series 6000 is designed for set ups such as hospitals and large living rooms or offices that have a higher concentration of pollutants and need more intense cleaning.

"The problem of polluted air is now a national challenge and needs immediate intervention, both at an individual level as well as at community level. It is important that we take charge of the situation and of our health. Philips is dedicated to providing innovations that help consumers do just that; make the right choices for a healthy lifestyle. The market for air purification is growing steadily and we are at the helm of it, continually reinventing our portfolio to meet the evolving needs of our consumers," said A D A Ratnam, President, Personal Health, Philips.

Talking about the launch of the new Air Purifiers, Jayati Singh, Business Head, Air, Philips India said, "Philips introduced the air purifiers category for the Indian market nearly two years back and has since studied the market closely to understand the needs and expectations of the Indian consumers. The insights we have gathered have inspired us to now introduce the new Aerasense technology. An industry first, it can help detect PM2.5 and most common airborne allergens with high accuracy and effectively remove them while giving real time numerical feedback that gives the users confidence and relief that they can monitor their air indoors and see purification in action We understand that different settings need different solutions, therefore we are introducing these two new products. The Philips Air Purifier Series 3000 designed to make your home a healthier place and Philips Air Purifier Series 6000 for larger corporate and industrial spaces where the air conditions are tougher to purify." ■

Clariant Introduces Heat Transfer Fluids For The HVAC Industry In India

The company's customers using these solutions will be provided additional support like performance checks, sample analysis and technical consulting...

Clariant has introduced safe and innvoative heat transfer fluids for leading players in the Heating, Ventilation and Air Conditioning (HVAC) industry in view of the growing demand for efficient and safe manufacturing solutions in India.

The company's Business Unit Industrial & Consumer Specialties introduced its innovative heat transfer mediums – Antifrogen L, Antifrogen N and Protectogen C aqua to the HVAC industry during the recently concluded National Conclave on 'Strengthening of Farm-to-Consumer Cold-Chain Infrastructure', organised by the PHD Chamber of Commerce and Industry.

Image Courtesy: Clariant

Example of application segment for heat transfer fluids in HVAC industry...

Key Product Features

Antifrogen L is a mono-propylene glycol-based heat transfer fluid, for special use in the pharmaceutical and food industry, where hygenic manufacturing is critical. Its permanent usage temperature ranges from -25 to +150 °C.

Antifrogen N is a monoethylene glycol based heat transfer fluid for industrial applications, like closed hot water heating systems, cooling and refrigeration equipment, heat pumps, gravity systems and wind energy turbines. Its permanent usage temperature ranges from -50 to +150°C.

Protectogen C aqua is a glycol-free, long-lasting corrosion inhibitor concentrate for cold water systems with closed heating or cooling circuits, and which do not require frost protection. The recommended permanent usage temperature is +5 to +95°C.

Clariant's customers using these solutions will be provided with additional support such as performance checks, sample analysis and technical consulting. ■

Commercial
Refrigeration Equipment

HP control consists in regulating the condensation pressure at a given value in order to obtain the lowest power consumption of the compressor / condenser couple (and auxiliaries)...

A refrigeration system is a thermodynamics cycle, which transports heat from a cold storage, via an evaporator, to the outside via a condensor (Figure 1 shows a refrigeration system in order to locate devices).

To understand succintly the benefits and operation of HP control, it is not necessary to fully understand the operation of the refrigeration installation.

Compressors

The compressor is the heart of the circuit, as it compresses the gas generating the flow necessary for the cycle. Generally, the compressor consumes the major portion of the energy. Its consumption is not constant and depends on several variables, most important are the low and high pressures. Some compressors are equipped with a mechanical device to reduce cooling capacity. The use of these partial load devices affects the compressor efficiency.

In terms of energy consumption, the most useful is the COP (Coefficient Of Performance). The COP takes into account variation of internal compressor efficiencies and the refrigeration cycle status. It is therefore necessary to have the operating status associated with the COP to be able to judge. (Example: -10 °C / +35 °C).

COP is the ratio of the cooling capacity produced (or useful) to the consumed electrical power. The COP operates in the same direction as efficiency.

There are several types of the compressors, most representative are:

- recriprocating compressors
- scroll compressors
- screw compressors.

The following explanation is applicable to these three types of compressors.

Note : there are some specific characteristics on certain compressors.

Condensers

The condenser's function is to dissipate calories. It is usually on the roof or outside. It can be used to heat water for another use.

We can distinguish four categories of condensers:

Dry condensers

- evaporative condensers
- adiabatic condensers
- hybrid condensers.

Water-cooled condensers

- lost water condensers
- opened circuit cooling tower
- closed circuit cooling tower
- hybrid cooling tower
- dry air cooler
- adiabatic air cooler
- heating networks or intermediate heating networks.

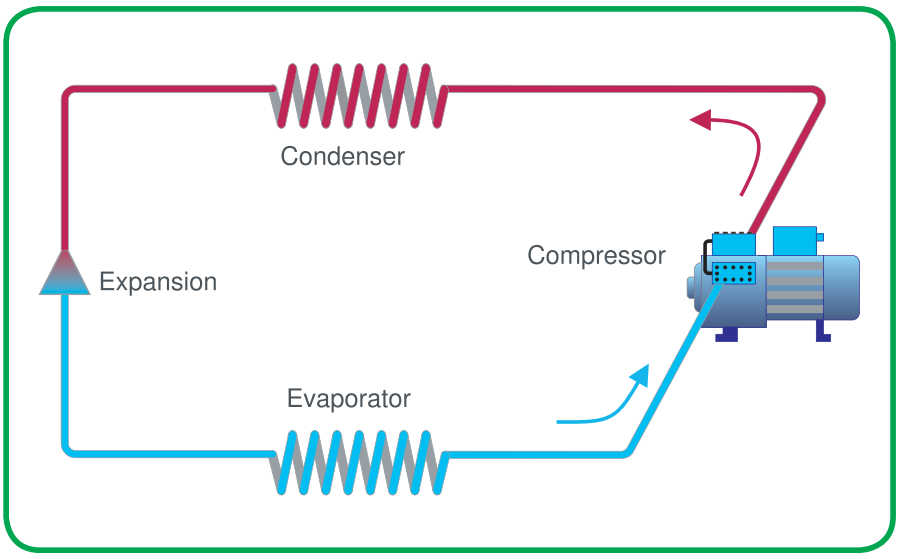

Fig. 1: Representation of a refrigerating system...

Evaporative condenser or other gas heater

HP control can be applied to all these condensers (except evaporative condensers and heating networks), but explanations given in this document are primarily applicable to dry air coolers and condensers.

There are some adaptations needed to make it applicable to other condensers.

High pressure

HP is created by the balance between the heat to be dissipated in red on the chart, and cooling capability in green.

The system must dissipate a quantity of heat, which depends on the instantaneous cooling power and the compressors efficiency.

The condenser can dissipate a certain amount of calories depending on its operating conditions: a large temperature difference between cooler and fluid wil increase the cooling capability.

Pressure can also be derived from the saturation temperature (temperature from

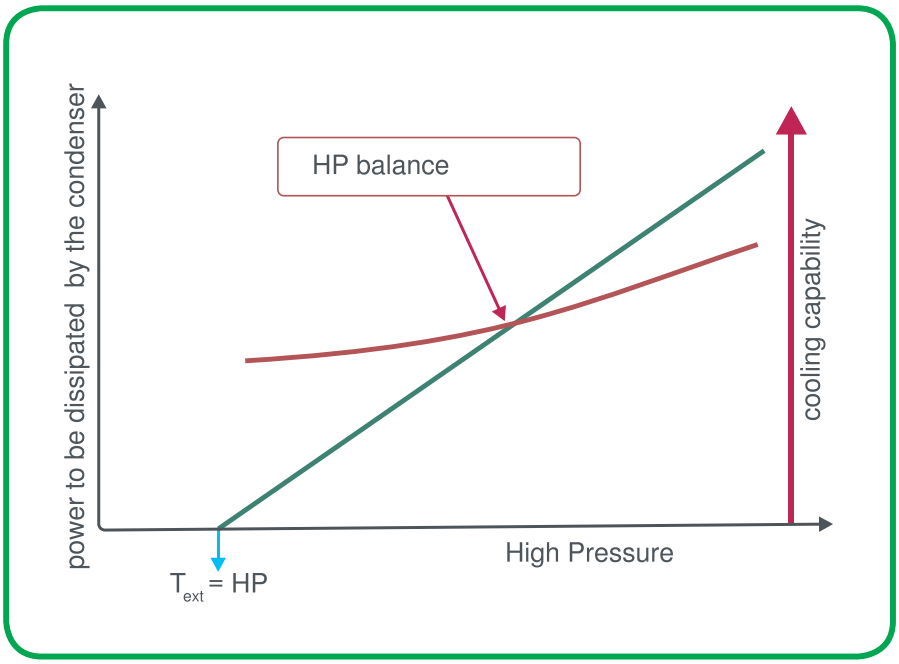

Fig. 2: High pressure according to the evacuable powers...

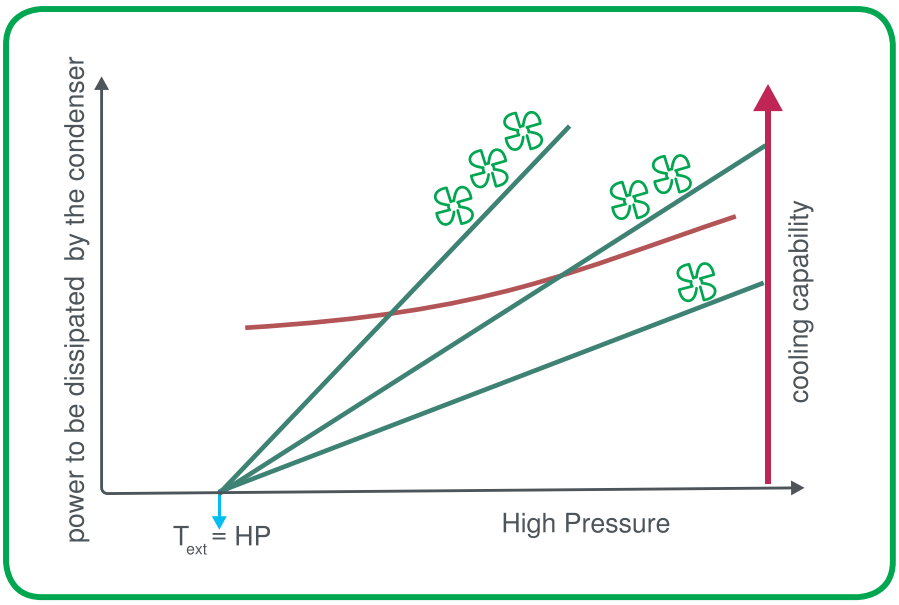

Fig. 3: Flow influence of the fans...

which the liquefied refrigerant evaporates or the gaseous refrigerant condenses). This temperature increases as the pressure increases. According to the fluid in the system, a HP at 40°C will not have the same pressure.

On the graph, it is clear that when the HP temperature is equal to the outside temperature, heat which can be dissipated is equal to zero.

The highest HP temperature the highest is the power that can be dissipated (temperature difference between outside and the fluid temperature is high). In other words heat rejected by the condensor (in green) increases.

For the compressors (in red), when the HP increases, power which is disspated increases too but slower.

Steady state for HP, is when the heat produced by the compressor and the heat rejected by the condensor are identical.

In order to control this balance, the condenser capability is adjusted by controlling the cooling fans. Increasing the amount of airflow across the condenser increases the performance of the condenser and vice versa as shown figure 3.

Of the many variables that effect the heat dissipation of the condenser, the only one we can control is the airflow trough the condenser

HP control consists in regulating the condensing pressure value to obtain the lowest consumption of the compressor/ condensers couple (and auxiliaries).

This is definitely not to reduce HP to the minimum.

HP control modes

The implementation of the HP modes is not identical with all condensers. It is understandable that the control is not implemented or controlled in the same way with a dry condenser or a cooling tower. However, the methods described below are applicable with some modifications.

Constant HP or hysteresis control

This method is the most used control method, however, with implementation of HP control being easier and for other added benefits, this method is slowly being replaced. The goal is to maintain HP at a constant value that can be held throughout the year. For a constant HP, it would be necessary to use a regulation with neutral zone or a PID. However most common solution is the use of pressure switches or hysteresis controller creating steps in the HP regulation (Figure 4).

HP is not really regulated at a constant value, it will vary uncontrolled according to the outside temperature, the heat to be dissipated and the number of fans required to accomplish this operation.

HP control

Reducing HP is interesting in terms of energy consumption: when HP decreases the compressor COP increases, and vice versa. Figure 5 shows the COP as a function of the condensation temperature for a screw compressor, COP variation is clearly visible. In the example, it jumps from 1.9 at -10 °C / +50 °C to 4.7 at -10 °C / +20 °C i.e. a variation of 62%.

Figure 6 gives the percentage gain (or loss) on COP for variations of one degree of condensation temperature (given in Kelvin) according to the HP and for various evaporation temperatures. All compressors do not react the same way, it is therefore necessary to use the characteristics of the actual compressors to correctly assess the energy savings.

However, to reduce HP, it is mandatory to operate more fans. Energy savings is thus less than those calculated for the compressor.

It is necessary to calculate the COP on the compressor and condenser as a whole to specify HP control.

The use of fans should be made whith definite purpose and with absolute need. Sometimes savings made on the compressor can be offset by the use of fans.

The graph of Figure 7 demonstrates the existence of an optimum. This phenomenon

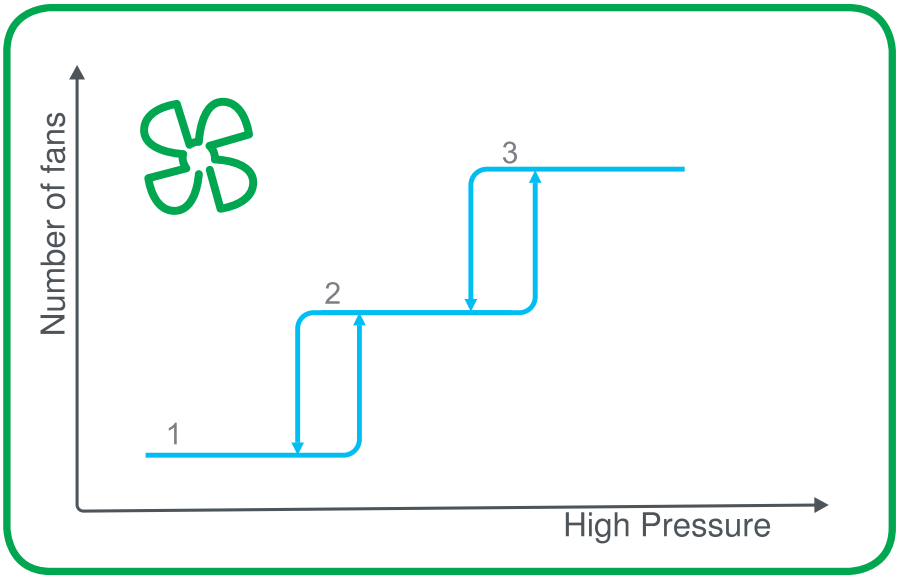

Fig. 4: HP variation according to the number of fans...

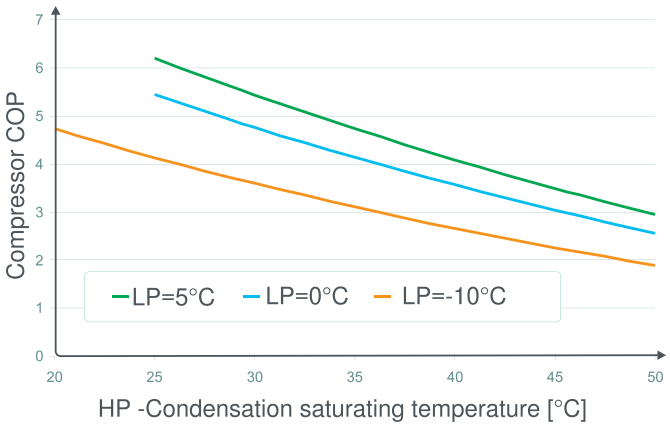

Fig. 5: COP variation vs HP for a screw compressor...

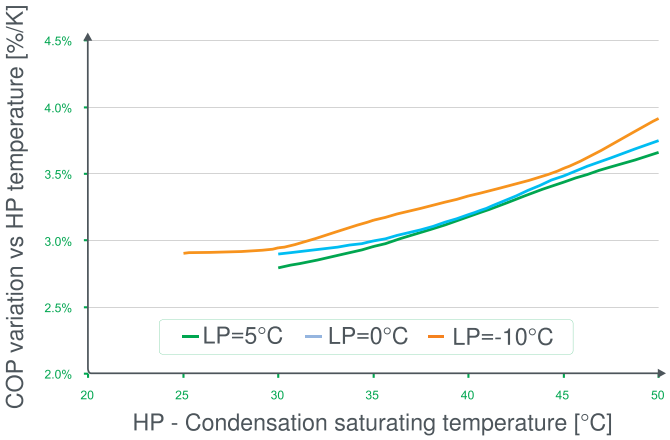

Fig. 6: COP variation (K in%) vs HP...

often occurs on installations operating below 50% of full load.

Concretely on the field

Installation is relatively simple (see example in figure 8). The controller embedded with HP control algorithms, receives HP information of the refrigerant, the outside temperature and then, processes this information.

The controller converts pressure to temperature (depending on refrigerant fluid used).

It calculates the differential with the outside temperature.

This differential is the parameter to be controlled. A PID function is used (it is a control block) that gives the percentage of condenser power.

This percentage is translated into the number of fans required.

Application on storage system

Example of calculation on a cold store, a fixed HP at 40°C is compared to a HP control. The comparison is done for 2 outside temperatures: 30°C and 15°C.

When the outside temperature is high, energy savings are low, even nonexistent. Once the outside temperature decreases, energy savings increase strongly. It should be noted that in France average temperature is around 11°C far from 30°C. Savings are consistent, but dependent on several factors.

Generic application

This example will help in showing the impact of two factors - the outside temperature and the load of the installation – which influences the performance of installation and those of the HP control.

This nstallation, produces 500 kW of cold when running at its maximum speed, i.e., a Low Pressure (LP) at -10°C and a HP at 50°C. Compressors have a COP rated 3.4 at -10 / +30°C. The condenser ventilation power is 40 kW; which dissipates 685 kW with a differential of 10°C. The minimum HP temperature is limited to 20°C for technical constraints.

Figures 9 and 10 give the power consumption of the compressor and condenser for different outdoor temperatures and regulation requirements. Each curve represents the power absorbed by the compressor and condenser for several external temperatures.

X-coordinate is the difference between the outside temperature and the HP. The addition of the value in X-coordinate and the outside temperature gives the HP value.

This chart can be used to define what algorithms is the best suited to reduce the power requirements to the minimum.

In this example, when the installation operates at full cooling capacity (Figure 9), that

To summarize, HP control consists in regulating the condensation pressure at a givenvalue in order to obtain the lowest power consumption of the compressor / condenser couple (and auxiliaries).

This is definitely not to lower the maximum HP, which could on top of an increase of the power consumption cause malfunctions of the installation. (See appendix)

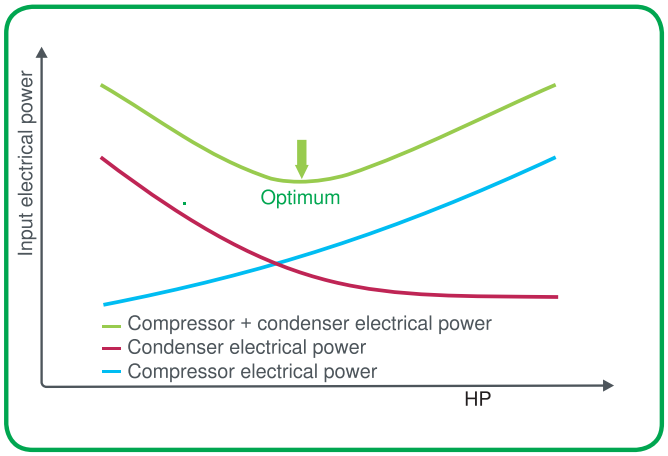

Fig. 7: Powers optimization of the compressor/condenser...

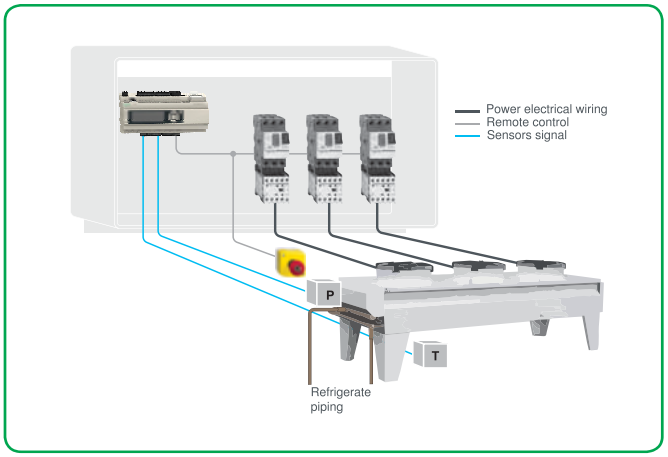

Fig. 8: Installation example...

	HP at 40°C	HP control	Saving
For an outside temperature of 30 °C			
Refrigeration need	300 kW	300 kW	
HP value	40°C	40°C	
Electrical power of the compressors	129 kW	129 kW	
Electrical power of the condensers	22 kW	22 kW	
Total power	151 kW	151 kW	0 %
For an outside temperature of 15 °C			
Refrigeration need	240 kW	240 kW	
HP value	40°C	25°C	
Electrical power of the compressors	103 kW	62 kW	
Electrical power of the condensers	7 kW	15 kW	
Total power	110 kW	77 kW	30 %

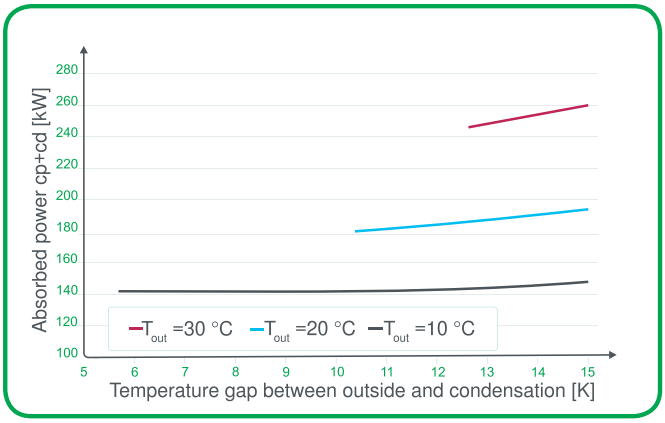

Fig. 9: Electric output of the whole at 500kW...

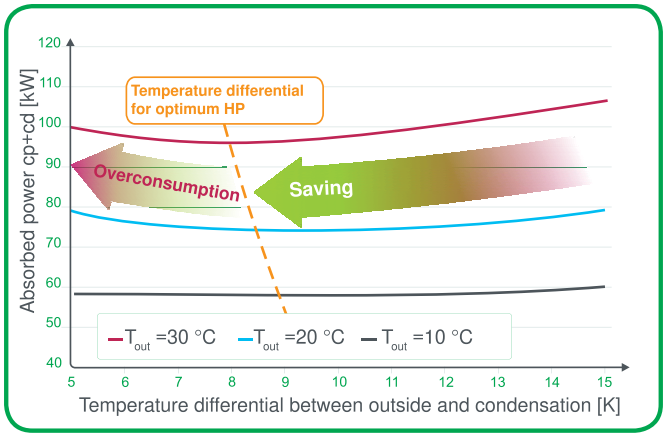

Fig.10 Electric efficiency of the whole at 500kW...

is to say 500 kW of cold, running all fans is less energy demanding whatever the outside temperature.

When the installation is running at partial load i.e., 40% load (Figure 10), input power decreases with the reduction of HP. From the optimal HP, power consumption increases while HP continues to decline. Savings are about 1.5% / K at right of the optimal HP and -1.5% / K at the left of the optimal HP. These values are not generic for all installations.

An optimal value of HP emerges: the goal of a HP control will be to regulate the installation at this value.

Note: that these values are for a given installation, it is necessary to analyse each installation to determine the optimum HP.

Conclusion

In today's climate, energy saving solutions are a must. Environmental aspect is sometimes not sufficient to justify the huge required investments.

Solutions as HP control have the benefit of reducing the environmental impact not to mention the financial aspect.

HP control remains an effective and current solution for energy savings. There may be differences between solutions and their implementations.

To improve the return on investment, good commissioning must not be forgotten.

This solution, according to the installations, is not very expensive; however it can have very significant energy savings, exceeding 30%. HP control is the solution with the best return on investment for refrigeration.

Today, all new installations must have an effective HP control. ■

Source

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Advance E-Water Descaler

Review & Applications In Dairy/Process Industries

Magnetronic Technology is a unique descaling solution for dairy and process industries without wastage of water with energy efficiency...

We know a 100% successful eco-friendly technology is still a subject of research but main benefits of this are prevention and control of lime scale up to 60-90%, which depends on ground water quality.

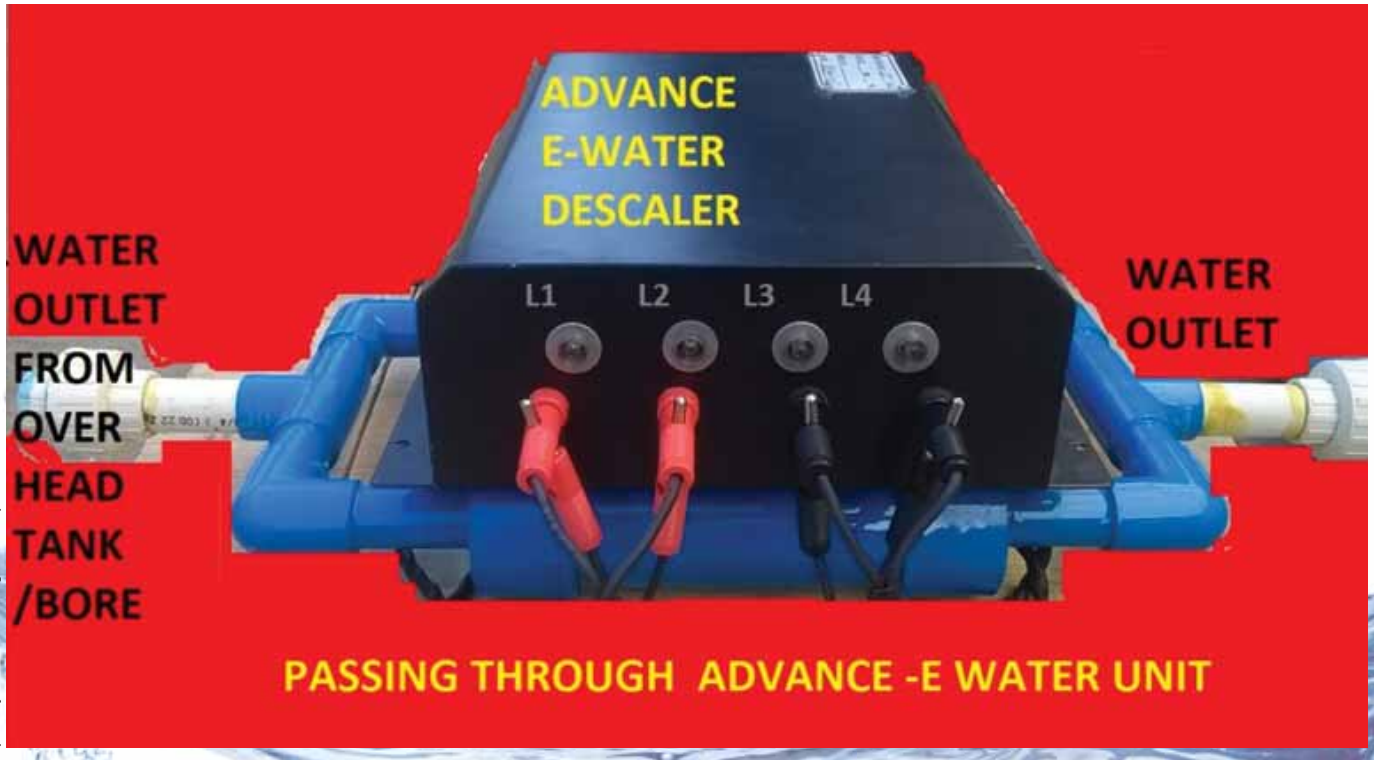
Awareness is not only for industrial application but also for commercial buildings, hotels and homes. Routine applications are 'must' for reducing wastage of 60-70% of waters in R.O. plants or softener plants. Use softener plant only for treating the specific equipment only and for other routine application usage of Advance E Descaler saves lots of water and running expenses.

Each and every personal residence water system can be free from water problems by utilising this advanced technology. Owners are very happy due to reduction in routine maintenance and running expenses for maintaining swimming pools, spas, hot tub systems and water heaters. The thermal efficiency of solar heater and other hot water heating systems is weakening with scale build-up and corrosion problems. Thus, this advanced technology saves energy by keeping heat transfer surfaces free from insulating scale.

Furthermore, no chemical or sodium additives and resin required and nothing is removed, there is no wastage of water that reduces water pollution of the environment, natural minerals remain in water and this is a healthier water treatment system than conventional means.

A terrific amount of wear and tear occurs in plumbing fixtures in chemical industries, dairy industries and commercial equipment due to water and other fluids in these systems causing corrosion and scale build-up. As a result, scientist and researcher focus towards more energy efficient, eco-friendly water treatment equipment, which reduces wastage of water, limited use of chemical additives, so an important discovery was made: treating fluids with a properly engineered magnetic field is effective in preventing the formation of scales in many dairy process and equipment systems.

Algae, which usually grow on cooling tower in the open air and in swimming pools, die rapidly under the effect of the Ultrasonic High Frequency treatment. Well, these technologies are successful only if designers take care during design stage – and after careful study of specific geometrical locations and quality of ground water available for treatment. Why many researchers claim that not a successful technology exists in India? Because of inadequate information of Magnetronic Technology.



(Courtsy: www.advancemagnetronic.in)

Technological benefits available with this method

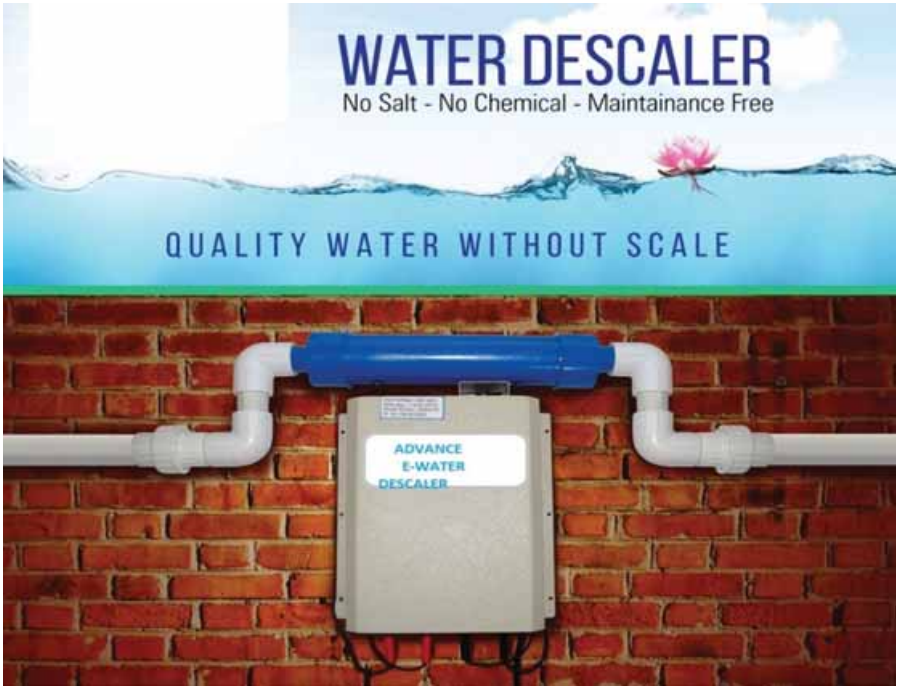
- Elimination of scales in evaporators, chillers, heat exchanger, which build up due to high temperatures
- Decrease of oily or saline deposits in piping systems
  - Improve bactericidal functions of sterilizer
  - Increase velocity of reagent (chemical additive) diffusion
  - Enhance in the effectiveness of ion exchange resin (water softening)
  - Subtraction of fine ingredient part in the purification of recycling waste water
  - Enhance rate of the solidification of certain cements concrete mixture
  - Increase in the elasticity, plasticity, density and strength of waterborne materials.

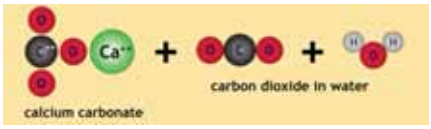
Eco Friendly treated water, also called 'E -water' is widely suitable for routine water applications i.e., for boilers used in all purposes. Enhance the life of various pipes and plumbing used in different dairy, oil, coal and mining industries.

About Advance E-Magnetic Technology

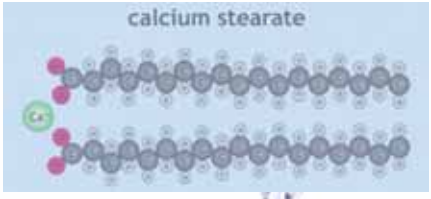
Advance E-magnetic water treatment is very old technology, and have been successfully practised from more than two decades in many European Countries, USA, UK with considerable water saving with economic and industrial benefit. The advanced magnetisation process has widespread use in almost every industrially developed country for various water related applications.

E-Magnetic Technology is very successful in the US, and many other countries, but fails in Indian environment. Several companies have started manufacturing magnetic units of varying designs but effectiveness often varied – with limited success. The reason is that the design was done without in depth research and geographical consideration. Also, devices which are designed without adequate data, leads towards failure. The success of the product is largely dependent on acceptance of the new advanced technology.





The type and quantity of liquefy and undecided matter contained in raw water be different, quality of raw water depends on the source, such as borewell, river, pond, canal or well, and notably from one geographical area to the next. The foremost suspended materials in water are silica, iron, calcium, magnesium, and sodium compounds. Metallic constituents occur in various combinations with bicarbonate, carbonate, sulphate and chloride radicals. In solution, the metal ions carry a positive charge (cations) and the bicarbonate, carbonate, sulphate, and chloride ions are negatively charged (anions). Scaling occurs when calcium or magnesium compounds in the water (hardness compounds) precipitate and adhere to the internal surfaces on the container.



When these suspended particles precipitate, however, they become neutral sludge, which can be flushed out of the system, in many cases by the normal movement of the solution.

Advance E Magnetic Water Treatment

The basic principle is that when water containing hardness is passed through the E-magnetic field, the electrochemical nature of the ions is changed so that precipitation occurs in a different way than is experienced with untreated water. This phenomenon has been scientifically investigated thoroughly throughout the world, and has been recognised for many years.

Areas of water consumption at dairy processing plants

Area of use	Consumption (L/kg product)	Percentage of total
Locker room	0.01–1.45	2%
Staff use	0.02–0.44	2%
Boiler	0.03–0.78	2%
Cold storage	0.03–0.78	2%
Receipt area	0.11–0.92	3%
Filling room	0.11–0.41	3%
Crate washer	0.18–0.75	4%
Cooling tower	0.20–1.8	5%
Cleaning	0.32–1.76	8%
Cheese room	0.06–20.89	13%
Utilities	0.56–4.39	16%
Products	2.21–9.44	40%
TOTAL		100%

(Courtesy Danish EPA, 1991)

Some specific applications

Smart building water systems

These applications include: building water systems, solar hot water systems, swimming pool, spa and hot tub systems, and boiler systems.

Boiler systems used in dairy and process industries

If all types of boilers are equipped with a E-magnetic system then successful elimination of scale formation and corrosion is possible, without the use of other chemicals for treatment. After E-magnetic treatment, boiler matter does not, when heated, produce a hard scale on the walls of the boiler or in heating pipes, but rather a loose sludge which settles to the bottom and can easily be removed, or flushed by a simple blow-down without acidic treatment.

Even one can obtain results with very polluted grades of water as there is reduced tendency towards scaling after the water has passed through the E-magnetic field.

E-Magnetic treatment is already widely used in boilers for all purposes. The advantages over conventional treatment are: that no chemicals are needed and no analysis of the water is required. The labour requirement is severely reduced as compared with the constant attention required by conventional dosing and ion-exchange plants.

Moreover cost-savings advantages with low boiler maintenance. Different types of boilers and installations will benefit in different areas and to different degrees depending upon their particular circumstances and functions.

Cooling towers and condensers and evaporators used in dairy industries

A cooling tower loses water all the way through evaporation (to attain cooling) and through drift let system (droplets passed away by wind and fan). Thus, water has to be added to compensate for the loss. Since all cooling water contains dissolved solids, unless previously removed, the evaporation will concentrate these dissolved solids in the cooling systems. High concentrations will result in scale formation in the heat exchanger and in the tower.

Heat Exchanger – A heat exchanger is a device that transfers heat between two media, while keeping them physically separated. Particularly In dairy refrigeration system it removes from the compressed refrigerant gas, the heat of compression and the heat absorbed by the refrigerant in the evaporator.

The refrigerant is hereby converted back into the liquid phase, so the heat exchanger is properly called a condenser. Deposits on tubes in a condenser cause a tremendous loss of heat transfer efficiency resulting in inefficient cooling of the refrigerant which in turn causes higher compressor head pressure. Higher head pressure will create a large increase in power consumption.

For Agriculture and Bore water

Why do you adopt this technology?

Only Reason is Reduce Water Wastage in all routine work.

1 Financially viable technology

Clients using E- magnetic cooling tower water treatment can manage with extremely minor operating resources because of:

- Low water consumption (reduced or no blow down)
- Energy savings (less power consumption)
- Drastically reduced maintenance
- Purchase of chemicals eliminated

2 Green eco friendly technology

- Environmentally clean cooling tower (no drain dumping cost and drastically reduced septic tank load).
- Fulfilment by means of local pollution agencies and pollution control board. Authorities are starting to prohibit the dumping of chemicals in the sewer system.
- Pollution control inspectors restrict to work unqualified personnel working with dangerous and toxic chemicals such as acids, chlorine, and chromates.

Wherever water or other natural fluids need to flow through industrial equipment and systems, magnets can prevent costly decay of components and improve the effectiveness and efficiency of system functions. Among these additional known and proven applications, are river and ocean-going vessels; pipes in the oil, coal and mining industries; flotation pulp for removing dust in pits, mines and ore concentrating plants; water for preparing cement; water softening systems; water purification in recycling of waste water.

Conclusion

Advance E-Water Technology lasts for many years when properly designed with proper Magnetronic System.

- Eco-Friendly & Energy Efficient and Easily Repairable Technology.
- Latest Technology based on your water Quality report.
- Green Point Rating can be obtaining in your premises.
- No Chemical or Salt or Resin Required.
- Fit and Forget - Zero % Maintenance.
- No Filter Replacement or Running Cost
- Device life more than 15 years
- Change any Parameters as per your Requirement and Applications.
- Reduce Lime scale & Corrosion & Rusting
  - Increase efficiency of all process industries
  - (Boilers, Heaters, Cooling towers, Chillers, Ice Plants, Heat Exchanger and many more.
- More Growth in Food crops & Agricultural Products up to 60-80%.
- Ideal For Poultry Farms and Cattle feed Owners.
- Improve water quality for bath make silky hair and skin, reduce soap consumption Detergents
- Protect Luxuries Bath Fittings and swimming pool.
- Ideal for Kitchen, Laundry and showers in Luxuries Hotels and Resorts. ■

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Mitsubishi Electric Reduces Its Carbon Footprint

According to Mitsubishi Electric Group's recently published environmental report, the group mostly achieved its targets for total CO_2 emissions generated by product use and manufacturing operations. How did they do that?

Mitsubishi Electric is one of the world's well known names in the manufacture and sales of electrical and electronic products and systems used in a broad range of fields and applications including HVAC&R systems. As an advocate of green technology, the company has been applying its technologies to contribute to society and daily life around the world.

Recently, it has released the Mitsubishi Electric Group's environmental report for the fiscal year that ended in March 2016, which documents that the group mostly achieved its targets for total carbon dioxide emissions generated by product use and manufacturing operations. Investment in environmental initiatives came to 5.1 billion Yen or approximately US$45 million during the reporting period.

The report reviews the operations of Mitsubishi Electric and its 112 Japan-based and 79 overseas affiliates, focusing on the group's efforts to reduce greenhouse gas emissions, expand recycling in society, enhance environmental awareness and strengthen environmental management. Also covered are efforts to meet targets and implement policies set under the Mitsubishi Electric Group's three-year environmental plan. Launched in April 2015 as the company's eighth three-year blueprint for environmental action, the plan is aligned with a long-term environmental vision that will culminate in 2021, Mitsubishi Electric's centenary.

Key Initiatives and Results

Greenhouse gas reduction from products and production: The group reduced total annual greenhouse gas emissions to 1.28 million tons, which was 120,000 tons lower than the target of 1.4 million tons. Non-carbon dioxide emissions were reduced by 240,000 tons on a carbon-dioxide-equivalent basis by reducing the use of hydrofluorocarbon in overseas factories – and improving sulfur hexafluoride recovery. Energy loss was reduced by 13,000 tons by replacing air conditioners, power generators and lighting in facilities, and by another 11,000 tons by installing and utilising energy-monitoring and control systems. Carbon dioxide emissions generated by 107 Mitsubishi Electric eco-products were reduced by 34% on average compared to fiscal 2001.

Recycling: The final-waste disposal rate was improved through enhanced waste sorting, the reselection of recycling partner companies, and more efficient logistic strategies. Affiliated companies outside of Japan achieved a 0.67%, well below the 0.8% target. Also, resource inputs were reduced to 39% of the fiscal 2001 level through the manufacture of lighter and more compact products.

Environmental awareness: Mitsubishi Electric attracted 4,700 participants, compared with a target of 3,500, to its nature-oriented public-awareness activities. Venues were expanded, new activities were added and the support of influential individuals and non-profitable organisations was secured. E-learning programs for environmental management were expanded to 98 affiliates worldwide, helping to foster greater environmental awareness in the Mitsubishi Electric ecosphere.

Environmental management: The environmental risks of 90 global factories were evaluated using an original index covering air pollution, water pollution, chemical substances, greenhouse gas emissions and waste disposal.

The activities of factories that scored highly were shared among factories worldwide to strengthening environmental management worldwide. ■

Optimising Building Performace

An existing energy guzzler and reciprocating chillers were replaced with two units of highly efficient YORK water cooled screw chillers...

India's Pushpawati Singhania Research Institute was in need of a retrofit solution as its current centralised air conditioning system was inefficient and incurring unnecessary costs. Johnson Controls led the project which cut electrical costs by more than 50% (equivalent to USD 70,000) and freed up space for future expansion.

The Story

Pushpawati Singhania Research Institute (PSRI) is South East Asia's first and India's foremost institute providing advanced and comprehensive medical and surgical treatment for digestion-related diseases, with core specialisation in the treatment of aliments related to liver, kidney, gall bladder, pancreas and gastro-intestinal tract systems.

Located in South Delhi, PSRI has become a leading knowledge centre with state-of-the-art medical facilities.

As the hospital sees many patients each day, it is paramount for it to maintain optimal humidity and temperature levels to create a comfortable indoor environment.

However, its old air conditioning system was unable to meet rising load conditions and was consuming 60 to 70% of the hospital's electricity.

Johnson Controls Maps Retrofit Plans

PSRI's initial system ran on six water-cooled reciprocating chillers with the capacity of 50 tons of refrigeration (TR) each, which provided an efficiency rate of 1.1kW/TR that was below expectations.

Johnson Controls swiftly performed an audit and presented a complete centralised air conditioning retrofit solution that would raise the efficiency of the system.

The team first consolidated real annual data to gauge for accurate energy consumption demands. They then compared the efficacy of the initial and proposed new systems based on current demands.

The total energy consumption of the old system was 1,049,272 units of electricity, while the estimated consumption of the proposed system was only 504,572 units of electricity – a reduction of more than 50%.

Creating an Optimised System for Enhanced Chiller Performance

The existing energy guzzler and reciprocating chillers were replaced with two units of highly efficient YORK water cooled screw chillers (model YRTDTCT0555C) with capacities of 200TR each.

Three 300TR cooling towers, primary and secondary chiller pumps, condenser water pump and main electrical panel were also installed. The previous chillers had a power factor of 0.75, which fell short of the 0.99

power factor needed in the hospital. More capacitor banks would need to be installed due to a low power factor. With the new system, the optimal power factor could be maintained with the help of one capacitor bank with a capacity of 100KVAR. To keep the cooling towers running at optimal conditions, the team recommended the use of hydrochloric acid to maintain the pH level of the water. Other measures to address scaling and corrosion control were also implemented.

Reaping the Benefits

PSRI recorded electrical savings of more than five lakh units within a year, equivalent to USD 70,000 (based on the tariff rate of USD 0.134). With such robust savings, the projected payback period was only 25 months. They could also enjoy a comfortable environment within the hospital for the benefit of both patients and doctors. During the retrofit project, the Johnson Controls team was sensitive to the needs of the customer and managed the installation works without disrupting the operations of the hospital.

"The installation work was successfully completed within 45 days - 15 days ahead of schedule," commented Debashis Kole, Chief Engineer, Pushpawati Singhania Research Institute. "Johnson Controls accommodated their working time to minimise disruptions to our hospital's operations. Where shutdown periods were required, the team scheduled for the tasks to be completed at night. We really appreciate the thoughtfulness shown."

Moreover, the hospital also recovered an estimated 450 square feet area previously occupied by the six old chillers. This freed-up area can be used to house new chillers powering up the new extension in the hospital, providing a single plant room serving two different buildings for ease of operations and maintenance. It can also potentially increase the parking space available within the hospital.

"It was a great experience working with Johnson Controls. We are satisfied with their commitment, workmanship and technical knowledge. I will definitely recommend Johnson Controls for professional services, and I look forward to continue working with them in future," Kole concluded.

Case Summary

Customer Challenges

- High energy consumption due to low efficiency of centralised AC System
- Maintain optimal level of comfort in hospital premises
- Optimise layout space within plant room for future expansion

The Solution

- Energy audit to identify appropriate system capacity
- Complete retrofit solution for centralized air conditioning system, including:
  - Two highly efficient YORK water cooled screw chillers (model YRTDTCT0555C)
  - Three cooling towers
  - Primary and secondary chiller pumps
  - Condenser water pump

Customer Benefits

- Reduction of energy consumption levels by more than 50%, resulting in energy savings of USD 70,000 per year
- Comfortable indoor environment for the hospital's patients
- Freed up 450 sq ft of space for future expansion. ■

Credits

Johnson Controls

Safeguarding Quality Of Horticultural Produce

It is unfortunate that India wastes more fruits than are consumed in the UK. Hence, it is necessary to have proper postharvest handling and wide market distribution system so that growers get remunerative prices and consumers pay less...

India has diverse agro-climate, and the country produces a wide range of fruits and vegetables. It is the 2nd largest producer of fruits and vegetables in the world and produces more than 250 million tones of horticultural produce surpassing the cereal production in the country. Owing to lack of production planning, post-harvest, infrastructure and climatic factors a huge accumulation of a particular fruit takes place in a particular region resulting in glut. Therefore, growers are forced to make distress sale, and a substantial quantity of the produce goes waste. It is unfortunate that India wastes more fruits than are consumed in the UK. Hence it is necessary to have proper postharvest handling and wide market distribution system, so that growers get remunerative prices and consumer pay less.

Horticultural crops play an important role in generating employment, improving economic conditions of the farmers and entrepreneurs and above all providing nutritional security to the people. Horticultural crops typically have a high moisture content, tender texture and high perishability

Figure 1: Harvesting tools and techniques...

and deteriorate rapidly, if not handled properly. Losses during post-harvest operations are enormous and it's a matter of great concern. The important sites where postharvest losses are noticed are farmers' fields, packaging areas, transportation, storages and wholesale or retail markets. Actual post-harvest losses of fruits and vegetables have been estimated to be as high as 25-40%. The major contributory factors for post-harvest losses of fruits and vegetables are:

- Lack of awareness about harvesting techniques for fruits and vegetables
- Improper packaging & transportation techniques
- Gaps in cold chain
- Insufficient cold storage capacity
- Unavailability of cold storages in close proximity to farms
- Poor marketing infrastructure etc.

This results in instability in prices, farmers not getting remunerative prices, rural impoverishment resulting in farmers' frustrations and suicides.

Adequate postharvest handling of produce will result in a product with better appearance and shelf life and thus better price. The knowledge and practical approach of postharvest management of horticultural produce offers good opportunities for entrepreneurship and employment generation especially for rural youth and women.

Importance

Postharvest technology plays an important role not only in minimising the postharvest losses but also maintains the quality and regulates the marketing of horticultural produce. Importance of post-harvest technology lies in the fact that it has the capability to meet food requirement of growing population by eliminating losses from farm to consumers. The farmer whose role has been reduced to producer can be transformed into producer cum processor and thus getting more dividends for hard labour, input, kind of risk taken and generating resource for socio-economic advancement keeping pace with the modern times. The use of some of the techniques like sorting, grading, packaging and storage leads to value addition of horticultural crops and income generation. In this article, some useful technical guidelines have been discussed for proper postharvest management of horticultural produce.

Technical Aspects

Harvesting:

Growers often do not understand the effect of harvesting and handling on the quality of produce. Ideally, harvesting should take place when the crop and climate is cool and plant has highest moisture content. The shelf life of the crop and its suitability for long term storage is affected by the maturity of the crop at harvest. The optimum harvesting stage for most crops depends not only on the climate and market distance but also on growing conditions. After investigating the market distance, the harvesting of produce should be decided. Harvesting of fruits at immature stage or over mature stage leads to loss of quality. It is imperative that fruits should be harvested at proper stage of maturity with no physical damage or bruise. The fruits should be harvested with clippers or scateurs and they should not be harvested by pulling, which leads to injury in the stem end (Figure 1). However, the vegetables can be harvested with hands but gentle picking will help to reduce crop losses.

Grading:

Produce brought to many markets often has variable characteristics and sometimes it may be delivered immature or contain shriveled, damaged and rotten materials. Delivering such produce generally results in lower prices. Grading helps to develop greater confidence between buyers and growers. Systematic grading is pre-requisite for efficient marketing of fruits and vegetables. The bruised, damaged and mis-shapen produce should be sorted out and healthy fruits or vegetables should be graded according to their size, weight, shape, colour, maturity etc. The graded produce fetches better price in the market. The fruits or vegetables can be graded in extra fancy, superior and standard grades or class I, II and III, respectively. Grades and standards are extremely important for earning good income.

Grading can be done by hands or using machinery at packhouse. Rural women can be trained for performing sorting and grading operations of horticultural produce at farm level (Figure 2). Grading is sometimes carried out on the farm ground under the shade of tree. This is an unhygienic practice. The sorting and grading of produce should be carried out in shed/pack house having grading tables, knives and packaging materials etc.

Figure 2: Sorting and grading of fruits and vegetables...

Figure 3: Farm level packhouse...

Figure 4: Mechanical Waxing of kinnow fruits...

Precooling:

The produce should be kept in shade immediately after harvesting. It is essential to remove field heat of the harvested produce in order to extend their shelf life. The temperature of the fruits at harvest is close to that of ambient air and could be as high as 40°C particularly during summer season. At this temperature, the respiration of produce is extremely high and storage life is short. It is often a good practice to harvest the fruits early in the morning to take advantage of lower temperature. Various methods like room cooling, forced air cooling, hydro-cooling are used depending on the type of fruit or vegetables to be pre-cooled. However, at farm level the farmers can pre-cool their produce under shade of trees. Farmers can also make a low cost pack house at their farms for holding the fruits or vegetables (Figure 3).

Waxing (Food grade):

The post-harvest losses of fruits can be reduced to some extent by use of various food grade waxes. Certain edible coatings like shellac, carnauba and bees-was approved by PFA also help to improve the shelf life of fruits and vegetables. The waxing of fruits can be done manually or through mechanical waxing machines (Figure 4).

Methodology for manual waxing (For small scale):

- Select diseased and bruise free fruits
- Clean the fruits with the help of moist soft cloth
- Allow the fruit to dry under shade
- Drench a piece of foam pad with wax coating and apply it on fruit surface gently
- Allow the fruit to dry under shade
- Pack the fruits in plastic crates or corrugated fibre board boxes.

Packaging:

The main functions of packaging are to help prevent mechanical damage and enhance the attractiveness of the produce. Proper packing of produce will ensure safe transportation from the farm to the storage and consumer centre, while reducing the damage during transportation. The produce should be packed in such a way that they do not collide with each other during transportation.

Bulk packaging:

A wide variety of containers such as wooden boxes, plastic crates, and corrugated fibre board boxes are important package used in the transportation and distribution of fruits in most of the developing countries.

All the packages must have some amount of ventilation in order to prevent physiological break down.

Corrugated Fiberboard Boxes (CFB) are comparatively new and making significant entry into this field.

These have many advantages such as light in weight, cause much less damage to the fruits, easy to handle and print and improve product image. Plastic crates can also be used successfully for bulk packaging of produce (Figure 5).

Consumer packaging:

The fruits or vegetables can be packed in consumer packs of half kg to two kg polythene bags or plastic net bags for direct distribution to consumers in the retail markets.

Some fruits and vegetables like cauliflower, cabbage, kinnow, tomato, capsicum etc., can be successfully wrapped in shrink or cling films for retail marketing (figure 6).

Storage:

The primary purpose of storage is to control the rate of respiration, transpiration, ripening and also undesirable biochemical changes and disease infection.

Proper temperature management can be very effective tool in ensuring that produce remains in good condition through out the storage and transportation.

It may be necessary to seek expert guidance whether long term storage could significantly increase farmers' income. The storage conditions for different fruits are given in Table 1.

Marketing:

It is quite apparent that marketing plays a key role in the postharvest operation of fruit. Marketing of perishable fruits presents more problems as compared to other durable agricultural commodities.

Due to the presence of middleman, the price of the fruits is 50-100% higher in mandis than growing areas. The producers have to sell their produce at throw away prices and consumers have to purchase it at high prices.

The cooperatives can play a very important role in the marketing of fresh fruits. HPMC in Himachal Pradesh is a successful attempt, which has become landmark for apple industry in India.

National Dairy Development Board has also established outlets for fresh fruits and vegetables in New Delhi.

Concept of Apni Mandi is another good example, where producers sell their produce directly to consumers without chain of commission agents.

Figure 5: Bulk packaging of fruits and vegetables in CFB boxed and plastic crates...



Figure 6: Shrink packaging of kinnow, tomato & capsicum...

Table 1: Recommended storage conditions for fruits and vegetables

Name of Commodity	Temp(°C)	RH (%)	Approximate Shelf-Life
Apple	0-2	90-95	1-6 months
Asian pear	0-2	90-95	2 months
Grape	0-2	90-95	2 months
Guava	6-10	90-95	2-3 weeks
Lemon	10-13	85-90	1-6 months
Mandarin (Kinnow)	5-6	90-95	2 months
Mango	13-15	85-90	2-4 weeks
Papaya	7-13	90-95	1-3 weeks
Peach	0-1	90-95	2-4 weeks
Plum and prunes	0-1	90-95	2-4 weeks
Cabbage	0-1	90-95	2-3 months
Carrots (topped)	0-1	90-95	3-6 months
Cauliflower	0-1	90-95	3-4 weeks
Cucumber	10-11	85-90	10-14 days
Eggplant	10-12	90-95	1-3 weeks
Okra	7-10	90-95	7-10 days
Peppers	7-10	90-95	2-3 weeks
Tomato	10-13	90-95	1-3 weeks
Potato (seed)	0-1	90-95	5-6 months
Onion	0-1	65-70	4-5 months
Garlic	0-1	65-70	5-6 months

Conclusion

The postharvest losses of horticultural crops are enormous, and it is a serious threat for the horticulture industry. It is estimated that postharvest losses of fruits and vegetables occur to the tune of 25-40% amounting to Rs 50-60 thousand crores. However, these losses can be avoided to some extent, if the produce is handled with great care after harvest. The properly harvested, graded and packed fruits and vegetables have good market potential, because now-a-days consumers are becoming quality conscious and believe in hygiene and food safety. Grading and packing are important in adding value to a product.These practices not only help in reducing the losses but also farmers and traders can get better price for their produce. ■

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Bio Chillers

A Fortunate Thing *for* Rural Development

Without cooling capabilities the dairy products have to be sold immediately after taking form animals. This reduces the chance of negotiating good prices, because the buyer is in a better bargaining position...

In the current situation the energy demand is increasing with increasing in the population. Energy is the crucial input to the development of any country. The International Institute of Refrigeration in Paris (IIF/IIR) has estimated that approximately 15% of all the electricity produced in the whole world is employed for refrigeration and air-conditioning processes.

In a tropical country, like India, refrigeration is most widely used and generally the most energy consuming process. In general, refrigeration is defined as any process of heat removal from a place for preserving foods and medicines by enhancing their shelf life.

Farmers mostly dairy farmers who sell their products to export markets, refrigeration could play an important role to increase their annual income. Without cooling capabilities the dairy products have to be sold immediately after taking form animals. This reduces the chance of negotiating good prices, because the buyer is in a better bargaining position. Particularly in these sectors, farmers have the potential to produce a lot of biogas through available cattle dung. Biogas based refrigeration technology would be a good opportunity for such farmers to take maximum benefits.

Bio-chilling system

Cooling effect is produced by the evaporation of a refrigerant. Heat is used in different ways to operate a refrigerator system for evaporating the refrigerant in the cycle. Biomass energy is a good source, especially for agro-based rural areas where a lot of organic materials are being wasted. Extraction of bio energy with carbon neutral process is possible. As regular hike in the conventional fuel prices like LPG and CNG, biogas serves a good source of fuel for refrigerators. Bio-chilling denotes that heat is produced through any conversion process of biomass such as biogas, producer gas etc., to operate a refrigeration cycle. Biogas refrigeration technology can be classified into mainly two categories: electrical refrigeration and thermal refrigeration.

Kim *et. al.* (2008) & Hwang *et. al.* (2011) have provided with a broad overview of the various technologies available to use non-conventional energy for refrigeration purposes, which include electric, thermo-mechanical, sorption and some newly emerging technologies. They have also compared the potential of these different technologies in delivering competitive sustainable solutions.

A bio-electric refrigeration system consists mainly of electric generator and a compressor-based refrigeration unit. Biogas is used as fuel to generate electricity. The biggest advantage of using bio-generator for refrigeration is the ease of operation, and high overall efficiency when combined with a conventional vapour compression system. Winrock International, Pakistan installed a biogas based vapour compressor milk chilling unit during the year 2012-13. They installed 4 biogas plants: two plants of 50m^3 and two plants of 100m^3. The milk chillers run on electricity with capacity of 500 litres and 1000 litres for eight hour. But high initial investment is the major issue for the development of this technology.

Bio-thermal refrigeration system uses heat produced from burning of biogas. Based on sorption principle, this type of system uses physical or chemical attraction between a pair of substances to produce refrigeration effect. A sorption system has a unique capability of transforming thermal energy directly into cooling power. Among the pair of substances, the substance with lower boiling temperature is called sorbate and the other is called sorbent. The sorbate plays the role of refrigerant. This category is further classified into two streams as absorption systems and adsorption systems.

Room for the research

A few designs of absorption refrigeration system are commercially available which operates on conventional fuels. However, there appears to be a lack of products specifically designed to operate on biogas. There is a simple way of using biogas for refrigeration is by adapting commercial absorption refrigerators.

In this situation, the burner in the refrigerator needs to be modified in order to deal with the safe and controlled combustion of biogas with its impurities and the varying levels of methane content. Without modification, chances of components failure are more. Remote ignition via a piezoelectric element substantially increases the ease of operation.

Apart from the physical modification, energy analysis will also play an important role in the further modification towards energetic optimisation. In this regard, an evaluation based on first law and second law of thermodynamic gives result in point energy loss and identify the reversibility that lead to energy destruction. The second law analysis recognises that heat energy has a lower availability than work energy.

Biogas-based Absorption refrigeration system

Vapour Absorption Refrigeration Systems (VARS) belong to the class of vapour cycles. The absorption refrigeration cycle consist of a generator, condenser, evaporator, absorber, expansion valve and pump

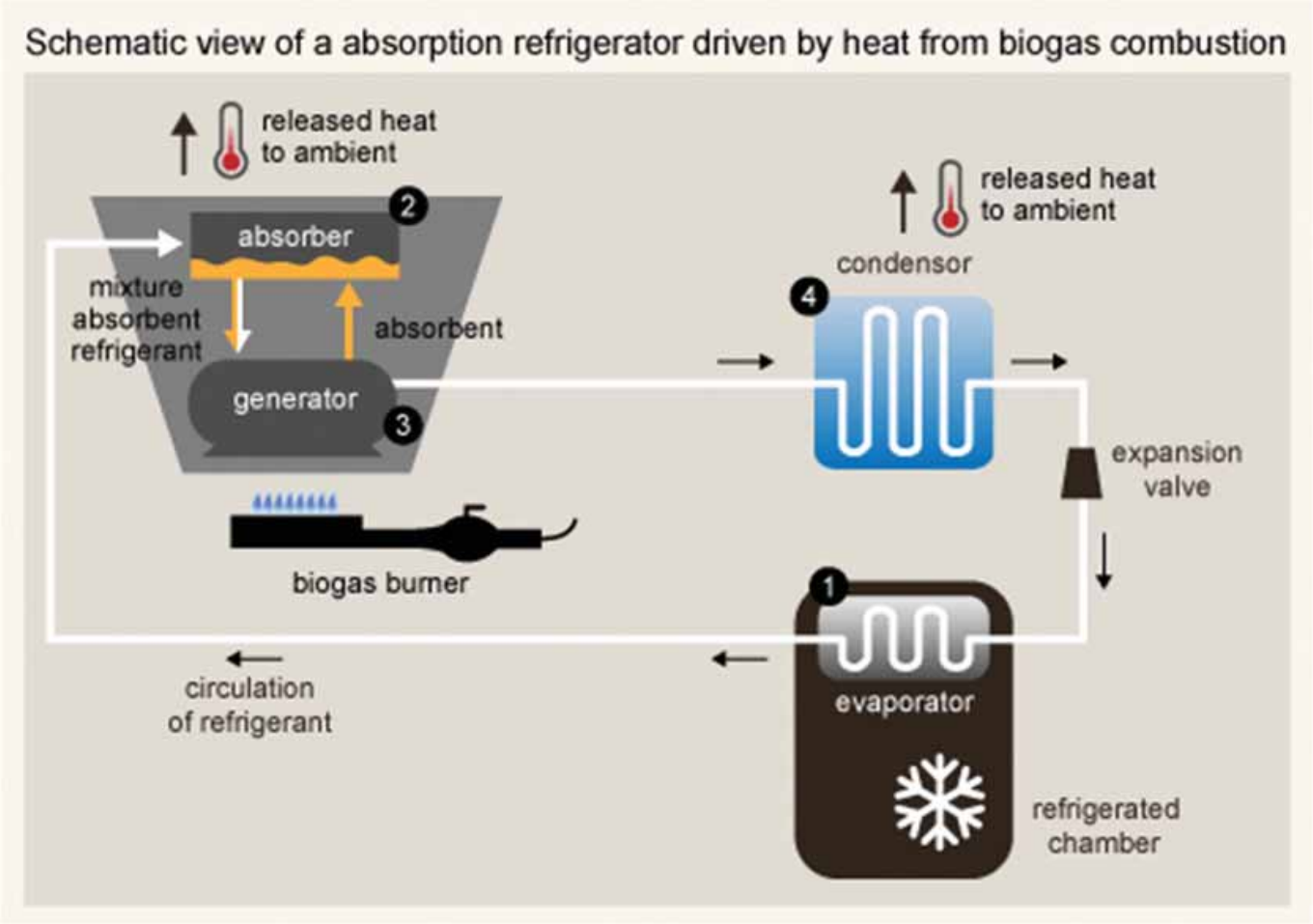

Image Courtesy: www.wisions.net

Fig. 1: Schematic view of biogas based absorption refrigeration system...

as shown in Figure 1. During one cycle the refrigerant passes through four main stages:

- In the evaporator, the fluid refrigerant evaporates by extracting heat from the product or room being refrigerated.
- The evaporated refrigerant flows into the absorber where it mixes with the secondary fluid.
- The resulting solution is then driven into the generator, where it is heated. This heat causes the refrigerant to vaporise.
- The resulting vapour passes into the condenser, where it returns to liquid state and is ready to start a new cycle.

Srikhirin *et.al.* discussed various designs of vapour absorption refrigeration system. Rao *et.al.* studied the thermodynamic simulation and analysis the biogas operated double effect ammonia water based GAX absorption refrigeration system. A computer code was developed for computing the effect of temperature and pressure of the high temperature generator and the pressure of the evaporator over the COP for a constant condenser and absorber temperature. It was suggested that biogas can be used to operate the absorption cycle.

It is estimated that one kerosene refrigerator emits between 900 kg CO_2 per year. Biogas based refrigeration can replace conventional refrigerators and offers a sustainable solution for cooling using renewable energy.

Conclusion

There are some commercial products available based on heat driven refrigeration processes. The basic principles of heat driven refrigeration have long been known but the market for heat driven cooling is still small. Technologies for generating cold from biogas seem to be an innovation field with significant potential. Harnessing this potential would require serious effort in terms of research, development and bringing the technology to market.

Key areas to focus in order to improve the overall performance of heat driven refrigerators are efficiency improvements of the different systems and the possibility of the joint operation of various refrigeration cycles. Modification ensures user-friendly operation and maintenance. In the case of users, who can produce their own biogas, switching to biogas can result in economic benefits in the medium term, due to the savings made in fuel costs. However, there are currently too few biogas refrigerators in use to provide concrete figures.

The gas demand for refrigeration varies depending on the outside temperature. A 100 litres volume refrigeration system needs about 2000 litres of biogas per day to down the temperature from ambient to five degree Celsius. A large household refrigerator consumes about 3000 litres of biogas per day. ■

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Let ACs + Business Bloom

Spring is right time for HVAC cleaning, we have seen in my Feb article, about deep coil cleaning, let us follow the same footsteps of cleaning coils, make coils as good as brand new shiny fins, so that maximum Heat Exchange takes place...

Indian summers are nowadays very different from earlier ones. In summer, we see so many incidents of AC failure, compressor blast, injuries of various types to technicians when working on units... Sometimes even the brand new, just installed, Air Conditioning unit fails to cool.

So let us see, how to bring the best out of working ACs. New air conditioning units are more coil compact, with fine fins, more fins / inch, slit fins etc, making them most difficult to clean, but with technology and professional equipment, you can make them a cake walk to success!

Spring is the right time for Heating Ventilation & Air Conditioning (HVAC) systems' cleaning. We have seen about deep coil cleaning, in my February article.

Let us follow the same footsteps of cleaning coils, make coils as good as brand new shiny fins, so that maximum Heat Exchange takes place.

Useful Tips for Spring Cleaning

- Use professional pumps for coil cleaning, for normal window, split, etc 2-3 row coil, work with low pressure, say max 30-35 bar pressure unit with max approx.3- ltrs / minute water flow! Small gun helps to work in tight area, and various additional accessories available with professional pump will make cleaning an easy way to success.
- Cleaning with professional pump & effective coil cleaners will instantly improve unit cooling efficiency and reduce power consumption, which is measurable by Amp meter. Pl. make note of Amp meter reading before and after cleaning. For more data, also check CFM and Temp. Reading at the coils, before and after cleaning.
- Ensure right coil cleaners being used, avoid Caustic at all cost, 90% of cleaning is possible with aerosol type pressure of plain water from professional pump, chemical required only in cases, where, oil, grease, solvents, bio growth (on cooling coil), corrosive deposits etc., are found on coil. Avoid air blower cleaning, they are useless, but just spreads contamination from one place to other, hardly 30-50% dust comes out, sometimes it blows deeper in the coil, thereby reducing cooling efficiency.
- Spring cleaning leads to max / original cooling effect, reduces compressor working load, and compressor failures also can be reduced to greater extent (possibly up to 75% of compressor failures can be reduced, except for other technical reasons that cause variations from site to site).
- Units facing sea side, saline environments, requires continuous (monthly/ bi-monthly, or as per site demand) cleaning during monsoon and especially after monsoon period. Or else salts melt when sun shines brightly leading to fins corrosion and its decay.
- Cleaning of salts with plain water only is essential, clean for longer duration, do not get fooled by seeing coil clean in short time, as salt melts in water and make thin coating, which can be seen later, when fins surface dries up. So, take more time for cleaning.
- Clean coils' bottom area with longer duration, as all contamination, exit from this area, and ensure nothing is left inside the coil area.
- R&D labs, Saris, Dress Material show rooms, Beauty parlor, Pathology labs, Kitchen area and its adjacent area coils need much frequent cleaning, than other areas.
- Condenser coils located near kitchen ducts need degreaser chemical cleaning.
- DG radiator sets need water base solvent coil cleaners, for effective cleaning, as acid / alkali coil cleaners can have corrosive effect on copper coils, brazing joints.
- Coils during installation, if those are coated with special chemicals:
  - will reduce cleaning frequency
  - cooling coils turn to 'self cleaning coils'
  - Condenser coils fins have better corrosion resistant effect
  - All future cleanings are with aerosol type plain water jet pressure only
  - Cooling efficiency is constant for 4-6-8 + rows coils, as condensate water sweeps away contamination continuously, on slippery fins surface. Such coils coating does not affect heat transfer efficiency of the coils, if professional coatings are used.
  - Fins coating can be done for deep coils on new / old coils, by professional help.

Effective Spring Cleaning leads to loyal customer base, which grows on mouth publicity by clients, base itself, which is the best certificate in present competitive scenario.

Learn the trade, not tricks of the trade!!

Happy Spring Cleaning!

Mahesh Mehta
EcoChemPlus, Mumbai

WAKE UP & SMELL THE COFFEE

Trying to clear a grease trap by pumping will not prevent the built up of Fats, Oils and Greases (FOGs) in the drain line. A system like BioAmp delivers active, naturally occurring bacteria directly to break down FOGs and other organic wastes – clearing blockages and eliminating odours...

We have all opened that questionable bottle of milk at one point or another for the smell test and there's no clearer example of how important smell is when it comes to food. Foul odours and other problems caused by poor wastewater management can result in an array of problems for food and beverage production businesses, as Mario Kelly, VP of the Wastewater Innovation Platform at global water, energy and maintenance solutions provider, NCH Europe, explains.

Did you know that around 80% of the flavours we taste are a result of smell? That's why food doesn't really taste of anything when you have a cold. Our sense of smell is also programmed to keep us safe by identifying the scent of rotting food produce and telling us to steer clear.

So, imagine you're showing a potential client around your food processing plant and they keep picking up an aroma of 'gone off' food stuffs. You know it's not your produce – but they don't. Although, even if they did know that the smell was resulting from organic particulates decomposing inside your grease traps and drains it can be enough to stop them making a purchase.

Poor effluent management can have a variety of negative ramifications for food and beverage manufacturers, including bad odours, blockages, increased costs and possible fines. Given the amount of sugars, fats, gums, milk, proteins and particles of food making their way into wastewater systems, it's hardly surprising that there are challenges to overcome.

All these contaminants, along with high levels of biochemical oxygen demand, cause blockages, foul odours and overloads at wastewater plants. These things cost businesses money as a result of both plant downtime, charges and fines from government or local authorities.

Many common solutions to these issues don't really help. For instance, trying to clear a grease trap by pumping will not prevent the built up of Fats, Oils and Greases (FOGs) in the drain line. In addition, many biological products used to tackle effluent are dormant, meaning they require many hours to become active; others simply liquefy the waste and move the problem on.

Image Courtesy: NCH (UK) Ltd.

This problem is becoming so prevalent that governments and local authorities are introducing stringent requirements regarding waste emitted by businesses into municipal sewers. This is due to the high levels of FOGs and dangerous chemical build up in sewers that cost local authorities a lot of money to remove before they cause damage to the environment.

However, all of these issues can be addressed easily with a system like BioAmp from NCH Europe. This computer controlled microbial fermentation unit, installed onsite, delivers active, naturally occurring bacteria directly into drains, grease traps and lift stations. The naturally occurring bacteria begin working immediately to break down FOGs and other organic wastes – clearing blockages and eliminating odours.

The system is automatically controlled, using the latest PLC technology and thanks to a GSM connection – key functions can be controlled remotely.

The FreeFlow bacteria has full National Sanitation Foundation (NSF) approval for use in and around food processing areas. By using an environmentally friendly answer to effluent management, food and beverage manufacturers can save money, reduce charges, avoid fines, stop blockages and eliminate the bad smell left by inefficient alternatives. It's time to wake up and smell the coffee – not the wastewater... ■

We are moving...

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Sheetal Sutra

An office building at Nashik, Maharastra, India...
It has no Air Conditioning, Evaporative Cooling, or Exhaust Fans. However, all the occupants remain comfortable because the temperatures of the walls, floor and ceiling are 30-31 Deg. C...

This article investigates the underlying causes of the high cost of providing thermal comfort in modern built environments in India...

Air conditioning energy costs are fast rising to unsustainable levels. Electricity demand for ACR averages 30% to 50% of the total energy budget of air-conditioned buildings. Skyrocketing energy cost has made air conditioning unaffordable for domestic users who cannot write it off as business expense. It has increased overhead costs of commercial users and production costs of industrial users to a level that makes them lose their competitive edge while facing global challenges. This article proposes a new formula that can reduce those energy bills substantially by reducing or eliminating air conditioning altogether.

Lowering The Energy Bills

Much has been written about increasing the energy efficiency of the HVAC system that pumps out the solar and internal heat from the building. This article is about draining it out. Draining requires no energy, pumping uses that.

The method described is rooted in our Indian heritage, but it does not involve khus screens or desert coolers. As a matter of fact the first known desert cooler in India was called the "Thermantidote." A

British engineer built it for the Jaipur royal family. It is still in the City Palace museum, albeit in the storeroom.

Before talking about the solutions, let us understand the problem.

The Problem

The problem is: thermal comfort in India is equated with air conditioning as its only stand alone solution. So far, every HVAC professional mechanically calculates the various heat gains into the building, either manually or by computers. A system is selected, tendered and installed, that will adequately meet the load.

The main villain is that the designers, comprising the consultants, the sales engineers and the premises officers, fail to realise that we are applying, mindlessly, an energy hungry cooling technology born in a country where the buildings are insulated, the summers are mild and energy is cheap. Here the houses are bare, summers are sweltering and energy is not only very expensive, but also unreliable.

So it is case of a right formula applied to a wrong problem. It is like walking down a Delhi street in a woolen suit, overcoat and a Bowler hat! It is proper in London but not here.

A Whole New Ball Game

For example, a couple sleeping in a bedroom at night will generate only about 300 watts of metabolic heat. The heat load form will not show any other significant load. A one- ton air conditioner removes more than 3000 watts of energy from the room. Thus, in a 10- hour session, the compressor should work for a total of one hour only, and the monthly energy use should be less than 50 kWh. We know that it is much more. So, where is the extra load? Of course it is the stored solar gain.

This example also establishes that all direct solar heat reaches the interior through, and only through, the structure. Even the sunlight coming through a window falls on the floor or the wall and is absorbed there.

Also that all heat gains other than people, lights, fresh air and equipment are solar in origin and that solar loads are very heavy in India as compared to USA and Europe. Thus, providing thermal comfort in India is a whole new ball game.

Herein lies one solution to our problem. If we could, somehow, keep the structure cool without using energy, then we would achieve a major reduction in our energy bill. The answer is in our heritage.

Our Heritage Has The Answer

Our master builders of yore had learnt from nature to develop zero energy techniques that used mass to store heat, and flowing water or air to drain it out, thus keep masterpieces like the Gol Gumbaz and the Taj Mahal cool throughout the long hot Indian summers.

The former, having 10- foot thick walls and measuring 100 feet square topped by a massive dome, depends on its enormous mass to absorb the solar load while maintaining its 18,000 odd square feet of its interior quite cool. Its exterior finish contains the mineral barite that is plentiful in that area, and has an emissivity of 0.95 in the infrared region. This allows re-radiation to the sky mostly during the night.

The Taj Mahal is a massive building that sits on an equally massive podium measuring 325- feet square, 15 feet above ground and perhaps the same below.

Their combined mass is tens of thousands of tons and can absorb an enormous amount of heat before its temperature rises by just one degree.

The Yamuna River flowing next to it has near zero degree water all winter long. During that time, the whole massive podium cools down by a majestic heat transfer process and it turns into a heat sink for the superstructure, which gets additional cooling by rain water during the monsoon and by cold air during the winter.

The heat absorbing capacity thus created is so large that by the time the building warms up, the summer has gone. This is the Sheetal Sutra or the Natural Cooling Principle.

Sheetal Sutra Runs Throughout Our History

We find a continuum in the use of the same concept in lake palaces, temple/mosque complexes, royal residences etc. while searching our cultural history through ancient India. We could go past Mahabharata, where Duryodhan had fallen into a pool inside the Pandava palace, all the way back to the caves.

Here we Homo Sapiens-Sapiens have lived for over forty thousand years. The caves are cooled by mountain streams, while the soil layer, with its trees, reduces solar heating. The mass of the mountain stabilises the inside temperature.

Thus, conditions inside a cave are identified as a primary natural standard for human comfort. Radiant cooling of the human body by the cave walls is established as an important and necessary element for providing thermal comfort.

Emulating the caves, our ancestors put massive buildings on massive bases, and provided a thermal path to a water body.

Those of us who have visited a heritage building, or even the ancestral family home, know that this technique provides thermal comfort at zero energy cost.

The reason why these buildings are comfortable is that the entire structure cools down to a temperature that is several degrees below that of the human skin.

The reason why they consume little or no energy is because the heat is drained out to a low temperature sink in the form of an open water body.

Anyone who has drunk water out of an earthenware jar knows how cool it is, particularly early in the morning.

By contrast, air conditioning has to pump the heat out of the air to higher temperature ambient air. This requires oodles of energy.

If used in an air-conditioned building, the heritage technique would reduce solar load by a good amount and would also shave the peak. It would mean a smaller plant and lower energy consumption. The question was how it could be implemented in modern times.

Modern Technology

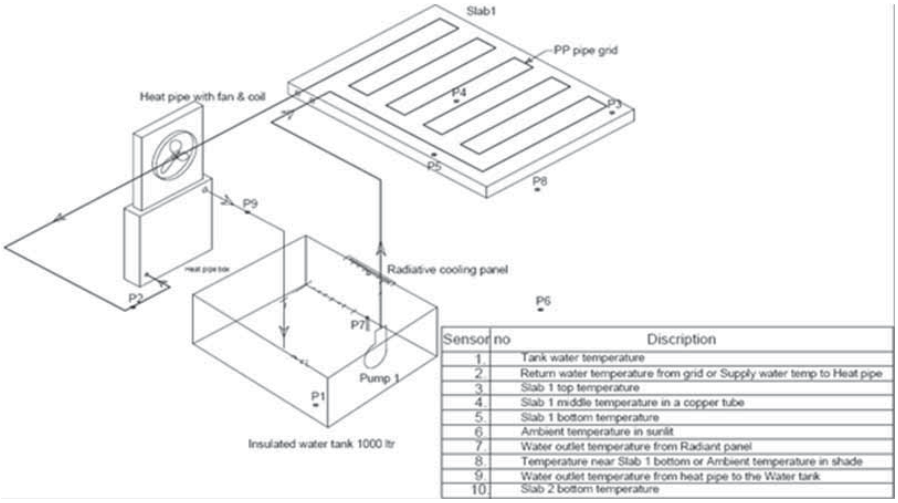
Things change. There are more people in Mumbai today than there were in the entire known world 2000 years ago. Space constraints and economics have forced us to live in crowded localities where massive buildings and water bodies are no longer practical. While this has spurred the growth of the AC&R industry, we no longer have cheap, abundant power to feed this energy hungry technology. An inescapable conclusion that emerges is that air conditioning is a right technology used in a wrong way and on a wrong day. It must be used like a cake- as dessert after a meal, not the meal itself. By using new technologies not known to our ancestors, the following idea adapts our heritage technique to modern times:

Modern Sheetal Sutra

Use barriers to reduce solar gains; absorb and drain out heat from the structure; then use air conditioning to pump out the balance load, if any, by cooling the air.

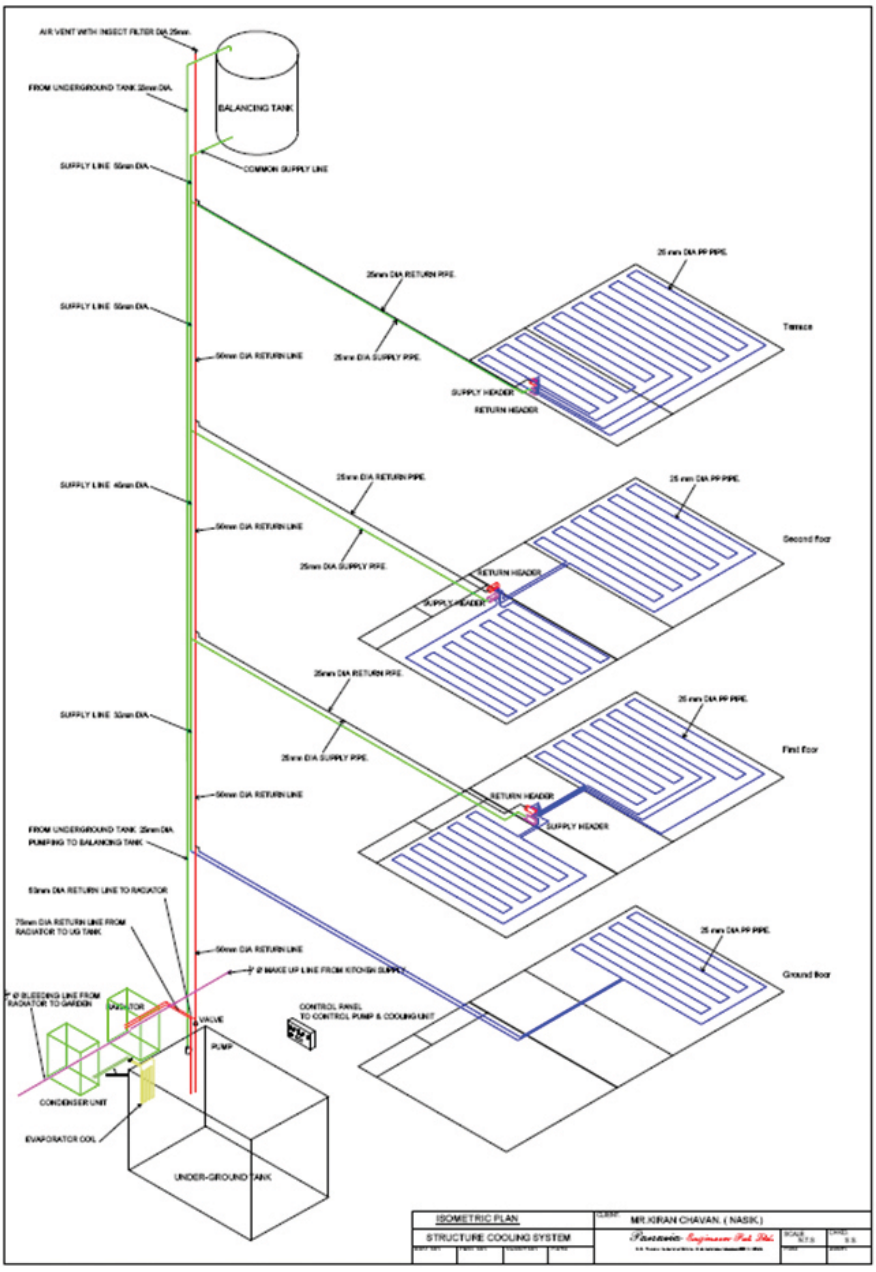
EASIER SAID THAN DONE: Many innovative solutions were tried, The first trial was a coir mat laid on the roof and wetted by a sprinkler. But dust, mosquitoes and water leaks ended that. Then welded iron pipes with water under vacuum were tried, It needed skilled welders at site and the pipes were prone to rust.

THE GAME CHANGER: The final solution was a game changer. A plastic tube was laid on a cured concrete slab and was covered by screed. Water flowing through it picked up the solar heat and was sent to a radiator, where most of the heat was dumped into the air. Lukewarm water returned to the tank, this was recycled through the radiator during the night and was cooled to the morning ambient temperature and the cycle began again. There

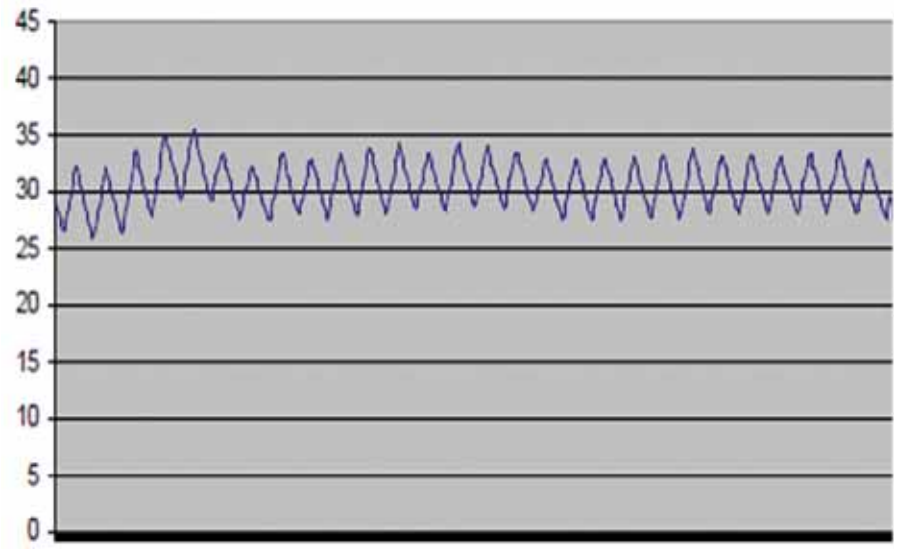


Sensor no	Discription
1	Tank water temperature
2	Return water temperature from grid or Supply water temp to Heat pipe
3	Slab 1 top temperature
4	Slab 1 middle temperature in a copper tube
5	Slab 1 bottom temperature
6	Ambient temperature in sunlit
7	Water outlet temperature from Radiant panel
8	Temperature near Slab 1 bottom or Ambient temperature in shade
9	Water outlet temperature from heat pipe to the Water tank
10	Slab 2 bottom temperature

THE BASIC SYSTEM



The cooling system was a bit more complex than the basic model...



Predicted temperature profile using a simulation software...

was no loss of water, and the little energy needed for the pump and the fan was supplied by a PV panel. That is all there is to it!

Conclusion

Our ancestors did not have the technologies of plastics, pumping or thermodynamics except perhaps in rudiments. Of course they did not have electricity. By infusing these into their technique of structure cooling, We were able to keep the occupants comfortable without air conditioning, air cooling or even a mechanical ventilation system.

Therefore, providing thermal comfort in India is a Whole New Ball Game! We are not promoting rocket science. It is very simple and is easily replicable by anyone with minimal technical training, using Indian materials and non patented published data.

The Game Changer building was a result of close cooperation between the Clients, the Architects and the Contractors.

It is hoped that many more such teams, the green NGOs, Architecture and Engineering Colleges and the Government will take notice, wake up and start a mass movement that will strike a big blow for the environment.

This is not an isolated example. There are many more installations around us at many parts of the country. ■

Surendra Himatlal Shah
BE Mechanical Engg,
Clemson University, USA
Founder & Owner of
Panasia Engineers Pvt Ltd

Buried Piping Applications

Mechanical couplings can be directly buried following the same guidelines as welded and split sleeve systems...

Pipe joining remains a critical area where choice of method can have a great impact on a project...

Grooved mechanical piping systems can offer advantages for buried pipework that make them a superior choice to alternative joining techniques like welding and flanging. Direct buried piping systems were one of the original applications for mechanical couplings – and they have been incorporated successfully in buried services for over 95 years.

Simon Ouellette, Engineering Manager at Victaulic, explains why mechanical joints are increasingly popular today for buried piping applications.

Joint selection

Unpredictable conditions can make the outdoor installation of pipework more difficult. A full range of pipe-joining solutions can be used in buried piping – including welding, flanging and mechanical grooved systems – and these all offer different performance benefits and disadvantages.

While the age of techniques varies considerably – flanging was employed by the Romans and mechanical pipe joining is a relatively recent 20th Century development – pipe joining remains a critical area where choice of method can have a great impact on a project. Skill levels and ease and speed of operations are key factors that determine not only installation costs but also maintenance costs over time.

A traditional welded system requires highly-skilled workers and is labour intensive. To install and repair welded piping systems, workers have to cut out a damaged pipe section, which is time consuming, can cause operational concerns and safety hazards.

In a traditional flanged system, multiple bolts are needed to create a joint and adding and removing these bolts is a time-consuming process, as this must be done manually and there must be space around the joint for this operation to take place. For example, a 12-inch flange joint requires 12 bolts to be added or removed.

Advantage grooved

With mechanical pipe joints, typically only two bolts need to be removed to access the system, allowing more time-efficient maintenance procedures. Additionally, unlike a flanged joint, a two-bolt coupling can be 'free floated' around the pipe for quick alignment adjustment and easy access. Mechanical pipe joining systems also require fewer installation man-hours than alternative methods.

Grooved mechanical pipe joining is a no-flame joining technique of forming or cutting a groove in pipe ends and then joining them with bolted housings around a sealed gasket. Since being made commercially available in 1919 by Victaulic it has become a preferred joining method on many piping applications when compared with welding, threading and flanging, and is commonly used in water systems technology projects.

A mechanical joint is comprised of four elements: grooved pipe, a gasket, coupling housings, and a pair of nuts and bolts. The pipe groove is made by cold forming or machining a groove into the end of a pipe. The key section of the coupling housings engage the groove and the bolts and nuts are tightened with a socket wrench or impact wrench and hold the housings together. The coupling housings engage in the groove around the circumference of the pipe and encase the gasket. A pressure responsive gasket then creates a seal unified joint that is enhanced when the system is pressurised.

For engineers, the benefits of the grooved system are many: the design versatility of the joint can allow both rigidity and flexibility throughout a system when necessary; a mechanical joint provides noise and vibration attenuation, seismic relief, and accommodates for thermal expansion and contraction.

Added to these benefits, the system provides a union at every joint for ease of system maintenance and expansion.

Burying joints

Installing pipework outdoors can create numerous difficulties for engineers. Many problems may be caused by harsh external conditions, including the weather, difficult terrain, ground swell and landslides. Access to basic amenities is also often an issue. It is not always easy to bring a generator to remote areas in tough climatic conditions, whilst ensuring maximum safety levels are maintained. Delays are a common outcome.

Over a number of years, land may be subject to ground movements and displacement, which can create stresses on pipes and even lead to underground breakages. This is very difficult for engineers to control, but flexible couplings offer additional security and can accommodate these potential misalignments without the need to install expensive and delicate specialised equipment.

The deflection characteristics of grooved systems offer significant benefits. They minimise the stresses that result from movement caused by ground and system thermal changes, settlement, and seismic effects.

Flexibility must also be provided at ground breakthroughs to accommodate differential settlement of piping. None of these characteristics are simultaneously available in any other alternative joining technique, such as flanging, threading or welding.

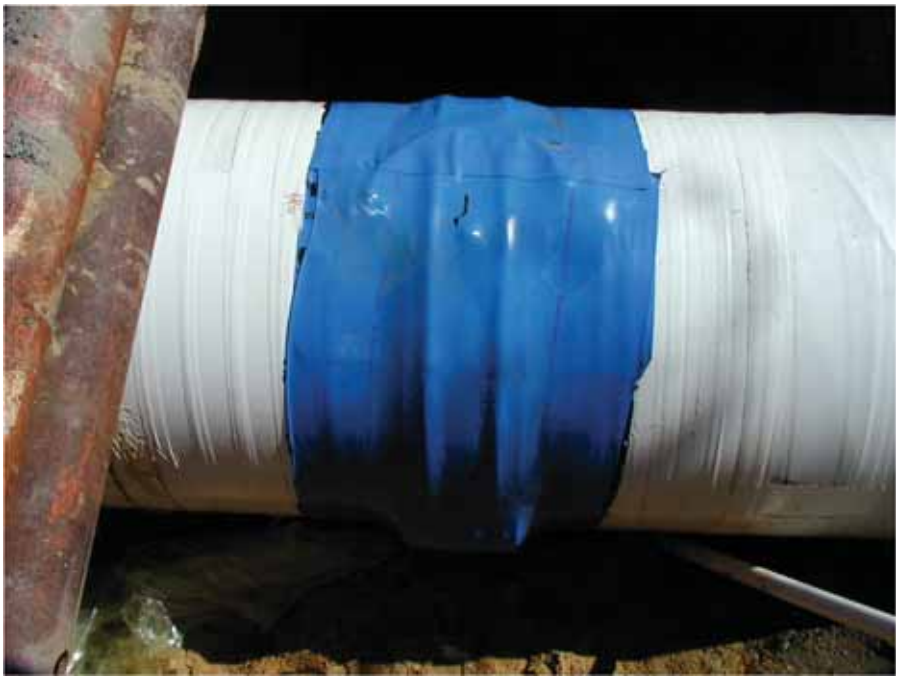
In fact, mechanical couplings can be directly buried following the same guidelines as welded and split sleeve systems – and there are no special design considerations with respect to pipe and joint loading. Direct burial will not adversely affect joint performance or reliability. Mechanical joining systems provide a fully restrained pipe joint while also allowing for flexibility at the joint.

Benefits in the field

Grooved systems help alleviate many of the other problems associated with using alternative joining methods in the field. Mechanical joints are perfect for outdoor, remote use as they can be hand assembled with no need for power tools and can be mounted under any weather conditions, unlike welds which need dry pipe.

Couplings provide visual confirmation of proper installation – and there is no need for X-ray testing. With a union at every joint, they offer added flexibility and are more easily adjusted if alterations are needed.

Another benefit of using grooved mechanical piping systems is that their flame-



External coverings such as, heat shrink tubing, tapes or wraps, mastics, wax and asphaltic tapes may be applied directly over couplings...

free assembly reduces the risk of fire as well as other hazards during installation. This is very important in outdoor installations – where the risk of using hotworks in dry conditions is high.

In addition a trench carrying a flanged or welded pipe must be nearly twice the width of a trench carrying a grooved line, so using grooved technology lowers labour and time requirements, as well as the environmental impact.

At a recent penstock line installation in Canoe Creek, the use of the grooved system successfully narrowed the piping trench from 13m to 6m in the Pacific Rim Rainforest.

In other systems, such as district heating, there is likely to be many hundreds of metres – sometimes kilometres – of pipework, which may include large-diameter pipe (350mm and above). Often pipe will be located in inaccessible trenches or buried, requiring solutions for accommodating thermal movement.

Whilst welding has traditionally been used to join pipework, on large projects with poor access, not only the welding operation itself but the essential site preparation and the need to move welding equipment during the job will take considerable time.

Maintenance and speed

Whether the project owner is a public agency or a private company, the speed of implementation is a very important factor. Grooved systems are dramatically faster than conventional solutions even in perfect construction conditions, lowering costs and limiting exposure to risk.

With measurable time savings between 35% and 50% compared to welding, grooved systems can contribute significantly to meeting tough deadlines. In harsh climatic conditions, the difference is even more impressive. Also, pipe misalignments during installation are easier to resolve as angles can be changed more easily.

Maintenance is also much easier with grooved joints, which are easily maintained and easily expandable. It can take all day to unbolt a flanged joint depending on size. Compare this with only few minutes to unlock even a large diameter grooved coupling.

Corrosion protection

As with other alternative methods of joining pipe, the effects of soil conditions on buried systems must be incorporated into the system design to prevent corrosion. Special coatings and/or cathodic protection may be applied to ensure system longevity. Product applications and processes regarding direct burial and corrosion protection methods are not unique to pipe joints installed with mechanical couplings.

System designers should review ground soil conditions and make a determination of the appropriate coating for the application. On steel or iron piping systems, the same type of protection system used on the pipe may also be used for couplings.

While some grooved couplings, such as those from Victaulic, are manufactured from ductile iron with zinc electroplated carbon steel hardware as a standard, coatings may also be applied in the field directly onto installed couplings.

External coverings such as, heat shrink tubing, tapes or wraps, mastics, wax and asphaltic tapes may also be applied directly over couplings.

These coverings will provide the same corrosion protection as they do with other alternative joining methods and can be installed in the same manner. For added corrosion protection, stainless steel bolting is an alternative to plated steel for buried applications.

Bonding and grounding

It is important for all pipe joining methods that system designers follow good piping practices – and ensure buried systems are adequately protected. Grounding of buried systems is necessary to ensure proper protection of a piping system from outside sources of electrical activity such as lightning strikes, power line breaks and stray currents. Grounding is also necessary to ensure static electricity within a pipeline does not build to a potentially dangerous level.

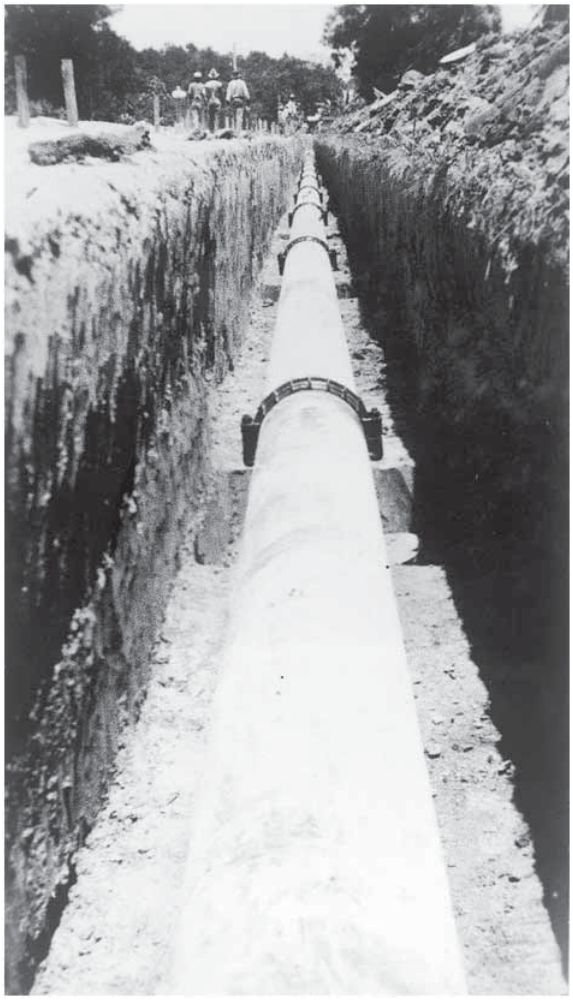
Stainless steel and bare steel direct buried systems are naturally grounded and do not require additional grounding, however systems that incorporate coatings or wraps may need earthing along selected locations of the piping system.

Stainless steel, bare, painted, or galvanised grooved and bolted couplings, when installed on uncoated, galvanised, or enamel painted pipe ends will provide continuity across the pipe joint through the coupling housing.

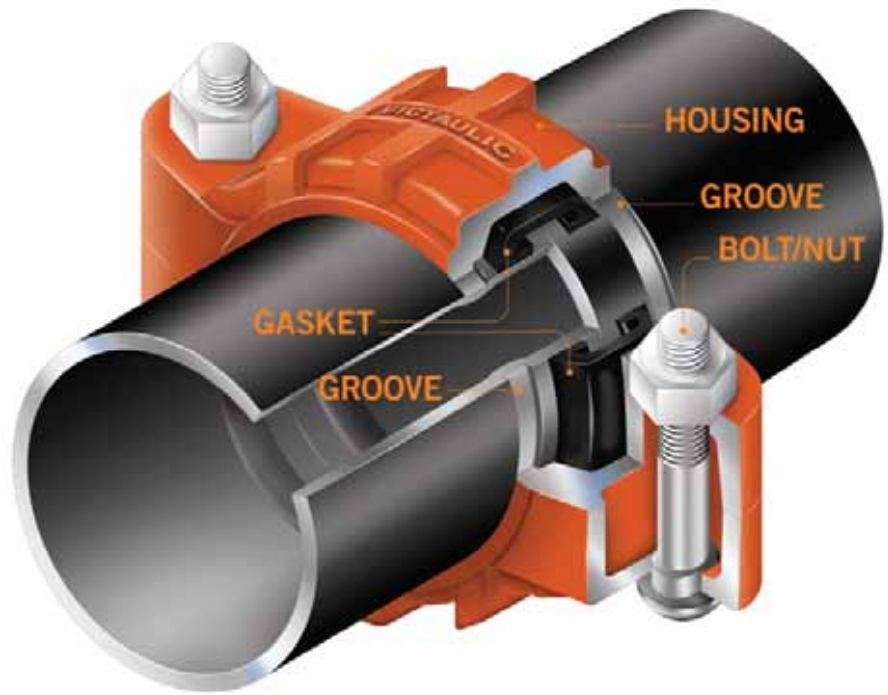
This is important for systems that are grounded only at select locations and where continuity across the pipe joints is required. Joint continuity is achieved by the high contact forces that occur between the coupling housings and the pipe in the area of the groove/restraint ring.

Similar to other joining methods, when the mating surfaces of either the pipe end or coupling are coated with something other than paint or galvanising prior to coupling installation, the use of grounding clips and/or grounding blocks will maintain continuity across the joint. It should be noted that in the event cathodic protection of the piping system is incorporated, the coupling housings must always be connected to the grounding method to ensure bonding of the coupling housing to the protected pipeline occurs.

Bonding of buried systems may be necessary to ensure electrical continuity through pipe joints and/or continuity with



Directly buried piping systems were one of the original applications for mechanical couplings – and they have been incorporated successfully in buried services for over 95 years...



The anatomy of a grooved mechanical joint...

adjacent piping systems. Bonding is achieved by direct connection of the two materials to be bonded together through the use of jumper wires, continuity clips, or some other means of providing continuity between the two materials.

Cathodic protection

Cathodic protection is a technique used to control the corrosion of a material by making it the cathode of an electrochemical cell. It is employed to protect a wide range of ferrous metallic equipment and structures in various environments such as pipelines, ships, tanks, casings, and offshore platforms.

Cathodic protection of a piping system can be accomplished by several methods, the most common of which are the use of hot dip galvanizing and high zinc content coatings. The zinc coats the carbon steel surface acting as a sacrificial anode preventing the corrosion of the underlying and surrounding material.

However, as with all sacrificial coatings, the coating will eventually become depleted and will no longer be able to protect the underlying material, typically carbon steel, from corrosion.

Other methods of cathodic protection include the installation of zinc anodes directly onto the surface of the material to be protected – or the use of zinc rich corrosion resistant paints and coatings.

In areas where pipeline integrity and longevity is required, and where pipeline integrity must be monitored, the use of imposed current cathodic protection can be applied. This method of protection utilises localised sacrificial anodes or remote anode beds along with an imposed current to ensure corrosion protection is even along the length of the pipeline. This method is often used in conjunction with pipeline coatings.

As with grounding, continuity of the pipeline is required to ensure the imposed current can freely travel the length of the protected area.

Couplings installed in an area protected by cathodic protection must be in direct contact or bonded to the pipe to ensure continuity through the connection and even protection of the joint. Continuity between the pipe and coupling is necessary to ensure the couplings do not experience accelerated corrosion.

Conclusions

Summing up the benefits there is scope for significant financial savings by using mechanical grooved piping systems.

Faster field installation, elimination of hotworks and reduced need for expansion joints all add up to advantages that are particularly important when choosing a system for a project in the current economic environment.

Selecting a high quality and innovative mechanical grooved piping system can bring improvements in productivity.

In a sector, where margins are increasingly tight, this is an increasingly attractive option for consultants, engineers and system designers alike. ■

Simon Ouellette
Victaulic Engineering Manager

Oil Management System

Oil Mamagement System is a cost effective system to replace expensive compressor in refrigeration...

Inaggressively moving away from the currently used Chloro Fluoro Carbon (CFC) and Hydro Chloro Fluoro Carbon (HCFC) refrigerants to new, non-ozone depleting Hydro Fluoro Carbon (HFC) refrigerants across a wide range of product lines. This massive undertaking requires careful assessment of the performance, operational capabilities, durability, and long-time reliability of HVAC products with these new HFC refrigerants and lubricants. Among the more important considerations in the change toward HFC refrigerants is the selection of lubricants that provide the same or improved characteristics relative to traditional mineral oils and alkylbenzene lubricants. Two of the more important characteristics of an acceptable lubricant, in addition to stability, cost and lubricity, are miscibility and solubility characteristics with the new HFC refrigerants. In general, the lubricant circulation behaviour of new HFC refrigerants with Mineral Oils (MO), PolyOlesters (POEs), and AlkylBenzenes (AB) has not been well characterised for HVAC systems. Universal guidelines need to be developed for various compressor types, configurations, piping arrangements and other system features.

Oil Management System installed in reciprocating or scroll compressor using HCFC or HFC refrigerant. An efficient oil management system is essential to ensure compressor lubrication and energy efficient cooling. If selected and installed correctly, an oil management system will give years of trouble free operation, protecting the compressor from both low and excess oil levels. Excess oil within the system can lead to a slug of oil returning to the compressor. A slug of oil can be damaging to a compressor as a slug of liquid refrigerant. By removing oil from discharge line. Oil present in a refrigeration system reduces the efficiency of the system by:

- Overall heat transfer reduction due to formation of oil layer in heat exchanger
- Displacing refrigerant volume resulting in an increase in system mass flow
- Increasing the two phase pressure drop
- Elevating the boiling point temperature
- Preventing all the refrigerant from evaporating
- Reducing log mean temperature difference.

Parallel Compressor System

Parallel compressor systems apply two or more compressor to a common suction header, discharge header and a common receiver. These systems are also known as 'Rack System' – because they are mounted on steel rack. The compressor can be of reciprocating, scroll, screw and rotary type configuration.

Advantages of parallel compressor system are:

- Load matching
- Diversification
- Flexibility
- Higher efficiency
- Lower operating cost
- Less compressor cycling.

Disadvantages of parallel compressor system are:

- Leak that affect the entire compressor rack
- Compressor burnout that contaminates compressor oil and will affect the entire compressor rack online system

As the refrigerant load varies, compressor of varied capacities are turn on or off in response to the ever changing load. The refrigeration load is sensed by pressure transducer mounted on the common suction header line. Pressure transducer couple with microprocessor and feedback provided to Input/output control board of compressor rack.

The common suction pressure on the parallel system varies as case in thermostat in the store call for cooling or as Evaporator Pressure Regulating (EPR) valve on the individual suction line, which come into the parallel rack, throttle open & closed, according to load to the load of each individual line of refrigerated cases. The pressure transducer senses the pressure increase or decrease and sends a voltage message to a microprocessor based controller locate on parallel rack system. The pressure transducer changes the pressure signal to the voltage signal, so that microprocessor can process it. The pressure transducer receives its power from input and output board of microprocessor. Compressor cycling logic for these systems may provide for even run time among all compressors resulting in ever wear on all compressors through the system's life.

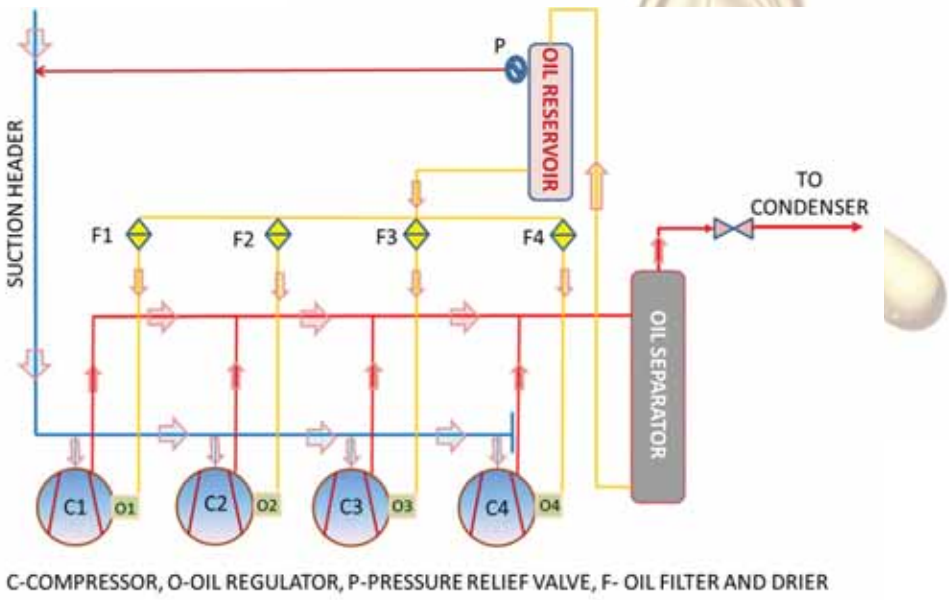
Oil Distribution System

A sophisticated oil system was designed to maintain the correct amount of oil in each compressor of the parallel system. The oil system consists of four major components as:

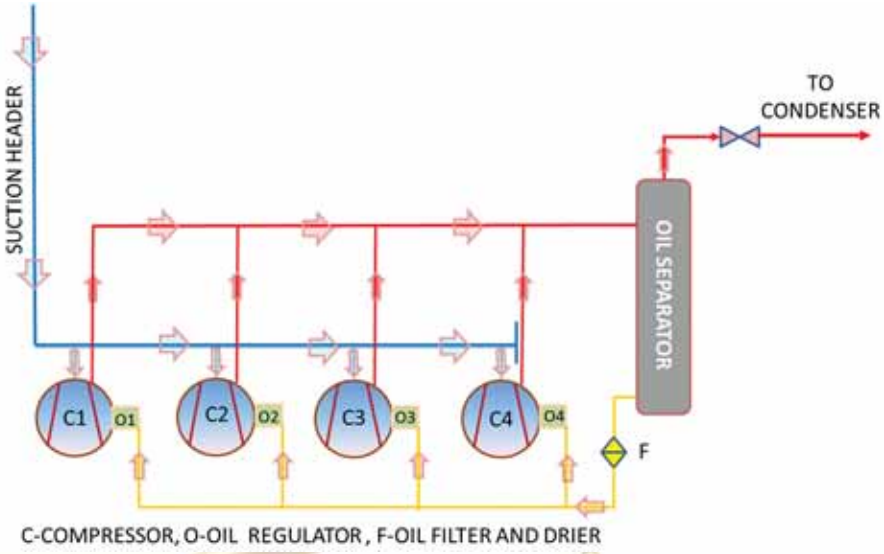
- Oil separator
- Oil reservoir
- Pressure differential valve
- Oil level regulator

A large oil separator is located in the common discharge line trap the pumped oil. Oil is not returned directly from the oil separator to the compressor as in conventional system. But is pumped by differential pressure to an oil reservoir. Often the oil separator and oil reservoir are combined into one vessel. From the reservoir, the oil passes to an oil level regulator float valve, which is mounted on each compressor at its slight glass location. The oil level regulator float valve senses crankcase oil level and opens /closes as necessary to ensure an adequate oil level in each compressor crankcase.

A pressure differentially valve located on the oil reservoir usually maintains 5psi-20psi pressure differential between reservoir pressure and common suction pressure. Depending on what pressure differential valve is used and vented to the suction line.



Low Pressure Oil Management System...



High Pressure Oil Management System...

Low Pressure Oil Management System

This system is applicable for parallel compressors. In this system common discharge header connected to inlet of the oil separator and outlet of the oil separator is piped to condenser through check valve.

Oil return line connected to top valve of the oil reservoir to oil separator. A vent line connected to oil reservoir to common suction header by using pressure relief valve, to reduce the pressure of oil reservoir. The valve will keep the reservoir pressure as a set pressure above the suction pressure. The bottom valve of the oil reservoir is connected to the compressor crankcase.

High Pressure Oil Management System

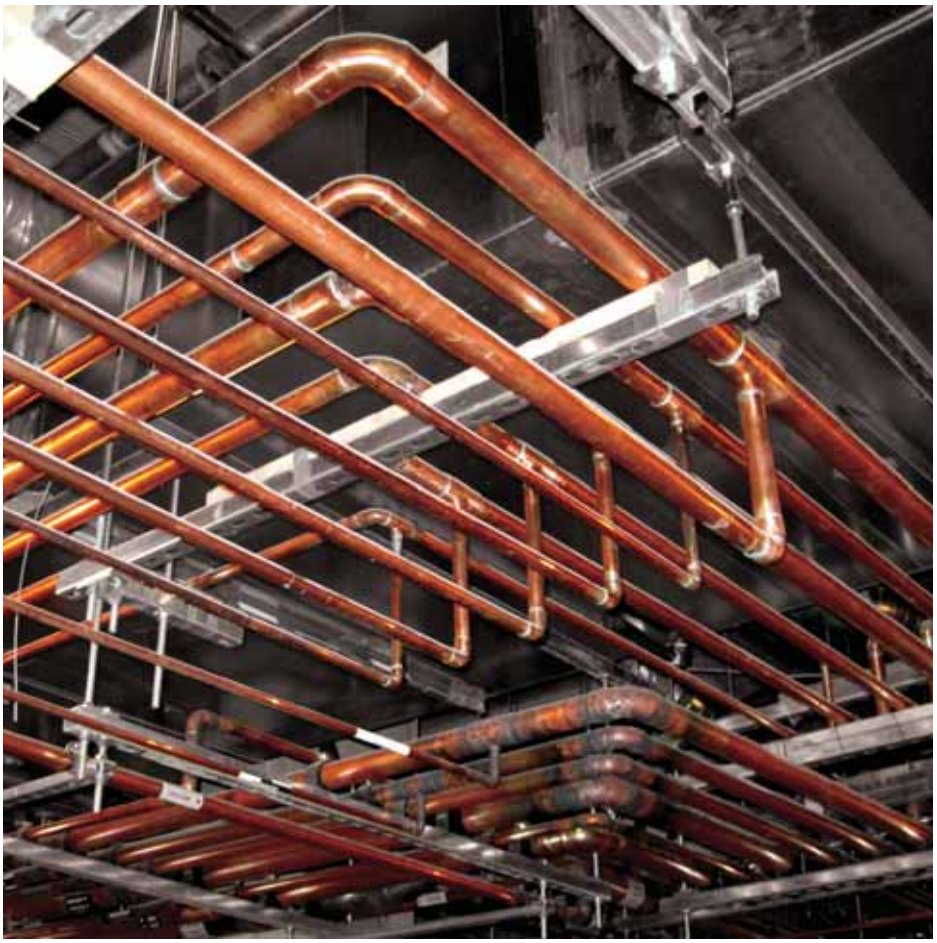
In this type of system, remove the need for a separator oil reservoir, it may help to reduces the amount of pipework and fittings. A high pressure management system relies on the oil level regulators being to able to operate with high pressure differential. These systems not applicable for HCFC/mineral oil due to formation of foaming. ■

Ganesh Shankarrao Patil
Dy. Manager – Engineering
Gea Refrigeration India Pvt.Ltd.

Cupronickel Tubes To Propel The Global Copper Tubes Market

Technavio's recent research study indicates that the shipment of global copper pipes and tubes market is expected to reach 4.58 million metric tons by 2020...

Technavio's latest research work titled, 'Global Copper Pipes and Tubes Market 2016-2020' presents an in-depth analysis of market growth in terms of revenue and emerging market trends. It has divided the entire market into four segments: HVAC, Industrial Heat Exchanger, Plumbing and Electrical & Others (Table 1).



Copper pipes and tubes market in HVAC segment

The global copper pipes and tubes market in the HVAC segment was estimated at 2.14 million metric tons in 2015. The HVAC segment is the prime consumer of copper pipes and tubes. The segment accounts for a 56% share in the global market. Antimicrobial properties and better thermal conductivity than aluminium have increased the use of copper pipes and tubes in HVAC applications. Further, copper is resistant to corrosion and is malleable.

Rapid growth in the construction sector has increased the demand for HVAC applications. The segment is shifting toward intelligent and energy efficient systems. This shift is anticipated to enhance the use of copper pipes and tubes over other substitutes.

Copper pipes and tubes market in industrial heat exchanger segment

The global copper pipes and tubes market in the industrial heat exchanger segment was estimated at 919,200 metric tons in 2015. The selection of suitable conductive material is a crucial aspect in the design of heat exchangers. These conductive materials are selected based on their thermal conductive properties and heat dissipation properties.

Table 1

Segmentation of global copper pipes and tubes market by end-users 2015	
HVAC	27.90%
Industrial heat exchanger	22.51%
Plumbing	7.69%
Electrical and others	31.41%

Source: Technavio research

Copper being an exceptional conductor of heat possess desirable properties required for creating thermally efficient and durable heat exchangers. Copper is also resistant to biofouling and corrosion. The metal can withstand high pressure too. Copper's high thermal expansion, rupture resistance, fatigue strength, specific heat, ease of fabrication, antimicrobial properties have increased its use in many applications.

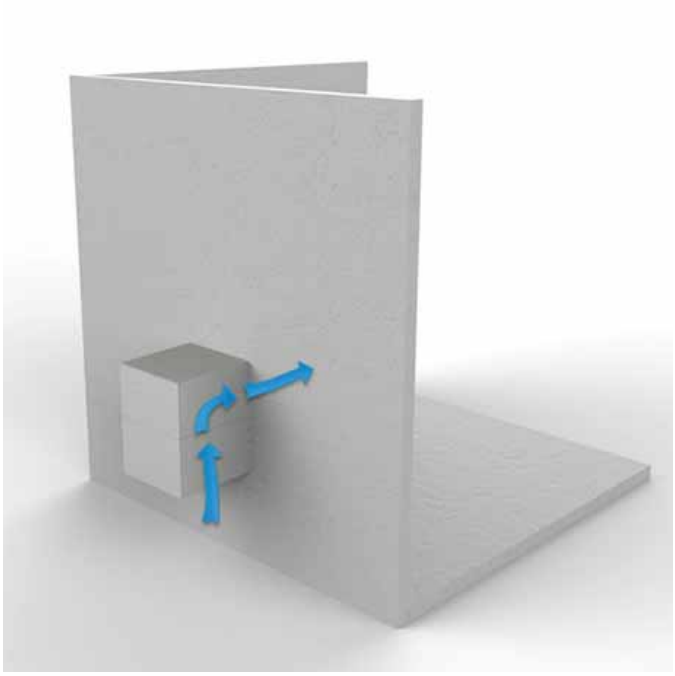
Copper pipes and tubes market in plumbing segment

The global copper pipes and tubes market in plumbing segment was estimated at 651,100 metric tons in 2015. Copper is preferred over steel and iron pipes and tubes in plumbing applications. Steel and iron pipes used in plumbing are easily corroded over time and are prone to rust. Plastic pipes cannot be used in high-temperature applications.

Copper pipe bores remain smooth with negligible changes on the inside even after being installed for years. This can be interpreted as substantial savings in terms of maintenance and installation. ■

Airedale's New Product To Slash Cooling Energy Costs

Designed for where floor space is limited or unavailable, the Ecotel Free Cool is quick and easy to install, utilising a secure and tamper-proof mounting bracket system...



Airedale International has launched a 100% free-cooling outdoor cabin cooler, which offers substantial energy-saving potential compared with nonfree-cooling alternatives.

The new system could save ISPs, telecoms and rail operators millions of pounds in energy costs.

The Ecotel Free Cool (5-15kW) is a compact, resilient outdoor cabin cooler designed for track-side side signalling applications, and switching and relay stations. The system is ideal for new installations – or can be supplied as a retrofit that will convert an existing Airedale or other manufacturer's unit.

Harnessing the benefit of low ambient UK temperatures (based on maximum summer outside ambient of 40°C, minimum winter ambient of -7.5°C, London, UK), a 10kW unit can provide free-cooling for 100% of the year with running costs of just £432.

The British manufacturer has significant experience in fan cooling applications, having supplied thousands of earlier generation Ecotel units to clients such as CTIL and Network Rail over past decades.

Designed for where floor space is limited or unavailable, the Ecotel Free Cool is quick and easy to install, utilising a secure and tamper-proof mounting bracket system, and is easy to service with front component access and removable centrifugal EC fan.

Temperature sensors are mounted in the return side of the unit to monitor dry bulb conditions, and the Airedale controls interface allows unit performance to be maximised, including monitoring and control of room and exterior air temperatures. A - 48V DC unit supply option is also available. ■

Extech VPC300 – A Video Particle Counter with Built-in camera

The VPC300 is a Video Particle Counter with built-in Camera. Measures up to 6 channels of particle sizes plus air temperature and relative humidity. Used for capturing videos and photos that are stored onto internal memory or a micros card. Use the included software to generate reports with videos, photos and data points. Complete with NIST-traceable calibration certificate, Universal AC Adapter/Charger with multiple plugs, USB cable, PC software, tripod, filter, 7.4V NiMH battery and a hard, protective case.

Key Features:

Designed for Routine Particle Testing & Challenging Troubleshooting -

- Simultaneously measures and displays 6 channels of particle sizes - 0.3, 0.5, 1.0, 2.5, 5.0, 10μm and Also measures Air Temperature, Humidity, Dew, Point and Wet Bulb
- Built-in Camera for Capture pictures or video of job sites for event documentation, reports, testing summary, communication with remote colleagues and more.
- 320x240-pixel camera takes videos (3GP) and photo images (JPEG) and records them in internal 74MB memory.
- Store 5000 records & 20 minutes of video & Internal memory expandable to 8 GB with microSD card
- Big, Bright Display: 2.8" Full Color LCD Screen for easier readability
- Report Software: Create compelling reports with data, video and images
- Quick data functions: Max, Min, DIF, AVG record
- 1-year Warranty. ■

Email: flirindia@flir.com.hk

MECO introduces new 6000 Count TRMS Digital Multimeter

The 66TRMS is a 6600 Counts Auto & Manual Ranging Digital Multimeter having AC & DC Voltage Range up to 1000V, and Current Range up to 20A AC & DC, Basic accuracy for DC Voltage ±1.0%rdg + 4dgt, for AC Voltage ±1.0%rdg + 5dgt, for DC Current ±1.0%rdg + 2dgt, and for AC Current ±1.5%rdg + 5dgt.

It has special features like Auto Power Off, Resistance, Capacitance, Frequency, Duty Cycle, Temperature, Diode Test, Audible Continuity and Data Hold. ■

Website: www.mecoinst.com

Alfa Laval introduces Low Head Fully Automatic Plate Press Washer

Alfa Laval, a well-known global provider of solutions and services for the water and waste treatment has introduced a new, low head, fully automatic washing machine for its fully mechanised plate press. Recently, the company came up with the new low head AS-H Fully Automatic Cloth Washer as an option for the Alfa Laval AS-H Fully Mechanised Plate Presses with side bar design.

They are especially appropriate for high capacity, constant dewatering in municipal and industrial applications, where a very high level of dry solids of the cake is of paramount significance. Plate presses are the finest technology for solids capture > 99%. The company's fully mechanised plate press offer maximum degree of automation, also with exceptionally sticky filter cake.

The latest enclosed stainless all steel washing machine cleans the filter cloths of the plate press utilising high pressure water at up to 100 bar. It works in combination with the automated plate separator of the plate press, and is an alternative to the company's previous automatic washer of standard height that has been sold for more than 10 years. ■

Website: www.alfalaval.com

FLIR India presents Refrigerant Leakage Detector

The RD300 Refrigerant Leakage Detector detects leakages from air-conditioning units and cooling systems. It's easy to use and is ideal for detecting leakages from air-conditioning units and cooling systems that use all standard refrigerants.

The multi-colored LED light bar indicates the level of leaking refrigerant detected by the RD300. The built-in, bright LED convenience light located at the sensor tip illuminates dimly lit inspection areas. Complete with leak test bottle, 9V battery, and protective hard carrying case.

The product detects all standard refrigerants using a heated diode sensor. It has LED light at probe tip (with on/off switch) for working in dimly lit areas. Its LEDs display user-selectable High/Medium/Low levels with sensitivity of 0.25/0.50/0.99 oz per year. It provides audible and visual alert with mute button. It carries a low battery indicator. It's featured with field replaceable sensor and LED light tip. The product is complete with leak test bottle, 9V battery, and protective hard carrying case, and it comes with 1 year warranty. ■

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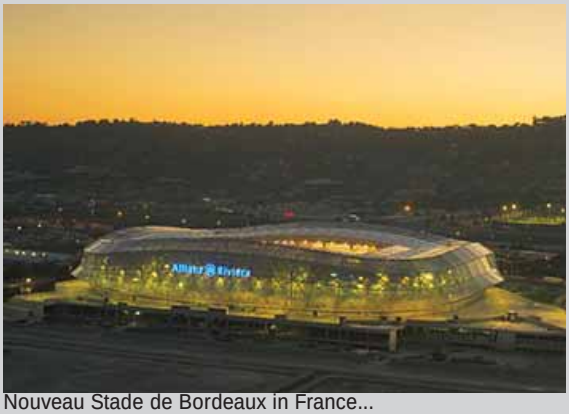
index to **advertisers**

Stadiums to offer worldclass internal environment



Nouveau Stade de Bordeaux in France...

A new generation multifunctional stadium, Nouveau Stade de Bordeaux in France is fervent to sports and culture. It has an adaptable capacity of 42,000 seats where comfort is offered by two Climaveneta units that combine the best internal temperature and humidity level, reducing the energy consumption and consequently the operating costs.

In this ultramodern and exemplary stadium, one NECS-N/CA 2416 reversible heat pump and one NECS-Q/CA 1816 multi-purpose unit offer utmost comfort all year round with the highest energy efficiency.

In the year 2013, the Allianz Riviera in Nice was inaugurated and since then it has hosted the home matches of the Nice team. It also houses the Museum of Sport with a capacity of 35,000 seats, air-conditioned by a Climaveneta multi-purpose heat pump NECS-CQ / B / S 0704.

The stadium in Paris, the Parc des Princes, was opened in 1972. Recently, it has undergone renovations, including the installation of two Climaveneta multi-purpose heat pumps ERACS2-Q / SL-CA in 2622 for the air conditioning of roofed spaces. ■

CSIA received ACREX Hall of Fame at ACREX 2016

Chhatrapati Shivaji International Airport (CSIA)...

Chhatrapati Shivaji International Airport (CSIA) Mumbai has been the first organisation to be inducted into the Hall of Fame at ACREX 2016. It has been highly privileged to receive such an honour at India's largest industry exhibition. ACREX Hall of Fame is an industry yardstick established by Danfoss India in partnership with ISHRAE (Indian Society of Heating, Refrigerating and Air Conditioning Engineers) to acknowledge the excellence achieved in conserving energy by commercial buildings in the Indian subcontinent. Hence, CSIA was chosen for this prestigious award as an energy efficient and sustainable HVAC venture this year.

Out of many entries across the nation, ten HVAC projects were nominated. The selection criteria was based on factors such as Energy Performance Index, Indoor Environment Quality initiatives, Energy Saving Initiatives including Renewable Energy, Building Management System (BMS), and one year operational data which was scrutinised for this purpose.

The features like improved indoor air quality, an air conditioning system that is integrated with the rest of the BMS, and the use of technology to attain a high energy productivity index that resulted in reduced energy usage, better air quality and high cost savings, set CSIA apart from rest of the projects. GVK CSIA, Larsen & Toubro (L&T) and Blue Star were the team behind the success of this project. ■

(Source: www.danfoss.in)

Wiegmann Associates commences HVAC project for RMC Distributing

The design of the new building...

Wiegmann Associates (Engineer of Record and HVAC Construction Manager for the project), has commenced work on a design/build HVAC project for RMC Distributing Company's 148,000-square-foot refrigerated beer warehouse located in Colorado Springs. RMC Distributing is a beer distributer serving 18 counties in Southern Colorado. The company distributes practically 235 brands of beer representing more than 30 suppliers. ARCO Beverage Group is the general contractor. This project is scheduled for a completion in the month of December this year.

The main goal of the project is to completely have an HVAC retrofit and expand the office. Wiegmann Associates basically aims to engineer an HVAC solution for the dry and refrigerated warehouses, adding together new equipment while retaining components of the existing equipment. The project also involves two new split refrigeration systems in the draught cooler.

A Direct Digital Control (DDC) System will improve climate control in a 16,800-square-foot new construction office expansion that will triple the facility's existing office area to 28,000 square feet. ■

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Guaranteed Power Saving with Small Foot Print...
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- Exremely 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	**ΔT for Chiller**	**28°C**	**25°C**
6	Chilled Water Compressor Motor Kw for 1200 TR	720	643
7	Energy Saved in %	-	10.7%
8	**Energy Saved in Kw**	**-**	**77 Kw/Hr**
9	Total Running Hours per Annum	8640	8640
10	**TOTAL POWER SAVED PER ANNUM**	**-**	**6,65,280 Kw**

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- Highest Power Saving (upto 15%) over equivalent Screw without Fully Automatic Variable Volume Ratio Control*.
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