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Publisher's Letter

Chillventa 2016: An Important Destination For Us

Whether it is food or drug preservation, dairy development, R&D laboratory work or clean room activities, we need sound support from the HVAC&R industry. Thus, literally growth of the modern civilization can't be thought of without the continued progressive and innovative support of the HVAC&R industry. However, at present, globally the industry itself is facing some major challenges – a few of which are intrinsic to the HVAC&R industry but most of them are parts of the wider common worldly problems. Lots of R&D works are going on at different parts of the world – some are being done by the major field players, others are being taken up by R&D institutes and so on. So, there is a need for a sound global platform to present and discuss the growing challenges and bring together the latest advances in solving them.

As the challenges of the HVAC&R industry are literally matters of global concern, approaches in their solutions or possible steps to mitigate them are also needed to be discussed in – and disseminated through global forums – so that the transparency of the R&D projects being taken up in isolation and their possible outcomes are well understood by the community worldwide. That way Chillventa 2016, the forthcoming international exhibition on Refrigeration, AC& Ventilation and Heat Pumps is going to offer a very good platform.

Besides the exhibition, where over 1,000 exhibitors will share their expertise as well as innovative systems and components, the Chillventa 2016, in Nuremberg from 11th to 13th October 2016, will offer a good networking hub to connect to top players in the international refrigeration, air conditioning, ventilation and heat pump industry.

In general, foci on the major areas like energy & climate goals, outlook for refrigerants, energy conservation in HVAC&R industry, and building energy solutions etc., will get special importance in Chillventa 2016. In the words of Daniela Heinkel, Director Chillventa at NürnbergMesse, "This year's exhibition and CONGRESS will focus on topics such as current climate targets, eco-design, refrigerants, efficiency through control systems, innovation in heat transfer, limits of refrigeration technology and climate control at data centres."

So, Chillventa 2016 will be a great opportunity for business. Hands on experience of the future trends will definitely open up new vistas for the decision makers.

Cooling India has been invited to cover Chillventa 2016. Let's meet there without fail…

Please send your comments at pravita@charypublications.in

Pravita Iyer
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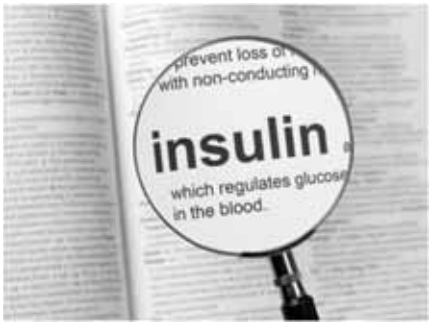

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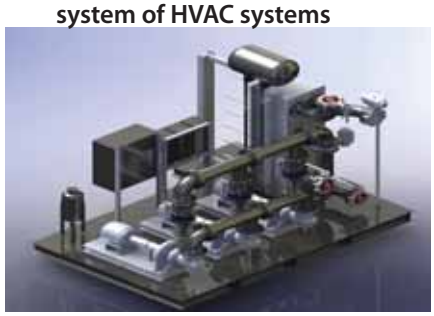

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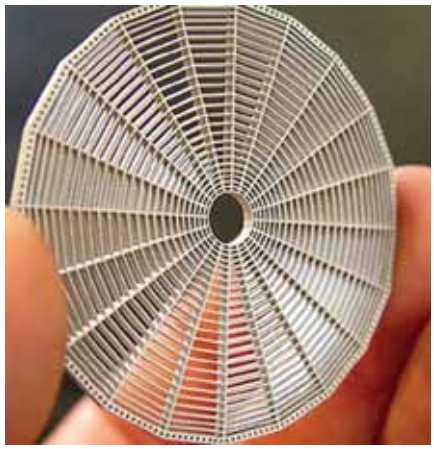

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FROM THE EDITOR

Growing Initiative To Improve Cold Chain Logistics

On an average, about 25% of the perishable food products produced in a developing country is wasted due to lack of availability of proper cold chain. In these countries, it's not only a great challenge to food quality standards but also a big threat to food security. Unfortunately, although acute in developing countries, the developed nations are also not completely free from such challenges.

Sometime back, through a research report, MarketsandMarkets predicted that the cold chain market would reach USD 234.49 Billion by 2020. They also communicated, "It is projected to grow at a CAGR of 7.0% from 2015 to 2020." There are two major segments of cold chain market, namely: the refrigerated storage and the refrigerated transport.

Thus, the need for nourishment of the cold chain market is undoubtedly being felt in every corner of the globe, and it is pleasing to note that several nations have started working on improving the situation. At the time of conducting the survey, MarketsandMarkets named AmeriCold Logistics, LLC (U.S.), Preferred Freezer Services (U.S.), Burris Logistics (U.S.), Lineage Logistics Holdings, LLC (U.S.), and Nichirei Logistics Group Inc. (Japan) as key players commanding the industry. But, now many other players are also taking initiatives to improve the situation, governments are also actively encouraging the private players to come forward to combat the long-time-existing challenges. Any such initiative has several socio-economic benefits.

"The need for nourishment of the cold chain market is undoubtedly being felt in every corner of the globe, and it is pleasing to note that several nations have started working on improving the situation...

For example, currently, more than 90% of imported fruits and vegetables entering the U.S. East Coast arrive via Northeast ports. A new Georgia-based company, PortFresh Logistics is building a 100,000 square-feet cold treatment facility dedicated to perishable cargoes imported through the Port of Savannah. According to Brian Kastick, CEO, PortFresh Logistics, the company has been working for more than two years to meet the need for additional chilled cargo infrastructure in Savannah. The facility, which is expected to open in this quarter, will strengthen Savannah in its role as a new entry point for South American produce. Kastick explains that use of the Port of Savannah will offer significant time and money savings per container for areas throughout the Southeast region.

Thus, any initiative to strengthen the Cold Chain has multiple benefits. At present, globally many such projects are coming up – and it's most desirable that the process should continue.

Pl. send your views at pkchatterjee@charypublications.in

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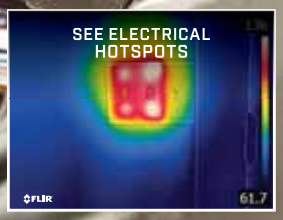

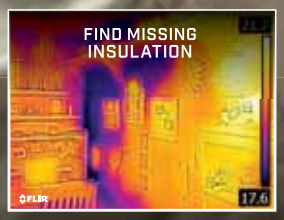

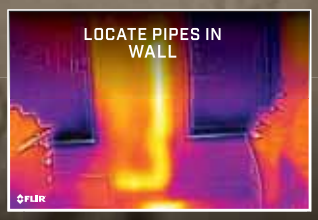

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Unilever acquires Blueair to extend its home care business

Unilever has signed an agreement to acquire Blueair. Blueair is well known for its premium category of air purifiers in markets like China, US, Japan, South Korea and India. It had a turnover of US$106m in 2015. This significant venture in air purification will further complement Unilever's existing water purification business. The terms of the deal has not been disclosed. The transaction is subject to customary regulatory and other approvals.

Nitin Paranjpe

Bengt Rittri

Nitin Paranjpe, President of Unilever's Home Care business, said, "We are delighted to be adding Blueair to our Home Care portfolio. The Blueair brand and products are widely known and represent exceptional quality and design, as well as superior capacity and performance. Blueair was founded on the belief that business should be a force for good in society, which is shared by Unilever."

Bengt Rittri, Blueair Founder, said, "Blueair was launched 20 years ago with the mission to start a clean air revolution by bringing people the world's best air purifiers. This mission remains embedded in the company values of Blueair today as we continuously work to elevate people's health and wellbeing in a world where WHO says outdoor air pollution has been continuously increasing over the past several years, with billions of people now exposed to dangerous air. We are saying yes to leveraging the help of Unilever – one of the world's most admired corporations for its sustainability practices – to help Blueair take the next step to allow more people to take action to create safe indoor havens for themselves, their loved ones, work colleagues and customers. Unilever is the best possible partner to help Blueair more quickly fulfil its mission to help people enjoy the health benefits of breathing clean air." ■

BEE introduces new star rating methodology for ACs

The Bureau of Energy Efficiency (BEE) has introduced a new star rating methodology called Indian Seasonal Energy Efficiency Ratio (ISEER) for air conditioners. This evolved rating methodology factors in variance in higher temperature in India – and rates air conditioners accordingly. Consumers can now purchase air conditioners with higher efficiency leading to lower electricity bills.

Keeping the performance of air conditioners during higher temperature in mind, ISEER will address the different climatic zones in India and higher temperature. It measures energy efficiency of ACs based on a weighted average of the performance at outside temperatures between 24 and 43 degree C based on Indian weather data.

Sanjay Seth, Secretary, BEE, said that the new methodology for rating system will bring in higher energy efficiency of appliances and reduce energy consumption. The standards have been developed keeping changing Indian temperature in mind. Such innovations will help them achieve the objective sooner. Contextually, ratings based on ISEER have been introduced on a voluntary basis for Variable Speed (Inverter) Air Conditioners since June 2015. ■

Daikin Europe partners with Egyptian private equity firm

Daikin Europe N.V., a wholly-owned subsidiary of Daikin Industries, Ltd. ('Daikin'), has partnered with BPE Partners S.A.E., a well known Egyptian private equity firm, to establish Daikin Airconditioning Egypt S.A.E.

Daikin established the Egyptian subsidiary, Daikin Egypt, based on a belief that the country's growing economy remains the pillar of growth for both the Middle East and Africa. To implement large-scale projects, the Egyptian government has created an environment that expands the role of foreign companies by actively seeking investment from foreign companies.

In establishing a subsidiary in Egypt, Daikin is laying the groundwork for business development that aggressively competes for large-scale projects by leveraging the local knowledge and investment expertise of BPE Partners and collaborating with the Daikin Middle East Office in Dubai.

With energy-saving products ranging from residential to commercial use, Daikin is poised to substantially expand business in Egypt. The success it achieves in the Egyptian market will be used as a springboard to future development in the Middle East and Africa. ■

Carrier Transicold introduces refrigeration unit for LCVs

Florists, grocers and other businesses that use small refrigerated trucks and delivery vans have a new cooling option from Carrier Transicold: the Neos 100S alternator-driven electric refrigeration unit. Unlike a conventional direct-drive refrigeration unit with a belt-driven compressor mounted to the vehicle engine, the Neos 100S unit uses the vehicle's alternator to electrically power the system, thus enabling a constant cooling or heating capacity for fresh and frozen cargoes, regardless of engine speed.

With its compressor housed inside the condenser unit, the Neos 100S unit eliminates the need to run lengthy refrigerant lines between the LCV's engine and condenser. This decreases the number of fittings by 80%, which reduces the amount of refrigerant needed and the potential for refrigerant leaks.

The main condenser assembly can be nose-mounted to the front of a truck box or mounted to the roof of a delivery van. As a split system, the Neos 100S design locates the evaporator on the ceiling of the cargo area. At only 6.5 inches deep, its SlimLine evaporator is more than 10% narrower than those of competitive systems.

The Neos 100S unit is rated to provide 3,600 British thermal units (Btu) of cooling at a setpoint of 35 degree Fahrenheit and 100 degrees Fahrenheit ambient, and produces the same capacity in standby mode. Use of the optional electric-standby module enables the unit to be plugged into a 230-volt electric power source when parked, eliminating the need to idle the truck to maintain refrigeration, saving fuel and eliminating engine noise and emissions.

Carrier's Cab Command digital control system mounts in the vehicle's passenger compartment for easy accessibility. ■

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Emerson acquires Locus Traxx, PakSense


Bob Sharp

Emerson extends its long-time presence in 'cold chain' management with the acquisitions of Locus Traxx and PakSense. These investments in cargo solutions will allow the company to provide consistent and safe control of food and other temperature-sensitive goods. Terms of the acquisitions have not been disclosed.

Locus Traxx, based in Jupiter, Florida, offers real-time temperature loggers, which can be monitored anytime, anywhere, using cloud-based analytics. This allows cargo owners to monitor food and high-value shipments throughout the entire supply chain to promote freshness and quality.

PakSense, headquartered in Boise, Idaho, offers a full complement of temperature monitoring solutions fitting a wide range of shipments and cost/benefit scenarios that monitor the condition of perishable goods through the supply chain, so that only the freshest and safest products reach consumers.

Bob Sharp, Executive Vice President and Commercial & Residential Solutions Business Leader, Emerson, said, "The addition of Locus Traxx and PakSense to our portfolio strongly positions Emerson to address the high-stakes challenges faced by end-users in the agriculture, transport and retail industries to keep their products fresh, while helping them drive incremental growth."

"This investment in innovation and technologies in fresh food monitoring demonstrates how we are transforming Emerson to meet the evolving needs of our customers," he further added. ■

Danfoss signs official sponsorship agreement for the CHL


Heikki Hiltunen

Danfoss has secured a sponsorship package for the Pan-European Champions Hockey League (CHL) for the 2016/17 season. As per the company, Ice hockey is a fast and exciting sport that's full of action. The same applies to Danfoss and, in particular, the AC drives business. That's why the sponsorship agreement for the Champions Hockey League made perfect sense.

Heikki Hiltunen, Senior Vice President of Sales, Marketing and Service for Danfoss Drives said, "Danfoss is already well-known in ice hockey circles: our cooling technologies are used in ice rinks around the world. The Champions Hockey League, as the only Pan-European ice hockey platform, is a highly compelling opportunity for the drives business. It offers our brands superb exposure across many of our key sales regions, such as middle and north Europe, which all hold a strong affiliation to the sport. This cooperation gives Danfoss Drives a good opportunity to offer inspiring experiences to our customers and key stakeholders." ■

Encycle's EASE enhances HVAC performance of Allen Theatres

Allen Theatres owns cinemas across New Mexico and Colorado. They were seeking simple solutions to reduce their utility costs and the time required to manage their buildings. Earlier, the theatres' IT Department Manager Charles Green drove out to each of the three locations near their head office when updating HVAC schedules for special events. Each site used a different HVAC control system, none of which provided remote web access. At some sites, he even had to set thermostats individually.

In 2010, the theatre installed Encycle at three locations in Las Cruces, NM. Encycle's Energy-as-a-Service (EASE) has provided Green with more visibility into his HVAC performance than ever before. He makes use of EASE's portal to remotely manage his sites, regardless of variations in HVAC control systems at each site. He said, "EASE makes HVAC operation quick and painless while adding thousands of dollars to our bottom line. Encycle's easy-to-use portal allows me to focus my time on core theatre operations."

Bob Chiste, Encycle's CEO, said, "Theatres continue to be an excellent vertical for EASE, where we consistently demonstrate exceptional IRRs for our customers." Allen Theatres has rolled out Encycle at eight additional locations. ■

Fujitsu General strengthens its business in the Middle East


Training centre for multi air-conditioning system for buildings in the FG (ME) office...

Fujitsu General (Middle East) FZE [FG(ME)], the Middle East sales base of Fujitsu, has started sales activity recently in the new office, which was expanded training centre for multi air conditioning system for buildings aiming to expand the air conditioner business.

Middle East is the area where the company started overseas business of air conditioners in 1971. They established the foundation of 'GENERAL' brand there, by developing the room air conditioners that could maintain high performance and withstand the continuous operation even under the severe environment such as unstable electricity as well as the extremely high outside temperature of more than 50°C and dust storm.

In recent years, various countries of the Middle East have been promoting and strengthening the energy saving regulations by respective governments – along with the increasing electricity consumption with the background of population increase and economic growth – and the air conditioner market in the area is anticipated to expand.

As the demand for large-size air conditioners is increasing along with the progress of urban development, FG (ME) has moved to the new office, which has expanded the training centre in August following the release (in January) of 'AIRSTAGE' V-III, multi air conditioning system for buildings coping with high outside temperature.

With the relocation of the office, they plan to strengthen the business in the Middle East through the trainings and business negotiations – for the expansion of order acquisition for large-scale projects. ■

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Modine to acquire HTS, signs agreement

Modine Manufacturing Company, which is well known for its thermal management technology and solutions, has entered into a definitive agreement to acquire Luvata Heat Transfer Solutions (HTS). The acquisition is for a total consideration of approximately $422 million. It will be financed through a combination of cash, debt, and $25 million of the manufacturing company's common stock.

Further, the company expects the transaction to close within calendar year 2016, subject to customary closing conditions, including regulatory review. J.P. Morgan Securities LLC serves as its exclusive financial advisor and Kirkland & Ellis serves as its primary legal advisor.

Luvata HTS is well known for commercial and industrial coils, coolers and related products, primarily for the HVAC&R markets. In addition, it is reported as a significant player in the power generation and transformer cooler markets due to its strong relationships with European OEMs. As per the company, Luvata's offering to the HVAC&R markets is among the broadest in the world.

Thomas A. Burke, Modine President and Chief Executive Officer (CEO) said, "We examined several interesting acquisition opportunities as part of our strategic review process, but Luvata HTS was the most logical and compelling fit. While the company already operates a fairly lean enterprise, we do expect to achieve annual cost synergies of roughly $15 million within the first three to four years, in particular through the ongoing optimisation of manufacturing and procurement organisations and cost structures. We also believe revenue synergies will emerge as we look to sell Luvata HTS's products into Modine's broad client base, utilise Luvata HTS's sales team to sell Modine's coil and other products into Luvata HTS's client base, and pursue other larger geographic and adjacent product line opportunities in the future."

"Luvata HTS is the largest independent producer of HVAC&R coils and coatings globally. They bring an innovative culture and broad product offering that are highly complementary to Modine. Further, they bring a global footprint with manufacturing facilities spread over three continents, all of which are supported by best in class sales, engineering and support teams. Most importantly, the addition of Luvata HTS helps to expand our margin profile and future growth opportunities. We look forward to welcoming the Luvata HTS team to our family," he added further. ■

LG launches new models with the InstaView feature

David Vanderwall

LG Electronics is building on its success in the refrigerator category with the launch of new models with the InstaView feature, representing the next generation LG's award-winning Door-in-Door refrigerator technology. Four new models with InstaView technology boast a sleek glass panel that illuminates with two quick knocks, allowing users to view inside without opening the door. And LG's Doorin-Door technology allows users to access often-used items without having to open the entire refrigerator. The refrigerator's ColdSaver Panel, a barrier between the interior compartment and the rest of the refrigerator, reduces cold air loss and helps keep food fresh.

David VanderWaal, VP, Marketing, LG Electronics USA , says, "We've been impressed with the consumer interest for years in the Door-In-Door feature pioneered by LG, and now we're taking this innovation to new heights with the introduction of InstaView." ■

SPX introduces Marley NC Everest cooling tower

SPX Cooling Technologies, Inc., a well known manufacturer of evaporative and air-cooled heat exchangers, has introduced the new Marley NC Everest Cooling Tower (CT). It is a crossflow evaporative cooling system that provides up to 50% more cooling capacity than any other single-cell, factory-assembled cooling tower. In addition to unmatched cooling capacity, the NC Everest uses up to 35% less fan power to achieve higher energy savings. Its unique design minimises piping and electrical connections to reduce installation costs. Seven-foot doors provide access to the tower's interior service decks and mechanical components, making routine inspections and maintenance safer and easier.

With the (patent-pending) MarKey Drift Eliminators, the CT achieves the lowest measureable drift rate, down to 0.0005% of circulating H_2O flow, so less H_2O escapes the tower. The sound levels have been independently verified per CTI ATC-128 test code by third-party CTI-licensed test agents and certified acoustical engineers. ■

MHI launches 2016 'roomist' humidifier lineup

Mitsubishi Heavy Industries Air-Conditioning & Thermal Systems Corporation, a Group company of Mitsubishi Heavy Industries, Ltd. (MHI), has launched eight models in its 2016 lineup of 'roomist' humidifiers for the Japanese home market. The lineup is to include five fan-powered steam type units and three hybrid evaporative warm-mist models. The former types are designed for easy operation and engineered for outstanding energy savings and quiet operation. The latter models achieve one of the highest levels of energy efficiency among products of their type, and they are also the only humidifiers in the industry equipped with a function enabling sequential operation with an air-conditioner.

Among the five fan-powered steam type humidifiers, the two with a humidifying capacity of 350 milliliters per hour (ml/h) consume a maximum of only 250 watts (W) and operate at 27 decibels (dB) - making them the most energy-efficient and quietest humidifiers of their type. The lineup will also include two 600ml/h models - the only humidifiers of this capacity offered by the major Japanese manufacturers – and one 1,200ml/h model.

All models in the fan-powered steam humidifier lineup, including the newly added 1,200ml/h unit, come with a standard-equipped ion filter that curbs scaling, for easy overall maintenance.

The three hybrid evaporative warm-mist humidifier models offer humidifying capacities of 500, 700 and 850ml/h. They integrate two systems: a vapourising system in which a moist humidifier filter is fanned to induce humidification, and a warm-mist vapourising system in which a moist humidifier filter is placed in a warm air current to induce vapourisation. When humidity is low, humidification is swiftly achieved by warm-mist vapourisation; then, when the preset humidity level is reached, the unit switches to vapourisation mode and adjusts the amount of humidification.

As changeover between the two modes is automatically carried out depending on the humidity level, unnecessary electricity costs can be significantly curbed. When the unit is set to 'ECO' operating mode, the heater is shut off and power consumption is reduced by roughly 90% compared to during normal operation. ■

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Silk keeps fruits fresh without refrigeration

Tufts University's biomedical engineers have demonstrated that fruits can stay fresh for more than a week without refrigeration, if they are coated in an odourless, biocompatible silk solution so thin as to be virtually invisible. The approach is a promising alternative for preservation of delicate foods using a naturally derived material and a water-based manufacturing process.

Silk's unique crystalline structure makes it one of nature's toughest materials. Fibroin, an insoluble protein found in silk, has a remarkable ability to stabilise and protect other materials while being fully biocompatible and biodegradable.

For the study, researchers dipped freshly picked strawberries in a solution of 1 % silk fibroin protein; the coating process was repeated up to four times. The silk fibroin-coated fruits were then treated for varying amounts of time with water vapour under vacuum (water annealed) to create varying percentages of crystalline beta-sheets in the coating. The longer the exposure, the higher the percentage of beta-sheets and the more robust the fibroin coating. The coating was 27 to 35 microns thick.

The strawberries were then stored at room temperature. Uncoated berries were compared over time with berries dipped in varying numbers of coats of silk that had been annealed for different periods of time. At seven days, the berries coated with the higher beta-sheet silk were still juicy and firm while the uncoated berries were dehydrated and discoloured.

Tests showed that the silk coating prolonged the freshness of the fruits by slowing fruit respiration, extending fruit firmness and preventing decay. ■

Specified Air Solutions takes over Dectron

Specified Air Solutions, a well known manufacturer of semi-custom commercial and industrial HVAC equipment, has completed the acquisition of the Dectron pool dehumidification systems business (Dectron) from the Lakdawala family.

Specified Air is a portfolio company of The Sterling Group, a Houston-based middle market private equity firm. Dectron is a global provider of highly-engineered custom and semi-custom dehumidification, air quality and energy recovery solutions primarily for indoor pools.

Charley Brown, CEO of Specified Air Solutions, said, "Dectron is a strong addition to Specified Air's broad portfolio of products that provide solutions across a wide variety of commercial and industrial HVAC needs."

John Hawkins, a Partner at The Sterling Group, said, "The addition of Dectron is a part of Sterling's targeted initiative to grow Specified Air by adding complimentary HVAC solutions. We look forward to continuing to grow the business organically and through acquisition." ■

Whirlpool Corporation goes for FDC expansion

Whirlpool Corporation recently revealed its plans to expand their Greenville, Ohio Factory Distribution Centre (FDC) that services all global shipments of Kitchen Aid small appliances. The project, which will nearly double the FDC from 327,000 square feet to approximately 650,000 – builds upon Whirlpool Corporation's commitment to American manufacturing and reinforces Greenville as the global hub of the company's small appliances business.

The recent groundbreaking follows Whirlpool Corporation's $40 million investment in its Greenville, Ohio manufacturing plant – part of a larger $80 million project to expand facilities across Ohio that the company announced in May. The FDC's expansion, which is scheduled to be completed by March 2017 – will stand adjacent to the current facility in Greenville.

Ken Hossler, Plant Lead at the Greenville FDC, said, "This groundbreaking today is a testament – both to the success of our global Kitchen Aid business as well as our commitment to domestic operations in the U.S. and Ohio. We're continuing to invest in Ohio due to the skilled and talented workforce here, and are looking forward to this expansion's role in our continued growth." ■

Chillventa is putting its best foot forward this year

Daniela Heinkel, Director Chillventa

Chillventa will once again turn the Nuremberg Exhibition Centre into the international meeting place for the refrigeration, air-conditioning, ventilation and heat pump community from 11 to 13 October 2016.

The Chillventa CONGRESS will kick off the event on 10th October, inviting attendees to spend an entire day learning about the latest trends and developments. The mood in the industry is upbeat, and the exhibition is set to grow again in 2016.

In the words of Daniela Heinkel, Director Chillventa, "Chillventa is putting its best foot forward this year. The exhibition space has grown considerably once again. We designed a new hall configuration to accommodate the wishes of our exhibitors for more space. We are honoured by the trust placed in our exhibition. Experts from all over the world come together at Chillventa to obtain information, share their views, and present and initiate new projects. We expect more than 30,000 trade visitors again this year. And we expect almost 1,000 exhibitors from around the world again."

While talking on the topics that will be in the spotlight at Chillventa 2016, she informed, "With its comprehensive technical offering, Chillventa presents components, systems and applications for refrigeration, air conditioning, ventilation and heat pumps to a broad cross-section of the industry. This year's exhibition and CONGRESS will focus on topics such as current climate targets, eco-design, refrigerants, efficiency through control systems, innovation in heat transfer, limits of refrigeration technology and climate control at data centres." ■

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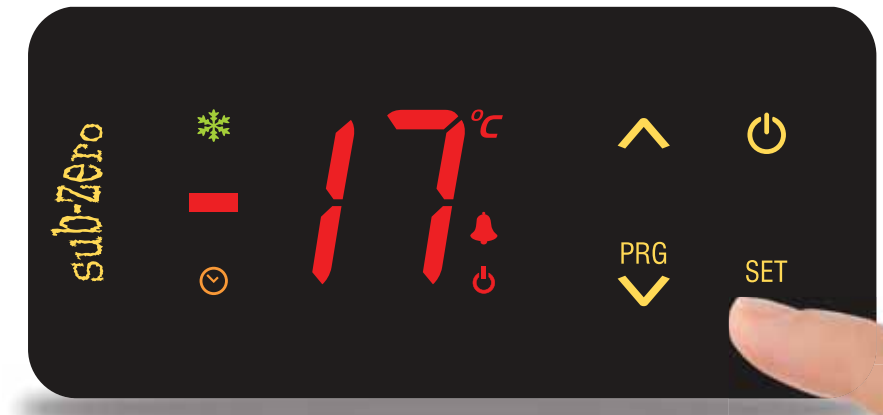

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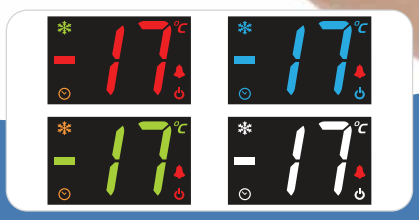

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Ashish Gaikwad

He brings to the role a successful track record from a career spanning more than 26 years...

Honeywell Automation India appoints a new Managing Director

Honeywell Automation India Limited (HAIL) has appointed Ashish Gaikwad as its Managing Director (MD) effective from October 1, 2016. He succeeds Vikas Chadha, who was recently named President, Honeywell India.

Ashish joined Honeywell in 1992 and has progressed through roles of increasing responsibility, most recently serving as General Manager for the Advanced Solutions business for the Asia Pacific region within Honeywell Process Solutions. He brings to the role a successful track record from a career spanning more than 26 years with a mix of operations, sales, strategic marketing and general management. Ashish has a bachelor's degree in electrical and electronics engineering from Birla Institute of Technology and Science (BITS), Pilani.

Vikas Chadha, President, Honeywell India, said, "This appointment is a testimony of the maturity and depth of Honeywell's leadership pipeline and focus on building talent from within. Ashish has successfully driven the growth of the Advanced Solutions business for the Asia Pacific region. With his hands-on knowledge of the latest in automation and control solutions, including software solutions, digital transformation, the Industrial Internet of Things (IIoT), and his understanding of the Indian market, I am confident Ashish will take HAIL to new heights." ■

Santiago Martin

He brings tremendous leadership and expertise that will strengthen the company help customers...

Danfoss Drives gets a new Head for the Americas region

Danfoss has appointed Santiago Martin as Head of Danfoss Drives for the Americas region. Previously, Martin was Vice President at Danfoss Drives in Latin America, where he was responsible for sales, marketing, and service.

He joined Danfoss as part of the company's merger with Vacon, where he spent seven years — first as Managing Director in Spain and Portugal, and later as Vice President of Vacon Latin America.

Martin holds an International MBA from Instituto de Empresa business school in Madrid, Spain, and completed Hanken & SSE Executive Education's LEAP global leadership program in Stockholm, Sweden. He has a bachelor's degree in electrical industrial engineering from the University of Seville (Spain).

John Galyen, President, Danfoss North America, said, "Variable speed drives continue to play an increasingly important role in the control of motor, fan, pump, and gear applications across a variety of industry sectors; this technology is becoming more integrated as part of an overall pursuit of reliability, performance optimization, and energy efficiency."

"We're pleased to welcome Santiago to this new position within Danfoss. He brings tremendous leadership and expertise that we believe will strengthen our ability to help customers tackle challenges, meet industry demands, and look toward future high-performance innovations."

Danfoss Drives is the world's second largest manufacturer of variable speed drives, with a product and service portfolio that meets the needs of a variety of energy-intensive and high-performance industries dependent on efficient and reliable motor control — including HVAC, refrigeration, food and beverage etc. ■

Tony Cole

He served as Airedale's Operation's Director and now with the UK -based company for over 26 yrs...

Airedale International Air Conditioning reveals change in leadership

British cooling company Airedale International, part of the Modine Group, has recently declared that Tony Cole has succeeded Clive Parkman as UK Managing Director for the Airedale Group, which includes primary operations in Leeds and Consett, UK and Johannesburg, South Africa. Prior to this, he served as Airedale's Operation's Director and has been with the UK based company for over 26 years, having varied roles throughout the organisation.

Matt McBurney, Modine Vice President of Building HVAC, said, "Tony has a wealth of experience and has been credited for shaping our manufacturing processes in the UK and South Africa. His passion for our principles and values, as well as familiarity with our culture, vision and strong leadership make him the ideal person to lead the overall strategic development of our business."

Tony said, "We've a dedicated, highly-skilled workforce, industry leading mfg capabilities, a fantastic culture and strong values that are second to none. I look forward to continuing our ambitious plans to grow the business and pioneer innovative, market-leading, British engineered thermal solutions for our customers." ■

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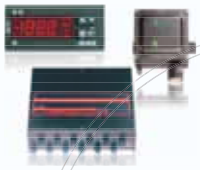

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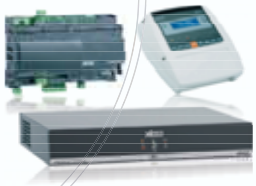

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Lizzie Garside wins 'South West Region Contribution to the Business' Award

Bristol-based engineering student, Lizzie Garside, has been named one of two winners of the South West Region's Contribution to the Business Awards. The award scheme is operated by The Engineering Development Trust (EDT) and is open to students participating in the Year in Industry (YINI) scheme. YINI matches talented gap year and undergraduate students with businesses for paid work placements before or during their degree course.


Lizzie is receiving the award...

Lizzie Garside (19) was one of the six finalists, who delivered presentations to a panel of judges at the National Composites Centre in Bristol. The judging panel acknowledged the significant impact made by Lizzie during her YINI placement with Bristol-based refrigeration and testing house, ECH Engineering. She joined the company to gain practical, hands-on engineering experience prior to studying for a degree in Mechanical Engineering (Bachelor of Engineering with Honours) at the University of Canterbury, Christchurch, New Zealand.

In addition to the Contribution to the Business Award, the panel of judges also presented her with the Bandvulc Environmental Award, in recognition of the energy saving aspects of her work.

Dr Ed Hammond, ECH Engineering's Managing Director, said, "Lizzie has been a model employee and has made a major contribution to ECH Engineering and a number of our commercial projects. We wish her well for her studies in New Zealand and we are confident that she will go on to make a significant impact in the engineering sector." ■

Frick India receives award from ASSOCHAM

Frick India Ltd., has been awarded "Product of the Year 2016" award for their Screw Compressors by the Associated Chambers of Commerce & Industry of India (ASSOCHAM) at their 9th International Summit on Food Processing, Agriculture & Dairy (FAD) Summit.

The Chief Guest of the Summit, Sadhvi Niranjan Jyoti, Minister of State for Food Processing Industries, Government of India, along with Parshottam Rupala, Minister of State for Agriculture & Farmers Welfare, Government of India presented the award.

The summit was supported by Ministry of Food Processing Industries (MOFPI) and Investment & Promotion Technology Division, Ministry of External Affairs. ■


A view of the ASSOCHAM's award ceremony...

Tozour Energy Systems earns 'Best Places to Work' title

Full-service HVAC and building automation provider Tozour Energy Systems has once again been named one of Greater Philadelphia's 'Best Places to Work' in the 13th annual ranking presented by the Philadelphia Business Journal. The top employers of Greater Philadelphia, as selected based on surveys taken by employees of companies spanning the region, receive the distinction of 'Best Places to Work (hereafter BPtW).'

Tozour Energy Systems has received the honour in the 'Large Company' category five years running. Employees of companies participating in the Philadelphia Business Journal survey complete an online questionnaire administered by an independent surveying firm.

Questions range from evaluating work-life balance, respect and employee care, teamwork, commitment to community and more. "Thank you to our leadership team, our BPtW committee and our entire staff for voting Tozour Energy Systems among Philadelphia's BPtW for the 5th year in a row. Our company's success is a direct result of our highly engaged team that works tirelessly to deliver innovative solutions and outstanding customer service," said Kevin Duffy, President, Tozour Energy Systems.■

Motorcars Honda bags the Carbon Neutral Award

British Petroleum (BP) rolled out the 'green' carpet for more than 5,000 residents and businesses at Wade Oval in University Circle to present Motorcars Honda with the prestigious 'Carbon Neutral Award' status, the first automotive dealership in the world with this distinction.

Motorcars Honda is an automotive dealership in Cleveland Heights, OH.

The dealership can boast impressive solar panels that generate 70% of the dealership's electricity, LED lighting fixtures that now replace the old energy consuming bulb, a system to reclaim water at their car wash, natural gas fuelling pump.


Motorcars Honda receives the award...

Trevor Gile, General Manager at Motorcars Honda, said, "We're eliminating the carbon footprint of the vehicles we sell; 5 years ago, we never thought that we would be going down this path, but as our employees became more involved and concerned with the environment, we started to learn about some of the various options available to help."■

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- Auto Power Off
- Non Contact Voltage
- Data Hold & Max Function

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Selecting the right source for the purchase of materials is an important consideration as the whole purpose of insulation will be defeated, if proper care is not taken...

Chiller piping with INSUshield-tubing...

With process and pharmaceutical industry in the country booming, chiller pipe insulation material manufacturers in India are having a heyday.

This is so, because in any industrial process or plant, insulation is necessary to control heat gain or heat loss on process piping and equipment.

There is near unanimity among the users that the correct application of thermal insulation can significantly reduce operating costs and may even prevent plant breakdown.

This belief and awareness has only added to the demand for chiller pipe insulation material in the country.

With government giving increased importance to the growth of process industry in the country through programmes like 'Make in India', demand for chiller pipe insulation material is only going to go up in the coming days.

As sustainability and energy conservation campaigns gain further momentum, insulation industry itself is in for sunny days as insulation conserves energy by reducing heat loss or gain.

Selecting the right source for the purchase of materials is an important consideration as the whole purpose of insulation will be defeated, if proper care is not taken while selecting the insulation material as it is often exposed to extreme operating conditions.

Over the years, Supreme Industries has proven to be dependable chiller pipe insulation material manufacturer in India and its product INSUshield-tubing has been regarded as an ideal piping insulation material.

The very fact that INSUshield is certified 'Class O' in Fire Propagation and 'Class 1' in Surface Spread of Flame as per BS 476 Part 6 & Part 7, respectively, proves that it is not a run of the mill stuff.

It goes without saying that INSUshield is chemically inert, thus providing resistance to chemical attack. Further, prolonged exposure to extreme operating temperatures will not have any impact on INSUshield as it performs well in wide operating temperature range from -40°C to +80°C.

Above all, it is a non-fibrous, fire retardant, closed-cell, tri-dimensional chemically crosslinked polyethylene foam and is more than 90% closed-cell thus ensuring negligible water/moisture absorption.

More importantly, INSUshield is known to maintain its insulating properties throughout its life span.

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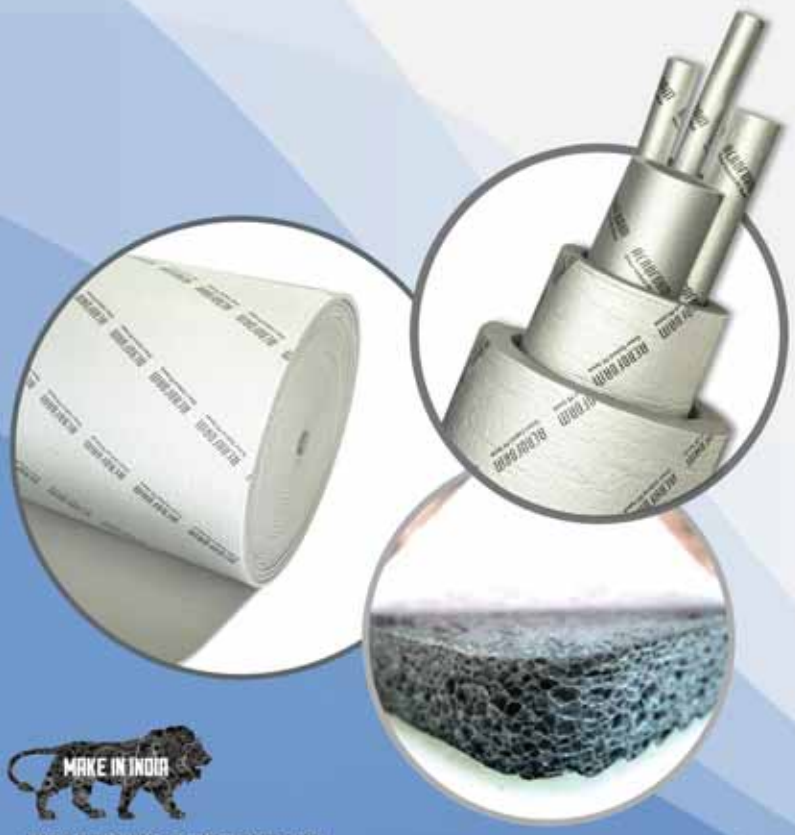

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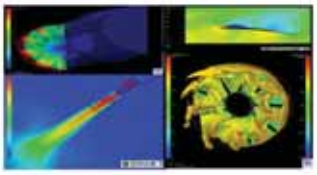

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Reduction Of Operational Costs

An engineering team from the Asia division of the UK-based refrigeration specialist carried out complete marine refrigeration inspections aboard the Cala Portese, Cala Piana, Cala Pevero and Cala Piccola. What happened then?

London Ship Managers (LSM) manages reefers and container carrying ships, registered in a number of countries including the United Kingdom. According to the company, its ship management extends far beyond the normal limits of a standard ship management contract. It embraces all aspects of ship owning, such as insurance, surveying and inspection, new building research, development and supervision, as well as sale and purchase.

Recently, the company has made substantial savings across its fleet of 9000gt refrigerated cargo vessels following an extensive refrigerant plant optimisation programme carried out by Oceanic Technical Solutions. An engineering team from the Asia division of the UK-based refrigeration specialist carried out complete marine refrigeration inspections aboard the Cala Portese, Cala Piana, Cala Pevero and Cala Piccola.

LSM Technical Fleet Manager Mike Seymour said, "We found we were spending substantial time and resources looking and checking for gas leaks which were still not being efficiently detected, in order to try and remove any environmental impact our vessels were making. This, along with losses of refrigerant obviously had a monetary impact, which we also wanted to reduce."

The company operates large direct expansion-type reefer plants, with a substantial amount of pipe work penetrating decks and bulkheads, so gas monitoring and detection is a highly complex task for them.

Seymour added, "We transport bananas and pineapples so maintaining a 13.3°C temperature is crucial to our operations. If we lose refrigerant, not only does it result in unnecessary expenditure, it puts undue stress on the compressors and it could result in cargo loss. Although our vessels operate outside of European F-Gas rules, its good practice to ensure our ships operate in an economically and environmentally-sustainable way."

Taking just three days to inspect the entire plant on each ship, the Oceanic Technical Solutions team carried out a full system evaluation and performance test, finding substantial gas leaks from corroded pipe work in bulkhead penetrations.

Dave Lloyd, Oceanic Technical Solutions' Technical Director said, "Two of the vessels were found to have major refrigerant leaks, but they had proven very difficult to find. You get a lot of moisture building up around insulated pipes and bulkhead penetrations and this can corrode the pipe work, resulting in substantial refrigerant loss."

Once Lloyd's team found the source of the leaks, the plant was shut down and isolated so that repairs could take place. Additional isolation valves were fitted and when the plants were running to optimum, shipboard crews were shown how best to carry out routine inspections.

"The catalyst for inspection was to reduce the amount of refrigerant being used and to prevent gas escaping to the environment. We achieved that," said Lloyd.

While LSM has made annual savings of about 15% year-on-year with replacement of refrigerant cylinders, frequent refrigeration inspection and optimisation prevents compressor wear and tear and increased loads on generators as they compensate for systems with reduced refrigerant.

"Oceanic got our refrigeration plants back to their design specifications. The savings we have made in refrigerant costs alone have more than paid for the cost of inspection and maintenance. That's a very good return on investment," said Seymour.

"With vessel movement and vibration, it is inevitable that refrigerant leaks will occur, with seals breaking down and valves coming loose and so on; but the key is to carry out frequent performance tests and to keep on top of the maintenance. Simple measures, such as regular oil changes, replacing filters and tightening valves and flanges, can make a huge difference," added Robert Chesters, Oceanic Technical Solutions' Managing Director.

LSM has shown that even though their vessels do not fall under the F-Gas regulations for mandatory inspections, they have taken control of refrigerant consumption, and the overall impact of operations on the environment. This is responsible ship management. ■

Cala Pevero (left) and Cala Piccola (right) are to LSM vessels to have been inspected by Oceanic Technical Solutions…

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Bio-Solar Chilling System

24×7 Renewable Energy For Refrigeration

Photo courtesy: Enerpoint

Approximately 15% of all the electricity produced in the whole world is employed for refrigeration and air-conditioning processes. The time has come to look at the alternative ways...

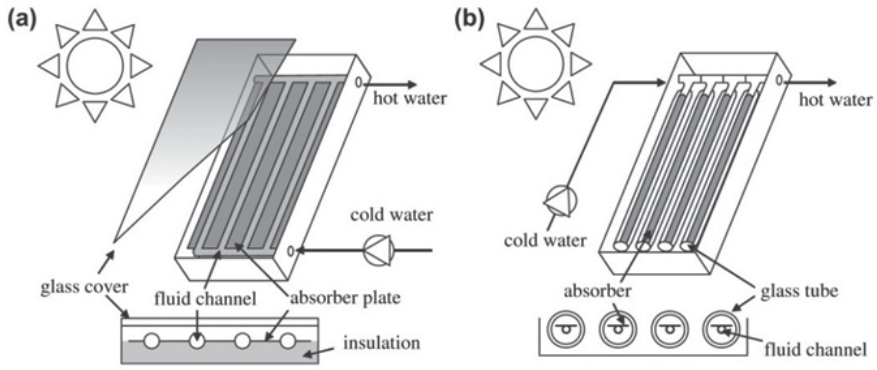

Fig. 1: Schematic diagrams of non concentrating solar collectors
(a) flat plate type... and (b) evacuated type...

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

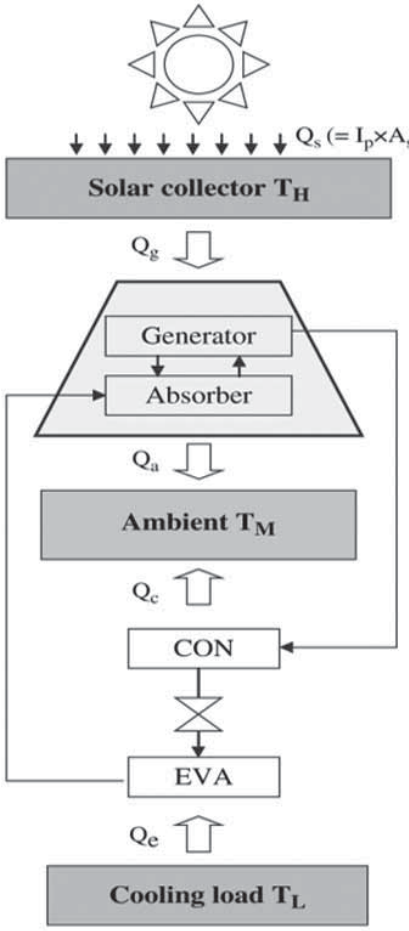

Fig. 2: Solar absorption ref. system...

At the time of independence milk production in India was only 17 million tons per annum. Today India has become number one in milk production, producing 127 million tons per annum with approx. 20% of the total milk production is handled by the organised sectors.

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. Solar- Biogas Hybrid based cold Storage technology would be a good opportunity for such farmers to take maximum benefits.

System Features

Hybrid Solar-Biogas thermal systems use solar energy in day time and biogas for night time as a heat source to produce refrigeration effect. Solar heating system consisting flat-plate solar collectors including a metallic absorber and an insulated casing topped with glass plate(s). Evacuated collectors may also perform better at high temperatures. Evacuated collectors are typically made in a glass tube design, i.e., a metallic absorber inserted in an evacuated glass tube, to withstand the pressure difference between the vacuum and the atmosphere. Figure 1 shows schematic diagrams of these two collectors.

Hybrid Solar-Biogas thermal sorption refrigeration 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. Fig. 2. And Fig.3 shows schematic diagram of solar powered and biogas power closed sorption system respectively. Working of a sorption refrigeration system is described as under:

- 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.

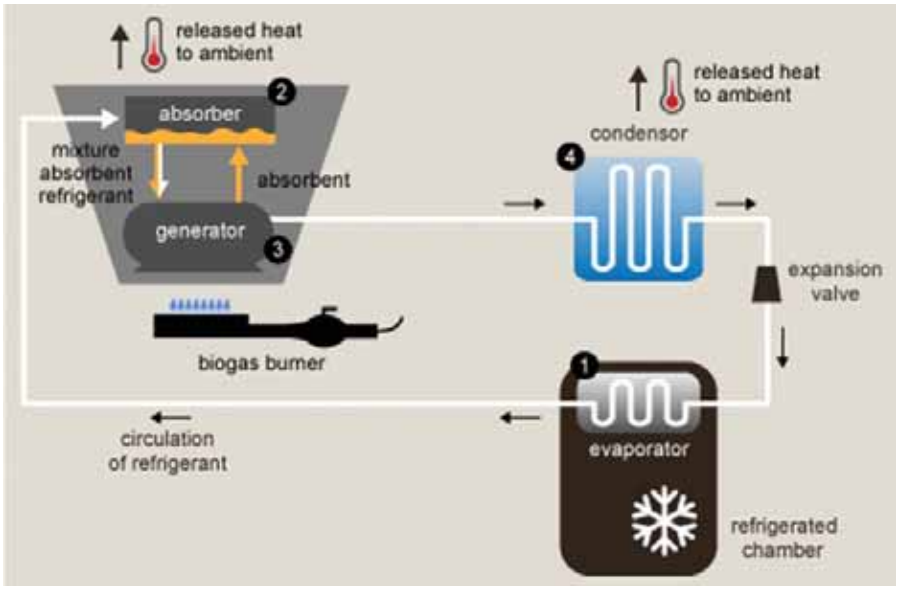

Fig.3 Schematic view of biogas based absorption refrigeration system...

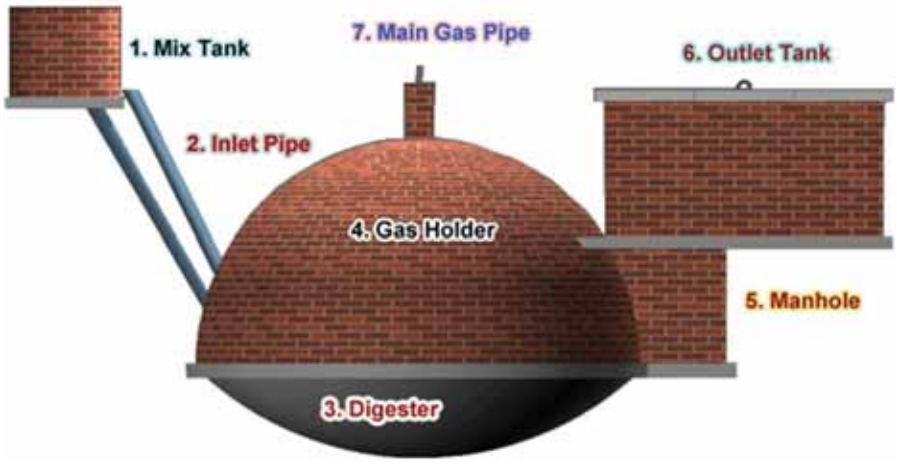

Fig.4: Biogas plant...

Biogas

Biogas is produced by decomposition of any organic matter in the absence of oxygen/ air. Biogas comprises of 60-65 percent methane (CH_4), 35- 40 percent carbon dioxide (CO_2), 0.5-1.0 per cent hydrogen sulphide (H_2S) and traces of water vapours. It is almost 20 percent lighter than air. Biogas cannot be converted into liquid like Liquefied Petroleum Gas (LPG) under normal temperature and pressure. The slurry coming from digester is rich in nitrogen which is an essential nutrient for plant growth.

Biogas is an easy and healthy cooking fuel since methane emissions from untreated cattle dung and biomass wastes can also be avoided. Since there is no pollution from biogas plants, these are one of the most potent tools for mitigating climatic change and being earth.

Properties

- Biogas is a non-toxic, colourless and flammable gas.
- It has an ignition temperature of 650 – 750 °C.
- Its density is 1.214 kg/ m^3
- About 60 percent methane and 40 percent CO_2 content
- Calorific value is 20 MJ/m^3 (4700 kcal).
- Almost 20 percent lighter than air
- It liquefies at a pressure of about 47.4 kg/ cm^2 at a critical temperature of - 82.1°C.

Purified biogas (bio-methane) has a higher calorific value in comparison to raw biogas.

Conclusion

Dairy and food industries are fast growing industries and day-by-day newer technologies are being introduced to get better quality of foods. Use of conventional energy is common practice for major processing of milk. At present almost all dairy operations are performed using grid supply with diesel gen-set as backup. Milk procurement system has changed in India and now milk is being procured by maintaining cold chain to improve its microbial quality. In this article, an idea has been proposed – by which it is possible to use solar energy and biogas energy to operate vapour sorption refrigeration systems. ■

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First Air-Cooled Chiller With DR-55

The Trane AquaTrine demonstration unit was on showcase at the IIR International Congress...

Trane recently presented the first-ever air-cooled demonstration chiller with next generation, low Global Warming Potential (GWP) refrigerant DR-55 at the IIR International Conference of Refrigeration. This demonstration chiller is a Trane AquaTrine using DR-55, which is designed for top-grade apartments, luxury villas, office buildings, small restaurants, retail stores and hotels. It uses a high-efficiency hermetic scroll compressor and evaporator technology to provide a stable, reliable and highly efficient operation.

DR-55, marketed by The Chemours Company as Opteon XL55, is a next generation low-GWP refrigerant with strong safety, design and sustainability performance compared to other refrigerant choices. An olefin-based blend, DR-55 is currently being evaluated by the HVAC industry for use in unitary and residential equipment.

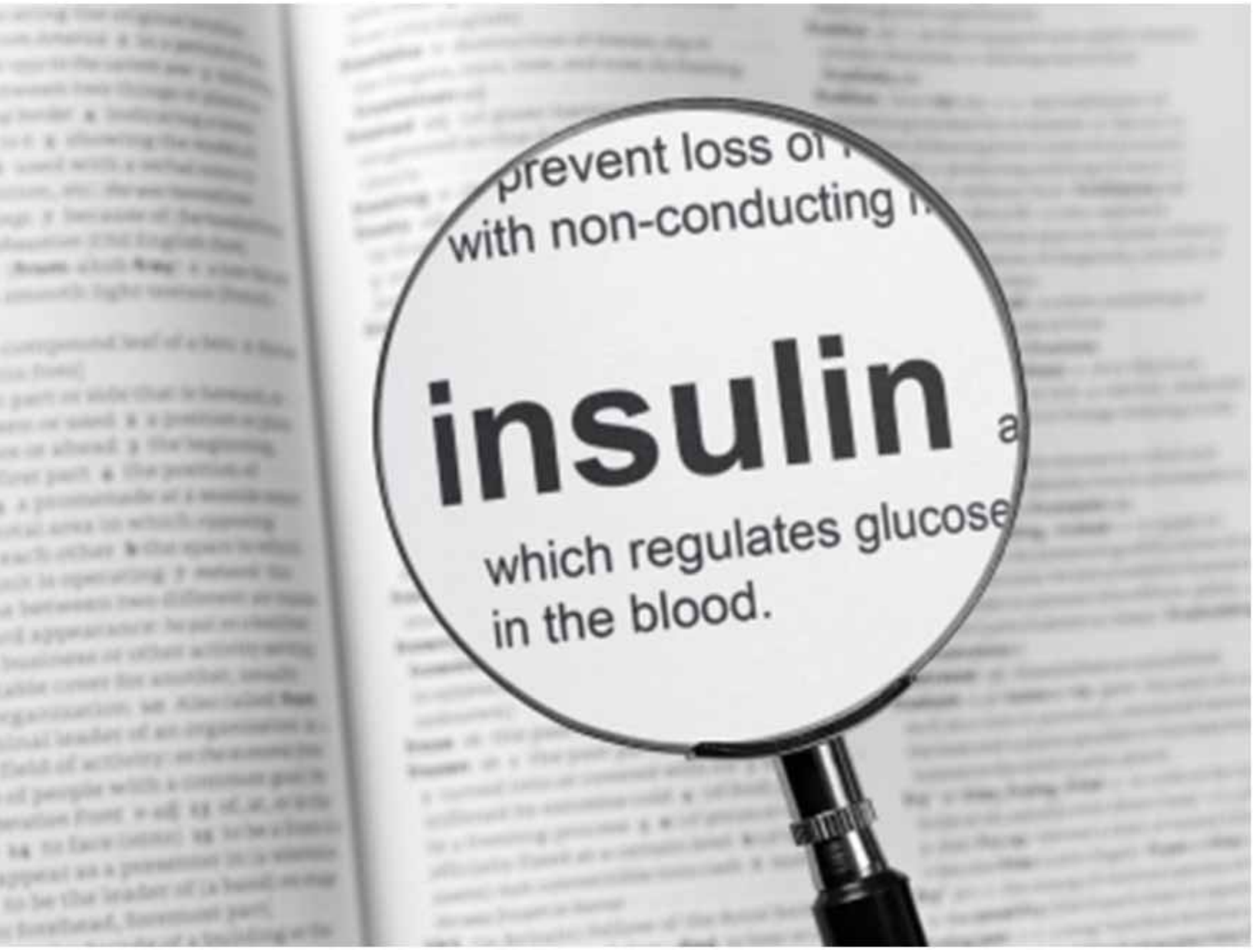
"We expect high performance HVAC systems to be available with next generation refrigerants like DR-55 within the next 12-18 months pending regulatory approval. This demonstration project is one way that Ingersoll Rand is delivering on our environmental commitment to identify, test and introduce technologies that are safe, increase efficiency and reduce climate impact," said Randal Newton, Vice President, Enterprise Engineering, Ingersoll Rand.

Image: The Chemours Company

DR-55 is under evaluation...

The University of California (UC) at Davis Western Cooling Efficiency Center laboratory recently completed testing of DR-55 as a design-compatible alternative to R-410A in a Trane Precedent roof top heat pump. "DR-55 should be considered as a possible replacement for R-410A because of the relatively low global warming potential and refrigerant charge requirements. Lab testing has shown excellent performance over a wide range of outdoor air conditions. Although some flammability will need to be accepted to use refrigerants with lower GWP, refrigerants like DR-55 offer greater potential for safer implementation," said Curtis Harrington, Associate Engineer at UC Davis Western Cooling Efficiency Center. ■

10 Tips For Storing & Carrying Insulin



Do not let your dependence on insulin for your fight against diabetes, restrict your lifestyle. Here are 10 tips that will help you store and carry your insulin...

Insulin therapy is often an important part of diabetes treatment. The primary role of insulin is to keep the level of glucose in the bloodstream within a normal range. After you eat, carbohydrates break down into glucose, a sugar that serves as a primary source of energy, and enters the bloodstream. Normally, the pancreas responds by producing insulin, which allows glucose to enter the tissues. Insulin helps in storage of excess glucose for energy. On eating — when insulin levels are high — excess glucose is stored in the liver in the form of glycogen. Between meals — when insulin levels are low — the liver releases glycogen into the bloodstream in the form of glucose. This keeps blood sugar levels within a narrow range.

If your pancreas secrete little or no insulin (type 1 diabetes), or your body does not produce enough insulin or has become resistant to insulin's action (type 2 diabetes), the level of glucose in your bloodstream increases because it is unable to enter cells. Left untreated, high blood glucose can lead to complications such as blindness, nerve damage (neuropathy) and kidney damage.

Insulin although a very useful hormone, is only potent when it is stored under right conditions or it will begin to breakdown. This results in it being absorbed and moved around the body differently, affecting blood glucose levels. However, by following a few simple tips we can ensure that the potency is maintained.

1. Studies show unopened insulin is best stored inside the fridge [2° to 8° Celcius]. Unopened insulin stored in the refrigerator is good until the expiration date printed on the insulin box.
2. Once open there are different storage needs for insulin. What does OPEN mean? OPEN means the insulin cap is removed and the rubber stopper was punctured. Vials and pens have different needs for storage. These differences can lead to confusion.

   Open (in-use) vial: Opened vials, whether or not refrigerated, must be used within 28 days. Although refrigeration is highly recommended, if however not available, the open vial in use can be stored for up to 28 days in a place away from direct heat and light, as long as the temperature is not above 30°C.

   Pen: Once used for the first time, insulin pens should not be stored in the fridge. Instead, they should be stored at controlled room temperature (15°C to 25°C at a relative humidity of 60%). The number of days you can use the pen will depend on which pen you use.

3. Store insulin in a refrigerator in hot climates where possible.
4. Do not expose to direct heat e.g. car glove compartments, near a fire, radiator or windows.
5. Never store in a freezer. If insulin is frozen, do not use it. Do not use even after thawing. Freezing temperature will break down the insulin and it will not work well to lower your blood sugar. Frozen insulin must be disposed.
6. Do not leave in sunlight. Exposure to light diminishes the potency of insulin.
7. Write the date on the insulin vial on the day you open it or start keeping it outside the fridge. This will help you remember when to stop using it. Throw the insulin away 28 days after opened or since kept out of the fridge.
8. When traveling, keep insulin on your person or in your carry-on bag. Insulin placed in suitcases that are transported in cargo holds of aircraft, boats, and buses or in car trunks may be exposed to damaging temperature extremes unless it is protected in a special bag.
9. Shuttling opened insulin vials between refrigeration and room temperature does not appear to affect the insulin's potency. However, manufacturers of insulin pens do not recommend storage in a refrigerator once a pen is opened and in use.

10. Check the appearance of the insulin before you use it. Insulin becomes unsuitable for use — if the soluble (clear insulin, quick acting) may look cloudy or turbid. Suspension or cloudy insulin may have lumps or clumps that do not disperse when gently mixed, or the bottle/vial may have a frosted appearance with particles sticking to the sides. It may also turn brownish incolor.

Pluss has developed a complete solution for carrying insulin- PronGO versatile. The bag comes with advanced Phase Change Materials (PCMs) packs, which maintain a temperature of 2-8°C for up to 5 hours and an extended 15 hours for a temperature control between 2°C to 25°C.The bag is portable and light to be carried easily.

The combined passive cooling from PCMs and thermal insulation ensures protection from temperature fluctuations and direct sunlight.

The bag has an overall internal capacity of 3 litres making it versatile for carrying other refrigerated products as well for long travels. PCMs are innovative smart materials that release cool/heat energy at a precise temperature as desired. These bags would be most beneficial during both short (4-5 hours) and long duration (up to 15 hours*) travel through road, flightor train. ■

**2-25°C only recommended for opened vials. Standard testing done under an ambient temperature of 30°C.*

Anirudh Batra
Associate - Business Development,
Pluss Advanced Technologies Pvt. Ltd.

Vishnu Sasidharan
Business Development,
Pluss Advanced Technologies Pvt. Ltd.

T P Singh

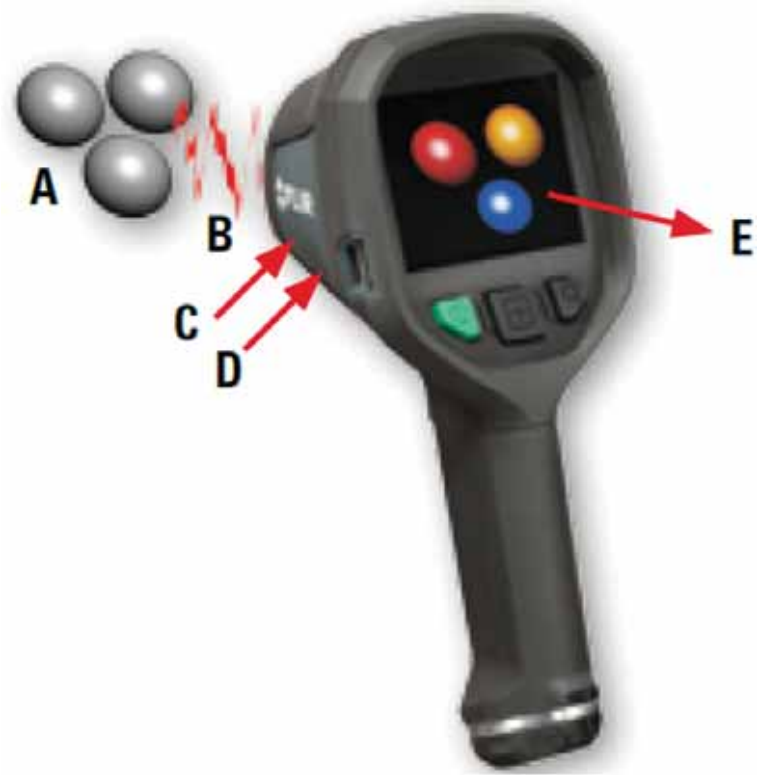
"Choosing a wrong or low resolution product can be dangerous..."

FLIR is the world leader in the design, manufacture and marketing of thermal imaging/IR cameras for a wide variety of applications in commercial, industrial and government markets. **FLIR** – Pioneer company in the **commercial infrared camera industry**, has been supplying thermography equipment to industry for over 50 years. From predictive maintenance, condition monitoring, electrical inspections, building diagnostics – inspection of building insulation, HVAC systems, and refrigeration units, air leaks and manufacturing process control, **FLIR** offers the widest selection of infrared cameras for beginners to professionals. **FLIR**'s name is well known in India for providing innovative cameras for this purpose. In an e-interview with **Cooling India**, **T P Singh, Country Manager, India-Instruments, FLIR Systems India Pvt. Ltd.**, is updating on various aspects of thermal imaging. Excerpts...

What is thermography and how does it works?

Almost all objects around us emit Infrared (IR) radiations, which our eyes cannot see. Infrared thermography is the art of transforming an infrared image into a radiometric one; every pixel in a radiometric image is actually a temperature measurement, so temperature values to be read from the image. Thermal imaging cameras are the perfect tool for locating and identifying faults/ failures because they make the invisible visible.

For understanding, see the image below: Infrared energy (A) coming from an object is focused by the optics (B) onto an infrared detector (C). The detector sends the information to sensor electronics (D) for image processing. The electronics translate the data coming from the detector into an image (E) that can be viewed in the viewfinder or on a standard video monitor or LCD screen. Since IR radiations are everywhere, these cameras have application almost at all the places.



What are the unique advantages of this technology?

Infrared (IR) inspection is a powerful and non invasive means of monitoring and diagnosing the condition of buildings. An IR camera can identify problems early, allowing them to be documented and corrected before becoming more serious and more costly to repair.

An infrared inspection within building diagnostics help:

- Visualize energy losses
- Detect missing or defective insulation
- Find moisture in the insulation, in roof and walls, both internal and outside
- Detect mold and badly insulated areas
- Locate thermal bridges
- Locate leaks in flat roofs
- Source air leaks
- Detect breach on hot-water pipe
- Detect construction failures
- Locate radiant floor heating faults
- Monitor the drying of buildings
- Detect electrical faults
- Find faults in supply line and district heating
- Plus much, much more!

What are the application areas for this technology in buildings?

Detecting Poor Insulation and Air Leaks

Infrared thermography (thermal imaging) is an outstanding tool to locate building defects such as missing insulation, delaminating render, condensation problems and 'see' energy loss. Thermography also helps assess flat roofs for damaged insulation and trapped moisture.

Bigger office buildings often have an atrium in the middle. These atriums often have a cafeteria at the floor and a glass roof above to let the sunshine in.

Large warehouses with well insulated prefabricated walls and roof can experience energy loss from the joints between these parts.

Insulation Defects

The typical thickness of the insulation varies from country to country. In cold climates the insulation usually is thick. In countries with warmer temperate climates, there is less thickness or nothing at all. On the other hand, in warmer climates, cooling inside is often used which calls for thick insulation to take care of the energy. Using an IR camera, the rule of thumb is that it should be at least 10°C temperature difference between outside and inside temperature the sides of the wall to get good, easy to see patterns. Using a camera with higher resolution and thermal sensitivity, the temperature difference can be less.

Detection of Air Leaks

It is not unusual to find air leaks through the envelope of a building. An air leak leads to higher energy consumption, often causing problems with the ventilation system, as well as causing condensation in the construction, which makes the indoor climate poor. 90% of air leaks are caused by the defect in the climate shelf.

To detect air leaks with an infrared camera a temperature difference and a pressure difference over the construction is needed. The air itself is not possible to see. With an infrared camera however, you detect the characteristic patterns that occur when cold air is coming through a leak in the construction - goes along a surface and cools it down. The infrared inspection should always take place on the side of the construction with negative pressure.

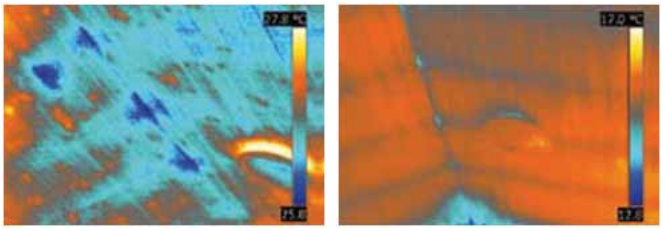
Moisture Detection

Moisture damage is the most common form of deterioration for a house. Air leakage can cause condensation to form within walls, floors, or ceilings and wet insulation takes a long time to dry and becomes a prime location for molds and fungi.

Scanning with an infrared camera can locate moisture that creates an environment conducive to molds - locations that may never be seen with the human eye.

One might smell its presence, but not know where it is forming. An infrared survey will determine where inherently moist areas are located that promote potentially serious mold and health problems.

Moisture can be difficult to spot and the trick is to make the construction change temperature. Materials with moisture will then be clearly visible as they change temperature much slower than dry materials. Where other methods only measure the temperature in one point, infrared covers huge surfaces in an instant.



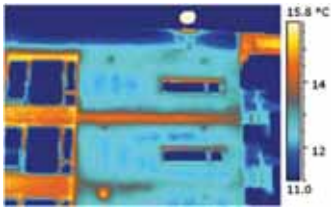
Infrared images taken of the same ceiling. In left, the room temp has been changed by heating that makes the moisture in the insulation appear clearly...

Thermal Bridges

A thermal bridge is an area with less insulation due to the construction; such as a metal fastener, concrete beam, slab or column.

Heat will flow the easiest path from the heated space to the outside - the path with least resistance. Very often heat will 'short circuit' through an element which has a much higher conductivity than surrounding material, which can be described as a thermal bridge. Typical effects of thermal bridges are:

- Decreased interior surface temperatures; in the worst cases this can result condensation problems, particularly at corners.
- Significantly increased heat losses.
- Cold areas in buildings.



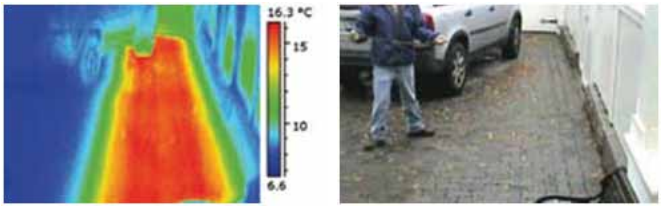
The image shows a thermal bridge at one of the floors…

The bridging is between the roof beams and the adjacent wall…

Supply Lines and District Heating

In cold climates heating of pavements and gangways are used. It is also common with district heating, a system for distributing heat generated in a centralised location for residential and commercial heating requirements.

A thermographic survey can easily detect any defects in heating systems under ground. Even if there is snow on the ground, the heating pipe lines are visible with an infrared camera.



Heated pavement, but only a part of it is working...

Electrical Faults

One of the most common faults in buildings are electrical faults. Most of the time these electrical problems are invisible to the naked eye, but an infrared camera instantly makes hot spots visible on a thermal image. You can scan electrical cabinets, components and survey multiple wires, connections and get an instant picture of potential trouble. The problem area can be detected and repaired before real problems occur! Common electrical targets in the building industry are fuses, electrical panels and lighting.

What kind of experience or training is required to develop skill in working with this technology?

Basic half day training should be enough to start using the product. For expert applications, level 1 course is recommended which requires 40 hours that lasts for 5 days.

FLIR co-operates with Infrared Training Center (ITC), an independent, ISO certified, worldwide training facility. ITC offers everything from short introduction courses to certification courses. For more information, you may check: www.infraredtraining.com .

How is its market shaping up in India?

It's growing very well. Awareness through publishing housing like yours are helping end users gain more knowledge.

What're the latest models from FLIR that are available in India?

We have a complete range of products. Starting from Innovative Clamp meter with IGM to a very sophisticated high resolution camera with more than 7 Lakh pixels. We have multiple options to choose from, based upon requirement or application.

Models like C2, Ex series, Exx series and T4xx series are available in start and mid segment. Range starts from INR 68,000 plus tax.

What are your steps to maintain good quality ?

We are maintaining the highest standard of quality and our products confirm the same. We have extensive network of support all over India. We are giving 10 years warranty on detector for selected products, after product registration, that itself confirms the confidence we have in our product and quality standard we follow.

What are your suggestions to the potential buyers from the HVACR industry?

The main message from my side will be to choose right product for your application. If the object is smaller and distance is longer, a good high resolution Thermal Camera is required for accurate measurement.

The main technical name to choose a product keeping this requirement in mind is IFOV (Instantaneous Field of View). Choosing a wrong or low resolution product can be dangerous as it may not see potential problems and hence main purpose of using time, money, energy can go waste. ■

Disclosing Climate Strategies

Five hundred and thirty three cities globally (representing 621 million citizens) reported the actions they're taking on climate to the non-profit CDP this year...

A record number of cities are now measuring and disclosing environmental data on an annual basis in order to manage emissions, build resilience, and protect themselves from the growing impacts of climate change. Five hundred and thirty three cities globally representing 621 million citizens reported the actions they're taking on climate to the non-profit CDP this year, a rise of 70% from 2015. There has been a nearly four-fold increase in the number of cities in Africa disclosing climate information to CDP, from 12 to 46, since the adoption of the global climate deal by 195 countries in Paris last year. Accra, Kisumu and Mazabuka are among the cities disclosing data for the first time. Many new cities are from the least developed countries in Africa such as the Democratic Republic of Congo, Ethiopia and Uganda.

With their citizens facing climate change-related impacts, including from increased infrastructure damage and rise in water-borne diseases, African cities are seeking greater levels of support in managing climate strategies. Lorna Omuodo (Chief Officer, Green Energy and Climate Change) from the City of Kisumu in Kenya, which disclosed for the first time this year, says, "Climate change poses a serious threat to the wealth and wellbeing of our city. Delaying action will be costly, which is why we are taking steps now to ensure we build resilience in Kisumu. CDP is the best initiative on climate change I have seen in a long time because it is focused on practical actions." Increasing awareness of climate risks means more cities are undertaking a GHG emissions inventory, a basic 1st step for any organisation seeking to understand its climate impact. In 2011, 1 in 10 cities reported undertaking a citywide emissions inventory, now 4 in 10 cities report doing so.

Patricia Espinosa, Executive Secretary of the UNFCCC, says, "This is welcome and encouraging news as governments continue to ratify the Paris Climate Change Agreement and work to implement it in full. On NAZCA, the UNFCCC's online climate action portal, many cities have registered their climate action pledges and are blazing an ambitious trail. When cities measure their climate footprint and seek a sustainable path to green growth powered by clean energy, they take us all further towards the global transition to low emissions and resilient development. I also commend CDP for its role as a key provider of data to the NAZCA portal. I congratulate cities taking action and encourage everyone to use NAZCA to showcase their climate commitments."

Other regions are capitalising on the benefits of disclosure:

- Europe has had an 83% increase in cities reporting, to 126 (32 countries). Many cities in Eastern Europe are reporting for the 1st time.
- In North America there has been a 72% rise to 131 cities using CDP's disclosure platform. Twenty-eight of the top 30 US cities by population now disclose to CDP, representing 38 million people. Disclosure by Canadian cities doubled in 2016 aided by a commitment from Canadian Big City Mayors to disclose to CDP as part of efforts to cut emissions.
- Latin America saw a 51% increase in cities disclosing, with 136 cities sharing data this year. Over half of these cities are in Brazil, including hosts of this year's Olympics, Rio de Janeiro who are disclosing for the fifth time through CDP.
- The Asia-Pacific region has seen a rise of nearly a third since 2015 and includes first-time disclosers such as Kuala Lumpur, Malaysia's largest city, Guangzhou, one of China's most populous cities, and Bangalore and Kolkata.

Paul Dickinson, Executive Chairman of CDP, says, "We are thrilled to have so many new cities, in particular from the developing world, share their climate strategies through CDP for the first time. Disclosing environmental information fuels awareness that in turn helps city leaders plan, finance and build low-carbon resilient cities. You cannot manage what you do not measure, and this year city leaders around the world are sending a clear message that they are ready and able to take on the global climate challenge."

The City of Adelaide is disclosing for the second time in the Asia-Pacific region. Adelaide's Lord Mayor Martin Haese says, "Strong growth in cities reporting environment data is a clear signal that CDP provides much needed global visibility to those who are preparing for the impacts of climate change and reducing their carbon footprint.

The City of Adelaide works in close partnership with the Govt of South Australia, and we share a commitment for zero net carbon emissions in Adelaide by 2025. Our signing of the Compact of Mayors and Compact of States and Regions in Paris at COP 21 further cements our shared commitment to limit global temp. rise to well below 2°C."

The City of Las Vegas is also disclosing for the fifth time through CDP's cities program. The City of Las Vegas' Mayor Carolyn G Goodman says, "The city of Las Vegas is committed to sustainability and has set a goal to be 100 percent powered by renewable energy. We see real value in that conversation being transparent and open. That is why disclosing through CDP was a natural fit for us and why we are excited about hosting a CDP workshop for cities in October."

Antha Williams, Environment Team Lead at Bloomberg Philanthropies, who supports CDP's cities program, says, "Building off the historic Paris Agreement, it's promising to see over 500 global cities reporting emissions and climate risks to the CDP platform. By transparently reporting to CDP, cities are measuring progress and staying accountable." ■

Retail Chain Air Conditioning Systems

A Design Approach

In retail stores , space conditioning is required both for human comfort and for proper operation of refrigerated display cases. The AC unit should introduce a minimum quantity of outside air, either the volume required for ventilation based on ASHRAE Standard 62 or the same to maintain slightly +ve pressure in the space, whichever is larger...

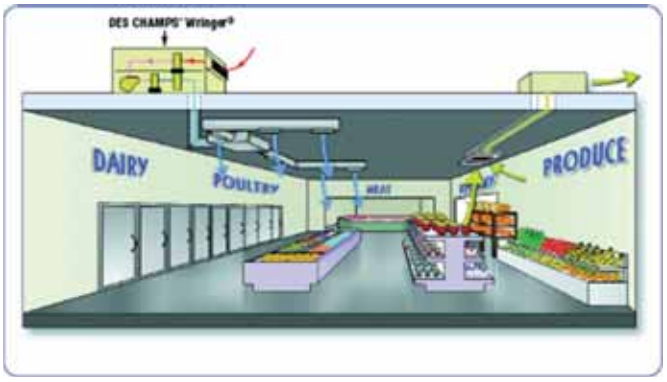
The proper air conditioning of retail stores and supermarkets is a difficult task and offers mechanical designers many challenges. It is one of the most complex applications for heating, ventilating, and air conditioning systems.

In supermarkets, indoor air can be too warm, too dry, too wet or too cold. Any of these conditions can lead to numerous problems for building owners and their customers. One ideal condition does not usually apply to the entire store. If conditions are too hot — products spoil, too dry — products shrink, too wet — products mold, too cold — customers complain.

Some areas, such as meat preparation, must be cold, about 50°F, to help reduce spoilage. Air too dry is good for freezers but not so good for packaged meats, produce and people. Areas that are too damp promote mold, mildew and bacterial growth; and besides concerns with health, these growths produce offensive odours.

During the cooling season, moist outdoor air infiltrates the store to oppose systems that try to maintain the proper conditions.

Therefore, enough conditioned make-up air must be supplied to maintain positive pressure in the store. In big multi-use stores, it is extremely difficult to keep moisture in the air below a 50°F dew point in the summer.



Most supermarkets are large buildings with numerous openings to outside. As the moisture difference between the outdoor and indoor air rises, the force driving the moisture indoors increases. On a 95°/78°F design day, one might expect a 56°F dew point when using a DX cooling system.

There is definitely an optimal space dew point to aim for in the typical supermarket. Tests performed by one chain show that the ideal store dew point is around 53°F. Anything less than this is not desirable if maximum store profits are to be earned.

Cooling Load Estimates

Cooling loads should be calculated using the methods outlined in data for calculating loads caused by people, lights, motors, and heat-producing equipment as specified in the equipments.

In retail stores, space conditioning is required both for human comfort and for proper operation of refrigerated display cases. The air conditioning unit should introduce a minimum quantity of outside air, either the volume required for ventilation based on ASHRAE Standard 62 or the volume required to maintain slightly positive pressure in the space, whichever is larger.

Many supermarkets of a large chain owned or operated by a single company. The standardized construction, layout, and equipment used in designing many similar stores simplify load calculations. It is important that the final air-conditioning load be correctly determined. Refer to manufacturers' data for information on total heat extraction, sensible heat, latent heat, and percentage of latent to total load for display cases. Relative humidity above 55% at 75°F and 72 gr/lb absolute humidity) substantially increases the load; reduced absolute humidity substantially decreases the load, as shown in Figure 1.

Trends in store design, which include more food refrigeration and more efficient lighting, reduce the sensible component of the load even further. To calculate the total load and percentage of latent and sensible heat that the air conditioning must handle, the refrigerating effect imposed by the display fixtures must be subtracted from the building's gross air-conditioning requirements (Table 1).

Modern supermarket designs have a high percentage of closed refrigerated display fixtures. These vertical cases have large glass display doors and greatly reduce the problem of latent and sensible heat removal from the occupied space. The doors also require anti condensation heaters to minimise condensation and fogging. These heaters should cycle by automatic control.

Design Considerations

Temperature Control

Air-conditioning systems must compensate for the effects of open refrigerated display equipment.

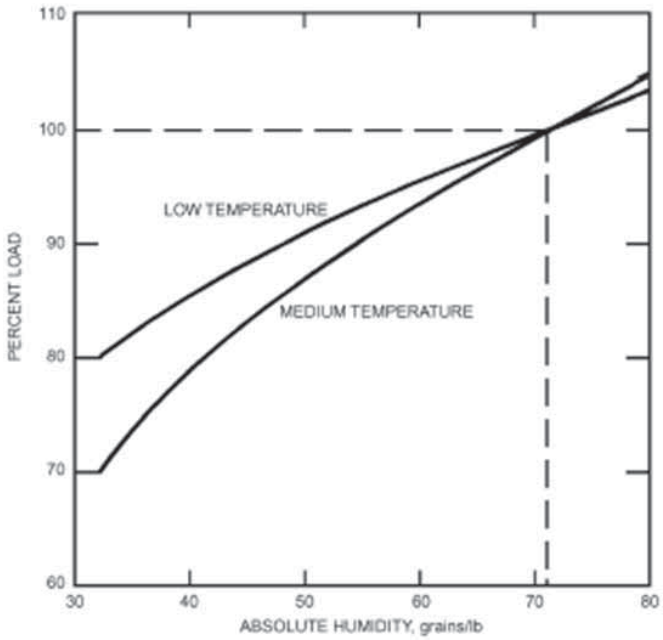


Figure 1: Refrigerated Case Load variation with store air humidity...

Design considerations include the following:

- Increased cooling requirement because of removal of large quantities of heat, even in summer.
- Net air-conditioning load after deducting the latent and sensible refrigeration effect. The load reduction and change in sensible latent load ratio have a major effect on equipment selection.
- Need for special air circulation and distribution to offset the heat removed by open refrigerating equipment.
- Need for independent temperature and humidity control.

Energy costs may be extremely high if the year-round air-conditioning system has not been designed to compensate for the effects of refrigerated display equipment.

Table 1 Refrigerating Effect (RE) Produced by Open Refrigerated Display Fixtures

	RE on Building Per Unit Length of Fixture*			
Display Fixture Types	Latent Heat, Btu/h·ft	% Latent to Total RE	Sensible Heat, Btu/h·ft	Total RE, Btu/h·ft
Low-temperature (frozen food)				
Single-deck	38	15	207	245
Single-deck/double-island	70	15	400	470
2-deck	144	20	576	720
3-deck	322	20	1288	1610
4- or 5-deck	400	20	1600	2000
Ice cream				
Single-deck	64	15	366	430
Single-deck/double-island	70	15	400	470
Standard-treatment				
Meats				
Single-deck	52	15	298	350
Multideck	219	20	876	1095
Dairy, multideck	196	20	784	980
Produce				
Single-deck	36	15	204	240
Multideck	192	20	768	960

*These figures are general magnitudes for fixtures adjusted for average desired product temperatures and apply to store ambients in front of display cases of 72 to 74°F with 50 to 55% rh. Raising the dry bulb only 3 to 5°F and the humidity to 5 to 10% can increase loads (heat removal) 25% or more. Lower temperatures and humidities, as in winter, have an equally marked effect on lowering loads and heat removal from the space. Consult display case manufacturer's data for the particular equipment to be used.

Heat Removed by Refrigerated Displays

The display refrigerator not only cools a displayed product but envelops it in a blanket of cold air that absorbs heat from the room air in contact with it. Approximately 80 to 90% of the heat removed from the room by vertical refrigerators is absorbed through the display opening. Thus, the open refrigerator acts as a large air cooler, absorbing heat from the room and rejecting it via the condensers outside the building.

Occasionally, this conditioning effect can be greater than the designed air-conditioning capacity of the store. The heat removed by the refrigeration equipment must be considered in the design of the air conditioning systems – because this heat is being removed constantly, day and night, summer and winter, regardless of the store temperature.

Humidity Control

Multishelf refrigerated display equipment requires 55% RH or less. In the dry-bulb temperature ranges of average stores, humidity in excess of 55% can cause heavy coil frosting, product zone frosting in low-temperature cases, fixture sweating, and substantially increased refrigeration power consumption.

Cooling from refrigeration equipment does not preclude the need for air conditioning. On the contrary, it increases the need for humidity control.

With increases in store humidity, heavier loads are imposed on the refrigeration equipment, more defrost periods are required, and the display life of products is shortened. The dew point rises with relative humidity, and sweating can become so profuse that even non refrigerated items such as shelving superstructures, canned products, mirrors, and walls may sweat. Lower humidity results in lower operating costs for refrigerated cases.

There are three methods to reduce the humidity level:

1. Standard air conditioning, which may overcool the space when the latent load is high and sensible load is low
2. Mechanical dehumidification, which removes moisture by lowering the air temperature to its dew point, and uses hot-gas reheat when needed to discharge at any desired temperature
3. Desiccant dehumidification, which removes moisture independent of temperature, supplying warm air to the space unless post cooling is provided to discharge at any desired temperature.

Each method provides different dew-point temperatures at different energy consumption and capital expenditures. The designer should evaluate and consider all consequential tradeoffs. Standard air conditioning requires no additional investment but reduces the space dew-point temperature only to 60 to 65°F. At 75°F space temperature this results in 60 to 70% rh at best. Mechanical dehumidifiers can provide

View of the ducted split model...

humidity levels of 40 to 50% at 75°F. Supply air temperature can be controlled with hot-gas reheat between 50 and 90°F. Desiccant dehumidification can provide levels of 35 to 40% rh at 75°F. Post cooling supply air may be required, depending on internal sensible loads.

System Design

The air-handling equipment and distribution system are generally recommended for both cooling and heating using heat pump air conditioning system in extreme summer and winter cities like northern region in India. However, this needs not be applicable over 70% of the balance country mostly close to coastal areas and with higher relative humidity always present.

For small retail outlets from 1000 to 2000 sqft area, most of the super markets in India prefer to install ducted split air conditioners, which are compact, space saving and need no floor space. The capacity varies from 15 TR to 30 TR depends on the heat load and the city ambient conditions. These split units have separate outdoor condensing units.

In such systems fresh air can be injected directly behind the evaporator units' location drawn from the adjacent wall openings. This is the traditional Indian system followed due to space between the ceiling and false ceiling acts as negative pressure area. The size of the wall opening depends upon the fresh air make up and air changes required. Most of these designs follow one air change per hour similar to other comfort air conditioning system.

View of the Ducted Split Model

For the large retail outlets of 5000 sqft and above, have allocated floor space for installing floor mounted packaged air conditioners or an air handling equipments connected to roof mounted air cooled condensing units.

Air-cooled condensing units are most commonly used in supermarkets. Typically, a central air handler conditions the entire sales area. Specialty areas like bakeries, computer rooms, or warehouses are better served with a separate air handler – because the loads in these areas vary and require different control than the sales area.

Most condenser installations are made on the roof of the supermarket. If air-cooled condensers are located on the ground outside the store, they must be protected against vandalism as well as truck and customer traffic.

The operation of these air conditioners are mostly simplified using micro processor controls, easily readable and operatable by the customer.

Air Distribution

Designers overcome the concentrated load at the front of a supermarket by discharging a large portion of the total air supply into the front sales area. The air supply to the space with a standard air-conditioning system is typically 1 cfm per square foot of sales area. This value should be calculated based on the sensible and latent internal loads. The sensible heat factor based on the lighting and equipment loads installed considerably and according to the SHF, the circulating air quantity plays important role to reduce internal heat loads.

The amount of human customers' presence will add latent as well the sensible loads in the stores area. Hence, the detailed heat load analysis declares the correct air conditioning system selection.

The choking of frequent filtration system normally does not happen in high humidity stores with positive pressure maintained in the conditioned areas. However, in dry goods areas with exposed powdered materials will lead to high dust level in filtration system, which needs to be taken care. Treated fresh air system will also reduce the entry of fresh air to low dust levels with proper filtration of entry fresh air.

The retail operators have not yet established the power consumption levels and control requirements in India – due to recent entry in to this business. However, the indigenously available split air conditioning units are designed and developed to meet the overall other market segment requirements, such as high EER, low power consumption etc, which will be the common usage factor for these products.

Cold air being denser, the open refrigerated display cases settles to the floor and becomes increasingly colder, especially in the first three feet above the floor. If this cold air remains still, it causes discomfort and does not help in cooling other areas of the store that need more cooling. Cold floors or areas in the store cannot be eliminated by the simple addition of heat. Reduction of air-conditioning capacity without circulation of localised cold air is analogous to installing an air conditioner without a fan. To take advantage of the cooling effect of the refrigerated display cases and provide an even temperature in the store, the cold air must be mixed with the general store air.

Very Large Retail Store cum Hyper Market

Large spaces can be centrally controlled with large chiller units integrated with air handling equipments. These units can be fully equipped with cooling – and humidification and also continuously monitored for temperature and humidity through building management system. Terrace spaces are used for air cooled chillers and cooling tower in case of water cooled system.

The air change remains similar to other small areas with one air change minimum. The power supply and distribution design is the maximum in such large area air conditioning solutions. Roof top air conditioners integrated duct system can be used for this application with floor space saving. However, such units are not yet readily available in our country.

Maintenance

Most supermarkets, except large chains, do not employ trained maintenance personnel, but rather rely on service contracts with either the installer or a local service company. This relieves store management of the responsibility of keeping the air conditioning operating properly.

New Focus Areas on System Design

As the technology is growing fast in HVAC industry, it will be better to consider the following concepts for energy efficient air conditioning system performance.

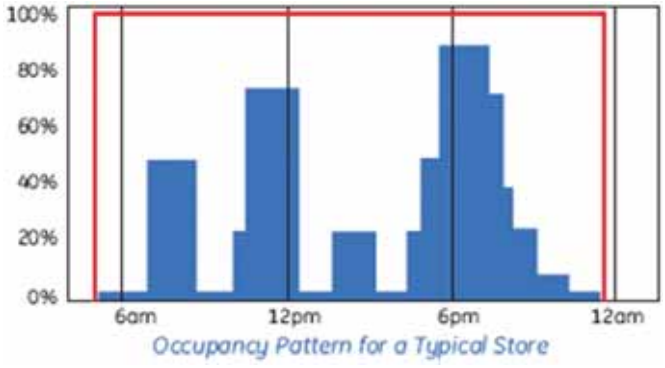
Energy Savings Using Ventilation Control in Retail Stores and Supermarkets

It is important to know if rising AC use is one of the reasons for such an increase and if energy efficiency measures are being used effectively to limit the power required by AC systems. These systems exist primarily for the comfort of customers and staff, also for stock in case of food, but the same effect can be achieved with much less energy use, particularly in hot climates. Typical measures in the retail sector may include more efficient use of display lighting, more and no

arbitrary setting of cooling temperatures combined with self closing doors or air curtains.

The example store has 10,000 ft² of floor space and is occupied for 18 hours per day, seven days per week. The savings grow as the store size increases and the occupancy period is extended. At this savings rate, the CO_2 sensors pay for themselves within a couple of months.

Ventilation Control adjusts the economizer's outdoor air intake based on the measured CO_2 levels to maintain the proper ventilation rate (10 cfm of outside air/person). The picture below shows you a typical occupancy pattern for a retail store or supermarket. With Ventilation Control, the outdoor air intake follows the occupancy pattern. As customers come and go throughout the day, the CO_2 sensor adjusts the amount of outdoor air entering the store accordingly. Your current ventilation system thinks the store is always fully occupied.



Occupancy Pattern for a Typical Store

Taking Control of Air Conditioning

Controlling electrical components in an air-conditioning system is vital to ensure correct and efficient operation. It has become even more important to increase energy savings. It is also an essential expectation of customers that they have the opportunity to 'control' their working environment and, theoretically at least, the functioning of their air-conditioning systems.

Two types of control are involved — the functioning of the equipment electronically and the manipulation of the conditions within the occupied space.

Reliable Electronics

Since the advent of cheaper and highly reliable electronics, today's air-conditioning systems rely internally more and more on complex electronic control rather than the electro-mechanical control of old. Externally, a wide variety of systems are provided to enable air-conditioning equipment to interface with users.

A directly driven compressor operates at fixed speed and does not compensate for the reduction in load as the set point is reached, resulting in constant stop/start operation.

Fan motors inside air-conditioning equipment are critical to the function. The transfer of heat away from the coil is vital. The outdoor fan is required to run at different speeds for different modes of operation under different outdoor conditions to maintain efficient system operation. The indoor fan is also important, as it delivers the cooling as per user requirement. In the past, such fans were mostly controlled via taps for the different speeds. This approach was very effective, but the speed change was sometimes audible for the customer. The degree of control was also limited to the amount of taps or relays that could be fitted to the control PCB.

Other components in the air-conditioning system have benefited from advances in electronics. In many systems refrigerant expansion was, and still is, managed via mechanical expansion valves and capillaries. However, some systems now use electronic expansion valves. These produce greater efficiency, as the degree of opening can be controlled via sensors in the unit and predetermined control algorithms in the software on the micro-controller.

Profound Effect

Such components have become very important in air-conditioning systems to increase energy-efficiency ratios and coefficients of performance. No single individual component makes a massive difference but the combination has a profound net effect.

With regard to external or room control, electronics is once again to the fore, with central control of several separate systems being popular. Remote Internet control, energy-monitoring data and innovations such as touch screens or key pads are the latest attractions to the end-user. Infra-red remote room control has become common place in the last few years.

Open Protocols

Interfaces with building-management systems are commonly offered by manufacturers like Toshiba, carrier, daikin etc, but open-protocol technology is also offered by companies like Siemens, Johnson controls, Honeywell etc; which are recognised as the future of customer control technology.

To provide centralised control, a Japanese A.C company, for example, uses a wide range of controllers that can be adapted to complex control scenarios — from relatively simple central controllers with limited connectivity to systems for on/off control and basic reporting of faults.

When more complex control solutions are required, toolbox of software solutions that are easily implemented and fully tried and tested — allowing fully functional seamless links to all major BMS manufacturers.

This software acts as a fully-functional supervisor which can interface with other items of building plant via the digital input/output modules.

This type of software also provides reportable alarm management, with dedicated reporting to a wide range of other sources. There are many generic versions available, with dedicated diagnostic software routines and many functions that allow programming related to specific equipment functions.

A good example is the input from a fire alarm to stop and restart the whole large retail store.

Conclusion

The overall design considerations in a supermarket or a retail stores, should have more focus on energy efficiency, controlled indoor air quality environment, modern temperature and humidity control systems with precise control through a data system, will be the need of the day for efficient and economic operation of the air conditioning system operation. ■

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Energy Efficiency

For Heat Exchanger, Refrigeration And Air Conditioning

This article is the continuation of the article published in the August 2016 issue of Cooling India on page no. 46.

The rapid depletion of non-renewable fossil resources need not continue. This is particularly true now as it is, or soon will be, technically and economically feasible to supply all of man's needs from the most abundant energy source of all, the sun...

Over millions of years ago, plants had covered the earth converting the energy of sunlight for living plants and animals, some of which were buried in the depths of the earth to produce deposits of coal, oil and natural gas. The past few decades, however, have experienced many valuable uses for these complex chemical substances and manufacturing from them plastics, textiles, fertiliser and the various end products of the petrochemical industry. Indeed, each decade sees increasing uses for these products. Coal, oil and gas, which will certainly be of great value to future generations, as they are to ours, are however non-renewable natural resources. The rapid depletion of these non-renewable fossil resources need not continue. This is particularly true now as it is, or soon will be, technically and economically feasible to supply all of man's needs from the most abundant energy source of all, the sun. The sunlight is not only inexhaustible, but, moreover, it is the only energy source, which is completely non-polluting.

Industry's use of fossil fuels has been largely blamed for warming the climate. When coal, gas and oil are burnt, they release harmful gases, which trap heat in the atmosphere and cause global warming. However, there had been an ongoing debate on this subject, as scientists have struggled to distinguish between changes, which are human induced, and those, which could be put down to natural climate variability. Notably, human activities that emit carbon dioxide (CO_2), the most significant contributor to potential climate change, occur primarily from fossil fuel production. Consequently, efforts to control CO_2 emissions could have serious, negative consequences for economic growth, employment, investment, trade and the standard of living of individuals everywhere.

Air Distribution

The air distribution system can make a big difference in both the cost and the effectiveness of geothermal heating and cooling. It also has an important effect on personal comfort and health. The air-handling component is either a separate cabinet or is part of the cabinet that houses the geothermal heat pump, and includes the blower assembly that forces air through the ductwork. The supply ductwork carries air from the air handles to the rooms. Typically, each room has at least one supply duct and larger rooms may have several. The return ductwork moves air from the room back to the air handler. Most buildings have one or more main return ducts located in a central area. The cold liquid refrigerant is circulated through the air handler, where it absorbs and removes the unwanted heat from the air and vaporises the refrigerant to a gas. The gas is compressed to increase its temperature and then the underground/underwater coils act as a condenser rather than an evaporator (as in the heating cycle) (Figure 1). The heat in the refrigerant is transferred to the ground/water as the refrigerant condenses.

Refrigerants are present in the GSHP systems and so present the threat of the HCFCs and toxicity. However, new types and blends of refrigerant (some using CO_2) with minimal negative impacts are approaching the market as shown in Table 1. Because the GSHPs raise the temperature to around 40°C they are most suitable for underfloor heating systems or low-temperature radiators, which require temperatures of between 30° and 35°C. Higher outputs, such as to conventional radiators requiring higher temperatures of around 60° to 80°C can be obtained through use of the GSHP in combination with a conventional boiler or immersion heater.

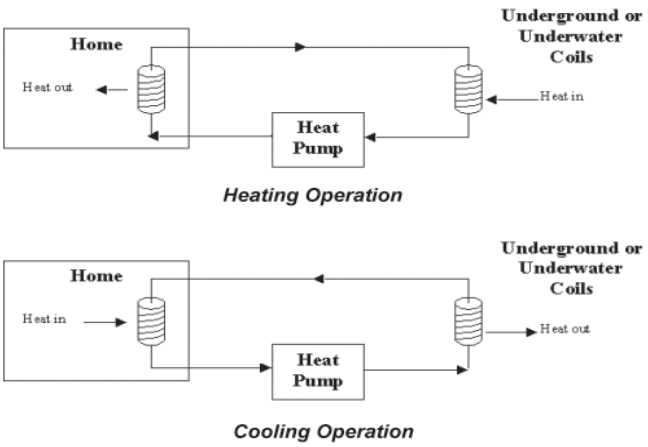


Figure 1: Heating and cooling operations...

The GSHPs come in 15 models from 4 kW up to 30 kW (even up to 300 kW when connected in parallel). At least 65% of the heating and hot water energy consumption of a house can be saved (65-75% of heating costs with a heat pump) as a result of using such a system. However, sizing of the heat pump and the ground loops is essential for the efficient

operation of the system. If sized correctly, a GSHP can be designed to meet 100% of space heating requirements. The sizing of the system is very sensitive to heat loads – and should therefore be installed into properties with high-energy efficiency standards, particularly new build. It is a good and practical idea to explore ways of minimising space heating and hot water demand by incorporating energy efficiency measures (Figure 2). This is known as the saturation pressure-temperature relationship (Figure 3). The refrigerant exits the compressor as a hot vapour, which then goes into the earth loop field (Figure 4).

Table 1: CO_2 emissions

System	Primary Energy Efficiency (%)	CO_2 emissions (kg CO_2/kWh heat)
Oil fired boiler	60 – 65	0.45 – 0.48
Gas fired boiler	70 – 80	0.26 – 0.31
Condensing gas boiler + low	100	0.21
temperature system	36	0.9
Electrical heating		
Conventional electricity + GHSP	120-160	0.20-027
Green electricity + GHSP	300-400	0.00

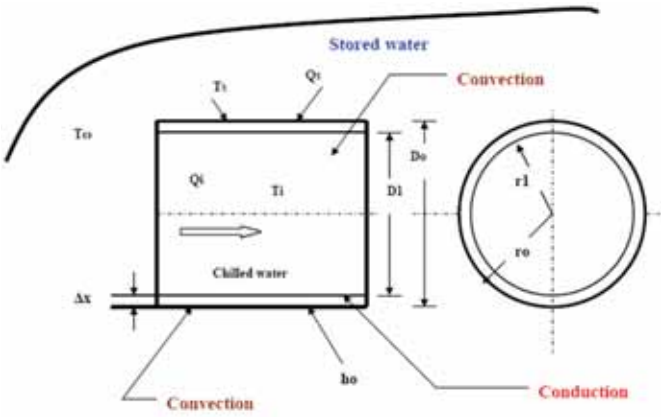


Figure 2: Schematic of heat transfer through a circular tube heat exchanger...

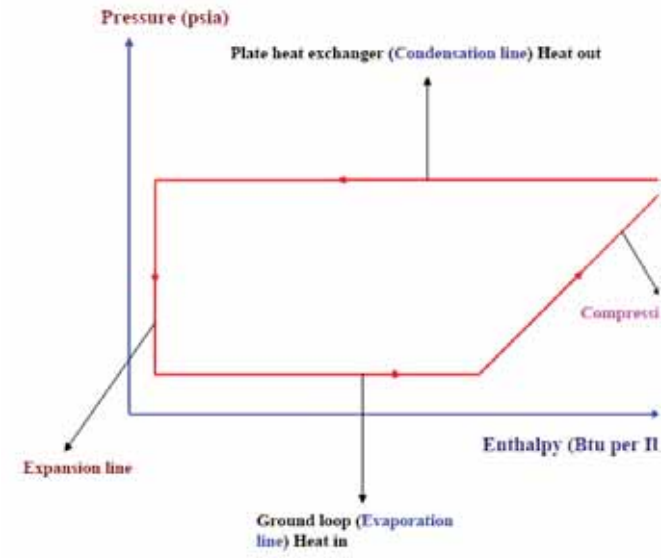
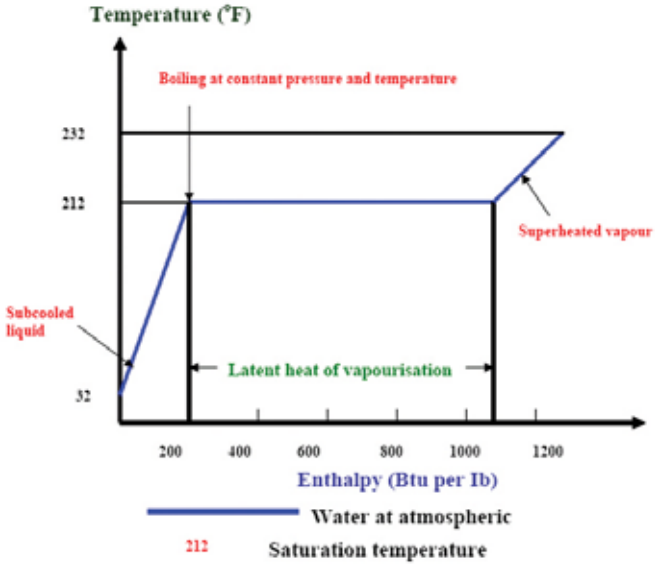


Figure 3: The ideal cycle on Pressure-Enthalpy diagram...



Figur 4: Water undergoing a charge of state...

Some Definitions

1. The word "Efficiency" is defined as the ratio of useful heat output to energy input, e.g., if an open fireplace loses half its energy up the chimney it is said to be 50% efficient.
2. The COP or "Coefficient of performance" is found by dividing the useful heat output by the energy input, e.g., a heat pump that produces 3 kWatts of heat for 1 kWatt of input power has a COP of 3. The open fireplace example with 50% efficiency would have a COP of 0.5 (1/2).
3. The heat "Source" is the outside air, river or ground, wherever the heat is being extracted from. Sometimes is referred to as an ambient source.
4. The "Sink" is the name given to the part where the heat is usefully dissipated, such as radiators in the room, underfloor heating, hot water cylinder, etc.

Horizontal Collector

This can be either coiled 'Slinky' or straight pipes that are buried 1.5 m to 2 m deep in open ground (in gardens). The pipe is usually plastic and contains a Glycol antifreeze solution.

Antifreeze

This is simply an additive to water that makes its freezing point lower. Common salt does the same thing, but Ethylene or Propylene Glycol is more practical for heat pump systems.

Refrigerant

This is the working fluid within the heat pump. It evaporates in one part and condenses in another. By doing so, heat is transferred from cold to hot. This fluid is sealed in and will not degrade within the heat pumps life.

Heat Exchanger

This is a simple component that transfers heat from one fluid to another. It could be liquid-to-liquid, or liquid-to-air, or air-to-air. Two heat exchangers are housed within the heat pump, one for the hot side (the condenser), and one for the cold side (the evaporator).

Slinky

The name is given to the way that ground collector pipes can be coiled before buying in a trench.

Passive Heat Exchange

When waste hot water preheats cold input water, it is said to be 'passive'. This costs nothing to run. A heat pump is said to be 'active' it

can extract heat from cold waste water but requires a relatively small power input.

Some Refrigeration Characteristics

The seasonal energy efficiency ratio (SFEE) may be applied to each of the components.

Assuming that KE & PE effects are negligible, i.e., the SSFEE is applicable; vis

$Q + W = m \Delta h$ (1)

Compressor:

Compression assumed adiabatic:

$\therefore Q = 0$ (2)

$W12 = m (h2 - h1)$ (2)

Or

$W_{in} = m (h2-h1)$ (4)

Condenser:

$W23 = 0$ (5)

$\square Qout = m (h2-h3)$ (14)

Expansion valve:

$W34 = 0$ & $Q34 = 0$ (6)

$\therefore h3 = h4$ (7)

Evaporator:

$W41 = 0$ (8)

$\therefore Q_{in} = m (h1-h4)$ (9)

Refrigeration effect It follows that:

$COP_{ref} = (h1-h3)/(h2-h1)$ (10)

$COP_{hp} = (h2-h3)/(h2-h1)$ (11)

In order to determine the above equations, the specific enthalpy values will be needed. Because refrigerants work in the liquid/vapour phases appropriate property charts or tables must be used.

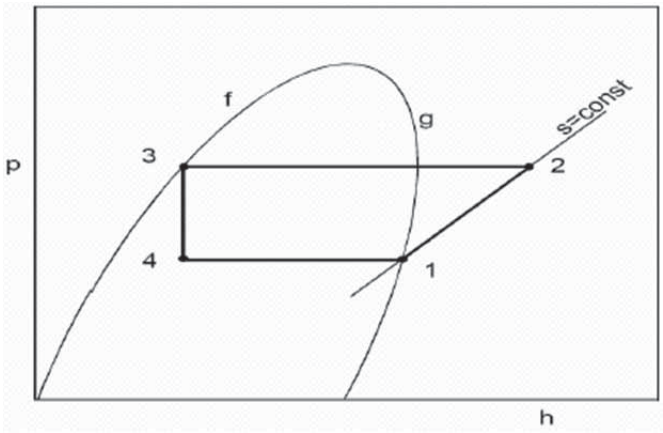


Figure 5. Refrigeration cycle...

The Ideal Refrigeration Cycle

- Isentropic compression (1 → 2)
- Constant pressure cooling/condensation (2 → 3)
- Throttling (3 → 4)
- Constant pressure vaporisation/heating (4 → 1)

The ideal refrigeration cycle plotted on the p-h chart as shown in Figure 5.

Real Refrigeration Systems

Evaporator superheat

g → 1 given in K above Tsat(s)

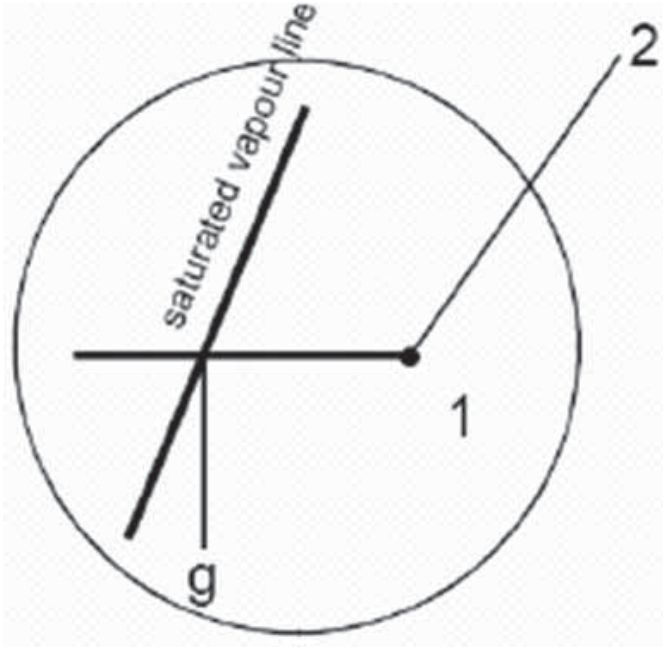


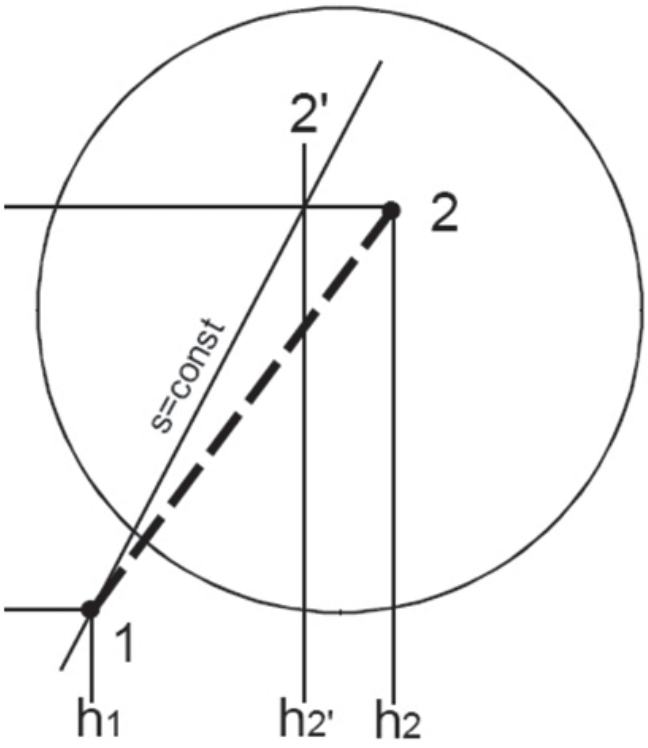
Figure 6. Evaporator superheat...

Isentropic Compressor Efficiency

$\eta isen = h2'-h1/h2-h1$ (12)

Condenser Sub-cooling

f□□3 given in K below Tsat(c)



NB: s1 = s2'

Figure 7. Isentropic compressor...

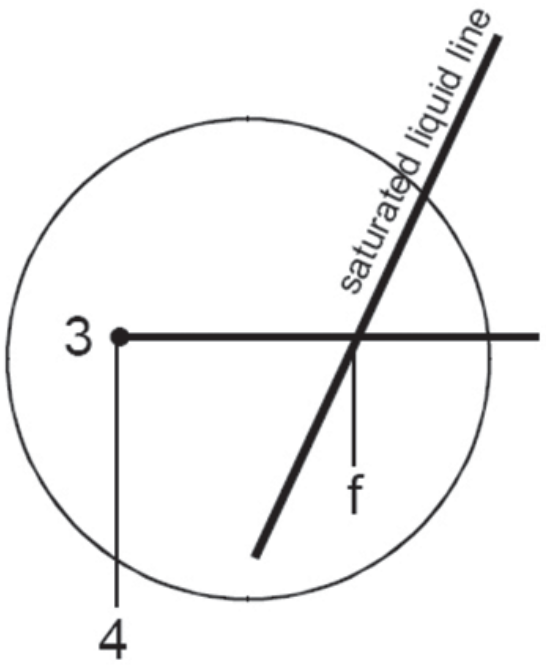


Figure 8. Condenser sub-cooling...

Refrigerant Properties (Charts and Tables)

Because refrigeration systems basically work between two pressures, and specific enthalpy is one of the most useful properties we need, refrigerant thermodynamic properties are normally presented in the form of a pressure - specific enthalpy (or p-h) chart.

This is done for convenience, and is simply an alternative way of presenting property data, instead of, e.g., p-V, or T-s, or h-s (Figures 6-8).

Other useful properties are also shown on the chart, vis: specific entropy, specific volume, temperature and quality. Regard these properties as 'contours'.

The pressure axis (y-axis) is typically logarithmic.

Pressure Drops in Evaporator and Condenser

Clearly, any or all of the above effects can be present, but the pressure drops are often small enough to be neglected (Figure 9).

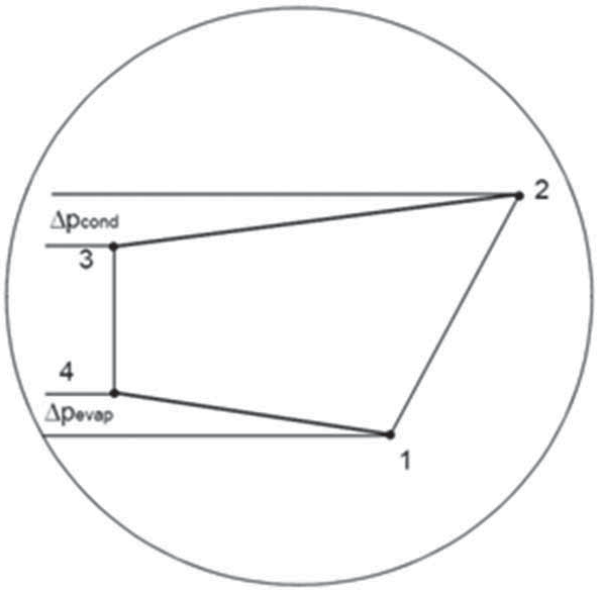


Figure 9. Pressure drops in evaporator and condenser...

Refrigeration System Performance Improvement

Liquid-Suction heat exchanger (Figure 10-11)

Assuming no losses:

$$H_{1b}-h_{1a} = h_{3a}-h_{3b} \quad (13)$$

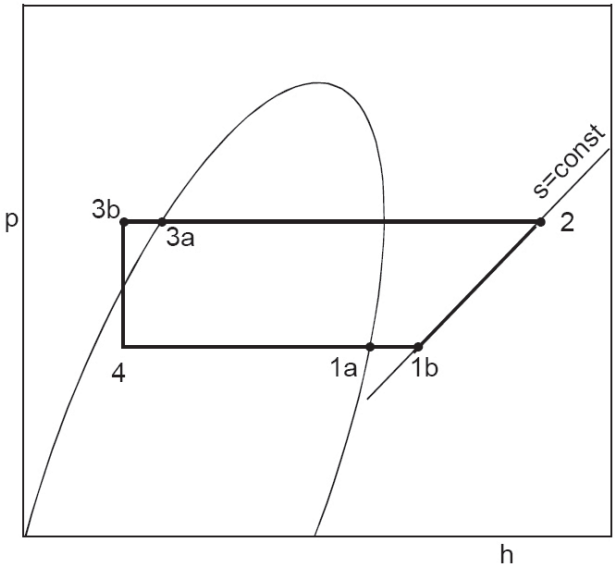


Figure 10. Diagram of liquid-suction heat exchanger...

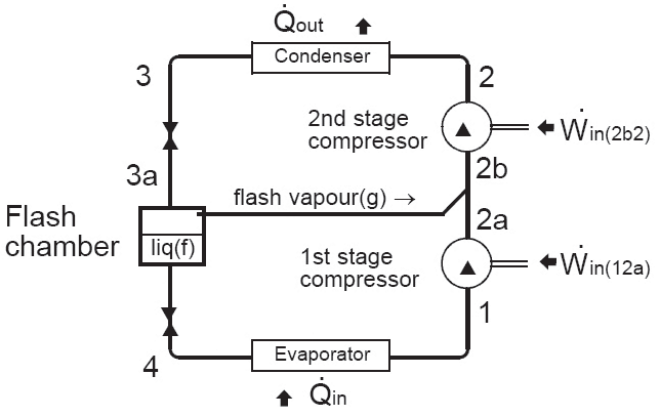


Figure 11. Liquid-suction heat exchanger cycle...

Multiple Compression Using Flash Chambers

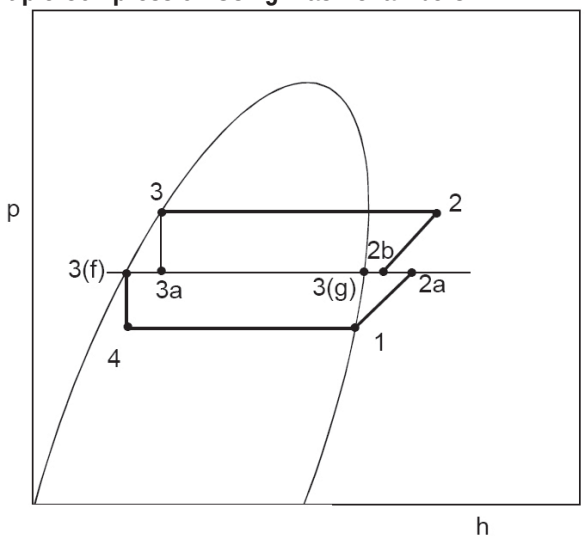


Figure 12. Cycle of multiple compressions using flash chamber...

Diagram of Multiple Compressions Using Flash Chamber

At point 3a, have a mixture of vapour and liquid, which is separated, in the flash chamber (Figure 12). The proportion of the total mass flow that is liquid (and proceeds to the evaporator) is given by:

$$x_f = h_{3\,(g)} - h_3 / h_{3\,(g)} - h_{3\,(f)} \quad (14)$$

The remaining vapour mixes with the discharge from the first stage compressor to give different inlet conditions to the second stage.

Assuming adiabatic mixing:

$$1^* \; h_{2b} = x_f h_{2a} + (1-x_f)\, h3_{(g)} \quad (15)$$

A similar equation can be used to find s_{2b}

Finally the COP is given by:

$$COP = (x_f (h_1 - h_4)) / (x_f (h_{2a} - h_1) + (h_2 - h_{2b})) \quad (16)$$

Conclusions

There is strong scientific evidence that the average temperature of the earth's surface is rising. This is a result of the increased concentration of carbon dioxide and other GHGs in the atmosphere as released by burning fossil fuels. This global warming will eventually lead to substantial changes in the world's climate, which will, in turn, have a major impact on human life and the built environment. Therefore, effort has to be made to reduce fossil energy use and to promote green energy, particularly in the building sector. Energy use reductions can be achieved by minimising the energy demand, rational energy use, recovering heat and the use of more green energy. This study was a step towards achieving this goal. The adoption of green or sustainable approaches to the way in which society is run is seen as an important strategy in finding a solution to the energy problem. The key factors to reducing and controlling CO_2, which is the major contributor to global warming, are the use of alternative approaches to energy generation and the exploration of how these alternatives are used today and may be used in the future as green energy sources. Even with modest assumptions about the availability of land, comprehensive fuel-wood farming programmes offer significant energy, economic and environmental benefits. These benefits would be dispersed in rural areas where they are greatly needed and can serve as linkages for further rural economic development.

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Future Of VSDs In The H_2O Industry

Most countries are developing new legislation to encourage their water industries to adopt new strategies and new technologies to make their operations more efficient...

Recent generations have probably taken water for granted and the structure of the industry meant it was left to run often aging and inefficient distribution networks. Today that is no longer the case, as there is new investment and a public appreciation that water is both one of the most important commodities on earth and a costly one to process, hence efficiency and improved management is the new goal for the industry.

The challenges facing the water industry include climate change, rising energy costs, tightening legislation, population growth and increasing usage per head. The use of automated systems in order to make pumps and processes work more efficiently is helping keep pace with these demands; however, what does the future hold for one of the most pivotal products in the automation mix, the Variable Speed Drive (VSD)?

According to Oliver Endres, European Variable Speed Drive (VSD) Product Manager, Mitsubishi Electric Europe, the Drive technology is evolving to help in an industry where equipment may be expected to run for 25 years, and judging by current evidence, could be in operation for a century or more.

To take care of the above mentioned challenging scenario, while upholding the goals for improvement, leakage of water in transit from collection areas to the point of use has to be reduced and pumping has to become less energy hungry and costly to operate. Equally, new methods for the treatment of sewage that use less water need to be developed. One starting point to this is sewage waste being used to generate energy, and if this can be done relatively locally, then less input energy will be required.

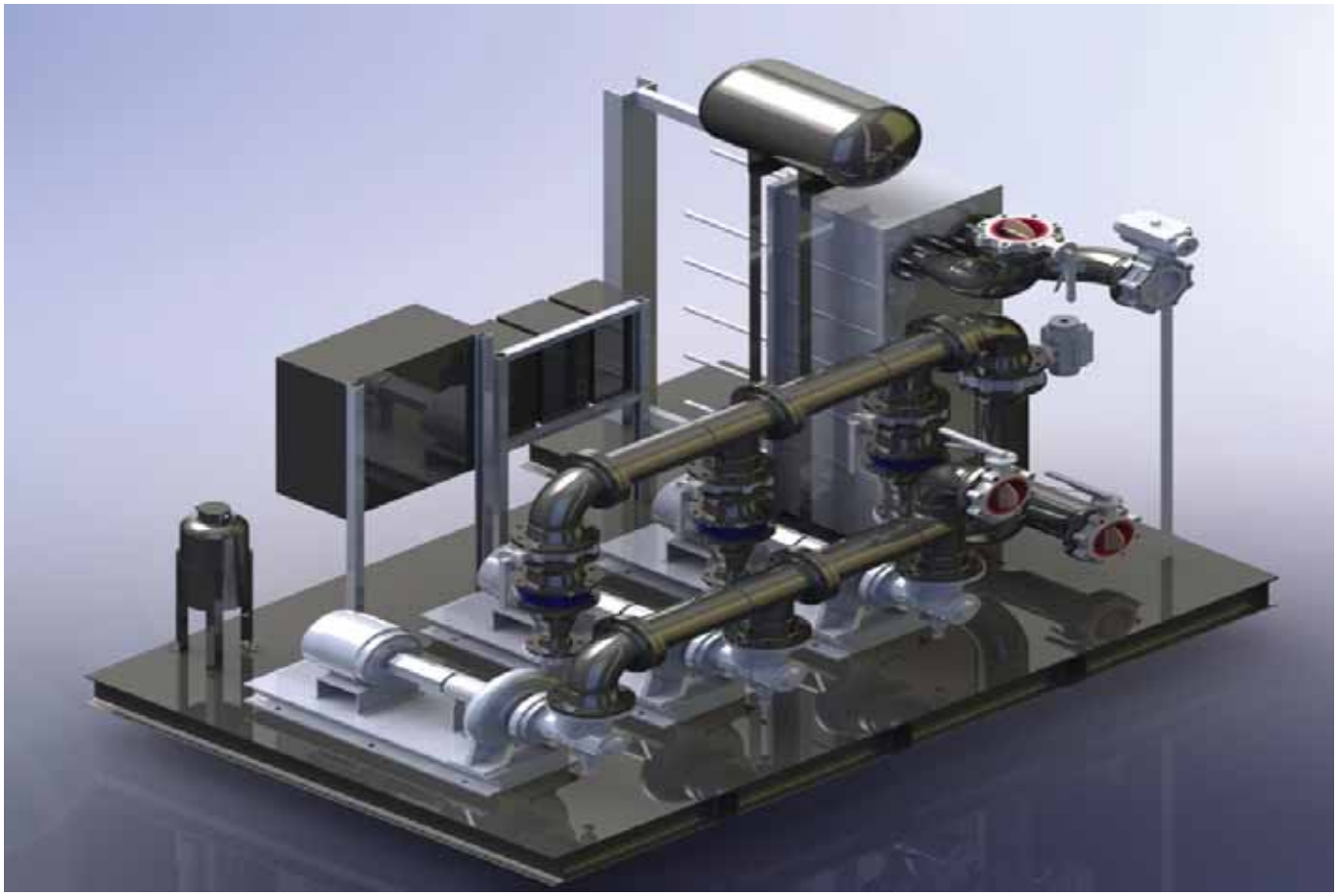
Not surprisingly, Variable Speed Drives (VSDS), or inverters, are seen as a key technology for helping the industry address these issues. Originally developed to bring more control to industrial processes, VSDs can also reduce electric motor energy consumption significantly. Both of these characteristics are very attractive to the water industry.

One of the most important attributes water engineers look for when specifying equipment is long design life, and VSDs are not exempt from this. Therefore, a robust design and reliable components are essential. Additionally, water engineers will need their VSDs to be adaptable, because they may want to redeploy them to a different duty in five, ten or even fifteen years' time.

VSD controlled pumps can be used to match supply to demand throughout the distribution network, providing more water at peak times and trimming it back, say at night, when demand drops off. Reducing the pressure in the distribution network like this has a considerable effect on losses due to leakage. Similarly, processes like aeration, chemical infeed and sewage treatment can be more precisely controlled through the use VSDs on various pumps and motors.

For many years, the water industry used valves to reduce flow at times of low demand. But this meant that the pump motors continued to work at full speed, which used a lot of energy. It is also notable that motors were often oversized for their basic duty so that they had a bit of extra power in reserve, but this did mean that they constantly drew more energy. The modern alternative is to add VSD control to the motors, which allows pump speeds to be reduced at times of low demand to save energy. The VSD can also be used to give the motor a temporary power boost when required. ■

Energy Conservation In Pumping System Of HVAC Systems



Pumps and pumping systems offer lot of opportunities for energy saving in HVAC systems. This article talks about energy conservation in pumping systems in general, and also highlights opportunities in their applications in HVAC systems...

Pumps are used to impart potential and kinetic energy to liquids. Pumps increase the mechanical energy of a liquid and cause the liquid to flow through piping circuit or equipment. Pumping systems account for almost 15.0% of the total national electrical energy consumption. Though different types of pumps are available for variety of applications, the most commonly used ones are centrifugal (with single or multistage impellers) types. Centrifugal pumps operate on the principle that when a mass of liquid is rotated by an external torque, the pressure of the liquid rises, which forces the liquid to flow inside the pipe / equipment. Most commonly, water is the liquid handled by pumps. Pumping systems account for about 15-20% of energy consumption in HVAC systems. This article presents the various options for energy savings.

Basics of pumping systems

The schematic of a simple water pumping system is shown in Figure 1.

The variation of efficiency of typical motor and pump at different load factor is shown in Figure 2. From the Figure, we can observe the following:

- Efficiency of motor is good from 40-100% loading.
- Efficiency of pump is good from 75-100% loading.
- Part load operation of pump leads to inefficiency.
- A pump with 78% efficiency at rated flow may have only 56% efficiency at half the flow.
- In case of motors, the drop in efficiency is less.

The characteristic curve of a typical pump and system curve of a piping system are shown in Figure 3. It is seen from the graph that

- Pump curve shows the variation of head developed (supplied) by the pump for various flow rates inside a piping.
- System curve shows variation of total head (static + friction) required (demanded) by the piping for various flow rate inside the piping.
- Pump develops the head and flow shown at the operating point.

Pumping in HVAC systems

The schematic of a heating, ventilation and air conditioning (HVAC) plant is shown in Figure 4. Heat absorbed by chilled air in the conditioned space is transferred to Chilled water at AHU. Heat absorbed by chilled water is transferred to refrigerant at evaporator. Heat absorbed by refrigerant is transferred to condenser water at condenser. Heat absorbed by condenser water is rejected to the ambient air at cooling tower. The energy performance of typical pumps are given in Table1.

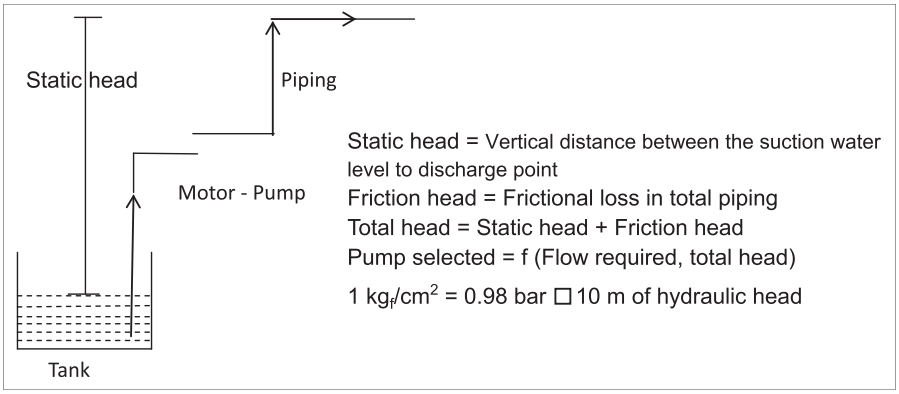


Figure 1: Schematic of a simple water pumping system...

The typical recommendations for energy saving in HVAC pumping systems are given below.

i. The optimum condenser water flow rate is 0.9 m³/h/TR and chilled water flow rate is 0.7 m³/h/TR. The optimum temperature rise in cooling water across the condenser and temperature drop in chilled water across the chiller is 4.0-4.5 ºC. In many plants, it is observed that the flow rate is much higher. By optimising the flow rate, energy saving upto 40-70 % is possible. Variable frequency drive (VFD) needs to be used with the motor-pumps for flow control.

ii. The pressure drop on water sidewill be high (0.83-0.87 bar) in some plants due to scaling inside condenser area (due to use

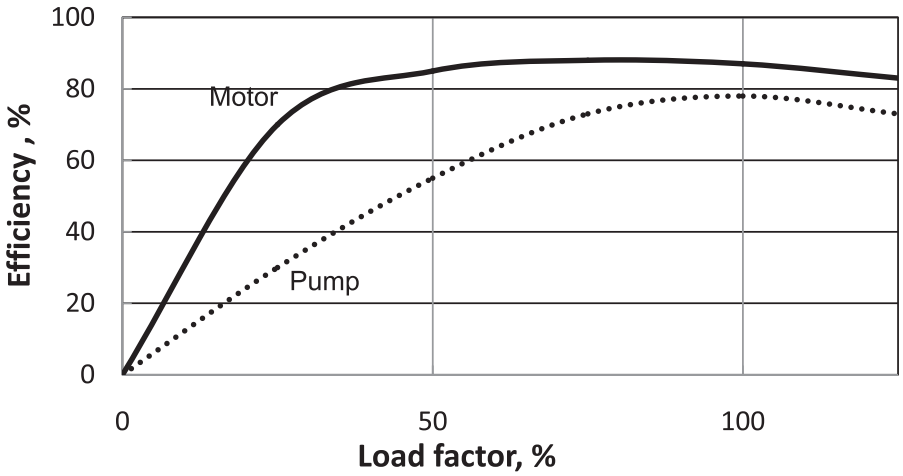


Figure 2: Typical variation of efficiency of motor and pump with load factor...

Table 1: The energy performance of typical pumps

Sl. No.	Particulars	Unit	Chilled water pumps			Condenser water pumps		
			Design	Pump-1	Pump-2	Design	Pump-1	Pump-2
1	Motor output rating	kW	11.3	11.3	11.3	5.5	5.5	5.5
2	Input electrical power	kW	8.8	10.38	9.65	6.1	6.50	6.81
3	Measured flow	m3/h	76.8	92.1	76.7	19.4	31.5	32.2
4	Velocity inside pipe	m/s	2.34	2.80	2.34	1.03	1.67	1.70
5	Suction pressure	bar		0.10	0.10		0.90	0.90
6	Discharge pressure	bar		1.70	1.81		3.20	3.29
7	Total pressure developed	bar	2.5	1.60	1.71	4.4	2.30	2.39
8	Motor + pump efficiency	%	59.4	39.4	37.7	49.6	30.9	31.4
9	Motor load factor	%	67.8	79.9	74.3	74.2	100.4	105.2

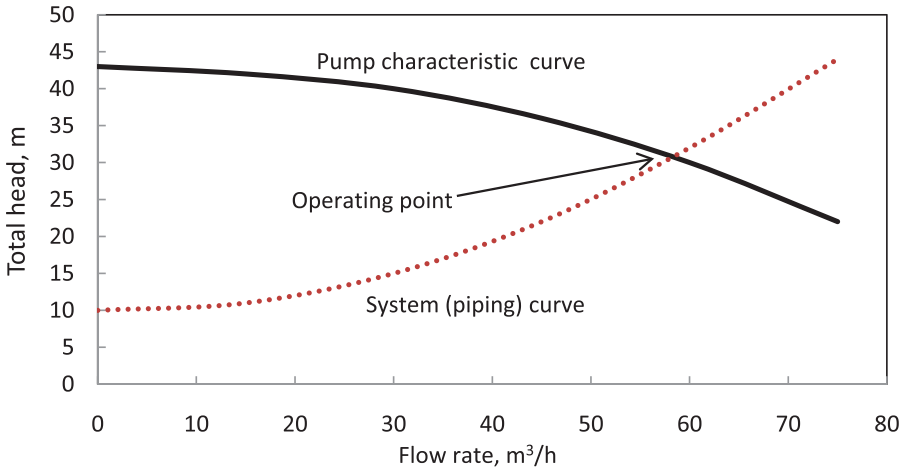


Figure 3: Pump characteristic curve and system curve with flow rate...

of hard water and no water treatment). The maximum drop is supposed to be 0.3-0.5 bar only. Hence, the condensers need to be de-scaled. Water treatment needs to be initiated and online descaling equipment need to be installed. Nowadays some organic descaling liquids available for use. This needs to be added with cooling water.

iii. Lot of scaling will be observed in pump internals in some condenser water pumps. It is suggested to remove the condenser pumps and clean the scales inside the pump internals and also the connecting pipelines.

iv. The efficiency of pumps will be highest when used close to the rated head. Sometimes the pump will be operating at substantially different head due to poor selection and the efficiency will be low. In such cases, the pump needs to be changed with correct rating for the specific application.

v. In some old plants, separate primary & secondary chilled water pumps will be used. It is suggested to dismantle suchprimary & secondary tanks and directly pass the chilled water (after chilling in chiller) to end use through closed cycle and again back to chiller. This will minimise the pumping energy, space, water and maintenance cost.

vi. Sometimes the efficiency of pumps will be low due to erosion of internals. In such cases, the pump internals need to be coated with erosion resistance & smooth material to restore the design profile. Efficiency improvement upto 10-15 % can be achieved. Otherwise the pump needs to be replaced.

vii. The water piping should be sized in such a way that the water velocity is less than 2.0-2.5 m/s. More the velocity, more the friction loss.

viii. During new procurements, it is suggested to go for 2 way modulating motorised valves for AHUs (instead of conventional 3 way valves) so that either chilled water pass through the chilled water coils or no flow (and there is no bypass). The manual valves (if any) in existing 3 way valves need to be closed so that it acts like 2 way valve. The control should be such that when the AHU is OFF, the 2 way valve should close the chilled water circulation completely. In the present systems, chilled water will be flowing through / up to all AHUs, irrespective of whether the AHU is ON or OFF and chilled water under circulation is always constant.

Ideally when only 3-4 AHUs are under operation (during night time & holidays), water should flow only to those 3-4 AHUs and not to all AHUs. AC VFD needs to be installed for the chilled water pumps sensing the temperature drop across the chiller and maintain 4.0-4.5 °C. The energy saving upto 40-60 % of chilled water pump is possible. First, the required no. of AHUs should be switched on so that water circulation is established before switching on the chiller.

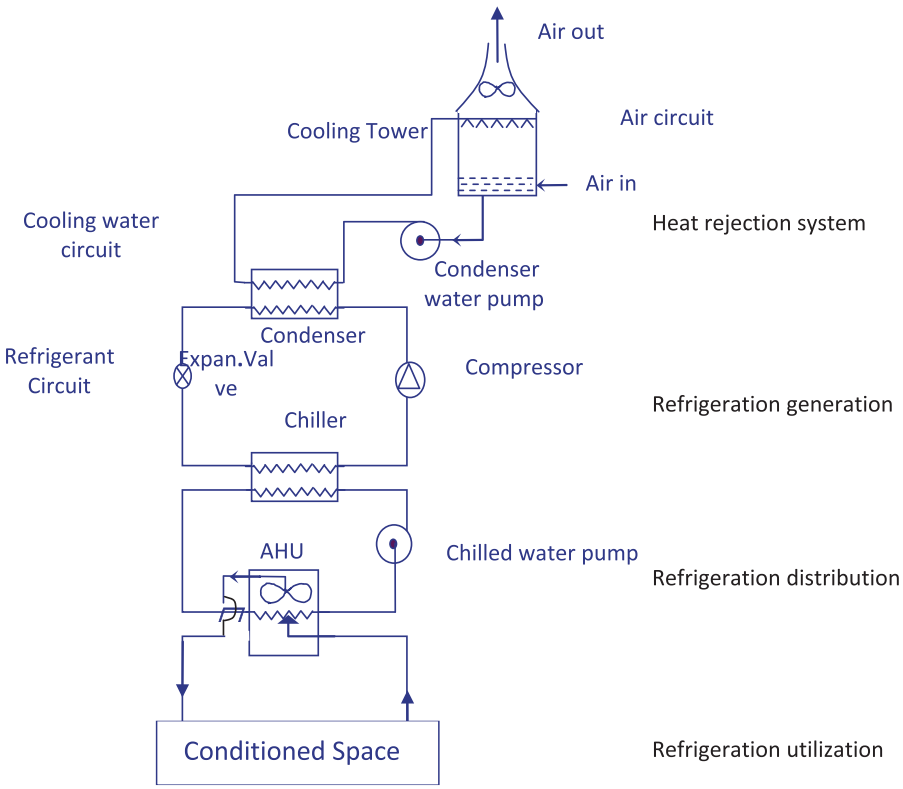


Figure 4: Schematic of a typical HVAC plant...

Conclusion

Pumps and pumping systems offer lot of opportunities for energy saving in HVAC systems. A detailed system study and analysis will lead to identifying all potential areas of energy conservation. Majority of opportunities are described in this article. ■

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Will Hong Kong Emerge As A Leading GF Hub?

Green Finance (GF) is a broad term that refers to capital raising and financial investments flowing into projects, products and companies that support the development of a more sustainable, low-carbon and climate-resilient economy. Experts find Hong Kong's high potential to emerge as a green finance hub...

Image Courtesy: FSDC

Green Finance (GF) is a broad term that refers to capital raising and financial investments flowing into projects, products and companies that support the development of a more sustainable, low-carbon and climate-resilient economy. Experts find Hong Kong's high potential to emerge as a green finance hub…

According to a recent report entitled, 'Hong Kong as a regional green finance hub' by Financial Services Development Council (FSDC), FSDC has made recommendations to help Hong Kong position itself as a leading centre for Green Finance (GF) in the region.

The Chairman of the FSDC, Laura M Cha, said, "To meet global commitments in achieving low emissions, billions of US dollars are needed annually to fund low-carbon assets. China is now playing a leadership role in green finance and the National 13th Five-Year Plan makes a number of references to green finance priorities. All of these signify that there are huge opportunities for Hong Kong to position itself as a leading hub for the provision of green finance and investment. Hong Kong should act and seize these opportunities without any delay."

"A flourishing green finance business can assist Hong Kong in promoting the development of its bond and project finance markets, as well as providing numerous benefits ranging from increased employment opportunities to boosting growth in the investment management, derivative, insurance and private equity industries," she commented.

"The Financial Secretary also made reference to green finance in his Budget Speech 2016-17, which states that the government will strengthen efforts to publicise its competitive capital markets and highlight Hong Kong's edge in developing green financial products," added Cha.

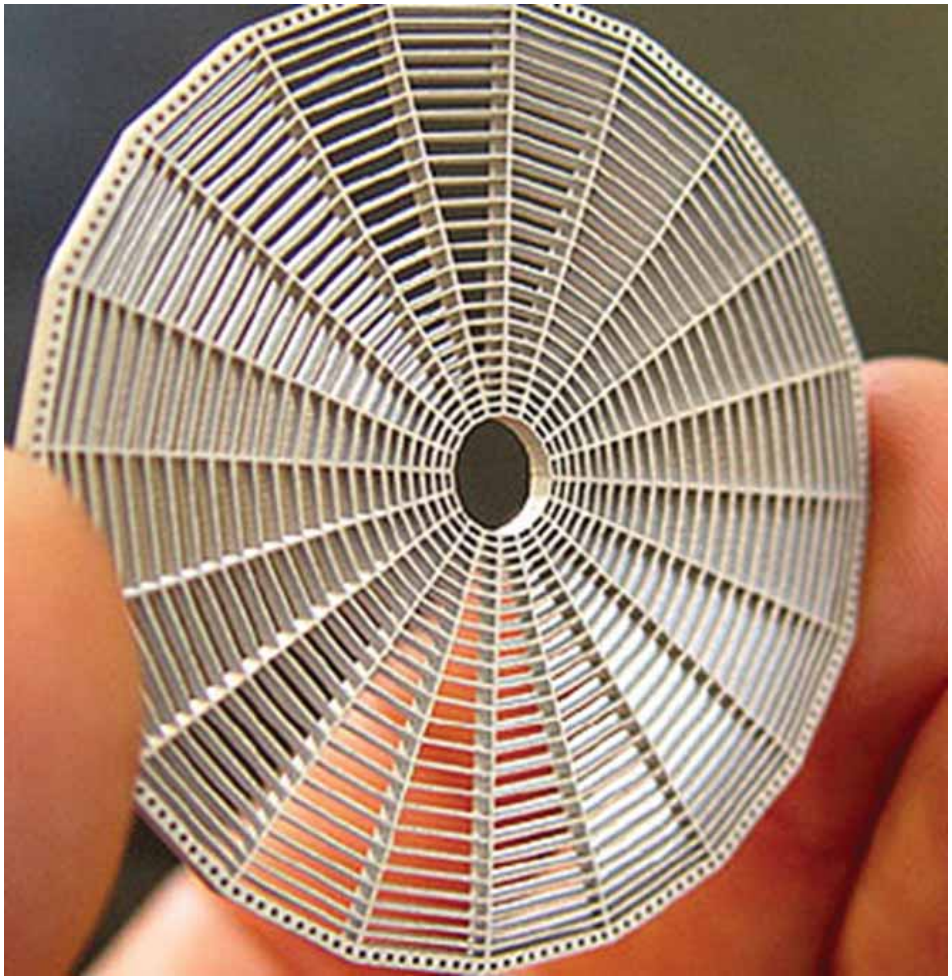
In general, green finance is a broad term that refers to capital raising and financial investments flowing into projects, products and companies that support the development of a more sustainable, low-carbon and climate-resilient economy.

Examples of such projects and objectives include clean energy, pollution control, green buildings, transportation and infrastructure, energy efficiency and sustainable resource management – as well as environmental services, such as waste management and sustainable forestry.

The report makes a number of recommendations for Hong Kong to consolidate its leading position in green finance, including:

i. issuing benchmark 'green bonds' by government and public-sector controlled issuers;
ii. establishing a Green Finance Advisory Council or similar body to provide ongoing focus and assistance;
iii. hosting a global conference on green finance and investment, followed by a seminar series;
iv. building a cohort of green finance professionals via universities and professional institutions; and
v. establishing a Green Labelling Scheme covering projects and securities, thus attracting issuers and new investors to Hong Kong. ■

Heat Transfer With NANOTECHNOLOGY



There is a need to develop nanoparticle-containing heat transfer fluids by manipulating the local environment at the fluid-nanoparticle interface through both physical and chemical means. The resulting nanoparticle-containing heat transfer fluid will have flow properties close to that of the base fluid, providing a substantial improvement in thermal conductivity and heat transfer coefficient...

Heat energy is the driving force of many day-to-day industrial as well as household activities and needs to be transferred from one place to other. Heat is not always generated in optimum quantity required for its desired use. Either it has to be taken away from the source or has to be driven-in into the location where it is being used.

This motion of heat whether on its own or controlled one for desired location, is nothing but a branch known as heat transfer. Heat can flow from higher temperature to lower on its own but can also be made to flow in reverse by using some driving force.

Heat transfer, an area of engineering based on the physics fundamentals is concerned with the transfer of thermal energy (heat) using a device called heat exchanger, built for heat transfer from one medium to another.

Heat transfer is the exchange of thermal energy between physical systems. Some of the examples of heat transfer are as:

- Air conditioner: a device that cools interior air, such as that of a building or vehicle
- Heat sink: a device used to absorb energy, typically by using its large mass to raise its temperature slightly or by changing phase
- Radiator: a device used to either move heat away from an object or heat an interior space by circulating a fluid through thin metal tubes
- Refrigerator: a device used to cool objects or interior spaces
- Space heater: a device used to heat spaces
- Hydraulic Oil Cooler or example will remove heat from hot oil by using cold water or air
- Swimming Pool Heat Exchanger uses hot water from a boiler or solar heated water circuit to heat the pool water.

The rate of heat transfer is dependent on the temperatures of the systems and the properties of the intervening medium through which the heat is transferred. The three fundamental modes of heat transfer are conduction, convection and radiation. Heat transfer, the flow of energy in the form of heat, is a process by which a system changes its internal energy, hence is of vital use in applications of the First Law of Thermodynamics. Conduction is also known as diffusion, not to be confused with diffusion related to the mixing of constituents of a fluid. The direction of heat transfer is from a region of high temperature to another region of lower temperature, and is governed by the Second Law of Thermodynamics. Heat transfer changes the internal energy of the systems from which and to which the energy is transferred. Heat transfer will occur in a direction that increases the entropy of the collection of systems.

Heat exchanger is a device which transfers heat from one medium to another. Heat is transferred by conduction through the exchanger materials which separate the mediums being used. A shell and tube heat exchanger passes fluids through and over tubes, where as an air cooled heat exchanger passes cool air through a core of fins to cool a liquid. There are many different types of heat exchanger available, the three main types are:

Shell and Tube Heat Exchangers: consist of a large number of small tubes which are located within a cylindrical shell. The tubes are positioned into the cylinder using a tube bundle or 'tube stack,' which can either have fixed tube plates. A floating tube stack which allows the tube bundle to expand and contract with varying heat conditions as well as allowing the tube bundle to be easily removed for servicing and maintenance.

Plate Heat Exchangers: operate in very much the same way as a shell and tube heat exchanger, using a series of stacked plates rather than tubes. Plate heat exchangers are usually brazed or gasketed depending on the application and fluids being used. Their compact stainless steel construction makes them an ideal choice for use with refrigerants or in food and beverage processing.

Air Cooled Heat Exchangers: are commonly used in vehicles or other mobile applications where no permanent cool water source is available.

Nanotechnology in Heat Transfer

Heat exchange has been a significant issue in many mechanical devices since the Industrial Revolution. There's enough inefficiency in heat transfer, for instance, that for water to reach its boiling point of 100 degrees centigrade, the temperature of adjacent plates often has to be about 140 degrees centigrade. With the growing need and demand for all type of heat exchange, heat exchange should be economical and efficient; therefore, efforts are being directed to make efficient and economical heat exchangers. Nanotechnology can no longer be considered an emerging science. It has developed past the point of having a few applications. Everything from medical science to futuristic hologram projections is being developed using various forms of nanotechnology. Every aspect of our lives will improve in one way or the other thanks to this unique technology.

Since the middle of 2000s, nanotechnologies have been magnified as a novel innovative approach to improve the cooling performance of boiling heat transfer. Based on thermo-physical fundamentals on boiling heat transfer, we can present two principal factors which dominantly determine the cooling performance; one is surface roughness and the other is wettability characteristics. Herein, the manipulated surface morphology via nanoscale structures, like vertically aligned nanowires, is able to increase the roughness extremely and intensify the hydrophilicity towards super-wetting regime which is clearly favourable to wetting of the target surface by liquid-phase coolant. At first, higher heat dissipation capacity can be attributed to the increase of surface roughness, which means the extended interfacial contact area between the solid surface and the liquid coolant. Even though silicon nanowires have relatively low thermal conductivity of about 8 W/m·K compared to bulk silicon substrate of about 140 W/m·K, the heat dissipation capability under boiling conditions was considerably improved. This can be demonstrated by other aspects on the morphological change via the structures. Surface morphology in company with nano/microscale vacant area formed by the coalescence of distributed nano-structures can play a role as a structural catalyst for the vaporizing of the coolant.

The other factor, surface wettability, has also been verified that hydrophilic characteristics of the surfaces result in the enhancement of surface re-wetting properties – and then it helps to increase Critical Heat Flux (CHF) to extend maximum heat dissipation capacity.

The problems of heat and energy consumption are interrelated. Energy consumption is lower when the hardware produces less heat. Likewise, the equipment needs less power when it runs cooler. Researchers have discovered a new way to apply nanostructure coatings to make heat transfer far more efficient, with important potential applications to high tech devices as well as the conventional heating and cooling industry. These coatings can remove heat four times faster than the same materials before they are coated, using inexpensive materials and application procedures. The discovery has the potential to revolutionise cooling technology. For the configurations investigated, this approach achieves heat transfer approaching theoretical maximums which is quite significant. The improvement in heat transfer achieved by modifying surfaces at the nanoscale has possible applications in both micro- and macro-scale industrial systems. Heat exchangers are what make modern air conditioners or refrigerators function, and inadequate cooling is a limiting factor for many advanced technology applications, ranging from laptop computers to advanced radar systems.

The new approach, through both their temperature and a nanostructure that literally encourages bubble development, water will boil when similar plates are only about 120 degrees centigrade.

To do this, heat transfer surfaces are coated with a nanostructured application of

zinc oxide, which in this usage develops a multi-textured surface that looks almost like flowers, and has extra shapes and capillary forces that encourage bubble formation and rapid, efficient replenishment of active boiling sites. Many electronic devices need to remove a lot of heat quickly, and that's always been difficult to do. This combination of a nanostructure on top of a microstructure has the potential for heat transfer that's much more efficient than anything we've had before.

Researchers have shown that an advanced cooling technology being developed for high-power electronics in military and automotive systems is capable of handling roughly 10 times the heat generated by conventional computer chips. The miniature, lightweight device uses tiny copper spheres and carbon nanotubes to passively wick a coolant toward hot electronics. This wicking technology represents the heart of a new ultrathin "thermal ground plane," a flat, hollow plate containing water. Similar "heat pipes" have been in use for more than two decades and are found in laptop computers. However, they are limited to cooling about 50 watts per square centimeter, which is good enough for standard computer chips but not for "power electronics" in military weapons systems and hybrid and electric vehicles.

Cooling technology, which makes possible to dissipate generated or transmissive heat from hot spots to atmosphere, based on heat transfer is an essential ingredients for practical modern industry fields. As the quantity of heat generation rapidly increases according to the increase of the integration density of electric circuits, advanced cooling technologies are required as pre-requisite criteria for thermal designing of devices.

Bottlenecks

Heat transfer needs to be controlled as it is a critical aspect of many different technologies. Interfaces between different materials are often heat-flow bottlenecks due to stifled phonon transport. Inserting a third material usually only makes things worse because of an additional interface created. However, introducing an ultrathin nanolayer of organic molecules that strongly bond with both the materials at the interface gives rise to multi-fold increases in interfacial thermal conductance, contrary to poor heat conduction seen at inorganic-organic interfaces. This method to tune thermal conductance by controlling adhesion using an organic nanolayer works for multiple materials systems, and offers a new means for atomic- and molecular-level manipulation of multiple properties at different types of materials interfaces. Radiative heat transfer at nanoscale distances, while theorized, has been especially challenging to achieve because of the difficulty of maintaining large thermal gradients over nanometer-scale distances while avoiding other heat transfer mechanisms like conduction. All objects in our environment exchange heat with their surroundings using light. This includes the light coming at us from the sun, the glowing red color of the heating element inside our toaster ovens, or the "night vision" cameras that enable image recording even in complete darkness. But heat exchange using light is usually very weak compared to what can be achieved by conduction (i.e., by simply putting two objects in contact with each other) or by convection (i.e., using hot air).

Conclusion

To date, the benefits from nanomaterial-enhanced industrial heat transfer fluids have not been realized, due to some significant technical issues. There is a need to develop nanoparticle-containing heat transfer fluids by manipulating the local environment at the fluid-nanoparticle interface through both physical and chemical means. The resulting nanoparticle-containing heat transfer fluid will have flow properties close to that of the base fluid, providing a substantial improvement in thermal conductivity and heat transfer coefficient. The nanoparticle-enabled heat transfer fluid should improve the energy efficiency of existing industrial waste heat recovery systems that utilise fluid flow in a closed-loop. The new fluids should find applications in large industrial operations such as refineries, chemical plants, and paper mills. The principles developed also should be applicable to engine coolants, used in both off-road and consumer automotive applications, where weight and cost savings from smaller heat exchangers are important. ■

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A Breakthrough At CSIRO In Australia

Image Courtesy: © Ian Wilson

Rooftop concentrating solar thermal collectors power air conditioning systems at Stockland Wendouree...

Recently, CSIRO has unveiled a solar-powered air-conditioning system to cool Australian commercial buildings, achieving greater energy efficiency...

CSIRO is an organisation that holds more than 1,800 patents, they are Australia's largest patent holder. This ever-increasing wealth of intellectual property is a vast source of commercial opportunity and has already resulted in more than 150 spin-off companies, with many more to come. With more than 5,000 experts based in 55 centres, extensive local and international networks, and a burning desire to get things done, they are Australia's catalyst for innovation and a global force in transforming imagination into reality.

Recently, CSIRO has unveiled a solar-powered air-conditioning system to cool Australian commercial buildings, achieving greater energy efficiency. Operating at Stockland Wendouree Shopping Centre in Ballarat, Victoria, the system uses concentrating solar thermal technology to produce heat energy used to power the air conditioning system.

The Australian Renewable Energy Agency (ARENA) provided $520,000 to support the $1.2 million project, jointly managed by CSIRO with Stockland Group and NEP Solar. The system addresses the high energy consumption of large commercial spaces such as shopping centres and hotels due to their heating and cooling energy requirements – around 60% of total energy use.

The closed-loop system uses two 'desiccant' wheels to remove moisture from the air, acting as a dehumidifier. A high-temperature wheel uses solar heat for regeneration while a low temperature wheel functions without any external heat to deliver greater efficiency on a commercial scale.

CSIRO Energy Director Peter Mayfield is extremely pleased with the early results. Dr Mayfield said, "CSIRO's energy research is driving down costs of renewable technologies, accelerating the transition to a lower-emissions future. We are pioneering new technologies and this project is a world-first demonstration of a desiccant air-conditioning system using roof mounted concentrating solar thermal collectors."

The system addresses the high energy consumption of large commercial spaces...

ARENA CEO Ivor Frischknecht said that ARENA is happy to have partnered with CSIRO on this technology. He added, "It has the potential to further improve the efficiency of solar thermal energy systems and storage to provide clean and reliable heating and cooling in commercial buildings. ARENA is committed to supporting innovative projects like this and helping to share lessons learned amongst the wider RD&D sector, powering Australian renewable energy innovation well into the future."

The air conditioning system is powered by NEP Solar's trough collectors with heat stored in a thermal oil tank. The roof space required for the solar air-conditioning technology can be 40% less than a traditional single-stage desiccant system. Solar heat-driven desiccant air conditioning systems can provide humidity controlled fresh air into the buildings and is expected to significantly reduce HVAC electricity usage for commercial buildings. ■

Geo-Exchangers For Heating & Cooling

An Earth Coupled Energy Transfer Source

Example of 18T Excavated Pit for Earth-coupled Geothermal Heat Exchanger...

Depending on latitude and time, below ground temperatures range from 7 – 8°C to 20 – 21°C. Like a cave, this ground temperature is warmer than the air above it during the winter and cooler than the air in the summer. The GHP takes advantage of this by exchanging heat with the earth through a ground heat exchanger...

Clean Power support the use of geothermal energy that comes from the heat within the earth. This energy can be drawn directly from the earth as hot water or steam reservoirs deep in the earth that are accessed by drilling; geothermal reservoirs located near the earth's surface. Geo-Exchange, had been first used in the late 1940s. The system operates on the constant temperature of the earth as the exchange medium instead of the outside air temperature. India experience seasonal temperature extremes 47°C from scorching heat in the summer to sub-zero cold in the winter. But during all seasons, few feet below the earth's surface the ground remains at a relatively constant temperature. Depending on latitude and time, below ground temperatures range from 7-8°C to 20-21°C. Like a cave, this ground temperature is warmer than the air above it during the winter and cooler than the air in the summer. The GHP takes

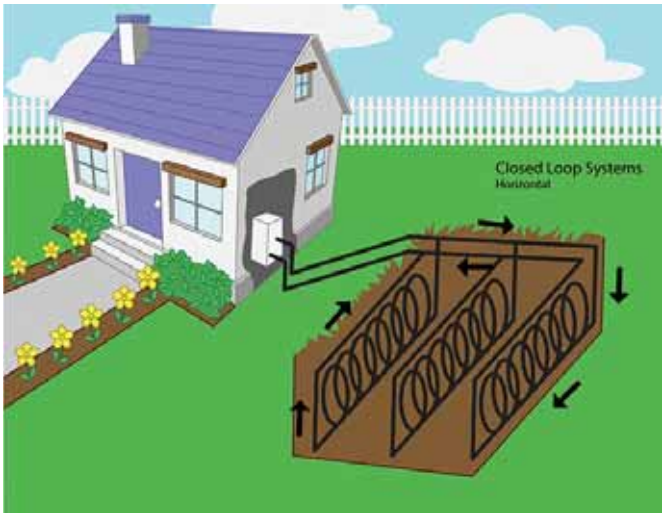

Figure 1: Horizontal type closed loop Geo-exchanger...

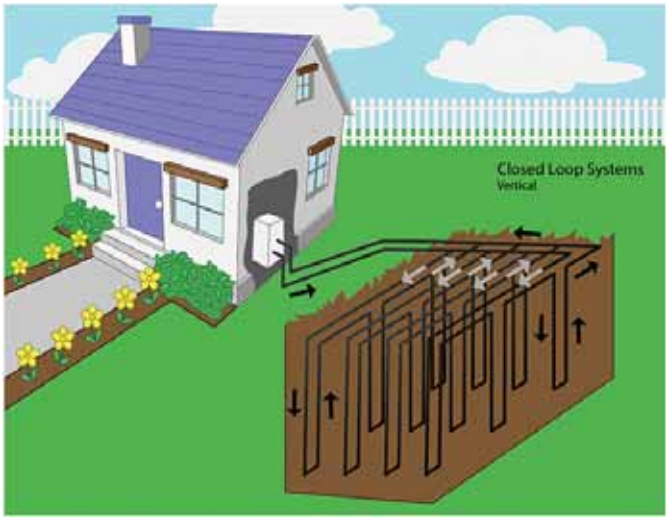

Figure.2: Vertical type closed loop Geo-exchanger...

advantage of this by exchanging heat with the earth through a ground heat exchanger.

As like any heat pump, geothermal equipped heat exchangers are able to produce heat or cool for human comfort. Some models of geothermal systems are available with two-speed compressors and variable fans for more comfort and energy savings. In comparison to air-source heat pumps, compressor based system are quieter, last longer, need little maintenance, and do not depend on the temperature of the outside air.

A dual-source heat pump combines an air-source heat pump with a geothermal heat pump. Dual-source heat pumps have higher efficiency ratings than air-source units, but are not as efficient as geothermal units. This technology is adoptable due to its lower installation cost than a single geothermal unit. Cost of a geothermal system can be several times more that of an air-source system of the same heating and cooling capacity, the additional costs are returned in form of energy savings in 5 to 10 years. System life is estimated at 25 years for the inside components and more than 50 years for the ground loop.

Types Of Geothermal Heat Pump Systems

Geothermal heat pumps are either closed loop type of open loop type. The closed-loop system uses sealed horizontal or vertical pipes as heat exchangers through which water, or water and antifreeze, transfer heat to or from the ground. The second type, the water-source (or open-loop) GHP, pumps water from a well or other source to the heat exchanger, then back to the source. In closed loop system, there are three designs; horizontal, vertical, and pond/lake systems.

Closed-Loop Systems

In closed-loop geothermal heat pumps, an antifreeze solution is circulated in the circuit. Plastic tubes are used above earth surface. Copper tubes are buried in the ground or submerged in water. A heat exchanger transfers heat between the refrigerant in the heat pump and the antifreeze solution in the closed loop. The loop can be in a horizontal, vertical, or pond/lake configuration.

Horizontal Closed-Loop System

This type of installation is generally most cost-effective for residential installations, particularly for new construction where sufficient land is available. It requires trenches at least four feet deep. The most common layouts either use two pipes, one buried at six feet, and the other at four feet, or two pipes placed side-by-side at five feet in the ground in a two-foot wide trench. The Slinky method of looping pipe allows more pipe in a shorter trench, which cuts down on installation costs and makes horizontal installation possible in areas it would not be with conventional horizontal applications.

Vertical Closed-Loop System

Large commercial buildings and schools often use vertical systems because the land area required for horizontal loops would be prohibitive. Vertical loops are also used where the soil is too shallow for trenching, and they minimize the disturbance to existing landscaping. For a vertical system, holes (approximately four inches in diameter) are drilled about 20 feet apart and 100 to 400 feet deep. Into these holes go two pipes that are connected at the bottom with a U-bend to form a loop. The vertical loops are connected with horizontal pipe (i.e., manifold), placed in trenches, and connected to the heat pump in the building.

Pond/Lake Closed-Loop System

If an adequate water body like pond or lack is available nearer to site, a supply line could be placed underground from the building to the water and coiled into circles at least eight feet under the surface to prevent freezing. The coils should only be placed in a water source that meets minimum volume, depth, and quality criteria. This may ultimately reduces overall cost of the system.

Open-Loop System

This type of system uses well or surface body water as the heat exchange fluid that circulates directly through the GHP system. Once it has circulated through the system, the water returns to the ground through the well, a recharge well, or surface discharge. This option is obviously practical only where there is an adequate supply of relatively clean water, and all local codes and regulations regarding groundwater discharge are met.

Hybrid Systems

Hybrid systems using several different geothermal resources, or a combination of a geothermal resource with outdoor air (i.e., a cooling tower), are another technology option. Hybrid approaches are particularly effective where cooling needs are significantly larger than heating needs. Where local geology permits, the "standing column well" is another option. In this variation of an open-loop system, one or more deep vertical wells is drilled. Water is drawn from the bottom of a standing column and returned to the top. During periods of peak heating and cooling, the system can bleed a

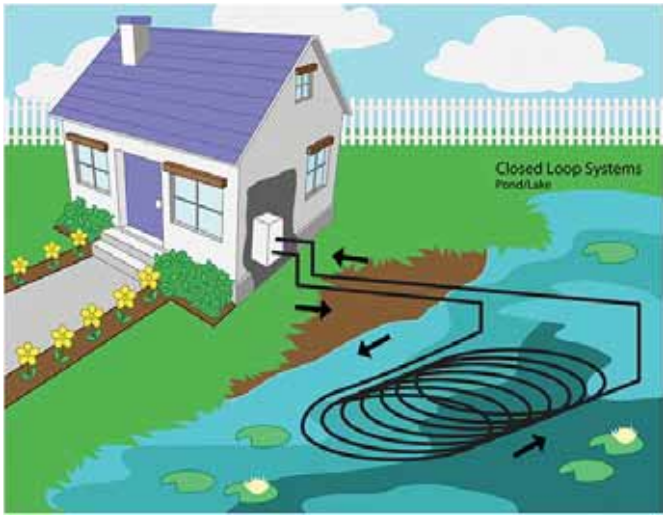

Figure.3: Pond type closed loop Geo-exchanger...

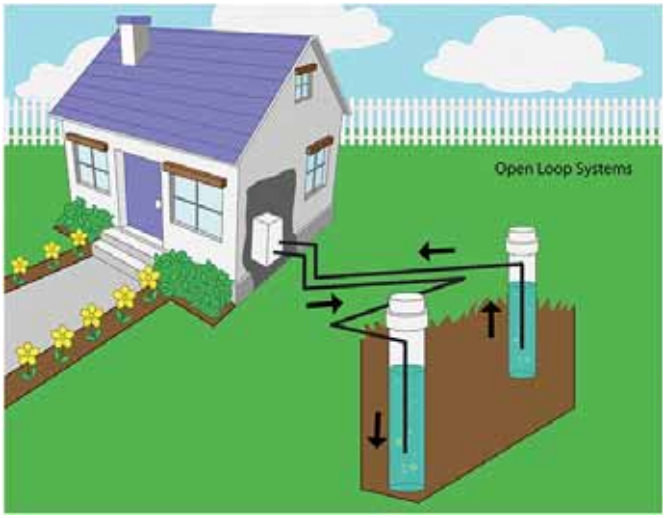

Figure.4: Open loop type Geo-exchanger...

portion of the return water rather than reinjecting it all, causing water inflow to the column from the surrounding aquifer. The bleed cycle cools the column during heat rejection, heats it during heat extraction, and reduces the required bore depth.

Conclusion

Geothermal energy is one of the renewable sources of energy available in the form of vast natural reservoirs of heat energy in the earth's interior. A number of geothermal power plants, which generate more than 10,000 MW power are operational in at least 24 countries of the world. Besides, geothermal energy is being used directly for heating in at least 78 countries. The largest producer of this energy is USA that generates about 3,086 MW of electricity.

Geothermal energy has great potential as a clean, green and naturally occurring renewable source of energy.

Geothermal hot water can be used for many applications that require heat including heating buildings, raising plants in greenhouses, drying crops, heating water at fish farms, and several industrial processes.

It can be used for generating electricity as well. It is therefore necessary to explore the possibility of setting up more geothermal power plants to use the naturally occurring renewable source of energy. ■

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Kitchen Ventilation Systems

There are particular objectives, which the kitchen ventilation has to achieve. The general ventilation has to provide sufficient air for complete combustion at burning appliances, otherwise chronic debilitating carbon monoxide poisoning could occur...

Ventilation is the single most important factor in the design, construction and operation of commercial kitchens. Without adequate ventilation and an ample supply of clean makeup air, no kitchen will operate efficiently. There are particular objectives, which the ventilation has to achieve. The objectives include the following:

1. The general ventilation through the kitchen has to introduce sufficient clean, cool air and remove excess hot air for the occupants to breathe adequately and remain comfortable.
2. The general ventilation has to provide sufficient air for complete combustion at burning appliances, otherwise chronic debilitating carbon monoxide poisoning could occur.
3. The general and local ventilation has to dilute and remove products of combustion from gas and oil fired appliances.
4. The general and local ventilation has to dilute and remove odours, vapours and steam from the cooking processes.
5. Local ventilation has to protect against particular hazards to health arising from some cooking fumes, such as those involving direct application of heat to the food.
6. The local ventilation has to be capable of being kept clean from fat residues to avoid loss of efficiency and fire risks.
7. The system has to be quiet and vibration free. The amount of ventilation required in a particular cooking area depends on various factors: the type of product(s) being cooked, the structure which houses the cooking area, the type of equipment used and local code regulations. And, depending on your location, the building heat source may also play a factor.

The growth of the service industry and the need for more control over the air quality inside difficult to maintain areas such as commercial kitchens has created a boom in the market for kitchen ventilation equipment. This equipment is becoming increasingly more critical to the safety and comfort of employees within kitchens located in retail restaurants, cafeterias, stadiums and nearly any other type of building complex.

Application

The nation's leading manufacturer of commercial kitchen ventilation systems had built a reputation on providing fast, reliable service, and was looking to further capitalise on this reputation to grow its business across the nation. In the process, it wanted to focus on its internal mechanisms for controlling costs while maintaining the quality of its systems and its reputation as the vendor of choice for integrated kitchen ventilation packages that include hoods, exhaust fans, electrical controls, direct-fired heaters and utility distribution systems.

Objective

The customer's core business with independent restaurants, national chains and other public and private institutions continued to show signs of solid growth, which gave the organisation the opportunity to improve their business by focusing on key product offerings and leveraging the economies of scale this success would provide. Areas that they decided would be most advantageous to them and their customers' success included:

- Standard electrical, controls and automation products on a single vendor to minimize support issues
- Reduce inventory expense by minimising on-hand and replacement parts
- Decrease the reliance on custom built vendor parts integrated into the design of their products.

Solution

Duct Temperature Sensor

Typically one per hood installed above the duct collar. Thermistor or RTD type sensors can be used.

Hood Differential Pressure

This measurement is used for multiple purposes: detection of clogged or very dirty fi lters, detection of a missing filter, and calculation of air flow.

VFD – Variable Frequency Drive

Adding a Variable Frequency Drive (VFD) to a motor-driven system can offer potential energy savings in a system in which the loads vary with time. VFD's belong to a group of equipment called adjustable speed drives or variable speed drives.

Variable speed drives can be electrical or mechanical, whereas VFDs are electrical. The operating speed of a motor connected to a VFD is varied by changing the frequency of the motor supply voltage. This allows continuous process speed control.

Kitchen Space Temperature Sensor

Measures the ambient temperature in the kitchen.

User Interface Control

A hood usually has the following control components:

Alarm Light

This light is activated when any alarm condition is detected. Most common alarm conditions are: filter missing, filter clogged, fi re suppression system activated, duct temperature dangerously high, sensor failed, or VFD is in fault. The easiest way to diagnose problems is by using the Konsole™ Diagnostic Software remotely.

Alarm Buzzer

This is an audible alarm that is activated at the same time as the alarm light.

Override Button

Pressing this button accelerates the exhaust rate to 100% for a pre programmed period of time (default 1 minute). Pressing and holding the button for 3 seconds starts the hood if it has been overridden by a schedule or an "off" state. In this event, the system will start in idle mode and operate normally for the specifi ed override interval. The default override time is 1 hour.

Fan Control Device Override Switch

The Fan Control Device Override Switch is used only in emergency situations to override the control system entirely. This switch should be located inside the VFD cabinet.

Options

- Space humidity (i.e., room humidity)
- Outdoor temperature
- Outdoor humidity.

Infrared Radiation Index Sensor (IRIS) (Optional)

Typically, there are 1 to 4 IRIS sensors per hood. The sensors are installed inside the hood in such a manner that each of them views a cooking surface.

Benefits

The final solution enabled the customer to meet its objectives and achieve several key financial, service and product advantages including:

- Consolidating on a single supplier for all major components to minimise cost and service confusion
- Eliminating the need to maintain inventories of control and automation products
- Gaining the freedom to choose alternative breaker products to improve performance and functionality
- Eliminating solution components by selecting a new breaker, Automation Controllers, VFD's etc. that provided a broader range, by reducing both space requirements and cost. ■

Santosh Churmure
Senior Application Design Expert
Industry Business
Schneider Electric India

Are You Coming To INDIA COLD CHAIN SHOW 2016

The number of exhibitors has gone up by over 25% this year with several new international and Indian companies participating at the show for the first time...

A view of the India Cold Chain Conference 2015...

This October, 6th edition of India Cold Chain Show will open in Mumbai. It is set to be the biggest of all previous editions. The industry has seen the rise of ICCS and its evolution as the power center of Indian cold chain industry.

The number of exhibitors has gone up by over 25% this year with several new international and Indian companies participating at the show for the first time. The profile of exhibitors is clearly segregated into three key segments – Cold Storage, Cold Transport and Cold Supply Chain that will give the visitors complete solutions for their cold chain business.

ICCS has also seen a great value edition this year with transport giant, TATA Motors coming in as the main sponsor at the show. With their complete fleet on display, Tata Motors is expected to draw a high quantity of buyers – especially with other big brands of transport being already present at the show.

The new age technology in insulation, refrigeration, power conservation, storage, IT support and infrastructure will make the visit to ICCS this year worthwhile. With a certain implementation of GST in near future, this year's edition hold key importance for cold chain industry in India as it is set to change the dynamics of logistics operations. Another important factor in this year's edition is a special focus on the booming e-commerce business. Started late for fresh produce, online retail is capturing everyone's imagination. This sector is definitely going to be instrumental in changing landscape of cold storage and transport business.

A view of the inauguration ceremony in 2015...

The very popular, India Cold Chain Conference, in its 5th edition will be a high profile one this year. Theme of the conference this year 'Taking Cold Chain Business to Next Level: Opportunities & Challenges' is in conjunction with the special focus areas of this edition including GST, online retail and maximising profits. The two-day-conference is designed with very interesting sessions holding importance for all stakeholders of cold chain industry in India.

Debuting this year, START-UP WORKSHOP for new entrants in the industry is set to be the high point of the show. Since first edition, the organisers have been getting a lot of queries from individuals and business houses wanting to get into the cold storage and transport operations. They decided to have focused sessions addressing the entry concerns, setting up a profitable business model and running smooth operations by using sophisticated technology and equipment. The workshop is open for all delegates and visitors and will take place on 18th November at the show floor.

Since, cold chain business is highly reliant on Government policies and regulatory framework, ICCS has gathered the support of all leading bodies including National Horticulture Board of India (NHB), APEDA and National Centre for Cold Chain Development (NCCD) to have substantial presence of policymakers at the show.

There are enough reasons for everyone in the industry to plan their visit and attend the most promising event on cold chain sector in India. ■

(For more information browse through: www.indiacoldchainshow.com)

MECO offers new 6000 Count TRMS Digital Multimeter

171B+ TRMS is a 6000 Counts Auto & Manual Ranging Digital Multimeter with LCD Backlight & Holster having Voltage Range up to 1000V DC & 750V AC and Current Range up to 20A AC & DC. Basic accuracy for DC Voltage ± 1.0% rdg + 4 dgt, for AC Voltage ±1.0% rdg + 5 dgt, for DC Current ± 1.0% rdg + 2 dgt, and for AC Current ±1.5% rdg + 5 dgt. It has a special feature like Auto Power Off, Resistance, Capacitance, Frequency, Duty Cycle, Temperature, Diode Test, Audible Continuity, Data Hold, Max/Min, RELΔ. ■

Website: www.mecoinst.com

Hansen introduces Motorized Control Valve

The Hansen Motorized Control Valve is an exclusive industrial grade, direct motor operated valve that eradicates the most common concern of the motor operated valves - valve stem seal leakage. The hermetic design has eliminated refrigerant leakage through stem seals due to the non-electric rotor and stem are enclosed in a stainless steel can that contains the fluid pressure. The motor is positioned outside the stainless steel can, and is isolated from the fluid in the valve. The V-port or throttling plug is accurately controlled and positioned by the powerful motor. Whether controlling level, temperature or pressure, the Motorized Control Valve provides precise control with an onboard, field programmable readout. The variety of control signal options allows the customer flexibility to control the valve utilising their own PLC or computer. No proprietary interfaces or controllers are necessary. ■

Website: www.hantech.com

Havells launches World's most advanced, Made in India range of Water Heaters

Havells India Limited has introduced the world's most advanced range of water heaters that uses colour changing LED technology to communicate changing temperature levels. The water heaters, which have been 100% designed and made in India under the "Adonia" series, have set a new benchmark in the global water heater industry.

The "Adonia" series provides excellent functionality that perfectly blends with the aspirational consumer's emphasis on aesthetics and safety. The water heaters come with a patented temperature sensitive LED that changes its colour from Blue to Amber as the water heats from normal to a maximum of 75 degrees. Unlike conventional geysers with only red and green colours, these technologically advanced water heaters will allow consumers to choose just the 'right' temperature as per their comfort for utilising water. This revolutionary feature will also protect consumers against sudden exposure to water at very high temperature.

The "Adonia" series also comes with digital temperature indicator and feather touch controls, which provide ease of use and takes customer's experience to a different level.

The inner container of the water heater has been built using the innovative Feroglas technology, which ensures high resistance against corrosion, making the appliance tough on hard water and giving it a longer life. Its inbuilt Incoloy Glass Coated Heating Element gives excellent resistance to both oxidation and carbonization at high temperature, and it has high precision digital thermostat cut-out for optimum water temperature and safety. In another first, the five star rated water heaters come with integrated shock resistant plug that safeguards against shocks. ■

Website: www.havells.com

WEH TW108 Filling Connector helps in the maintenance of AC equipment

The WEH TW108 Filling Connector is an alternative to the WEH TW110 for leak-tight filling and evacuating during maintenance work of automotive air conditioning equipment. In order to push to connect and the pressure-tight connection to the external diameter Ø 11 of beads is established.

The TW108 service connector is rated for a maximum operating pressure of 35 bar and has a colour coded sliding sleeve blue for the vehicle's low pressure connection port and an inline media inlet UNF 7/16"-20 external thread (SAE J513-45°).

The integrated shut-off valve prevents the escape of refrigerant which remains in the filling tube and can then be correctly disposed of. Connection and disconnection is effected by a simple movement of the sliding sleeve. RSI resulting in the inflammation of tendons and abrasion of joints caused by continuous screwing and unscrewing of threaded joints is thus eliminated. Compared to conventional screwed connectors, the TW108 features ease of operation saving costs and time.

The features are: Connection in seconds; No hand tightening required; WEH Jaw Locking Mechanism; High-grade materials. ■

Website: www.weh.com

Wika offers Ambient Temperature Sensor

Wika's Model TF41 ambient temperature sensors are used for temperature measurement in external areas as well as in cold rooms and production and storage facilities. The extremely small housing even enables mounting in locations where there is very little space available.

The model TF41 ambient temperature sensors are delivered as standard with the measuring element integrated within the housing. For faster temperature measurement, the TF41 can alternatively be delivered with an external sensor shaft.

To prevent erroneous measurements through strong radiation from sunlight, we offer a clip-on sun cover as an accessory. By selecting the appropriate measuring elements, the TF41 ambient temperature sensors are compatible with all commonly used control systems. ■

Website: www.wika.de

Compact prep station for the compact kitchen

In a real kitchen, chefs want to be able to access fresh ingredients instantly. They also need to keep them refrigerated, for food safety. And in today's kitchen, the job has to be done in the smallest space. That's why Williams has launched a compact version of their market-leading Onyx prep station.

Combining a preparation work surface with top-mounted ingredients wells, undercounter storage and Williams' advanced refrigeration technology, the new Onyx CPC2 delivers a prep solution that's both practical and energy efficient. It's ideal for a wide range of food prep including pizza, sandwiches, salads, tapas and desserts. ■

Website: www.williams-refrigeration.co.uk

Parker ZoomLock wins 2016 AHR Expo Innovation Award

Sporlan Division of Parker Hannifin Corporation, which is well known for motion and control technologies, received the 2016 AHR Expo Innovation Award for the Tools and Instruments Category for ZoomLock, a braze-free HVAC/R copper connecting concept.

The annual awards competition honours the most inventive and original HVAC/R products, systems, and technologies showcased at each year's AHR Expo. Winners are selected by a panel of third-party ASHRAE member judges who evaluate all award entries based on innovative design, creativity, application, value, and market impact.

ZoomLock's patented design is the only press-to-connect technology that is approved for HVAC/R operating pressures up to 700 psi. This truly is a ground breaking technology for the HVAC/R industry aimed at increasing technician productivity. One technician can quickly do the connecting job alone, with no torch, no hot-work permits, no safety equipment and no special experience. In just minutes, it provides a clean, leak-proof connection, and the fittings are more repeatable than brazed joints. By eliminating concerns about gas and flames, it also gives more flexibility in where and when one can work, plus there's no need to nitrogen-purge the lines.

The advantage of the braze-free process is that if the press fitting is not crimped properly, it can easily be re-crimped. In addition, it requires no adhesives, just the crimping tool and the fitting. ■

Website: www.parker.com

SIPLA launches NBR for HVAC applications

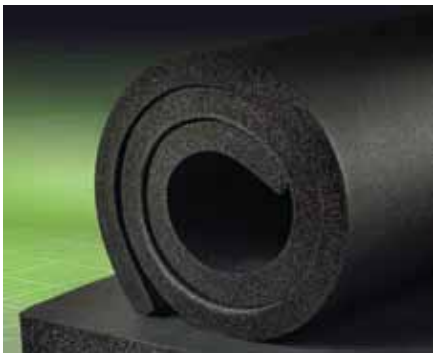
SIPLA has introduced its Nitrile Rubber (foam) insulation (NBR) for use in HVAC applications. The insulation is available in 3mm, 6mm, 9mm, 13mm, 15mm, 19mm, 23mm and 26mm thickness. The company also provides NBR insulation with 1 side Aluminium foil (FSK) as well.

NBR is closed cell insulation with a natural water vapour barrier and is used primarily for cold insulation. It is non wicking and has does not promote microbial growth. It is also dust and fibre free.

It is used in the following industry:

1) HVAC
2) Solar Energy
3) Acoustic Insulation
4) Building Insulation ■

Website: www.nitrilerubberinsulation.com



MECO presents POWERGAURD – TRMS (Model: PG09 – 20A / 5A / 1A)

MECO POWERGAURD - TRMS (PG09) is used to measure Power / Energy Consumption of electrical appliances (AC, Refrigerator, Washing Machine, Air Cooler, Microwave Oven etc.). It indicates TRMS values of 10 parameters on 5 display pages with Large Dual Row LCD Display having backlight and annunciator. It is equipped with 5 keys to view all the parameters and for programming of the meter.

POWERGAURD is available in three ranges, PG09 - 20A, PG09 - 5A, PG09 - 1A. It measures TRMS values of V, A, PF, Hz, KW, KVA, KVAr, KWh, EUT, CO_2 (in Kg). It is simple and easy to handle provided with Three Pin Socket and Plug suitable for Indian Socket.

It can be used for demonstration and testing of electrical energy consumption of household and office appliances. Also used in Houses, Offices, Shops, Schools, Laboratories etc. for Continuous Measurement. ■

Website: www.mecoinst.com

Thai Sekisui introduces Thermobreak Tube

Thermobreak Tube is preformed tube insulation for pipes, and is made from physically (irradiation) cross-linked closed-cell, polyolefin foam, factory bonded to pure reinforced aluminium foil. With a lower thermal conductivity than any other flexible insulation material, almost zero vapour permeability, it provides superior energy saving performance, fast and simple installation, and trouble-free operation in a variety of environments.

The features are as follows:

- Optimum Technical Performance
- Outstanding Appearance and Durability
- Independently Tested and Certified
- Fire and Smoke Standards Approved
- Health, Safety and the Environment
- Easy To Use
- Extensive Technical Support ■

Website: www.thaisekisui.co.th

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Tata Power's Corporate Centre receives 'IGBC GOLD' rating

Carnac building has been the first establishment within Tata Power to get the Green Certification...

Tata Power, India's well known integrated power company's Corporate Centre, Carnac building in Mumbai was awarded with 'IGBC GOLD' rating, under "Indian Green Building Council's (IGBC) Green Existing Buildings" category for achieving required green building standards.

There are different levels of green building certification like certified, Silver, Gold and Platinum that are awarded in recognition of the level of achievements. The Gold Certification is awarded to recognise national excellence and is valid for next three years. IGBC Green Existing Buildings Operations and Maintenance (O&M) rating system addresses green features under the categories such as site and facility management, water efficiency, energy efficiency, health and comfort and innovation.

Tata Power's Corporate Centre, Carnac building has been the first establishment within the company to get the Green Certification. The company has already taken up initiatives to get all the key establishments in Mumbai certified in a phased manner by 2020. ■

Sydney's Sea Life Aquarium creates a comfort zone for penguins

For penguins, in particular, water temperature and silence play a key role in recreating their natural environment...

The big Sea Life Aquarium in Sydney has opened a new area totally dedicated to penguins. The visitors can interact with the animals, being involved in a sort of expedition to explore different tanks, with many species of penguins.

In closed and busy spaces, like museums, constant temperature and humidity levels play a vital role for visitor comfort. For penguins, in particular, water temperature and silence play a key role in recreating their natural environment.

Owners have opted for an HVAC system, based on two Climaveneta NX air source chillers for outdoor installation. These chillers constantly cool water in penguin aquariums and the outdoor installation reduces noise emissions. Their engineering oriented design and energy efficiency levels are ideal solutions to provide penguins with an appropriate habitat, thus reducing running costs and optimising initial investment.

According to the latest TEA-AECOM report theme park attendance growth worldwide was about 5.4% in 2014–15. In particular, water parks saw healthy attendance improvements of almost 4% with most markets doing well.

Climaveneta is a European leader in HVAC and HPAC with 40 years' experience. It is in business for a purpose: to provide energy efficient heating, air conditioning and data centre cooling solutions that enhance everyone's comfort, improve the profitability of a building and do not contribute to an increase in CO_2 levels. ■

Paralympic sports complex benefits from using foam insulation

More than R$ 300 million has been invested in the new facility that is the largest single-venue complex of its kind....

Armacell has provided AF Armaflex closed cell foam insulation for the chilled water system in the Brazilian Paralympic Centre in São Paulo. More than three kilometres (3350m) of pipe insulation and 330m² of sheet insulation has been installed by Pro Dac, a local São Paulo company that specialises in mechanical HVAC installations.

Specification of Armaflex ensures condensation control on the chilled water systems and, with proper installation; the insulation is expected to last lifelong of the new mechanical system.

More than R$ 300 million has been invested in the new facility that is the largest single-venue complex of its kind. The venue accommodates 15 Paralympic sports – athletics, wheelchair basketball, swimming, wheelchair fencing, 5-a-side football, 7-a-side football, goalball, boccia, powerlifting, judo, wheelchair rugby, table tennis, wheelchair tennis, triathlon and sitting volleyball.

In addition to 86 athlete apartments and a medical centre, the cutting edge centre is expected to house sports science and research facilities along with a hotel and convention centre. ■

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