ISHRAE IEM STUDENT CHAPTER ACTIVITY REPORT SESSION: 2018-19

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ISHRAE IEM Student Chapter – Core Working Committee (Session 2018-2019)

1. **Gaurav Kumar Jha (President)**

2. **Ramesh Kumar Karthick (Secretary)**

3. **Harsh K Shah (Treasurer)**

4. **Ridhi Lakhotia (CWC Member and GWC President)**

5. **Shounak Das**
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6. **Shubham Barnwal**
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7. **Sahil Sonkar**
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8. **Avinish kumar**
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9. **Sagnik Dutta**
   (CWC Member)

10. **Meghna Saha**
(GWC Member)

11. **Pooja Baheti**
(GWC Member)

12. **Uttaran Sarkar**
(CS ME 4th Year)

13. **Subham Singha Mahapatra**
(CS ME 3rd Year)

14. **Abhijit Majee**
(CS EE 3rd Year)

1. SITE VISIT AT ANTHROPOLOGICAL SURVEY OF INDIA

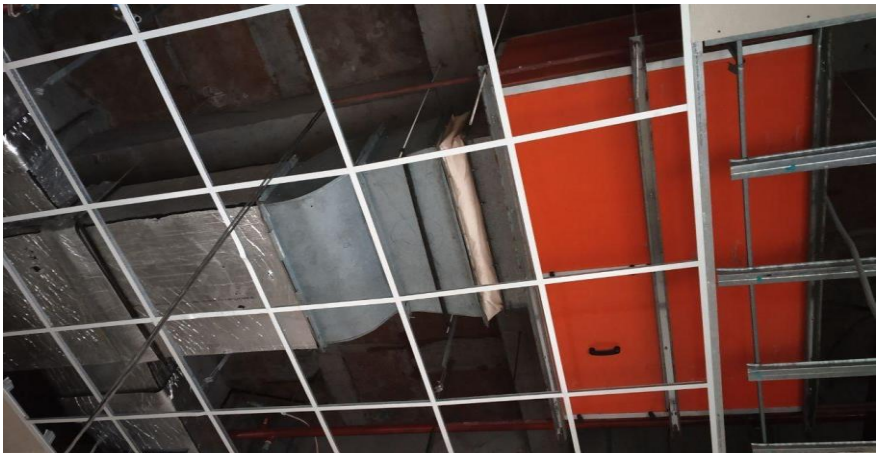
VENUE: - Anthropological Survey of India, Eastern Regional Centre, Kolkata

ABOUT THE VISIT: - 10 ISHRAE IEM student members went for a site visit organized by ISHRAE Kolkata at Anthropological Survey of India on 9th April. The students got to see the HVAC system installation in progress. The students saw the layout of water cooled chillers, evaporative cooling towers and three different types of AHUs.
The site engineer, Mr. Surajit Mukherjee coordinated the whole session.

Students of IEM with chief engineer Mr. Surajit Mukherjee during the visit to ASI

On behalf of Voltas Kolkata, Mr Debashish, the chief engineer of the HVAC systems was present there. After having a brief introduction related to HVAC layout and design of the various HVAC components such as primary pumps,chillers, secondary pumps, AHUs, cooling tower,etc., students were taken to different units, starting from Chiller. Here, students were briefed about the inlets and outlets of the condenser unit of the chiller and the cool water unit.We were then explained the working of the evaporative cooling tower which worked on the principle of increasing the surface area. There are nine motor in which three were primary and three were secondary and three were compressor motor. After this students were taken to various Air handling units and told about working of it and different parts and parameters associated with it. Students got to understand the idea of Air movement inside the AHUs and setup of these AHUs. Students were then taken to another special Air handling unit, It was a Dual Coil type - it could work with chilled water system(water cooled) as well as air cooled. This AHU set to water cooled system during day time and air cooled during night.

Dual cooling fluid type AHU mounted to handle the air in the DNA Synthesis lab



Ceiling mounted AHU connected to insulated ducts to carry conditioned Air

After having all these ideas of HVAC design, students were taken into auditorium to view the total installation of AHU and ducts. There was a single duct with partition separating inlet air and outlet air from each other. These ducts were connected to floor mounted water cooled AHU.

As a whole the complete site visit was an enriching experience where students got to learn about the design layout , working and installation of various HVAC components.

2. SITE VISIT TO NSCBI AIRPORT, DUMDUM, KOLKATA

VENUE:-Netaji Subhash Chandra Bose International Airport, Dumdum, Kolkata

ISHRAE IEM Student Chapter, in association with Voltas Ltd., organised a site visit to Kolkata Airport on the 16th of April, 2018.

STUDENTS ALONG WITH MR. JOYDEEP GHOSH

KOLKATA AIRPORT

Ten students of ISHRAE-IEM student chapter, got a chance to witness the working of the Central Plant consisting of Water Cooled Centrifugal Chilling System with a capacity of 12000 TR maintained by Voltas. The Site engineer Mr. Joydeep Ghosh accompanied the students to show and explain the site layout, distribution and functioning of different components. It had 4 chillers with 2500 TR capacity and 2 with 1000 TR capacity. At the time of visit 6000 TR was operational with two 2500 TR & ONE 1000 TR under working condition & the others on stand-by. Students were explained about the five cycles of water cooled chiller plant and flow of refrigerant and water in the complete circuit. Detailed explanation of functioning of centrifugal compressor was explained along with the VFD (Variable Frequency Drive) technology being used to save power in part load conditions. Students were also explained about the chemical treatment of water to avoid corrosion by maintaining desired PH level of water and the use of expansion tank to maintain the desired pressure in the closed circuit.

THE STUDENTS ALONG WITH THE SITE ENGINEER

PUMPS AT THE SITE

After explaining the compressor and secondary pump working students were taken to the roof top cooling tower where hot water was being sprinkled and cooled by a fan on the top of each tower, there were in total 12 similar cooling towers. On the roof top there was the arrangement of tanks of the chemicals used to be mixed with water to control its hardness and sulphuric acid to maintain the PH level.

COOLING TOWER AT THE SITE

At the end the students expressed their thanks and gratitude to the site engineer. The visit proved to be an enriching one and imparted great learning experience to all the students.

3. TRAINING AT HITACHI CENTRE OF ENGINEERING EXCELLENCE

Venue: Hitachi Centre of Engineering Excellence, Kolkata

Timing: 5th September, 2018 from 1 PM to 5 PM

The Hitachi Training was organised at Hitachi Centre of Engineering Excellence, Kolkata. The training began with the introduction of different types of Air Conditioners and its practical view which was kept in its lab. There were Cassette type ACs which are specially designed for false ceilings, and guarantee a smooth, modern interior finish. Ductable AC that are perfect for big size spaces that require balanced air distribution around the room, window AC and Split type AC. There were labs with open circuit systems that enabled visualization of their working. The models and use of each type AC were explained with a practical view of it. The use of Central AC with a remote in one of the cubicle in office was explained. We can operate the temperature level AC's in rooms and also switch on and off them when needed.

Students of IEM along with professor Gunjan Kumar

After this interactive session there was classroom training which comprised of explanation of the subject Air Conditioning and Refrigeration. It consisted basics of thermodynamics, heat transfer and different refrigeration cycles and understanding of psychrometry and psychometric processes used for the purpose of Air Conditioning. Classification of Refrigerants that is, synthetic, neutral and mixture were discussed. Further, information was given about domestic refrigeration, commercial refrigeration, residential refrigeration, chillers, centrifugal chillers and automotive system. There were also discussions on eco-friendly refrigerants which do not harm the environment and also do not cause ozone depletion. The reason of obsolete refrigerants such as R-12, R-22 were explained. Further the comfort air-conditioning and indoor environment health were also addressed in this session.

TECHNICAL TALKS

1. TECHNICAL TALK ON "ELECTRICAL SWITCHGEARS AND DRIVES"

Date: - 7th April, 2018

Venue: - ISHRAE Kolkata Office, Ballygunge, Kolkata.

Speakers:- Mr. Piyush Jain, Branch Head- Sales (Kolkata branch) of L&T Electrical & Automation Ltd., Subhro Chakraborty, L&T and Surojit, L&T.

Total Participants: 24

The technical talk was organized by ISHRAE Kolkata in association with Larsen & Toubro Ltd. on 7th April,2018 at ISHRAE Kolkata office in Ballygunge. It was attended by both professionals from the HVAC & R and electrical industries like Voltas Ltd. and also by students of Institute Of Engineering & Management (IEM).

The topic of switchgear was well explained by Subhro Cahkraborty. He started off by touching up on some basics for college students. Then he covered the various switchgears available like MCBs, MCCBs, ACBs and VCBs and their current ratings and their proper selection as per the requirement and threw some light on how the RMUs (Ring Man Unit) are used nowadays for uninterrupted power supply. For example, we calculated the max current levels for a transformer and also the short-circuit current (which is in range of 50-60KA). And thus the proper selection of switchgear for that line available in the market as per the IEC 60947 (IS/IEC 60947) guidelines.

Then he talked about some more parameters of switchgear like I_{CU}, I_{CW}, I_{CM} which describe the withstanding capabilities of the breaker in case of fault.

He went on to discuss about faults (symmetrical and unsymmetrical) and the various electrical protections required like O/L, S/C, U/V and E/F. He explained the "co-ordination" between breakers which decides which breaker trips first and the process of delaying used (time based and current based).

He also briefly discussed about contactors, the various duty classes (AC1, AC3, AC4, AC6), Inching, APFC (Automatic power factor controller) and simple short circuit protection devices (fuse, HRC fuses).

The next topic of Electrical Drives was taken up by Mr. Surojit. He started with explaining the different types of starters and differentiated between DOL starter, Star-Delta starter, Auto-transformers and Variable Frequency Drives (VFDs).


VFD being the main topic, he explained how the variable frequency is achieved by rectification of AC to DC and inverting DC back to AC at desired frequency using PWM and also the various types of frequency control. He described the many advantages of drives like stop operations, better efficiency and more energy saving capability. The difference between HVAC Drives and general electrical drives was also discussed. He also talked about the harmonics created due to drives and their solutions. He also explained that as the drives are more of a field device it has various classes of Ingress Protection (IP 54, IP 66, etc) which specify the extremity of environments in which they can work. He then showed various drives which L&T Ltd. provide with various smart features.

Throughout the session many queries were asked to which the speakers answered proficiently.

2. TECHNICAL TALK ON PSYCHROMETRIC PROCESSES

On 23 April, 2018 ISHRAE-IEM Student Chapter, in collaboration with ISHRAE Kolkata Chapter conducted a technical talk which helped the participants to enrich the knowledge about an important HVAC area – psychrometric processes. A total of 39 students from 2nd and 3rd year Mechanical Engineering department of IEM attended the talk.

Mr. Sujoy Dutt and Mr. Uttam Bag from Voltas Ltd. were invited as the guest speakers. Mr. Sujoy Dutt is also a CWC member as well as the membership chair of ISHRAE Kolkata Student Chapter. Mr. Arka Majumder, the assistant student activity chair of ISHRAE Kolkata Chapter was also invited in the technical talk. The guest speakers were felicitated by Mr. Arka Majumder.

Mr. Sujoy Dutt (left) and Mr. Uttam Bag (right) being felicitated by Mr. Arka Majumder

After the President of ISHRAE-IEM Student Chapter Mr. Gaurav Kumar Jha addressed the crowd and Mr. Arka Majumder shared brief introduction about the speakers, the technical session initiated. The whole technical session was divided into two segments.

The talk on psychrometric processes was conducted by Mr. Sujoy Dutt. As psychrometry is the key component to learn about the heat load calculation, the first part of the technical session was devoted into that area. Mr. Sujoy Dutt, with his immense dedication cleared the concepts of the basic psychometric parameters, chart, representation of processes on psychrometric chart. After this technical talk was over, there was a question answer session for clearing doubts.

Mr. Sujoy Dutt delivering the technical talk on psychrometric processes

3. TECHNICAL TALK ON HEAT LOAD CALCULATION

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Mr. Uttam Bag conducted the technical talk on heat load calculation. He explained every aspect of the factors which are contributing to the heat load so clearly that the participants grew an interest in that domain. He also talked about different case studies, design aspects and constraints which should be considered while making the heat load calculation and suggesting the suitable HVAC system for a given project. The talk came to an end with a precise question-answer session from students.

Mr. Uttam Bag conducting the technical talk on heat load calculation

After the technical talk was over a vote of thanks was given to Mr. Sujoy Dutt and Mr. Uttam Bag, who gave time for the students from their busy schedule, Mr. Arka Majumder for his help and collaboration, Mr. Ganesh Subramaniyam, President of ISHRAE Kolkata for providing such opportunity, Prof. Gunjan Kumar, faculty advisor of ISHRAE-IEM Student Chapter for his constant support and guidance and also the audience who patiently attended the talk and gathered technical learning.

The students and the delegates

4. TECHNICAL SESSION ON

"ENERGY EFFICIENT SYSTEM DESIGN AND EQUIPMENT SELECTION"

About the Speaker: The technical session was delivered by ISHRAE's Distinguished Lecturer and President Emeritus, Mr. Manoj Chakraborty, who is a very renowned HVAC consultant and authority.

Objective of the Session: Energy Efficient System Design and Equipment Selection.

Location and timing: The technical talk was organized by ISHRAE Kolkata Chapter at the ISHRAE Kolkata office on 30th of June, 2018 at 3:30 P.M IST.

The session lasted till 6:30 P. M IST and was really beneficial for the attendees. Three students from ISHRAE IEM Student Chapter attended this technical talk as a part of their training internship program.

About the learning:

As the technical session commenced, the speaker explained what energy efficient green buildings are and how are they designed to meet the expectations of a green building. The various chief factors taken into account when designing a green Building are:

1. Sustainable Site Planning
2. Water preservation and Water Efficiency
3. Energy conservation and Energy Efficiency
4. Conservation of Resources and matter
5. Indoor Air Quality(IAQ)

For designing the HVAC system of a green building, the first thing on the to-do list is to calculate the cooling load of the building. The performance of a building depends on how accurately the cooling load estimation is evaluated.

Hourly Load Analysis (Daily and Seasonal) is required to be evaluated to take into account the peak load and off peak load and hence derive the load pattern of the building.

The outside conditions of the building can be found out from ISHRAE / NBC Weather Data Handbook.

The inside conditions of the building can be chosen by the client depending on the work or it can be easily estimated fom the ASHRAE Std.55.

The Indoor Air Quality requirements for various usages of the building space can be found out from ASHRAE Std. 62.1/ NBC 2016.

The lighting and equipment load for the building can be derived from the ECBC Codes or from ISHRAE handbook.

Another thing to be taken into account for efficient use of energy is the Diversity in the cooling load.

Generally, it is observed that most of the buildings operate at 100% load for 1% of its total operation time, 75% load for 42% of its total operational time, 50% load for 48% of its total operational time and 25%load for 9% of its total operational time. So, in order to save energy, the building should not operate at full load conditions all the time of its operation. Hence, the building must be equipped with variable load settings such as VFD.

Equipment Selection:

Points/factors to take into account while selecting the equipments:

- Size of premises
- Usage of space
- Availability of power
- Availability of water
- Availability of space
- Location of the plant
- Operating Hours

Central Air Conditioning Plant

Types of Central Air Conditioning plant systems:

- Water Cooled Chilled Water System
- Air Cooled Chilled Water System
- Water cooled DX system
- Air Cooled DX system
- Vapor Absorption system
- Thermal Storage system
- Radiant Cooling system
- Geothermal Energy System

Types of chillers:

- Water Cooled Screw Chillers
- Water Cooled Centrifugal Chillers
- Air Cooled Screw Chillers
- Rotary & Scroll Water Cooled Chillers
- Rotary / Scroll Air Cooled Chillers
- Magnetic Levitation Centrifugal Chillers

Potential Techniques to be used for energy and economical efficiency:

Variable Speed Drive (VSD) in Centrifugal Components such as AHU Fans, Cooling Tower Fans, secondary pumps, etc. is beneficial for energy saving and hence reduced operating costs. VSD technology controls the Impeller speed and inlet drive vane to control the rate of flow and hence is a valuable asset during partial load operations.

Usage of Controls through sensors for high side and low side systems can be beneficial for tracking live load and hence can help conserve energy and reduce the overall expenses.

Fresh air induction should not be continuous and should be based on CO2 sensors. Fresh air is to be inducted only when the air quality levels cross their upper safe boundary.

Heat recovery wheel acts as a heat exchanger and helps reduce the sensible and latent heat load on the system by exchanging heat between the exhaust cool air and incoming hot air and hence reducing the load on the chiller and thus saving significant money.

Conclusion:

- Proper Heat Load Calculation needs to be done.
- Usage of VSD is a must if the building is going to be operated mostly on partial loads.
- Sustainable system selection
- Control of equipments with Building Management Systems (BMS)
- Use of Sensors for Energy Saving.

Students of ISHRAE IEM Student Chapter with the Speaker, Mr. Manoj Chakraborty

5. REPORT ON TECHNICAL SEMINAR ON "HILTI ANCHOR SYSTEMS AND PASSIVE FIRESTOP SOLUTIONS"

Venue: ISHRAE Kolkata Office, Ballygunge, Kolkata

Timing: 28th July, 2018 from 3 PM to 5 PM

Gathering: The seminar was presented by Mr. Utkarsh Pandey, Mr. Shounak Mitra, Ms. Jayita Das and Mr. Santosh Mahakund from HILTI Corporation. The seminar was attended by 3 Students from ISHRAE IEM Student Chapter. Engineers from Voltas Ltd, Sterling & Wilson also attended the seminar.

Learning from the seminar:

First session of the seminar was dedicated on Anchor systems used in the industry and newer innovations of HILTI in anchor systems such as Wire Hanging Systems and Modular systems. The factors affecting the choice of anchor systems to be installed at a certain place were discussed upon. These factors primarily include:

- Temperature
- Load direction
- Base Material
- Anchor spacing and Edge distance
- Corrosion
- Reinforcement
- Seismic zone of the location
- Embedment depth
- Tightening Torque

Special significance was given to conical load distribution in the concrete material by the use anchor and optimum spacing between the anchors. Effect of installing anchors on beams was also briefed. Anchor systems to be installed in a building should be seismically designed and approved and it is not just enough for just the structure of the building being seismically designed. This is because the architectural design of the building is its primary support system which won't fail easily. Anchors being secondary support structures are prone to failure during any earthquake. So, in order to safeguard the building by all means, Anchors should also be seismically designed and approved.

Wire Hanging Systems are flexible support anchors in the form of metallic ropes to support various structures such as HVAC ducts, Cable trays, Conduits, etc. This being flexible than the angles used conventionally, provide a little movement to the structures during any seismic activity, thereby nullifying any damage to the structures and anchors. This system has a limitation that it can be used only for a certain load range varying from 30 kg - 300 kg, i.e, only for commercial usage mostly.

Another system was Modular system which was a light weight alternate to conventional support systems used in power plants and industries for supporting pipelines carrying hot flue gases, chemicals, etc. The another advantage that this system offers is that it is less time consuming and multiple modules can be attached and detached from the primary

support systems as in this method joining is done by nuts and bolts rather than conventional permanent welding. This is also a much more accurate system.

Special equipments such as Automatic Torque Wrench, gas and battery actuated drill bits, reinforcement bar scanning devices were introduced along with each of their advantages.

Second session conducted by Mr. Santosh Mahakund was on fire safety measures in building construction in which particular emphasis was given on Passive Fire Fighting Systems by use of Compartmentation techniques as mentioned in NBC 2016 clause 2.21. We were introduced to CFS-CID cast-in and sleeve devices which help in preventing the spread of fire and smoke through PVC, PPE pipelines, Insulated metal pipelines, ducts and wire cable trays passing from one room to another or one floor to another. Reference was also given to MBBL 2016 laws and NBC 2016 codes for firestop systems. The cast-in Firestop devices designed for Plumbing pipes used a graphite based substance which would expand during a fire and seal the opening of the pipeline .If this is not used, the pipeline would melt away at such temperatures creating holes in the walls through which smoke would spread out.

Students from ISHRAE IEM Student Chapter with professional from HILTI

6. TECHNICAL SESSION ON "COLD CHAIN TECHNOLOGY"

About the Speaker: The technical session was delivered by ISHRAE's Distinguished Lecturer, Mr. Prabir Kumar Sen, who is a very renowned HVAC consultant and has immense experience of 44 years in HVAC field having worked for various companies across the globe.

Objective of the Session: Cold Chain Technology

Location and timing: The technical talk was organized by ISHRAE IEM Student Chapter at the IEM Management House on 1st of August, 2018 from 2:30 PM to 4:30 P.M IST.

About the learning:

The Technical talk on Cold Chain Technology was based on the basics of cold chain, various processes required Post Harvest of fruits and vegetables, fishes, etc and various techniques that are used in order to achieve extended post harvest life of food.

Firstly, we got to know the amount of wastage of food (especially fruits) per annum and corresponding losses incurred to the country. Each year about 25-30% of the fruits and vegetables go to waste because of their improper storage and transport. This leads to mammoth loss of Rs.50,000 crores on an annual basis. We got to know the meaning of cold chain. A cold chain is a supply chain of temperature sensitive products (such as food, vaccines) which consists of a series of uninterrupted refrigerated production, storage and distribution activities in association with equipments and logistics which are designed to maintain a desired low temperature of the product.
It finds uses in:
1. Meat & Seafood industry
2. Dairy Product industry
3. Bakery and confectionary industry
4. Vaccines, fruits and vegetables

Cold Supply chain constitutes the following steps:

1. Refrigerated processing Post Harvest
2. Refrigerated Storage
3. Refrigerated Distribution and Transportation
4. Refrigerated sales at retail units

We were taught about various processes linked with Vaccine transport and fruit and vegetable transport. Importance of Precooling of fruits and vegetables post harvest was also taught which if not done leads to softening of fruit before ripening hence reducing its life. Then we came to know about Post Harvest Technology like Irradiation which is used to eliminate microbes using gamma rays. Moreover, we came to know about the role of ethylene for ripening of fruits and the harmful effects of carbide for ripening. Effect of temperature on the shelf life of fruits and vegetables was also touched upon by the speaker. Recommended storage conditions (Temperature, Relative Humidity) for various fruits and vegetables were shown to the audience.

Types of storage technologies used in today's era to increase the post harvest shelf life of food were also brushed upon. These include:

1. Controlled Atmosphere storage (CA)
2. Modified Atmosphere storage (MA)
3. Individual Quick Freezing(IQF)

By the use of these Storage Technologies, shelf life of food can be increased. In case of IQF, shelf life can be extended even over a year as freezing makes the food dormant and so no respiration of degradation occurs keeping the fruit fresh for long durations. Not only does cold chain play major role but also in storage and transport of fruit, but is also is used in Ripening Chambers. Ripening Chambers are used for ripening of fruits after processing or storage. Effect of concentration of Ethylene, carbon dioxide, oxygen and relative humidity maintained inside the chamber was also covered. The Technical Talk was a very informative one and opened avenues for research on innovative technologies in cold chain.

Conclusion:

- Cold chain is a supply chain used for temperature sensitive products such as fruits and vegetables, fishes, vaccines, etc.
- It is used to increase the post harvest life of fruits and vegetables and for transportation of vaccines, food, etc.
- Chain starts with processing of the product (in case of fruits, it includes precooling, irradiation and sorting). After processing the products are stored or transported to wholesale or retail centers.
- Storage methods include Controlled Atmosphere (CA) Storage which extends the shelf life of fruits up to 3 to 6 months. The fruits are stored in chambers maintained at conditions which lower the respiration and ripening rates.
- Another method is Modified Atmosphere storage which is a small scale solution to extend the shelf life of food up to 1 to 2 months. Packaged food such as packaged apples, strawberries, etc come under this category. The condition inside the packet once set cannot be changed after seal. This method is generally cheaper than Controlled Atmosphere storage and is extensively used.
- Individual Quick Freeze is used generally for ripened fruits, vegetables, chicken nuggets and all food that can be chopped into small pieces which can float in a jet of air at -40 ^{o}C. This makes the food dormant and stops all processes in it make it shelf life long enough that it can be stored for more than a year. This is a costly method but it gives maximum shelf life.
- Ripening chambers are rooms maintained at conditions that are favorable for ripening process of fruits in order to facilitate fast and equivalent ripening of fruits.

Students of ISHRAE IEM student chapter with Mr. P.K. Sen (speaker), Mr. Utpal Biswas (delegate) and Prof. Gunjan Kumar (Faculty Advisor of ISHRAE IEM)

Mr. Gaurav Jha felicitating the speaker

Mr. Utpal Biswas addressing the audience

Students interacting with the speaker

7. TECHNICAL SESSION ON BASIC ELECTRICALS IN HVAC APPLICATIONS

A technical session on Basics Electricals in HVAC Applications was conducted by ISHRAE Kolkata in collaboration with ISHRAE IEM Student Chapter on 9th August, 2018 at Institute of Engineering & Management, Kolkata. The session began with welcoming and felicitation of the guests of honour. The Guests present were, **Mr. Debashish Nandi** (CESC & ISHRAE Member), **Prof. Tapobrata Bhattacharya** (HOD, Mechanical Engineering), **Prof. Tapas Kumar Dutta** (HOD, Electrical Engineering)

About the Speaker: The technical session was delivered by Mr. Debashish Nandi from CESC, who is also an ISHRAE Member.

About the Learning: The technical talk on basics of electrical in HVAC applications was based on various small areas where improvement was done and yet has a scope of reducing power consumption thereby, increasing the efficiency of the system. There was discussion on starters, capacitor which is the main element used in auto power correction devices and the necessity of change of compressor in ac to reduce power consumption.

Firstly, the use of starters in induction motors (widely used in industries) were discussed. Starters are mainly used to reduce the starting current and if not used, the current will be very high due to zero back emf which can damage the windings.
Different types of starters used are-

1. Star Delta
2. Direct On Line
3. Autotransformer

Star Delta is extensively used compared to other types of starting methods of induction motors. Star connection is preferable in transmission system as the voltage insulation required is less. Delta connection is used in distribution system. DOL can be used if high inrush current of the motor does not cause excessive voltage drop in supply circuit. The most efficient is the autotransformer starter as it is lesser in size and cost.
Further, the importance of power factor was discussed. Only the active power is drawn from the distribution system to reduce the cost. We only pay for active power we draw but actually, we need reactive power too. Therefore, auto power factor correction devices are used which is actually a capacitor to provide reactive power.
Moreover, the reason of replacement of compressor in split AC nowadays was discussed. The reciprocating compressor used in split ac nowadays reduced the power consumption and also increased the efficiency of air conditioners.

Conclusion:

- Starters are a very important part needed to start an induction motor. It is actually a resistance used externally to reduce current flow at the time of starting induction motors.
- A motor soft starter is used with AC electrical motors to temporarily reduce the load and torque in the power train and electric current surge of the motor during start up. Hence, it is used in many industries.

- The auto power factor correction device used nowadays reduces the “useless” current that affects lines and power components with the benefit of optimised dimensioning of the components.
- The purpose of compressor in Air Conditioner is to circulate the refrigerant in the system and condense refrigerant by rejecting heat through it so, plays an important part in reducing power consumption.
- Reciprocating type compressors are used in split Air Conditioner to improve the efficiency of it and reduce power consumption.

Mr. Debashish Nandi being felicitated

The Session in Progress

The speaker, Mr. Debashish Nandi

Interaction during the Technical Session

8. TECHNICAL TALK ON ACHIEVING EXCELLENT COP FOR CENTRAL AC PLANT

The CWC Installation ceremony was followed by a technical session. The talk was delivered by **Mr. Prateek Dutta Roy** (Technical Chair, ISHRAE Kolkata and Chief Engineering Manager, L&T) on "A**chieving Excellent COP for Central Air Conditioning Plant**".

The talk began with introduction of central air conditioning, highlighting the five cycles. Further students were introduced to high power consumption factor of the air conditioning systems and COP being the main parameter directly affecting power consumption, improving the COP will help to reduce power consumption. As most of the air conditioning plants in India are working at a COP of 5-6 ,which as per ASHRAE is considered as good but still has the scope to be improved to a COP around 6 which comes under the category of "excellent".

The talk was based on these measures which can be implemented. First of all the efficiency of chillers were discussed in which the main focus was on centrifugal chillers as they contribute to the large segment of modern chiller industry. Variable speed drives (VSD) technology for chillers contributes to energy saving by controlling the speed of the centrifugal chiller at part loads ,as per "the fan law " reducing speed one time reduces power consumption three times. The other measure being reducing the condensing water temperature thereby decreasing the lift needed by the compressor.

As the chiller has a lot of moving parts the "Magnetic Levitation Technology" helps in reducing friction, eliminating lubricant circulation needs and using permanent magnet motors which has high efficiency.

Students were later introduced to a new innovative evaporator design of Falling Film Technology. In this technology water to be cooled is sprayed through nozzles over vertical films of falling refrigerant, this reduce refrigerant pressure drop in Cooler while ensuring no droplet carryover and this technology is more effective as in case of the films the surface area for heat exchange is increased also energy requirement is less as gravity is used for the falling of refrigerant.

Another method being Series-Counter Flow Chiller Arrangement. When two or more chillers are piped in series counter flow, then the following conditions are met:

- Water flows through an evaporator in series
- Water flows through the condenser in series
- Water flow in the evaporator is opposite of the water flow in the condenser, a counter flow arrangement (opposite to each other)

In a Series Counter flow arrangement, the work done (lift) by each compressor is reduced, which significantly improves the efficiency of the chillers at full and part load conditions.

Another innovative method is using De Coupled refrigeration system for sensible and latent heat.

Lastly the concept of geo thermal heat sink was discussed, as the temperature bellow the earth surface is nearly same throughout the year so in summers it can be used as heat sink and in winters it can be used as heat source. For this to be effective we require large land holdings to lay down long loops of conducting pies through which water is to be flowed so that it can exchange heat with the soil.

Also need for a central software based monitoring of the air conditioning plant was emphasized as it helps in reducing the energy wastage.

The talk was an interactive one and was appreciated by everybody.

Mr. Prateek Dutta Roy

Interaction after the session

Technical session in progress

9. TECHNICAL TALK ON "LATEST TRENDS IN MODERN COLD STORAGE CONSTRUCTION"

VENUE: ISHRAE KOLKATA OFFICE, Ballygunge, Kolkata

TIMING: 24th August 2018, 5:30 to 8:00 PM

GATHERING: The session was conducted by DGM Lloyd, Mr. A. S. Choudhary.

The session was attended by 22 students from ISHRAE IEM Student Chapter. The technical talk was dedicated for the preparation of REFCOLD INDIA GLOBAL POSTER COMPETITION.

LEARNING FROM THE SESSION:-

The talk was dedicated to the implementation of modern cold storage construction. Since our country is incurring post-harvest losses of fruits and vegetables worth Rs 2 Lakh Crore per year, so there is a need for efficient cold chain system.

Stepwise processes to be followed for efficient cold chain system;

- Harvesting
- Sorting/grading
- Transportation
- Precooling
- Cold storage
- Distribution
- Retailer

There is other alternative step after sorting, if sufficient field cold storages are used then the system will be more efficient by causing minimum loss of product.

The different types of cold storages are as follows:

- Walk- in type
- Single chamber/ single commodity cold storage
- Multi chamber/ multi product cold storage
- CA storage (controlled atmosphere)

Major components of cold storage is building, refrigeration and insulation. Construction of building and insulation play a vital role for better cold storage system.

Construction of building is of 2 types:-

- Conventional RCC construction
- Steel construction

While insulation can be done by expanded polystyrene slab, sandwich panel, PUF spray.

There are certain disadvantages of RCC construction:-

- less storage space for a specific volume
- less construction time
- inefficient thermal insulation

Factors affecting efficiency of cold storage insulation

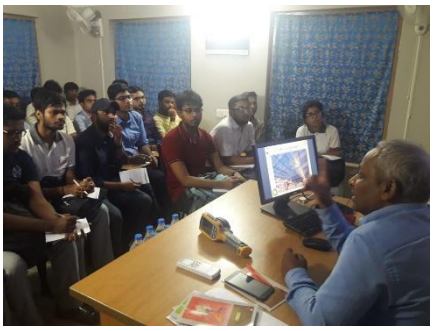
- Up gradation of insulation: it is helpful to increase the efficiency of cold chain system.
- Use of insulated sandwich panel: it avoid moisture coming in contact with insulation.

Then some pre-engineering techniques was introduced for steel building system, these techniques are as follow:-

- RCC work should be replaced by steel columns & purlins.
- Air gap should be maintained at a gap of 12 feet on the sides & 4 feet for staircase.

Finally, PCMs were introduced. PCM is a substance presenting a high heat of fusion, and capable of storing large amount of energy and the most commonly used PCM is water.

The session was an interactive one with good participation from various other chapters including IEM.

The students along with the speaker during the technical session

10. TECHNICAL TALK ON REFRIGERATION AND AIR CONDITIONING OF TRANSPORTING VEHICLES

Venue: ISHRAE Kolkata Office, Ballygunge, Kolkata – 700019

Timing: 25th August 2018, 3:40pm to 6:30pm

Gathering: The session was conducted by Mr J K Nanda.

It was attended by 5 students of ISHRAE IEM Student's Chapter. Employees from Voltas Limited were also present. Students from other colleges were also a part of the audience.

Discussed Topics and Summary:

The air conditioning of automobiles used for commercial and transport purpose was first discussed in the seminar and the following points were discussed-

- Air conditioning systems used in ambulances and regular four wheel vehicles consists of condenser, condenser fan, receiver, compressor etc. All these components are supplied a 24V DC connection except for the compressor.
- The compressor of the above mentioned automobiles runs on power directly from the engine through belt driven connection. They use a magnetic clutch system to engage the compressor with the output of the engine.
- Large busses used for inter-state transportation and busses used in hilly areas use power packs for air conditioning. These power packs are additional engine systems specially put into the bus for air conditioning purpose only.
- These power packs are comprised of small subsystems of AC such as condenser, radiator, compressor etc. They have an I C engine as well whose function is to provide power to these AC subsystems.
- The railways use a more powerful AC which is in accordance with the heat load calculated.
- The available power supply is of 3 Phase 415V AC for the compressor and the motor, whereas the power is inverted to 24V DC for use in the operational circuits.
- A Roof Mounted Package Unit (RMPU) is used in the coaches.
- In metros different systems are used that can compensate the lack of oxygen inside the underground tunnel.
- The pipes used in all the above mentioned air conditioning systems are made up of strong, durable and insulated rubber material unlike the copper pipes used in regular stationary ACs.
- O rings are used at connections and joints to prevent any leakage.

The refrigeration of compartments of transportation vehicles consisted of the following points –

- For small scale refrigeration such as for Ice-creams, cold drinks, juices, soda etc. ice boxes are used very commonly by the vendors.

- Refrigeration of compartments in a city transport automobile is achieved by using a Direct Drive System. These vehicles usually transport vaccines and medicines, dairy products, IQF products, Ice creams on a wholesale scale.
- A Direct Drive System as clear from the name withdraws power directly from the engines.
- Warehouses and large trucks accomplish the refrigeration of desired and relatively larger compartments by a self-driven refrigeration systems.
- These self-driven refrigeration systems maintain the desired temperature even if the engine is off. They have their own engine and electrical battery so when the main engine is off the battery is utilised for refrigeration.
- The walls in these large trucks are designed with bump like projections which enhances the flow of cool air thus achieving the desired temperature with a better efficiency.
- These systems provide a limited time for loading and unloading of goods. If the gates of the compartment are left open for any longer, product will be at a risk.
- Refrigeration in large compartments on a cargo ship uses an external power supply (mostly from the engine of the ship).

The Talk was an effective and interesting one with good participation and interaction from all the students.

Some snaps of the session

Students of IEM with Mr S. Ganesh, President, ISHRAE Kolkata

11. TECHNICAL TALK ON PUMPING SYSTEMS

Venue: ISHRAE Kolkata Office, Ballygunge, Kolkata – 700019

Timing: 22nd September 2018, 4:50pm to 7:30pm

Gathering: The session was presented by Mr. Kamala Kannan V, Area Manager – East, Grundfos Pumps.

The talk session was attended by students from Inst. of Engineering & Management, MCKV and Techno India.

Discussed Topics and Summary:

The main points that were discussed about pumps are as follows:-

- Firstly the classification of pumps was told. Pumps are of two types Hydrostatic or Positive displacement pumps and Hydrodynamic pumps. Which were further classified into reciprocating, rotary and axial and centrifugal pumps. More classifications can be done but it was shown in brief.
- The various efficiency ratings were shown e.g. IE1, IE2, upto, IE5 out of which IE1 pumps had been banned by Indian as well as other govt. because of low efficiency since 2017.
- Parts of a pump were then discussed and first Impeller was discussed. Impeller was classified as radial flow, mixed flow and axial flow impellers.
- Different types of impellers were shown in the presentation and related terms such as "specific speed" were defined briefly.
- The second part was the Casing of pump which. Again casing is of three types volute casing, vortex casing and diffuser casing
- Thirdly shafts were discussed. The factors that affect the choice of shaft are type of fluid flowing in pump, critical speed, endurance limit, corrosion resistance and notch sensitivity.
- Stuffing Box and Mechanical Seals were then taught. Seals prevent fluid from flowing out of pump at the shaft entrance. Seals consists of a stationary and rotating part. They are of various types' examples- BBUE, HQBV, AUUV, HQQK, HQQE etc.
- Bearing were told about in a nutshell. Choice of bearing depends on factor similar to choice of shaft.
- Last part discussed was coupling and gas kits.
- Then the key points and terminologies of pumps was taught.
- Capacity and Head of pumps were major parameters for the selection of suitable pump.
- Various types of Heads were discussed such as
  - ➢ Static suction head (hs)
  - ➢ Static discharge head (hd)
  - ➢ Friction head (hf)
  - ➢ Vapour Pressure head (hvp)
  - ➢ Pressure head (hp)

- ➢ Velocity head (hv)
- ➢ Total suction head (Hs)
- ➢ Total discharge head (Hd)
- ➢ Total differential head (Ht)
- ➢ Net Positive Suction Head Required (NPSHr)
- ➢ Net Positive Suction Head Available (NPSHa)

- Formulas for pressure to head conversion, power consumption, NPSHa was taught and the power vs. performance curve was shown to us.
- Pump selection was suggested to be done at maximum efficiency point on the power performance curve.
- Factors affecting pump performance are
    1. Specific Gravity of Fluid
    2. Viscosity of fluid
    3. Altitude
    4. Temperature
    5. Vapour Pressure
    6. Percentage of Solids
    7. Life of the Pumps

- Effects of changing impeller diameter, effects of variable speed and usage of series and parallel combination of pumps was discussed.
- Data to seek for pump selection are as follows:
    1. Application and type of fluid
    2. Concentration of fluid(if the fluid is acidic or basic)
    3. Solid content
    4. Particle size
    5. TDS
    6. Flow or capacity of pump
    7. Head
    8. Suction pressure and discharge pressure in kg/cm^2
    9. Suction head or suction lift condition
    10. Temperature of the liquid
    11. Specific gravity
    12. Viscosity
    13. NPSHr and NPSHa

- Finally problems with pumps were discussed which are
    1. Wrong Choice
    2. Over Design
    3. Old and Inefficient
    4. Bad Arrangement

The session also included some real life case studies where the high wattage pumps were replaced by low wattage pumps by Grundfos, thereby giving great amount of energy savings.

Overall the session was an excellent one with good interaction & participation from all

Mr S Ganesh felicitating Mr Kamal Kannan

<u>Some Glimpses of the Session</u>

12. TECHNICAL TALK SESSION ON HVAC IN PHARMACEUTICAL APPLICATIONS

Venue: Jadavpur University, Raja Subodh Chandra Mallick Rd, Kolkata, 700032
Timing: 4/10/2018, 12:20 to 1:30pm

Gathering: The session was presented by Mr. SUBHASISH DASGUPTA.The session was held in presence of Mr. Uttam Bag and Prof. Gunjan Kumar. The attendees also consisted of students from Techno India, MCKV, Institute of Engineering and Management, and the organising institute Jadavpur University itself.

Summary of the Session

- ➢ At the very beginning the need for air conditioning, need for controlling the environment, and the need for controlling external as well as internal contaminants was discussed for clean areas.
- ➢ The ISO and the British standards for the classification of the clean rooms was then taught. The classification of clean rooms was also done on the basis of the preparedness and availability of equipment was done
- ➢ The chart of ISO class numbers was shown to us and the designation of clean rooms on the basis of class number, occupancy state and the considered particle size was taught.
- ➢ The temperature control and the relative humidity control was considered to be dependent upon the product and the processes as per the GMP Guidelines.
- ➢ The level of air cleanliness required was dependent upon product being manufactured, the process being used & the products susceptibility to degradation and was checked and regulated by WHO TRS 937.
- ➢ Levels of cleanliness were then discussed and the objectives for designing an HVAC system for pharmaceutical applications were pointed out.
- ➢ The discussion went on the topic “Contaminants” which was defined as any substance or particulate matter or energy which adversely affects either the product or the process.
- ➢ The sources of contaminants were raw materials, consumables, machinery / equipment and instruments, surfaces shredding or retaining particulate, occupants own micro-flora and garments, utilities like steam, water, gases, air leakages and fresh air ingress etc.
- ➢ Stoke’s law and the settling time for particles of various sizes were then shown to us.
- ➢ Principles of particulate contamination control and air flow pattern in a clean room was told which included turbulent, unidirectional and mixed flow.
- ➢ Pressure Gradient which is a driving force for transfer of particulate matter between the system and the surrounding was the next topic. Pressure Gradient was countered by the use of Air Locks at the entrances and the exits. Various types of airlocks were discussed.
- ➢ Differences between clean room HVAC system and comfort HVAC systems were pointed out.

- ➢ Finally energy optimization and basic strategies for achieving energy optimization were told.
- ➢ The necessity of AUTOMATION and few strategies were told to us for the betterment of the HVAC system in coming future were told in a nutshell.

13. TECHNICAL TALK SESSION ON OVERVIEW OF VRV HVAC SYSTEMS

TIME AND VENUE - On 4th October 2018, ISHARE KOLKATA CHAPTER in collaboration with JADAVPUR UNIVERSITY ISHRAE STUDENT CHAPTER organised a full day technical lecture series to celebrate student day.36 students of ISHRAE IEM STUDENT CHAPTER attended the session.

SPEAKERS PROFILE -Mr. Avik Roy of DAIKIN INDIA PRIVATE LIMITED

GATHERING - The session was held in presence of Mr. Uttam Bag and Prof. Gunjan Kumar. The attendees also consisted of students from Techno India, MCKV, Institute of Engineering and Management, and the organising institute Jadavpur University itself.

LEARNING OUTCOMES -

- VRV (Variable refrigerant volume) is a technology invented and patented by DAIKIN Pvt. Ltd. In japan in 1982.Now other companies use the technology with different names such as VRF (Variable refrigerant flow) or DVM (Digital variable multi).
- In this technology the volume of refrigerant in the system remains same whereas the volume of refrigerant flowing in the tubes is varying .This have been possible with the grace of inverter technology. In the inverter technology Alternating current is converted to direct current then the frequency is varied as desired to control the speed of the drive motor, and then the DC is converted back to AC.
- DAIKIN has launched five generations of VRV technology VRV I, VRV II, VRV III, VRV IV and the most recent is VRV X. Each generation was an improved version in terms of efficiency. VRV is built upon 4 basic "Building Blocks" — Outdoor Unit, Indoor Unit, Piping, and Controls. VRV X has many new technologies integrated in to one system combining VRV (variable refrigerant volume), VRT (variable refrigerant temperature) and VAV(variable air volume) which is managed by a building automation software.
- Variable Refrigerant Temperature automatically adjusts the system to meet individual building and climate requirements. To achieve the highest levels of seasonal efficiency, the system's capacity is controlled via the inverter compressor and by varying the evaporating (Te) and condensing (Tc) temperature of the refrigerant. Variable Air Volume systems vary the airflow at a constant temperature. The advantages of VAV systems over constant-volume systems include more precise temperature control, reduced compressor wear, lower energy consumption by system fans, less fan noise, and additional passive dehumidification.
- The new scroll compressor developed by DAIKIN are 12 HP compressors in 8 HP casing by increasing the tensile strength of the material ,this have been possible by the use of new manufacturing technology called thixocasting. The thixocasting process is a semi-solid metal processing route (SSM), which involves forming of alloys in the semi-solid state to near-net-shaped products. The process uses stirring of the melt during the solidification of a continuous cast bar to obtain the globulitic microstructure. Also the heat exchanger used are highly effective ones as heat transfer area has been increased maintaining the same installation space implying

three rows and reduced fin pitch coil as well as reduced air flow resistance by adopting smaller pipe size design.

- The VRV X offers a connectivity ratio up to 200%,Connection ratio is the **capacity index number** of indoor units divided by the **capacity index number** of outdoor units [multiplied by 100]. A connection ratio great than 100% indicates that the capacity of indoor units is greater than the capacity of outdoor units. Capacity index only tells us what a unit is capable of at peak nominal conditions. System diversity depicts the maximum load required of the building at any given time versus the actual capacity of the outdoor units at design conditions. A key aspect of this is designing with **Peak AND Block loads** for a building. Using peak load allows an indoor unit to be sized to satisfy its individual zone, while determining block load allows us to understand the greatest load the building will actually demand at a specific time. We use block load to prevent over-sizing of an outdoor unit given the unlikelihood that all indoor units will request their peak cooling load at the same time, like in homes all the rooms will not be occupied at same time.
- Few other improvements include Refrigerant cooled PCB instead of Air cooled PCB and high static external pressure up to 78.4 Pa. of outdoor units insuring effective heat dissipation.

The session was very interesting. The speaker was able to connect and deliver the information in a very swift and smooth way.

14. TECHNICAL TALK ON "INNOVATIONS IN CURRENT ARCHITECTURAL PRACTICES TOWARDS GREEN BUILDINGS"

ISHRAE Kolkata organised a Technical Session for the student members on 10th November, 2018 at ISHRAE Kolkata Office. The talk was conducted by **Mr. Debashis Sanyal**, (HOD, Department of Architecture, NIT Raipur) in presence of **Mr. Arka Majumder** (Assistant Student Activities Chair, ISHRAE Kolkata) There was a good participation of student members from Institute of Engineering & Management (IEM), Techno India Salt Lake.

Mr. Debashis Sanyal, NIT Raipur

The Students Attending the Session

Summary of the Technical Session

The idea of sustainable development has prevailed since and architectural practice also need to adopt sustainable approach for better environment quality .Green architecture is the architecture that seeks to minimize the negative environmental impact of buildings by enhancing efficiency and moderation in the use of materials, energy, and development space. There is urgent need for green buildings because in USA Buildings account for 60% of the raw materials and 40% of non-industrial solid waste, 65% of electricity consumption, 48% of greenhouse gas emissions and 12% of potable water consumption. Green architecture consists of eco-friendly construction material, good indoor air quality, water independent building, sustainable site selection, building with best utilization of solar energy and must give aesthetic pleasure.

Some of the characteristic features of green building are proper building orientation for proper utilization of daylight, glazed north façade to get glare free north light, use of solar shading device, use of rain water harvesting, use of sewage treatment, use of water efficient fixtures. The water efficient fixtures include dual flush toilet with controlled outlet options, use grey water from bath sinks, kitchen and washing machines to flush lavatories.

Sustainable site development implies encourage higher density urban development, urban re-development and urban renewal, and brownfield development as a means to preserve valuable green space. This helps in controlling the human encroachment to ecology. The other important point is building materials, minimizing the use of non-renewable resources, energy and water through efficient engineering. Use of recycled and environment friendly

materials must be promoted. Some of these green materials are **Wool Bricks**, developed by Spanish and Scottish researchers, these bricks are composite of clay, wool and natural polymer found in seaweed. These bricks are stronger than the conventional ones and can dry hard on its own this means we do not require fire to dry them thus reducing the use of energy. Second material is **Solar tiles,** Traditional roof tiles are either mined from the ground or set from concrete or clay – all energy intensive methods. Many companies are now developing solar tiles. Unlike most solar units which are fixed on top of existing roofing, solar tiles are fully integrated into the building, protecting it from the weather and generating power for its inhabitants. Third is **sustainable concrete**, forms of concrete exist that use recycled materials mixtures like Crushed glass can be added, as can wood chips or slag – a byproduct of steel manufacturing. Whilst these changes aren't radically transforming concrete, by simply using a material that would have otherwise gone to waste, the CO2 emissions associated with concrete are reduced. Fourth is the **paper insulation**, made from recycled newspapers and cardboard, paper-based insulation is a superior alternative to chemical foams. Both insect resistant and fire-retardant owing to the inclusion of borax, boric acid, and calcium carbonate (all completely natural materials that have no associations with health problems), paper insulation can be blown into cavity walls, filling every crack and creating an almost draft-free space. Fifth is **triple glazed windows**, in these super-efficient windows, krypton – a better, and more effective insulator – is used. In addition to this, low-emissivity coatings are applied to the glass, further preventing heat from escaping.

Many new technological developments have also happened for green buildings like **roof top vegetation**, in which selected plants are planted on the roof top over a root barrier coating and soil layer with arrangement for excess water drainage, apart from providing insulation and beauty this helps in improving the air quality if outside polluted air is allowed to pass through them and circulated in te building, and **rammed earth method ,** this is an ancient technique of building development by utilizing the raw materials from land and pressurizing then in form of columns by successive ramming and wetting layer by layer **,** the great wall of china has been also developed by same method**.**

Utilization of solar energy is also important specially in India where we have 300 days of sun. Solar energy can be utilized in building in two ways, **passive solar system**, The term passive solar refers to systems that absorb, store and distribute the sun's energy without relying on mechanical devices like pumps and fans, which require additional energy and **active solar system**, it involves the use of solar collectors and other renewable energy systems like biomass to support the solar passive features as they allow a greater degree of control over the internal climate and make the whole system more precise.

To promote green buildings, it is essential to evaluate the buildings in terms of its energy efficiency and environment friendliness and compare them with others thus many rating systems were developed three most important rating systems of india are, **Green Rating for Integrated Habitat Assessment (GRIHA**) is India's own rating system jointly developed by TERI and the Ministry of New and Renewable Energy, Government of India. It is a green building design evaluation system where buildings are rated in a three-tier process. Second is Confederation of Indian Industry (CII) formed the **Indian Green Building Council (IGBC)** in year 2001. IGBC is the nonprofit research institution having its offices in CII-Sohrabji Godrej Green Business Centre, which is itself a LEED certified Green building. Third is developed by BEE (Bureau of energy efficiency) for the buildings based on a 1 to 5-star

scale. More stars mean more energy efficiency. BEE has developed the Energy Performance Index (EPI). The Reserve Bank of India's buildings in Delhi and Bhubaneshwar, the CII - Sohrabji Godrej Green Business Centre and many other buildings have received BEE 5-star ratings.

The students along with the Speaker at the end of the Technical Session

CONFERENCE

1. AC AND REFRIGERATION TECH CONCLAVE

Date: - 24th August, 2018

Venue: - Hotel Novotel, Kolkata.

Speakers:- Mr. Ashish K Jain, Aeon Integrated Building Design Consultant LPP, Mr D. Nandy, Consultant, Crescent Power Limited, Mr. S K Paul, Director of Nicco Engineering Services, Mr. Mihir Das, Consultant Engineer GEF Solutions, Mr. Prateek Dutta Roy, Chief Engineering Manager, L&T, Mr. G. C. Modgil, Chairman, Sterling India Consulting Engineers.

Total Participants: There were around 90 to 100 participants present from various reputed companies and colleges

This AC and Refrigeration Tech Conclave was organized by ICC(Indian chamber of commerce) in collaboration with ASHRAE, India & ISHRAE, Kolkata on 24th August at the hotel NOVOTEL, KOLKATA. It was attended by professionals from the HVAC & R and electrical industries and also by few college students through their respective student chapters.

The whole event was divided into three sessions, an inaugural session followed by two technical sessions consisting of technical talks as well as product showcases. And to end the event on high note, a panel discussion was held by eminent professionals on "Built-in Environment".

The day kicked off with inauguration by lamp lighting, welcome address by **Dr. Rajeev Singh, Director General**, ICC, followed by keynote address by **Mr. S. Ganesh**, President ISHRAE,Kolkata and Vote of Thanks by deputy director,ICC, **Tapan K Chattopadhyay**. And **Mr. Sunil Kumar Gupta**, Additional Chief Secretary, Dept. of Power and Non-conventional Energy Sources, Govt. of West Bengal graced the event as the Chief Guest.

Techincal session 1- comprised of three technical talks and two product cases:-

First session was chaired by **Dr. Himadri Guha**, Director, S. S. Solutions. The first tech talk was given by **Mr. Ashish K Jain** on "**Towards Net Zero Energy Buildings**". He very enthusiastically explained the concept of net zero energy building or also known as zero-carbon building which means the total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy created on the site or elsewhwere by using both, our active energy sources as well as the passive sources like natural cooling by nearby water bodies, wind, utilizing shading coefficient of a building, etc. He shared with us a real case study of a construction of a hospital and the possible steps taken towards net zero energy for the building. He showed us the various studies done on the building like solar shading analysis, wind flow analysis, insolation analysis,etc which reveal the potential of the building towards net zero energy. These gave an insight into the future of green buildings.

Mr. D Nandy took over the stage for the second technical talk of the day, on **"Electricity from renewable Energy Sources"** . He started with giving us an idea of the potential of our country in terms of renewable energy sources and their current installed capacity of generation. Jammu-

Kashmir, Rajasthan, Maharastra and the coastal states were shown to the states with most potential for reliable renewable energy generation(for both wind and solar). Then, focusing on each field he described the main components of Wind Farm and Solar PV Plants, with schematic diagrams for each. These power plants can either be grid-connected systems or off-grid systems. He further gave detailed explanation of the types of mounting systems used for the solar panels in solar PV Plants like fixed structure type, single axis tracker types, tilted single axis tracker types, dual axis tracker type, etc. Thus he summed up his presentation by talking about the India's ambitious goal of achieving 100 gigawatts by 2020 for the country's ambitious renewable energy targets.

After a short tea break, **Mr. Nirjhar Chakroborty**, Regional head, Johnson Controls gave a product presentation on various products offered by his comapany. This was followed by another, the third technical talk of the day by **Mr. S. K. Paul** on the topic **"Improving asset efficiency and air quality".** He started by focusing on the importance of Aeris Guard for good ventilation and air conditioning system in hospitals,hotels and also for household purpose to have proper functioning of ventilation system. Then solution for some major environmental issues were discussed like foul smells due to bacterias is a major problem in hotels, hospitals in our country. The most important thing is that this solution is biodegradable, having pH value of 7, making it eco-friendly and non-toxic. This process improves air supply via ventilation system by removing the bacterial and fungal growth on the components of air conditioning systems which come in contact with moisture. Aeris guard system play a vital role for greenary of our environment meeting our future demand along with saving money otherwise lost on regular cleaning and replacing of the cooling components.

Following this there was another product showcase by **Mr. Priyank Garg**, Managing Director, Advance Valves where he showcased some the new technologies that only a few other companies produce all over the world. This was followed by lunch break where an assorted array of dishes, starting from main courses to delightful desserts, were served to re-energize the minds of the people.

Technical Session 2: Comprised of three technical talks and one product showcase:-

The second technical session was chaired by **Prof. Samir Saha,** Former Professor & HOD, Mechanical Engineering Dept., Jadavpur University. The second Session started with product presentation by **Mr. Indrajit Bhattacharya,** General Manager**,** U.P. Twiga Fiberglass Ltd. on various types of fiberglass insulation products from their company. It was followed by the fourth technical session of the day on **"Cold Storage Design and Energy Optimization"** by **Mr. Mihir Das,** Consultant Engineer, GEF Solutions. The technical talk was started with providing idea about criteria needed to be kept in mind while optimizing energy for a cold chain like product to be stored, cost, insulation, correct equipment, selection of proper chamber according to capacity etc. He stressed on using smaller spaces for achieving more efficient controlled conditions. A case study of solar powered cold storage in Sangli, Maharastra was also provided in this technical talk.

In the fifth technical talk, a discourse on **"Efficient Design of HVAC System in Warm & Humid Climate"** was given by **Mr. Prateek Dutta Roy ,** Chief Engineering Manager ,Larson and Tourbo. We were taught how handling of sensible heat load and latent heat load can be done to increase the efficiency of HVAC system designed for warm and humid climate. Due to little shortage of time the topics were wrapped up in a hurry.

The last technical event of the day was given by **Mr. G.C. Modgil**, Chairman, Sterling India Consulting Engineers on the topic **"ECBC- Glimpses of ECBC for residential".** He laid stress on the Energy Conservation Act, 2001 and the ground rules or minimum requiremnets to be met by it for building energy efficient buildings in India. The ECBC laws can be modified as per the climate conditons of different regions by states or central govt. Currently these laws are voluntary adoption in the

country. He also informed us that these compliances are applicable to building complexes having a connected loaad of 500KW or greater or a contract demand of 600MVA or greater. At the end he rightly pointed that studies have shown that by mandatory compliance to ECBC upto 30-40 % energy can be saved nearly upto 1.7 billion kWh nationwide.

When all the technical talks came to an end the technical sessions were summed up by the respected Session Chair, **Prof. Samir Saha.** And the queries were answered by the respective speakers.

At the end of the event, professional from all fields led a brilliant panel discussion on the topic "Built-in Environment". The panel discussion was headed by the following emminent professionals:-

- Dr. Himadri Guha, Director ,S.S Solutions
- Mr Prateek Datta Roy, Chief Engineering Manager, Larsen and Toubro
- Mr Debatosh Sahoo ,CEO , ESPACE
- MR G.C. Modgil, founder and chairman , Sterling India consulting Engineers
- Mr Surjoy Dutt ,Business Development Head HVAC ,Voltas Ltd

Discussion among the intellectualist started when Dr. Guha put a question in the panel about the change in way of doing business in the last 15 years. A genuine reply to the question was given by Mr. Pradeep Datta Roy , where he asserted that the buyer have become more conscious about product value than they were earlier, which eventually has forced the designer and maker's to create something more impactful. To this Mr. Modgil added with his affirmative reply that for using every single space of the building , design made by the engineer are just acceptable but not up to the mark. Mr. Debatosh Sahoo replied to Mr.Modgill that due to enormous increase in population and urbanisation designer have to design higher buiding and by keeping aside all other environment friendly criteria. So the buyer has also to be blamed.

Mr. Sahoo also enquired if industry of HVAC uses any gases which do not produce green house effect. Mr. Roy answered firmly that these days water vapour is used as a refrigerant in the industry which produces no green house effect. Mr Modgill added to the fact that soon nanotechnology will be implemented in the industry and they will also be able to make green buildings.

Mr. Surjoy Dutt added his point to the discussion that society like ISHRAE and ASHRAE should create understanding among the people about green building and government should also implement some rule regarding this. Mr Guha called out the discussion with the conclusion that they have crossed the first barrier that means buyer have become conscious so designer have to produce better product and the makers have to come up with some unique Indian style of design which satisfy the criteria of green building.

Throughout the technical sessions and product showcases many queries were asked to which the speakers answered proficiently.

Some snaps of the Tech Conclave

WORKSHOP

BRAZING TECHNOLOGY

Date: 6th September, 2018
Venue: Institute of Engineering & Management, Kolkata

A workshop on Brazing Technology was organized by ISHRAE Kolkata under the banner of ISHRAE HVAC Product Showcase & Skill Centre and under the guidance of Mr. Jay Prakash who was the guest for the day and a technical expert on brazing. There was a good participation of Students in the workshop. A hand on training practice was given on brazing, to the participants. Some faculty members attended the workshop too.

The workshop was dedicated to the basics of brazing and its stepwise practice. The major steps included:

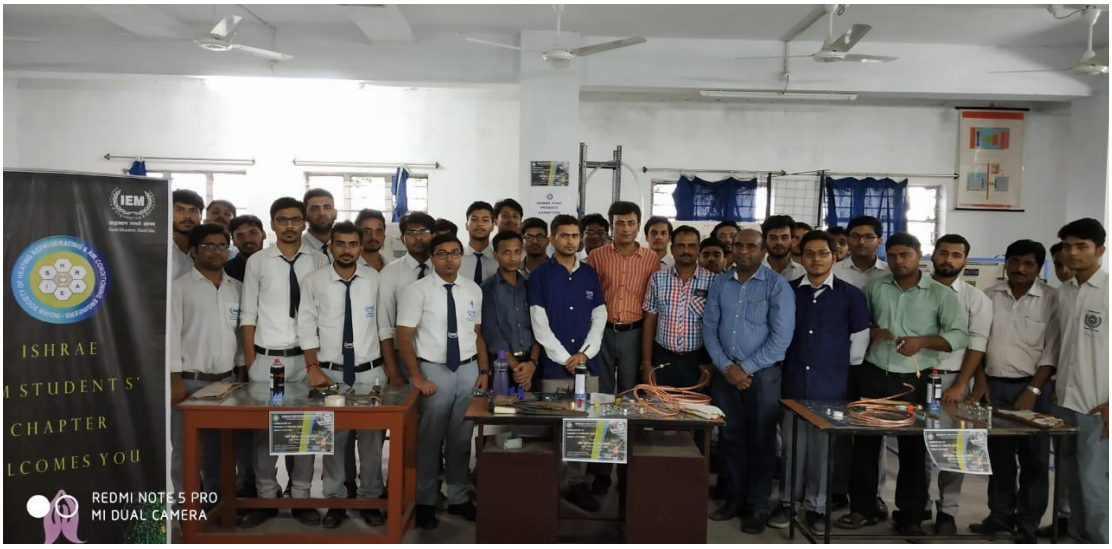
- Swaging: The dimensions of the copper pipe is increased in this process by using swaging tool. Inner diameter of the copper pipe is enlarged to its outer diameter. There are two basic types of rotary swaging machine, the standard (also known as a tagging machine), and the butt swaging machine. A butt swaging machine works by having sets of wedges that close the dies onto the workpiece by inserting them between the annular rollers and the dies, normally by the use of a foot pedal. A butt swaging machine can allow a work piece to be inserted without the dies closing on it, for example a three-foot work piece can be inserted 12 inches and then the dies closed, drawn through until 12 inches remain and the dies are then released, the finished workpiece would then, for example, be four feet long but still of its initial diameter for a foot at each end.

- Flaring: Flaring process is applied when a temporary joint is to be made. Flaring is done by increasing the diameter of the pipe so that it does not come out of the flaring nut & there is no leakage.

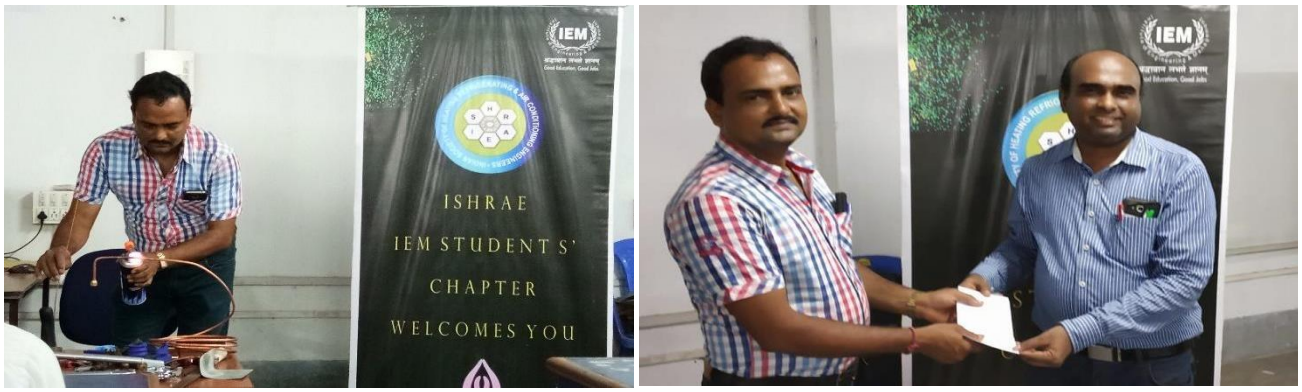
- Brazing: The filler material is applied over joint assembly and let it cool naturally. The filler metal flows into the gap between close-fitting parts by capillary action. The filler metal is brought slightly above its melting (liquidus) temperature while protected by a suitable atmosphere, usually a flux. It then flows over the base metal (known as wetting) and is then cooled to join the work pieces together. A major advantage of brazing is the ability to join the same or different metals with considerable strength.

After demonstration of the steps hand on training practice was given to the student members. Special importance was given to practice. Various important consequences like effect of applying extra filler material was also shown which resulted in droplet structure formation at the bottom part of the joint. Using less amount of filler metal resulted in holes inside the joints and results in leakage.

The workshop was an enriching one with great enthusiasm and participation from the students.



The students along with the technical expert Mr. Jayprakash and Prof. Gunjan Kumar



Some Glimpses of the Workshop


IEM


IEM
ISHRAE
IEM STUDENT S'
CHAPTER
WELCOMES YOU


REDMI NOTE 5 PRO
MI DUAL CAMERA


IEM
ISHRAE
IEM STUDENT S'
CHAPTER
WELCOMES YOU

PRODUCT SHOWCASE

A Memorandum of Understanding was realized between Indian Society for Heating Refrigerating & Air Conditioning Engineers Kolkata Chapter, called as ISHRAE-Kolkata And Institute of Engineering & Management (IEM). It was an Active collaboration between ISHRAE and IEM to establish an HVAC Showcase in the Eastern Region with an objective of educating the students and providing them a better practical exposure of HVAC.

The MOU was signed by the office bearers of ISHRAE Kolkata & IEM Kolkata.

S.NO	PARTICULARS	QTY.
1.	Air Terminals (grilles)	3
2.	Fan Blades	2
3.	Duct Units	4
4.	Nitrile Rubber	1
5.	Paramount Duct & Pipe Insulation	1
6.	Aerofoam polyolefin Insulation	1
7.	K-Flex ST tube insulation	1
8.	Acoustic Insulation	1

9.	Owens Corning- Fibre Glass Insulation	**1**
10.	Aerofoam polyolefin Insulation	**1**
11.	Aerofoam Antifungus insulation	**1**
12.	Reversible Energy Regeneration ventilator	**1**
13.	Thermostatic Expansion Valve	**1**
14.	MPCB, 3 phase	**1**
15.	Contractor, 3 phase	**1**
16.	Servo motor	**1**
17.	Pressure Control Switch	**1**
18.	Negative Temperature coefficient sensor	**1**
19.	Solenoid valve	**1**
20.	Smoke Sensor	**1**
21.	Liquid indicator	**1**
22.	Air filter	**1**
23.	Tube Bender 3 in 1	**1**
24.	Tube Bender ½”	**1**
25.	Tube Cutter small	**3**
26.	Flaring Tools 5/8” Impex	**3**
27.	Swaging Tools Impex	**3**
28.	Safety Gloves	**3**
29.	Safety Glasses	**3**
30.	Brazing Can (L.P.G.)	**3**

31.	Brazing Filler rod	**30**
32.	Small Size Hammer	**3**
33.	Flare nut 1/4”	**4**
34.	Flare nut 3/8”	**3**
35.	Flare nut 1/2”	**2**


INSULATIONS
AIR TERMINALS
FAN UNITS
DUCT UNITS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EVENTS

INTERNAL EVENTS

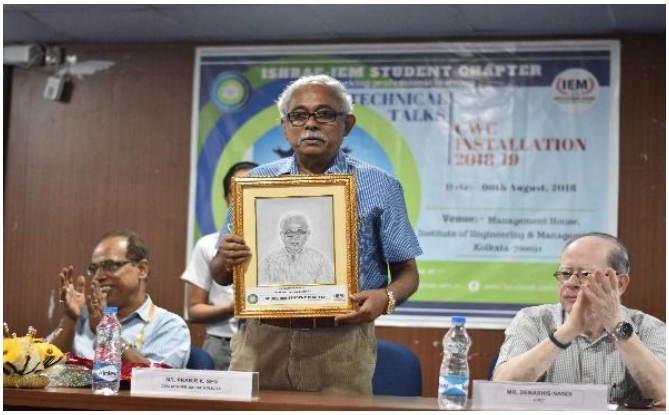
CWC INSTALLATION CEREMONY

The annual CWC installation ceremony of **ISHRAE IEM student chapter** was organised on **9th August 2018** at Institute of Engineering & Management, Kolkata. The event began with the National Anthem followed by video presentation by Mr. Gaurav Kumar Jha, President and Ms. Ridhi Lakhotia, CWC Member of ISHRAE IEM Student Chapter, exhibiting the glories of ISHRAE from its very inception to its phenomenal journey till date.

The event was graced by the presence of, **Mr. Prabir Kumar Sen** (CWC member, ISHRAE Kolkata), **Mr. Debashish Nandi** (CESC & ISHRAE Member), **Mr. Arka Majumder** (Student Committee Member, ISHRAE Kolkata), **Prof. Tapobrata Bhattacharya** (HOD, Mechanical Engineering), **Prof. Tapas Kumar Dutta** (HOD, Electrical Engineering), **Prof. Prabir Kumar Das** (HOD, Basic Science and Humanities), **Mr. Arun Kumar Bar** (Dean of Engineering, IEM). The gathering was addressed by all the delegates.

Prof. Prabir Kumar Das announced the names of the newly selected CWC for the year 2018-19. This was succeeded by the oath taking and installation ceremony which was presided by Mr. Prabir Kumar Sen along with the assistance of Mr. Arka Majumder**. Mr. Gaurav Kumar Jha** was elected as the new President with **Mr. Ramesh Kumar Karthick** and **Mr. Harsh K Shah** as the new Secretary and Treasurer respectively. They took the oath to abide by their assigned responsibilities and give their fullest in best possible manner.

The other CWC Members who have taken the oath of office included **Ms. Ridhi Lakhotia, Mr. Shounak Das, Mr. Shubham Barnwal, Mr. Sahil Sonkar, Mr. Sagnik Dutta** and **Mr. Avinish Kumar. Ms. Ridhi Lakhotia** holding the dual responsibility of the President of the Girls' Working Committee (GWC) as well along with the GWC Members **Ms**. **Pooja Baheti & Ms. Meghna Saha.** The Class Spokespersons for different classes were **Mr**. **Uttaran Sarkar (ME - 4th year), Mr. Abhijit Majee (EE-3rd year), Mr. Subham Singhamahapatra (ME - 3rd year).**



Mr. PK Sen with the token of love from the chapter

Mr. Prateek Dutta Roy with the artist, Mr. Nitin Ujjwal

President

Secretary

Treasurer

The Core Working Team 2018-19

A new initiative by ISHRAE IEM Student Chapter, ' **TECHNICAL ARTICLE SERIES'** were launched in the memory of **Late Prof. BB Ghosh** (Former Principal IEM) and dedicated to all the student members. The article series was launched by all the delegates present on the occasion. The article series had contributions from the student members of the chapter as well as the Alumni and the contents covered a wide range of topics.

On this occasion the winners of RACON 2017, ISHRAE STUDENT OF THE MONTH Contest were acknowledged and awarded the certificates of appreciation. The volunteers of ISHRAE JOB JUNCTION 2017 as well the annual volunteers of ISHRAE IEM Student Chapter were recognized and awarded the certificates. The former team of leaders, i.e. CWC 2017 were also acknowledged for their efforts in the past session and awarded certificate of completion of the tenure.

The session was concluded by Prof. Gunjan Kumar, who addressed the students and acquainted everybody with the upcoming events and opportunities.

Launch of TECHNICAL ARTICLE SERIES by the delegates

Volunteers of ISHRAE JOB JUNCTION 2017 being acknowledged by Prof. Tapobrata Bhattacharya

Annual volunteers of the chapter being awarded the certificates

PROJECT GRANT IN INTRA COLLEGE CONTEST

Two Projects under ISHRAE IEM STUDENT CHAPTER got project grant in Intra College Project Contest 2018.

TEAM 1: FRUCTORIPE: Small Scale Fruit Ripening Chamber for Retail Use.

Harsh K Shah, Kumar Shailendra Panda, Nitin Ujjwal, Avinish Kumar, Gautam Anand

TEAM 2: Sustainable Water Solution for High Rise Building

Ramesh Kumar Karthick, Nikunj Verma, Pooja Baheti, Sahil Sonkar, Sagnik Dutta

ZONAL EVENTS

1.RACON-18

RACON 18 was a zonal event organised by ISHRAE KOLKATA CHAPTER the problem of which deals with designing and selection of appropriate hvac for a school building in kolkata.The awards were as follows

1st prize=50,000

Winners

Gaurav Kumar Jha

Ridhi Lakhotia

Harsh K Shah

Sahil Sonkar

2nd prize=30,000

1st Runners Up

Shounak Das

Md. Sakib Rahi

Shubham Barnwal

Ramesh Kumar Karthick

3rd prize=20,000

Avinish Kumar

Ankit Das

Rustam Alam

Siddharth Ghosh

The Winning Team

1st Runners Up

2nd Runners Up

2. BEST PERFORMING STUDENT CHAPTER AWARD- THE BEGINNING OF A NEW INITIATIVE BY ISHRAE KOLKATA

ISHRAE Kolkata presents its new initiative, to recognize & mark the efforts of the Student Sections of ISHRAE, **THE BEST PERFORMING CHAPTER AWARD.**

The evaluation criteria was set, taking into account, the membership, participation of the chapter in various activities, awards achieved etc. The idea was conceived by Prof. Gunjan Kumar, Student Activities Chair, ISHRAE Kolkata (2017-18), under the guidance of Mr. Gautam Mukherjee, President, ISHRAE Kolkata (2017-18). The idea was well appreciated and supported by all the CWC Members of ISHRAE Kolkata.

ISHRAE IEM STUDENT CHAPTER proved its efficiency in all domain. It has secured a hat-trick in aQuest with the Second Runners-Up position in aQuest 2018 and also bagged 4 job offers from Hitachi. To its credit it also has 12 job offers through ISHRAE JOB JUNCTION 2017. The chapter also hosted its Flagship event, TAAPMAAN 2017, which is in line with the national level quiz contest. The Winners and Runners-Up team of RACON 2017 were from IEM Kolkata with a cash prize of 1,00,000 INR.

With all these, the **First Award for the Best Performing Student Chapter for 2017-18** was bagged by **ISHRAE IEM STUDENT CHAPTER,** which secured the highest score.

NATIONAL EVENTS

1. NSDC ZONAL PRESENTATION

The Zonal Level evaluation and presentation of NSDC 2018 (National Student Design Competition) for East Zone was organised by ISHRAE Kolkata on 26th December 2018 at ISHRAE Kolkata Office. The Event was graced by the presence of **Mr Subhashis Dasgupta** (ISHRAE Kolkata**), Mr Prabir Kumar Sen** (CWC Member, ISHRAE Kolkata), **Mr Sujoy Dutt** (Membership Chair, ISHRAE Kolkata), who were also the panel of judges for the Evaluation of the Zonal Presentation. **Prof Gunjan Kumar** (ISHRAE Zonal Chair) was also present in the event.

The problem statement of NSDC 2018 deals with the Design of Air Conditioning system for a Sports Complex for Better Indoor Air Quality.

There were a total of 10 Submissions for the competition from the East Zone, out of which 7 teams appeared for the Presentation at Zonal Level. Among the 7 teams there were 5 teams from IEM Kolkata, 1 team from KIIT Bhubaneshwar and 1 team from Kalyani Government College (KGEC).

As a result of the Evaluation at the Zonal Level, the top 2 teams were selected who would be representing the East Zone at the National Level. The top two teams in order are as mentioned below:

Team 1 (IEM Kolkata): Shubham Barnwal, Ramesh Kumar Karthick and Sahil Sonkar

Team 2 (IEM Kolkata): Shounak Das, Gaurav Kumar Jha and Abu Fazal

Prof Gunjan Kumar Felicitating Mr Subhashis Dasgupta

The Judging Panel along with Prof Gunjan Kumar, ISHRAE Zonal Chair

Prof Gunjan Felicitating Sujoy Sir

Prof Gunjan Kumar Felicitating Mr PK Sen

The top two teams along with the Judging Panel

The Evaluation session was a very interactive one and the judging panel along with the Zonal Chair gave a lot of valuable suggestions to the competing teams in order to refine their design for the next level.

The Judging Panel along with all the participants from various colleges

2. AQUEST 2018-19

AQUEST, The Ultimate Engineering Face Off, is the mastermind of ISHRAE (The Indian Society of Heating, Refrigerating and Air Conditioning Engineers) to introduce Engineering students to the HVAC&R industry, and to encourage them to choose it as a career path.

ISHRAE Kolkata organised the Zonal Quarter Finals for the East Zone on 23rd December 2018 at Rabindra Tirtha at Kolkata. The event was graced by the presence of **Mr Dipak Barma** (National Past President, ISHRAE) & **Mr Nirjhar Chakraborty** (Regional Head-Engineering Excellence Dept., Johnson Controls- Hitachi) who were also the Technical Experts for the event. The other dignitaries included **Mr Gautam Mukherjee** (Imm. Past President, ISHRAE Kolkata Chapter), **Mr S. Ganesh** (President, ISHRAE Kolkata), **Mr Gunjan Kumar** (ISHRAE Zonal Chair), and students and faculty from various colleges from the East Zone.

A total of 35 teams appeared for the prelims round, out of which Top 6 teams cleared the prelims round to make it for the Quarter Finals Face off at the stage. Among the Top 6, there were 4 teams from IEM Kolkata, 1 team from Jadavpur University and 1 team from C V Raman College of Engineering.

The winning team was that of **Mr Anirban Jan & Pritam Ghosal** from Jadavpur University, Runners Up team was that of **Mr Shounak Das & Mr. Harsh K Shah** from IEM Kolkata and the 2nd Runners-Up team was that of **Mr Agniprabha Roy & Agnitra Das** from IEM Kolkata. The other teams too did put up a brilliant show and gave a tough competition to the winners.

The top two teams got direct entry to the Semi Finals and would be representing the East Zone at Semi Finals in Chennai. The 2nd Runners Up and the team which secured the 4th position, comprising **Mr Sagnik Dutta & Biswayan Chattopadhyay** from IEM Kolkata would be competing and appearing for the wild card round at Chennai.

The Winning Team- Mr Anirban Jan & Pritam Ghosal

The 1st Runners up Team- Mr Shounak Das & Harsh Shah

The 2nd Runners up Team- Mr Agniprabha Roy & Agnitra Das

3. ISHRAE STUDENT PROJECT GRANT

ISHRAE IEM was able to secure two project grant in the year 2018 .

ISPG Project 1- Design and Fabrication of Solar Thermal Energy Storage for supporting continuous solar power generation in rural areas.

Gaurav Kumar Jha

Shounak Das

Abhishek Kumar

Deepak Kumar

TEAM 1

ISPG Project 2- Design, Fabrication and Analysis of Data Centre Cooling by Water Circulation through Racks.

Shubham Barnwal

Uttaran Sarkar

Sayan Mukherjee

Suvam Sahu

TEAM 2

INTERNATIONAL EVENTS

1. REFCOLD GLOBAL POSTER PRESENTATION

This was an international competition with participants from different regions all over the world. Out of Numerous Posters worldwide, 5 posters from ISHRAE IEM STUDENT CHAPTER were selected among the top 12 posters and ISHRAE IEMSTUDENT CHAPTER secured the 2nd prize in the contest.

The topic of poster was"**FRUCTORIPE: A SMALL SCALE RIPENING CHAMBER FOR RETAIL AND CONSUMER APPLICATIONS**"

The 1st Runners Up were :

Harsh K. Shah & Kumar Shailendra Panda

The 1st Runners up Team at REFCOLD

BEE REFRESHER COURSE FOR ENERGY AUDITORS (EA) AND ENERGY MANAGERS (EM)

We at ISHRAE IEM marked a yet another standard among all student chapters by hosting our department & college's first ever BEE Refresher Course organized by Bureau of Energy Efficiency (BEE) and Green Tree. This is a course offered annually to BEE certified Energy Auditors throughout India.

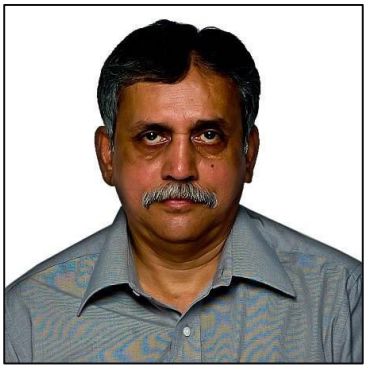
The fields of Energy Management, Energy Efficiency, Energy performance, conservation, Renewable Energy, etc are going to bloom for the coming 2-3 decades. The BEE Refresher course has opened new paths for the student members to pursue their careers into these future demand fields.

The BEE Refresher Course was organized by GreenTree supported by ISHRAE IEM Student Chapter on 29th and 30th December 2018 at IEM Management House. Nine student members got a chance to attend the course and learn from highly knowledgeable speakers and network with 25 certified Energy Auditors from Eastern India. The 25 Delegates that attended the course were from industry leading companies including ACC, SAIL, CREDA, CSIR, NTPC, IOCL, WBSEDCL, J K PAPER, NPTI, etc.

DAY 1:

SPEAKERS

Mr. Swapan K. Dutta



He is currently the CEO and Principal Consultant at Swapan K Dutta PE Consulting Energy Engineers and Auditors / DENA-BEE EmAEA Firm. He holds a massive 20+ years of experience as an energy conservation specialist with expertise in: - Energy Conservation Studies and Energy Auditing. He completed his Bachelors & Masters in Mechanical Engineering from Jadavpur University. He has worked upon 77 projects and has 8 certifications.

Dr. Subhasis Neogi

Dr. Neogi currently is into the teaching field and is a professor at Jadavpur University & Aliah University. He has done his PhD in Mechanical Engineering (Wind Engineering) from Jadavpur University. He has 30 years of experience in Teaching & Research and 5 years of experience in industry. He holds 13 paper publications and his fields of specialization include Energy Conservation in buildings & passive solar architecture, Solar Thermal Engineering, Energy Conservation system modeling & optimization, Energy Conservation management and audit, Wind Engineering with emphasis on wind turbine design and Energy Management.

TOPICS OF PRESENTATION

- Perform Achieve & Trade (PAT) Updates
- Energy Management Systems (EnMS): ISO 50001: 2018
- Electrical- Best Practices, Technologies & Case Studies & Thermal System.
- Energy Efficiency Data Analytics
- Measurement and verification of Energy Performance of Organization
- Renewable Energy Technologies & Applications

The day one started with a small orientation after which the speaker, Mr. Swapan Kumar Dutta delivered a presentation upon the topic of PAT(Perform, Achieve & Trade) which is a concept under National Mission on Enhanced Energy Efficiency (NMEEE). It is one of the eight missions which formed India's National Action Plan on Climate Change (NAPCC). Various steps under PAT concept were discussed upon which included: Baseline assessment, normalization, processes of verification, certification of energy savings. The speaker also covered a module on Energy Management Systems (EnMS): ISO 50001:2018. Mr. Dutta guided the delegates upon Plan-Do-Check-Act (PDCA) Cycle, Benefits of Implementation of ISO 50001 by a company, Energy policies under it, Strategic planning required to manage risks & responsibilities, various Energy Performance Indicators (EnPI) and energy baseline.

The second half of the day witnessed 4 modules presented upon by Dr. Subhasis Neogi. The speaker shared the Best practices, technologies & case studies in Electrical & Thermal domains. These included IE Classifications, use of Variable Frequency Drives, High COP Chillers, Heat pipes, Vapor Absorption Chiller Systems & Organic Rankine Cycle methods. Later on the speaker presented upon Energy Efficiency Data Analytics which included EE Performance Indicators, GAP Analysis: sources of data, steps involved and prioritization through GAP, Realistic Target Setting, Normalization, Benefits of EIMAS(Energy Information Management and Analytical Systems. The speaker carried on with his presentation on the topic of Measurement & Verification of Energy Performance of Organization. In this module, he presented the importance, benefits and applications of M&V, its implementation process, Factors that drive Energy Savings and a brief on M&T (Monitoring & Targeting). The last presentation of the day was on Renewable Energy Technologies & Applications also given by Dr. Subhasis Neogi. He spoke upon various Renewable energy technologies, installable potentials and capacities, bio energy, small scale hydropower, electrical energy storage systems, grid integration systems of renewable energy for mitigating climate change.

DAY 2:

SPEAKER

Mr. Avijit Ghosh

Mr. Avijit Ghosh is currently holding the post of Principal technical officer in nanostructure materials division at, central glass and ceramic research institute (CGCRI).He did his bachelor in engineering in civil engineering from Jalpaiguri government engineering college and Masters in technology in energy science and technology from Jadavpur university. He has published three research papers. Associated with Planning & Design of Hydroelectric Projects in North Eastern region of the country as sub divisional officer in North Eastern Electric Power Corporation. Worked as engineer at HCC Ltd, Assistant engineer, at Kolkata Port Trust, Assistant General (premises) at IDBI.

Topics of Presentation:

- Energy Scenario Update
- Key Thrust Areas of Energy Conservation Act, 2001
- Best Practices in building Energy Management and Conservation
- GHG and Carbon Footprints Accounting and Reporting

The first module of presentation gave a clear idea about the current energy scenario of India. The availability, usage and production data of Coal, Oil, Natural Gas, Hydro power, Nuclear Power were glanced upon. Electricity consumption in various sector were also discussed. Interventions due to various policies were also discussed. The speaker then focused on the Key Thrust areas of Energy Conservation Act, 2001. The benefits and requirement of standardizing & labeling appliances, buildings, etc were discussed after which the speaker moved on to ECBC rating system for buildings, its importance, levels of energy efficiency performance, ECBC compliance approaches and methods. Later on, Mr. Ghosh presented upon the Best Practices in Building Energy Management & Conservation which included ideas of Green Buildings, Net Zero Energy Buildings, etc and energy saving approach to building design.

The second half of the day witnessed a presentation on GHG and Carbon Footprint Accounting and reporting. It featured the methods of determination of Greenhouse Gas Emission, Global and Indian Greenhouse Gas Emission scenarios, Relevant Protocols and Standards, Carbon Footprint and its types, Reporting of GHG emissions. The participants had to give a small Assessment Test on their learning from the Refresher Course.

ISHRAE IEM Student Chapter maintaining its professional approach in such events also offered Token of Appreciation to all the Participants of the

Refresher Course at the completion of the two day Refresher Course.