ASHRAE (American Society of Heating Refrigerating and Air Conditioning Engineers) is a global professional association seeking to advance HVAC & R system design and construction. It has more than 50000 members worldwide, composed of building service engineers, mechanical contractors, architects, building owners, equipment manufacturers and all others concerned with design and construction of HVAC & R systems in the buildings. The society funds research projects, offers continuing education programs, develops and publishes technical standards to improve energy efficiency, indoor air quality and sustainable development.

MKSSS's Cummins College of Engineering for Women, Pune ASHRAE student branch was established in January 2022. It has currently twenty-nine student members. Prof. Dr. Parag Chaware and Prof. Rujuta Agavekar are the faculty Advisors for the student branch.

ASHRAE STUDENT CHAPTER COMMITTEE –

The ASHRAE Student Chapter functions under the guidance of Prof. Rujuta Agavekar and
Prof. Parag Chaware.

The core committee -
Bharti (President)
Anuja Madake (Vice President)
Palak Mandaokar (Secretary)
Arya Vedpathak (Treasurer)

The chapter comprises around 42 active members who contribute to its various technical and professional activities.

List of the Activities

Sr No.	Name of the Event	Date
1	Artificial Intelligence in HVAC Systems- Expert Lecture	August 26, 2025
2	Industrial Visit to Jai Jinendra Cold Storage	September 2, 2025
3	Industrial Visit to Persistent Systems – Bhagirath Office	November 8, 2025
4	Industrial Visit to Refcon Engineering Services, Pvt Limited	March 6, 2026
5	Student Pune Air Conditioning and Refrigeration Conference (SPARC 2026)	March 9, 2026
6	Industrial Visit to Central Air Conditioning Facility at City Pride Theatre, Kothrud, Pune	April 8, 2026

Artificial Intelligence in HVAC Systems
Expert Lecture
Report

Day -Wednesday

Date - 20/08/2025

Type – Expert Lecture

Topic - Expert Lecture on Artificial Intelligence in HVAC Systems

Expert Speakers- Mr. Rohit Chavan and Ms. Sairandhri Pawar from Simulation Hub.

1. Information -

Mr. Rohit Savan, Business Unit Head at simulation Hub, has over 12 years of experience in software development, CAD, algorithms, and web technologies. He specializes in building high-performance product teams applying agile methodologies to deliver advanced simulation and optimization solutions.

Ms. Sairandhri Pawar, a passionate explorer in the field of AI, is experienced in web development, data science, and advanced AI technologies. She focuses on problem-solving, teamwork, and transforming complex real-world challenges into AI-driven solutions.

Location — IT Building, KB Joshi Hall, MKSSS's Cummins College of Engineering for Women, Karve Nagar, Pune - 411052

Duration — 1 hour

No of Participants — 60

- Students of Third Year, Mechanical Department

- Students of Final Year, Mechanical Department
- Prof. Rujuta Agavekar (SBA)
- Prof. Dr. Parag Chaware (SBA)
- Prof. Dr. Shridhar Kedar
- Prof. Dr. Anindita Roy (ASHRAE Pune chapter students' activity chair)

2. Learning Outcomes -

The session was introduced by Ms. Mahika Ektapure, who warmly welcomed the speakers and set the context for the lecture.

The guest speakers explained how Artificial Intelligence is transforming HVAC systems through predictive maintenance, automated fault detection, energy optimization, and real-time monitoring. Practical case examples were discussed, demonstrating how AI driven simulations can analyze airflow, rainfall, and fire scenarios prior to construction, thereby ensuring safety, efficiency, and sustainability in building systems.

Students also gained insights into how AI complements mechanical engineering, bridging CAD, simulation, and software tools to create new career opportunities in industry and research. The importance of adopting an interdisciplinary approach was strongly highlighted.

The interaction between the guest speakers and students was highly engaging. Students actively asked questions regarding AI applications in energy savings, smart buildings, and integration with existing HVAC setups. The speakers patiently addressed each query, encouraging curiosity and providing clarity with real-world insights. This created a very lively and collaborative learning environment. The lecture not only enhanced technical knowledge but also motivated students to explore AI-driven solutions for future challenges in mechanical engineering.

The session concluded with a Vote of Thanks delivered by Ms. Bharti and Ms. Sneha, expressing gratitude to the speakers for their valuable time and knowledge.

3.Photographs-

Compiled by: Bharti

Jai Jinendra Cold Storage Industrial Visit

Report

Day - Tuesday

Date -2nd September, 2025

Type - Industrial Visit

Name of Company –Jai Jinendra Cold Storage

Location of Visit – Senapati Bapat Road, Pune

Duration - 2 hours

Number of Participants -

- Students from Second and Third Year, Mechanical Department, (ASHRAE Members)
- Prof. Rujuta Agavekar (SBA)
- Prof. Parag Chaware (SBA)

1.Introduction -

Jai Jinendra Cold Storage is one of the largest cold storage facilities in Pune, designed for blast freezing, long-term storage of fruits, vegetables, grains, and frozen products. It operates

on a 100% ammonia-based industrial refrigeration system using heavy-duty Kirloskar compressors and has nearly 2800 tons of chilled storage capacity.

This visit introduced us to the practical working of multi-stage refrigeration, deep-freeze systems, compressor arrangements, ammonia handling safety, cooling towers, and cold room management. The ammonia plant is the heart of the refrigeration system. It uses insulated lines and high-quality safety valves to ensure safe operation, since NH_3 is a strong but hazardous refrigerant. Ammonia lines are color-coded (yellow) and supported by receivers and jackets to handle liquid refrigerant safely.

2.Refrigeration Plant Overview -

The plant uses **NH_3 (Ammonia)** as the refrigerant. Ammonia is preferred because it provides:

- very high cooling efficiency,
- low cost of operation,
- strong performance at extremely low temperatures (up to –30°C).

3.The system is built around -

- multiple compressors (low-stage & high-stage)
- evaporators at different temperature levels
- intercooler
- water-cooled condenser
- evaporative condenser
- refrigerant receivers, and
- cold air circulation through AHUs.

4.Compressor System -

Jai Jinendra Cold Storage uses multiple stages of compression because lower temperatures require very low pressures which cannot be handled by a single compressor.

4.1 KC-4 Compressor

- A 4-cylinder Kirloskar compressor
- Connected to water-cooled pipelines
- Used as one of the high-stage compressors
- Sends compressed vapour to the next stage or condenser

4.2 ACX-6 Compressor

- Air-cooled, 4–6 piston machine
- Used where airflow cooling is required
- Works in combination with KC-4 for load balancing

4.3 Cylinder Low Temperature Compressor

This is one of the most important compressors. It handles the low-pressure vapour coming from the deep freezer room.

- Suction pressure: ~3.1 bar
- Discharge pressure: ~10–8 bar
- Evaporation temperature: around –1°C to –1.1°C
- Condenser temperature: 30–35°C

4.4 Intercooler

An intercooler is placed between the low-stage and high-stage compression.
It reduces the temperature of the vapour before it enters the next stage, improving:

- compressor life,
- energy efficiency
- cooling capacity

Oil System -

Oil lubricates all moving parts. Oil pressure is kept **twice the suction pressure** (around 5–6

bar) to ensure the compressor runs smoothly.

5. Deep Freezer Section (–30°C)

This is the coldest and most critical part of the plant. The deep freezer maintains a temperature of **–30°C**, which is needed for storing frozen foods like corn, fruits, and long-term products. The evaporator in this room absorbs heat from the stored material and leaves the room at very low temperature. The low-pressure vapour goes to the **low-stage compressor**. After this, it passes through the **intercooler** and then enters the high-stage compressor for further compression. The discharge vapour then moves to the condenser.

Refrigerant Lines

- **Suction line (insulated):** Carries extremely cold vapour to the compressor. It is insulated to avoid heat gain.
- **Discharge line (iced):** After compression, the discharge line often develops frost because hot vapour meets cold surroundings.

6. Cold Storage Section (–10°C to –21°C)

Apart from the deep freezer, the plant also has:

- **–10°C cold rooms** for general cold storage
- **–21°C cold rooms** for frozen fruits and long-term storage

AHUs (Air Handling Units) circulate cold air uniformly in these rooms. These units ensure proper temperature and humidity control to prevent spoilage.

Product Handling

- Frozen fruits
- Corn (main commodity; produced in-house)
- Daal and grains for ration
- Materials from Uttarakhand and MP

7.Evaporative Condenser -

The plant uses an **evaporative condenser**. Condenser coil is placed inside the cooling tower itself. Fan at the top of the cooling tower removes air containing water vapor. As the water is sprinkled at the top of the cooling tower, its temperature drops due to evaporative cooling. The low temperature water forms film around the condenser coil. Ammonia vapor in the coil, rejects heat to the water film and gets converted to ammonia liquid. It is then stored in the receiver. A **horizontal cylindrical receiver** stores liquid ammonia before sending it to evaporators. This entire system ensures that products remain safely frozen at extremely low temperatures.

The visit to Jai Jinendra Cold Storage helped us understand the full working of an ammonia-based refrigeration plant, from low-temperature deep freezing to general cold storage. We saw how multistage compressors, intercoolers, evaporators, evaporative condensers, and cooling towers work together to maintain temperatures as low as –30°C.

This visit strengthened our understanding of:

- practical refrigeration cycles
- ammonia safety
- multistage refrigeration systems.
- cold room design
- Industrial temperature control

8.Photograph -

Compiled by: Bharti

Persistent Systems – Bhagirath Office

Industrial Visit

Report

Day - Saturday

Date -8th November 2025

Type - Industrial Visit

Name of Company –Persistent System- Bhagirath Office

Location of Visit – Senapati Bapat Road, Pune

Duration - 3 hours

Number of Participants -

- Students from Second and Third Year, Mechanical Department, (ASHRAE Members)
- Prof. Rujuta Agavekar
- Prof. Parag Chaware

1. Introduction -

The industrial visit to **Persistent Systems – Bhagirath Office, Senapati Bapat Road** was conducted to understand the practical functioning of HVAC and building service systems in a

modern IT facility. As the building supports continuous technical operations, it requires reliable cooling, controlled ventilation, and automated monitoring.

During the visit, we observed the working of the **chiller plant, cooling towers, water treatment units, AHUs, VRF systems, and the centralized Building Management System (BMS)**. The onsite explanations provided clarity on equipment specifications, operational practices, and energyefficient strategies used in commercial buildings to maintain thermal comfort and system reliability.

2. Company Overview – Persistent Systems, Bhagirath Office -

Persistent Systems, established in **1990 under SPTI**, operates as a global IT services and consulting firm.

The Bhagirath Office at Senapati Bapat Road is a multi–level hybrid workplace designed with high performance infrastructure.

Building Levels:

- **Level 1:** Cafeteria, Auditorium, Badminton Court
- **Level 2:** Gym, Business Floor
- **Level 3:** Work Café, Hybrid Workplace, XT Studio
- **Level 4:** Hybrid Workplace
- **Level 5:** Business Floor
- **Level 6:** Solar-panel rooftop terrace

Facility Statistics:

- 6 Cabins
- 4 Server/Network Rooms
- 28 Meeting Rooms
- 19 Team Rooms
- 10 Exhaust-equipped Toilets
- 4 Plant Rooms

3. Building Layout and Infrastructure Details -

The building follows a **zonal distribution model** to support varied occupancy and heat-load conditions.

Key internal zones include:

- Hybrid Workplaces
- IT Server Rooms
- Meeting & Collaboration Rooms

- Business Floors
- Recreational Facilities

Each zone is connected to a centralized Building Management System for coordinated operation.

4. HVAC and Mechanical Services Overview -

The HVAC setup is designed for reliability, energy efficiency, and centralized automation.

4.1 Cooling Systems

Figure 1- Students learning about chiller

The building is equipped with **170 TR primary chillers** of two types:

- **Water-Cooled Chillers** – Higher efficiency due to better heat rejection
- **Air Cooled Chillers**

Chiller Specifications:

- Type: Screw Compressor
- Normal Operation: 12°C inlet → 7°C outlet
- Winter Mode: **7°C inlet → 9°C outlet** (Uses ambient air; saves ~15 kW/hr)

Cooling Tower Shading:

Increasing shaded area reduces direct heat load, improving chiller efficiency by **up to 50%** due to reduced condenser water temperature.

5. **Water Treatment and Filtration System**

The water treatment network ensures scale-free, corrosion-controlled circulation water.

5.1 Water Softening Plant

- Hardness reduction range: **250 ppm → 0–20 ppm**
- Purpose: Prevent scaling in copper piping and condenser circuits
- Excessive hardness leads to fouling and reduction in heat transfer efficiency

5.2 Sand Filter

- Removes suspended particles before water reaches the softener
- Protects downstream equipment and valves
-

6. Chiller Plant and Cooling Tower Operations -

The chiller plant integrates:

- Primary chillers (170 TR)
- Cooling towers
- Pumping network
- Treated water distribution system **Cooling Tower Highlights:**

- Enhances heat rejection efficiency
- Lower condenser water temperature → Improved chiller performance

7. Building Management System (BMS) and Automation Controls -

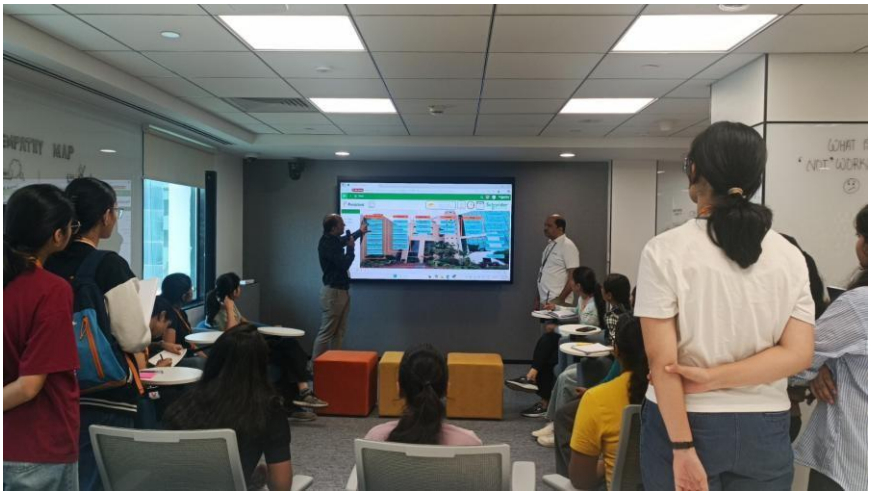

Fig: Students learning how BMS system works

The BMS serves as the centralized control interface for **Electrical, HVAC, WMS, and FAS** systems.

7.1 Core Functions

1. Real-time monitoring of AHU, VAV, VRF/VRV, ventilation fans, sensors, pumps

a. Calendar-based scheduling:

- Holidays and weekends can be pre-set
- AHUs automatically adjust **start/stop times**

b. CO_2-Based Control:

- BMS detects rise in CO_2 concentration o
  Automatically regulates **fresh air intake** for ventilation
- Fault detection alerts for temperature, pressure, airflow, and equipment status

7.2 HVAC Subsystems Controlled by BMS

A. AHUs (with 3-micron and 10-micron filters)

- VRF/VRV indoor units
- Exhaust systems
- Temperature sensors
- Ventilation fans
- Critical zone monitoring (server rooms)

8. Conclusion -

The visit to the **Persistent Systems – Bhagirath Office** offered practical exposure to commercial HVAC plant operations, BMS automation, and water treatment processes.

The facility demonstrates optimized energy management through shaded cooling towers, winter mode chiller operation, advanced filtration, and intelligent CO_2-based ventilation.

The overall system reflects a technically sound, efficient, and well-managed building infrastructure suitable for modern hybrid workplaces.

Figure 3: Photograph From the visit location

Compiled by: Bharti

Refcon Engineering Services, Pvt Limited

Industrial Visit

Report

Day & Date - Friday, March 6, 2026

Name of company – Refcon Engineering Services, Pvt limited, Pune.

Duration – 3 hours

Participants -

- 27 Students from Second and Third Year, Mechanical Department, (ASHRAE Members)
- Prof. Rujuta Agavekar, SBA
- Prof. Parag Chaware, SBA

1.Introduction -

Refcon Engineering Services Pvt. Ltd. is a Pune-based company working in the field of industrial refrigeration and HVAC engineering. The company was founded in 1987 and later incorporated as a Private Limited company in 1997.

Refcon is engaged in the design, supply, installation, and maintenance of industrial refrigeration systems on a turnkey basis. The company also manufactures refrigeration equipment such as evaporative condensers, ammonia chillers, condensing units, and other refrigeration components through its associated manufacturing facilities.

Over the years, the company has developed expertise in providing refrigeration solutions for industries such as cold storage, food processing, dairy plants, breweries, pharmaceuticals, and chemical industries, where maintaining controlled temperature conditions is essential. Refcon focuses on delivering reliable, energy-efficient, and sustainable refrigeration systems, often using natural refrigerants like ammonia and CO_2 for industrial cooling applications.

2.System Overview -

2.1. Evaporative Condenser

The UMA Evaporative Condenser manufactured by Refcon Engineering Services Pvt. Ltd. is used in industrial refrigeration systems for effective heat rejection from the refrigerant. It combines the functions of a condenser and cooling tower in a single unit and operates on the principle of evaporative cooling.

In this system, hot refrigerant vapor from the compressor enters the condenser coil, while water is sprayed over the coil surface and air is circulated by axial fans. A portion of the water evaporates as air passes over the coil, removing heat from the refrigerant and causing it to condense into liquid form. The condensed refrigerant then flows to the expansion device, while the remaining water is collected in the water sump and recirculated for continuous operation.

- **Technical Specifications:**

  - Heat Rejection Capacity: 100 kW – 1600 kW
  - Refrigerants Used: Suitable for Ammonia (NH_3) and Freon refrigerants
  - Coil Material: Stainless Steel SS 304 tubes
  - Water Sump Material: SS 304 sheet
  - Structural Material (Condenser Casing): Hot-dip galvanized steel
  - Fan Type: Tube axial fans with adjustable blades
  - Motor Type: Energy-efficient IE3 motors with IP56 enclosure
  - Design: Multi-section design for easy transportation and installation

[

Additional Feature – De-Superheating Coil:

- A de-superheating coil is provided in the fan section of the condenser.
- The coil is made of SS 304 tubes spirally finned with aluminum, which reduces airside pressure drop.
- It reduces the temperature of ammonia vapor before condensation to about 45– 50°C.
- Helps achieve 10–15% reduction in water evaporation losses.

- Reduces scale formation on the coil surface, improving efficiency and system reliability.

2.2. Screw Compressor Package

- **Overview**

The screw compressor package is used in industrial refrigeration systems to compress refrigerant vapor and circulate it through the refrigeration cycle. It uses GEA Grasso screw compressor blocks, known for high efficiency and reliability.

Low-pressure refrigerant vapor enters the suction port and gets trapped between the rotating male and female rotors. As the rotors rotate, the volume decreases, compressing the vapor. The high-pressure vapor is then discharged to the condenser where heat is removed.

The compressor can operate up to 3600 RPM with Variable Frequency Drives (VFDs) for flexible and energy-efficient operation. The package includes components such as oil separator, oil filters, oil pump, and oil cooler, with a three-stage oil separator to minimize oil carryover.

- **Important Features of Refcon Screw Compressor Package**

  - Classic and reliable design with flexible operation
  - Cooling capacity up to 9 MW for large industrial refrigeration systems
  - 10–100% stepless capacity control for efficient part-load performance
  - Low vibration and noise levels for smooth operation
  - Duplex oil filters to reduce downtime during maintenance
  - Oil coolers available in refrigerant-cooled and liquid-cooled options
  - GEA Omni control panel for advanced monitoring and control

2.3. Skid Mounted Refrigeration Unit

The Skid Mounted Refrigeration Unit manufactured by Refcon Engineering is a compact refrigeration system in which all major components are mounted on a single base frame (skid). This integrated design simplifies transportation, installation, and maintenance. These systems are widely used in cold storage, food processing, dairy, and chemical industries where reliable industrial refrigeration is required.

3.Manufacturing and Testing Facility -

Refcon Engineering has a well-equipped manufacturing and testing facility for producing industrial refrigeration equipment. The company manufactures its own condenser coils using specialized coil-forming machines, ensuring high precision and quality. For quality assurance, the equipment and pipelines are tested using the nitrogen pressure testing method to detect leaks and ensure system safety and reliability before installation.

4.Outcomes from the Industrial Visit Learning -

- The industrial visit to Refcon Engineering provided practical understanding of industrial refrigeration systems.
- Understood the vapor compression refrigeration cycle used in industrial cooling.
- Learned the working and construction of evaporative condensers and screw compressors.
- Observed integration of refrigeration components in skid mounted units
- Gained knowledge about oil separation, pressure control, and energy-efficient refrigeration systems.

5.Photograph -

6.Conclusion -

The industrial visit to Refcon Engineering provided valuable insight into the design, manufacturing, and operation of industrial refrigeration systems. The visit enhanced our understanding of key components such as evaporative condensers, screw compressors, and skid mounted refrigeration units, along with in-house manufacturing and nitrogen pressure testing practices. Overall, it helped bridge the gap between theoretical knowledge and practical industrial applications.

Compiled by: Anuja Madake , Arya Vedpathak, Palak Mandaokar

Student Pune Air Conditioning and Refrigeration Conference (SPARC 2026)

Report

Day: Monday

Date: 9th March 2026

Type: Expert Session

Name of Expert: William McQuade (President of ASHRAE)

Location: MKSSS's Cummins College Of Engineering, Pune.

1. Introduction -

SPARC 2026 – "Shaping Tomorrow's Engineers" was conducted as a prestigious platform that brought together ASHRAE Student Branches, academicians, industry professionals, and student members for technical interaction, networking, and knowledge exchange. The event was graced by Mr. William McQuade, President of ASHRAE, whose presence and guidance added great value to the program. He interacted with students and faculty members while emphasizing innovation, sustainability, technical excellence, and the growing need for industry-ready engineers within the HVAC&R sector.

The event provided students with an opportunity to present the progress, achievements, and initiatives undertaken by their respective ASHRAE Student Branches during the academic year 2025–26. The program reflected the commitment of the ASHRAE student community towards professional growth, technical learning, and meaningful contribution to the HVAC&R industry.

2. Inaugural Address -

The program commenced with an inspiring keynote address delivered by Mr. William McQuade, which set a motivating tone for the event. He welcomed students into a rapidly evolving industry that continuously demands innovative and technically skilled engineers capable of solving real-world challenges.

His address highlighted the importance of practical learning, sustainability-driven engineering, technological advancement, and continuous professional development. He encouraged students to actively participate in technical activities and contribute towards the future growth of the HVAC&R industry through innovation and leadership.

The session proved to be highly insightful for students, faculty members, and participating ASHRAE Student Branch representatives.

3. Academic Roundtable Discussion -

A significant highlight of the event was the academic roundtable discussion convened under the guidance of Anindita Roy. The session brought together academicians and Student Branch Advisors from more than ten institutes hosting ASHRAE Student Branches.

The discussion focused extensively on:

* Challenges faced by student branches
* Strategies for increasing student engagement
* Strengthening industry-academia collaboration
* Enhancing technical exposure for students
* Planning impactful ASHRAE activities and initiatives

The deliberations and exchange of ideas during the session proved to be highly valuable and constructive for all participating institutions.

Additional guidance and direction were provided by Kapilan Natesan, whose insights regarding student branch development, technical growth, and professional opportunities were deeply appreciated attendees.

The session successfully encouraged collaboration, active participation, and the exchange of innovative ideas among academicians and student representatives.

4. Chapter Activities Presentation -

An important segment of the event was dedicated to the presentation of annual progress and activities conducted by various ASHRAE Student Branches during the academic year 2025–26.

The participating chapters showcased:

* Technical workshops and seminars
* Industrial visits
* Guest lectures and expert sessions
* Sustainability and awareness initiatives
* Student engagement activities
* Community outreach programs
* Technical competitions and collaborative events

The presentations reflected the enthusiasm, dedication, and active involvement of student members in promoting technical learning, professional growth, and awareness regarding HVAC&R technologies and sustainable engineering practices. The session also provided an excellent platform for branches to exchange ideas, learn from one another's initiatives, and strengthen inter-chapter collaboration.

5. Women's Day Celebration -

A special segment of the event was organized in celebration of Women's Day, recognizing and appreciating the invaluable contribution of women in engineering, leadership, research, and innovation. The celebration highlighted the importance of inclusivity, diversity, and empowerment within the engineering and technical community. The segment served as an encouragement for aspiring women engineers to actively participate in technical domains and leadership roles while contributing meaningfully towards the advancement of the industry.

6 Industry-Oriented Workshop on Autodesk Revit

The afternoon session was conducted on **Autodesk Revit**, a leading Building Information Modelling (BIM) software extensively used in the Architecture, Engineering, and Construction (AEC) industry. The session was delivered by Ms. Ankita Wagh and Ms. Sanika patil , who holds a Master's degree in Architecture**,** and aimed to familiarize participants with modern digital design methodologies and the role of BIM in project planning, visualization, and execution.

During the session, a live demonstration of Revit was presented, showcasing its user interface, modeling tools, and workflow. Participants observed the creation of essential building components such as walls, floors, doors, windows, and roofs, along with the generation of plans, elevations, sections, and schedules from a single 3D model. The session also highlighted the advantages of Revit, including enhanced design accuracy, efficient collaboration among multidisciplinary teams, and improved project management. Overall, the session provided valuable exposure to industry-standard software and emphasized the growing importance of BIM technology in modern engineering and construction practices.

Photographs -

7. Conclusion -

SPARC 2026 proved to be an exceptionally successful, informative, and memorable event that effectively promoted technical learning, professional interaction, collaboration, and innovation among ASHRAE Student Branches.

The event provided students with valuable exposure to industry perspectives, academic discussions, technical advancements, and professional opportunities within the HVAC&R sector. It successfully strengthened the connection between academia and industry while fostering a spirit of leadership, teamwork, and continuous learning among participants.

Compiled by : Anuja Madake , Palak Mandaokar , Arya Vedpathak

City Pride Theatre Air – Central Air Conditioning Facility

Report

Day - Wednesday

Date - April 8, 2026

Type - Industrial Visit

Location - City Pride

Location of Visit - Central air conditioning facility at City pride theater, Kothrud, Pune - 411038

Number of Participants –

70 students of Third Year, Mechanical Engineering Department

Prof. Rujuta Agavekar, SBA

1.Purpose of Visit -

The purpose of visiting the Central Air Conditioning facility at City Pride Theatre is to gain comprehensive insights into its state-of-the-art system. This visit aims to delve into the technology and infrastructure that supports comfortable viewing experiences for patrons. Additionally, it provides an opportunity to understand the energy efficiency measures and environmental considerations inherent in large-scale air conditioning operations. Assessing the maintenance protocols and operational strategies employed ensures a deeper understanding of how uninterrupted service is maintained.

2.Introduction -

The visit to the central air conditioning facility at City Pride Theatre in Pune provided valuable insights into the cooling infrastructure supporting the comfort of patrons. The facility utilizes three cooling units with capacities of 110 TR, 2 units of 55 TR, and 95 TR respectively

3.Overview of Cooling Units:

There are 3 vapor compression refrigeration systems as follows.

1 110 TR Unit: This unit serves as the primary cooling source, boasting a substantial capacity to efficiently regulate the temperature within the theater complex. Its robust design and high capacity make it well-suited for maintaining comfortable conditions even during peak occupancy periods.

2 55 TR 2 Unit: Complementing the larger cooling unit, the 55 TR unit provides supplementary cooling support, ensuring uniform temperature distribution across the theater space. Its moderate capacity is optimized to address fluctuations in demand while maximizing energy efficiency.

3.95 TR Unit: Acting as another essential component of the cooling system, the 95 TR unit contributes to maintaining optimal environmental conditions

within the theater premises. Its intermediate capacity bridges the gap between the larger and smaller units, enhancing overall system flexibility and resilience.

Key Components of the refrigeration system:

- Semi Hermetically sealed screw compressor
- Water cooled shell and tube type condenser
- Sheel and tube type of evaporator
- Thermostatic expansion valves
- Plate Heat Exchanger

Shell Tube Type Condenser: The utilization of shell tube type condensers underscores the commitment to efficiency and reliability within the cooling system. This condenser design facilitates efficient heat exchange. Water flows through tubes and refrigerant vapor undergoes condensation on the shell side. Its robust construction enhances durability, minimizing maintenance requirements.

Compressor: - Semi hermetic Screw type compressor is used in the vapor compression system.

Evaporator: Shell and tube type evaporator is used where water is on the shell side and refrigerant is on the tube side. Water at 13 ºC comes from AHU after picking up the heat from the air of the cinema hall and its temperature is lowered to 6 ºC. This chilled water acts as secondary refrigerant.

AHU: It consists of a centrifugal blower, filters and chilled water coil. Air from the cinema hall is filtered, flows over the chilled water coil. It is cooled and dehumidified and supplied back to the cinema hall. After picking up heat from air, chilled water temperature rises 13 ºC. It goes back to evaporator where it is cooled to 6 ºC. Primary refrigerant picks up heat from water and undergoes phase change. Refrigerant vapor goes to the suction of the compressor.

Cooling Tower: The presence of a cooling tower enhances the cooling efficiency of the system by facilitating the dissipation of heat generated during the air conditioning process. This crucial component plays a vital role in maintaining the optimal operating conditions of the cooling units, contributing to overall energy savings and system performance. Cooling towers are located at the rooftop. Water cooled in the cooling tower is supplied to the water-cooled condenser.

Throttle Valve: Thermostatic expansion valve is used for throttling in the system.

4.Conclusion -

The visit to the central air conditioning facility at City Pride Theatre provided valuable insights into the design, operation, and components of the cooling system. The utilization of multiple cooling units, shell tube type condensers, cooling towers, and air handling units underscores the commitment to efficiency, reliability, and patron comfort. The integration of these components reflects best practices in large-scale air conditioning systems, serving as a benchmark for similar facilities seeking to enhance their cooling infrastructure.

5.Photographs:

Compiled by: Bharti

References:

[1] http://www.jjcs.in/

[2] https://www.persistent.com/

[3] https://refconengg.com/