FACTORY VISITS REPORT

The steady hum of machines, the synchronized rhythm of moving parts, and the quiet coordination of skilled hands made stepping into a factory for the first time feel like watching imagination take form in metal and motion. What began as a simple curiosity about how things are made soon became a meaningful journey of discovery. As a student aspiring to be an engineer, I wanted to look beyond textbooks and experience the processes that bring everyday products to life.

Driven by this vision, I took the initiative to organize a series of four factory visits for underprivileged students from NGOs such as *People for Action* and *Mera India Mera Adhikar* etc. The aim was to bridge the gap between classroom concepts and real-world practice, to show that learning can be as tactile and dynamic as the machines that power our industries.

Inside these factories, we witnessed raw materials transformed into finished goods, observed rigorous safety and quality checks, and understood the precision and teamwork that make production seamless. Guided by factory professionals and mentors, each visit offered hands-on insights that deepened our understanding and ignited new ambitions.

More than just technical exposure, these experiences became a catalyst for inspiration, instilling confidence, curiosity, and a sense of purpose among the students. For me, it reaffirmed a personal mission to make education inclusive and experiential, and to open doors of opportunity for those who deserve to dream just as boldly.

Factory Covered

Report Compiled and Presented by:
Devasya Agarwal

M/s K.L Rathi Steels Ltd

Sec-60, Eco-Tech, Bisrakh Road

ABOUT THE COMPANY

M/s K.L. Rathi Steels Ltd., located at Sector-60, Eco-Tech, Bisrakh Road, is a steel manufacturing unit known for producing high-quality steel for construction and industrial use. The company is equipped with modern facilities and follows strict quality standards to ensure durability and reliability in its products. With a focus on efficiency, timely delivery, and customer satisfaction, it has built a reputation as a trusted name in the steel industry.

External View of the Factory

PRODUCT SPECIFICATION

TMT Bars (Thermo Mechanically Treated Bars) which commonly produced in 8mm, 10mm, 12mm, 16mm, 20mm, and 25mm. **MS Squares (5-inch / 4x4 sections and other sizes)** Commonly used in engineering, construction, and manufacturing of tools and equipment

PURPOSE OF VISIT

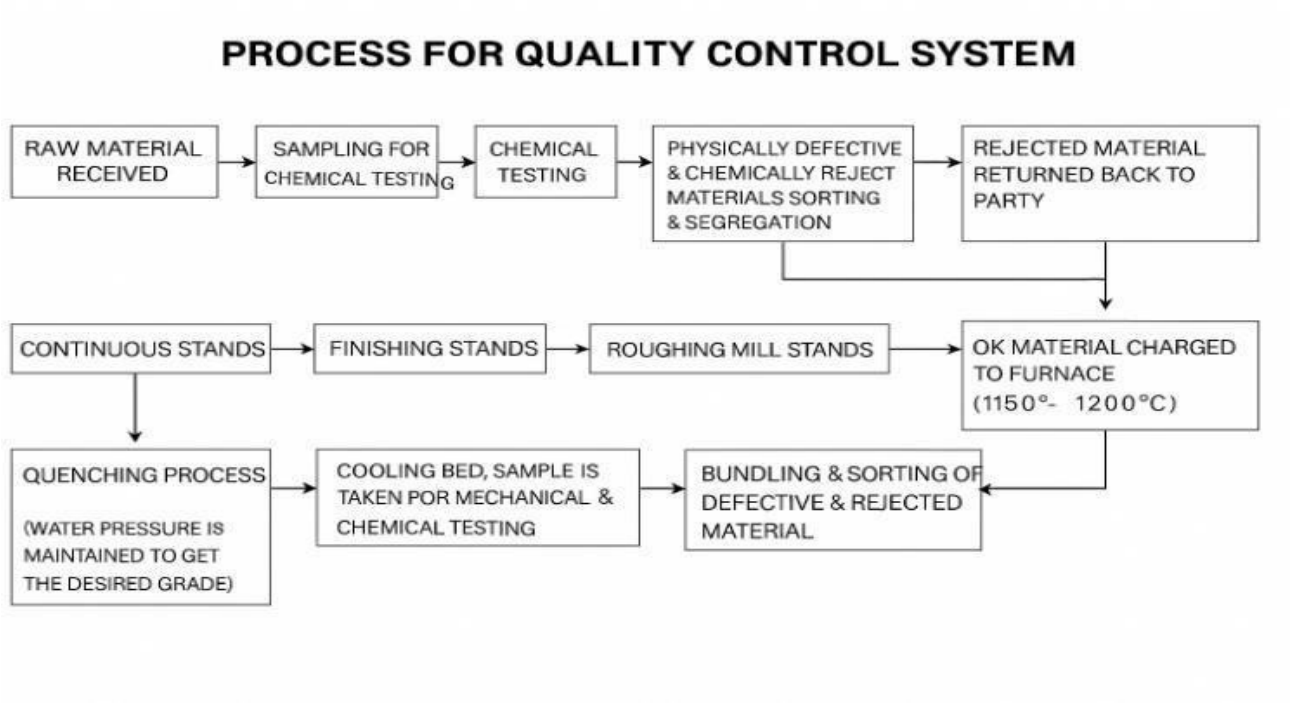
The visit focused on observing each stage of production, beginning with the receipt and inspection of steel billets, followed by their controlled heating for **five hours** at 1200 °C in a 25-meter-long, 150 MT capacity, oil-fired furnace, which prepares the billets for size reduction.

Students witnessed the billets being rolled **into 8 mm–25 mm TMT bars,** learning how precise rolling operations determine final product dimensions. Overall, the visit aimed to connect science and technology with industrial operations, build confidence, and introduce students to potential career paths in fields such as **furnace operations, quality control, and metallurgical testing.**

Finished Material – TMT Bars and MS Squares

QUALITY ASSURANCE

The quality assurance process at **M/s K.L. Rathi Steels Ltd.** is designed to maintain structural integrity and compliance with industry standards at every stage of production. Once billets are heated to approximately **1200 °C** in the re-heating furnace, they must enter the rolling mill without delay; if machinery failure causes a delay and the billet's surface temperature drops below the required rolling threshold, typically around **950–1000 °C**, it is classified as a **"missed roll"** and immediately rejected to prevent internal cracks and strength inconsistencies. Each finished TMT bar and MS square section undergoes **Ultimate Tensile Strength (UTS)** testing using a calibrated tensile testing machine to determine parameters such as **yield strength, ultimate tensile strength, and percentage elongation**, ensuring they meet IS standards for construction-grade steel. Additionally, random samples from every batch are subjected to **bend and rebend tests** to verify ductility, **chemical composition analysis** to check the percentage **of carbon, manganese, sulfur, and phosphorus**, and **hardness testing** to assess surface strength after quenching and tempering. These rigorous checks ensure that only defect-free, high-strength steel conforming to quality benchmarks is cleared for dispatch.



Quality Control System – Step-by-Step Procedure

PROCEDURE INVOLVED

Raw Material (Billet):
The manufacturing process begins with **6-meter-long steel billets**, which are used as the base raw material for producing TMT bars and MS sections.

Heating in Furnace:
The billets are placed in a **25-meter-long re-heating furnace** and heated to a temperature of around **1200 °C for approximately five hours**. This heating ensures the billets become sufficiently

Initial Shaping:
Once the billets reach the desired temperature, they are transferred for **initial shaping**, where they are formed into **5-inch (4×4) square sections**, preparing them for the subsequent reduction process.

Reduction Process:
The shaped billets pass through **19 sequential rolling stages**, each reducing the cross-section progressively until the billet is transformed into **8–10 mm diameter steel bars**. This step gives the steel its final

Missed Roll:
If a billet cools before rolling due to any **machinery failure or delay**, it loses its required temperature for proper shaping. Such billets are categorized as **"missed rolls"** and are rejected immediately to

Quality Assurance:
In the final stage, the finished steel undergoes **rigorous testing**, including **Ultimate Tensile Strength (UTS) testing** to check mechanical strength and **chemical analysis** to verify the composition of

STUDENT INTERACTION

During the visit, the students actively engaged with **each stage** of the production process, showing particular excitement during the **live demonstrations** conducted on the shop floor and in the laboratory. In the **furnace section**, they observed how **6-meter billets are pushed into a 25-meter oil-fired furnace and heated to 1200 °C**, followed by a demonstration of how the glowing billets are transferred to the rolling mill. They watched as the billets passed through **a sequence of 19 rolling stands**, gradually reducing in size to form **8–10 mm TMT bars**, while technicians explained how rolling speed, temperature, and stand alignment affect the final product's uniformity.

Student Industrial Visit to the Site

Technicians explained that maintaining the **rolling temperature between 1050 °C and 950 °C** is crucial for achieving proper grain refinement and avoiding surface defects. The **rolling speed** was kept in the range of **10–14 m/s**, adjusted progressively as the bar size reduced, to balance deformation rate with temperature loss. Furthermore, **precise stand alignment** with tolerances typically within **±0.5 mm** is essential to prevent twisting, uneven rib formation, or dimensional inconsistencies in the final TMT bars. Through this controlled process, billets were gradually reduced to **8–10 mm diameter TMT bars** with uniform mechanical properties and surface finish.

Practical Training to students

EXPERIENCE & REFLECTION

The visit to **M/s K.L. Rathi Steels Ltd.** provided valuable hands-on exposure to the **entire TMT bar production line**, bridging the gap between theoretical concepts and real-world industrial practices. One key observation was the **systematic alternation of billet cross-sections between oval and round shapes** during the 19-stage rolling process. This **oval–round pass technique** is a widely used method in modern rolling mills to ensure uniform deformation, better metal flow, and accurate dimensional control. By alternating the billet's shape, internal stresses are evenly distributed, reducing the risk of surface cracks and improving the final product's **mechanical strength and dimensional accuracy**.

Quality Testing Equipment – UTS Machine

In the laboratory, **tensile strength testing** was conducted using UTS machines to measure yield strength, ultimate tensile strength, and elongation, parameters that determine structural suitability. **Furnace oil** was used as the heating fuel, and precise control of heating duration ensured the required malleability of billets for rolling. Overall, the visit enhanced my understanding of practical quality control, temperature management, and mechanical testing in steel manufacturing.

Students with Factory Personnel

CONCLUSION

The industrial visit to **M/s K.L. Rathi Steels Ltd.** offered an integrated perspective on how theoretical metallurgy is applied in real manufacturing environments. Students from **Swaraj Vikas Foundation** gained first-hand exposure to the coordination between **furnace operations**, **rolling sequences**, and **laboratory testing**, which together shape the quality of TMT bars. In the production area, they observed how **controlled heating**, **precise deformation through oval–round passes**, and **timely rolling** ensure dimensional accuracy and structural integrity.

The laboratory session deepened their understanding of **mechanical and chemical testing**, where parameters like **yield strength**, **ultimate tensile strength**, **elongation**, and **chemical composition** were evaluated to meet safety and performance standards.

Overall, the visit bridged classroom learning with industrial practice, allowing the students from Swaraj Vikas Foundation to understand how **temperature control**, **rolling techniques**, and **quality assurance systems** come together to produce reliable steel products for construction.

ANUPAM PRODUCTS LTD.

62/2, Site No 4, Sahibabad Industrial Area, Ghaziabad, Uttar Pradesh

ABOUT THE COMPANY

Anupam Products Limited, established in 1970, operates a 1 lakh sq. ft. automated facility in Sahibabad with 7 fabrication lines and 50 press machines, producing 9 million tin cans monthly. The company's business model is characterized by its non-captive manufacturing, serving a diversified and prestigious client base in the paint, dairy, and automotive sectors. This approach has allowed it to build a strong market position and a legacy of over five decades. Led by Mr. Devashish Binani (MD) and Ms. Aditi Binani (Director), the company reports an annual turnover of ₹25–100 crore, with revenue estimates of ₹75–100 crore.

External View of the Factory

PURPOSE OF VISIT

Anupam Products Limited positions itself as one of the leading manufacturers of metal containers in India. As stated on the **company's official website**, the company's stated purpose is to **"cater the expectations of customers by providing them excellent quality products as per their gratification".** This customer-centric approach is supported by a long-standing legacy of 53 years in the tin can industry and a commitment to working with **Top Brands like Milkfood, British Paints, Fevicol, Patanjali etc.**
It provides a tangible case study in modern manufacturing, demonstrating the relationship **between capital investment in automation, operational efficiency, and large-scale production**. The visit also provides a perspective on the critical role of systematic quality control and a robust supply chain in sustaining long-term customer trust**.**

Finished Product Warehouse

PRODUCT SPECIFICATION

The company's products are categorized by application, including **paint and adhesive cans** for solvent-based products, **ghee cans** for dairy items like ghee and milk powder, **auto parts cans** for components such as piston and ring sets, and **decorative cans** for premium goods like chocolates, cookies, liquor, dry fruits, and tea.

MANUFACTURING PROCESS:

1) Raw Material Sourcing:

The production process begins with the procurement of high-grade tin-plated steel sheets from reputed suppliers. Materials are sourced from leading producers such as **Tata Steel, JSW Steel, and the Tinplate Company of India**, which supply standardized **electrolytic tin-plated (ETP) sheets.**

Supplied Raw Material

2) Can Body Fabrication

In the next stage, the cut steel sheets are fed into automated fabrication lines, where they are mechanically shaped into cylindrical or rectangular forms depending on the required container type. Advanced bending and rolling machines ensure **precise shaping, maintaining uniform edges** to allow seamless joining later in the process.

Sheets Molded into shapes

3) Component Production

While the can bodies are being fabricated, a parallel process takes place in the component production section. Here, the **company's 50 component press machines** are used to manufacture the top and bottom ends of the cans. Steel sheets are punched using **high-precision dies** to form **circular blanks**, which are then drawn, flanged, and crimped into lids and bases. This multi-stage pressing ensures that each component fits tightly with the body during final assembly. Regular machine calibration and in-process inspections help maintain accuracy in dimensions, which is essential for a proper seal.

Can Making Machines

Can lid Pressing Technology

4) Final Assembly and Sealing

Once both the bodies and ends are ready, they are brought together on high-speed assembly lines for the sealing process. A **double crimping** technique is used, where the can end is mechanically folded and pressed around the body flange in two successive operations.

The process is carefully controlled to maintain uniform pressure and alignment, as even minor deviations could compromise the container's integrity.

Final Assembly Line

SUPPLYCHAINNETWORK

Anupam Products Limited operates an extensive and well-coordinated supply chain designed to efficiently serve its diverse client base across India. The company's clientele includes some of the most prominent names in the **paint**,

adhesive, **dairy**, and **FMCG** sectors, such as **Asian Paints**, **Pidilite Industries (Fevicol)**, **Madhusudan Dairy**, **Patanjali Ayurveda**, **British Paints**, **Shriram Pistons**, and **Milkfood Ltd.** Supplying to such large-scale industrial clients requires a distribution system capable of maintaining high volumes, strict timelines, and consistent product quality.

The company's manufacturing facility in **Sahibabad Industrial Area (Ghaziabad, Uttar Pradesh)** is strategically located with proximity to major transport corridors like **NH-9** and **Delhi–Meerut Expressway**, providing excellent connectivity to the National Capital Region (NCR) and beyond.

DISTRIBUTION NETWORK

For distribution, Anupam Products Limited uses a **hybrid logistics model** combining **direct bulk deliveries** to large industrial clients with **third-party logistics (3PL) providers** for wider geographic coverage. Large consignments for companies like **Asian Paints**, **Pidilite**, and **British Paints** are typically transported through **dedicated fleets of container trucks** on fixed schedules to synchronize with clients' production cycles. For FMCG and dairy sector, the company leverages **temperature-controlled and time-bound logistics** to ensure the integrity of containers used for food-grade packaging.

The company maintains **on-site finished goods warehouses** adjacent to the production lines. Inventory is managed through a **First-In-First-Out (FIFO)** system to ensure freshness and rotation, especially critical for food and dairy sector packaging. The ability to consistently deliver to well-known national brands reinforces Anupam Products Limited's reputation for **trust, operational transparency, and supply reliability**.

Ready-to-Dispatch Product

STUDENT INTERACTION AND PERSONAL EXPERIENCE

Students from Mera India Mera Adhikar NGO observed the full transformation of tin-plated steel sheets into finished containers, from sheet entry to dispatch. They learned how longitudinal seams are welded for leak-proof bodies, explored downgauging technology that uses thinner tinplate for durable, economical cans, and examined the double crimping process that creates hermetic seals essential for food-grade products.

Student Interaction on Production Line

They were struck by the facility's output 9 million cans monthly with only 11–25 employees made possible by automation in welding, pressing, and crimping stations. Discussions showed how synchronized fabrication lines, real-time leak detection, and automated quality checks ensure efficiency and consistency.

Through interactions, students grasped how zero-leak standards, FIFO inventory, and humid-proof storage are integrated with logistics, embedding quality assurance throughout production and supply chain operations to guarantee container integrity for industrial clients.

CONCLUSION

Anupam Products Limited exemplifies how a traditional manufacturer can adapt to modern practices. By adopting **downgauging technology**, the company achieves both cost efficiency and sustainability, while its focus on **"zero leaks"** through automated quality checks ensures reliability. Its **non-captive business model** allows it to serve diverse clients across multiple industries, strengthening resilience and market reach.

Equally important is its commitment to **"crystal pure transparency"**, demonstrated through verifiable client relationships and consistent customer satisfaction. Together, these practices highlight how Anupam Products Limited blends **innovation, efficiency, and ethical clarity**, making it a strong model for modern manufacturing

APPENDIX:

Product Name	Storing Material / Usage	Price Range (per piece)	Product Image With Supplier's Name
1 Liter Round Paint Tin Container	Paint, Material Handling	₹ 26.60	
15 Liter Square Oil Tin Cans	Oil, Material Handling	₹ 189	
10 Kg Square WMP Tin Cans	WMP, Material Handling	₹ 238	
500 Gm Cylindrical WMP Tin Container	Material Handling	₹ 52.86	

Final Product Specifications

SUNFLOWER GROUP HOUSING PROJECT

GHAZIABAD

ABOUT THE COMPANY

The Sunflower Group Housing is a large-scale residential development located in Ghaziabad, strategically positioned to offer excellent connectivity to major city hubs. Spread across approximately 8.3 acres (based on the Built-Up Area of 1,809,417.65 sq. ft.), the project has been designed to provide a modern, community-oriented living environment.

Developed by M/s AU Real Estate with M/s Steady Stone LLP as the contractor and M/s NUPC as the project management consultant, the project aims to deliver a well-planned residential enclave featuring multiple apartment towers equipped with modern facilities and infrastructure.

Construction commenced on 15 June 2024 and is scheduled for completion by 2 December 2027, reflecting a structured timeline and adherence to development milestones.

Side View of construction site

PURPOSE OF VISIT

The visit to **The Sunflower Group Housing Project, Ghaziabad** was organized to provide students with **practical exposure to large-scale residential construction**. The objective was to help students understand the **complete project lifecycle**, including **planning, architectural and structural design interpretation, construction techniques, and on-site safety practices**.

During the visit, students observed key aspects such as **formwork and shuttering methods, reinforcement placement, use of RMC (Ready-Mix Concrete)**, and **firefighting installations**, gaining valuable insights into how residential buildings are executed on a real site. This hands-on experience aimed to **bridge the gap between theoretical knowledge and field application**, fostering a deeper understanding of construction processes and project management.

Practical exposure to residential construction site

READY-MIX CONCRETE (RMC)

Ready-Mix Concrete (RMC) is a specialized form of concrete that is **produced in a centralized batching plant** as per a **predefined mix design** and then transported to the site in a **fresh, unhardened state**. Unlike conventional hand mixing, RMC production follows **strict proportioning of materials** to ensure uniform quality, strength, and durability. A typical RMC mix for residential high-rise construction, such as at **The Sunflower Group Housing Project**, follows a **1:1.5:3 ratio** (cement : sand : coarse aggregate) for M20 grade, or **1:1:2 ratio** for M25 grade concrete, with a **water–cement ratio maintained between 0.40 and 0.50**. These proportions are controlled using automated batching systems that weigh each material precisely, in accordance with IS 456:2000 and relevant IS mix design codes.

RMC mix

Once mixed, the concrete is **loaded into transit mixers**, where the drum rotates continuously to **prevent segregation and maintain homogeneity** during transportation.

Transit Mixers

On reaching the site, the RMC is directly pumped or placed in structural components like **columns, beams, slabs, and foundations**. This method offers several advantages: **high workability**, **uniform compressive strength**, **faster placement**, **less material wastage**, and improved **environmental control**, since dust and noise are confined to the batching plant.

Mix Transported through Pumps

Routine quality checks, including **slump tests**, **cube compressive strength tests**, and **equipment inspections**, ensure that every batch meets project-specific performance criteria.

At The Sunflower site, the use of RMC ensures **structural uniformity across multiple towers**, reduces construction time, and supports both **safety and sustainability goals**, making it a key element in modern residential construction.

FORMWORK (SHUTTERING) AND CENTERING WORK

At **The Sunflower Group Housing Project**, the **formwork system** plays a central role in shaping the structural components of the residential towers. The site uses a **combination of Aluminium Formwork (Mivan system)** for vertical and horizontal elements and **Nova Board shuttering** for supplementary works such as lintels and non-structural elements. Aluminium formwork is extensively deployed for **columns, walls, slabs, beams, staircases, and balconies**, offering **millimeter-level accuracy** and a **smooth concrete finish** that minimizes the need for plastering. The system is designed for **quick assembly and dismantling**, allowing for **7-day slab cycles**, which significantly speeds up floor-to-floor construction.

The **aluminium panels** are prefabricated according to the architectural and structural drawings, then assembled on-site using **pins and wedges** to create rigid molds. Before pouring, the joints are **tightly sealed** and the entire formwork surface is coated with a **chemical release agent** to prevent concrete adhesion and ensure clean stripping. **Vertical alignment is checked with plumb bobs**, and **laser levels** are used to confirm slab levels before concreting begins.

Aluminium Formwork & Nova Board Shuttering

The **centering work** involves a system of **adjustable steel props, staging pipes, and ledger beams** to support the shuttering beneath slabs and beams. These props are placed on **firm wooden sole plates** to distribute load evenly and avoid settlement. During concreting, the formwork is checked for **deflection, leakage, and vibration stability**, ensuring the structure retains its designed dimensions. After the concrete attains the required **stripping strength** (typically 50–70% of design strength, depending on the element), the shuttering is carefully removed. Aluminium panels are then cleaned, repaired if needed, and reused for subsequent floors — often up to **200 repetitions**, making the system both **economical and sustainable**.

Wooden Sole Plates

By employing **modern aluminium and Nova Board formwork systems**, the Sunflower project achieves **faster turnaround times**, **consistent quality**, and **high precision**, which are essential for the timely and safe execution of a large multi-tower residential development.

Student Understanding Formwork

QUALITY ASSURANCE

At **The Sunflower Group Housing Project**, **cube testing** is an integral part of the **quality assurance process** to verify the **compressive strength** of concrete used in structural works. This test ensures that the concrete produced and placed on site meets the **design strength** as specified in the mix design and relevant IS codes (primarily **IS 516: 1959** and **IS 456: 2000**). Immediately after concrete placement, **standard cube moulds of 150 mm × 150 mm × 150 mm** are filled in **three layers**, each layer being **compacted using a tamping rod** to remove air voids and ensure uniform density. Once filled and levelled, the moulds are tagged with **date, location, and structural member details** for accurate tracking.

Concrete Cube Moulding

The cubes are then stored under **controlled curing conditions**, typically in a **water tank at 27 ± 2 °C**, for predetermined periods — usually **7 days and 28 days**. These curing durations correspond to **early strength** and **characteristic strength** assessments respectively. After curing, the cubes are taken to a **Compression Testing Machine (CTM)**, where they are subjected to a **gradually increasing load** until failure. The **maximum load** at failure is recorded, and the **compressive strength** is calculated by dividing this load by the **cross-sectional area of the cube**.

Compression Testing Machine (CTM)

For residential structures, the project commonly uses **M20 to M30 grade concrete**, where the **28-day characteristic compressive strength** is expected to be **20–30 N/mm²**, depending on the grade. Any deviation from these target strengths triggers a review, which may involve **checking batching records**, **evaluating site practices**, and if required, **conducting Non-Destructive Testing (NDT)** to assess in-situ strength. This systematic approach ensures that **only structurally sound concrete is accepted**, maintaining the **safety, durability, and serviceability** of the constructed elements.

Non-Destructive Testing (NDT)

By strictly adhering to this **cube testing regime**, the Sunflower project ensures **consistent quality control**, verifies **mix design performance**, and upholds the **structural reliability** of its multi-storey residential towers.

STUDENT INTERACTION AND PERSONAL EXPERIENCE

During the visit to **The Sunflower Group Housing Project**, students had gained valuable insights into the **practical implementation of EHS (Environment, Health, and Safety) protocols** on an active construction site. The session began with an **EHS briefing**, where students were familiarized with **mandatory PPE (Personal Protective Equipment)** such as helmets, reflective jackets, safety shoes, and gloves, along with the importance of **site access control and hazard identification**. Safety personnel explained the layout of **emergency assembly points**, the significance of **clear evacuation routes**, and the role of **safety signage** placed strategically across the site.

Student Leaning EHS protocols

The **fire safety demonstration** was particularly engaging. Students observed the **Fire Line Pump Room**, where they were shown how water supply systems and pumps are installed to maintain adequate pressure across all floors. They also learned about **fire hydrant lines**, **hose reels**, and **extinguishers**, including their types and usage. Safety officers explained the **inspection procedures for fire extinguishers**, ensuring they remain charged and functional at all times.

Fire Line Pump Room

Additionally, students witnessed checks on **drinking water tanks for labour**, **ambulance availability**, and **inspection of batching plants and transit mixers**, all part of routine EHS audits.

Batching Plant Inspection

This on-site interaction helped students **connect theoretical knowledge with real-world safety practices**, giving them a clear understanding of how **EHS standards and fire safety measures are integrated into daily operations** on large residential construction projects. The experience enhanced their **awareness of site discipline, emergency preparedness**, and the **critical role of safety compliance** in ensuring both worker protection and project quality.

CONCLUSION

The visit to The Sunflower Group Housing Project provided a clear understanding of real-time construction practices, technical drawings, structural methods, and safety systems. Observing reinforcement work, formwork techniques, RMC usage, and firefighting infrastructure gave practical insight into how large-scale projects are executed. Interactions with engineers clarified technical concepts like load transfer, crack control, seismic detailing, and foundation design, bridging the gap between theory and practice. Overall, the visit enhanced both technical knowledge and practical awareness of modern construction workflows.

Dorset Industries Private Limited
AIHP Horizon, Udyog Vihar Phase-V, Sector 19, Gurugram, Haryana, India

ABOUT THE COMPANY

The company is a leading manufacturer of architectural and security hardware, specializing in door locks, handle systems, and related components. It operates modern manufacturing facilities in Gurugram and Jammu with a combined area of around 200,000 sq. ft. Over the years, Dorset has earned a reputation for design innovation, product reliability, and eco-friendly practices such as trichloroethylene-free cleaning. The company also holds more than 50 design registrations and 11 patents, highlighting its R&D strength. Its portfolio covers architectural hardware, locks and security systems, furniture and kitchen hardware, and digital locking solutions, with annual production running into the millions of units.

Student Visit to Dorset Industries – Reception Area

PURPOSE OF VISIT

The purpose of visiting Dorset Industries Pvt. Ltd. was to gain practical exposure to modern manufacturing and surface finishing techniques in the field of architectural hardware and security systems. Dorset integrates advanced technologies such as **SCADA-controlled electroplating lines** and automated multi- stage baking systems in its production process. Observing these systems firsthand provided valuable insights into how theoretical concepts in engineering and materials science are applied on the shop floor.

For students, this visit offered the opportunity to connect classroom knowledge of topics such as electrochemistry, process automation, quality control, and product design with real industrial practice. It also highlighted the importance of sustainability in modern industries, as Dorset operates zero-discharge plating plants and emphasizes energy-efficient, environment-friendly processes. Through direct interaction with engineers and technicians, the visit allowed students to understand the challenges of maintaining product reliability, precision, and durability at scale, while appreciating the role of R&D and innovation in a competitive manufacturing environment.

PRODUCT SPECIALISATION

Dorset India specializes in **architectural hardware and security solutions**. Its key product lines include **door handles, hinges, and glass fittings** under architectural hardware; **mechanical and digital locks** such as rim locks, padlocks, and biometric smart locks under security systems; and **furniture and kitchen hardware** like cabinet handles, knobs, and drawer channels. The company also focuses on **digital and IoT-enabled locking solutions** for smart homes and offices. All products are designed with an emphasis on **durability, aesthetic finishes, and eco-friendly surface treatments** such as nickel/chrome plating and electrophoretic coating, ensuring long life and international quality standards.

Digital Door Lock

Digital Push/Pull Lock

Mortise Digital Door Lock

Rim Lock

Phantom Trio Lock

Phantom Trio Lock Dead Bolt

Hinge System

Soft Close 3D Adjustable Hinge

Soft Close Clip On Hinge 0 crank with 3D mounting plate

Soft Close Hinge with 4 Hole Mounting Plate

Soft Close Hinge with 4 Hole Mounting Plate

ELECTROPLATING PROCESS

Dorset India employs a modern **SCADA-controlled electroplating system** to ensure high-quality and consistent surface finishes. The process begins with **raw material inspection**, where metal components are checked for dimensions and surface defects. Next, the parts undergo **pre-treatment and cleaning** in an eco-friendly, **trichloroethylene-free setup** to remove oils, dirt, and oxidation. After cleaning, components are immersed in **electrophoretic coating (EPL) or electroplating baths**, where a controlled electric current deposits a uniform metal layer commonly **nickel or chrome** onto the surface. The SCADA system monitors critical parameters such as current density, voltage, bath composition, and temperature to maintain uniformity. Post-plating, the parts are **baked or cured** in multi-stage ovens to enhance adhesion and durability. Finally, each component undergoes quality inspection, including **coating thickness measurement, adhesion tests, corrosion resistance checks, and visual evaluation, before being assembled or packaged.** This integrated process combines automation, sustainability, and rigorous quality control, resulting in durable and aesthetically refined hardware products.

SCADA-Controlled Electroplating Line

QUALITY ASSURANCE

Dorset India follows a strict multi-stage **Quality Assurance (QA) process** to ensure every product meets international standards. Raw materials undergo **Incoming Quality Control (IQC)**, where chemical composition and dimensions are checked before production. During manufacturing, **In-Process Quality Control (IPQC)** is carried out at polishing, machining, and electroplating stages to maintain consistency. The electroplated parts are tested using **XRF coating thickness measurement**, **adhesion/tape tests**, and **salt spray corrosion resistance tests**. Finished locks and handles are further subjected to **life cycle testing** (thousands of operational cycles), **torque/strength checks**, and **visual inspections** to detect any defects. All processes are monitored using **SCADA automation and statistical process control (SPC) methods** to maintain uniform quality. Each batch is given a unique code for **traceability**, and products are released only after final inspection and reliability checks.

Incoming Quality Control (IQC)

COMMITMENT TO SUSTAINABILITY

The company integrates sustainability into all aspects of its operations, focusing on **environmental management, resource efficiency, and social responsibility**. Their manufacturing units are designed to minimize pollution, conserve water and energy, and treat wastewater through effluent treatment plants, while the Binola facility has earned a **Bronze Certification under the National Green Buildings Standard**. Dorset aims to achieve **Net Zero Energy Building (NZEB)** status by generating as much energy as it consumes annually through renewable and efficient methods. Employee awareness and skill- building are emphasized through an in-house program called **Pathshala**, which trains staff on sustainable practices. Additionally, the company engages in **Corporate Social Responsibility (CSR)** initiatives, such as partnering with “Teach for India” to support quality education, reflecting its commitment to both environmental and social sustainability.

Pathshala

Teach for India

STUDENT INTERACTION & PERSONAL EXPERIENCE

During the visit to Dorset India, students had the opportunity to **observe and interact with various stages of modern manufacturing**, gaining practical understanding of concepts learned in the classroom. We saw how **raw materials are inspected** for dimensions and surface quality, and then **machined using world-class CNC machines, Special Purpose Machines (SPMs), and conventional equipment**, demonstrating precision, repeatability, and advanced automation. Students also learned about **pre-treatment, cleaning, and multi-stage baking systems**, which highlighted the importance of surface preparation and process control.

Total Quality Management (TQM) techniques

The application of **Total Quality Management (TQM) techniques** including **JIT (Just-In-Time)** for minimizing inventory and waste, **VSM (Value Stream Mapping)** to visualize and optimize production flows, **SMED (Single Minute Exchange of Die)** to reduce machine setup times, and **Statistical Process Control (SPC)** to monitor tolerances and detect process variations was explained and observed in real-time. Interaction with engineers emphasized **the critical linkage between design and manufacturing**, showing how departments collaborate to deliver durable, aesthetically refined, and eco-friendly products.

This visit provided a **holistic, hands-on learning experience**, reinforcing classroom concepts of **manufacturing engineering, automation, quality assurance, lean production, and sustainable industrial practices**.

Students from People for Action NGO interaction with Dorset people

CONCLUSION

The visit to Dorset India offered a unique perspective on the integration of technology, management, and sustainability in modern manufacturing. Students gained insights into how industrial operations are planned, monitored, and coordinated across departments, enhancing their understanding of real-world engineering challenges. Observing the organizational workflow, team collaboration, and problem-solving strategies highlighted the importance of effective communication, process optimization, and continuous improvement in achieving high standards. The exposure also emphasized the role of innovation and sustainable practices in maintaining competitiveness, giving students a comprehensive appreciation of the industrial environment beyond textbook concepts. Overall, the experience strengthened practical knowledge, analytical thinking, and awareness of professional responsibilities in the manufacturing sector.