A Brief Report on

IndustrialVisit

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Industry:Indo german tool room,Ahmedabad.

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1.1 OVERVIEW:

A total of 48 students, accompanied by two faculty members, participated in the industrial visit to the Indo-German Tool Room (IGTR) located in Ahmedabad. The primary objective of this visit was to gain firsthand exposure to the tooling industry and to understand the cutting-edge manufacturing technologies and practices implemented at IGTR.

Renowned for its specialization in precision tooling and engineering solutions, IGTR caters to a diverse range of industries, offering both manufacturing and training services of high standards.

The visit commenced with a welcome and orientation session conducted from the Administration Department. He provided a general briefing on the facility's operations, safety protocols, and the schedule of the visit. Following this, representatives from the Production Department were assigned to guide the students through various sections of the plant, offering technical explanations and insights into the processes.

Accompanied by their faculty coordinators and under the guidance of IGTR staff, the students explored the core operational areas of the facility. The sections visited included:

- **Design Department** – where students observed the use of CAD/CAM software and design methodologies employed in creating precision tools.
- **Production Unit** – showcasing various stages of tooling production, including CNC machining, EDM processes, and quality control.
- **Training Centre** – where IGTR conducts skill development programs and hands-on technical training for aspiring engineers and industry professionals.

Overall, the visit provided valuable industrial exposure, bridging the gap between theoretical knowledge and practical application. It also offered students a deeper understanding of the professional standards and technological advancements shaping the modern tooling and manufacturing sector.

Objective of IGTR

The primary objective of the Indo-German Tool Room (IGTR) in Ahmedabad is to design and develop high-precision tools, dies, press tools, injection moulds, various gauges, jigs, and fixtures that meet specific customer requirements. All products are engineered to adhere strictly to international quality standards. IGTR emphasizes innovation and technical excellence, ensuring that the tooling solutions provided not only meet the demands of current industrial practices but also contribute to improving productivity, accuracy, and efficiency across various manufacturing sectors.

Visit to the Mechatronics Lab

During our visit to the Mechatronics Lab, we explored various modern control systems used in automation and industrial processes. The lab is equipped with different electronic control (EC) circuits and signal-based systems that operate using pneumatic and electropneumatic technology. We observed how these systems are applied in real-world manufacturing for controlling actuators and movement. Additionally, the lab features Programmable Logic Controllers (PLCs), which are essential for machine automation. PLCs process input signals and execute logic-based control functions to operate machines efficiently. This hands-on exposure helped us understand the integration of mechanical systems with electronics and software in advanced manufacturing setups.

Visit to the Robotics Lab

The Robotics Lab at IGTR is equipped with several advanced robotic systems that are fully automated and capable of executing tasks with high speed, precision, and repeatability. The lab features a variety of industrial robots used in manufacturing processes. Among them, we observed:

- **Pick and Place Robots** – These robots are designed to identify, lift, and position objects from one location to another with extreme accuracy.
- **Welding Robots** – Used in automated welding applications, these robots offer consistent quality and reduce human error, increasing production efficiency.

These demonstrations allowed us to witness the future of automation and how robotics are transforming modern industries by reducing manual labor, improving safety, and increasing productivity. It was a valuable learning experience to see the real-time application of robotic technologies in industrial settings

Visit to the Machining Lab

The Machining Lab at IGTR Ahmedabad is well-equipped with a range of traditional and manual machines used in basic and advanced manufacturing operations. During our visit, we observed various essential machines such as:

- **Lathe Machine** – Used for turning operations to create cylindrical parts.
- **Vertical Milling Machine** – For cutting and shaping metal or other materials using rotary cutters.
- **Surface Grinder** – For achieving a smooth finish on flat surfaces with high precision.

Alongside viewing these machines, we were given a live demonstration on how to interpret industrial engineering drawings accurately. We also gained practical insight into how to set up and operate a lathe machine, including the importance of tool positioning, workholding techniques, and safety measures during operation. This experience helped bridge the gap between classroom learning and practical shop floor skills.

Machine Shop

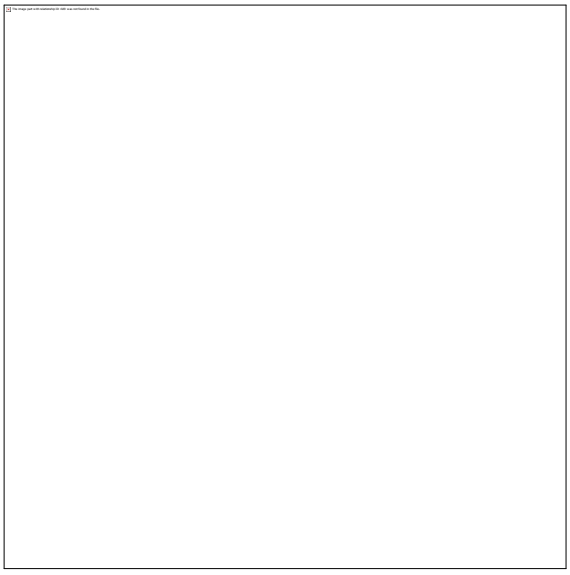
The Machine Shop at IGTR serves as a comprehensive facility where students can apply theoretical knowledge in a real-world manufacturing environment. It includes a wide variety of manually operated machines and tools that support training in conventional machining processes. The hands-on exposure in the machine shop enabled us to better understand the workflow of basic machining tasks, material removal processes, and precision measurements, forming a strong foundation for further advanced manufacturing techniques.

CNC Lab

The CNC (Computer Numerical Control) Lab at IGTR is designed to offer students direct exposure to automated machining technology. The lab features two key machines that represent the modern standards of precision manufacturing:

1. **CNC Milling Machine (Jyoti DX 200 Model)**
    - Equipped with a **turret** and **tailstock**, supporting a range of milling operations.
    - Features an **Automatic Tool Changer (ATC)** with **9 stations**, allowing for faster tool changes and efficient machining cycles.
2. **Vertical Machining Center – VMC (Haas Company)**
    - Controlled by a **HAAS Controller**, widely used in industrial applications.
    - Comes with an **ATC of 10 stations** to support multi-tool operations.
    - Working area dimensions:
        - **X-axis: 762 mm**
        - **Y-axis: 300 mm**
        - **Z-axis: 300 mm**

Both machines operate using **ISO standard G-codes and M-codes**, which are essential in programming CNC machines for precise and automated production. During the visit, we learned how CNC machines interpret these codes to perform complex machining tasks, improving speed, accuracy, and repeatability in manufacturing.



Injection Moulding Area

The Injection Moulding Section at IGTR Ahmedabad utilizes various plastic materials such as **Polystyrene, Acrylic, and Polypropylene** to manufacture precise plastic components. The primary machine used in this section is the **L&T ASWA 650/1000**, a reciprocating screw-type injection moulding machine. This type of machine ensures uniform plastic flow and accurate moulding, which is critical for achieving consistent product quality.

Different moulds are used to produce various plastic components, each requiring specific coding to identify and track mould types and product specifications. Each machine is equipped with a **preventive maintenance schedule** and a **specification chart**, ensuring optimal operation and reducing downtime. The injection moulding process plays a key role in producing high-precision plastic parts for industrial and consumer applications.

Parts Made by Injection Moulding

Several functional plastic components are manufactured in this section using the injection moulding technique. These include:

- Casings and enclosures
- Industrial plastic gears
- Mounting brackets
- Consumer product parts

Each product demonstrates the precision and versatility of the injection moulding process in shaping complex geometries from plastic materials.

Laser Beam Machining (LBM)

The Laser Beam Machining section introduced us to a **non-traditional machining process** used for precise cutting and shaping of metals. At IGTR, LBM is performed using **0.3 mm and 0.5 mm filler rods**, commonly made from **Aluminium (Al), Copper (Cu), and Brass**. Notably, this process generates **minimal heat**, reducing thermal distortion. A coolant is often used to improve the surface finish and maintain component quality.

Important parameters such as **current, voltage, and frequency** must be precisely set to achieve optimal machining results. LBM is ideal for applications requiring high precision and minimal material removal.

Quality Control Department

In the **Quality Control Section**, we observed various high-precision measuring instruments and quality assurance tools that are critical in maintaining manufacturing accuracy. The instruments included:

- **Profile Projector** – Used to measure the gear tooth profile and other complex geometries.
- **Dial Vernier Caliper**
- **Bore Gauge**
- **Micrometer**
- **Go and No-Go Gauges**
- **Sine Bar**
- **Bevel Protractor**

A highlight of this section was the **CMM (Coordinate Measuring Machine)**, which is used to measure the dimensional accuracy of components in 3D space. CMMs are essential for maintaining tight tolerances and are widely used across industries for quality control and inspection.

Wire-Cut EDM (Electrical Discharge Machining)

The **Wire Cut EDM** section featured multiple electro-discharge machines primarily using **copper wire** to cut complex profiles in metal components. One of the key machines observed was the **ROBOFIL 290 by Charmilles Technology**, a high-precision EDM machine capable of producing intricate shapes with tight tolerances.

Wire EDM is especially useful for tooling, die-making, and components that require accuracy beyond what conventional machining can offer.

Metal Rapid Prototyping & FDM (Fusion Deposition Modelling)

IGTR also features an advanced **Rapid Prototyping Lab** that employs both **FDM (Fusion Deposition Modelling)** and **Metal Rapid Prototyping** technologies. These additive manufacturing methods directly convert digital designs into physical components.

In **FDM**, **ABS plastic** is used to create parts by depositing material layer by layer based on the CAD design. In contrast, **Metal Rapid Prototyping** involves printing objects using **metal powder** such as stainless steel. The digital model is first converted into **.STL format**, which is then fed into the 3D printer to fabricate the object.

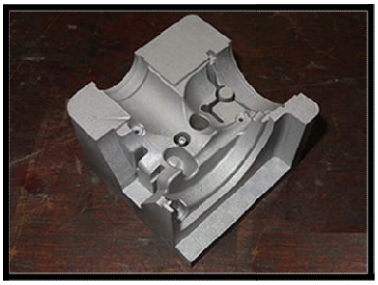
This process drastically reduces the time required to develop prototypes—from months to just days or weeks. These technologies are widely used in:

- Automotive
- Aerospace and Defense
- Medical Devices
- Consumer Products
- Oil & Gas
- Industrial Tools and Dies

Examples of Parts Made by FDM:

- Plastic torch casing
- Impeller casing
- RO water filter housing
- Fan casing
- Decorative vegetable-shaped lights

These components reflect the potential of additive manufacturing to produce customized, lightweight, and complex geometries quickly and cost-effectively.



- It was a great experience for us, many things we learn from IGTR which is very difficult to explain inwords on this paper buti tried to format my all experience andlearningin this report, I hope that typeof visit and learning programs to be done in future.
- Special Thanks to Team LDCE, Prof. A.G.MOMIN SIR, Prof G N Sutaria sir for organizing and guiding this visit and make it successful as well as thanks to Prof. D K Patel sir, Prof. S. BShah sir.