



# Maharaja Agrasen Institute of Technology, Delhi

PSP Area, Plot No. 1, Sector-22, Rohini, Delhi-110086

## Department of Mechanical Engineering

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### EVENT REPORT

<b>Name of the Activity:</b>	Industrial Visit to “Shri Ram Pistons & Piston Rings Ltd., Ghaziabad”	
<b>Date:</b> 16 <sup>th</sup> April 2025	<b>No. of Participants:</b> 33+ 4 Faculty member	

#### Objective

The purpose of the industrial visit was to expose mechanical engineering students to the real-time manufacturing environment of precision-engineered components like pistons, piston rings, piston pins, and engine valves. The visit aimed to bridge the gap between academic learning and industrial application by exploring one of India's leading automotive component manufacturers.

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#### About the Company

Founded in **1972**, Shri Ram Pistons & Piston Rings Ltd. is a major player in the Indian automotive sector, known for its high-quality engine components. The company operates **three manufacturing units**:

- Ghaziabad (UP)** – The primary and oldest plant, which includes an advanced R&D centre and produces all four product categories: **pistons, piston rings, piston pins, and engine valves**.
- Pataudi (Rajasthan)** – Another fully-fledged plant manufacturing all core products.
- Pithampur (Indore)** – Dedicated solely to **engine valve** production.

Shri Ram Pistons holds **ISO and OSS certifications**, and caters to both **domestic and global OEMs**, including **Maruti Suzuki, Hero MotoCorp, Tata Motors, Mahindra, Honda, Ford, Kubota, and FIAT**. It holds approximately **50% market share** across segments like 2-wheelers, 4-wheelers, and gasoline/diesel engines.

The company has also strategically acquired **IMF and Takota** brands to enter and expand in the **electric vehicle (EV)** segment.

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#### Key Observations and Activities

##### 1. Plant Tour

Students received a guided tour of the **Ghaziabad manufacturing unit**, which has **20 production lines** and a capacity to produce up to **18 lakh pistons per month**, currently operating at around **15 lakh units/month**. Combined with the Pataudi facility, the company can manufacture **35 lakh+ pistons monthly**.

They witnessed advanced machinery including **5-axis robotic arms**, **ultrasonic bond checkers**, and **eddy current machines** used for **cast iron bonding** and **puncture detection**, ensuring high precision and safety standards.

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## 2. Technical Insights

### Materials and Alloys Used

- Pistons are made from **aluminium alloys**, specifically:
  - **KS 1295** for **gasoline engines** (composition: ~85% Al, 12–13.5% Si, 0.65% Fe, 3.3–3.9% Cu, 0.1–0.4% Mn, 0.7% Mg)
  - **KS 1275** for **diesel engines**
- Piston rings and valves use proprietary alloys like **RIK 40**, **RIK 10**, **RIK 20A**, and **SPR-02**, developed in-house.

### Product Range

- Pistons: **40 mm to 170 mm outer diameter**
- Piston Rings: **40 mm to 150 mm**
- Engine Valves:
  - **Steam Diameter:** 4.5 mm to 19 mm
  - **Head Diameter:** 16 mm to 92 mm

### Compatibility

Products are compatible with **Gasoline**, **Diesel**, **CNG**, **LNG**, **Flex-fuel**, and even **Hydrogen-based engines**, aligning with modern fuel trends and sustainability goals.

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## 3. Manufacturing Process Observed

The students followed the step-by-step production of pistons:

- **Gravity Die Casting**
- **Annealing and Impulse Releasing**
- **Rough Turning**
- **Back Area Turning**
- **Oil Hole Drilling**(*where the third ring functions as an oil wiper*)
- **Fine Boring**(*for gudgeon pin fitting*)
- **Final OD Turning**(*micron-level precision*)
- **Buttoning & Washing**
- **Surface Coating**(*for initial lubrication – types vary based on application*)

- **Molycoating Paint (screen printed on the piston skirt)**
- **Inspection (Manual + Automated)**
- **Packaging and Dispatch**

Melting of alloys takes place at approx. **780°C** in **holding induction furnaces**. **Silicon (Si)** content in alloys plays a critical role in maintaining **hardness** and **thermal resistance** of the pistons.

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#### **4. Quality and R&D Practices**

The Ghaziabad unit also includes advanced **elemental analysis**, **rig testing**, and **ultrasonic inspection techniques** to ensure high endurance, structural integrity, and industry compliance. The in-house **R&D Centre** focuses on developing new materials and coatings tailored for different engine conditions and fuel types.

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#### **Advantages to Students**

- Real-world exposure to end-to-end component manufacturing.
  - Understanding the relevance of materials science, machining, automation, and inspection techniques.
  - Insight into advanced industry practices, automation, and process precision.
  - Opportunity to explore future careers and internship pathways in automotive manufacturing and R&D.
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#### **Outcomes**

The visit bridged the theoretical concepts taught in classrooms with real-time manufacturing applications. It enriched student knowledge in **materials**, **production engineering**, **quality control**, and **automotive systems**. The exposure also encouraged curiosity and interest in industrial automation, metallurgy, and sustainable engine component development.

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#### **Acknowledgments**

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