INDUSTRY VISIT REPORT

Baramati Engineering Pvt Ltd.

24/01/2026

Department of Mechanical Engineering

Vidya Pratishthan's

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JANUARY 26

Subject: Manufacturing Practices
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1. INTRODUCTION

Objective of the Visit

The objective of the industrial visit was to gain practical exposure to foundry operations and understand the complete casting process used in industries. The visit aimed to bridge the gap between theoretical knowledge of casting processes and real-time industrial practices, including pattern making, sand mould preparation, melting, pouring, and post-processing operations.

Company Overview

Bramati Engineering Pvt. Ltd. is a reputed foundry engaged in the manufacturing of various metal castings for industrial applications. The company specializes in producing high-quality cast components using modern foundry practices while maintaining safety and quality standards. The foundry caters to different engineering sectors by supplying precision castings as per customer requirements.

2. DETAILS OF THE VISIT

Date & Duration: [24/01/2026], approximately 2 hours (10:00 TO 12:00)
Team Composition: S.Y. B. Tech Mechanical Engineering students accompanied by faculty members Dr. S. M. Bhosle and Mr. Kadhane Sir.
Schedule Overview:

- **Introductory presentation about the foundry**
- **Guided tour of the foundry plant**
- **Observation of casting processes**
- **Interaction and question–answer session with industry personnel**

3. DESCRIPTION OF THE INDUSTRY / FACILITY

Plant Layout

The foundry is systematically divided into various sections such as pattern storage area, sand preparation unit, moulding section, melting furnace area, pouring section, cooling zone, fettling and finishing area, and inspection section. The layout ensures smooth material flow and safe operations.

Key Processes Observed

1. Pattern Making

Patterns made of wood and metal were used to form the mould cavity. Suitable allowances such as shrinkage allowance and machining allowance were provided on the pattern to compensate for metal contraction during solidification and to achieve dimensional accuracy after machining.

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2. Sand Mould Preparation

Green sand moulds were prepared using silica sand mixed with clay binder and water. Proper ramming was carried out to obtain adequate strength, permeability, and cohesiveness of the mould. Core placement was also demonstrated to produce hollow and internal cavities in castings.

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3. Melting Process

Metal melting was carried out using industrial furnaces. The raw material was charged into the furnace and heated above its melting point. Proper control of melting temperature and chemical composition was maintained to ensure sound and defect-free castings.

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4. Pouring Process

Molten metal was poured into the prepared sand moulds using ladles. Controlled pouring was ensured to avoid turbulence, oxidation, and metal spillage. Strict safety precautions were followed during handling and pouring of molten metal.

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5. Cooling and Solidification

After pouring, the moulds were allowed to cool for a specified period to enable proper solidification of molten metal. Adequate cooling time was maintained to prevent defects such as cracks and distortion.

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6. Post-Processing (Fettling and Finishing)

After solidification, the castings were removed from the moulds. Excess material such as runners and risers was removed. Fettling operations like grinding and surface finishing were carried out to improve surface quality and prepare the casting for inspection or further machining.

Equipment and Technology

1. Melting Furnaces

Melting furnaces are used to melt raw metal into molten form for casting. In foundry operations, furnaces are designed to withstand very high temperatures and provide uniform heating. The furnace temperature is carefully controlled to achieve proper fluidity and chemical composition of molten metal. Removal of slag is carried out to ensure clean metal before pouring. Efficient furnace operation helps in reducing defects and improving casting quality.

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2. Sand Mixing Machines

Sand mixing machines are used to prepare moulding sand by uniformly mixing silica sand, binders (clay), and water. Proper mixing ensures adequate strength, permeability, and cohesiveness of the sand mould. Uniform sand properties are essential to prevent defects such as gas holes and mould collapse during pouring.

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3. Moulding Boxes

Moulding boxes, also known as flasks, are rigid frames used to hold the sand mould during casting. They are generally divided into cope (top) and drag (bottom) sections. Moulding boxes maintain the shape and alignment of the mould cavity and provide stability during pouring and solidification of molten metal.

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4. Ladles for Pouring Molten Metal

Ladles are specially designed containers used to transport and pour molten metal from the furnace into the mould. They are made of heat-resistant materials and lined with refractory coating. Proper ladle design helps control the flow rate of molten metal and minimizes oxidation, turbulence, and heat loss during pouring.

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5. Grinding and Finishing Machines

Grinding and finishing machines are used in post-processing operations to remove excess material such as runners, risers, and flash from castings. These machines improve surface finish and dimensional accuracy of the final product. Finishing operations also help prepare the casting for further machining or assembly.

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6. Inspection Tools for Quality Checking

Inspection tools are used to verify the dimensional accuracy, surface quality, and internal soundness of castings. Common tools include vernier calipers, micrometers, gauges, and visual inspection methods.

Magnaflux Non-Destructive Testing (NDT):

Magnaflux testing is a non-destructive inspection method used to detect surface and near-surface cracks in ferromagnetic materials. In this process, the casting is magnetized and fine magnetic particles are applied to the surface. Any discontinuities in the material disturb the magnetic field, causing particles to accumulate at defect locations, making them visible. This method helps ensure reliability and safety of cast components without damaging them.

4. LEARNINGS AND INSIGHTS

Practical Knowledge Gained

The industrial visit provided a clear understanding of the complete casting workflow followed in a foundry, including pattern making, sand mould preparation, melting, pouring, cooling, and finishing operations. The importance of mould quality and proper control of sand properties such as strength and permeability was clearly observed. The visit also emphasized the significance of temperature control during melting and pouring to avoid defects. In addition, strict industrial safety practices, including the use of personal protective equipment and safe handling of molten metal, were observed. Exposure to inspection and quality control methods, including Magnaflux non-destructive testing, improved understanding of industrial quality assurance.

Comparison with Theory

In theory, casting processes are explained in a step-by-step manner, while in industrial practice, several operations are carried out simultaneously to increase productivity and reduce cycle time. Theoretical concepts of moulding sand properties such as permeability and refractoriness were practically validated during the visit. Textbook explanations of melting and pouring temperature control were observed in real-time operations to prevent defects such as misruns and cold shuts. The role of gating and risering systems, studied theoretically for metal flow and shrinkage compensation, was also clearly observed in industrial practice.

New Technologies Observed

The visit provided exposure to mechanized sand mixing machines, which ensured uniform sand composition and improved mould quality. Modern melting furnaces with temperature monitoring systems were used to maintain consistent molten metal temperature. Advanced inspection technologies, including Magnaflux non-destructive testing, were employed to detect surface and near-surface cracks in ferromagnetic castings without damaging the component. These technologies contributed to improved productivity, safety, and casting quality.

5. CHALLENGES AND OBSERVATIONS

Operational Challenges

One of the major challenges observed in foundry operations is maintaining uniform quality in mass production. Variations in moulding sand properties, moisture content, pouring temperature, and cooling rate can result in inconsistent casting quality. Continuous monitoring and process control are required to minimize rejection rates.

Another significant challenge is the safe handling of high-temperature molten metal. Foundry operations involve extremely high temperatures, which pose risks such as burns, fire hazards, and equipment damage. Proper training of workers and strict adherence to safety procedures are essential to reduce the risk of accidents during melting and pouring operations.

The visit also highlighted the difficulty of minimizing casting defects such as porosity and shrinkage. These defects may occur due to improper mould preparation, inadequate gating and risering design, or uncontrolled cooling. Careful control of process parameters and inspection is required to reduce such defects.

Best Practices Observed

Strict safety measures were followed throughout the foundry. Workers were observed using personal protective equipment (PPE) such as helmets, heat-resistant gloves, face shields, safety shoes, and protective clothing to ensure safe working conditions.

An organized workflow and systematic material handling were also observed, which helped in smooth movement of raw materials and finished castings. Proper plant layout and defined work zones improved productivity and reduced workplace hazards.

The foundry placed strong emphasis on quality control and inspection. Dimensional checks were carried out using measuring instruments, and Magnaflux non-destructive testing was used to detect surface and near-surface defects. These practices ensured reliable and defect-free castings before dispatch.

6. CONCLUSION AND RECOMMENDATIONS

Conclusion

The industrial visit to Bramati Engineering Pvt. Ltd. was highly informative and educational. It provided valuable insights into practical foundry operations and enhanced understanding of various casting processes studied in the Manufacturing Practices subject. Observing real-time industrial practices helped in relating theoretical concepts with actual applications. The visit successfully fulfilled its objective of providing practical exposure to industrial manufacturing practices and improved overall technical understanding.

Recommendations

It is recommended that industrial visits be conducted more frequently as part of the curriculum to strengthen practical learning. In addition, hands-on workshops and laboratory sessions related to casting and foundry practices can be introduced to enhance skill development and improve understanding of manufacturing processes.

Acknowledgment

We sincerely thank Baramati Engineering Pvt. Ltd. for granting permission to visit their foundry and for sharing valuable technical knowledge and industrial experience. We also express our sincere gratitude to our faculty coordinators for their guidance and for organizing this industrial visit successfully.

7. APPENDICES

1.Group Photo

2.Mold making

3.Valve pattern

4. Metal Filled Mold

5. Shot blasting machine

6. Magna-Flux Testing

7. Info Boards