

# Industrial Exposure to Press Working and Sheet Cutting Processes During Industrial Training at Inspire Metal Engineering, Ahilyanagar

Ekade Soham Subhash<sup>1</sup>, Mahendra Bapurao Jadhav<sup>2</sup>, Dr. Ramesh Suryabhan Gadakh<sup>3</sup>

<sup>1</sup>Student, Mechanical Department, Sau Sundarbai Manik Adsul Polytechnic

<sup>2</sup>Hod, Mechanical Department, Sau Sundarbai Manik Adsul Polytechnic

<sup>3</sup>Principal, Sau Sundarbai Manik Adsul Polytechnic

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## Abstract:

Industrial training is an essential component of mechanical engineering education because it provides students with practical exposure to manufacturing processes and industrial practices. This paper presents the observations and learning outcomes obtained during industrial training at Inspire Metal Engineering, Ahilyanagar MIDC, with particular emphasis on press working and sheet cutting processes. The training provided practical understanding of sheet metal handling, cutting operations, press machine operation, punch and die arrangements, component formation, material utilization, dimensional inspection, and workplace safety.

Sheet cutting is an important manufacturing operation used to obtain components of required dimensions and shapes from sheet metal. Press working further processes the sheet through operations such as blanking, punching, piercing, bending, and forming. The study focused on understanding the working principles of these processes, machine components, tooling arrangements, production sequences, quality requirements, and common manufacturing defects.

## 1. INTRODUCTION:

Manufacturing industries use different processes to convert raw materials into useful engineering components. Sheet metal processing is widely used in automotive, electrical, appliance, fabrication, and general engineering industries. Among the important sheet metal manufacturing operations are cutting, punching, blanking, bending, and forming.

Industrial training provides mechanical engineering students with an opportunity to observe these processes in an actual production environment. During the industrial training at Inspire Metal Engineering, Ahilyanagar MIDC, practical exposure was obtained to press working and sheet cutting operations.

Press working uses a press machine along with punches and dies to perform various operations on sheet metal. Sheet cutting involves separating material into required dimensions or shapes using suitable cutting equipment and tooling. Proper selection of material, machine, cutting tool, clearance, and process parameters is important for obtaining accurate and defect-free components.

## 2. Objectives:

The main objectives of the industrial training were:

1. To understand the principles of press working.
2. To study different sheet cutting operations.
3. To understand the construction and working of press machines.
4. To study the functions of punches and dies.
5. To observe practical sheet metal manufacturing operations.
6. To understand material handling and feeding methods.
7. To study dimensional inspection of manufactured components.
8. To identify common defects in sheet cutting and press working.
9. To understand industrial safety practices.
10. To correlate theoretical knowledge with practical manufacturing applications.

## 3. Industrial Profile:

### 3.1 Name of Industry:

Inspire Metal Engineering

### 3.2 Location:

Ahilyanagar MIDC, Maharashtra

### 3.3 Area of Industrial Exposure:

The industrial training provided exposure to activities related to:

- Sheet metal processing
- Sheet cutting
- Press working
- Punching
- Blanking
- Bending
- Forming
- Punch and die applications
- Material handling
- Dimensional inspection
- Quality control
- Industrial safety

The exact machine models, components, and production parameters should be reported according to the operations actually observed during the training.

## 4. Sheet Metal Processing:

Sheet metal processing involves converting metal sheets into components of the required shape and dimensions. The process generally consists of material selection, marking or feeding, cutting, forming, inspection, and finishing.

A typical manufacturing sequence can be represented as:

**Raw Sheet → Cutting → Press Working → Forming/Bending → Inspection → Finished Component**

The selection of sheet thickness and material depends on the required strength, application, geometry, manufacturing process, and product specifications.

## 5. Sheet Cutting Process:

Sheet cutting is the process of separating a portion of sheet metal to obtain a required size or shape.

The cutting process may be carried out using:

- Shearing machines
- Power presses
- Punching machines
- Dies and punches
- Other suitable cutting equipment

The selection of the cutting method depends on sheet thickness, component geometry, production quantity, dimensional accuracy, and required surface quality.

## 6. Press Working Process:

Press working is a manufacturing process in which sheet metal is subjected to cutting, bending, or forming forces using a press machine.

The main elements of a press working system include:

Press machine  
Ram/slide  
Punch  
Die  
Die holder  
Bolster plate  
Sheet material  
Guide arrangement  
Feeding mechanism

The punch applies force to the sheet material against the die to produce the required operation.

## 7. Working Principle of Press Working:

The sheet is positioned on the die or supporting surface. The punch moves downward under the action of the press mechanism. Depending on the geometry of the punch and die, the sheet may be cut, pierced, bent, or formed.

A simplified sequence is:

**Sheet Feeding → Positioning → Punch Movement → Cutting/Forming → Punch Retraction → Component Removal → Inspection**

Correct alignment of the punch and die is important for achieving dimensional accuracy and minimizing defects.

## 8. Types of Sheet Cutting Operations:

### 8.1 Shearing:

Shearing separates sheet metal along a straight or predetermined cutting line using cutting edges.

### 8.2 Blanking:

Blanking is a cutting operation in which the portion separated from the sheet is the required component or blank.

### 8.3 Punching:

Punching produces a hole in sheet metal. The removed material generally becomes scrap.

### 8.4 Piercing:

Piercing is used to produce holes or openings of required shapes in sheet metal.

### 8.5 Notching:

Notching removes material from the edge of a sheet to produce the required profile.

## 9. Punch and Die:

Punch and die are the most important tooling elements in press working.

### Punch:

The punch is the tool member that applies force to the sheet and performs cutting or forming.

### Die:

The die provides the required opening or forming surface against which the material is processed.

## Importance of Punch-Die Clearance:

Proper clearance between punch and die is essential for:  
Good cutting quality

Reduced burr formation  
Lower cutting force  
Longer tool life  
Improved dimensional accuracy  
Improper clearance can result in excessive burrs, poor edge quality, tool wear, and dimensional errors.

## 10. Material Utilization:

Efficient material utilization is important in sheet metal manufacturing because sheet material represents a significant portion of production cost.

Material utilization can be improved by:

- Proper nesting of components
- Optimizing blank dimensions
- Reducing scrap
- Selecting appropriate cutting sequences
- Using suitable die layouts
- Controlling cutting allowances

A well-designed layout can reduce material wastage and improve production economics.

## 11. Quality Control:

Quality inspection is performed to ensure that manufactured components meet the required specifications.

Important inspection parameters include:

- Overall dimensions
- Hole diameter
- Hole position
- Component thickness
- Bend angle
- Flatness
- Surface condition
- Burr height
- Component geometry

Typical measuring instruments may include:

- Vernier caliper
- Micrometer
- Steel rule
- Gauges
- Measuring templates

## 12. Industrial Safety:

Safety is extremely important during press working and sheet cutting operations.

Important safety practices include:

1. Use appropriate personal protective equipment.
2. Keep hands away from the punch and die area.
3. Use proper material-handling tools.
4. Ensure machine guards are properly installed.
5. Do not operate machinery without authorization.
6. Maintain proper housekeeping.
7. Follow standard operating procedures.
8. Inspect machines before operation.
9. Keep the working area free from unnecessary material.
10. Stop the machine before carrying out adjustments or maintenance.

## 13. Industrial Training Methodology:

The industrial study was conducted through:

**Industrial Visit/Training → Process Observation → Machine Identification → Discussion with Industrial Personnel → Process Understanding → Quality Inspection Observation → Safety Observation → Learning Assessment**

During the training, emphasis was placed on understanding the relationship between the theoretical concepts taught in mechanical engineering and their practical implementation in manufacturing.

## 14. Benefits of Industrial Exposure:

Industrial exposure provides several benefits to mechanical engineering students:

- Development of practical manufacturing knowledge.
- Understanding of industrial machinery.
- Awareness of production procedures.
- Improvement in technical skills.
- Better understanding of quality control.
- Awareness of workplace safety.
- Understanding of material utilization.
- Development of problem-solving skills.
- Improvement in professional discipline.
- Better understanding of industry expectations.

## Conclusion:

The industrial training at **Inspire Metal Engineering, Ahilyanagar MIDC** provided valuable practical exposure to press working and sheet cutting processes. The training helped in understanding the practical application of manufacturing concepts such as sheet cutting, blanking, punching, bending, punch and die operation, material handling, inspection, and quality control.

The industrial exposure also demonstrated the importance of proper tooling, machine settings, material utilization, dimensional accuracy, and workplace safety in achieving efficient production. The knowledge gained during the training helps mechanical engineering students connect theoretical concepts with real industrial manufacturing practices.

Overall, the training experience contributed to the development of technical knowledge, practical understanding, industrial awareness, and professional skills required for employment in the manufacturing sector.

## References:

1. P. N. Rao, *Manufacturing Technology*, McGraw Hill Education.
2. P. C. Sharma, *A Textbook of Production Engineering*, S. Chand Publishing.
3. R. K. Jain, *Production Technology*, Khanna Publishers.
4. S. Kalpakjian and S. R. Schmid, *Manufacturing Engineering and Technology*, Pearson.
5. Industrial training observations at **Inspire Metal Engineering, Ahilyanagar MIDC**.
6. Manufacturing Technology and Workshop Practice Laboratory Manuals.