

## Types of Patterns in Casting

A commonly used pattern is from Mahogany wood, as it is soft and lightweight. But the categorization is sometimes based on various criteria, including its purpose, methods, and equipment. Let us learn more about the types of patterns in casting.

### Single Piece Pattern

Solid pattern is another name for the single-piece pattern. It is the least expensive casting pattern available. Casting producers prefer these types of patterns as the rectangular blocks used are appropriate for simple operations and small-scale manufacturing. It is used to create stuffing boxes for steam engines.

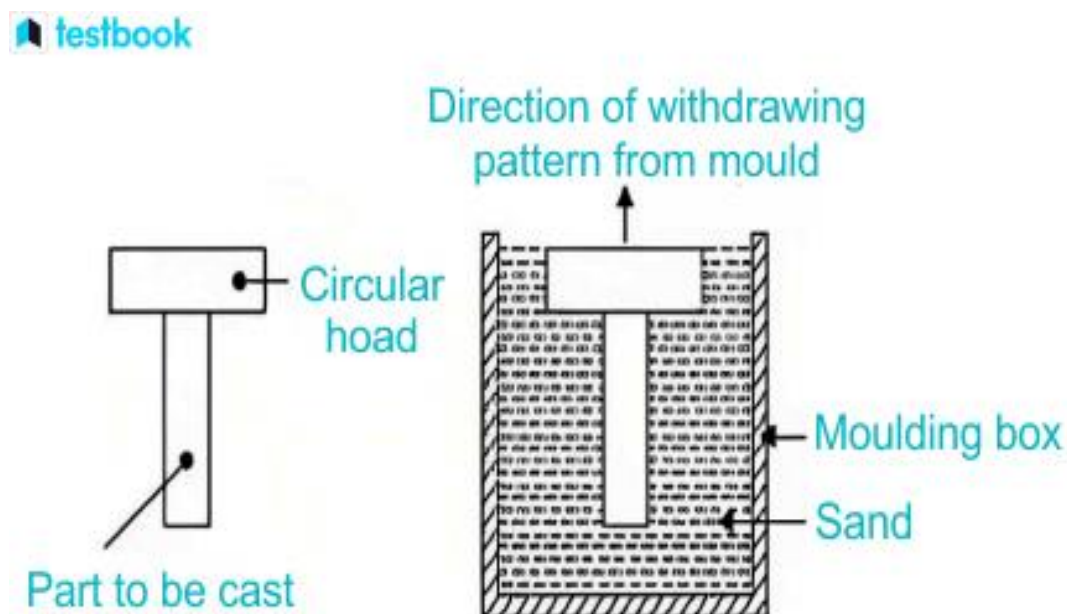


Fig 1: Single Piece pattern

### Two Piece Pattern

Casting patterns for complicated casting are carried out frequently using the two-piece pattern. It is also known as the split-piece pattern. It has two components: Drag and cope. The cope component utilizes dowel pins and is aligned with the drag.

It contains two dowel pins and two dowel holes that are used to align and attach the two sections. The shape of the casting determines the position of the separation planes (Irregular or Flat). The use of split patterns can be found in the production of steam valves and weapons.

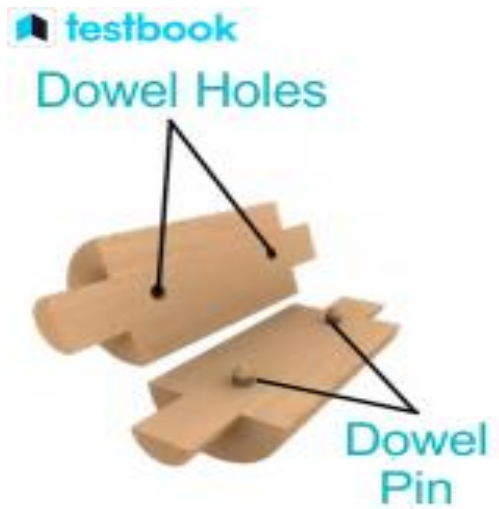


Fig 2: Two Piece Pattern

### Multi-Piece Pattern

A multi-piece pattern is a go-to choice for designs that are more complicated and difficult to construct. These types of patterns consist of three or more patterns, each of which contributes to the process of mould production.

Take, for instance, the pattern consisting of three separate pieces. The top, the bottom, and the middle are all components that make up the design. The component at the top is called the cope, the part at the bottom is called the drag, and the part in the middle is called the cheek.

They are commonly used in the production of joints like mitre and dowel.

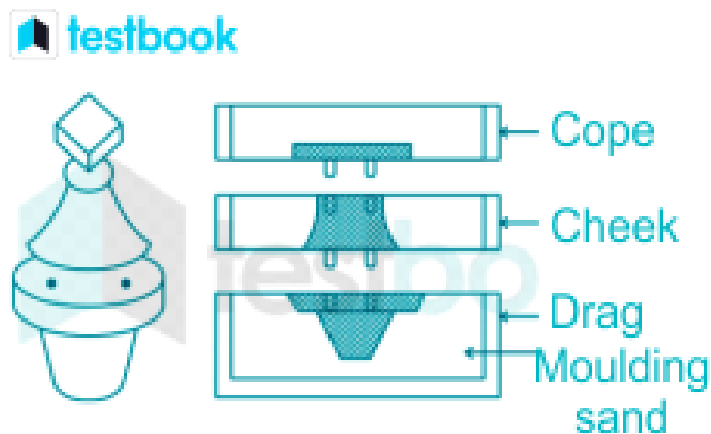


Fig 3: Multi-Piece Pattern

## Match Plate Pattern

The match plate pattern utilises a metallic plate to separate the cope and drag sections on the reverse side of the plate. In addition, the gates and runners are held by the plate. These types of patterns require less effort yet manage to produce high-volume results.

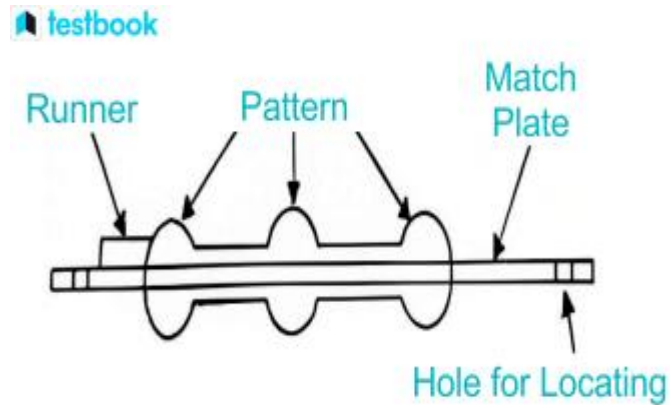


Fig 4: Match Plate Pattern

The manufacturing industry makes extensive use of it, and as a result, it often has a high cost. We should consider the fact it requires precision to produce a high yield. These types of patterns are frequently utilised in the production of metals like aluminium, piston rings, and rotor hubs.

## Gate Pattern

The gate pattern, also known as the gated pattern, is utilised to manufacture several pieces within a single mould. A gated pattern is simply a pattern composed of many patterns. These are unstructured patterns with attached gates and runners, as shown in the figure below.



Fig 5: Gate Pattern

Moulds with several cavities are utilised in the mass manufacture of casings. The illustration shows that such moulds are made by linking various types of patterns and gates, providing a common runner for the molten metal. These types of designs are fabricated from metal and are used in the production of small castings like corner brackets.

### **Sweep Pattern**

The cavity for casting is created by rotating a wooden board along one of its edges while working with the sweep pattern. It includes three components: a spindle, a base, and a sweep or wooden board. It is known for producing a casting in a remarkably short period.

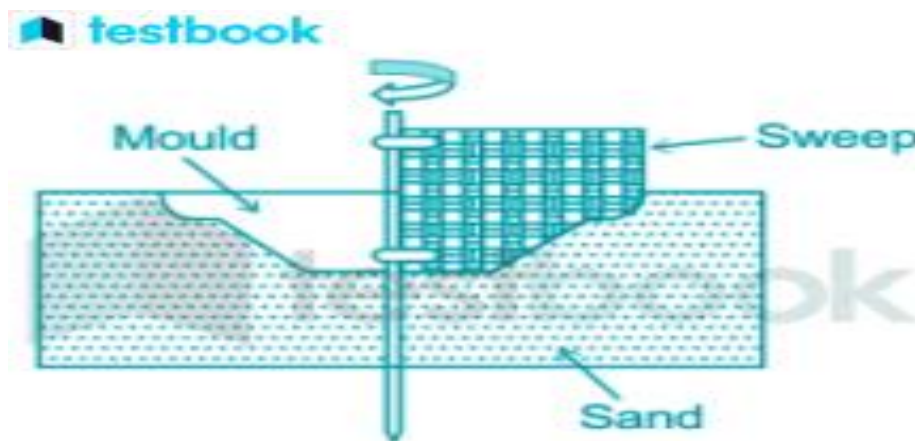


Fig 6: Sweep Pattern

The vertically directed spindle is attached to the base sand. Then, the spindle is rotated by an axis called the sweep axis, turning the plane by  $360^\circ$ . To create large, consistent moulds with a circular cross-section, the sweep pattern is employed.

### **Skeleton Pattern**

The skeleton pattern is large and is an excellent choice for castings with a simple shape and size. They consist of strips and frames made of wood. The mould is properly filled, and the excess sand is removed. The pattern is made of two sections and assembled with screws or glues to produce round shapes. Pit and floor welders rely heavily on the skeletal pattern for their welding process. These types of patterns are not adaptable to changes and are costly.

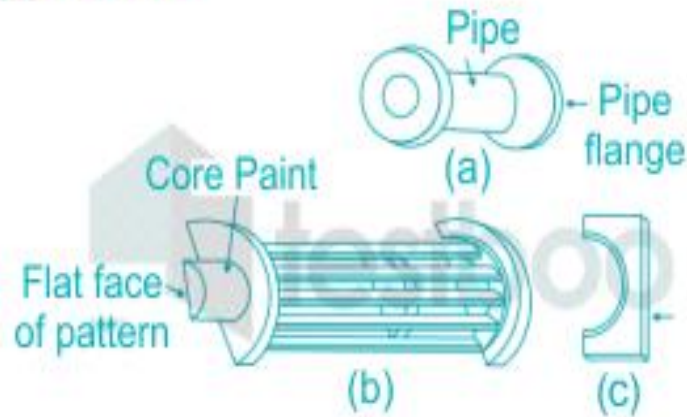


Fig 7: Skeleton Pattern

### Loose Piece Pattern

The removal of a single solid pattern piece above or below the separating plane of the mould can be facilitated by a loose piece pattern, as shown in the diagrammatic representation below. These types of patterns require additional expert effort, resulting in an expensive casting pattern. They are used in the production of axle pins.

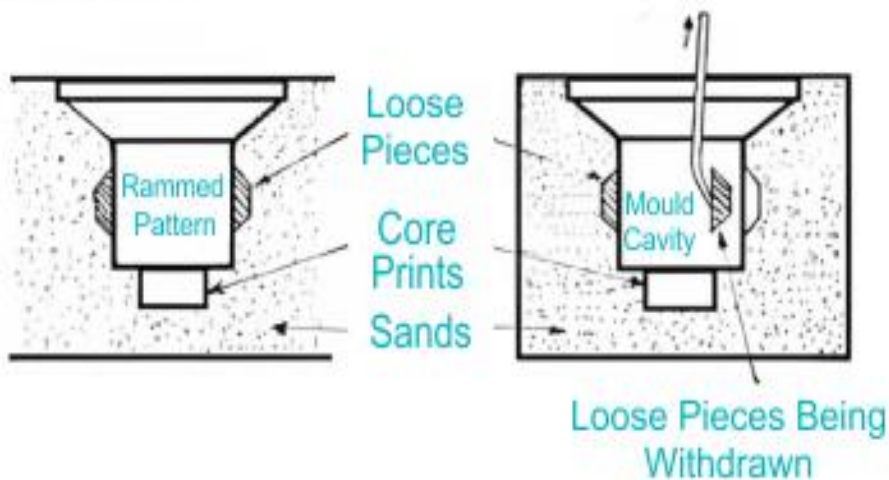


Fig 8: Loose Piece Pattern

### Cope and Drag Pattern

As the name indicates, Cope and drag patterns comprise two distinct plates with two components that can be independently moulded on the pattern moulding box. The cope and drag portions of the mould are made independently when the entire mould is too heavy for one operator to lift.

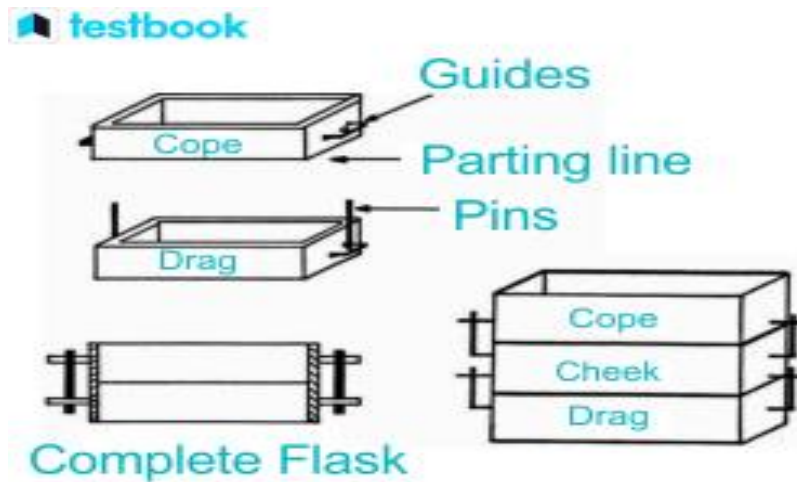


Fig 9: Cope and Drag Pattern

The pattern is split into two halves, each put on a separate plate. The cavity created using these types of patterns is similar to that of two-piece patterns, but the former is used for large-scale casting. These types of patterns are used in flange pipe manufacturing.

### Shell Pattern

The shell pattern is mostly made of metal. The design is divided down the middle part of the pattern, and the two parts are put together as shown in the figure below.

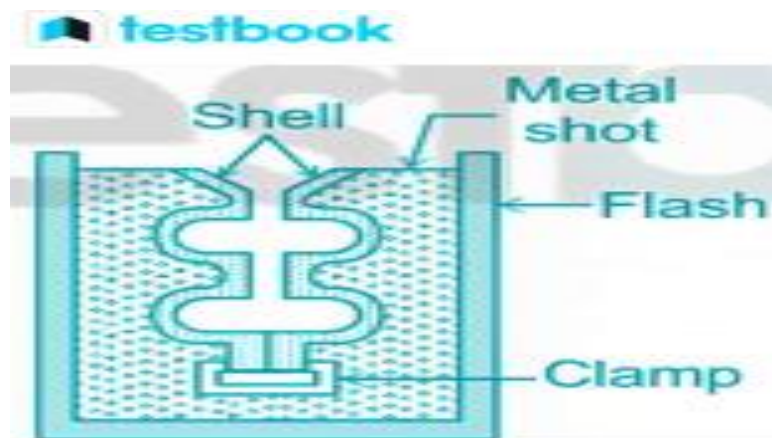


Fig 10: Shell Pattern

Here, the outer shapes serve as the mould, while the inside shapes serve as the core. The shell pattern is a good choice for designing hollow and straight structures such as pipes.

### Follow Board Pattern

A simple wooden board is used in the follow board pattern. The wooden board serves as the base in this pattern for the moulding process. As split or solid patterns become challenging, a follow board with a contour matching the geometry of one-half of the pattern is created.

This pattern is applied in operations where the casting structures are brittle and might fracture when pressure is applied. An example of these types of patterns is shown in the image below.

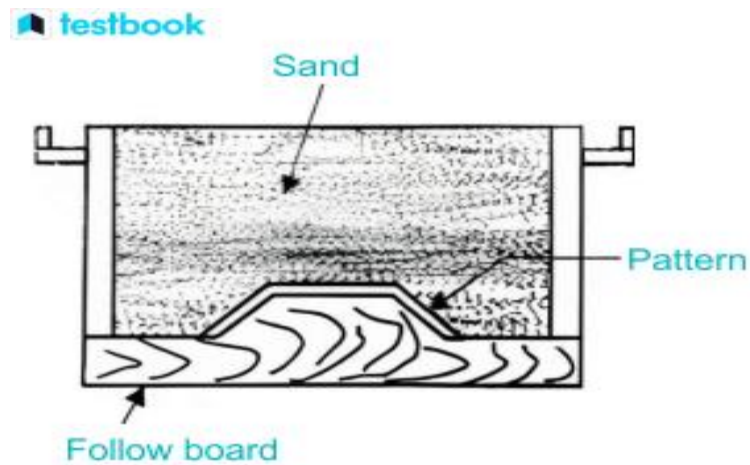


Fig 11: Follow Board Pattern

### Segmental Pattern

The segmental pattern is similar to the sweep pattern in the complete rotational motion of the mould preparation. The segmental pattern moves under the control of a central pivot. It proceeds to the next section after ramming the previous one.

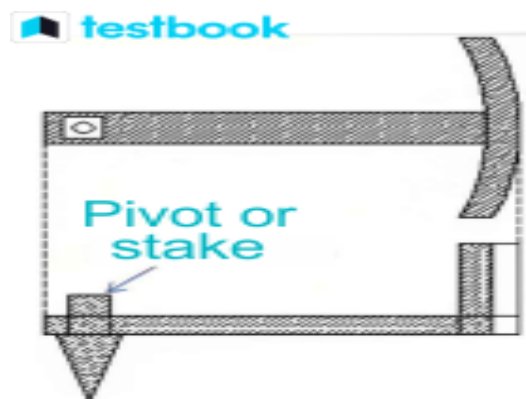


Fig 12: Segmental Pattern Schematic Diagram

The whole rotational motion pattern is repeated to finish the mould. These types of patterns are frequently employed for circular castings like wheel rims, gear blanks, etc..

Though a short article, we hope you enjoyed studying it. The article here on types of patterns strategically guides you to help you crack the AE/JE mechanical engineering exams. We also strive to help you crack the GATE ME examinations as well. Practise the concepts with SSC JE ME test series and GATE ME test series.