

FORGING

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FORGING

- Forging is a manufacturing process involving the shaping of metal using localized compressive forces.
- The blows are delivered with a hammer (often a power hammer) or a die.



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TYPES OF FORGING

- According to Temperature
- According to Arrangement of Dies
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According to Temperature

Cold forging: Forging is carried out at or near room temperature

Advantages:

Production rates are very high

Improves mechanical properties

Lubrication is easy



According to Temperature

Warm forging(800-1800°F): Forging is carried from above room temperature to below the recrystallization temperature.

Advantages:

- High production rates
- Excellent dimensional tolerances
- Significant savings in material

Recrystallization temperature :
Temperature at which the
crystal lattice structure of the
metal becomes reoriented

According to Temperature

Hot forging (most widely used): Forging is carried out at a temperature above the recrystallization temperature of the metal.

Advantages:

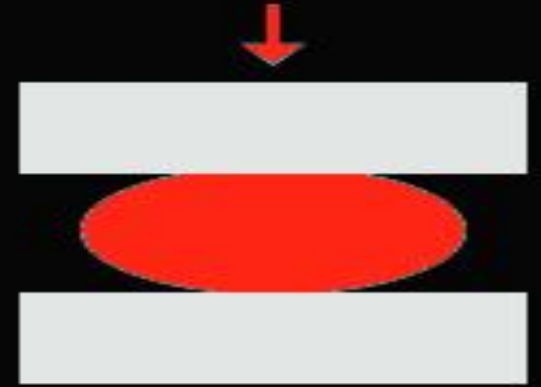
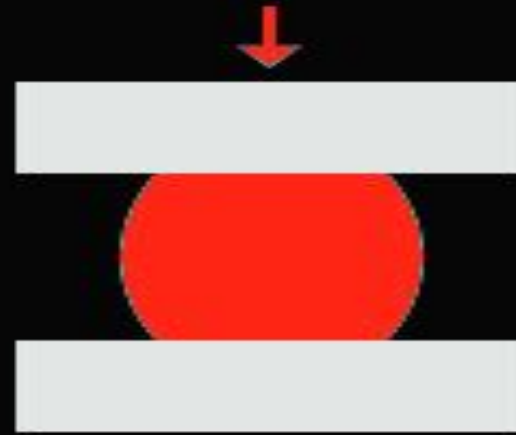
- Easy flow of the metal
- Recrystallization and recovery are possible
- Forces required are less.



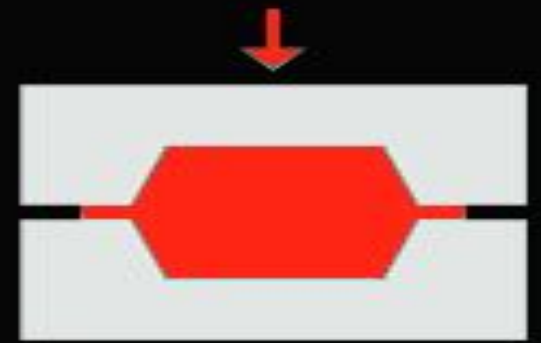
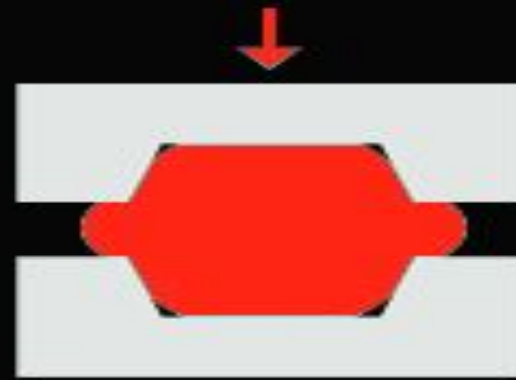
According to Arrangements of Dies

- **Open-die forging:** Forging in which the flat dies of simple shape are used to allow the material to freely deformed in lateral directions of applied load. Below shows open-die forging operation.
- **Closed-die forging (also called impression die forging):** Forging in which the material is fully constrained in the cavity created by the upper and lower die halves.

OPEN-DIE FORGING



CLOSED-DIE FORGING



According to Forging Equipment

- Hammer forging: The most common type of forging where hammer and anvil are used.



According to Forging Equipment

- Press forging: In press forging, the metal is shaped not by means of a series of blows as in hammer forging, but by means of a single continuous squeezing action.



TOOLS USED IN FORGING

- Anvils: Anvils are sturdy pieces of metal with a flat surface. they help keep the metal in place while it's being shaped.
- Hammers: Hammers are used in forging to shape metals into different forms.



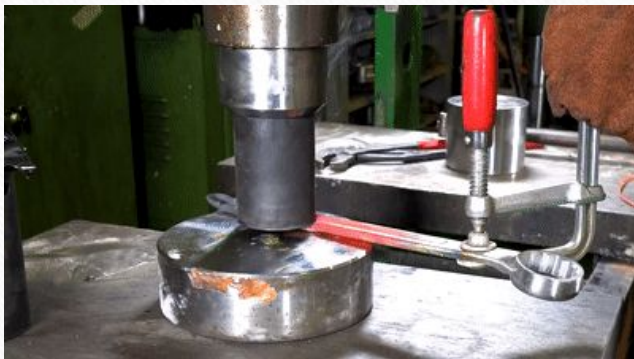
Tools Used in Forging

- Cone Mandrels: Cone mandrels are cylindrical-shaped tools with a conical end. It is used to create complex shapes without having to weld components together.
- Chisels: Chisels are tools used for cutting and chipping out metal. The primary purpose is shaping and forming hot pieces of steel or iron.

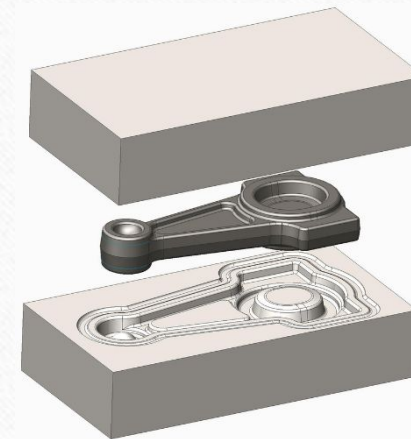


Tools Used in Forging

- Forging Presses: The forging equipment folds metal into the desired shape through the use of excessive pressure.
- Forging Dies: Forging dies serve as molds into which metals are pressed.



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Tools Used in Forging

- Tongs: Tongs are used to pick up and move hot metal onto anvils during forgings.



SAFETY PRECAUTIONS

- Properly maintain the hammer or press



- Wear proper eye protection

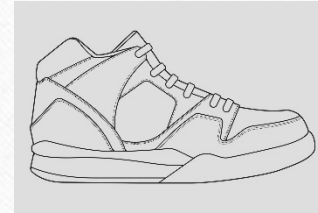


- Use ear protection



Safety Precautions

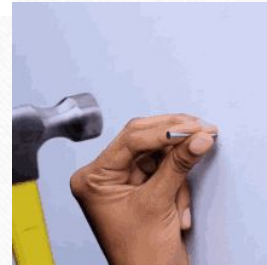
- Wear proper clothing(Shoes, Gloves etc.)



- Use the proper size tongs



- Keep hands clear of the moving parts



Safety Precautions

- Don't have people near you when hammering
- Know where the shut-off switches or valves are
- Hold the tongs to your side
- Make sure the workshop is properly ventilated



Conclusion

- Forging is a manufacturing process involving the shaping of metal
- There are many types of forging according based on different temperature, action etc.
- Tools such as anvil, hammer, chisels and mandrels are used to forge metal
- Safety precautions must be followed if we are to ensure that no harm is done to the tools and people

Thank You
