Óbuda University
Bánki Donát Faculty of Mechanical and Safety Engineering
Institute of Material Science and Manufacturing Engineering

Manufacturing Engineering 2

BAGGT23NEC

2013/14 I.

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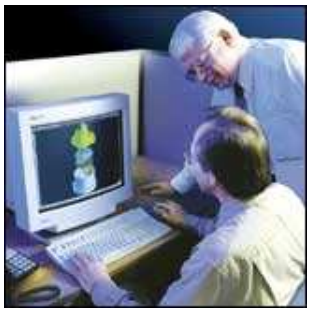
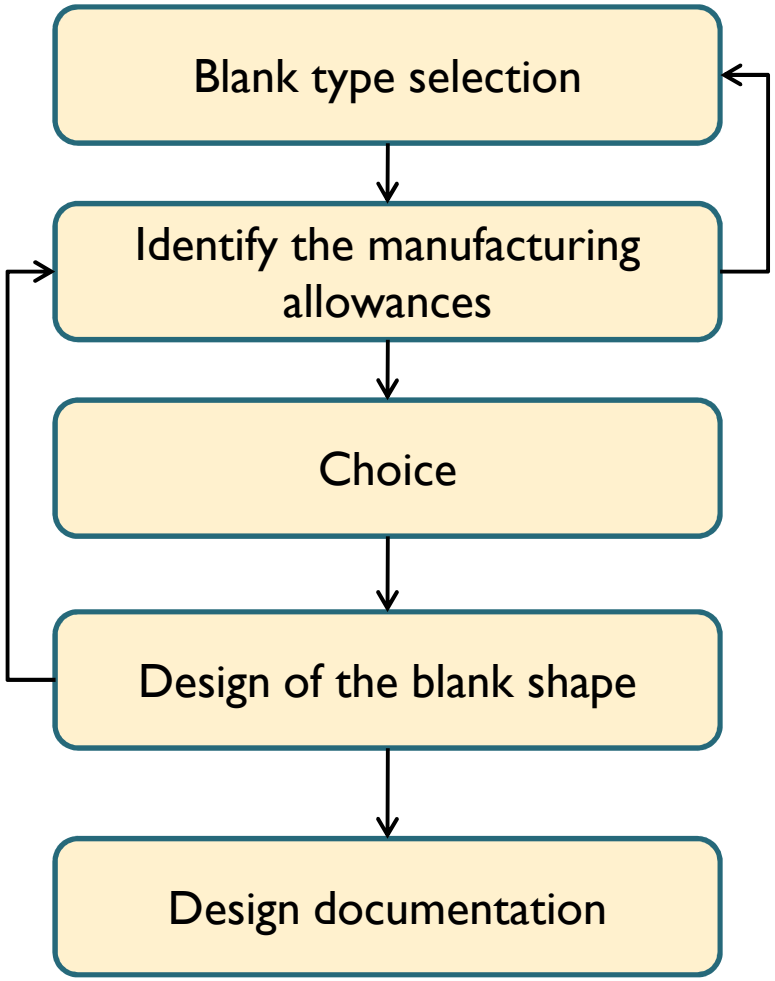




05

BLANK MATERIALS

Steps of the blank design



Blank types

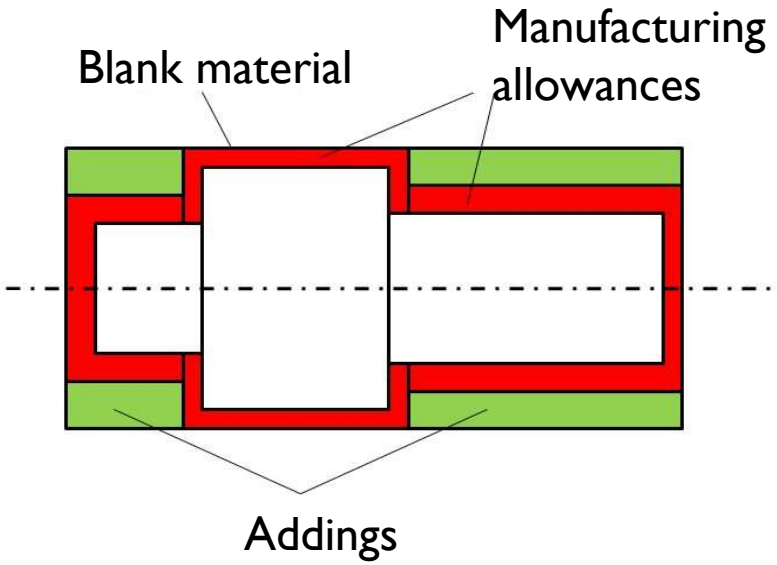
- Rolled bars or plates
- Drawing bars
- Forged parts
  - Free forging
  - Die forging
- Casted parts
  - Sand casting
  - Automated sand casting
  - Die casting
  - Lost-wax casting
  - Injection moulding
- Welded construction

Rolled bars or plates

Mass production
Cheap
Standard size
Hot forming

Application:
- piece production
- small cutting

Rolled bar



- ø 7 – 180
- □6 – □60
- 5x10 – 50x140
- ⬢ 10 – 48
- Plates 0.2 - 100

Hidegen húzott rudak

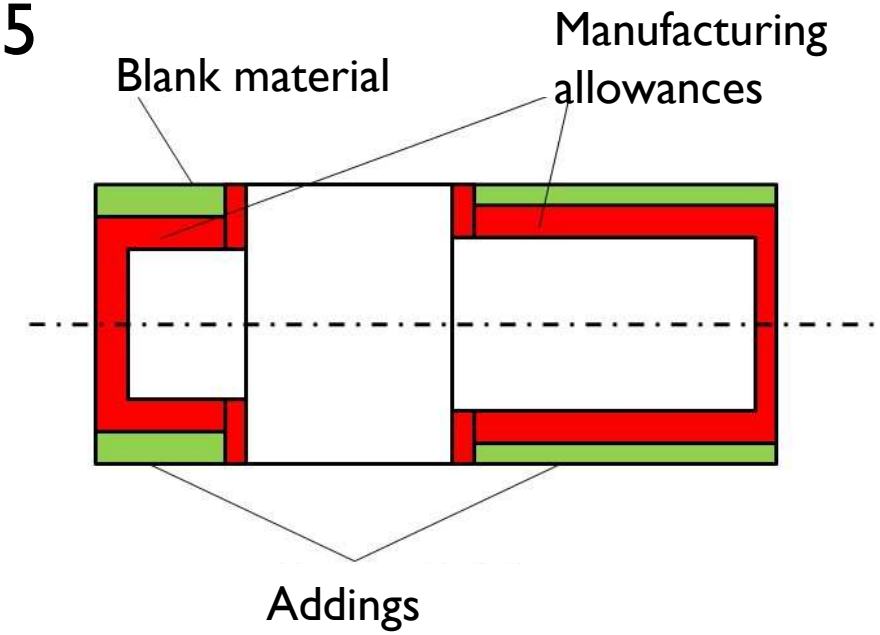
Application:

- the largest diameter no need to cutting
- accurate fixturing

Accuracy: h10, h9, h8

Surface roughness: R_a=12.5

- ø 1 – 80
- □3 – □50
- ⬢ 4 – 46

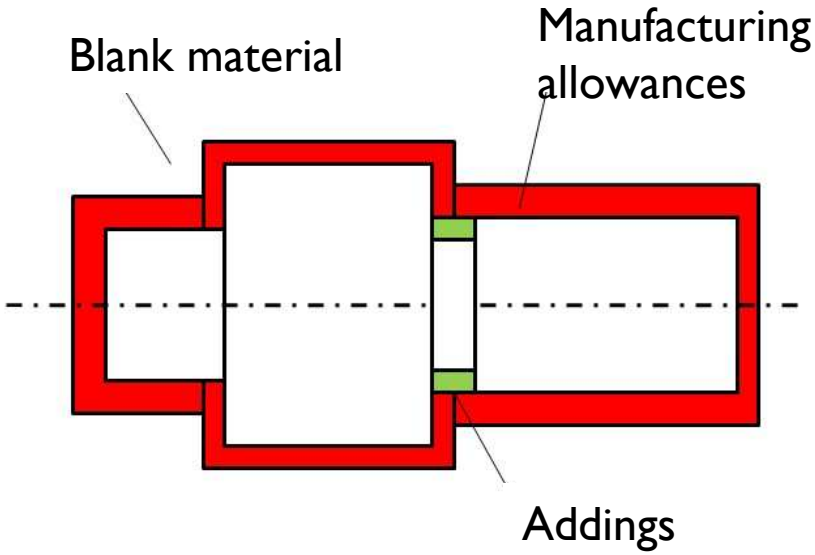


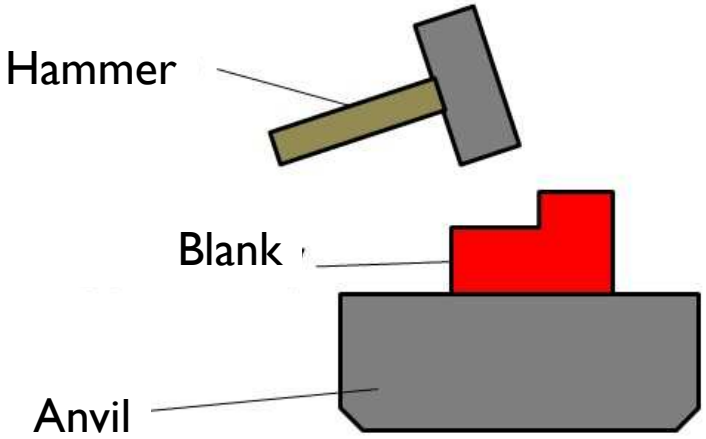
Size:

The larges diameter of the part.

Free forging

- Complicated
- Inaccurate
- No size and mass limit
- Simple blank geometry
- Piece production





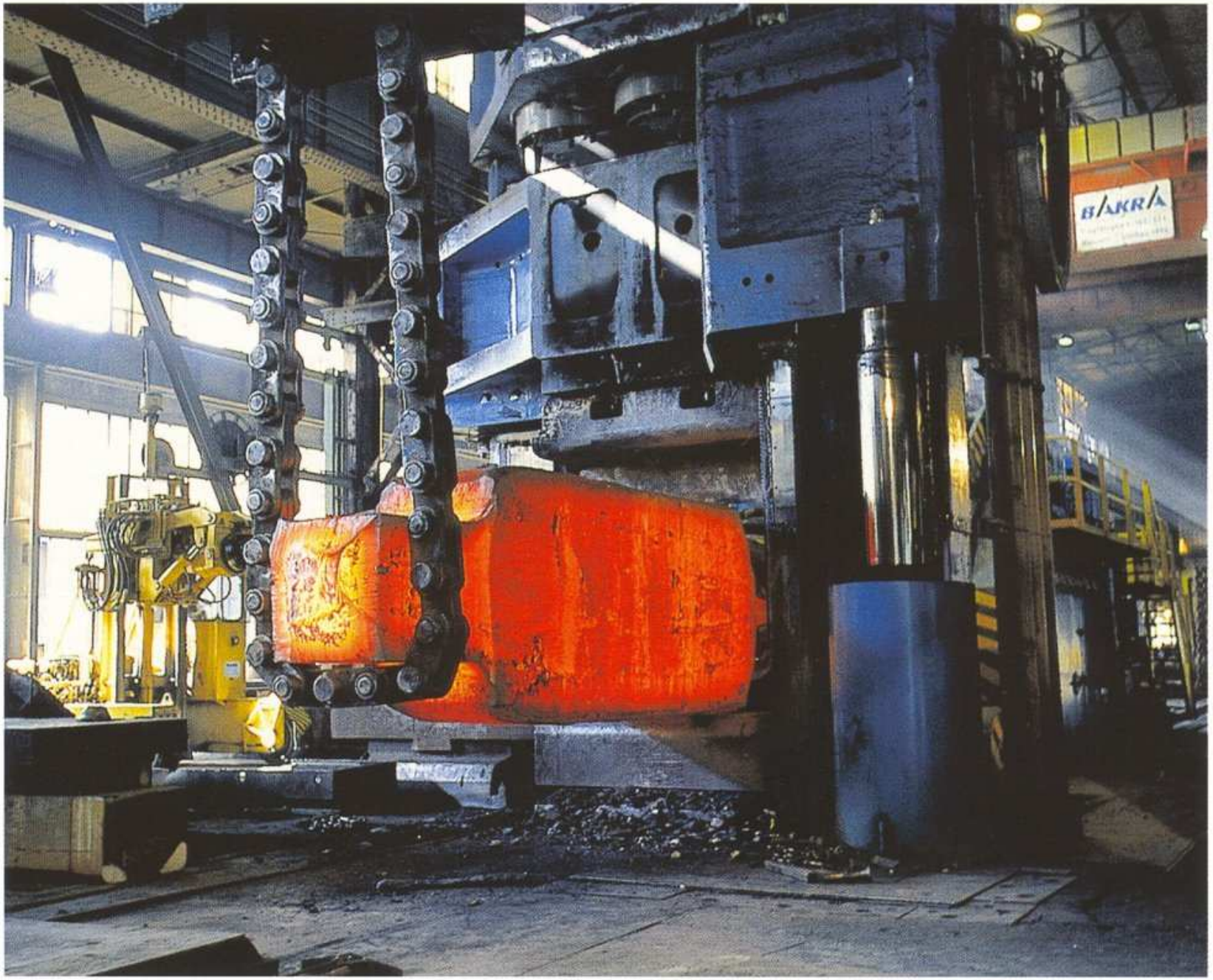
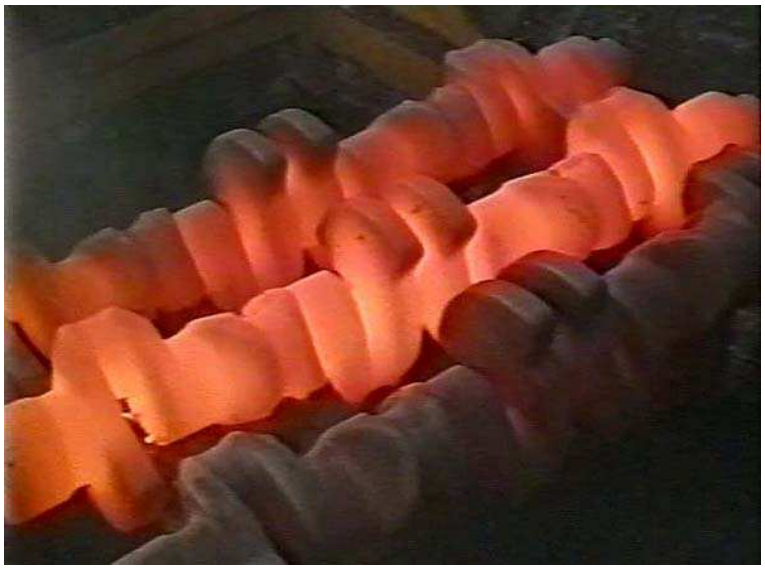
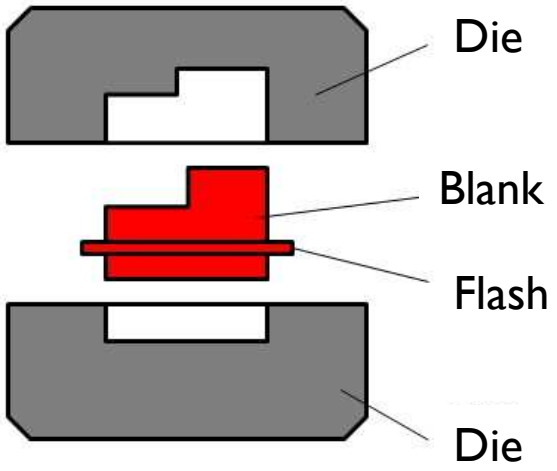


Bild 5.7: Schmiedung eines 100-Tonnen-Blockes unter der 55 MN-Schmiedepresse

Die forging



- Die – close cavity
- More complicate blanks
- More accurate
- Expensive tooling
- Mass production

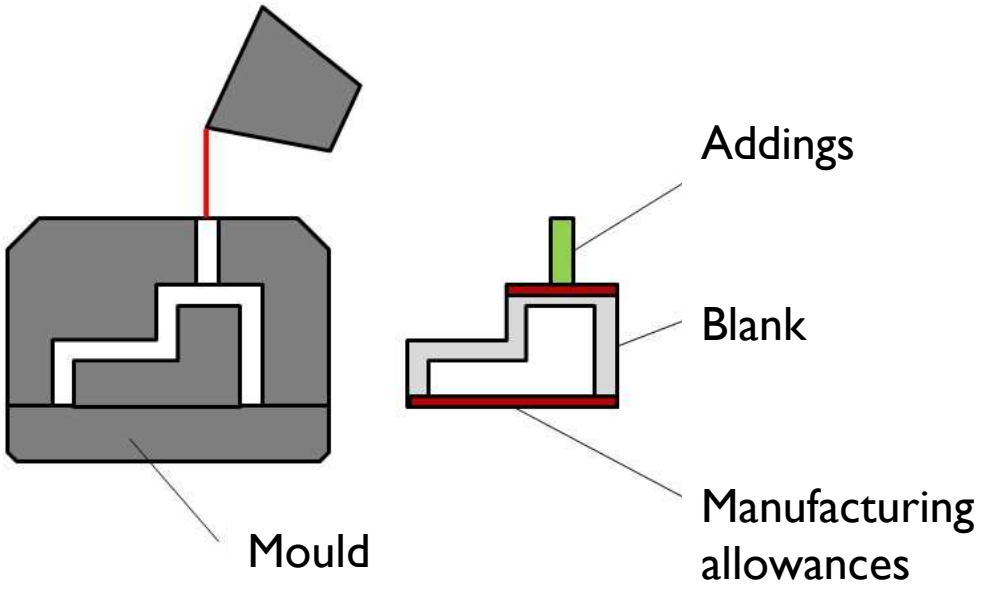


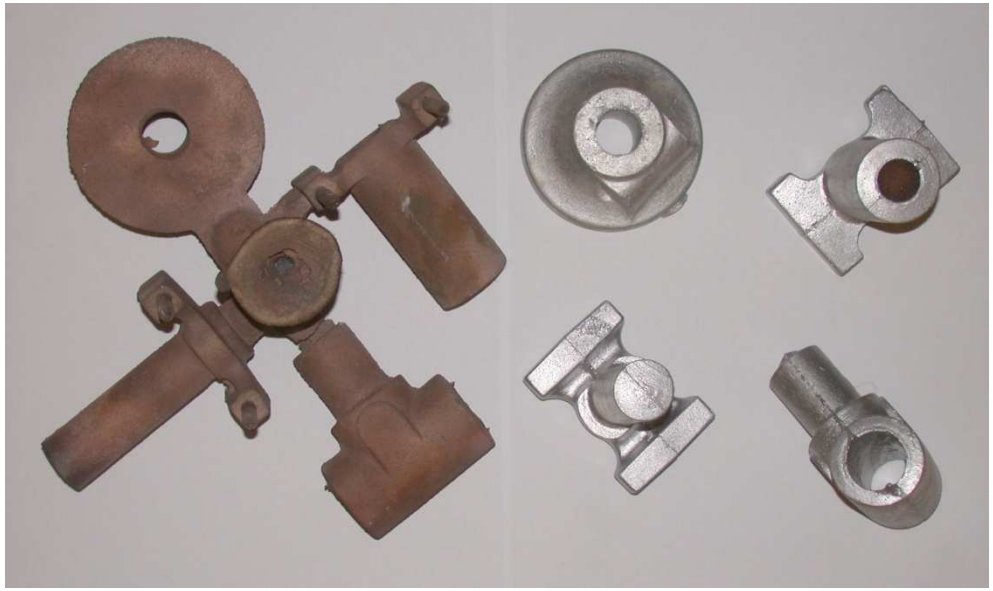
Casting

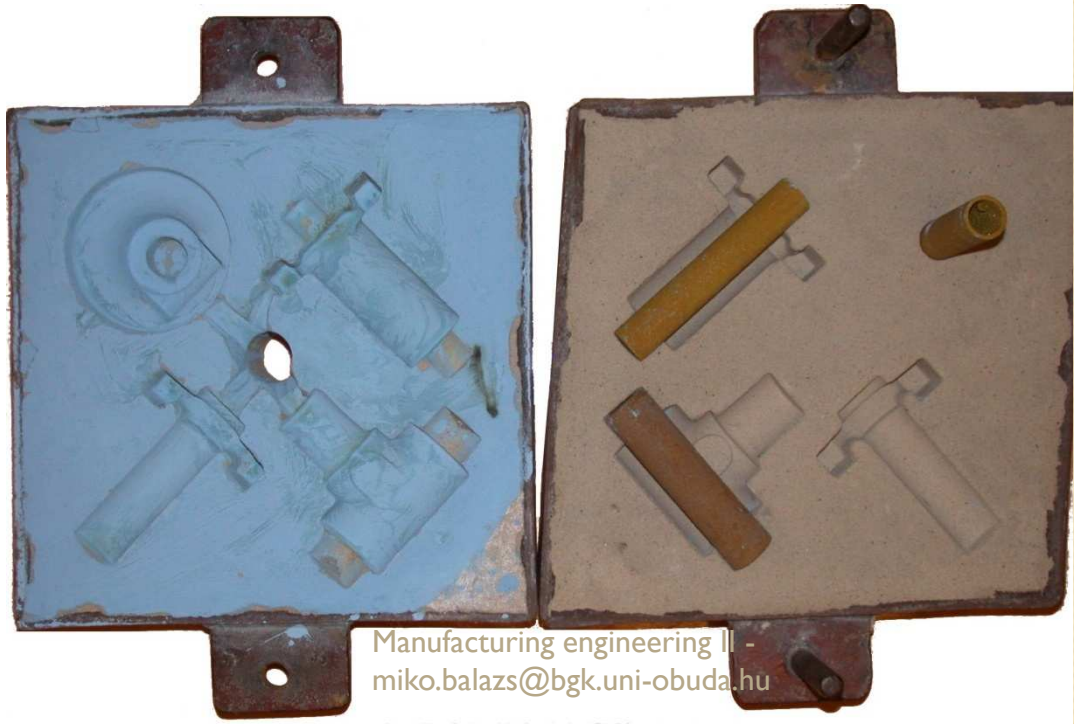
- Sand casting
- Automated sand casting
- Casting to metal mould
- Lost-wax casting
- Injection moulding

Sand casting

- Wood or plastic pattern.
- Inaccurate.
- Piece production
- No mass and size limits







Automated sand casting

- Metal pattern
- Sand forming by automated system
- More accurate parts
- Mass production

Casting to metal mould

- Mould made of steel
- Expensive mould
- Accurate parts
- Light metal parts
- Mass produltion

Moulding process

1. Cleaning

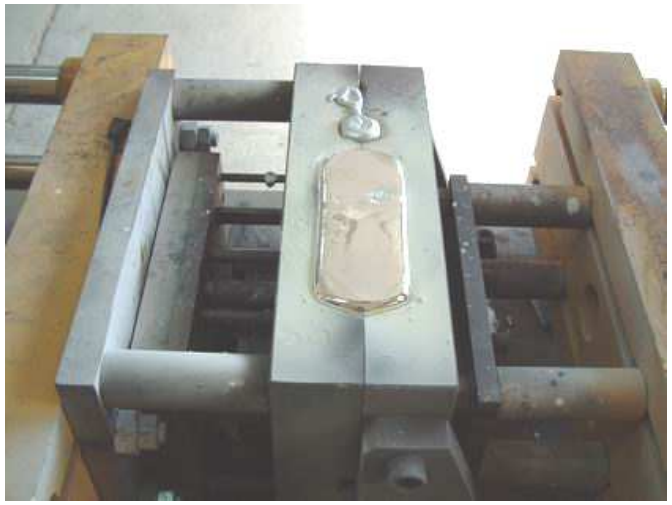
2. Filter

3. Filter

4. A Closing

Moulding process

5. Moulding



6. Cooling and solidification

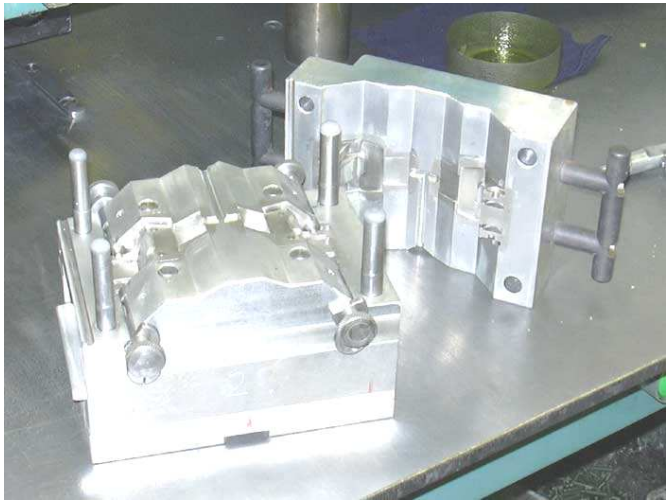
7. Opening

8. Verifying

Lost-wax casting

- Wax pattern – Ceramic cover – Heat treatment - Casting
- Small, complicate workpieces
- Very accurate

Lost-wax casting process



Wax mould

Wax patterms

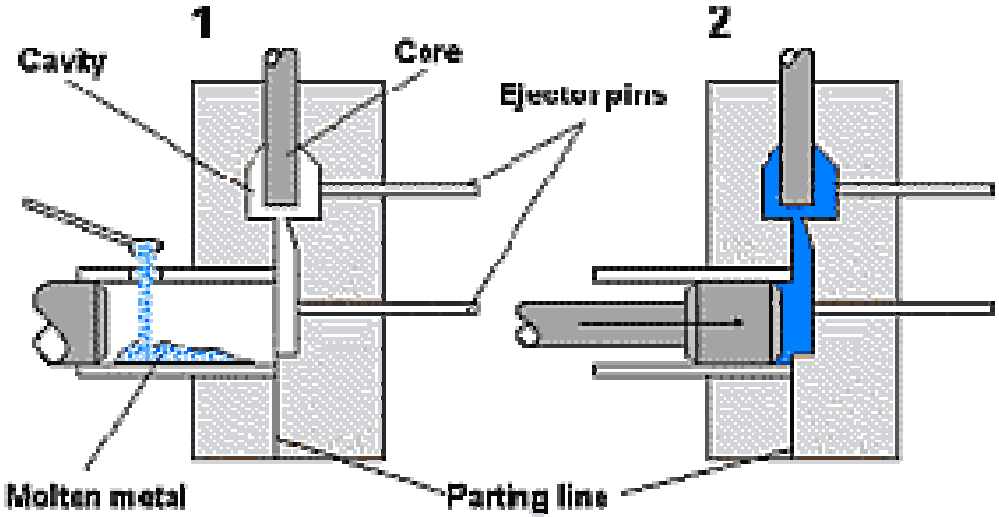
Covering

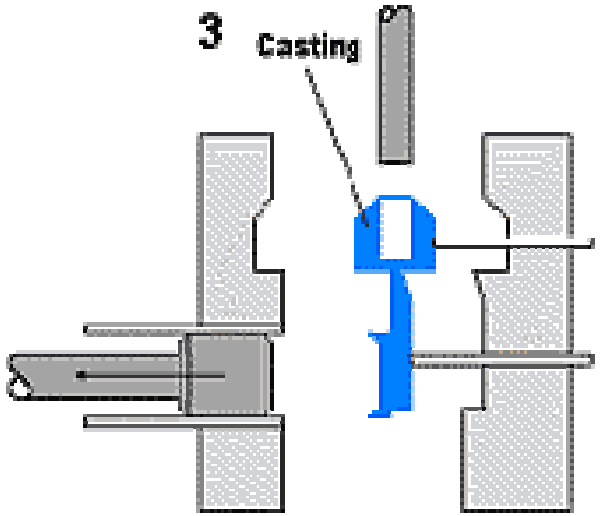
Heat treatment – burning and smelting

Casting

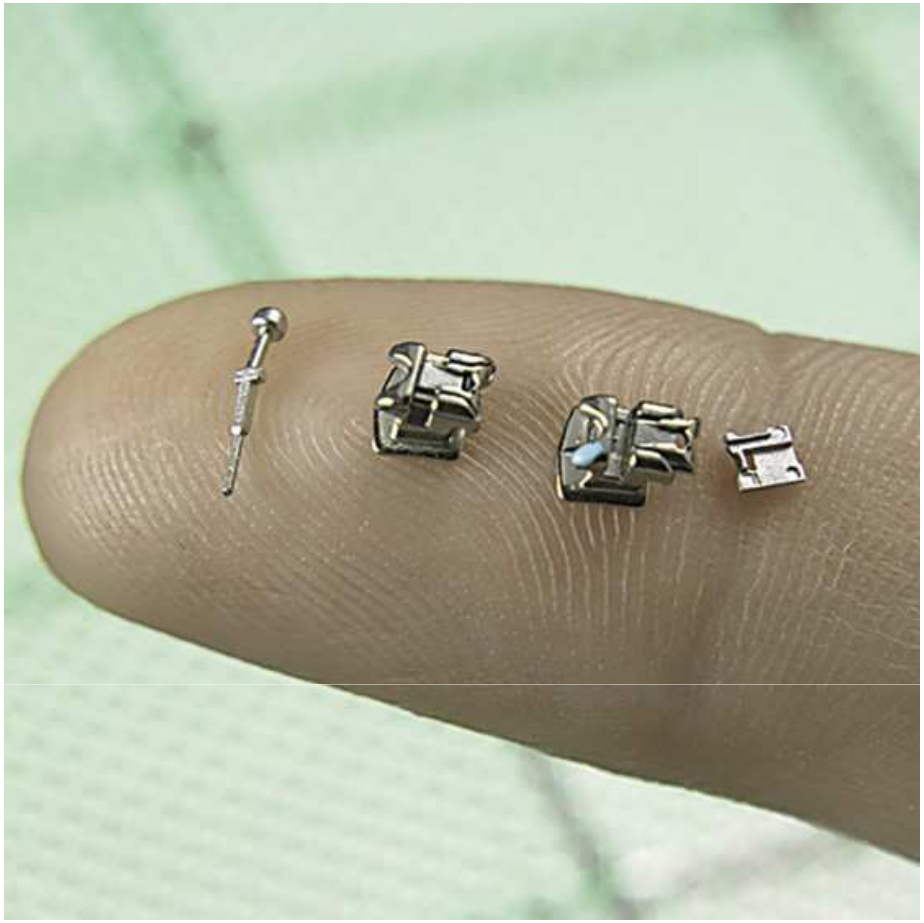
Cooling and solidification

Injection moulding



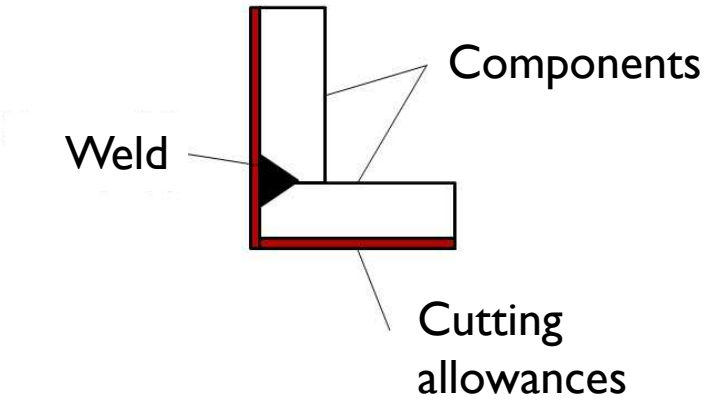


- Expensive tooling
- Very accurate
- Low melting point materials



Welding

- Good material use
- Lot of different welding technology
- Weldingability
- Deformation, fixturs



Engineering choice

Material / Designer (shape of the part)

Cost of the blank piece
\+ Cost of the cutting → MIN