GUJARAT TECHNOLOGICAL UNIVERSITY

BE-4 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK SOLUTION

Subject Name & Code:
Manufacturing Processes (3141908)

✂️ UNIT 7: Broaching & Sawing

Q.1 – What is broaching? How broaches are classified? (Assume 4 marks)
Ans:
Broaching: A machining process using a multi-tooth tool (broach) to remove material in one pass, producing internal or external profiles.
Classification of broaches:

- By usage: Internal (pull/ push) vs External (surface)
- By construction: Solid, Helical, Segmental
- By function: Keyway broach, Round broach, Spline broach
- By pull direction: Pull type, Push type (shorter)

Q.2 – Write short note on band sawing machine. (3 marks)
Ans:
Band sawing machine:

- Continuous loop of toothed blade (band) running over two wheels.
- Table moves vertically (for contour sawing) or tiltable.
- Used for cutting metal bars, plates, pipes, and wood.

Advantages:

- Narrow kerf (less waste)
- Can cut curved shapes
- High production rate

Real-world application: Cutting steel tubes in fabrication shops.

Q.3 – What is sawing? List different types of sawing machine. (3 marks – highly repeated on Page7)
Ans:
Sawing: A cutting process that uses a toothed blade or abrasive wheel to separate material.
Types of sawing machines:

1. Hacksaw (reciprocating)
2. Circular saw
3. Band saw (continuous)
4. Abrasive cut-off saw
5. Friction saw (high speed)

Q.4 – Illustrate reciprocating sawing machine with neat sketch and applications. (7 marks)
Ans:
Reciprocating power hacksaw:

- An electric motor driving a crank and slotted link (or hydraulic) to produce reciprocating motion of a frame holding a hacksaw blade.

- Blade only cuts on forward stroke (sometimes both).
- Workpiece clamped on vice, table automatically feeds upwards after each stroke.

[DG]

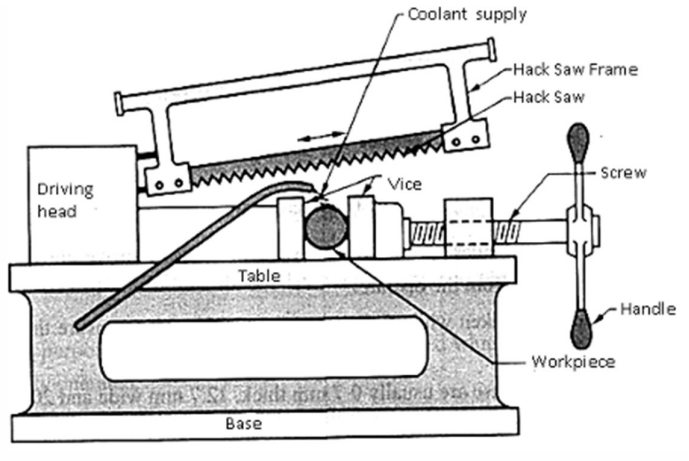


Fig.7.2 – Power Hack Saw

Applications:

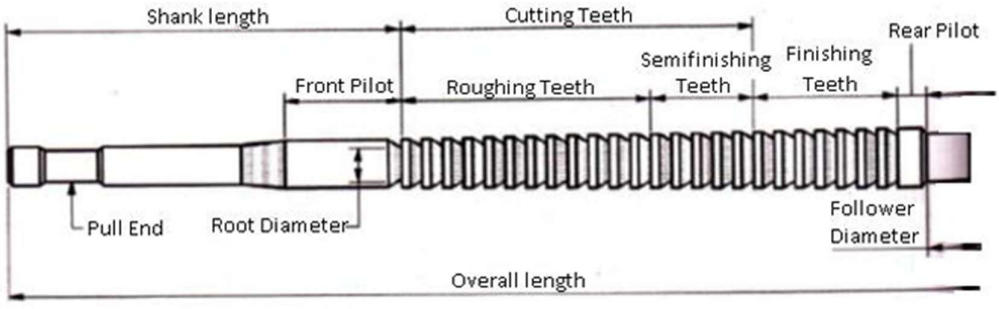
- Cutting thick steel bars (e.g., 200 mm diameter)
- Cutting structural sections (I-beams, angles)
- Machine shops for stock preparation

Advantages: Low cost, simple.
Limitations: Slow, blade wear.

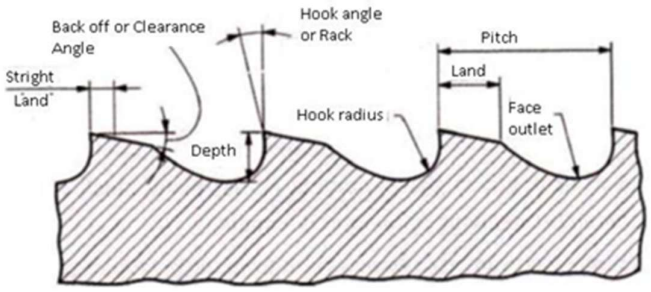
Q.5 – Sketch different elements of broach and describe them briefly. (7 marks)
Ans:
Broach elements (front to rear):

1. **Pull end** – Shank gripped by puller.
2. **Neck** – Reduced diameter for chip clearance.
3. **Front pilot** – Aligns broach in hole.
4. **Roughing teeth** – Each tooth 0.02–0.08 mm rise; removes bulk stock.
5. **Semi-finishing teeth** – Smaller rise, improves surface.
6. **Finishing teeth** – Final size, zero rise.
7. **Rear pilot** – Maintains alignment.
8. **Back-up pads** – Prevents dropping (for vertical broaching).

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(a) Broach teeth detail



(b) Broach term

Fig.7.8 – Broach geometry

Real-world application: Broaching splines in automatic transmission hubs.
