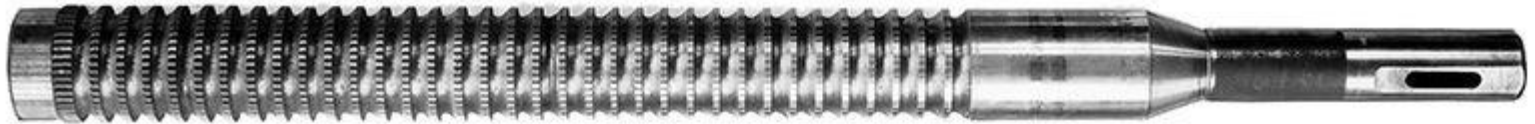


Sawing, Broaching, and Other

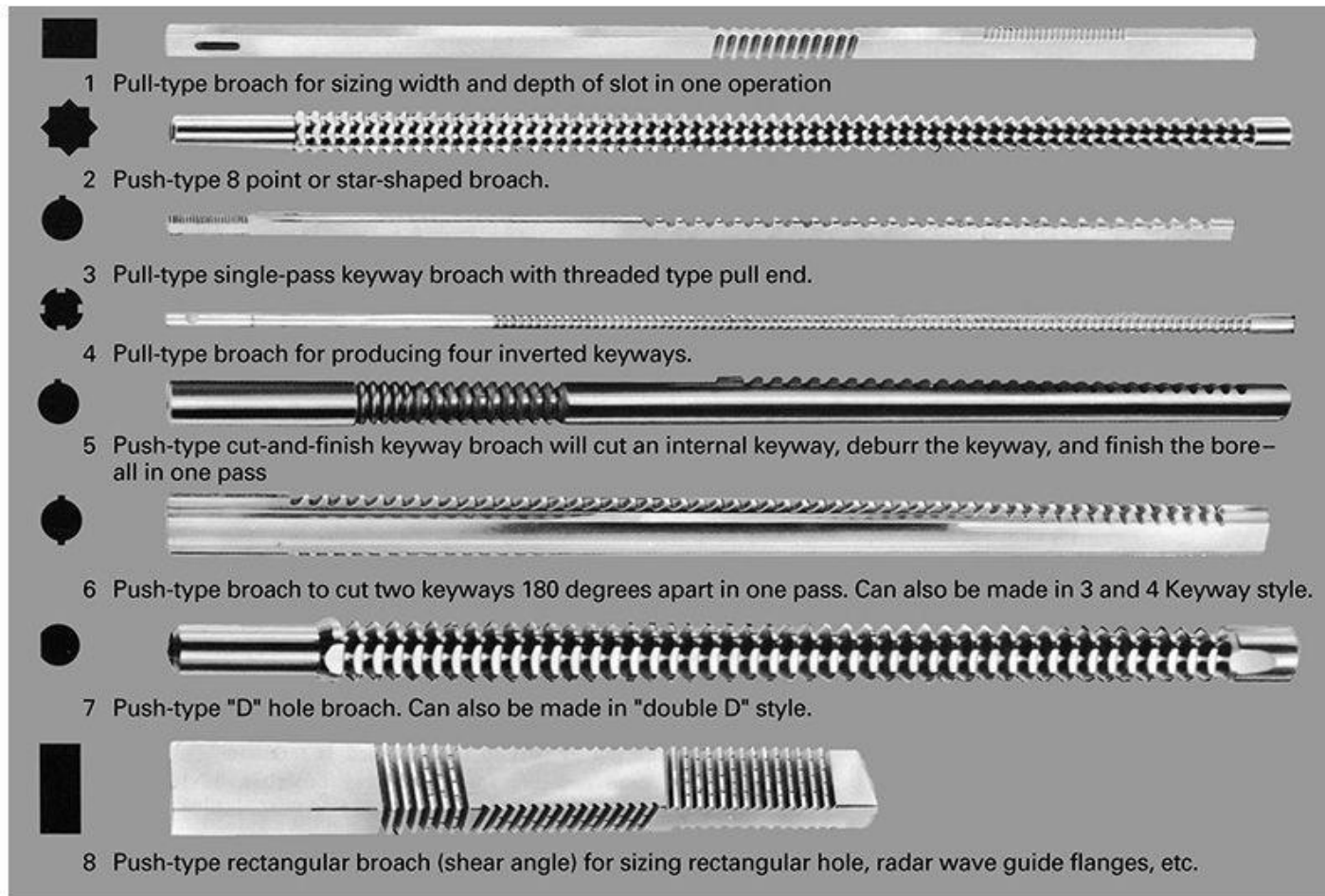


[Watch Video Here](#)

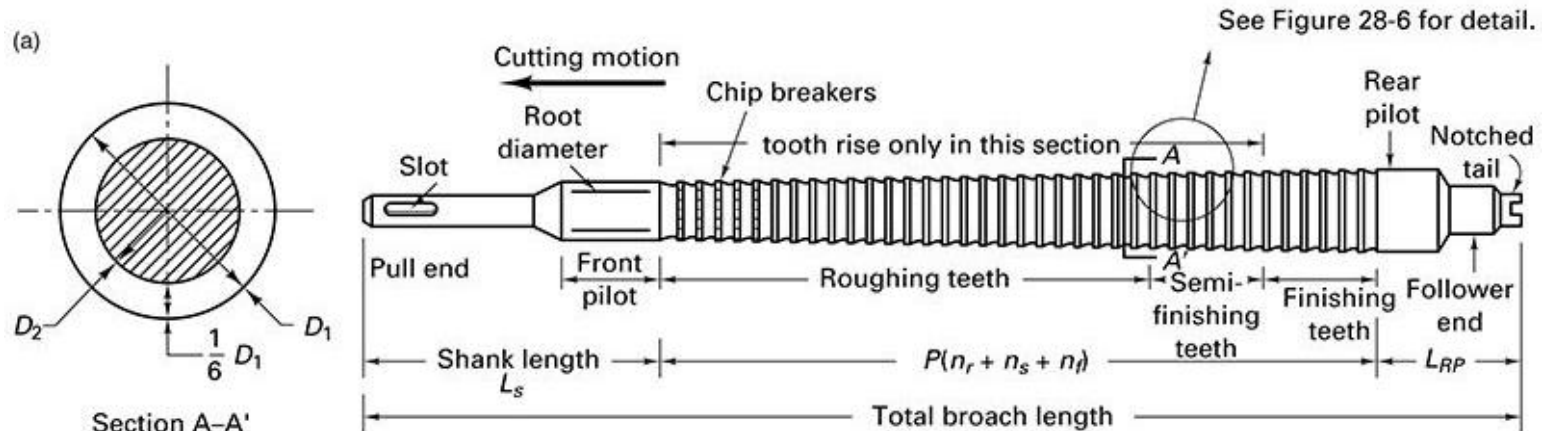
Broach



Shapes possible with Broaching



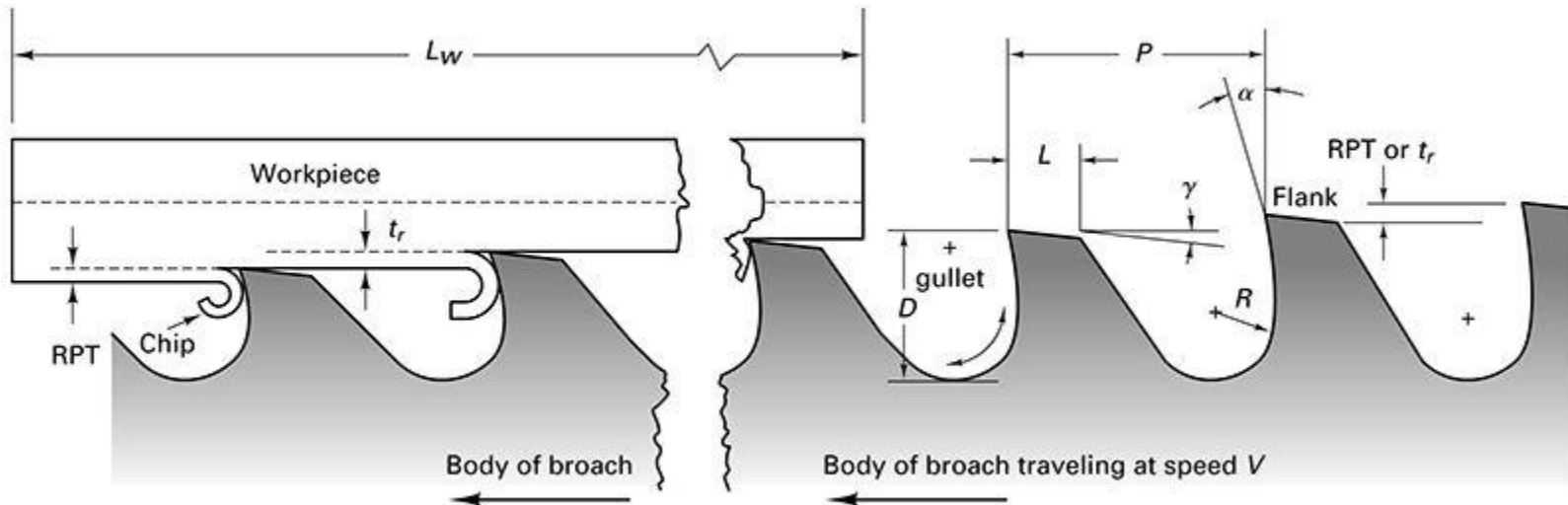
Broach for circular hole



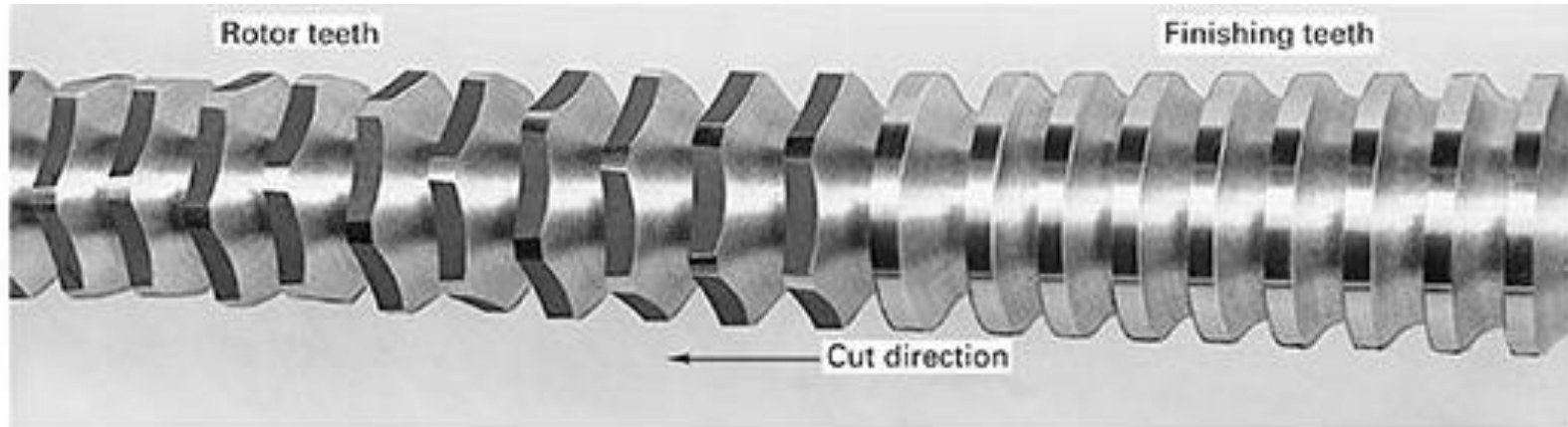
(b)

- P – pitch of teeth
- D – depth of teeth ($0.4P$)
- L – land behind cutting edge ($0.25P$)
- R – radius of gullet ($.25P$)
- α – hook angle or rake angle
- γ – backoff angle or clearance angle
- RPT – rise per tooth (chip load), t_r

Cutting process with broach



Chip-breaking methods

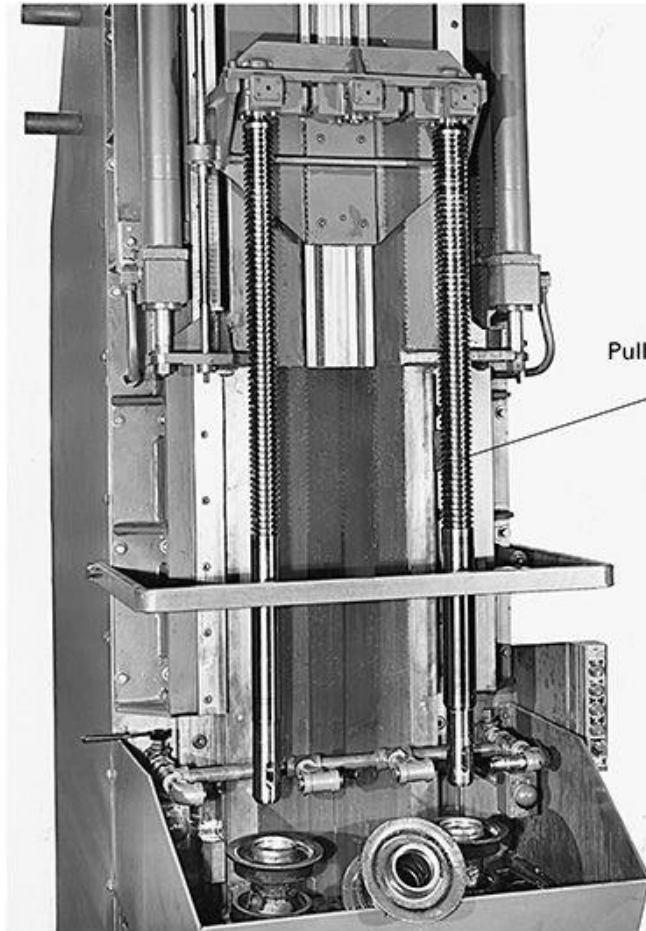


(a) Rotor- or jump-tooth broach design.

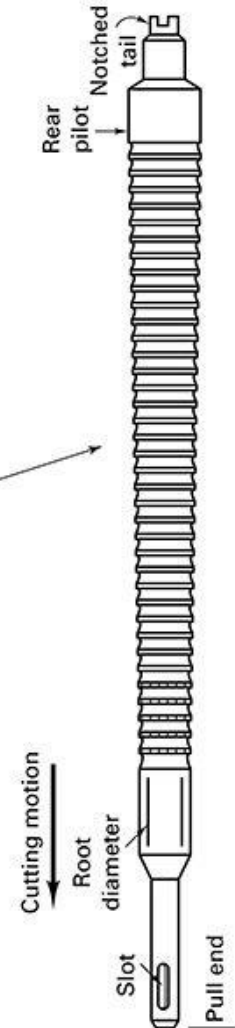


(b) Round, push-type broach with chip-breaking notches on alternate teeth except at the finishing end.

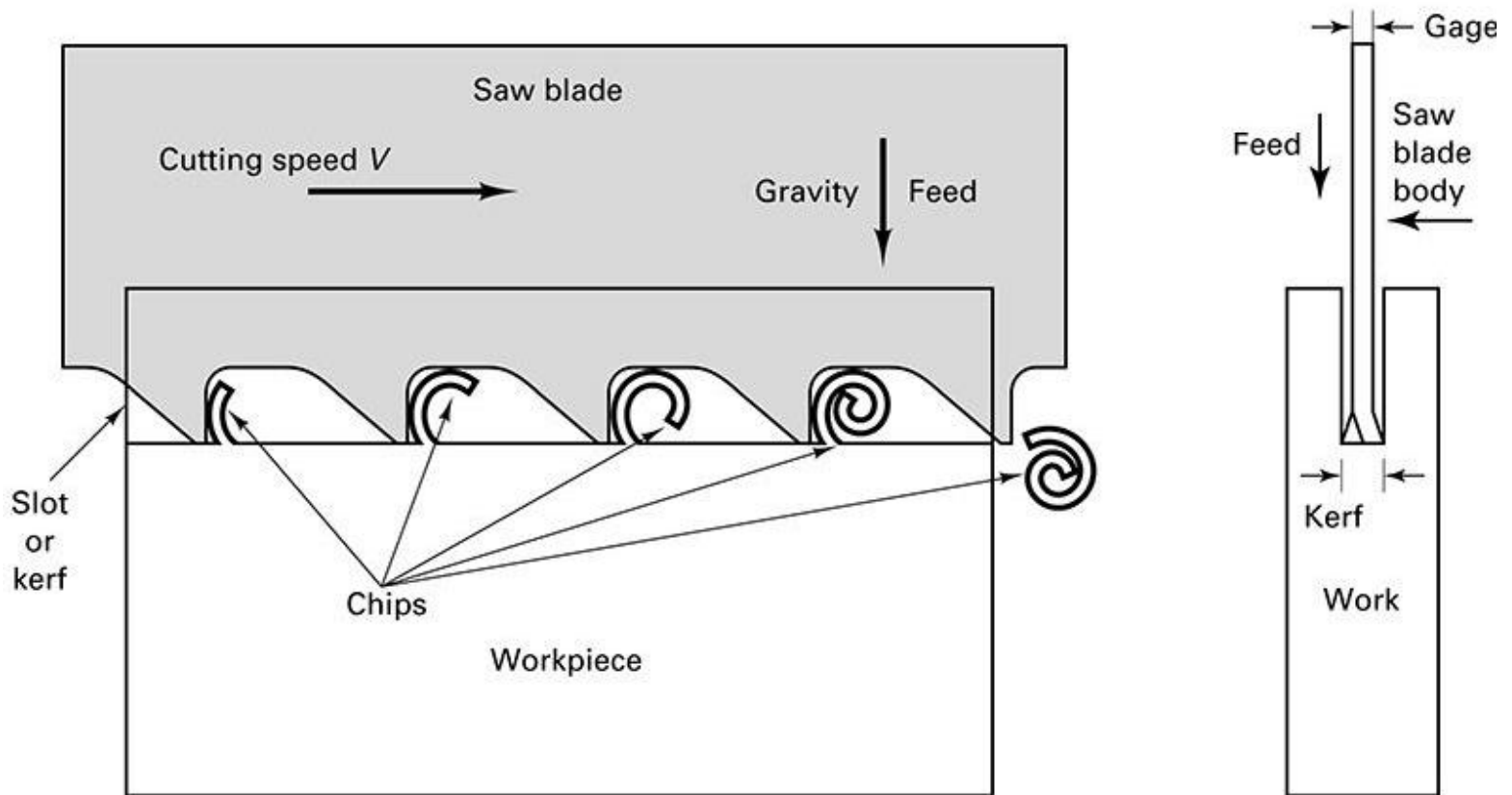
Broaching Machine



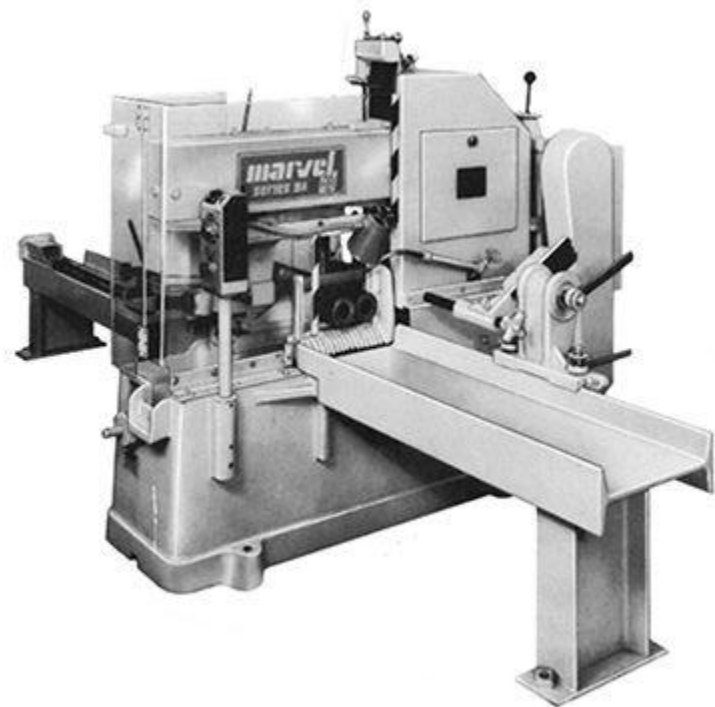
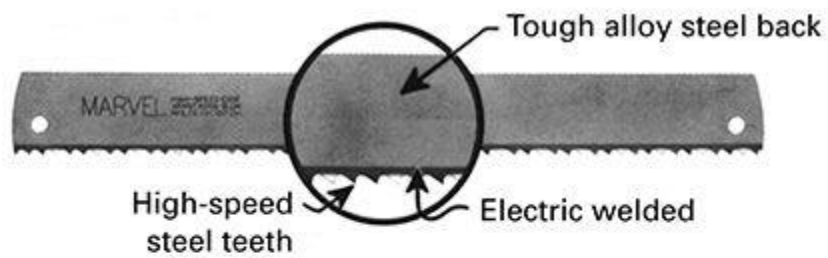
Pull broach



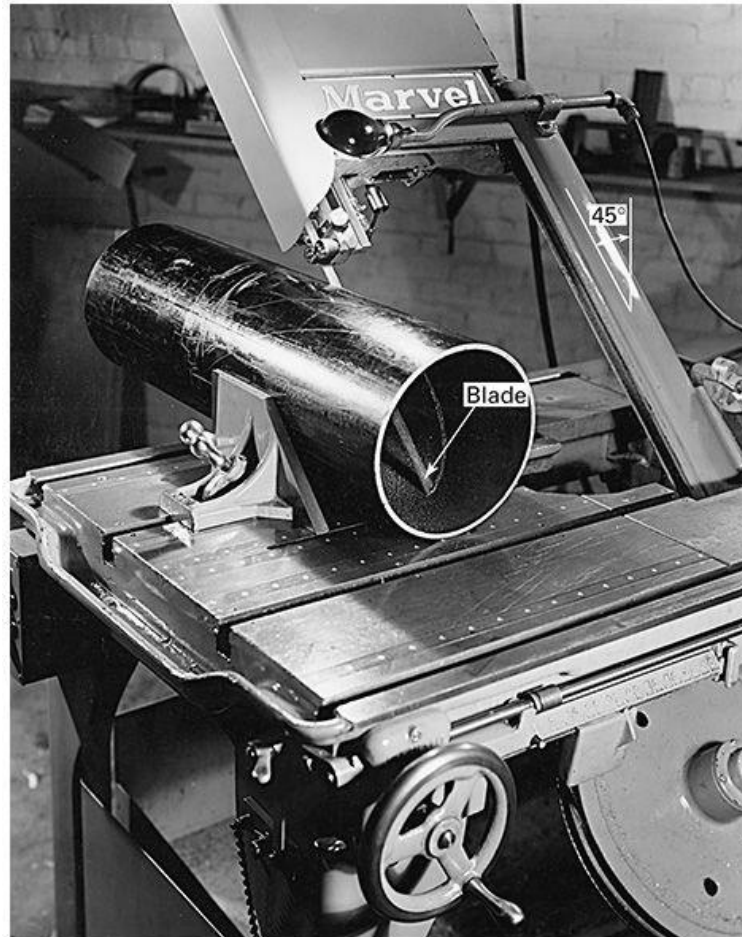
Sawing Action



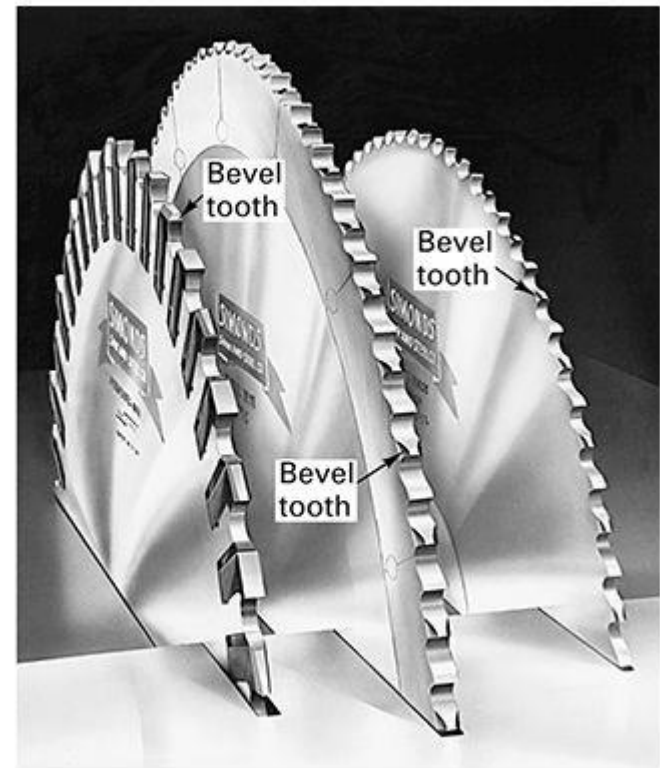
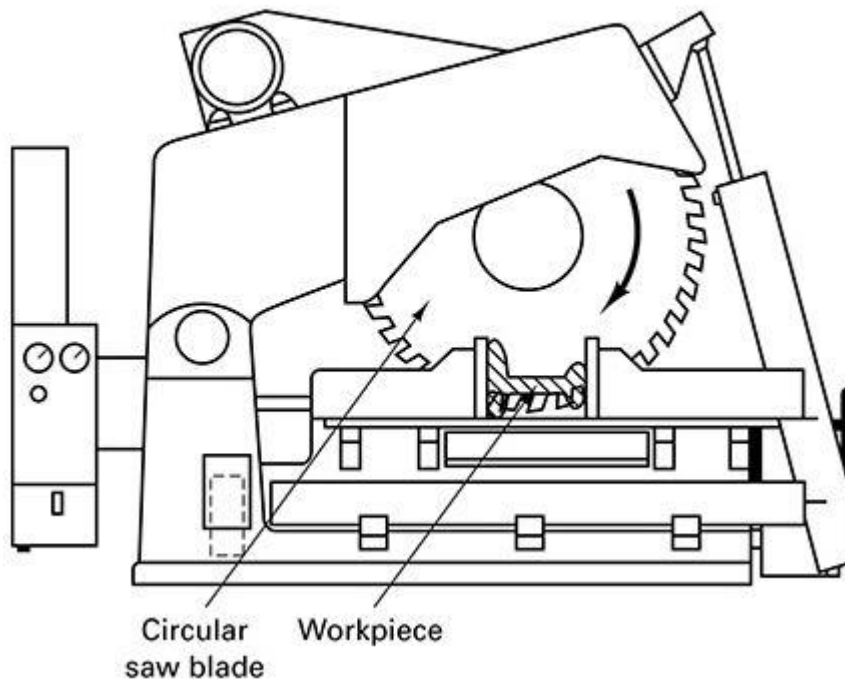
Power Hacksaw



Bandsaw

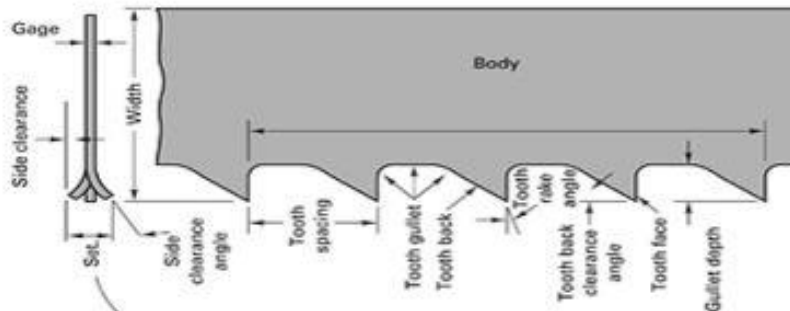


Circular Saw



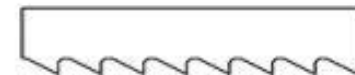
Blade designs and nomenclature

MATRIX MODIFIED MIX-TOOTH	M-42 COBALT WELDED-EDGE	M-2 HIGH-SPEED WELDED-EDGE	HARD BACK CARBON	FLEXIBLE BACK CARBON
The best all-purpose welded-edge blade for sawing varying sizes, shapes, and cross sections. Cobalt-tough for cutting wide range of materials. Welded to length and coil stock.	For high-production cutting of solids, superalloys, tool steels, high-temperature alloys. Welded to length and coil stock.	The original and widely used welded-edge band blade for general-purpose sawing. Welded to length and coil stock.	Hardened back provides greater beam strength for more accurate sawing. Welded to length and coil stock.	Recommended for contour saws running over 3000 SFPM. Welded to length and coil stock.

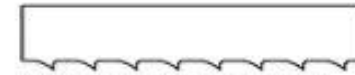


Common Tooth Sets

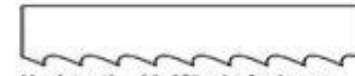
- Raker set has a straight tooth between one left and one right
- Wavy set for thin sections has progressive set, both directions
- Straight set—left, then right—is for better finish
- Cluster set has only a few straight teeth



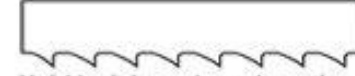
Standard design has zero rake



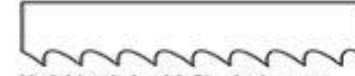
Skip-tooth blade clears chips, cuts nonferrous



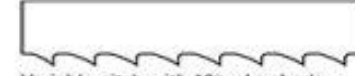
Hook tooth with 10° rake for large sections



Variable pitch can change by section or individually

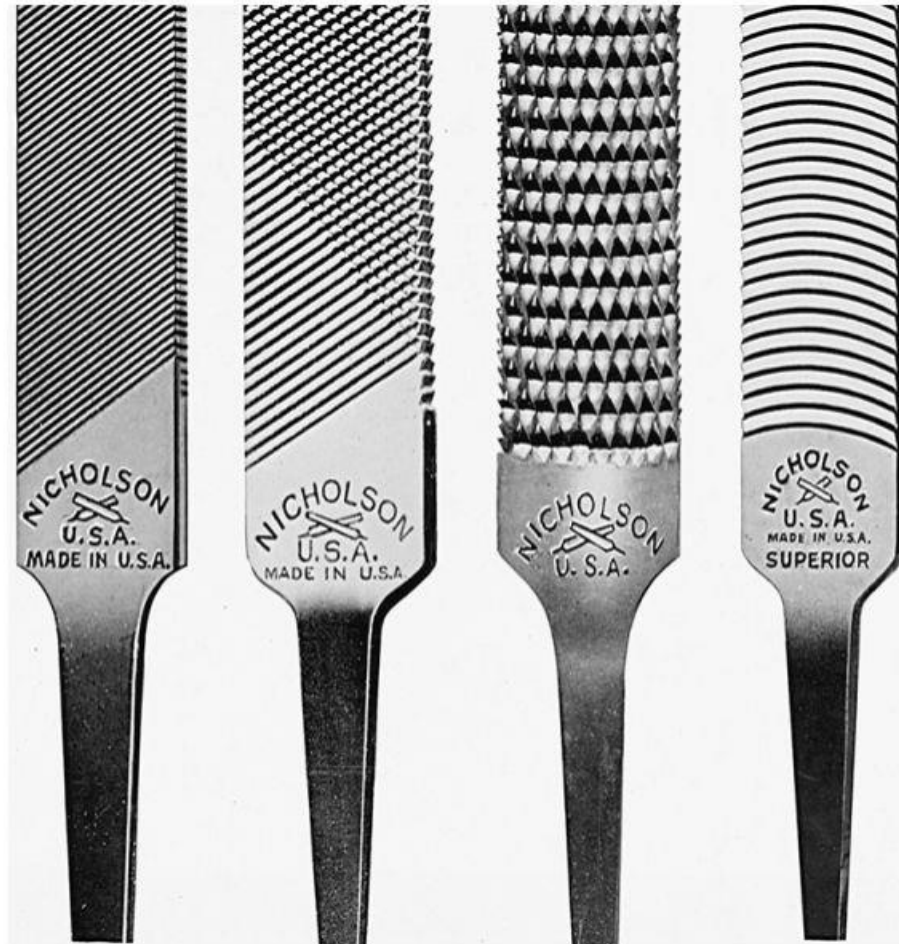


Variable pitch with 5° rake is more aggressive

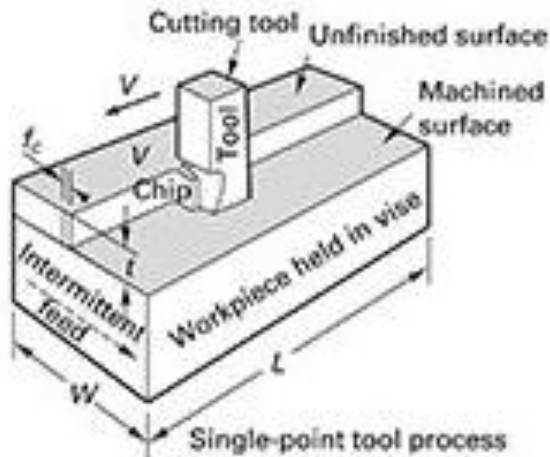


Variable pitch with 10° rake sheds chips better

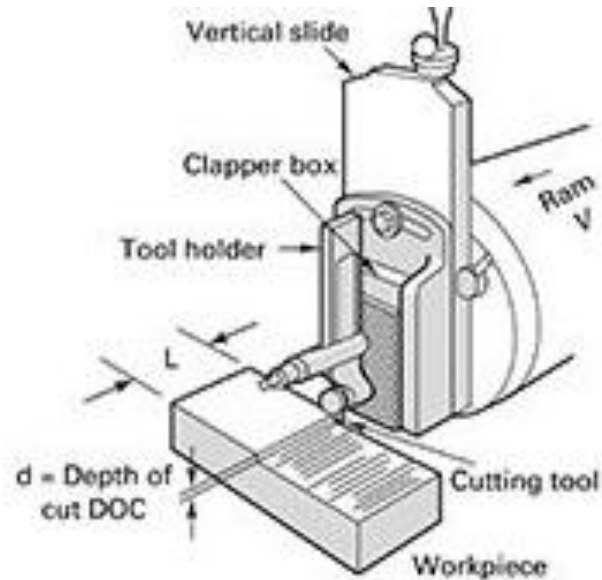
File Types



Shaping/Planing Process



(a) Basic geometry for shaping and planing

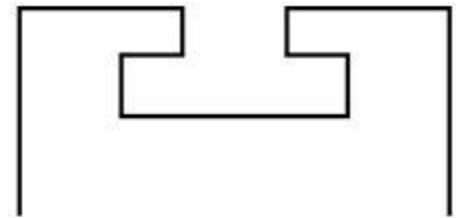


(c) Shaper tool holder, clapper box and workpiece

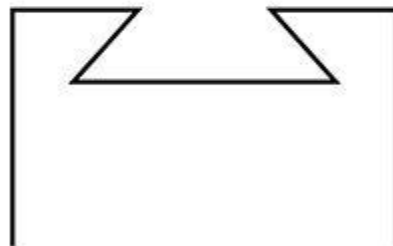
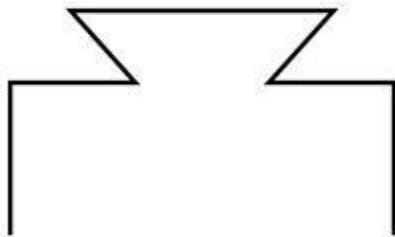
Surface types machined by shaping and planing



Grooves



T-slot



Dovetails



Flats and angles