Description

Image



Image caption

(1) Band Saw © Skeeze at Pixabay [Public domain] (2) Saw band © Skitterphoto at pixabay [Public domain] (3) Wooden kitchen table and chairs © Sundae2Sundae at Wikimedia Commons [Public domain]

The process

BAND SAWING uses a continuous flexible blade that is cycled in one direction around pulley wheels. The blade has to be sufficiently thin to bend around the pulley wheels. It is possible to cut curved contours, but the minimum curvature depends on the cross-section of the blade. Cutting fluids are used for lubrication and cooling when cutting metals.

Process schematic

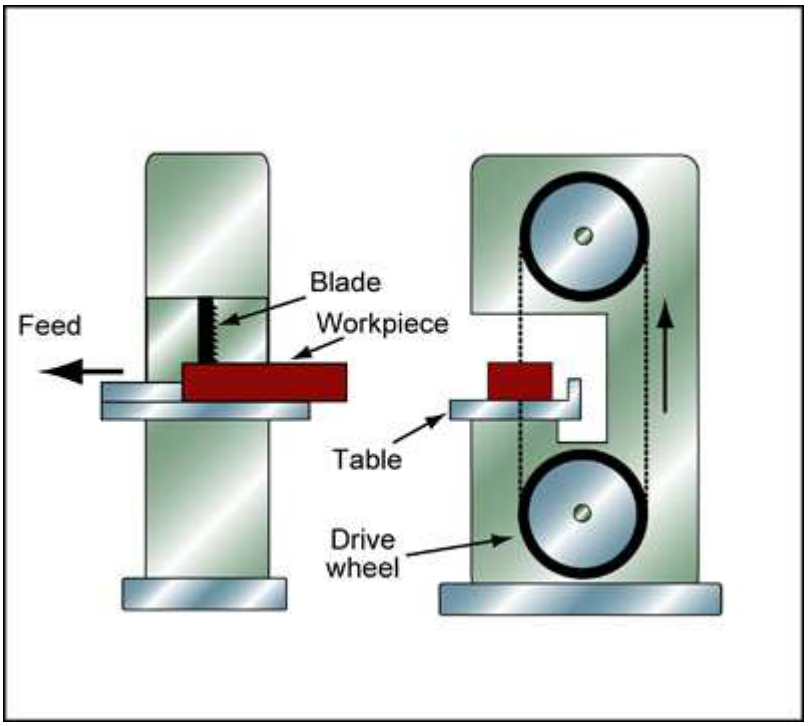

Figure caption

A vertical band saw. There are also circular and jig saws.

Material compatibility

Composites	✓
Foams	✓
Metals - ferrous	✓
Metals - non-ferrous	✓
Natural materials	✓
Polymers - thermoplastics	✓
Polymers - thermosets	✓

Shape

Flat sheet	✓

Economic compatibility

Relative tooling cost	low			
Relative equipment cost	medium			
Labor intensity	medium			
Economic batch size (units)	1	-	1e4	

Physical and quality attributes

Mass range	0.022	-	110	lb
Range of section thickness	118	-	787	mil
Tolerance	9.84	-	118	mil
Roughness	0.197	-	1.77	mil
Surface roughness (A=v. smooth)	B			
Cutting speed	0.0197	-	0.276	in/s
Minimum cut width	31.5	-	118	mil

Process characteristics

Primary shaping processes	✗
Machining processes	✓
Cutting processes	✓
Discrete	✓
Continuous	✓
Prototyping	✓

Supporting information

Design guidelines

Curved profiles can be cut, but the minimum radius depends on the width of the blade. Internal contours made by welding the ends of the blade together after it has been passed through a hole in the workpiece.

Technical notes

There are three main tooth forms for blades: regular (contour cutting), skip (deep cuts in soft metals) and hook (fast cutting rates). Pitch is defined as the number of teeth/inch. There must be at least two teeth for the thickness of the workpiece (three is preferable). Thicknesses of saw blades (gage) are standardized: 0.64mm, 0.81mm, 1.1mm, 1.3mm and 1.6mm. Saw teeth are offset to provide clearance for the back of the band. Bands are made of carbon steel or are bimetallic (high-speed steel) cutting edges electron beam welded to a steel back. Teeth can be hardened, or tipped with tungsten carbide, alumina or diamond.

Typical uses

Band sawing is widely used for stock cutting and profile cutting of metal, plastic and wood.

The economics

Wear is evenly distributed over the entire blade, making blade changes less frequent. Simple fixtures are required as the downward force of the blade holds the workpiece to the table.

The environment

Can be extremely noisy. Ear protection should be worn for extended operation.

Links

MaterialUniverse

Reference