SUMMARY

A BANDSAW AROUND THE WORLD

French: une scie-ruban

German: eine Bandsäge

Italian: una sega a nastro

Spanish: una sierra cinta

In bandsawing, a continuous bandsaw blade cuts in one direction with a uniform cutting action and evenly distributed, low individual tooth load. Chips produced have a constant thickness.

Bandsaws can be used for cut-off operation, straight sawing or contour sawing.

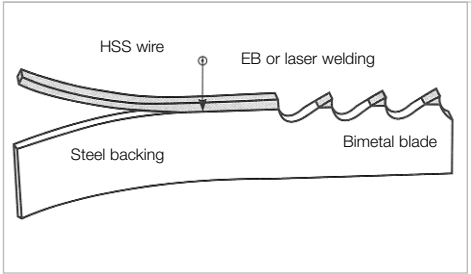
Three types of bandsawing machines are available:

- vertical, mainly used for contour sawing
- horizontal, for productive cut-off operations
- pendular machines.

TOOL MAKER'S TIP

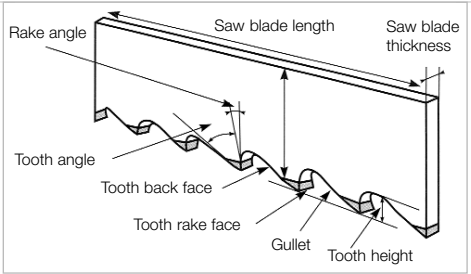
Use TiN coated bandsaws for longer blade life and resistance to abrasion

HSS	HSS-E 8% cobalt	HSS-E-PM
• Seldom used	• Basic choice	• For high performance and long tool life • For nickel alloys, titanium alloys and hard steels

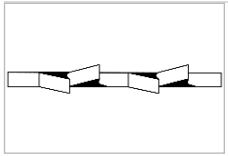


Bimetal saw concept

In bimetal saws, a HSS wire is welded by electron beam or laser on a steel backing

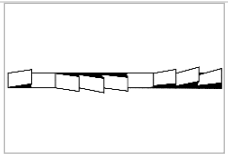


Vocabulary



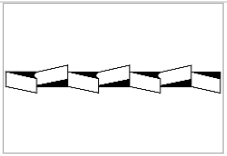
Raker set

- 3-tooth sequence, left, right, straight
- Reduces tooth load, for heavy cutting
- Uniform set angle
- Prefered for ferrous applications



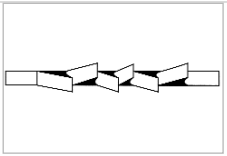
Wave set

- Progressive sine-wave offset pattern with fine pitch
- Reduces tooth load
- Smoother in thin wall sections
- Also for high speed cutting at reduced cutting depth



Alternate set

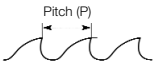
- 2-tooth sequence, left, right
- Prefered for non-ferrous metals

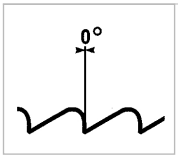


Variable (multipitch) set

- One unset tooth (raker) in each repeating pitch sequence
- Only the largest tooth in each sequence is unset
- Appropriate for most applications

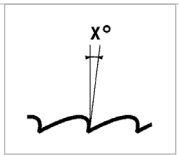
Tooth pitch





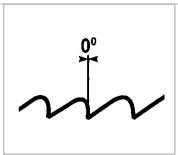
Fixed pitch

- General purpose use
- Good chip carrying capacity



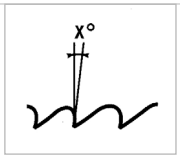
Fixed pitch positive

- General purpose use
- Good chip carrying capacity



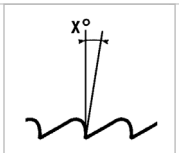
Variable pitch

- Smooth cutting
- Reduces harmonic vibrations and noise
- Good chip carrying capacity
- Long blade life



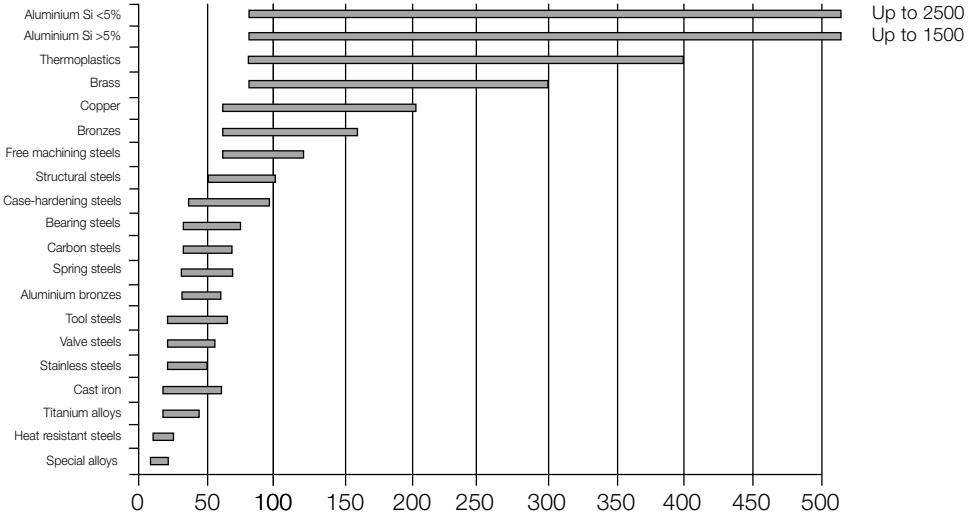
Variable pitch positive

- Smooth cutting
- Reduces harmonic vibrations and noise
- Good chip carrying capacity and easy chip formation
- Good tooth penetration
- Long blade life



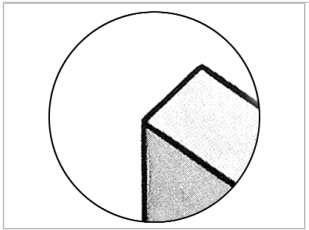
Hook positive

- Allows coarse pitch on narrow blades
- Easy chip formation
- Good chip carrying capacity
- Use in cast iron and non-metallic applications (wood, plastics, composites)


Aluminium Si <5%
Aluminium Si >5%
Thermoplastics
Brass
Copper
Bronzes
Free machining steels
Structural steels
Case-hardening steels
Bearing steels
Carbon steels
Spring steels
Aluminium bronzes
Tool steels
Valve steels
Stainless steels
Cast iron
Titanium alloys
Heat resistant steels
Special alloys
Up to 2500
Up to 1500
0
50
100
150
200
250
300
350
400
450
500
Cutting speed in m/min

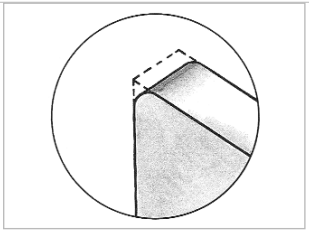
TOOL MAKER'S TIP

Break-in is necessary for long blade life



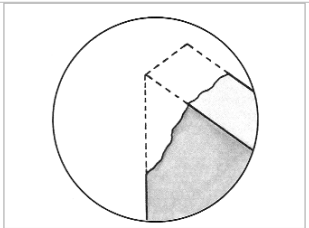
New blade

- Razor-sharp tooth



With break-in

- Micro-fine radius
- Break-in is done by reducing the feed rate/force control to achieve a cutting rate approximately 20 to 50% of the normal cutting rate.



Without break-in

- Premature tooth breakage

Very fine or pulverized chips

- Increase the feed rate
- Or lower band speed

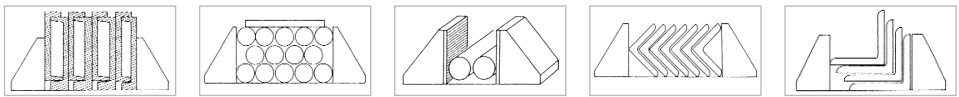
Thick, heavy or blue-colored chips

- Decrease the feed rate

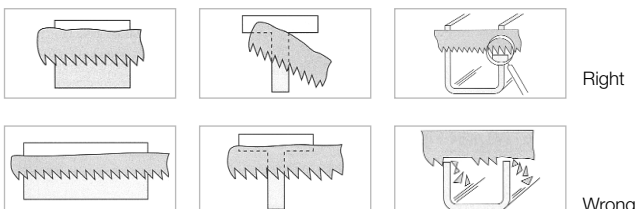
Loosely rolled chips

- Ideal cutting conditions

Methods of clamping workpieces



Positioning of blade and workpiece



Right

Wrong

Select saws with large teeth

Select saws with small teeth

Select saws with small teeth

Problem	Solutions
Tooth stripping and chipping	Reduce feed and increase speed. Use finer tooth pitch. Increase coolant flow. Check workpiece clamping.
Inaccurate cut	Reduce feed. Check coolant flow. Adjust blade tension and guides. Check for tooth set damage.
Blade stalling in work	Increase band tension. Increase speed. Reduce feed. Check for blade wear or chips.
Chip welding	Increase coolant flow. Reduce speed. Use coarser tooth pitch.
Premature blade wear	Use coarser tooth pitch. Increase feed or decrease speed. Check coolant flow.
Premature dulling of teeth	Check blade fixture. Increase feed. Check blade break-in. Check coolant flow and type.
Teeth fracture	Check speed and feed. Adjust saw guides. Check chip brush.
Blade breakage	Use finer tooth pitch and finer blade. Reduce blade tension and feed. Check coolant. Adjust speed.

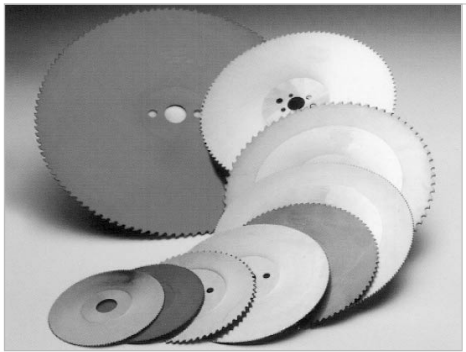
A CIRCULAR SAW AROUND THE WORLD

French: une scie circulaire

German: eine Kreisäge

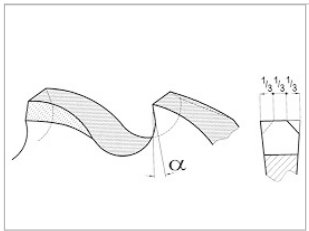
Italian: una sega circolare

Spanish: una sierra circular



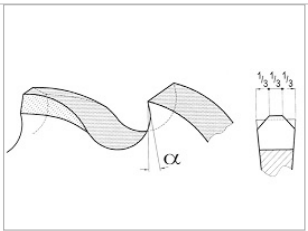
- Circular saws are used for high performance cutting of all forms of ferrous and non-ferrous metals: billets, tube, profile, bar, rounds, etc…
- Circular saws are available as:
  - solid saws
  - with HSS segments riveted onto a steel body, useful when large saw diameter is required.

HSS et HSS-E	• Basic choice
HSS-E	• For longer tool life • For difficult-to-machine alloys
TiCN Grey-violet	• For abrasive materials • For hard steels, titanium alloys and stainless steels • For higher cutting speeds (up to 90% higher)
TiN Gold	• Multi-purpose • For steels, tubes and profiles • For higher cutting speeds (up to 50% higher)
TiAlN Black-violet	• For hard steels, stainless steels and cast iron • For materials with low thermal conductivity • For dry cutting • For higher cutting speeds (+60%)
CrN Metal	• Low friction coatings preventing gumminess and built-up edges • For copper alloys, bronze, brass and aluminium • For higher cutting speeds (up to 70% higher)



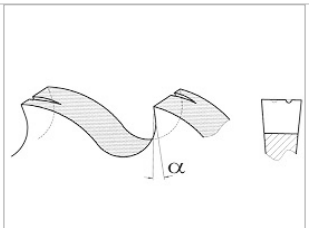
BW or ACME

Generally used for cutting thin walled steel tubes (3- and 4 mm pitch)



C or Heller forms

Generally used for cutting flat sections or thick walled tubes (greater than 4 mm pitch)



BC or Chipbreaker

For cutting thin walled tubes and small profiles.

Improves the quality of the cut

Improves performance

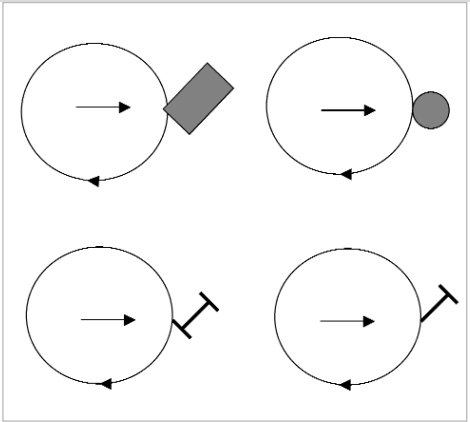
Pitch choice for plain section

Pitch (mm)	Material thickness (mm)
3	3-5
4	5-10
5	10-15
6	15-30
7	20-35
8	25-40
10	30-50
12	35-60
14	40-80

Pitch choice for tubes and profiles

For tubes and profiles, make sure that at least two teeth are in contact with the workpiece.

Material	Cutting speed (m/min)	Feed (mm/min)
Steels 35-50 kg/mm^2	28-35	70-160
Steels 50-65 kg/mm^2	20-28	60-120
Steels 70-85 kg/mm^2	15-22	40-100
Hardened steels	12-18	25-50
Austenitic stainless steels	5-12	30-45
Martensitic stainless steels	7-10	20-35
Cold rolled profiles	25-40	80-130
Tubes with thin walls	40-80	80-150
Tubes with thick walls	30-50	70-130
Girders	19-30	70-130
Grey cast iron	12-25	80-110
Aluminium	900-1500	1200-1400
Copper	80-400	400-600
Brass	400-600	800-1000
Bronze	40-120	400-800
Titanium alloys	10-15	80-160
Hard plastics	900-1500	1200-1400



Problem	Causes
Premature wear	Pitch too large Excessive cutting speed Wrong feed Cooling inadapted Wrong positioning of the workpiece
Teared-off teeth	Wrong pitch Excessive feed Poor cooling
Saw breakage	Seizing-up due to poor sharpening Excessive feed Clamping problem