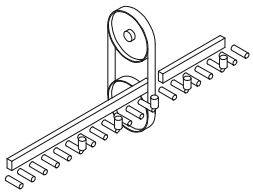
Eliminating Barriers to Sawing Performance



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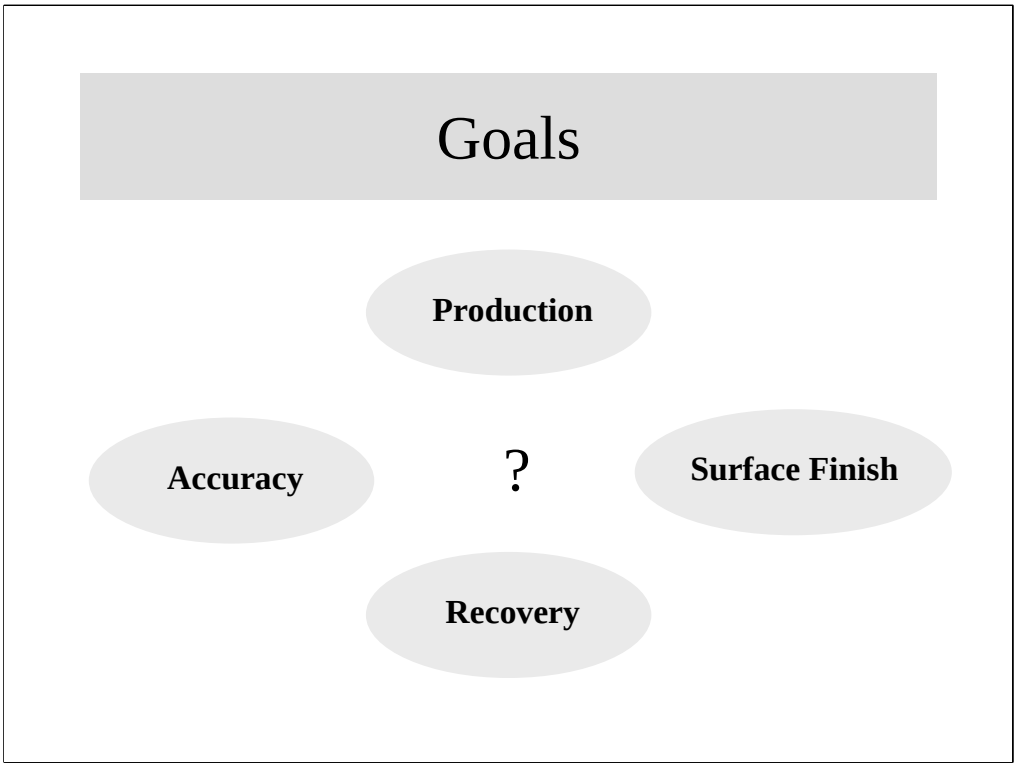
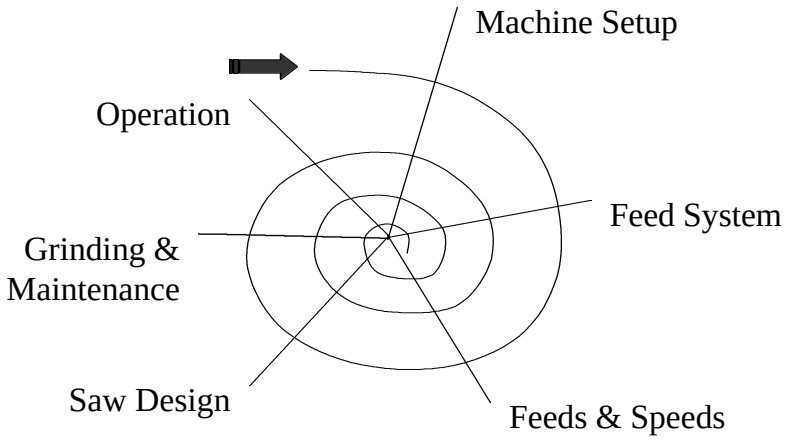


Trade-offs are necessary for all saw system designs

Accuracy and recovery go together

One saw system will not do everything, but the envelop is being pushed due to better machine construction and some new sawing technologies.

Improvement Spiral



Applies to which ever goal you want to meet.

Never-ending

Start with the machine setup.

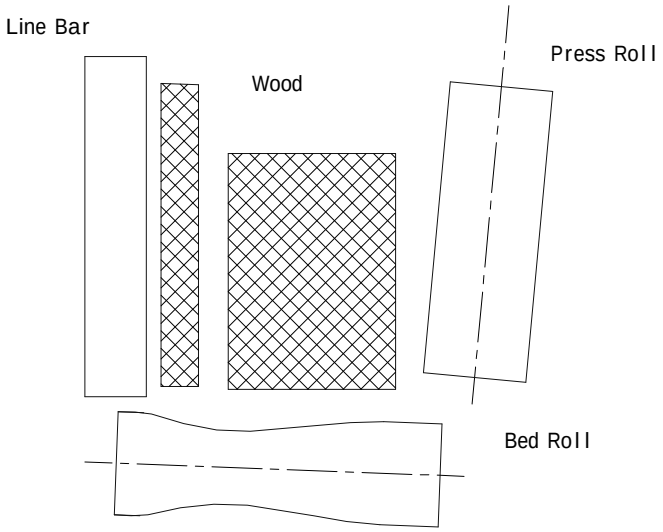
Better to take small steps. That way if you fall back, you don't fall too far.

The key is to make a system that is reliable, so that it will work all day, every day.

Machine Setup

- Alignment
  - All parts that hold the wood or the saw
- Tolerances
  - Better machines enable thinner, faster saws
- Maintenance
  - Arbours, collars, guides
  - Wheels, strain system, scrapers
  - Feed rolls, fences

Typical Problems with Linebars

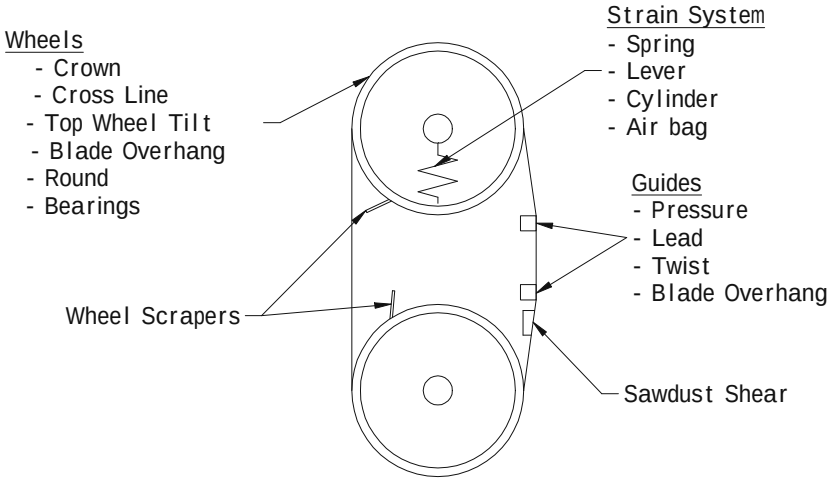


Heavy and narrow pieces will go through machine differently
Uncertain if top of board will stay against linebar, resulting in beveled board

Bottom bearing of press roll will take all of load and blow out sooner.

Other combinations of misalignment cause similar problems

Bandmill Parts

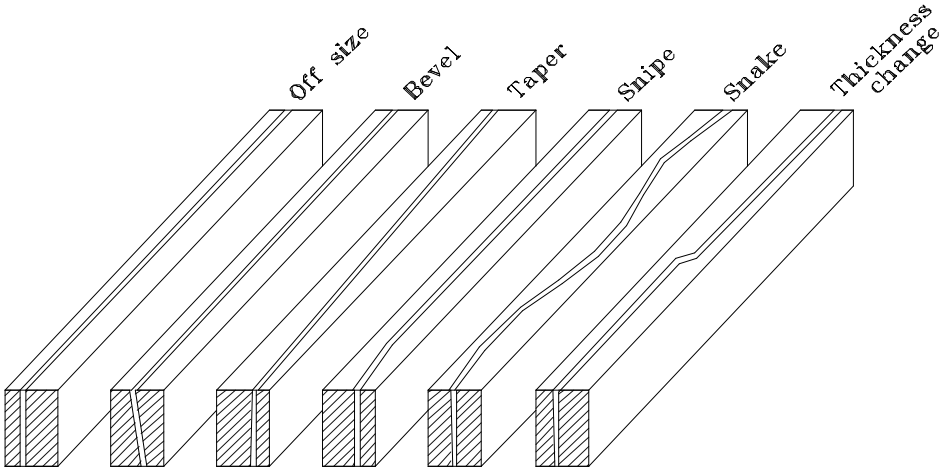


Feed System

- Alignment
  - Move wood in a straight line
- Adequate control of wood
  - Wood must not move sideways into saw

Articles on alignment available on www.thinkerf.com

Typical Defects



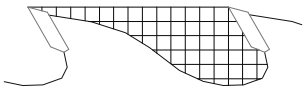
With the exception of snaking, all the other defects are patterns that will appear in each board. Each pattern has a definite cause, usually related to some problem with the feed system that causes or allows the wood to move.

If you know where the change in shape appears, say 42” from the trailing edge of the board, then whatever part that is 42” from the saw is causing the problem.

Feeds & Speeds

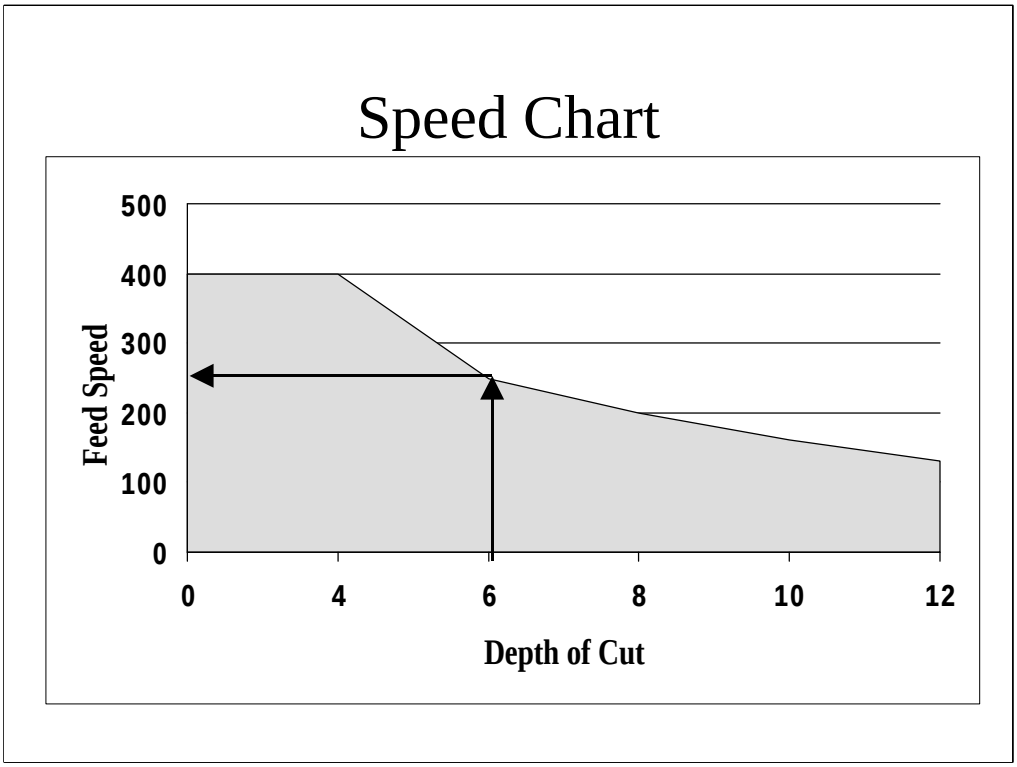
- Blade speed
- Tooth design
- Proper feed for depth of cut
- Limitations

$$\frac{\text{Bite}}{\text{Feed Speed}} = \frac{\text{Pitch}}{\text{Saw Speed}}$$



Allowable speeds can be calculated with some accuracy, so you don’t have to buy a blade just to see if it will work.

Vibration = critical speeds for circular saws



Allowable speeds can be calculated.

Many mills feed too slow for small pieces and too fast for deep cuts. There can be a significant improvement in production when proper feed speeds used.

Limitations

- Gullet loading
- Minimum side clearance
- Maximum tooth bite
- Critical speeds for circular saws
- Gullet cracking
- Power requirements

Gullet loading – keep sawdust in the gullet so it doesn't spill

Side clearance must be above a certain amount or saw will snake

Bite should be less than the plate thickness to avoid tooth bending

Circular saws loose stiffness at critical speed. Not so much of a problem for "thick" saws, but must be considered as plate thickness is reduces

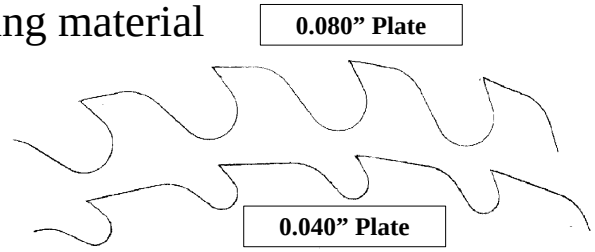
Cracking limits about of strain and tensioning for a bandsaw. This limits how stiff a bandsaw can be.

Grinding & Saw Maintenance

- Critical for thin saws
- Sharpness
- Symmetric tooth
- Flat plate
- Proper tensioning
- Care of collars and guides

Saw Design

- Thickness
- Diameter or width
- Tooth design
- Tipping material



Saw stiffness is proportional to the cube of the plate thickness. So reducing the thickness by 50%, reduces the stiffness 88%. This is why it is so difficult to reduce plate thickness.

Tipping Materials

Material	Composition	Comments
Saw steel	High grade steel	Inexpensive, easily fixed
Plasma Hardening	Heat treatment of saw steel	50% - 100% longer life
Stellite	Cobalt/Chromium alloy	Corrosion resistant (Red Cedar)
High speed steel	Tool steel	Limited use
Carbide	Tungsten particles in cobalt matrix	Various hardness Brazed
Cermets	Ceramic/metal mix	New to sawing. Very hard
Diamond	Artificial diamond layer on carbide tip	Long lasting, expensive

Operation

- Operator habits
- Press rolls timed properly
- Selecting proper feed speed

Conclusion

- One saw will not work for all applications
- All issues must be addressed to achieve “good” sawing performance
- Attention to detail becomes critical when trying to achieve “excellent” performance