Developments
in
Circular Saw Technology

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New Developments

- Guide Design for Curve Sawing
- Faster Speeds
- Stainless Steel Plate
- Variable Pitch

Saw design is always a compromise between production, accuracy and recovery. Not all new ideas are in the direction that you or your mill want to go, but continued development will eventually help everyone.

Faster Speeds

- Want more production
- Gullet loading
- Tip loss
- Critical speeds

Some mills need high production to survive.

The first obstacle is gullet loading. Usually a GFI of 30% (expansion factor of 3) is about the limit for good sawing.

However, if you want to sacrifice recovery and accuracy, higher gullet loading is possible. There are some mills with GFI of 45% (expansion factor of 2.2). The saws cut: not too well, but well enough for the product being produced

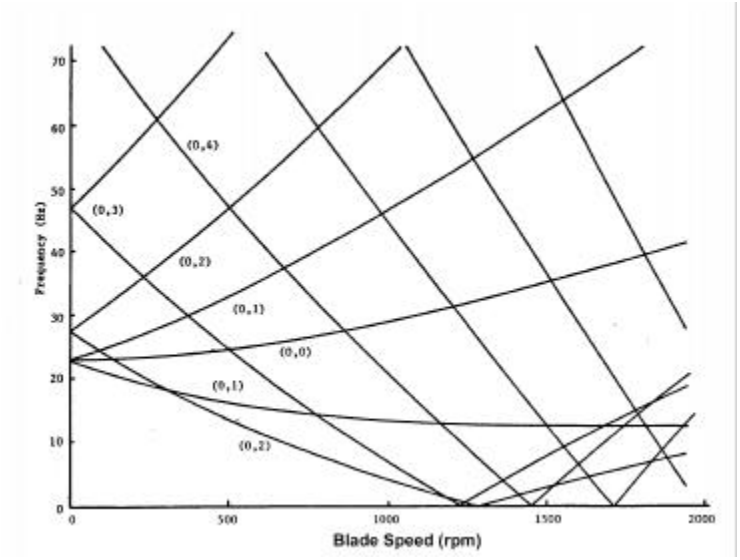
This is an example where the basic rules of saw design can't be broken, but they can be stretched to meet the needs of the mill.

Faster speeds can also be achieved by increasing the arbor speed. A general rule 5 years ago was that carbide saws shouldn't run at more than 12,000 fpm and Stellite, not more than 13,000. However, with advances in tipping procedures and materials there are saws running at 14500 fpm. Most of these saws are Stellite tipped.

If you are going to use carbide at high speeds, then surface contamination must be eliminated, and the annealing must be done properly.

Critical speeds……

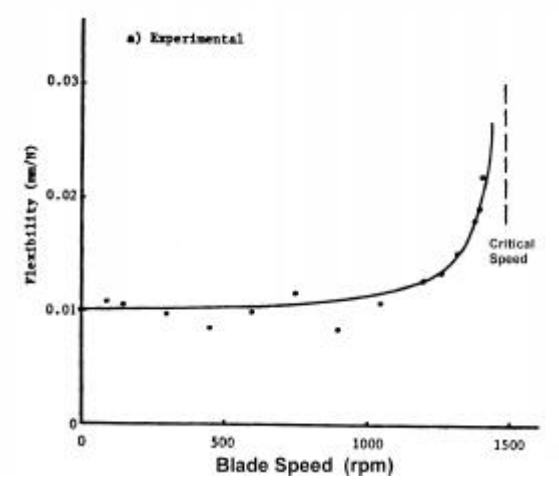
Speed Plot for a Collared Saw



For collared saws there are a series of critical speeds. You don't want to run at or near any of these speeds otherwise the saw will have no stiffness and snake.

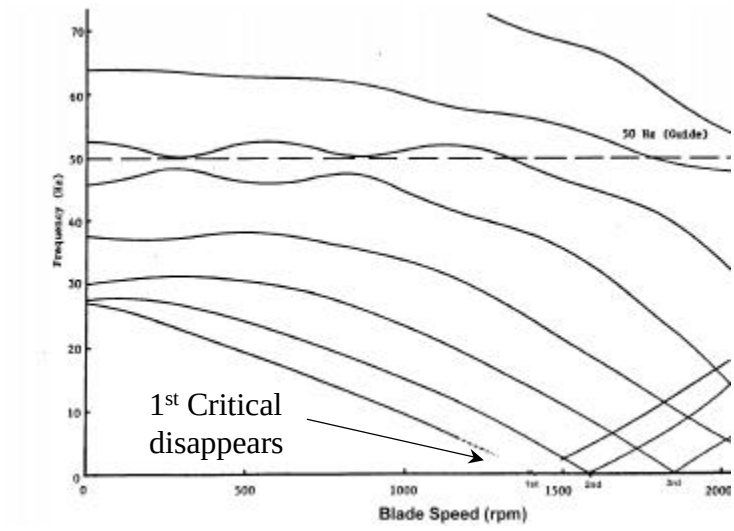
There are first, second, third…. Critical speeds

Effect of Speed on Deflection



Data for a collared saw showing how deflection increases coming up to the first critical speed.

Speed Plot for a Guided Saw



Guided circular saws also have critical speeds, but the first critical speed doesn't seen to appear.

This leaves the second critical speed as the one to watch out for.

We don't know why this first critical "disappears", but the testing seems to fairly consistent on this. Many guided saws run at what is theoretically the first critical speed.

This allows a faster arbor speed than what we thought possible in the past. Although some machines are running above the 2nd critical, you have to find a safe operating speed.

Stainless Steel Plate

- Corrosion resistant
- Harder – hold level & tension
- Slightly more stiff
- Heat stays in the teeth

Stainless saws originally intended to replace chromed saws where saws are being discarded because corrosion is making the saws too thin for tight guide clearance tolerances.

Now, with chroming plants having trouble staying in business due to environmental regulations.

Other benefits were found when stainless saws are used –

1. Slightly stiffer than standard saw steel
2. Slightly harder, so they hold their tension and level better.
3. However, also more difficult to initially level.
4. Stainless does not conduct heat as well as standard steel, so heat from the teeth does not get into the plate, resulting in a stiffer saw when cutting.

Variable Pitch

- Long used in metal cutting
- Breaks washboard vibration
- Perhaps a smoother cut

Most commonly talked about for bandsaws, but also common for circular saws now.

Variable pitch is common in precision metal cutting, especially reaming and milling.

Helps to break up any vibration generated at the teeth, such as washboarding.

May produce a smoother finish since plate vibration is reduced.