

Double Pulse Technology Reduces Vibration in Metal Band Sawing

Vibration has always been an inherent and unwanted characteristic of metal sawing, a trait machine and blade manufacturers have been working to mitigate for decades. Compounding the challenge is the need in today's market for cutting harder, larger-sized materials. Machine manufacturers have developed damping devices, while blade companies have focused on varied-pitch blades and special tooth designs to reduce band saw vibration. Though these attempts have shown limited success in increasing blade life and cutting rates, vibration continues to be a problem.

In response, Amada Cutting Technologies Inc., La Mirada, Calif., developed Double Pulse Cutting, designed to maximize productivity and blade performance by reducing vibration and

cutting resistance.

Double Pulse Cutting employs a totally new metal band sawing mechanism, developed in conjunction with a major motor manufacturer. The partnership produced a technologically advanced pulse drive motor that virtually eliminates vibration, according to Amada.

When metal is being sawed, two types of vibration occur at the cutting area: frictional vibration and tooth tip vibration. Figure 1 depicts these two wavelengths, and the cutting noise created during conventional operations. As the number of cut pieces increases, the sound pressure level also increases, indicating that the noise level is proportional to the wavelengths of vibrations. Therefore, eliminating these vibrations will reduce cutting noise and increase cutting efficiency.

Controlling tooth tip vibration is the key to producing quality

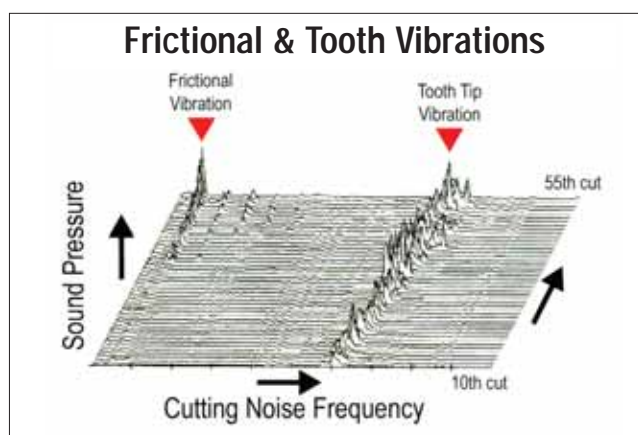


Figure 1—When metal is cut using conventional sawing technology, two types of vibration occur: frictional vibration and tooth tip vibration. As the number of cut pieces increases, the sound pressure level increases. This noise level is proportional to the wavelengths of the vibrations. Therefore eliminating these vibrations will reduce cutting noise and increase cutting efficiency.

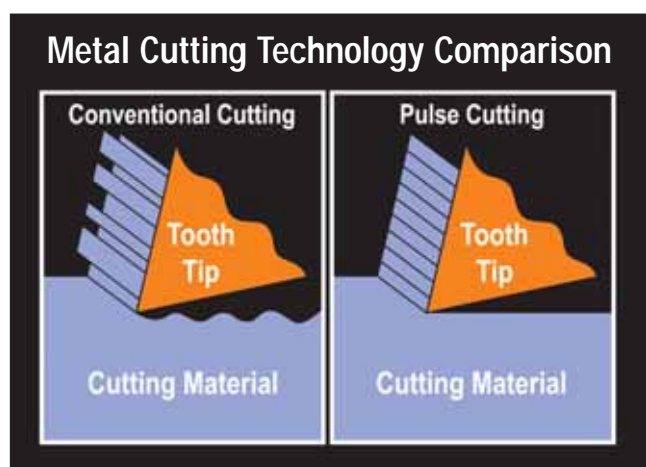


Figure 2—In conventional cutting, tip vibration causes excessive chipping, and chipped teeth produce a poor quality cut. Pulse cutting controls tip vibration, reducing chipping and improving the surface finish and blade life.

Editor's note: This article was contributed by experts at Amada Cutting Technologies Inc.

Double Pulse Technology

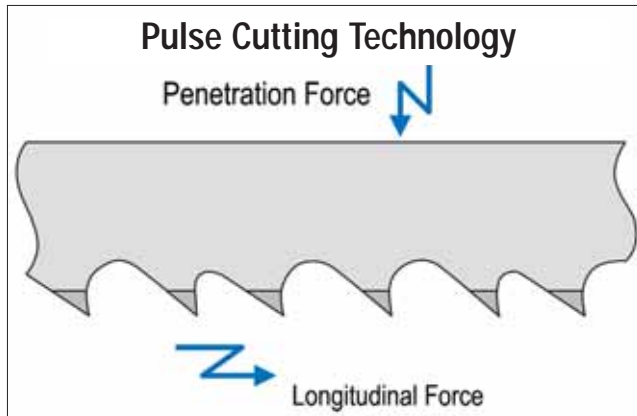


Figure 3—In metal sawing, two forces are required for efficient cutting: longitudinal force and penetration force.

surface finishes and increased tool life. Tooth tip vibration causes excessive tooth chipping, and chipped teeth produce an unacceptable surface finish. As illustrated in Figure 2, pulse cutting reduces chipping and improves the blade life and quality of the cut, compared with conventional cutting.

Understanding these concepts, Double Pulse Cutting Technology was developed to eliminate vibrations, preventing premature blade tooth wear, material damage and undesirable noise
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Pulse Cutting Effect Analysis

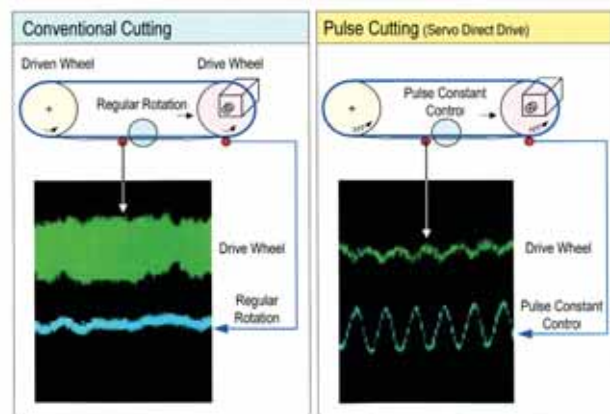


Figure 4—Pulse cutting technology, driven by a special high-output servomotor, sends out vibration-dampening pulses to the blade. By canceling out the blade vibrations, the pulses reduce cutting resistance and tooth chipping for increased blade life and improved surface finishes.



Low Cost Per Cut. High Cutting Rates.

Amada's PCSAW700 features an advanced servo drive system that produces ultra high-speed cutting with minimum vibration and noise. The unique AC servo drive also maximizes efficiency of blade performance. Here are more features of this high-speed performer:

- **Double Pulse Cutting**
By controlling vibrations that occur due to the penetration force, pulse cutting reduces cutting resistance and blade wear by 50%.
- **Automatic Adjusting Double-Wire Brushes**
The new automatically adjusted double-wire brush design assures keeping the chip area of the blade clean for maximum life of blade and brushes in all types of cutting.
- **Lower Costs**
Extended blade life ensures lower operating costs.



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levels while increasing productivity.

Here's how it works: In metal sawing, two forces are required for efficient cutting—longitudinal force and penetration force (see Figure 3). The function of the dual pulse is to keep both forces at a constant. By controlling these forces, high cutting rates and minimal noise levels can be achieved.

Figure 4 shows the pulse cutting effect analysis in the longitudinal direction. In conventional cutting, the rotation of the band saw's drive wheel creates consistent blade speed. This creates frictional vibration and generates high amounts of tooth tip vibration.

In pulse cutting, the drive wheel is controlled by a special high-output servomo-

tor. This servomotor assures constant blade speed control of the longitudinal force and eliminates the vibration at the cutting area. In short, the servo direct drive wheel sends another vibration to cancel out the frictional vibration to the blade. This is the first pulse.

The second pulse enhances penetration force by sending vibration-dampening pulses to the blade. These mechanically induced pulses are created by a very precise set of multi-lobe cams mounted above the blade, both spinning at a predetermined RPM to strike the blade at exactly the same time, producing successive pulses that assure proper damping. These successive pulses reduce cutting resistance and tooth chipping for increased blade life and

improved surface finishes.

It has been said it is nearly impossible to simultaneously satisfy the four desires in metal sawing—high cutting rates, high quality, low noise, and long blade life—because they contradict each other. But Amada claims that its Double Pulse Technology addresses these contradictions in a sawing system that offers maximum cutting rates at the lowest possible cost-per-square inch of metal removal. ■

Amada Cutting Technologies Inc., La Mirada, Calif., sells and distributes band saw machines, bi-metal blades and parts. For more information, visit www.amadabandsaw.com.