JDT

June/July 2004

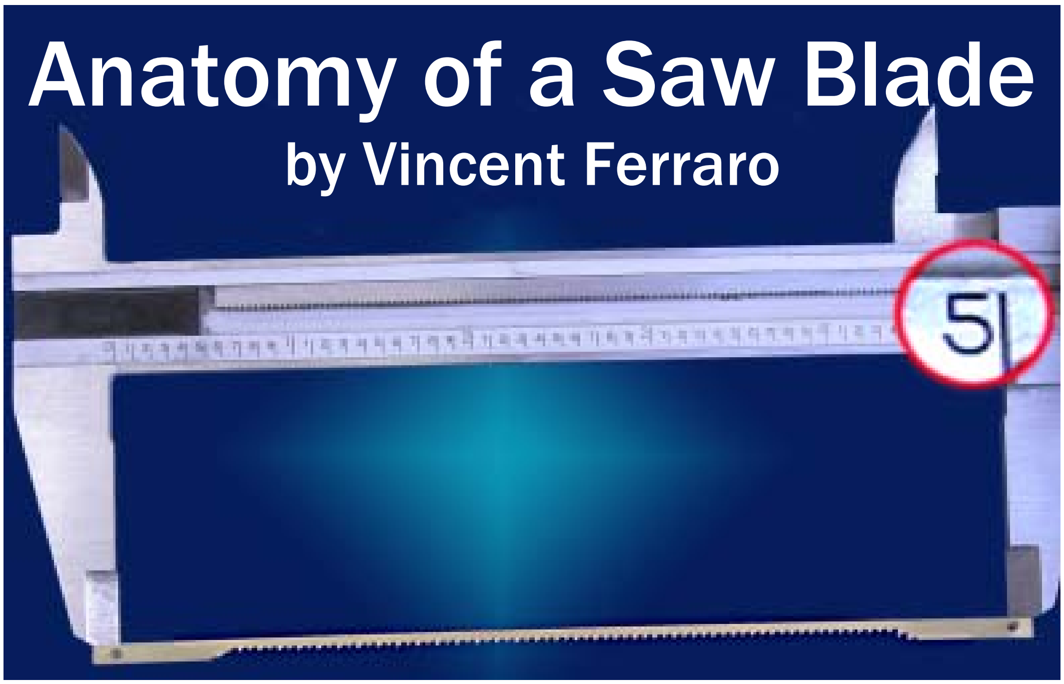


Figure 1

Although the saw blade provides an invaluable contribution to process, the importance of understanding the physical properties and principles is often overlooked. In this article we will focus primarily on the blades used to section the traditional pinned die stone model.

However, with the introduction of new die stones, stone enhancing liquids, synthetic and epoxy materials etc, there will be a need for a more comprehensive understanding of the properties of saw blades. This article will help you understand the different configurations and how they relate to selected applications.

Let's start by taking a look at the dimensions and properties of the 5" blade, one of the most commonly used in the dental lab. The length (size) of the saw blade is measured from pin to pin, or to be more precise, from the center of one pin to the center of the other pin **(Figure 1)**.

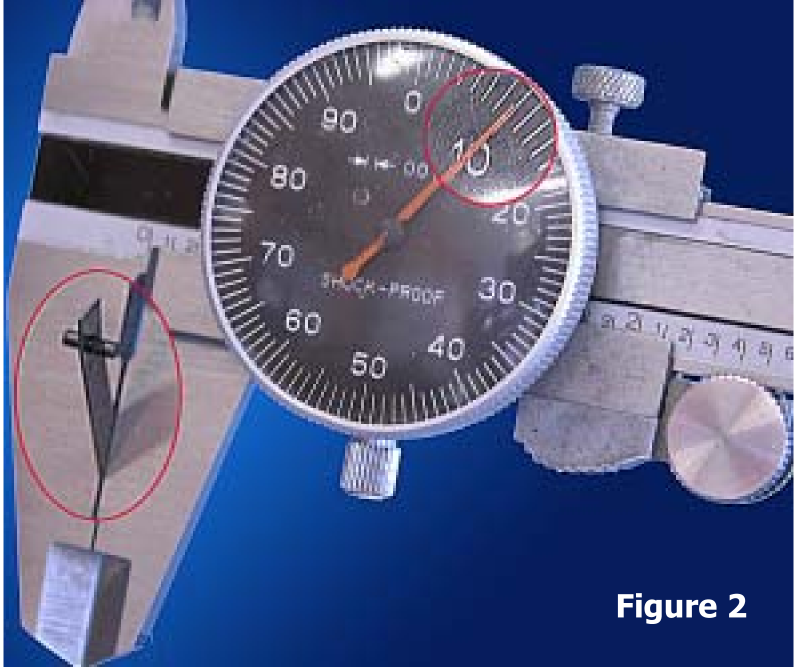


Figure 2

The thickness of the blade is measured from side to side in an area where there are no teeth; this allows you to measure the original thickness of the metal band- stock material used to fabricate the blade. Ten thousands of an inch (.010) is a very common thickness **(Figure 2)**. Seven thousands of an inch (.007) would be considered thin or ultra thin.

The width of the saw blade is measured from its back to the tip of its teeth **(Figure 3)**.

Sixty eight thousands of an inch (.068) is a common width. Note that some blades may be wider in the area of the pin, but that reference is not a factor in determining the blade width. TPI stands for teeth per inch. The blades most frequently used in dental labs have 18.5 TPI and are considered a standard cut **(Figure 4)**; 25 TPI is considered a fine cut.

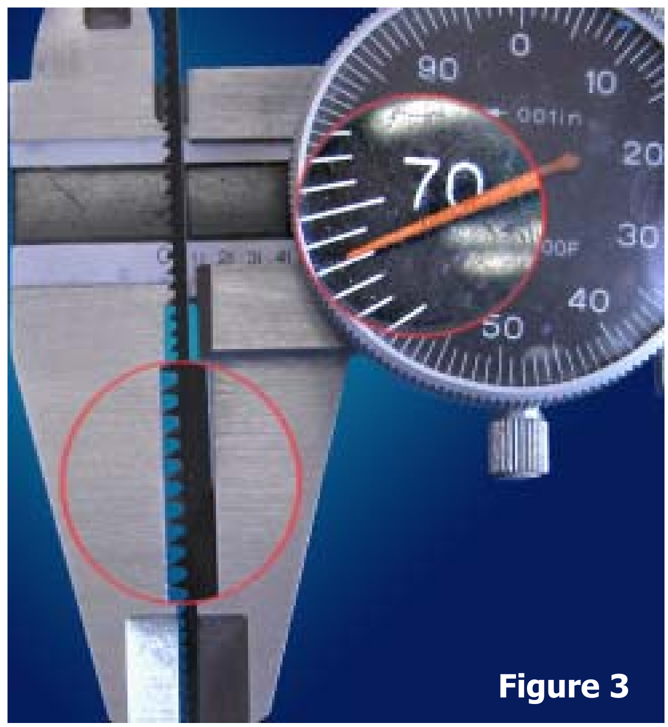


Figure 3

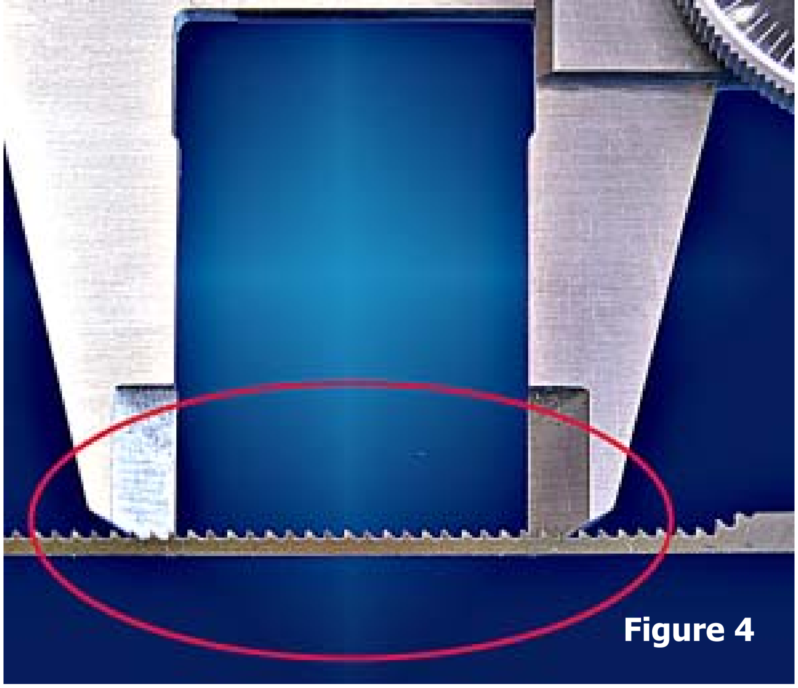


Figure 4

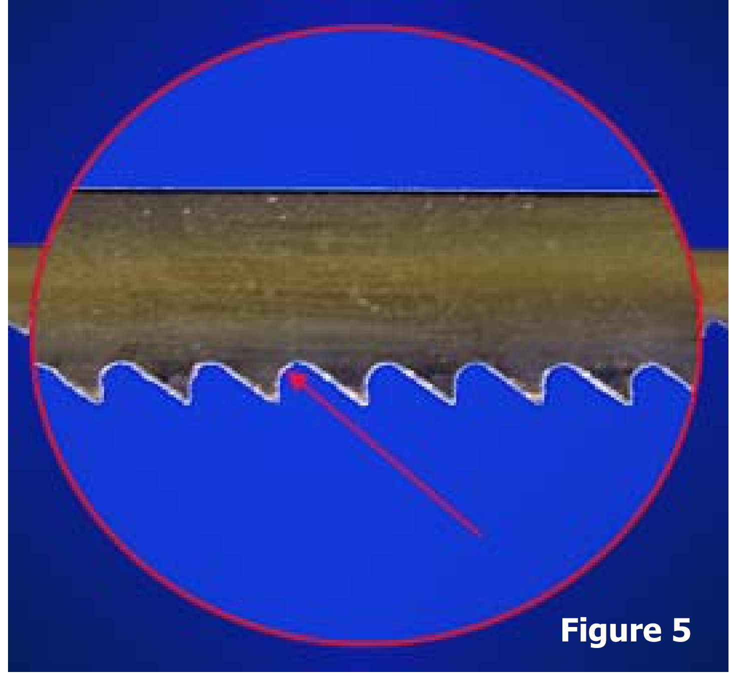


Figure 5

In the process of shaping the teeth of the blade, a concave area called a "gullet" is formed **(Figure 5)**. The gullet serves several functions that can be explained using the analogy of a plow: as a plow moves forward its concave configuration bite into and force the earth to ride up into the gullet, extracting the earth from the furrow*.* The gullet of dental saw blades serve a similar function except that the extracted material is die stone dust.

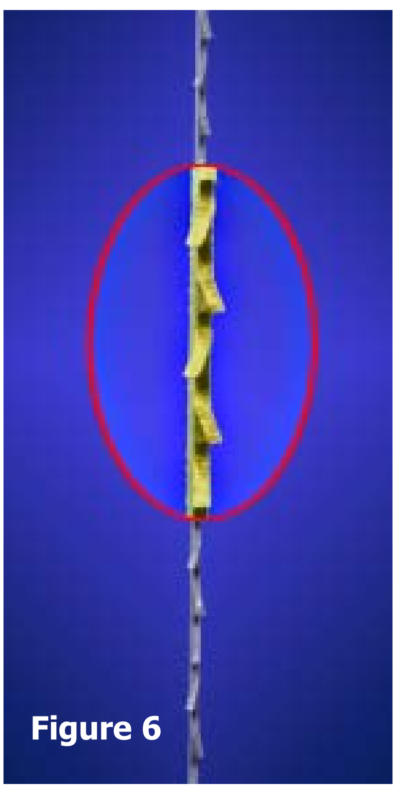


Figure 6

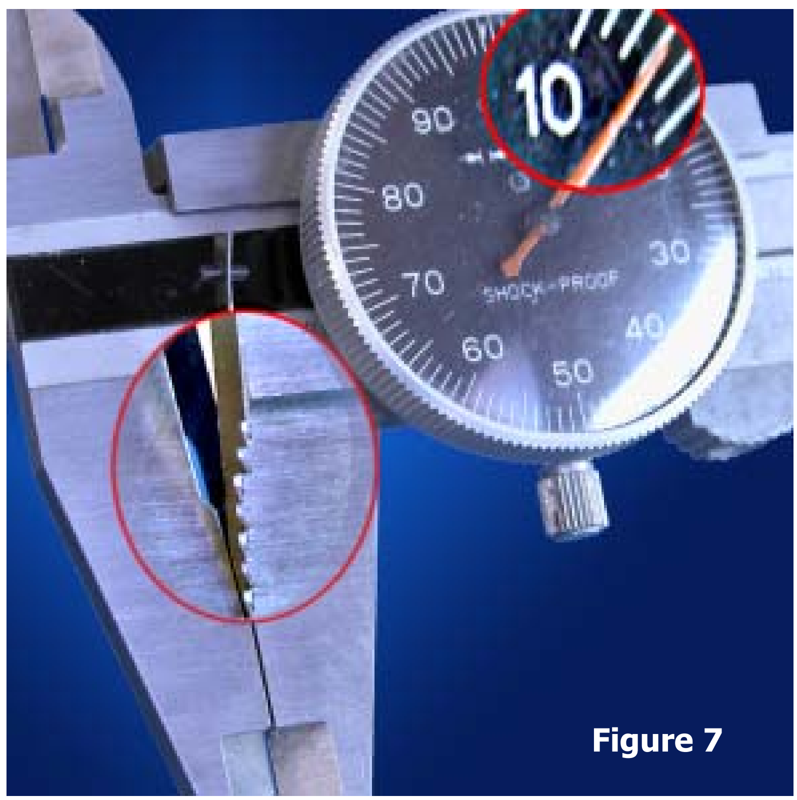


Figure 7

Positioning the blade so the teeth face you, notice that the teeth are not in a straight row; they are intentionally bent to the right and left in an alternating pattern known as the "set" **(Figure 6)**. If you measure the thickness of the blade in an area across the "teeth set", you will see that it is thirteen thousands of an inch (.013) **(Figure 7)**.

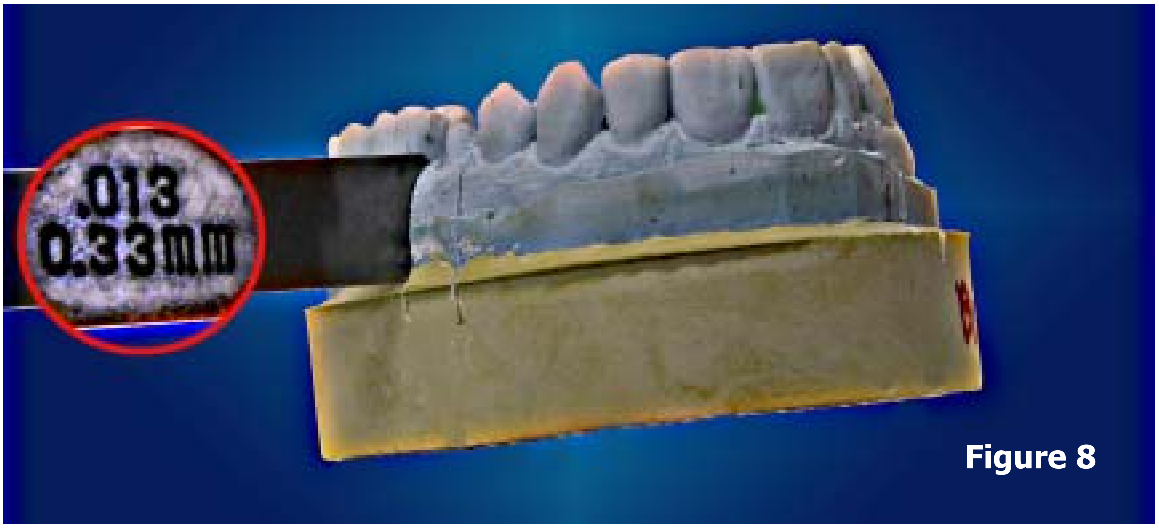


Figure 8

However, the thickness of the blade measured in an area without teeth is ten thousands of an inch (.010) **(Figure 2)**. The function of the set is to create a "curf" wider than the thickness of the metal band-stock. The curf is the width of the area removed: referring back to our plow analogy, the width of the furrow. A thickness gauge in the curf reveals that it is thirteen thousands of an inch (.013) **(Figure 8)**.

Awareness of the teeth's orientation is important: it determines the direction of the "cutting stroke". If the teeth point towards the handle (author's preference) cutting occurs as the saw is pulled towards you. On the cutting stroke slight downward pressure assist in helping the teeth bite deeper into the die stone and more rapidly advance the cut. As the saw cut proceeds, observe how the gullets help carry the stone dust out of the curf and how the set of the teeth create a curf wide enough to prevent binding of the blade and also necessary clearance if you want the cut to curve right or left.

Pushing the saw away results in little, if any, cutting. One could consider the pushing (return) stroke an opportunity to relax your grip on the saw and conserve energy. This process, described as a cycle, consists of the cutting stroke and the return stroke.

I would strongly recommend that the model be held in place with a model clamping device. Stabilizing the model with hand pressure over time could cause unnecessary fatigue.

Analyzing Context:
Small Preps and Dowel Pins in Close Proximity

In instances where very little space exists between dowel pins the conventional technique of sawing from the margin down to the model base could produce undesirable results. It may be preferable to saw from the bottom of the die up towards the margin **(Figure 9)**.

Start by centering the saw blade between the dowel pins **(Figure 10)**. Lightly stroke the die section over the inverted saw blade to create a track. Verify that the track is centered between the pins, continue to complete the cut. When using an instrument, as in the photo, greater control can be obtained if the saw blades teeth point away from you, in which case the cutting occurs as the die is pulled towards you.

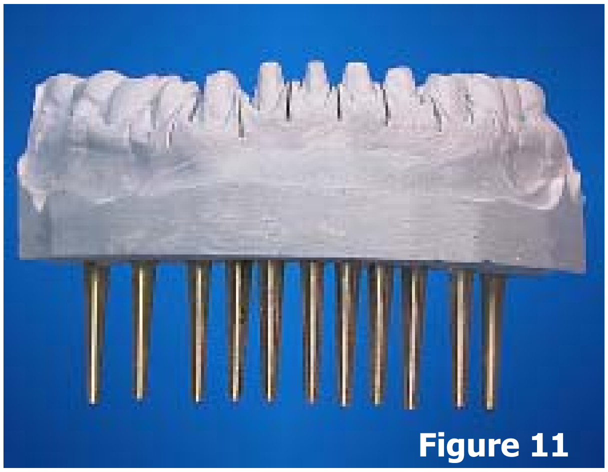


Figure 11

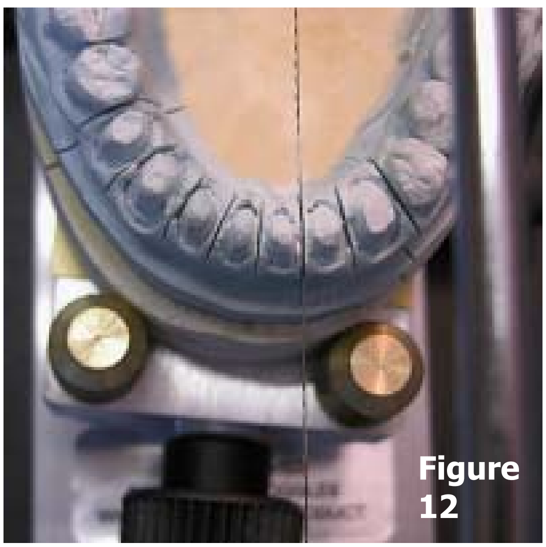


Figure 12

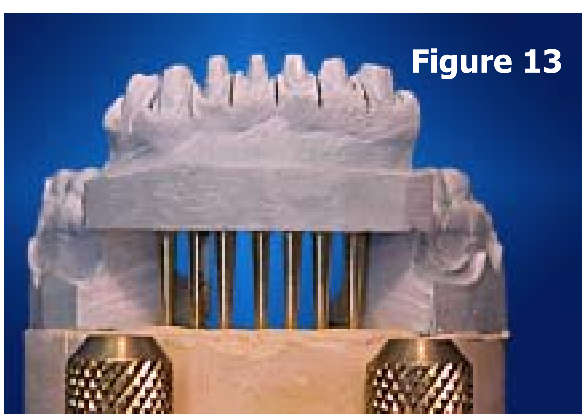


Figure 13

A ten thousands of an inch (.010) blade for rigidity, with 25 TPI for less aggressive cutting action, would be a good choice if conditions allow it. There are instances when just cutting from the bottom of the die up to the margin is not as viable as discussed previously.

The ten thousand of an inch (.010) blade chosen for its rigidity may be too thick for the closely spaced margins of the preparations; or the ideal angle of the cut from the margin side may differ from what would be ideal on the base side. Note the instance of crowded preps and dowel pins **(Figure 11)**.

The technique that may address both problems would be to pre- saw each section to a depth that is below the margins. Use a seven thousand of an inch (.007) saw blade to preserve the margins integrity.   Note, to provide greater visibility: an offset saw- frame should be used for this procedure **(Figure 12)**. Now saw completely through the distal of the # 22 and # 28 die. The block of seven dies can be removed as a single section **(Figure 13)**.

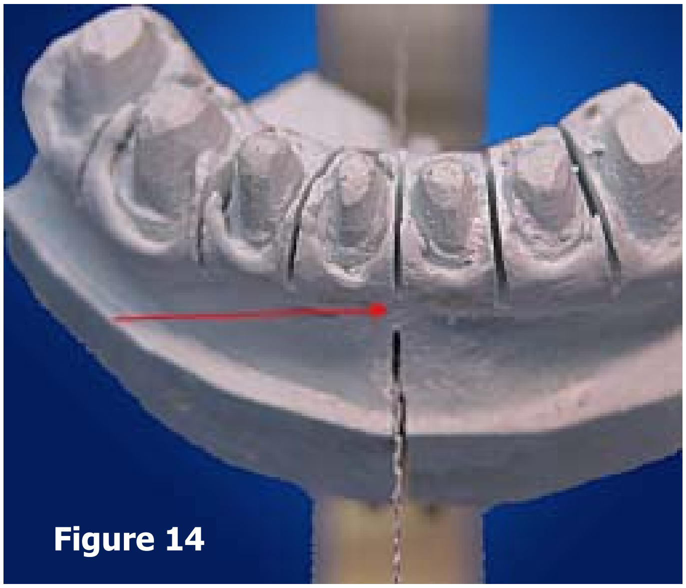


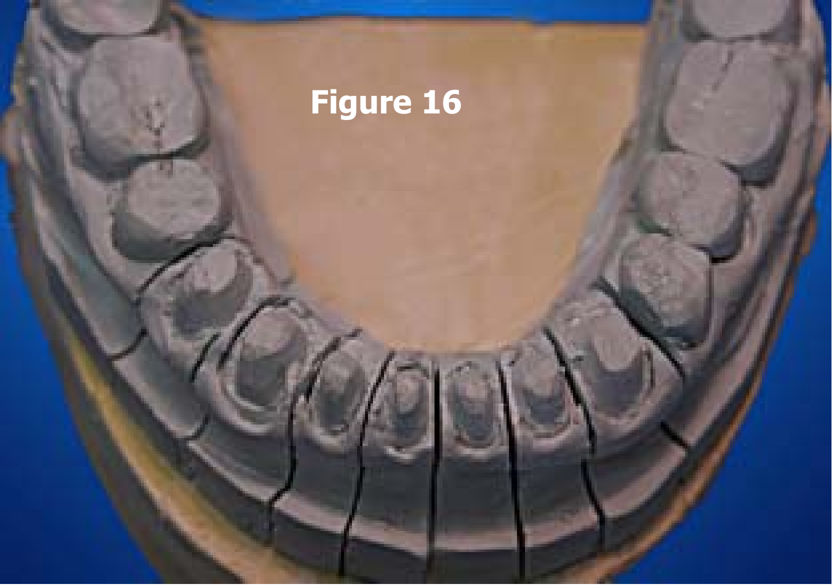
Figure 14

If you prefer working with smaller sections, locate cut **(Figure 14)** and proceed using the same technique indicated previously. While the (.007) blade is ideal for the pre- saw cuts, the blades lack of rigidity may make the cuts between the dowel pins more difficult. Consider using a .010 (25 TPI) blade to cut upwards until both cuts meet **(Figure 14)**. If your models are processed rapidly and still retain a fair amount of moisture you may discover that when using the finer (25 TPI) blade the gullets become loaded with the moist die stone dust and inhibit efficiency. In this instance, consider drying the models or using the coarser 18.5 TPI blade as circumstance allows.


Figure 15

Repeat these steps until you have seven individual dies, each resembling the die in **Figure 15**. Upon completion of all saw cuts, reassemble the individual dies back into the base **(Figure 16)**. It is now ready for the next process, trimming the margins.

In general blades with more TPI (IE: 25) are less aggressive, with less tendency to chip the stone, making it more ideal for cuts in the margin area. Blades with fewer TPI (IE: 18.5) are more aggressive. Whenever possible select the thicker and more aggressive blade, if conditions allow.



Ideally, a well equipped model department should have a minimal of three hand saws with the follow blades pre-mounted: #1 .007 (25 TPI); #2 .010 (25TPI) and #3 .010 (18.5 TPI). Ultimately, the empirical method determines which blade works best in a given situation. However, having knowledge of blade properties and access to a variety of blade configurations will help speed up and refine the process of choosing the optimum blade needed to address more challenging and problematic technical procedures.

About the author:

Ferraro has been a technician and lab owner for 35 years. He is also the founder of Ferraro Engineering, a company specializing in innovative design instruments for the dental lab. He can be reached at (520) 378-6597 or vmferraro@cox.net.