Wagner Die Supply®
Diemaking & Diecutting Source and Resource

VALU-EDGE™
Wagner Products & Technical Support
NEWSLETTER

What's inside...

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Service, Innovation & Quality Since 1947

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Wagner Punches

Technical information, details and advice on how to get the most out of Wagner Punches.

Wagner punches have been at the forefront of design and quality manufacturing since their introduction in 1947. Our quality and innovation, has always been on 'the cutting edge'.

Punches are sophisticated tools, they require high-technology production techniques to design and produce, and in-turn require specialized knowledge to get optimum results in their usage.

We've dedicated this issue of *Valu-Edge Newsletter* to technical tips and information on Wagner Punches. It's our hope that this information will help you to get the very optimum performance from Wagner Punches.

As always, your Wagner representative is ready to answer questions regarding any of our products and assist you to properly implement them into your operations.

Wagner Punch TECH:

Optimizing the Performance of Wagner Punches.

Getting the best performance from the comprehensive range of Punches produced by Wagner Die Supply should be relatively simple. However, there are some key safeguards to be taken and some potential problems to avoid, to ensure the punch delivers the precise diecutting performance it is capable of.

A steel rule punch is a unique engineered tool, which must be integrated into and with the balance of the steel rule die to ensure effective and compatible performance. The reason it is necessary to take more care with the specification and the integration of punches is while they are intended to be used in a steel rule die, they have very different cutting characteristics from standard steel rule knife.

There are immediately a couple of key differences. The steel punch reacts to applied pressure very differently than the steel rule blade. The steel punch is rigid hardened steel, which provides maximum support to the very tip of the cutting edge. See illustration 1. By comparison the steel rule knife has limited resistance to lateral deflection, see illustration 2, and is only supported for two thirds of its height. See illustration 3.

When pressure is applied to a punch and to steel rule, the steel rule has the ability to deflect under load, see illustration 4, and this must be taken into consideration, when analyzing and specifying the most effective punch parameters for the intended diecutting application.

The punch has to be a rigid tool because it must resist "Inside/Outside" pressure imbalance. After all, that is why we invest in the punch, because while bending the shape using steel rule of sufficient hardness is difficult, it is the inside-outside pressure imbalance, which causes the bent shape to flex apart, particularly at the joint intersection. See illustration 5.

The type of anvil the diecutter is using is also critical. When using a hard anvil, it may be effective to lower the height of the punch slightly to compensate for surrounding steel knife compression, deflection and damage. See illustration 6. However, when using a soft anvil the cutting edges of the knife and the punch are slightly penetrating the surface of the anvil, see illustration 7, which eliminates deflection and compressive damage, and to enable both punch and knife to coexist effectively.

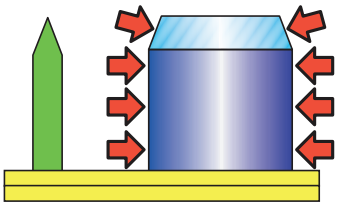

Illustration 1.

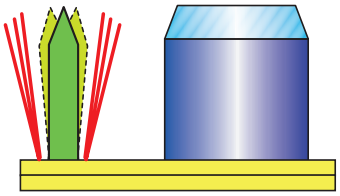

Illustration 2.

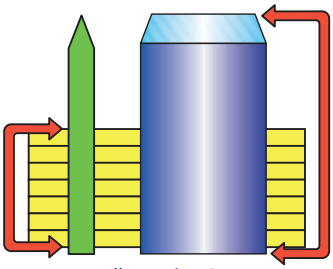

Illustration 3.

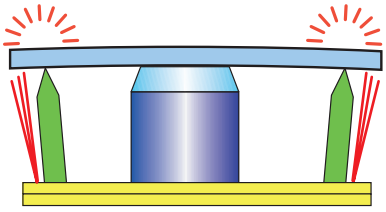

Illustration 4.

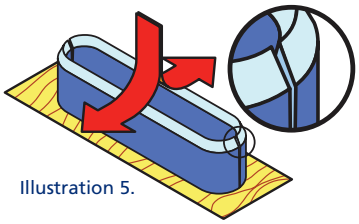

Illustration 5.

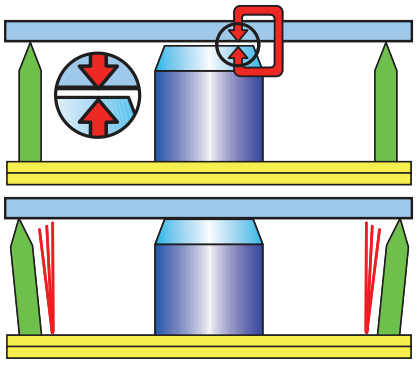

Illustration 6.

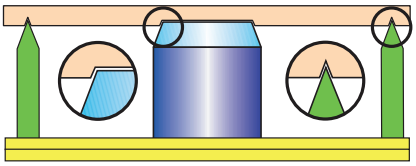

Illustration 7.

Continued on next page...

Wagner Punch TECH:

Optimizing the Performance of Wagner Punches. (continued)

In fact, when using a soft anvil, it may be an advantage to invest in a long bevel punch, see illustration 8, or perhaps to consider a serrated edge, see illustration 9, depending upon the type of material being diecut.

In practice the integration of steel punches into a steel rule die, should be part of the solution, and not part of the problem, therefore, it is an advantage to consider both problems and solutions in optimizing the performance of the entire steel rule die/punch combination.

The Problem

While we have described many of the benefits of the steel punch, there are many diecutting problems, which can be traced to poor utilization of this specialized tool. These may include some of the following issues:

- A slow cutting make-ready
- A soft, spongy cutting impression
- Cutting variation
- Unstable cutting
- Poor slug ejection
- Inconsistent stripping
- Punch damage and failure
- Cutting plate damage and marking
- Short punch life

This is a good cross section of reported problems throughout the industry, so let us examine one of the potential causes.

Failing to verify the verticality of the laser-cutting beam

One of the more dangerous assumptions in dieboard manufacturing is to assume the laser beam, the jigsaw blade, or the routing tool is at 90 degrees to the base of the dieboard. See illustration 10. A laser is an optical device and the cleanliness and the condition of the optical system, can significantly impact cutting performance and key kerf parameters.

In particular, if the laser optical system is not maintained carefully, the verticality of the kerf can be different in different directions of laser cutting. See illustration 11.
If the punch is not perfectly vertical, the impact on punch seating and cutting properly will be affected. Damage to the cutting plate will occur.

An important item to check during a steel rule die inspection is to verify the verticality of the kerf holding the punch and steel rule. See illustration 12

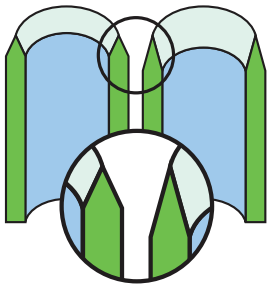

Illustration 8.

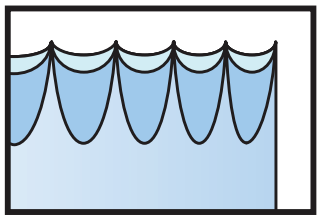

Illustration 9.

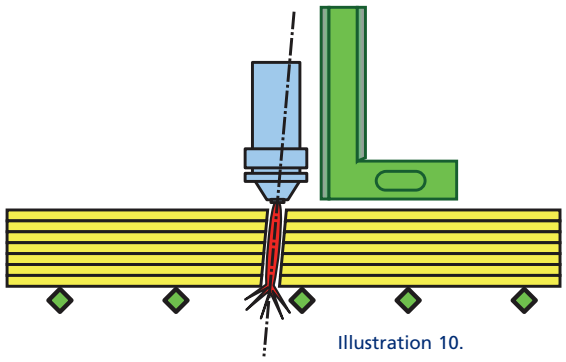

Illustration 10.

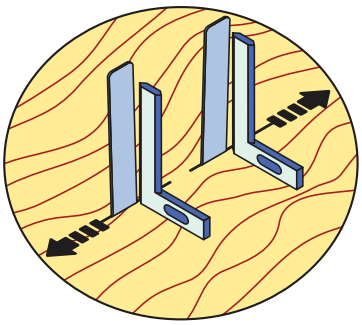

Illustration 11.

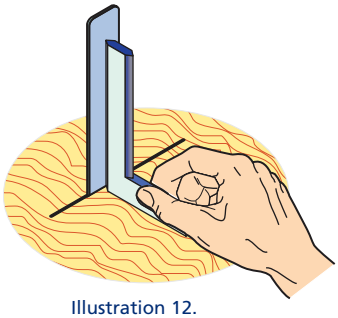

Illustration 12.

Wagner Punch TECH:

Why do punches require "more" pressure to diecut?

If you examine well-used press cutting plates, you will often see the "pressure shadow" or even an indentation in the surface, formed by a steel punch. This is hardly a surprise, but it is useful to understand why this happens, and what if anything you can do to avoid this potential problem.

In diecutting we use a basic formula for pre-calculating the pressure required to diecut. This states that for every 1-inch of knife, 300 pounds of pressure is required to diecut a material. However, what is intriguing about this pressure calculation is if the 1-inch of knife were bent into a "U" shape, the pressure to diecut the material has increased! See illustration 1.

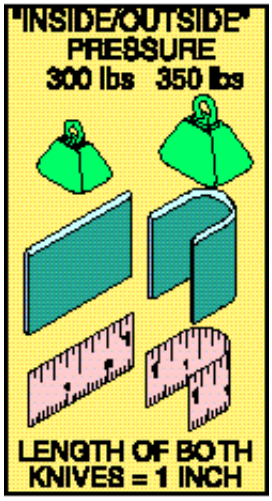

Illustration 1.

Why is this?

We are seeing the result of a basic principle of diecutting called "Inside-Outside Pressure." The correct question to ask is,"Where does pressure come from in diecutting?" We know, for example, when diecutting less than 30% of the pressure required is consumed by penetrating the surface of the material, but more than 70% of the pressure is required in splitting the material apart. See illustration 2. This is telling us that platen diecutting is a "displacement process," and the most important feature of the knife is the bevel angle of the blade, and we can control displacement by changing the bevel angle or the profile of the blade. See illustration 3.

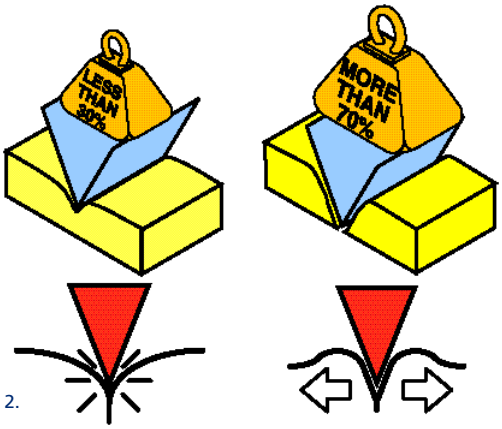

Illustration 2.

What is happening?

As a blade is punched into and through a material, the knife/wedge pushes the material laterally away from the centerline of the knife, with sufficient force to split the material, generally before the tip of the knife

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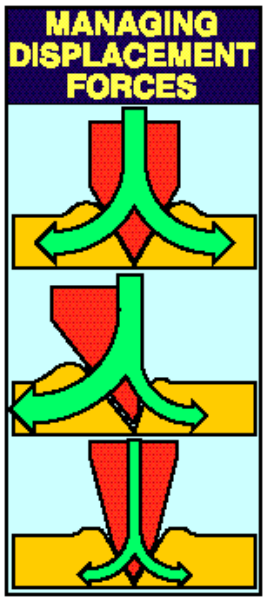


Illustration 3.

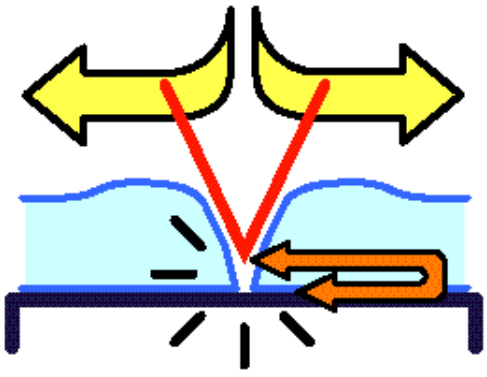


Illustration 4.

Wagner Punch TECH:

Why do punches require "more" pressure to diecut? (continued)

strikes the cutting plate. See illustration 4. With the majority of the pressure expended in converting the vertical force of diecutting into a lateral splitting action, it is obvious that as two knife/wedges are brought closer together, the material between the blades must compress and absorb the two inside bevels of the blades. In practice what happens is the imbalance in lateral pressure, between the "inside" and the "outside" of the ruled shape, will force or deflect the top of the knives apart. See illustration 5.

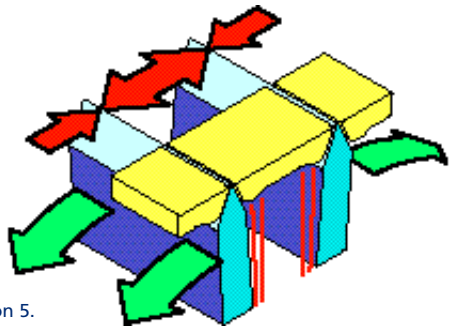


Illustration 5.

There is a limit to the ability of a material to absorb this much deflection, which means as the blades get closer together the pressure to diecut the knives gets higher and higher. See illustration 6. This is called Inside-Outside Pressure in diecutting, and this is why narrow slots are not only difficult to diecut, the blades will often flex apart and fracture. See illustration 7.

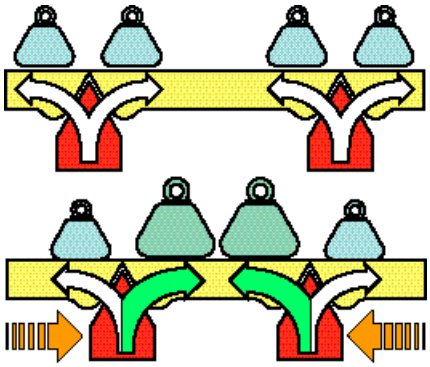


Illustration 6.

The punch is obviously the prime example of this type of pressure imbalance. It is almost impossible for the relatively small "inside" slug of waste material to laterally compress to absorb both "inside" bevels of the punch. This classic imbalance between the inside displacement pressure and the outside displacement action of the punch bevels, causes the overall pressure to diecut, to climb dramatically.
See illustration 8.

So how do we solve this pressure problem?

There are a multitude of bevel and cutting edge options when you examine the Wagner steel punch portfolio. And of course it makes a considerable difference if the cutting process is hard or soft anvil; if you are cutting single or multiple layers; the density and toughness of the material; the design and the concentration of punches; and the caliper and construction of the diecut material.

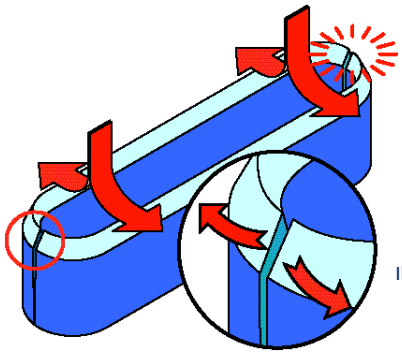


Illustration 7.

The impact of Inside-Outside pressure is an important factor in tool design and specification, and it is vital to choose the right punch, for the right material and the right application. To discuss these and other factors, it is an advantage to discuss your specific punch and diecutting needs with one of our team of technical experts.

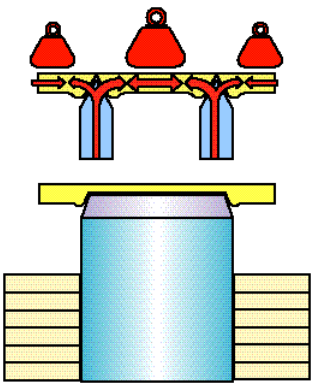


Illustration 8.

Wagner Punch TECH:

Wagner Inside-Inside Serrated Punches Cut Effectively with Less Pressure.

On the previous page punch cutting pressure was discussed and explained. As a direct result of our research, Wagner developed it's line of Inside-Inside Serrated punches.

These uniquely-designed punches feature a 10-tooth design, a shallow .011" gullet that produce ridge-free cuts with less pressure due to it's specially-designed serration configuration.

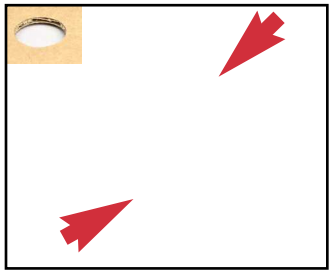
Wagner Inside-Inside Serrated punches produce cleaner cuts, require less ejection materials, and reduces damage to anvil covers to boot! Plus you get crisp, precise sharp-edged cuts and the waste cannot stay in the punch, requiring less ejection material - if any at all on some applications!

Wagner Inside-Inside Serrated punches also dramatically reduce board crush, for an overall finer quality cut part.

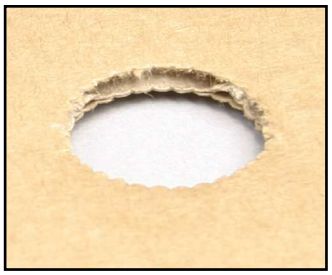
Wagner has a complete line of Inside-Inside Serrated punches in a wide variety of cut sizes in stock, and can produce custom sizes upon request.

Contact your Wagner representative for more information on these and other innovative, and production-enhancing products from Wagner Die Supply - America's Die Supply Leader!

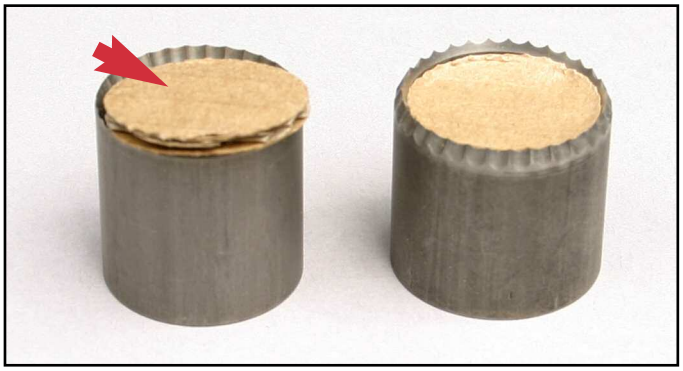
Available in 1" & 1.030high in the following diameter cut sizes:
3/8", 1/2", 5/8", 3/4", 7/8", 1", 1-1/8" and 1-1/4"
Other sizes and heights available upon request.



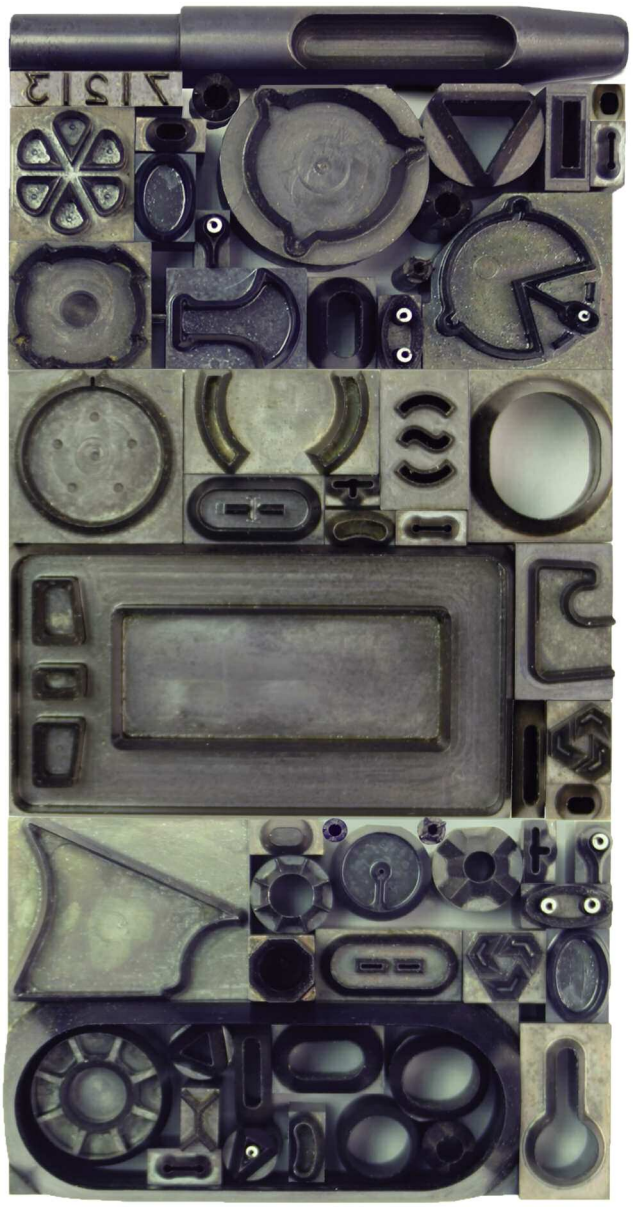
Actual cut with a Wagner Inside-Inside Bevel Serrated Punch. Note the clean edge cut with minimal tearing and board crush.



Actual cut with a Standard Center Bevel Serrated Punch.



Cuts were made into corrugated using no ejection material, notice the Wagner Inside-Inside Bevel Serrated on the left - the waste does not stay inside the punch, as it does in the conventional outside bevel and center bevel punch as shown on the right.



Wagner Custom Punches:

A Quality Wagner Punch for Every Application!

Since 1947, Wagner has been committed to being at the cutting edge of punch innovation and design. Today, we lead the industry with quality CAD design and machining, and a dedication to quality and value that has been a cornerstone of our operations since the very first day we opened our doors.

Wagner custom punches are manufactured to the same stringent quality standards as our standard punches. We work with our customers to develop and manufacture custom punches that meet their specifications and surpass their expectations.
We can work from CAD drawings, or work with you to develop a design that precisely fulfills your needs.
If you can think of it, we can produce it – it's just that simple!

Contact your Wagner representative today to discuss your punch needs, whether we have the solution on our shelves, or if we produce a custom punch for you, rest assured you'll be getting the very best in quality and value.

Members of:

IADD INTERNATIONAL ASSOCIATION of DIECUTTING and DIEMAKING