

# 5 Steel Rule Tech: Steel Rule Bevel Angles

Title: Diemaking 101: The Knife Bevel Angle

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## Diemaking 101: The Knife Bevel Angle

The bevel angle of the cutting knife is a feature we pay minimal attention to. See illustration 1. The bevel angle only becomes an issue when we change miter tools, or when trying a new type of cutting rule. While we admit the importance of the bevel angle as a key feature of a steel rule die, it is rarely factored into the design and specification of the tool. This is a great mistake, because the selection of the bevel angle and the bevel type is critical to on press quality and productivity.

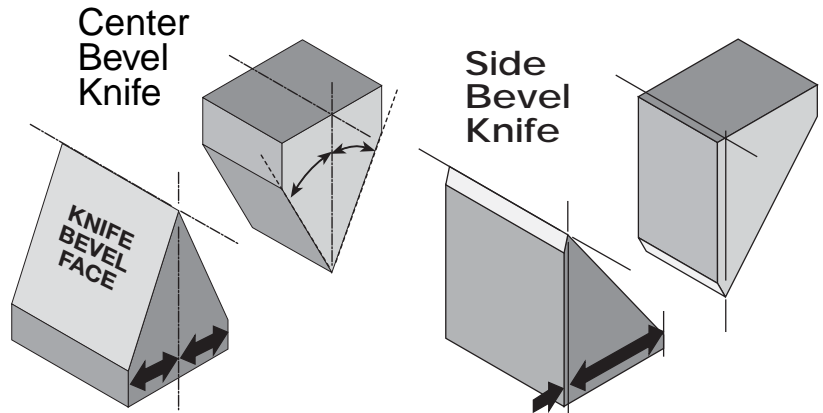


Illustration 1

Illustration 2

### The Knife Bevel Angle & Diecutting Pressure

The majority of knives are center bevel, with some side bevel, see illustration 2, and double bevel, for specialized applications. Why is the bevel so important? There are several factors we should consider.

The first is, diecutting is a Displacement Process. What does this mean? In platen diecutting we are not cutting in the conventional sense. This is not a slicing action but a more accurate picture is to imagine the knife as a wedge driven into a material, trapped against a rigid anvil. See illustration 3 (Note the lateral force and the material pressure ridges, generated by each type of knife). The material is not so much split by the knife-edge, but by the action of the bevel faces as they split the material and push it aside. See illustration 3. This description is confirmed in practice because the majority of diecut material splits before the edge of the knife has reached the cutting plate. See illustration 4.

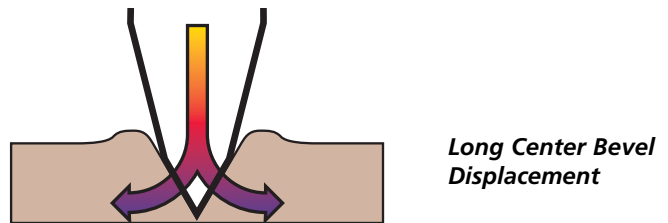
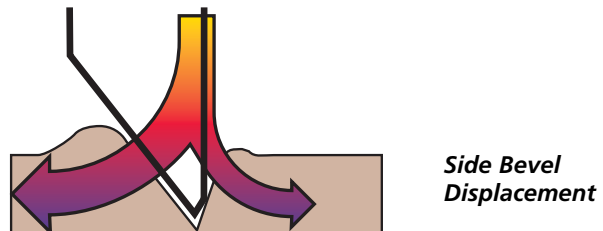
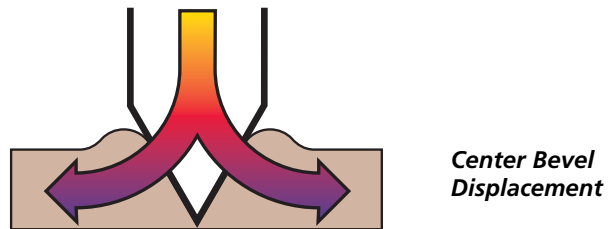


Illustration 3

### Material Displacement

The displacement of material is generally temporary, because immediately the press cycles, and the knife withdrawn, the edges push back together. However, in denser, tougher materials, the displacement ridge becomes a permanent feature of the cut edge. When this happens we substitute a side bevel knife, in which most of the displacement, and the majority of the splitting pressure is to one side. See illustration 5 on page 2. This shows the major bevel facing the waste and the minor bevel facing the diecut part. This means the diecut part will have smooth unblemished edges, with minimal distortion of the material, while the ugly pressure ridge will be pushed into the waste.

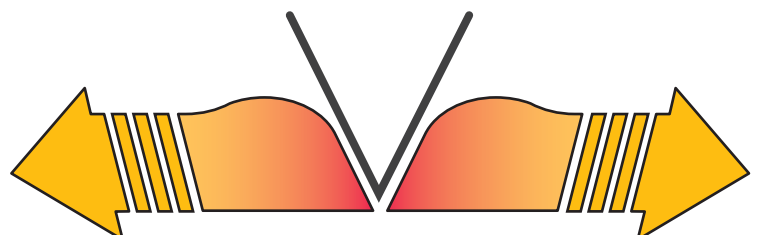


Illustration 4

(Continued next page)

### Where Does "Pressure" Come From?

Diecutting is about pressure management, and it is important to understand the source of pressure. Pressure in diecutting is the resistance of a material to full penetration of a knife with a specific bevel angle. What this means is if we increase the bevel-angle is reduced, and the amount of pressure require to diecut the material is lower.

**Therefore, the amount of "pressure" required to diecut a specific material, is directly related to the bevel angle of the steel rule used in the die.**

There are more articles in this series, they are: "What is "Inside/Outside Pressure?" ... "Is it Travel Distance or Pressure?" and "Pressure Balancing: The Key to Diecutting Success." Remember, the Wagner commitment to on-press success, so if you have a technical problem, please call.

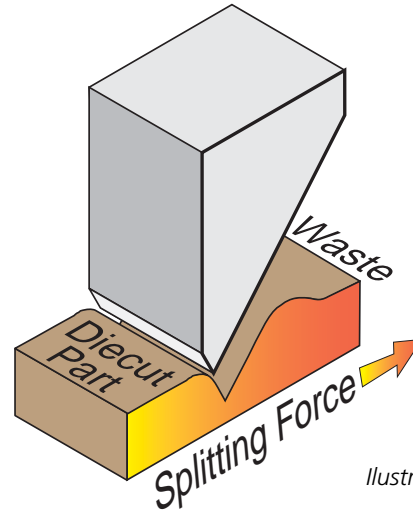
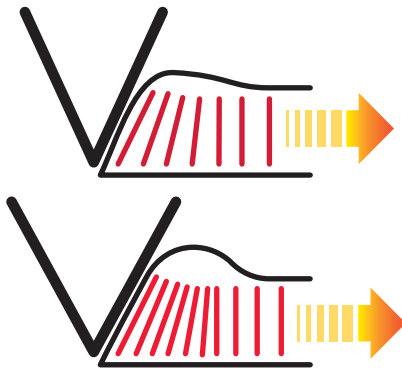


Illustration 5

**Higher Bevel Angle =**



**More Material Compression!**

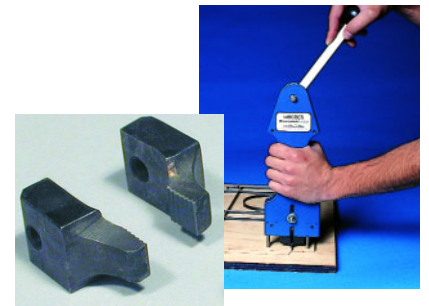
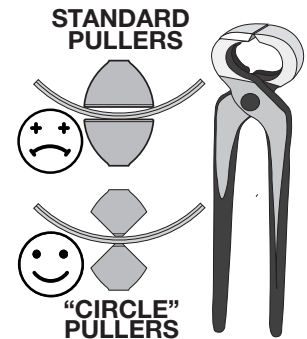
### Circle Rule Puller Modification

Here's an easy way to create a specialized "curved rule puller" from a standard rule puller.

Simply, grind or cut the sides of the jaws to a narrower profile (see illustration). By narrowing the area of contact, distortion from pulling will be minimized.

Of course for optimum rule pulling efficiency, **Wagner's Extractor 2000** is your best bet! Especially with the **narrow jaws installed** - especially well-suited for pulling curved rule.

**Order your Extractor 2000 from your Wagner Die Supply location today!**



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