



## Drag Knife Models D1, D2, D3 & D4

PATENT PENDING

### Instructions for Use

- **Important:** Read and understand all product warnings and instructions included with your CNC machinery and/or router before installing or using this accessory.
- **Important:** Read and understand all product warnings and instructions included with this accessory before installation or use.
- **Warning:** Unplug or otherwise disable the drive motors for your CNC machinery, spindle, and/or router before installing this accessory.
- **Warning:** Never operate your spindle drive or router with this accessory installed; the spindle or router acts only as a holder for the accessory and is not used to rotate it. Personal injury and damage to the spindle drive or router can result from spinning any unbalanced accessory.
- **Warning:** Blade is sharp. Always wear eye, hand, and other necessary personal protective equipment.
- **Warning:** The use of any blades other than the bimetal blades included with this accessory is not recommended. Use of any other blades may result in the blade cracking or shattering and could cause personal injury or damage to the work piece.

### Holding Down Materials

For accurate cutting, the material being cut must be held securely and held flat. The exact depth of the Drag Knife blade should be maintained—any wrinkled or bowed areas of the material being cut can greatly affect the quality of the finished cut.

For the best results, Donek Tools recommends using a vacuum hold-down system, especially for flexible materials. If such a system is not available, certain tapes or temporary spray adhesives can be effective.

### Cutting Direction

It is important to always be aware of the orientation of the Drag Knife at the start of a cutting path. If the blade is inserted into the material in a position not lined up with the cutting direction, the tip of the blade is likely to break or bend and damage to the work piece may result. **You should always manually turn the blade to the correct direction before starting to cut a project.**



## Cutting Radius and Depth

Tool	Minimum cut radius	Maximum cut depth	Blade Offset* Stock blade	Blade Offset* Safety blade
D1	1/16in(1.6mm)	1/16in(1.6mm)	0.065in(1.6mm)	NA
D2	1/8in(3.2mm)**	1/4in(6.4mm)	0.140in(3.6mm)	0.090in(2.3mm)
D3	1/16in(1.6mm)	1/16in(1.6mm)	0.065in(1.6mm)	NA
D4	1/8in(3.2mm)**	1/4in(6.4mm)	0.140in(3.6mm)	0.090in(2.3mm)

\* Offset values are approximate. They can change for different swivel depths. If the blade appears to overturn during a swivel motion, reduce the offset. If it does not turn far enough, increase the offset.

\*\*When cutting materials thicker than 1/8in(3.2mm), the minimum cut radius is increased to the material thickness.

### Blades

Bi-metal utility blades, such as the Irwin and Lenox blades are recommended. These blades are less prone to breakage under the significant strains applied in this application.

The use of a safety blade in the **D2** or **D4** can reduce the offset and reduce the minimum cut radius to 0.090in. A safety blade reduces the maximum cut depth as well and should only be used when cutting materials thinner than 0.090in. In some circumstances, alternative blades may be effective. Be sure to always wear safety glasses when using carbon steel blades as they can shatter.

### Tool Pathing

#### Software

Tool paths can be generated with any CAM software. If rounded corners bypass loops or turning cuts (see explanations below) are used, tool paths can be programmed the in the same manner as any other tool path. Simply program to cut on the vector and remove commands that turn on the spindle or router.

Sharp corners made by swiveling the blade, can be accomplished with the following options.

#### Donek Tools Free Excel swivel program

This free Microsoft Excel document can be downloaded from the Software tab on our website. It can be used in conjunction with any CAM software on the market.

Be sure to download the correct version (for example, the Shopbot version works only for Shopbot users). The video tutorial provides excellent tool pathing advice, so be sure to watch the Partworks/VCarve portion of the video, even if you do not use this software.

## Vetric Drag Knife Gadget

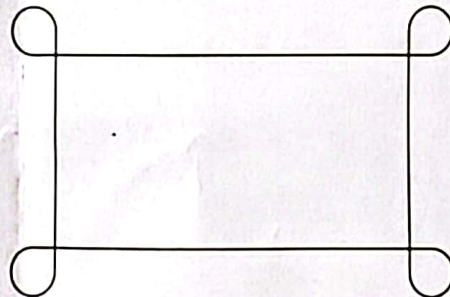
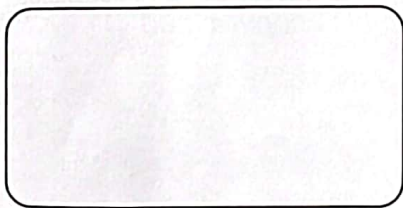
Aspire 4.0 and VCarve Pro 7 both include a Drag Knife gadget. This tool in the Gadgets menu produces excellent tool path results using the swivel technique. Be sure to check out the video tutorials on our web site for more details on the use of this software.

## Sheetcam

This software has an excellent Drag Knife Tool Path generation system. Check out the video tutorial on our web site.

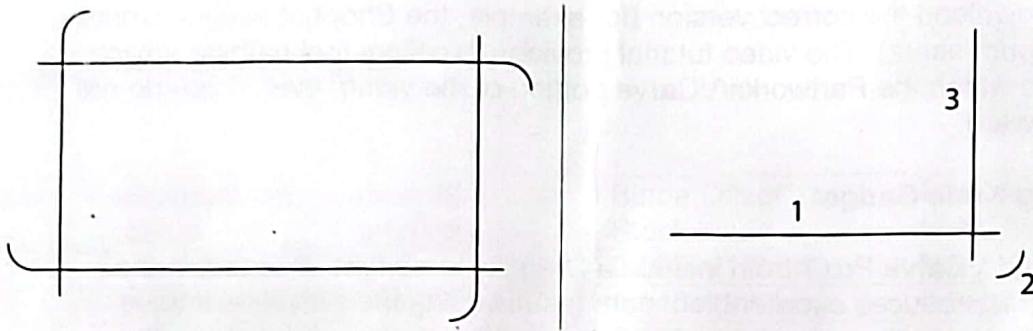
## Rounded Corners are the Easiest *(below left)*

The simplest approach to programming the cutting path of the Drag Knife is to replace any sharp corners with filleted (slightly rounded) corners. By setting the fillet radius to the minimum cutting radius, the Drag Knife can complete its cutting path without stopping and still leave relatively tight corners. Filleting corners produces the most time-efficient cutting program as the blade does not need to be lifted out of the material until the cut is complete.



## Cutting Sharp Corners with "Bypass Loops" *(above right)*

If a design requires a square or acute angle corner in the cut part and the material outside the part is scrap material, the simplest method may be to program the cutting path to pass the corner point slightly, make a loop in the scrap outside the finished part and then to cross the previous path at the desired angle. This eliminates the need to lift the Drag Knife out of the work but may create more scrap material than other methods.



### Cutting Sharp Corners with "Turning Cuts" (above)

Another method of cutting square or acute angle corners is to cut a small arc as a separate step in between cutting paths to turn the blade in line with the next cut. The turning cut move can be made at the end or beginning of a path (*above left*), or the drag knife can be lifted and moved to scrap material outside the finished part (*above right*). If there is no scrap material near the part being cut, make the turning cuts at a reduced depth--not cutting all the way through the material. To do this, it is usually best to cut the material from the back side so these light cuts will not be visible in the finished part.

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