5th AXIS®

SPEEDS & FEEDS

Dovetail Cutters: DC1750-M, DC1750-I, DC1750-60I, DC1750-M45, DC1750-45, DC7150-60					
MATERIAL:	TYPE:	BRINNEL HARDNESS:	ROCKWELL HARDNESS:	SURFACE FT. / MIN. (SFM)	INCH PER TOOTH (IPT)
Aluminum	6061, 7075	N/A	N/A	1000+	.005”-.010”
Graphite	All types / densities	N/A	N/A	1000+	.002”-.004”
Cast Iron	Gray	100-400	N/A	700-900	.003”-.008”
Cast Iron	Nodular	100-400	N/A	500-700	.003”-.008”
Steel	Low Carbon 11018, A36	100-200	N/A	400-700	.003”-.008”
Steel	Alloyed Steel 4140, 4340, P20	250-400	25-44 HRC	350-500	.002”-.005”
Steel	Tool Steel 01, S7, A7, D2	250-400	25-44 HRC	350-500	.002”-.005”
Steel	Hardened Steels	400-630	48-58 HRC	200-350	.001”-.003”
Stainless Steel	203, 303, 416	200-300	12-32 HRC	450-700	.003”-.006”
Stainless Steel	304, 316, 410, 113-8 PH	200-300	12-32 HRC	300-600	.003”-.006”
Stainless Steel	15-5 PH, 17-4 PH	300-400	32-42 HRC	350-500	.003”-.006”
Nickel Alloys	Inconel 718, Hastelloy, Waspalloy	N/A	N/A	75-120	.001”-.003”
Titanium	6Al-4V, 5Al-5Mo-5V-3Cr	275-350	28-38 HRC	120-180	.004”-.008”

NOTE: Speeds and feeds recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause reduction in speeds and feeds or dramatic increases.

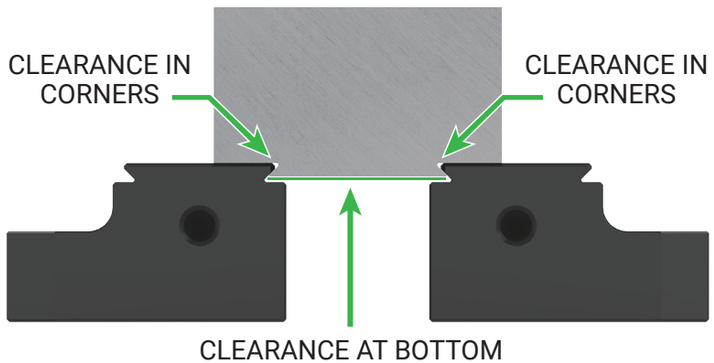
Legend:		
	Cutter Diameter (D)	1.791” (to theoretical sharp corner of the cutter)
	Width of Cut (WOC)	.120”
	Depth of Cut (DOC)	Application dependent (different fixtures have different requirements)
	Number of Teeth (Z)	5

Revolutions Per Minute (RPM) = SFM * (12/π) * D

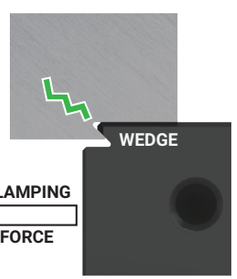
Cubic Inches Per Minute Metal Removal Rate (in^2/min) = RPM * DOC * WOC * IPT * Z

PROPER DOVETAIL

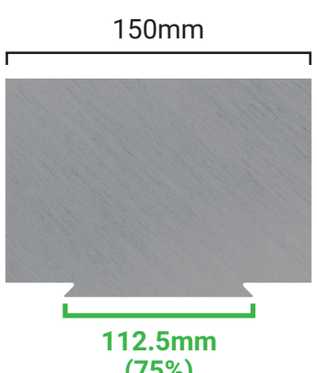
MATERIAL SHOULD REST ON TOP OF THE JAW / FIXTURE AND ON THE 45° FACE.



When a **proper** dovetail is used, jaw/dovetail fixture **acts as a wedge** trying to split the material in the corner.

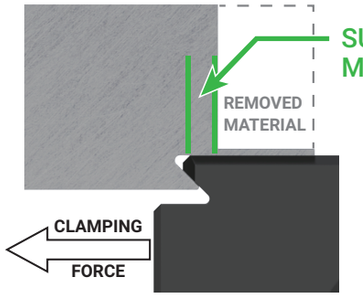


Material is clamped only once or twice and is therefore resistant to fracturing.



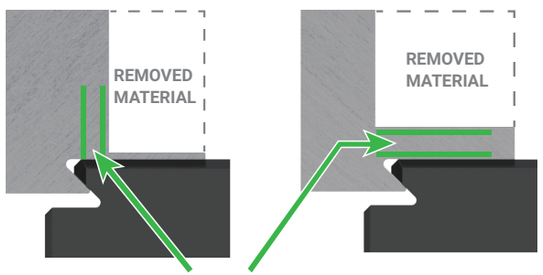
We recommend dovetail width should not be **less than** 75% of the width of the stock.

This is a **general ratio, not a rule**. If in doubt, stick to 75%.

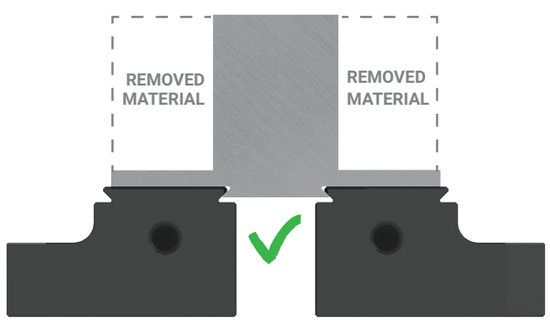


Dovetail width should be narrow enough to support the part after material is removed.

THERE IS NO SIMPLE ANSWER TO HOW MUCH SUPPORT IS NEEDED.



If more support is needed,
Decrease dovetail width or **increase tab thickness**

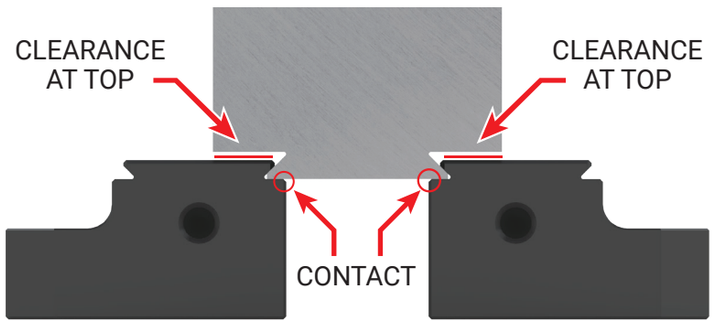


For narrow parts, position the dovetail as close as possible to the **finished part's** center of mass.

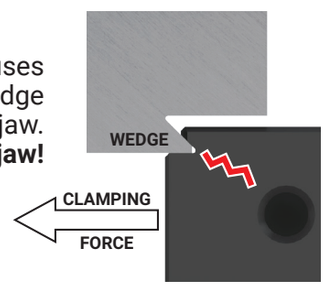
COMMON MISTAKES

1. DOVETAIL TOO DEEP

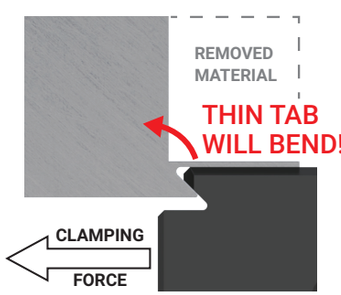
Clamping with a dovetail should **never** cause the material to locate on the bottom step of the jaw.



Locating on bottom step causes material to become a wedge trying to split the jaw.
This can break the jaw!

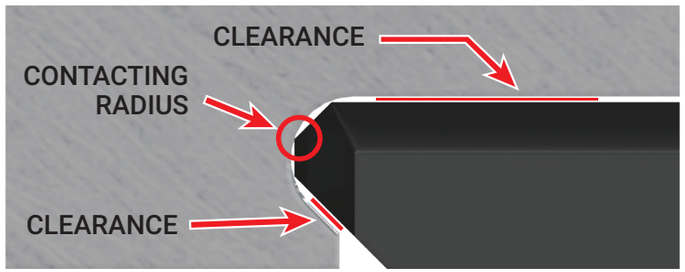


2. FINISHED PART UNSUPPORTED



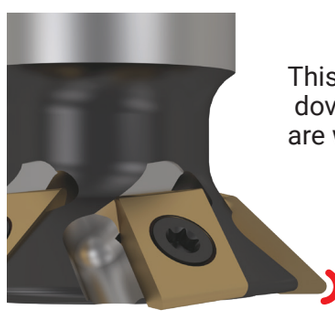
A thin tab and/or insufficient material on the top locating surface will allow the part to move during machining.

✘ 3. OVERSIZED CORNER RADIUS



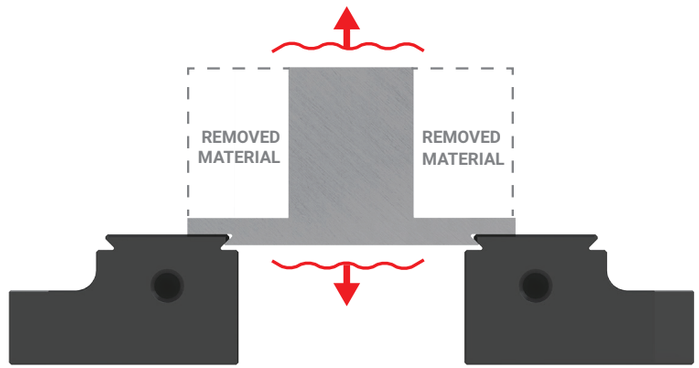
An overly wide inside corner radius allows material to contact the corner of the jaw, preventing it from locating correctly.

This will call excessive vibration during machining.



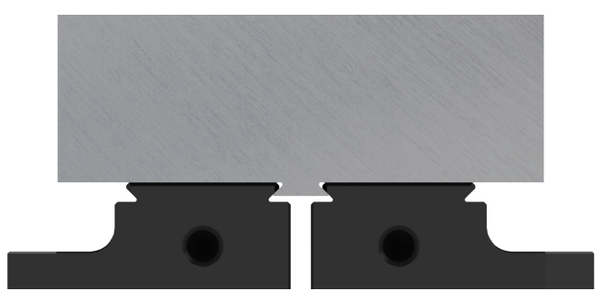
This issue is caused when dovetail cutter inserts / flutes are worn or broken.

✘ 4. EXCESSIVELY WIDE DOVETAIL



Even though this part has tabs thick enough to prevent breaking, the dovetail is not properly positioned under the part. This may result in excessive vertical vibration.

✘ 5. EXCESSIVELY NARROW DOVETAIL



Excessively narrow dovetail will concentrate support at the center of the stock and potentially cause chatter.

Keep in mind how and where force is applied to stock during machining.

5th AXIS®

DOVETAIL TROUBLESHOOTING GUIDE

The information in this document is applicable to **ALL** 5th Axis™ products with a dovetail feature.

Both vises **AND** dovetail fixtures should follow these rules.