



TIPS FOR CLUSTER PUNCHING

THE PROBLEM:

Cluster tooling is an ideal way to produce repeat holes or patterns in sheet metal. By increasing the number of holes per hit, clusters are efficient, reduce costs and can help reduce machine wear and tear. Many different punch designs and cluster areas are available, providing a wide variety of punching choices. Clusters can be tricky to use, but there are techniques you can use to ensure you get the results you require.

THE MATE SOLUTION:

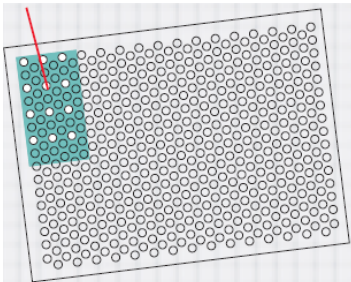
- **Punching Force Formula:**

For cluster punching, the maximum recommended punching force **SHOULD NOT EXCEED 75% of press capacity**. Use the following formula to estimate the required punching force:

Linear Length of Cut X Material Thickness x Shear Strength = Punching Force in kiloNewtons (kN)

- In the above formula, the "Linear Length of Cut" =
 - Hole Perimeter X the number of punches in the cluster
 - The Hole Perimeter = 3.14 X hole diameter

Let's look at an example:



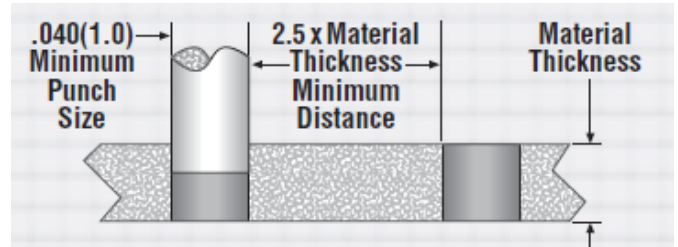
In the illustration at left, the punch (represented by the blue rectangle) is a 12-hole cluster. The grid of .250(6,35) diameter holes is spaced on .157(4,0) centers. The area of the cluster punch covers 48 holes, which is punched every fourth hole (12 holes, 4 times). The material is mild steel .060(1,52) thick.

	Linear Length of Cut										
	Hole Perimeter (3.14 x hole diameter)	X	Number of Punches in Cluster	=	Linear Length of Cut	X	Material Thickness	X	Shear Strength	=	Punching Force Tons/kN
Inch	3.14 X .250 = .785	X	12	=	9.42	X	.06	X	25	=	14.1 tons
Metric	3.14 X 6,35 = 19.94	X	12	=	239,26	X	1,52	X	0,345	=	125,5 kN



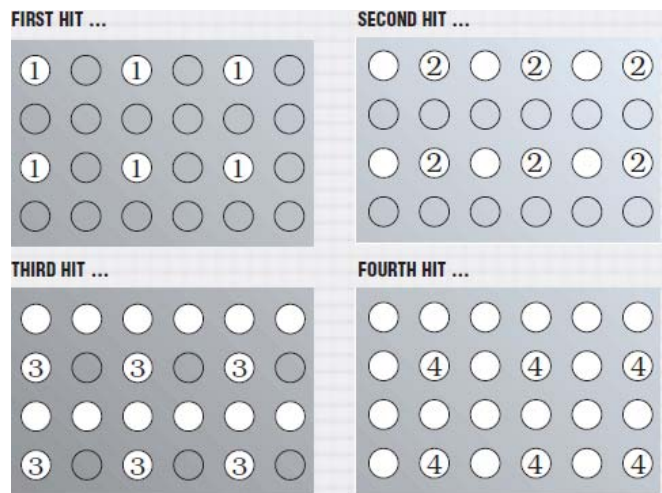
- **Minimum Punch Size**

The minimum punch size is .040(1,0) and not normally less than 100% of the material thickness for mild steel and aluminum. For stainless steel, minimum punch size should not be less than 150% of the material thickness. The punching area varies by station size and is limited by press tonnage.



- **Hole Uniformity and Flatter Sheets**

For greater hole uniformity and flatter sheets, spread the punches to avoid punching adjacent holes in the same hit. Repeat for the necessary number of times to complete the desired pattern.



- **Use Fully-Guided Clusters in Challenging Applications**

In challenging applications or high production environments, fully-guided cluster punches are extremely helpful. The design suits small punches that benefit guiding at the tip to ensure accuracy. Fully-guided also works well for punch clusters with too few punches to provide a good punch-to-stripper guiding surface. Fully-guided cluster punches are ideal for heavy-duty service or long production runs.

- **Maxima™ Coating for Long Punch Life**

Mate's optional Maxima™ coating increases the lubricity of the punch points, helping to resist wear and ensure cleanly punched holes. In fact one Mate customer achieved over 4.1 million hits with a Mate cluster punch treated with Maxima *without sharpening or maintenance!*

WATCH THE VIDEO:

See how one Mate customer achieved over 4.1 million hits with a Maxima-treated cluster punch without sharpening or maintenance:

<http://www.youtube.com/watch?v=vkQHeZru6zE>

SOLUTION BULLETIN



AVAILABLE TOOLING STYLES AND STATION SIZES:

- All tooling styles and station sizes

MATERIAL AND OTHER RESTRICTIONS:

- Contact your Mate Applications Specialist

OTHER MATE PRODUCTS TO CONSIDER:

- Mate special applications tooling
- Mate fully-guided tooling
- Maxima coating