SOLUTION
BULLETIN

IMPROVE MACHINE UPTIME AND PRODUCT QUALITY WITH ALIGNED TURRETS

THE PROBLEM

Maximizing machine uptime in a fabrication operation is usually a matter of taking a series of small steps as opposed to one giant leap. Over the past several years Mate has consulted with many customers on ways to maximize uptime. While the first step in successful punching is to pay close attention to the quality and features of the punched parts, Mate discovered that incorrect turret alignment is a leading cause of reduced uptime and poor tool life.

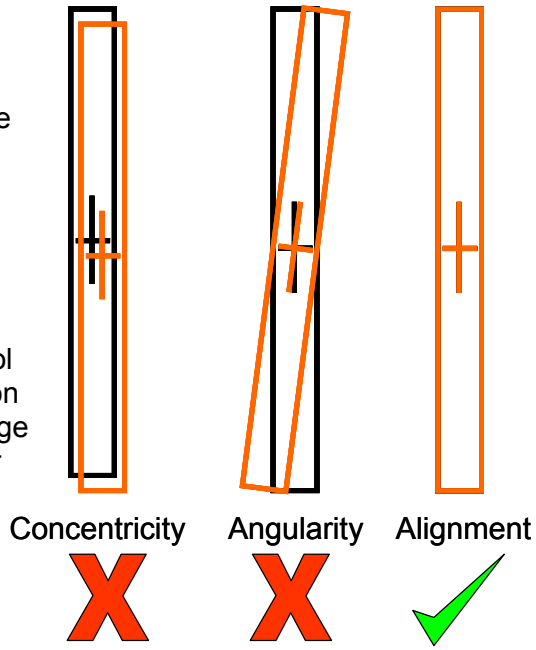
Superior piece part quality, extended machine life and longer tool life is achieved when the upper and lower turrets of a punch press are precisely aligned. New turrets are aligned by factory technicians and verified during installation. After use, turrets often require some realignment. Press uptime will be increased if accurate station alignment is maintained. Alignment ensures the punch enters the center of the die, resulting in even die clearance around the cutting edge, the best possible tool life and higher quality parts.

THE MATE SOLUTION

Alignment Defined

There are two types of alignment, *concentric* and *angular*. The benefits of concentric and angular alignment are:

- Superior piece part quality
- Extended machine life
- Extended tool life



Concentric alignment means that the center line the upper tool holder and the lower die holder are in line. In the left illustration in Figure 1, the edge of the punch (orange shape) and the edge of the die (black shape) are parallel with each other. However the center lines are not in line. This tool is not in concentric alignment and must be corrected.

Angular alignment means that the edge of a punch should be parallel with the edge of the die. In the center illustration in Figure 1, the center line of the punch and die are in line. However, the edges are not parallel with each other. This tool is not in angular alignment and must be corrected.

In the right illustration in Figure 1, the center line of the punch and die are aligned, with the edges of the punch and die parallel to each other. This tool is in concentric AND angular alignment.

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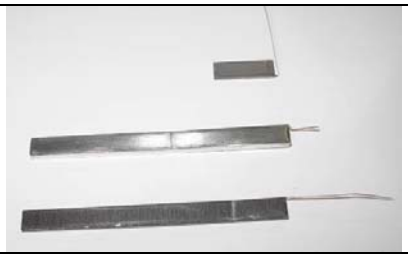
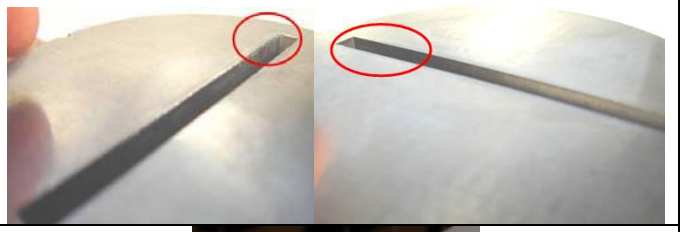
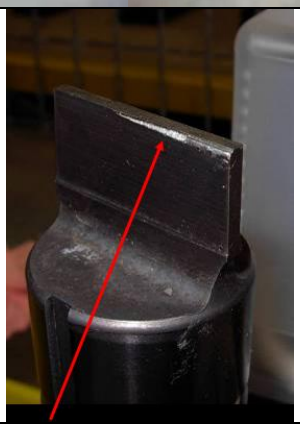
Signs of Misalignment

You can detect the need for alignment through tool wear, part burrs, and scrap inspection. The following table shows some of the more common indicators of misaligned turrets. Following are some of the most

Slivers on a long rectangle • Classic misalignment indicator	
Damaged corner (left photo) has marks and abrasion, evidence of being hit. Other corner (right photo) on same side is sharp and has no evidence of being hit.	
Uneven punch surface wear on any one side of the tool (marking and or galling). • More evident on long, narrow shapes but can happen on any shape or size tool.	

Realigning the Turret

Alignment tools should be used as soon as there is evidence of misalignment. There are very good, extremely accurate products available to help maintain this important relationship in a very short amount of time. The alignment tools refresh the precision orientation of the upper and lower tools, allowing the punch to enter the center of the die. If possible, align the station as a periodic preventive maintenance measure to prevent poor quality parts and damage to tools.

Mate Pilot™ Calibration System

One such alignment tool is Mate's Pilot calibration system, which ensures precision concentric and angular alignment of thick turret punch presses. The Pilot™ Calibration System provides a simple and accurate way to verify the precise alignment of a punch press station and perform station alignment when required.

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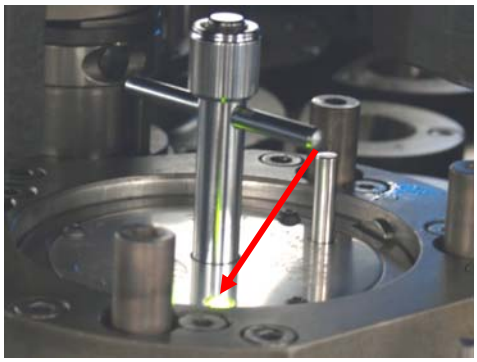
The Pilot Calibration System operates in two modes:

- *Verification Mode* — enables the user to confirm the precise concentric and angular alignment of each station within their turret. If verification confirms the station is aligned, then the machine is ready for use. If verification shows that alignment is required, then calibration system should be used in the alignment mode.
- *Alignment Mode* — enables the user to restore the concentric and angular alignment of each station with the same or better precision as the initial machine installation.

The tri-color indicator light makes it simple for the user to know when the turret is aligned.



- *Red* light indicates that the station is not aligned.
- *Yellow* light indicates that the station is aligned to within 0.0012(0.030).
- *Green* light indicates that the station is aligned to within 0.0003(0.008), recommended when punching material with a thickness 0.048(1.20) or less

Important note: When reviewing sheet metal edge quality, hole quality and tool wear, a worn turret bore may look like a problem with station alignment. Unfortunately, worn turret bores do not consistently result in the punch entering the center of the die opening, so aligning the station will not solve this problem. A worn turret bore will allow the upper alignment tool to move to match the lower, resulting in a green light and the appearance of alignment.

AVAILABLE TOOLING STYLES AND STATION SIZES:

- Thick Turret A-Station through E Station and Multi Tool
- Contact your Mate Applications Specialist for availability for other tooling styles

OTHER MATE PRODUCTS TO CONSIDER:

- Mate fully-guided tooling, where accurate and close tolerances between the guide and stripper hold the punch rigid to control against hole distortion and saw toothing.

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