Superior Solutions For Sheet Metal Fabricators

# Mate Type III Tooling For Salvagnini Punch Presses

mate.com/salvagnini

## Part Number 2010

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MATE®
PRECISION TOOLING
*TRUSTED I QUALITY I SERVICE I SOLUTIONS*

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# MATE TYPE III TOOLING SYSTEM FOR SALVAGNINI PUNCH PRESSES

Mate's high speed steel punches, dies and strippers compliment Salvagnini's high performance punching system like no other. Our complete range of standard, special shapes and forming assemblies available to customer specifications expand Salvagnini's complete metal fabricating system to the fullest.

Mate's Type III tooling is compatible with Salvagnini machines and is available in the following station sizes:

| Salvagnini Poitions | Station Size | Comments |
|---|---|---|
| 1-20 and 41-76 (7 Ton) | 6 mm Size | Rounds Only |
| | 10.5 mm Size | Rounds Only |
| | 33 mm Size | |
| | 33 mm Size - diagonal up to 1.023(26.00) | Fully Guided Perforating Assembly |
| 30-35 (12 Ton) | 60 mm Size | |
| | 60 mm Size | Auto-Index |
| 21-24 (26 Ton) | 70x90 Size | Type 70 (3.1) |
| | 90x90 Size | Type 90 (3.0) |

Punches:

- Premium Powdered Metal Based Tool Steel in 6mm, 10.5mm, all 33mm, and smaller stations. High Speed Steel standard on 60mm, 70x90, and 90x70 stations. Both steel types provide incredibly long tool life under even the most extreme punching conditions
- High abrasion resistance, high anti-galling properties, plus toughness against chipping.
- Fully guided perforating tool has punch size range to 26mm.
- A punch chuck is available for punch sizes 10.5mm and under.
- Punches can be resharpened up to 0.157"(4.00mm) and dies to 0.060"(1.50mm), yielding many additional spans of production. An unlimited variety of special shape punches can be made to your specifications.

Strippers:

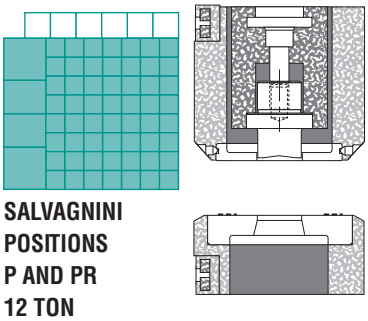
- Stripper openings are precise to match punch dimensions.
- Fully guided perforating stripper has unique design to support punch point throughout the punching cycle.
- The stripper is assembled into the upper cartridge.

Dies:

- High speed steel dies in 33mm stations (A, B and C).
- A wide variety of special shapes are available to a clearance of your choice, as well as standard shapes.
- Specify die clearance as punch size PLUS total clearance, NOT as clearance per side.
- Brushes in D, E and F stations prevent marking.
- SLUG FREE® dies are available as an option for all Type III stations at no additional cost.

Dimensions in inches (millimeters)

# MATE TYPE III TOOLING SYSTEM FOR SALVAGNINI PUNCH PRESSES

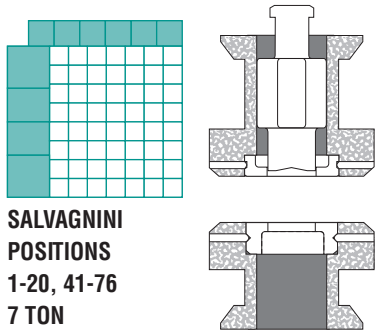


**SALVAGNINI POSITIONS P AND PR 12 TON**

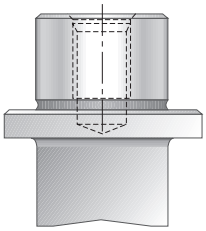
## THE SALVAGNINI PUNCHING SYSTEM

The architecture of the Salvagnini press is unlike any other NC punch press on the market. It is an aggregate of independently programmable punch presses in one punching head. This allows for the modular nature of the punching tools which can be unlocked hydraulically and changed quickly.

Punching operations can be programmed to occur simultaneously, performing like a cluster punch; or in sequence, so that punching and forming operations can occur within the same punching cycle. Some stations are capable of programmable rotation. With the addition of the right angle shear and external sheet rotator, Salvagnini becomes a very flexible and productive sheet metal fabricating system.



**SALVAGNINI POSITIONS 1-20, 41-76 7 TON**

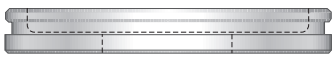


## PUNCHES

Salvagnini tool system punches are made of either premium Powder Metal Tool Steel or premium High Speed Steel which delivers incredibly long tool life under even the most extreme punching conditions. High abrasion resistance, high anti-galling properties, plus excellent hardness, means excellent punch life with little degeneration in punched part quality.

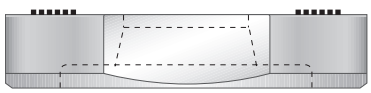
Depending which station, punch size can be inscribed up to the dimensions of a 90mm square. A punch chuck is available for diameters up to 10.5mm.

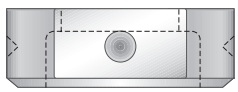
Punches can be resharpened up to .157(4.0) and dies to .060(1.5), yielding many additional spans of production. An infinite variety of special shape punches can be made to your specifications.



## STRIPPER

The stripper is assembled into the upper cartridge.





## SLUG FREE® DIES

Are available as an option for all Type III stations.

Dimensions in inches (millimeters)

# MATE TYPE III TOOLING SYSTEM FOR SALVAGNINI PUNCH PRESSES

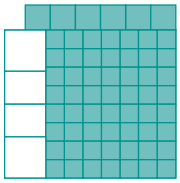
**POSITIONS 1 - 20, 41 - 76**
Single action 7 ton presses with a maximum tool diameter of 33mm:
Punches, dies and strippers to 33.0mm diameter/diagonal
Special shapes

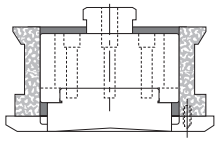
**EI EMBOSS STATIONS (OPTIONAL)**
Some positions can be fitted for low profile forming operations (max.height 6.5 mm) where no scrap is generated.

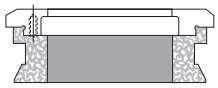
**POSITIONS 21 - 24**
Single action 26 ton presses with a maximum station size of 90 x 90mm:
Punches, strippers, dies to 70 x 90mm
Punches, strippers, dies to 90 x 90mm
Punch supports for positions 21-24
Special shapes
Cluster Punches

**POSITIONS 30 - 35**
**BU EMBOSS OPTION**
Double action 8 + 7 ton presses that can be set up for forming operations. Maximum form height 16 mm where no scrap is generated.
Forming tools

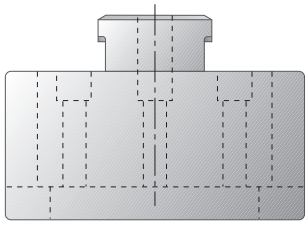
**PR OPTION**
Optional auto rotation 12 ton punching units that can be installed in punching positions 30-35.
Punches, die and strippers to 60.0mm diameter/diagonal

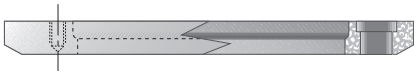


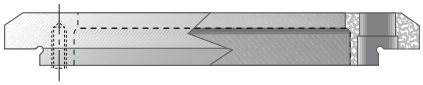




**SALVAGNINI POSITIONS 21-24 26 TON**







## Type III
**(H3 HEAD)**

| | 30 | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|---|
| 90 x 90 24 | 76 | 68 | 60 | 56 | 52 | 48 | 44 |
| | 75 | 67 | 59 | 55 | 51 | 47 | 43 |
| 90 x 70 23 | 74 | 66 | 58 | 54 | 50 | 46 | 42 |
| | 73 | 65 | 57 | 53 | 49 | 45 | 41 |
| 90 x 70 22 | 72 | 64 | 20 | 16 | 12 | 8 | 4 |
| | 71 | 63 | 19 | 15 | 11 | 7 | 3 |
| 90 x 90 21 | 70 | 62 | 18 | 14 | 10 | 6 | 2 |
| | 69 | 61 | 17 | 13 | 9 | 5 | 1 |

## DIES

An infinate variety of special shapes are available to a clearance of your choice, as well as standard shapes - rounds, rectangles, ovals and squares. Specify clearance as punch size PLUS clearance, NOT as clearance per side. Mate provides three options for punching corners in acute angles, reducing die wear and breakage, see special shapes page 11.

## SPECIAL ASSEMBLIES

Mate special assemblies for Salvagnini complement and expand upon the capabilities of the Salvagnini punching system. Mate builds special assemblies for virtually any application such as threadform, louver, beading, embossing, stamping, knockout and cluster punch assemblies. Special assemblies alo perform slitting, shearing, multiple parts on sheet (shake-and-break) and tabbing functions.

From a drawing showing your application, Mate will manufacture a special assembly to your design. The forming tool pages in this catalog will help you specify your requirements. Mate will work with you in obtaining the results you want.

In addition to special assemblies, multi-use tools are also available. Used in conjunction with the optional PR stations, the corner rounding, notching and quad radius tools are like several tools in one providing greater value for your tooling dollar.

**Mate Type III tooling is compatible with Salvagnini tool types S4, P9, S6, P5, S8, S9, and SA.**

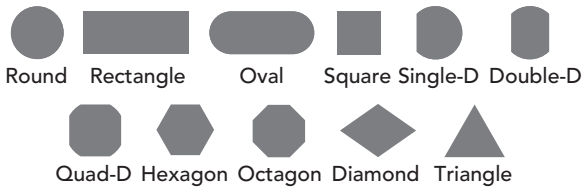
Dimensions in inches (millimeters)

# PUNCHES, STRIPPERS AND DIES

| | 30 | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|---|
| 90 x 90 24 | 76 | 68 | 60 | 56 | 52 | 48 | 44 |
| | 75 | 67 | 59 | 55 | 51 | 47 | 43 |
| 70 x 90 23 | 74 | 66 | 58 | 54 | 50 | 46 | 42 |
| | 73 | 65 | 57 | 53 | 49 | 45 | 41 |
| 70 x 90 22 | 72 | 64 | 20 | 16 | 12 | 8 | 4 |
| | 71 | 63 | 19 | 15 | 11 | 7 | 3 |
| 90 x 90 21 | 70 | 62 | 18 | 14 | 10 | 6 | 2 |
| | 69 | 61 | 17 | 13 | 9 | 5 | 1 |

## SALVAGNINI POSITIONS 1-20, 41-76 7 TON AND POLI PUNCH STATION

STANDARD SHAPES



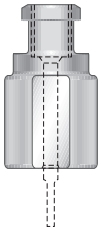

## 6 mm Size

>.030-.236(0.76-6,0)
ROUND ONLY

included with punch chuck

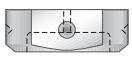
**Lock Screw**
VINSSS

**Insert Punch**
ROUND
PAPA0A



**Punch Chuck**
VINPS010

**Stripper**
ROUND
S6PA0A



**Die**
ROUND
DAPA00

## 10.5mm Size

.237-.413(6.00-10,5)
ROUND ONLY

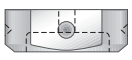
included with punch chuck

**Lock Screw**
VINSSS

**Insert Punch**
ROUND
PAPB0A

**Punch Chuck**
VINPS020

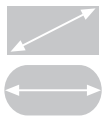
**Stripper**
ROUND
S6PB0A



**Die**
ROUND
DAPB00

## 33mm Size

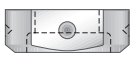
UP TO 1.299(33,0)
DIAMETER OR
DIAGONAL



**Punch**
ROUND
PAPC0A
SHAPES
PAPC_A

*Round strippers will be provided on narrow width punches to prevent shoulder of the punch from interfering with the stripper.

**Stripper**
ROUND
S6PC0A
SHAPES
*S6PC_A



**Die**
ROUND
DAPC00
SHAPE
DAPC_0

**Poli Punch Stripper for all sizes**
ROUND
S6PP0A
SHAPES
S6PP_A



**Die Shim for all sizes**
MSP3
Package 6 each:
.004(0.10), .008(0.20),
.012(0.30)

Mate's 6,0mm and 10,5mm inserts are NOT compatible with Salvagnini's punch chuck.

General Add-Ons:

| | |
|---|---|
| Radius Corner | Add 10% to punch, stripper, and die |
| Special Angle Settings | Add 25% to punch, stripper, and die |

Small Diameter Round Tools

| | |
|---|---|
| Diameter 0.031(0.76) to 0.061(1.55) | Add 25% to punch, stripper and die |
| Diameter 0.062(1.56) to 0.092(2.34) | Add 10% to punch, stripper and die |

Narrow Width Shaped Tools

| | |
|---|---|
| Widths under 0.125(3.20) | Add 25% to punch, stripper, and die |

Maxima™ or Nitride Add-Ons
6.00mm and 10.50mm size inserts
33mm Size
60mm Size
70mm x 90mm Size or
90mm x 90mm Size

SLUG FREE® DIES AVAILABLE!!

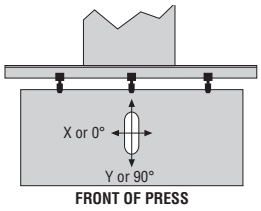
Dimensions in inches (millimeters)

# PUNCHES, STRIPPERS AND DIES

| | 30 | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|---|
| 90 x 90 24 | 76 | 68 | 60 | 56 | 52 | 48 | 44 |
| | 75 | 67 | 59 | 55 | 51 | 47 | 43 |
| 70 x 90 23 | 74 | 66 | 58 | 54 | 50 | 46 | 42 |
| | 73 | 65 | 57 | 53 | 49 | 45 | 41 |
| 70 x 90 22 | 72 | 64 | 20 | 16 | 12 | 8 | 4 |
| | 71 | 63 | 19 | 15 | 11 | 7 | 3 |
| 90 x 90 21 | 70 | 62 | 18 | 14 | 10 | 6 | 2 |
| | 69 | 61 | 17 | 13 | 9 | 5 | 1 |

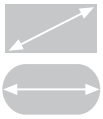
## SALVAGNINI POSITIONS 30-35 12 TON

(These positions can be auto index if the press is configured for auto index)

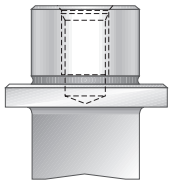



**PUNCHING ORIENTATION…**
For shapes other than round or square, punching orientation must be specified when ordering punches, strippers or dies.

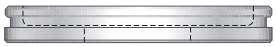
## 60mm Size



UP TO 2.362(60.00) DIAMETER OR DIAGONAL

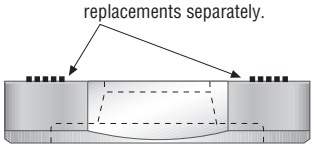


| Punch |
|---|
| ROUND |
| PAPD0A |
| SHAPES |
| PAPD_A |



| Stripper |
|---|
| ROUND |
| S6PD0A |
| SHAPES |
| S6PD_A |

Die comes with brushes already installed. Order replacements separately.

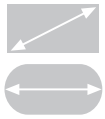


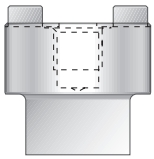
| Die |
|---|
| ROUND |
| D0PD00 |
| SHAPES |
| D0PD_0 |

| Brush |
|---|
| MIS61188 (3 Minimum) |

## 60mm Size

for use in Salvagnini Blank Holder style holders
Up To 1.669(42.40) DIAMETER OR DIAGONAL

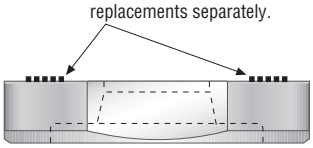




| Punch |
|---|
| ROUND |
| PAPX0A |
| SHAPES |
| PAPX_A |

| Stripper |
|---|
| ROUND |
| S6PX0A |
| SHAPES |
| S6PX_A |

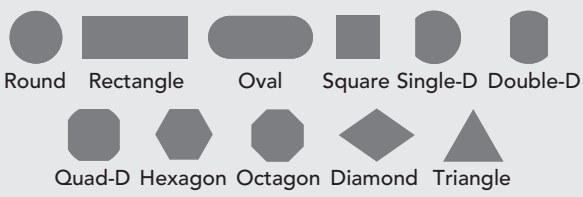
Die comes with brushes already installed. Order replacements separately.



| Die |
|---|
| ROUND |
| D0PD00 |
| SHAPES |
| D0PD_0 |

| Brush |
|---|
| MIS61188 (3 Minimum) |

STANDARD SHAPES




SLUG FREE® DIES AVAILABLE!!

Dimensions in inches (millimeters)

# PUNCHES, STRIPPERS AND DIES

## SALVAGNINI POSITIONS 21-24 26 TON

| | 30 | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|---|
| 70 x 90 24 | 76 | 68 | 60 | 56 | 52 | 48 | 44 |
| | 75 | 67 | 59 | 55 | 51 | 47 | 43 |
| 70 x 90 23 | 74 | 66 | 58 | 54 | 50 | 46 | 42 |
| | 73 | 65 | 57 | 53 | 49 | 45 | 41 |
| 70 x 90 22 | 72 | 64 | 20 | 16 | 12 | 8 | 4 |
| | 71 | 63 | 19 | 15 | 11 | 7 | 3 |
| 70 x 90 21 | 70 | 62 | 18 | 14 | 10 | 6 | 2 |
| | 69 | 61 | 17 | 13 | 9 | 5 | 1 |

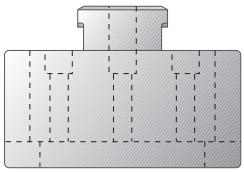
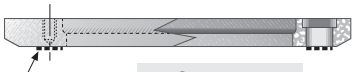
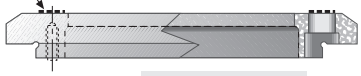
Type 70

To determine if Type 3.0 or 3.1 is needed, verify what stations are in the cartridge.

| Type 90 Cartridge | Type 70 Cartridge |
|---|---|
| (1) 70x90 Type 3.0 | (2) 70x90 Type 3.1 |
| (1) 90x90 Type 3.0 | |

Type 90

| | 30 | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|---|
| 90 x 90 24 | 76 | 68 | 60 | 56 | 52 | 48 | 44 |
| | 75 | 67 | 59 | 55 | 51 | 47 | 43 |
| 70 x 90 23 | 74 | 66 | 58 | 54 | 50 | 46 | 42 |
| | 73 | 65 | 57 | 53 | 49 | 45 | 41 |
| 70 x 90 22 | 72 | 64 | 20 | 16 | 12 | 8 | 4 |
| | 71 | 63 | 19 | 15 | 11 | 7 | 3 |
| 90 x 90 21 | 70 | 62 | 18 | 14 | 10 | 6 | 2 |
| | 69 | 61 | 17 | 13 | 9 | 5 | 1 |

| Type 70 (3.1) 70x90 mm Size 2.755x3.543(70.0x90.0) | Type 90 (3.0) 70x90 mm Size 2.755x3.543(70.0 x 90.0) | Type 90 (3.0) 90x90 mm Size 3.543x3.543(90.0 x 90.0) |
|---|---|---|
|  |  | |
| **Punch Support** | **Punch Support** | **Punch Support** |
| VSPES | VSPES | VSPFS |
|  | | |
| **Punch** | **Punch** | **Punch** |
| ROUND<br>PAPE0A<br>SHAPES<br>PAPE_A | ROUND<br>PAPE0A<br>SHAPES<br>PAPE_A | ROUND<br>PAPF0A<br>SHAPES<br>PAPF_A |
|  Stripper and die come with brushes already installed. Order replacements separately. | | |
| **Stripper** | **Stripper** | **Stripper** |
| ROUND<br>S6QE0A<br>SHAPES<br>S6QE_A | ROUND<br>S6PE0A<br>SHAPES<br>S6PE_A | ROUND<br>S6PF0A<br>SHAPES<br>S6PF_A |
|  | | |
| **Die*** | **Die*** | **Die*** |
| ROUND<br>D2QE00<br>SHAPES<br>D2QE_0 | ROUND<br>D2PE00<br>SHAPES<br>D2PE_0 | ROUND<br>D2PF00<br>SHAPES<br>D2PF_0 |
|  | | |
| **Brush** | **Brush** | **Brush** |
| MIS61188<br>(3 minimum) | MIS61188<br>(3 minimum) | MIS61188<br>(3 minimum) |

*** Dies can also be ordered in A2 material. Part numbers will begin with D0 instead of D2. Prices are the same. A2 recommended for clearances <= .016(0,40).**

Die Shims for 70x90mm/90x90mm must be purchased from Salvagnini.

**Small Brushes**
**MIS61161** (8 minimum)

**Ball Plunger Ejector**
**BPL00005**

SLUG FREE® DIES AVAILABLE!!

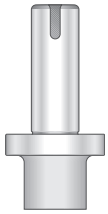
Dimensions in inches (millimeters)

# FULLY GUIDED PERFORATING ASSEMBLY

## SALVAGNINI POSITIONS 1-20, 41-76 7 TON AND POLI PUNCH STATION - 1.023(26.0) MAXIMUM

| | 30 | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|---|
| 90 x 90 24 | 76 | 68 | 60 | 56 | 52 | 48 | 44 |
| | 75 | 67 | 59 | 55 | 51 | 47 | 43 |
| 70 x 90 23 | 74 | 66 | 58 | 54 | 50 | 46 | 42 |
| | 73 | 65 | 57 | 53 | 49 | 45 | 41 |
| 70 x 90 22 | 72 | 64 | 20 | 16 | 12 | 8 | 4 |
| | 71 | 63 | 19 | 15 | 11 | 7 | 3 |
| 90 x 90 21 | 70 | 62 | 18 | 14 | 10 | 6 | 2 |
| | 69 | 61 | 17 | 13 | 9 | 5 | 1 |

**RECOMMENDED FOR POLI PUNCH STATION**



### Insert Punch

ROUND

PAPS0A

SHAPES

PAPS_A

### Fully Guided Stripper

ROUND

S2PN0A

SHAPES

S2PN_A

### Die

ROUND

DAPC00

SHAPES

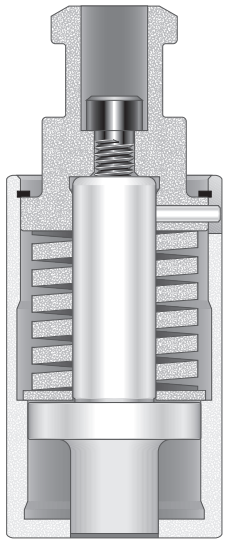
DAPC_0



### Die Shim

MSP3

Package 6 each: .004(0.1), .008(0.2), .012(0.3)



This tool is used in the 33 mm station but has a maximum punch size capability of 1.023(26.0) diameter/diagonal.

### Perforating Assembly

ROUND

SHAPES

### Tang Assembly

VCPCS

Tang assembly includes tang, spring, washer, draw bolt and retaining ring. Does NOT include insert punch or fully guided stripper.

VPPC00SW

Spring Washer (10 minimum)

MIS97287

Retaining Ring (10 minimum)

VDPC0

Assembly/Disassembly Fixture

### Cartridge Stripper*

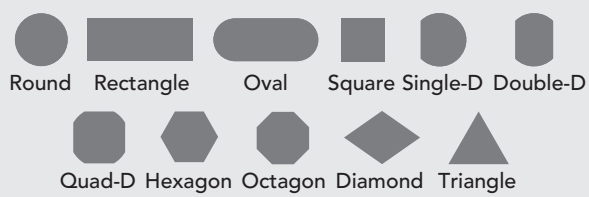
V0PC00US

* NOT FOR USE IN POLI PUNCH STATION

SLUG FREE® DIES AVAILABLE!!

Dimensions in inches (millimeters)

STANDARD SHAPES

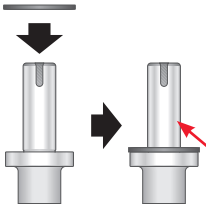


# FULLY GUIDED PERFORATING ASSEMBLY INSTRUCTIONS

Assembly instructions:

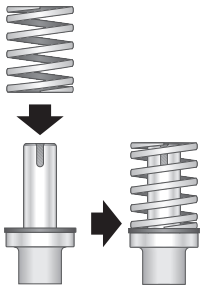
1. 

Stand punch on flat surface so that tapped hole and angle orientation slot are visible.

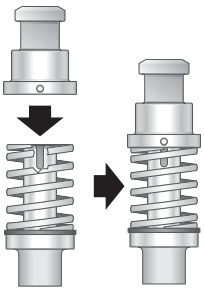
2. 

Place spring washer over punch shank onto punch shoulder. Apply lubricant to punch shank.

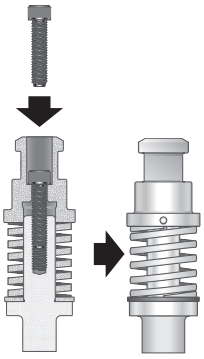
- Use Mobil grease C-MP or equivalent.

3. 

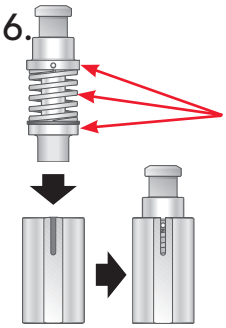
Place spring over punch shank on top of washer.

4. 

Place tang onto punch shank so that internal locating pin is visually in line with punch angle orientation slot.

5. 

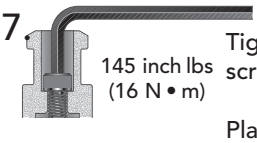
Insert 6mm socket head cap screw through tang and lightly tighten to the punch with a 5mm hex wrench - approximately 8 revolutions. Note: cap screw must not be over tightened at this step. Over tightening may result in misalignment during assembly.

6. 

Apply lubricant to outside surfaces of punch shoulder, spring, and tang flange.

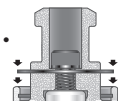
- Use Mobil grease C-MP or equivalent.

Insert assembly into the stripper so that the tang locating pin engages the vertical slot in the stripper.

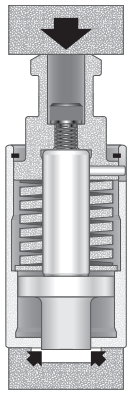
7. 


Tighten 6mm socket head cap screw to 145 inch lbs (16 N•m).

Place retaining ring over tang.

8. 

Place assembly into a vise or fixture so that it can be compressed axially approximately .040(1.0). The compression exposes the stripper body's internal retaining ring groove. Groove must be completely visible. Note: the punch point opening must not be obstructed and the punch must be able to protrude through stripper face. Insert retaining ring by slowly coiling it into the retaining ring groove. Release tang and remove assembly from the vise or fixture. When properly assembled with a new punch, the stripper lead should be .030 (0.75).

9. 

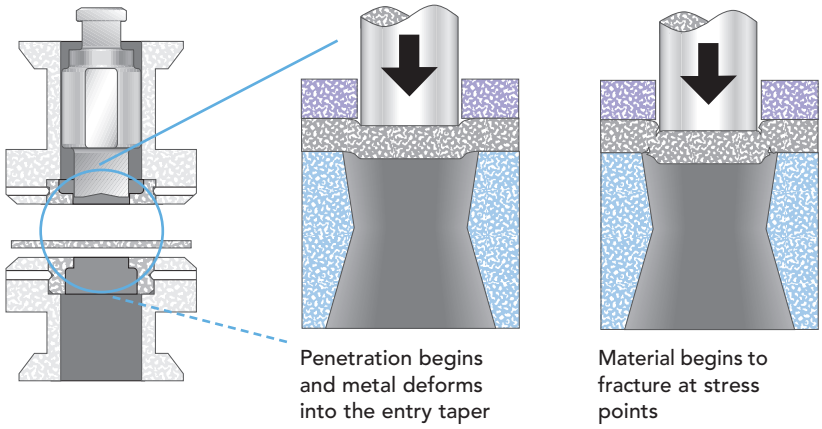
## Disassembly

1. Place into assembly fixture (VDPC0) so that it can be compressed axially approximately .040(1.0). The compression relieves the spring pressure on the retaining ring. Note: the punch point opening must not be obstructed and the punch must be able to protrude through stripper face.
2. Remove retaining ring by slowly uncoiling it from the retaining ring groove. Clean retaining ring groove of dirt or obstructions prior to re-assembly.
3. Remove assembly from vise or fixture.
4. Loosen 6mm socket head cap screw with a 5mm hex wrench. Punch can now be sharpened or replaced.

MATE®

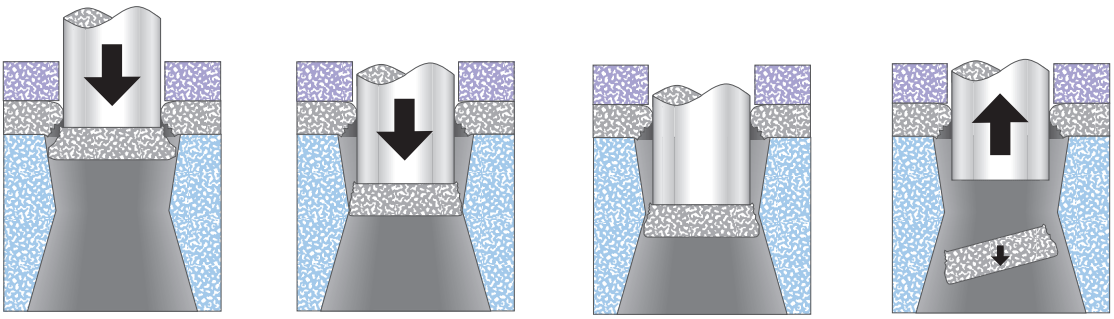
Dimensions in inches (millimeters)

# SLUG FREE® DIE OPERATION



Penetration begins and metal deforms into the entry taper

Material begins to fracture at stress points

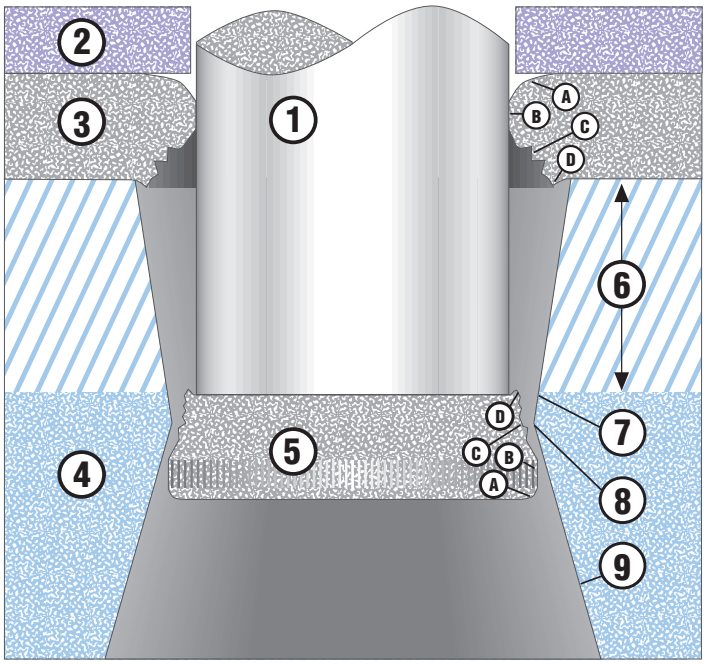


Slug fractures away from sheet

Pressure point constricts slug

Punch stroke bottoms out as slug squeezes past pressure point

Punch retracts and slug is free to fall down and away through exit taper




## Slug Free® Die Components

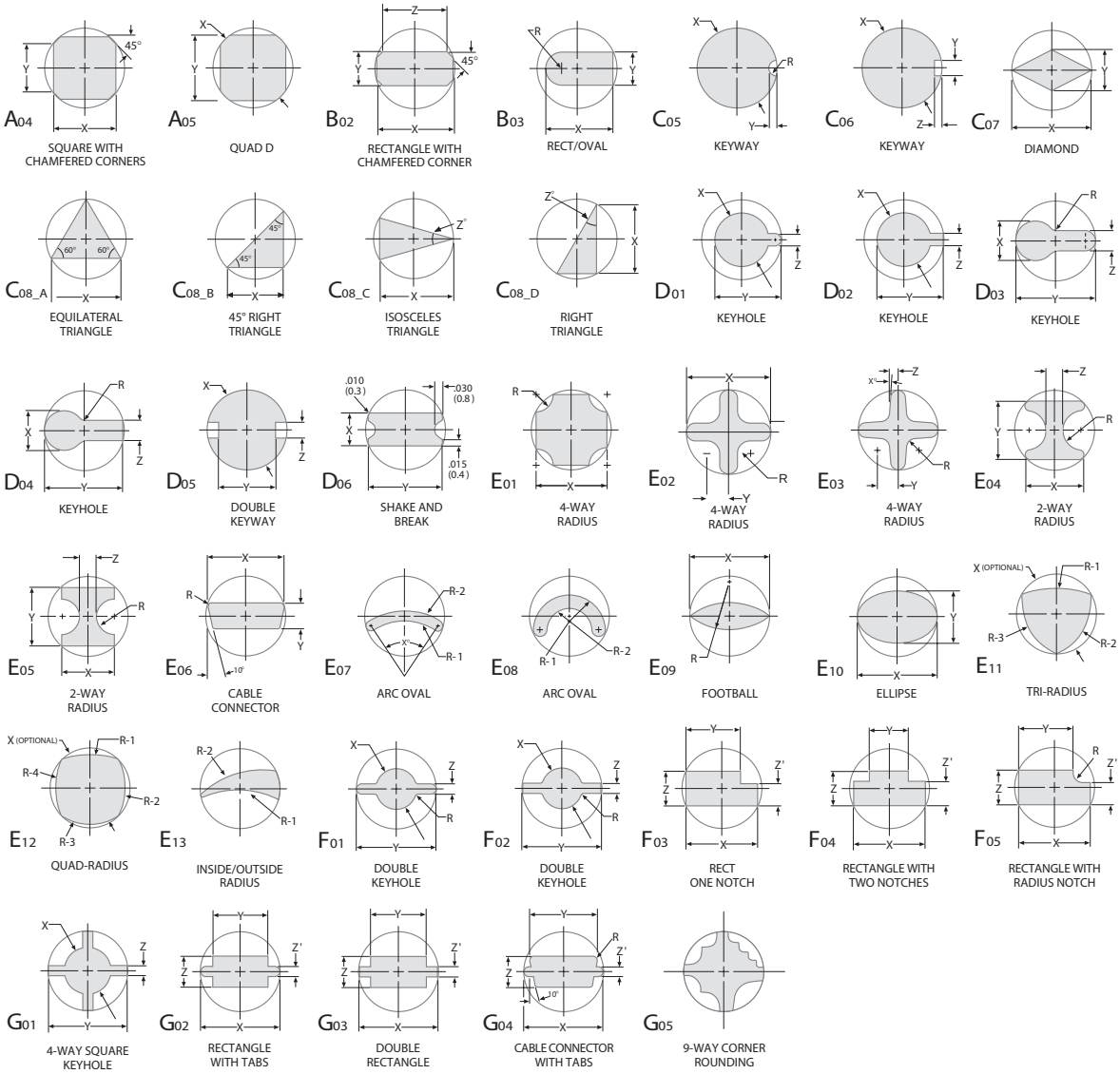
1. Punch
2. Stripper
3. Material
4. Slug Free® Die
5. Slug
6. Die Penetration
7. Entry – Constricting Taper
8. Pressure Point
9. Exit – Relief Taper

## Hole/Slug Geometry

A. Rollover
B. Burnish
C. Fracture
D. Burr

Dimensions in inches (millimeters)

# COMMON SPECIAL SHAPES

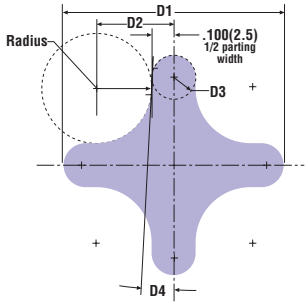



When ordering a special shape, please provide all dimensions noted above for the corresponding shape. Special shape drawings are also available on mate.com.

NOTE:
Shape possibilities are not limited to those shown on this page; Mate can manufacture any shape you require. Just contact a Mate customer service representative. A detailed drawing of the shape (sent via fax or e-mail) will be required.

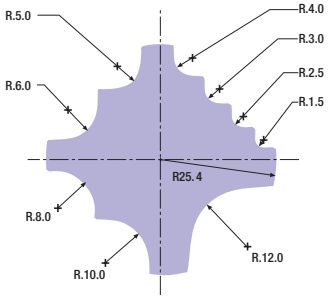
# SPECIAL SHAPE APPLICATIONS

## 4-WAY CORNER ROUNDING



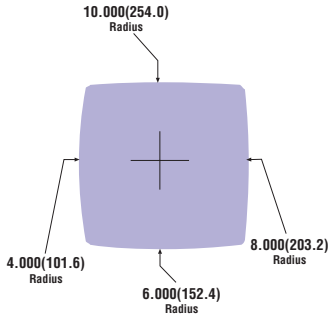

The 4-way corner rounding tool can round all four corners of a piece part without rotating the tooling - use with standard parting tools for piece part separation.

## 9-WAY CORNER ROUNDING



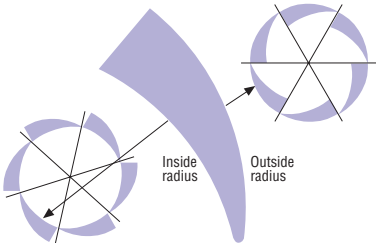

A single 9-way corner rounding tool provides nine popular radii in one tool. Auto indexing selects and rotates the desired radius to round off all corners of a piece part.

## QUAD RADIUS



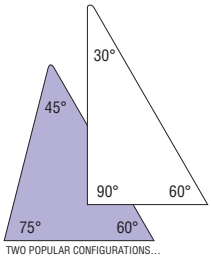

The quad radius tool nibbles large holes with smoother edges and fewer hits than using a round nibbling punch. In effect, smooth round holes not limited to station range.

## INSIDE/OUTSIDE RADIUS




This tool's large radii results in blanks with smoother edges produced with fewer hits than with an ordinary radius punch. This tool can be programmed to punch holes with slugs or parts retained in the sheet, yet can be separated easily off the press.

## 3-WAY CORNER NOTCHING



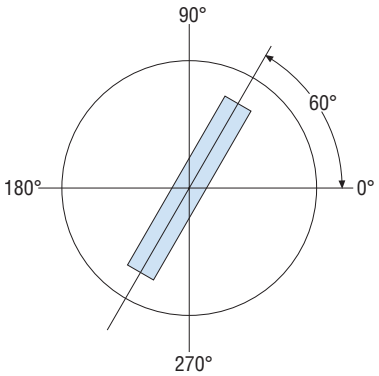

The 3-way notching tool can include angles from 150° to 15° - shown above are two popular arrangements. One tool can provide nine corner options - with auto index in two hits.

## SPECIAL SHAPE SOLUTIONS TO OTHER PUNCHING PROBLEMS

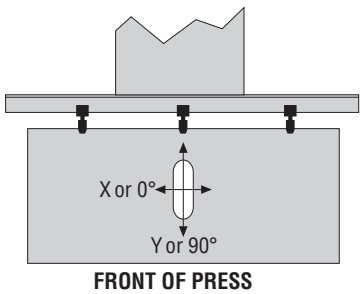
In addition to standard tooling, a few selected multi-purpose punches can fill out a very versatile tooling complement. Some very simple tools, along with auto index press capacity, can perform complex punching operations without resorting to other means to accomplish these tasks.

# SPECIAL ANGLE SETTINGS

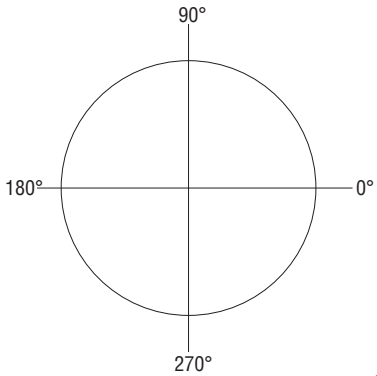
## TOP DIE VIEW CARTESIAN COORDINATE SYSTEM




## TOP VIEW OF TURRET




## PLEASE SKETCH IN SHAPE OF DIE OPENING AND THE ANGLE SETTING




Dimensions in inches (millimeters)

# CLUSTER PUNCH ASSEMBLY

## FULLY GUIDED CLUSTER PUNCH ASSEMBLY

- Better piece part quality and longer tool life from "on the die stripping" as provided by the fully guided stripper.
- Cluster assembly and die can be set at 0°, 90° 180° and 270°.
- Greater precision and better hole accuracy.
- Also available for auto index blank holder design.

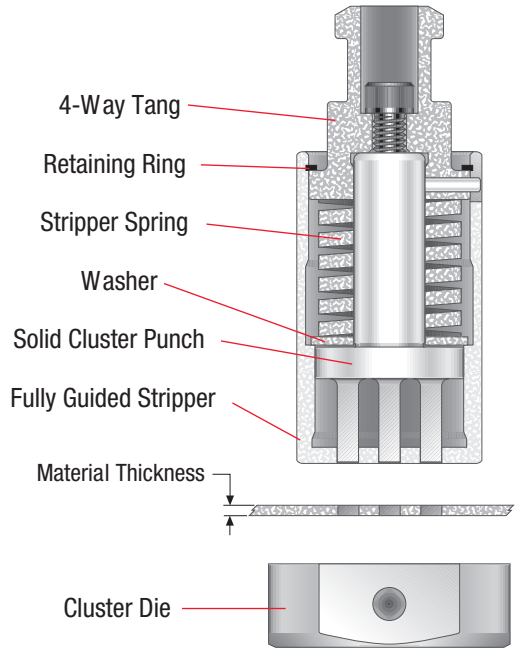
## SPRING LOADED CLUSTER PUNCH ASSEMBLY

- A spring-loaded stripper with "on-the-die" performance is built into the punching assembly.
- Fully guided, spring loaded assembly with hardened and ground stripper guide posts are bolted into jig ground pockets in stripper and punch retainer for trouble free operation.
- Low cost replaceable inserts.
- Optional one-piece punch construction available for greater economy .

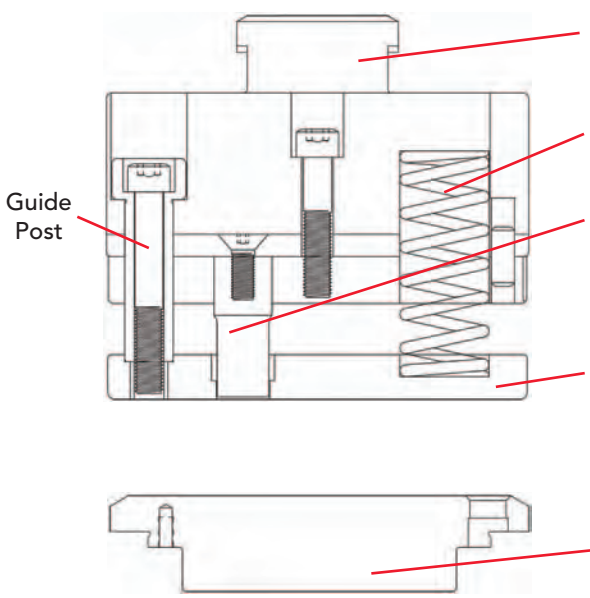
## NON-SPRING LOADED CLUSTER PUNCH ASSEMBLY

- Economical design includes replaceable inserts.
- Optional one piece punch construction available for greater economy .
- Larger punching area not limited by stripper posts for more holes in fewer strokes.

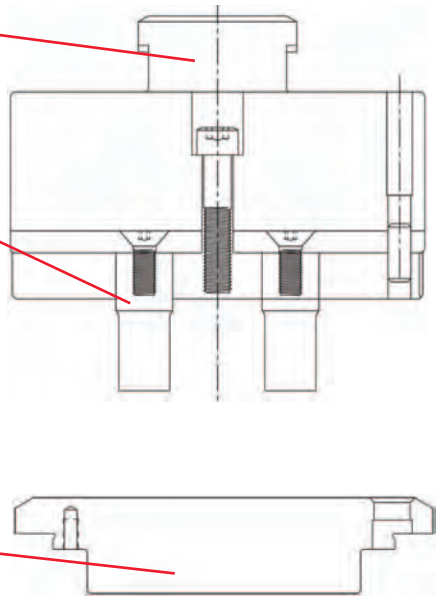
## FULLY GUIDED PERFORATING CLUSTER PUNCH ASSEMBLY

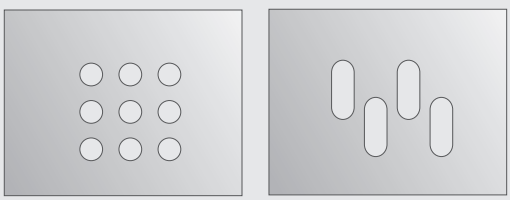



## SPRING LOADED/FULLY GUIDED CLUSTER PUNCH ASSEMBLY

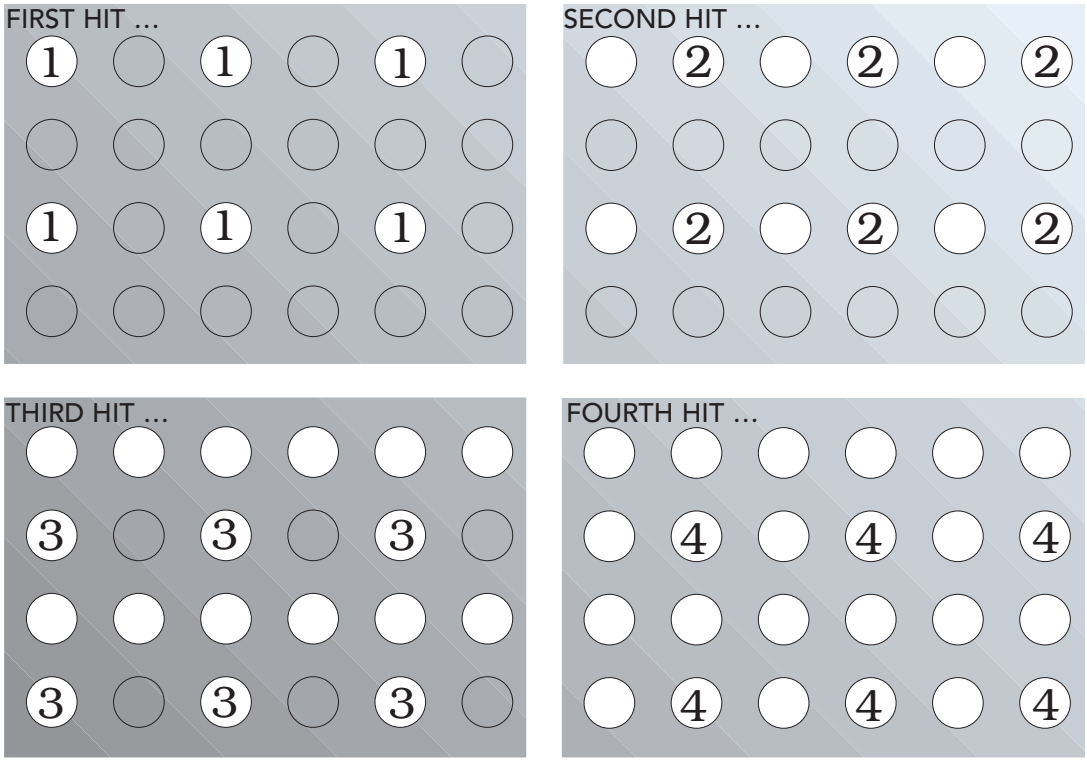



## NON-SPRING LOADED CLUSTER PUNCH ASSEMBLY

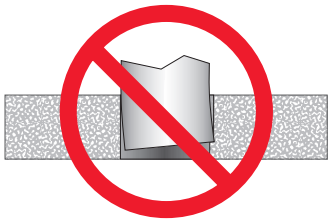




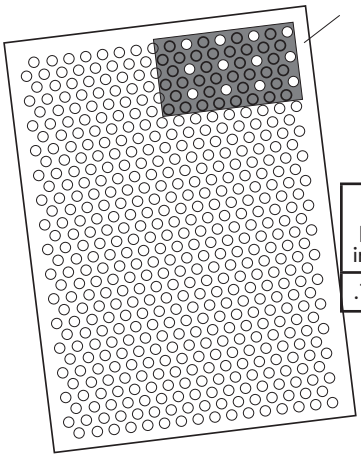
# CLUSTER PUNCH NOTES




For greater hole uniformity and flatter sheets, spread the punches to avoid punching adjacent holes in the same hit. Complete the desired pattern with the technique known as bridge hitting.



DO NOT DOUBLE-HIT HOLES. Using the cluster punch to finish missed holes in patterns will cause punches to shave sides of previously punched holes. The great lateral thrust from this shaving shortens punch life. Use a single-hole punch to complete the pattern.



**PUNCHING FORCE FORMULA** = linear length of cut x material thickness x shear strength = punching force in kilonewtons(kN).
**PUNCHING FORCE SHOULD NOT EXCEED 75% PRESS CAPACITY.**

EXAMPLE: Grid of .250(6.35) diameter holes spaced on .157(4.0) centers. Area of punch covers 48 holes; punch every 4th hole (12 holes, 4 times). Mild steel .060(1.52) thick. (Linear length of cut = 3.14 x diameter x number of punches)

| hole perimeter inches(mm) | X | number punches in cluster | X | material thickness inches(mm) | X | shear strength tons/in$^2$ (kN/mm$^2$) | X | punching force tons(kN) |
|---|---|---|---|---|---|---|---|---|
| .785(19.94) | X | 12 | X | .06(1.52) | X | 25(.345) | X | 14.1(125.5) |

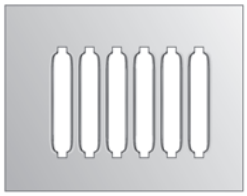
Spring pressure of the spring-loaded cluster assembly runs under a ton (9 kN) and can be ignored in calculations for machine capacity.

Dimensions in inches (millimeters)

# SPECIAL APPLICATIONS


CLUSTER - ROUND


CLUSTER - SHAPE


CARD GUIDE


CENTERPOINT


COUNTERSINK - ROUND


COUNTERSINK - SHAPE


EMBOSS - BEADING

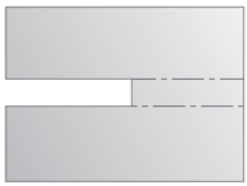

EMBOSS - EDGEFORM


EMBOSS - FORMED

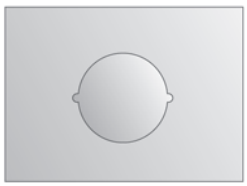
EMBOSS- COLD FORGED


EXTRUSION - TAPPING


EXTRUSION - FLANGED HOLE

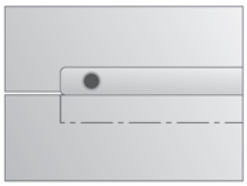

GUIDED SHEARING

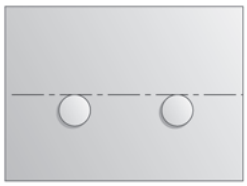

HINGE TOOL


KNOCKOUT


LANCE AND FORM

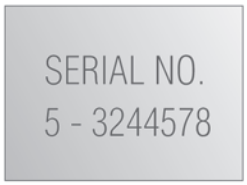

LOUVER


SCISSORTOOL™


SHEARBUTTON


ROLLERBALL™

SHEETMARKER™



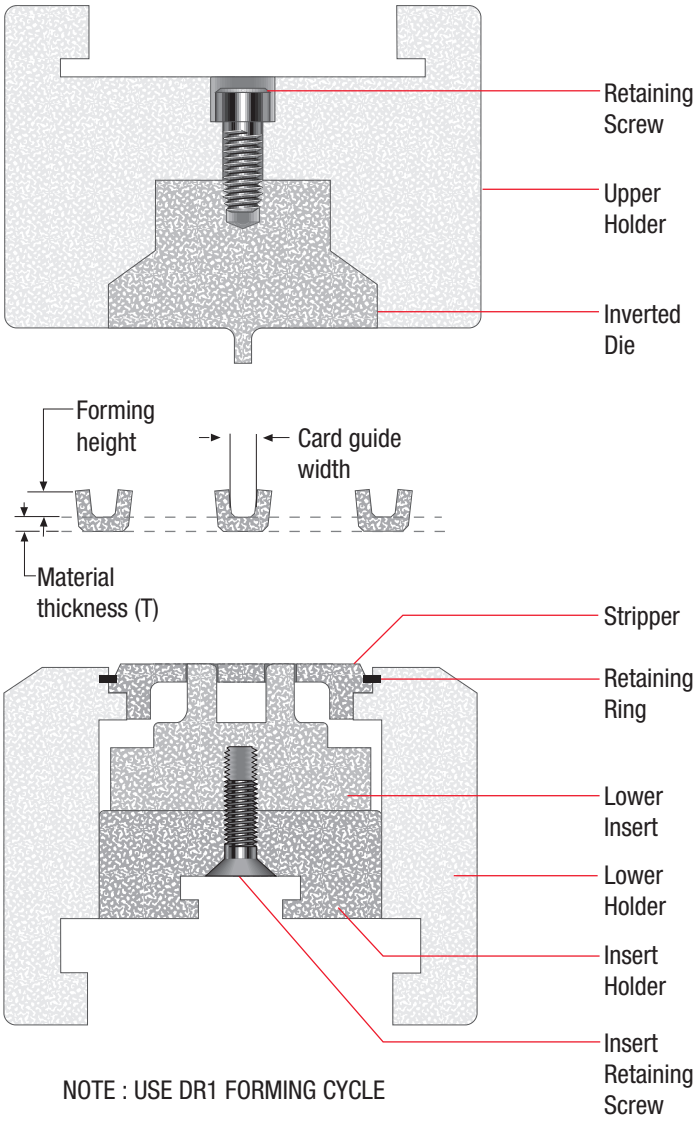
STAMPING - ALPHA/NUMERIC


STAMPING - V-LINE


THREAD FORM

# CARD GUIDE ASSEMBLY

## BU POSITON 30-35 12 TON




NOTE : USE DR1 FORMING CYCLE

### CARD GUIDE

**Use:**

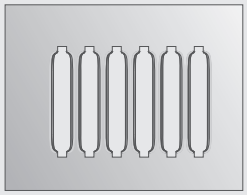
As a retainer for printed circuit boards

**Typical Application:**

- Material thickness from 0.040(1.00) to 0.078(2.00)
- Maximum recommended top-of-sheet to top-of-form height is 0.125(3.20)

**Comments:**

- Length of the card is dependent upon station size and machine tonnage
- Also available as a continuous form to increase productivity and flexibility

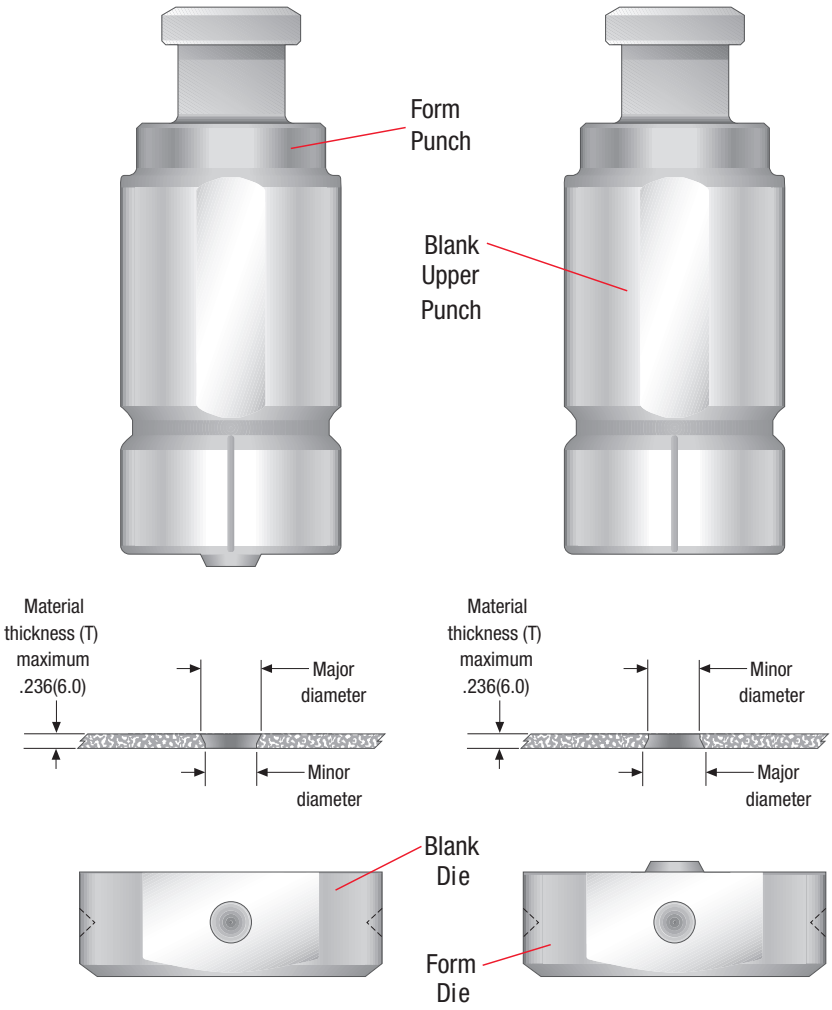


Dimensions in inches (millimeters)

# COUNTERSINK ASSEMBLY

## CONTERSINK DOWN
1-20, 41-76 7 TON

## COUNTERSINK UP
1-20, 41-76 7 TON

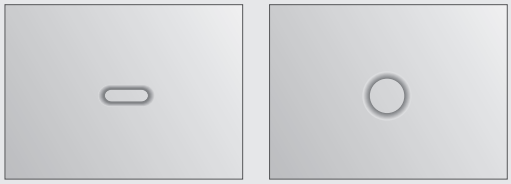



**COUNTERSINK**

**Use:**
Allows screw and rivet head to sit flush or below the surface of the material

**Typical Application:**
- Material thickness from 0.048(1.22) to 0.250(6.35), dependent upon press tonnage capacity

**Comments:**
- The shoulder (dedicated) style is generally ordered for one material thickness and screw size
- The shoulder style coins the surrounding area producing a clean flat countersink with minimal burring



SHAPE ROUND

Dimensions in inches (millimeters)

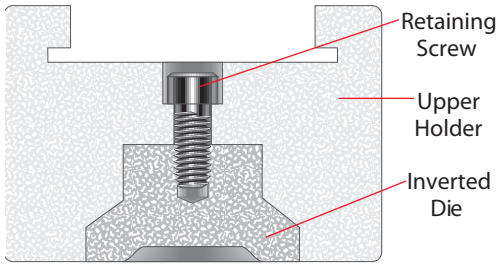
# EMBOSSING ASSEMBLY

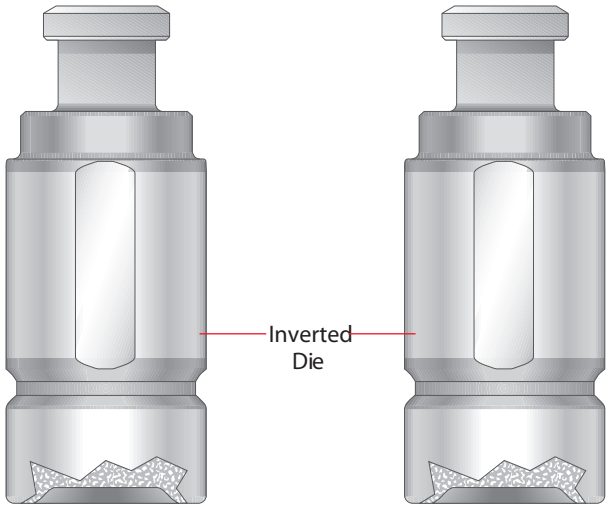
## BU POSITION
30-35 12 TON

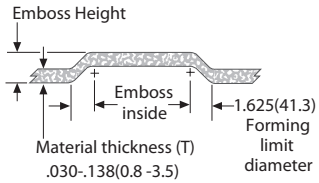
## EI POSITION
1-20, 41-76 7 TON

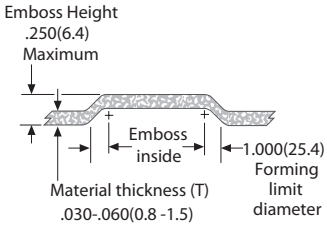
## 1-20, 41-76 7 TON

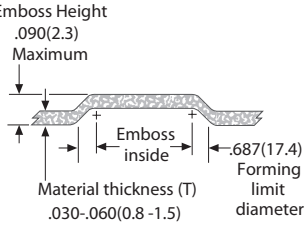
NOTE : USE DR1 FORMING CYCLE
FOR BU AND EI POSITIONS

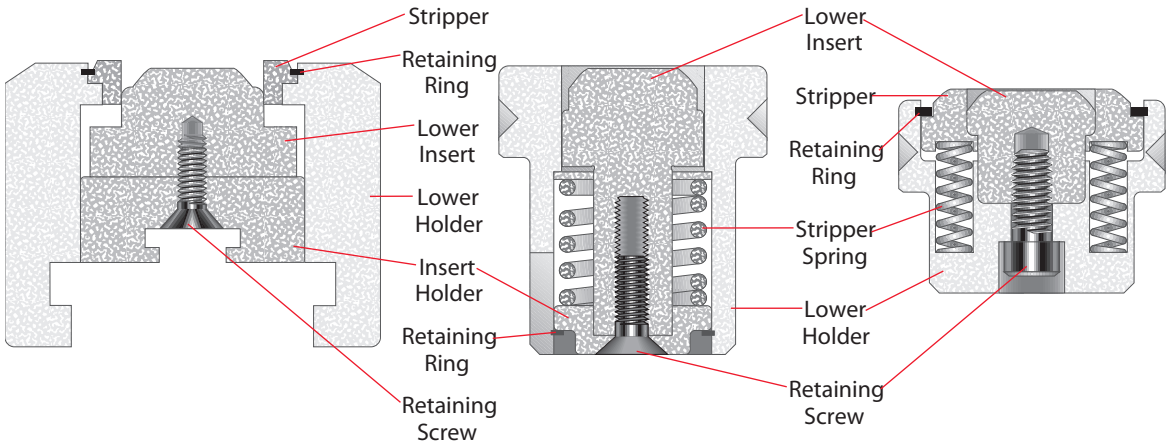


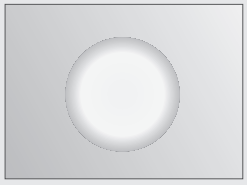



Dimensions in inches (millimeters)

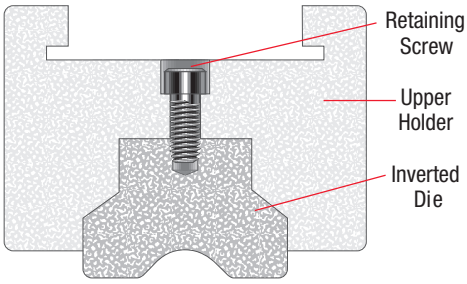
# EMBOSS BEADING ASSEMBLY

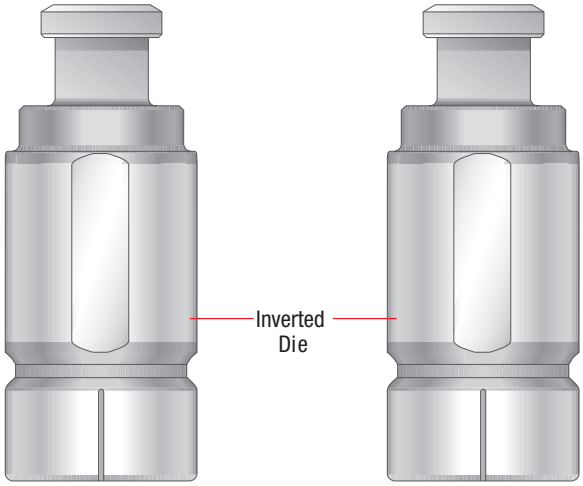
BU POSITION
30-35 12 TON

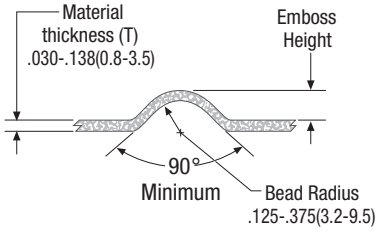
EI POSITION
1-20, 41-76 7 TON

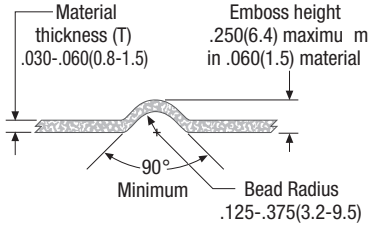
1-20, 41-76 7 TON

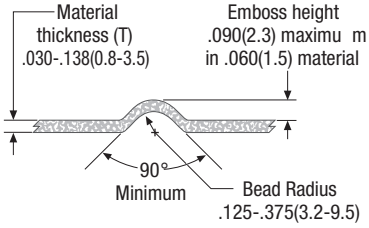
NOTE : USE DR1 FORMING CYCLE
FOR BU AND EI POSITIONS

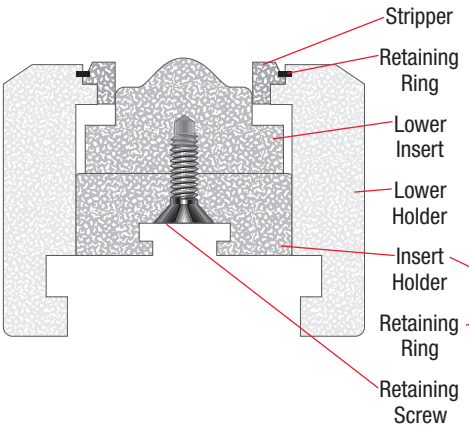


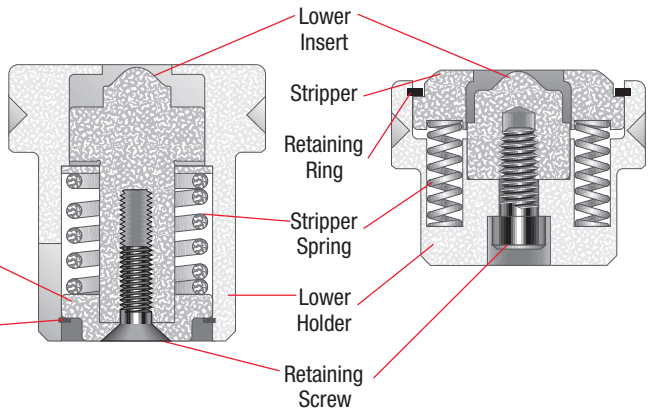



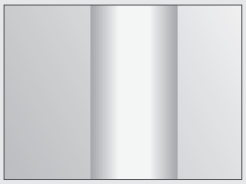



Dimensions in inches (millimeters)

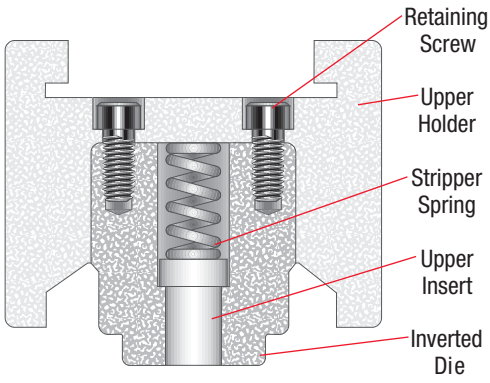
# EXTRUSION ASSEMBLY
# PRE-PIERCE AND FORM

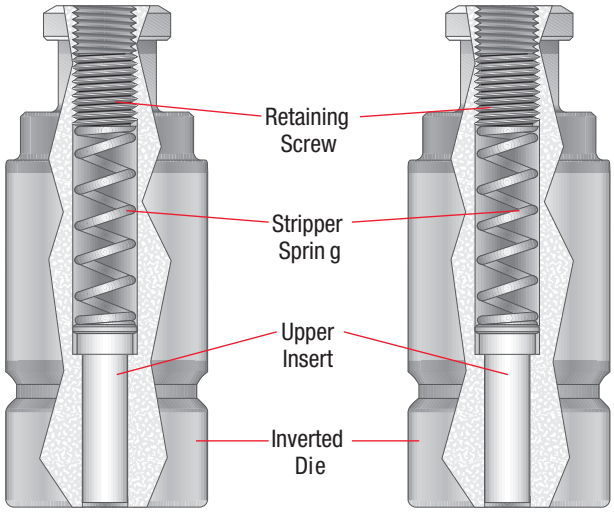
BU POSITION
30-35 12 TON

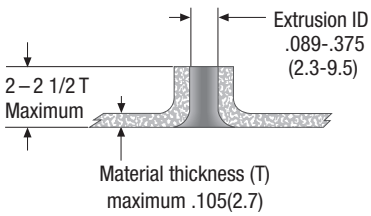
EI POSITION
1-20, 41-76 7 TON

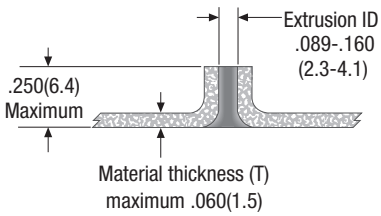
1-20, 41-76 7 TON

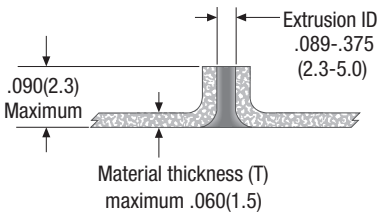
NOTE : USE DR1 FORMING CYCLE
FOR BU AND EI POSITIONS

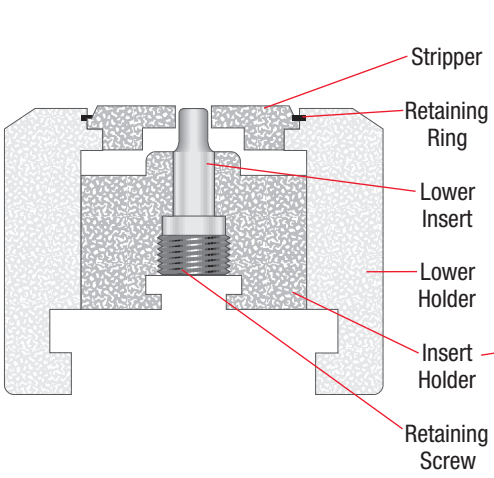


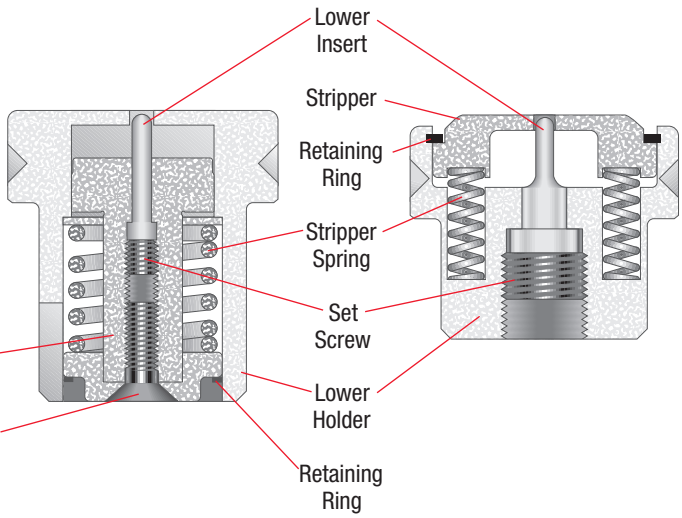



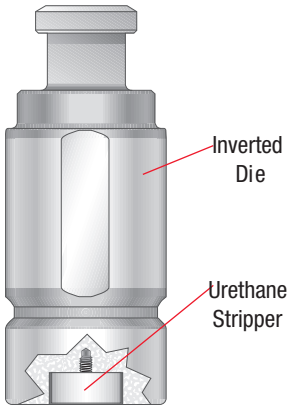



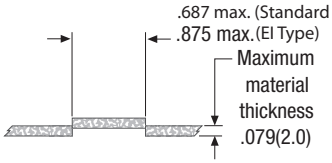




Dimensions in inches (millimeters)

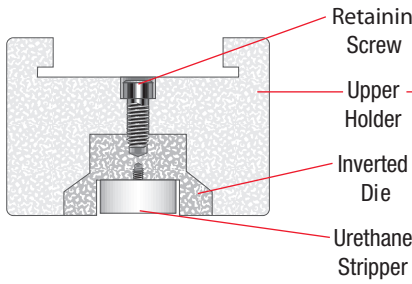
# KNOCKOUT ASSEMBLY

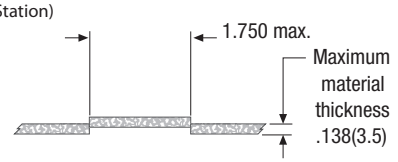
SINGLE KNOCKOUT*
1-20 41-76
7 TON



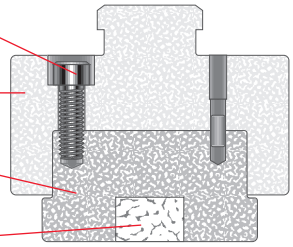



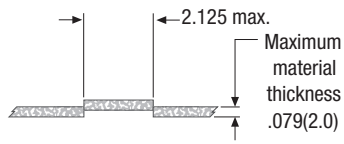

SINGLE KNOCKOUT
BU POSITION 30-35
12 TON

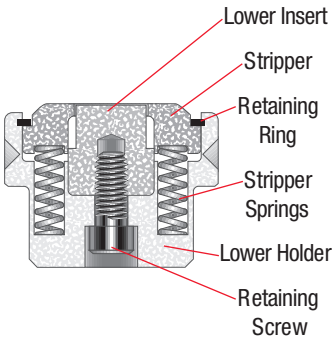


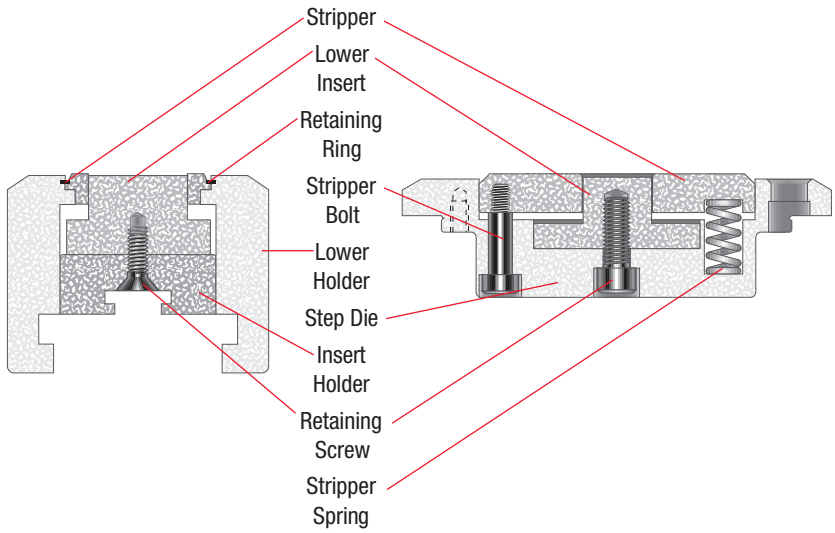




SINGLE KNOCKOUT
BU POSITION 30-35
12 TON 70X90



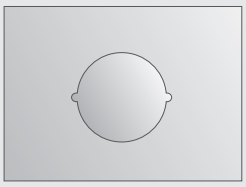



NOTE : USE DR1 FORMING CYCLE

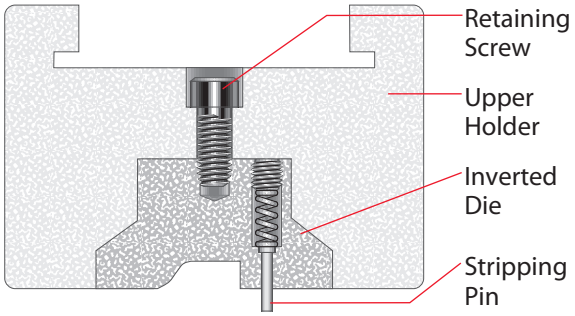
*ALSO AVAILABLE FOR EI POSITION (UPFORMING)

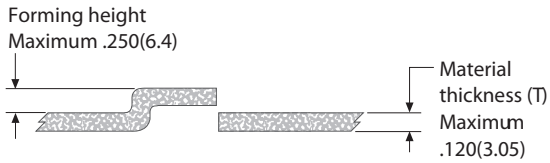


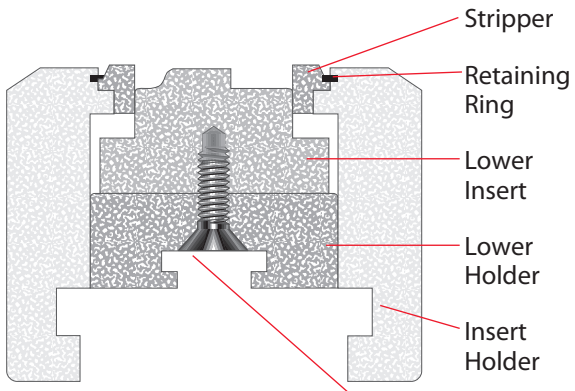
Dimensions in inches (millimeters)

# LANCE AND FORM ASSEMBLY

## BU POSITION 30-35 12 TON

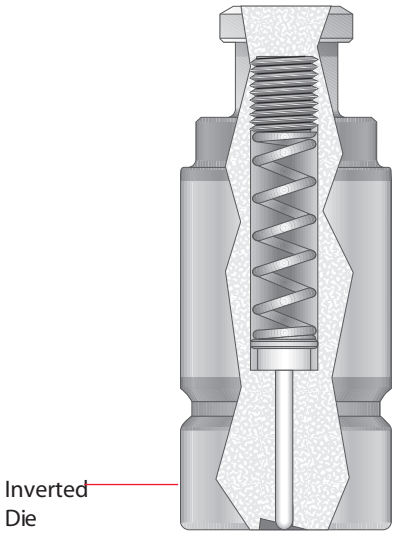


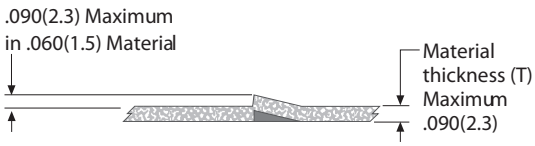



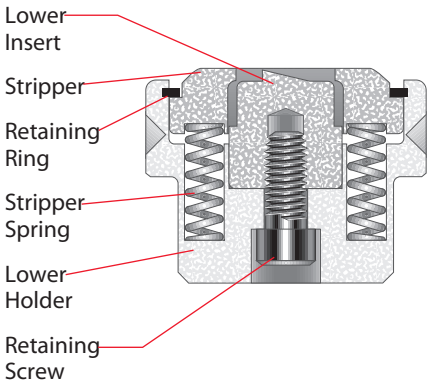




NOTE : USE DR1 FORMING CYCLE

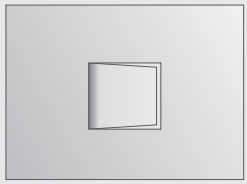
## 1-20, 41-76 7 TON*



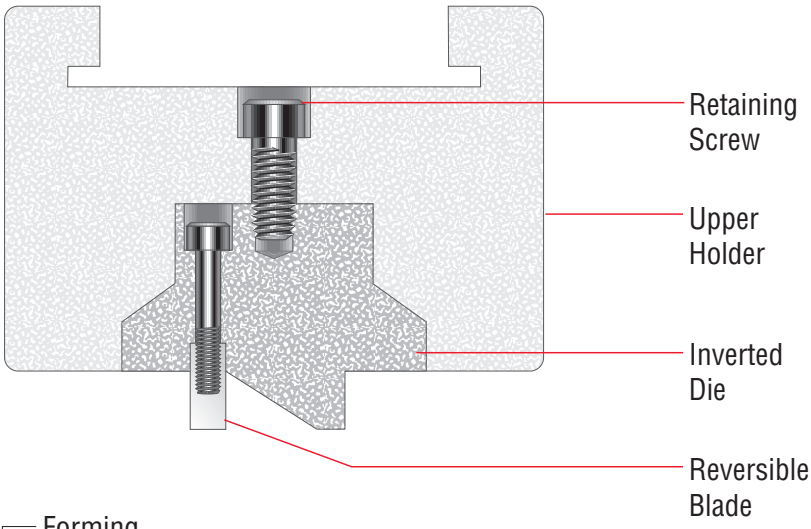

*ALSO AVAILABLE FOR EI POSITION (UPFORMING)

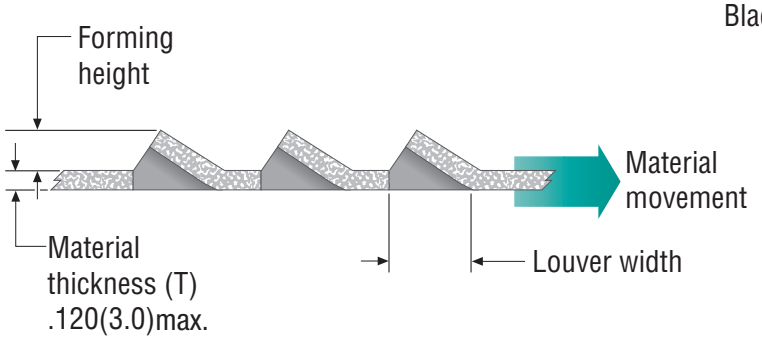


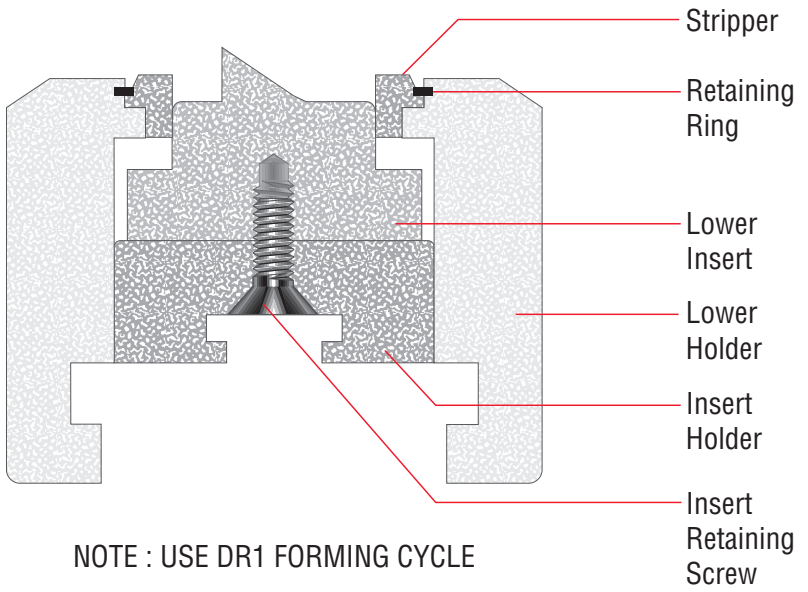
Dimensions in inches (millimeters)

# LOUVER ASSEMBLY

## BU POSITON 30-35 12 TON



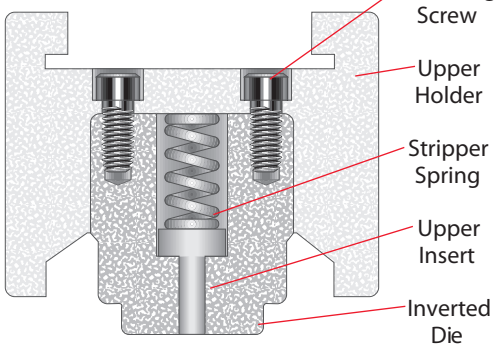

NOTE : USE DR1 FORMING CYCLE

Dimensions in inches (millimeters)

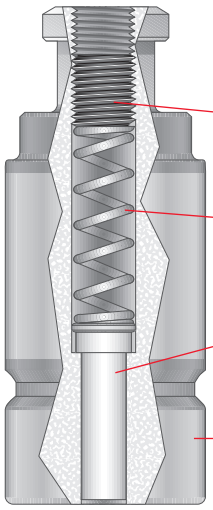
# SHEARBUTTON ASSEMBLY

## BU POSITION
30-35 12 TON

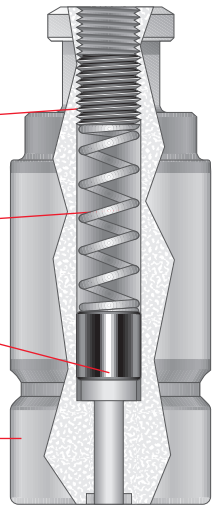
NOTE : USE DR1 FORMING CYCLE
FOR BU AND EI POSITIONS

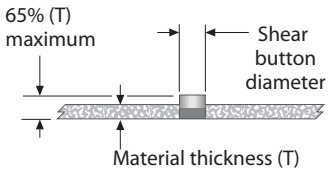


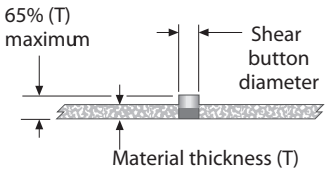

## EI POSITION
1-20, 41-76 7 TON

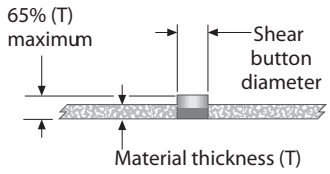


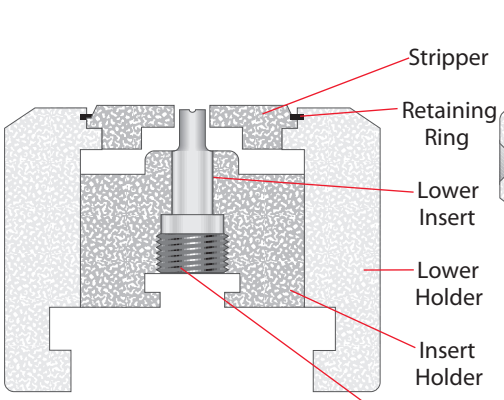

## 1-20, 41-76 7 TON

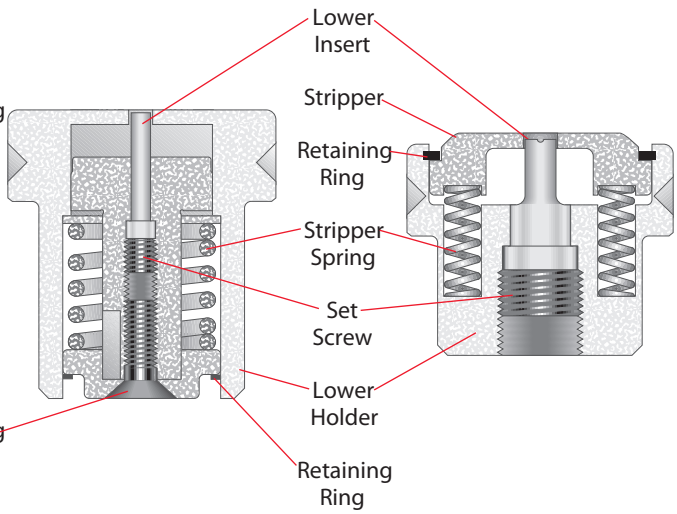


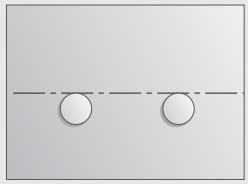


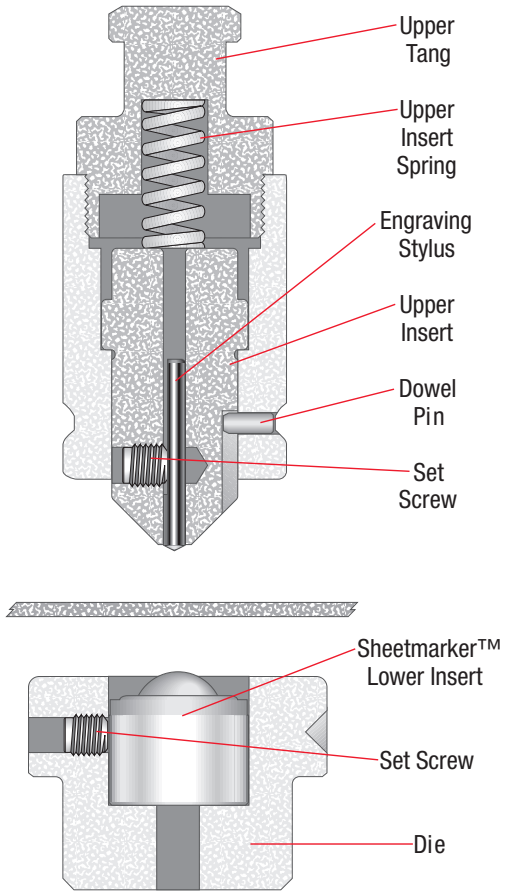



Dimensions in inches (millimeters)

# SHEETMARKER™ ASSEMBLY

## 33 mm POSITION
## 1-20, 41-76 7 TON




**SHEETMARKER™**

**Use:**
For markings or etchings on the surface of sheet metal. The tool uses a diamond pointed insert in a spring loaded holder to create the markings.

**Typical Application:**
- The Sheetmarker tool can be used on all material types and thicknesses

**Comments:**
- A wide variety of results can be produced ranging from very light etching to deep grooves on the sheet
- Variations are achieved with a combination of three spring pressures and two insert point angles
- The press must be capable of holding the ram down while the sheet is moved in the x and/or y axis

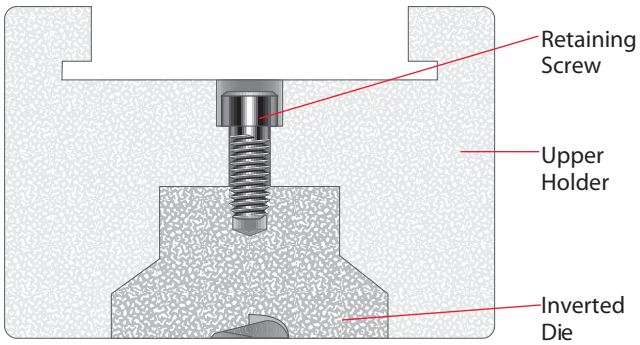
Dimensions in inches (millimeters)

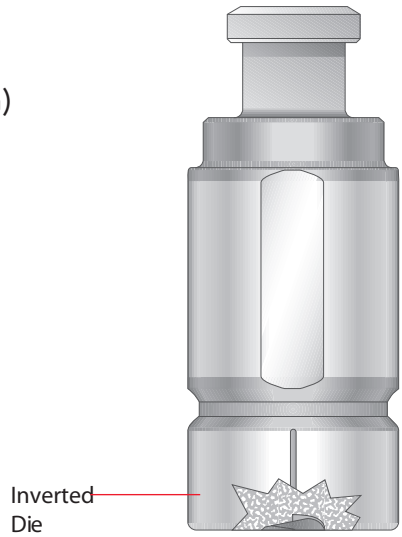
# THREAD FORM ASSEMBLY

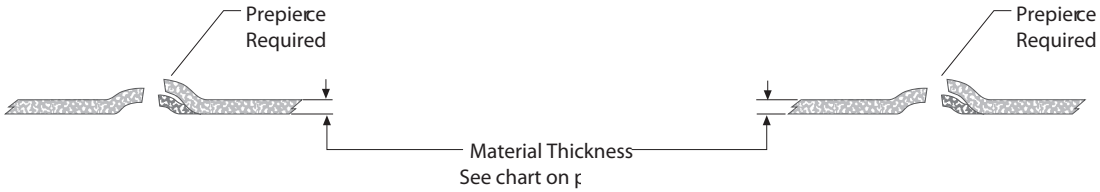
BU POSITION 30-35 12 TON

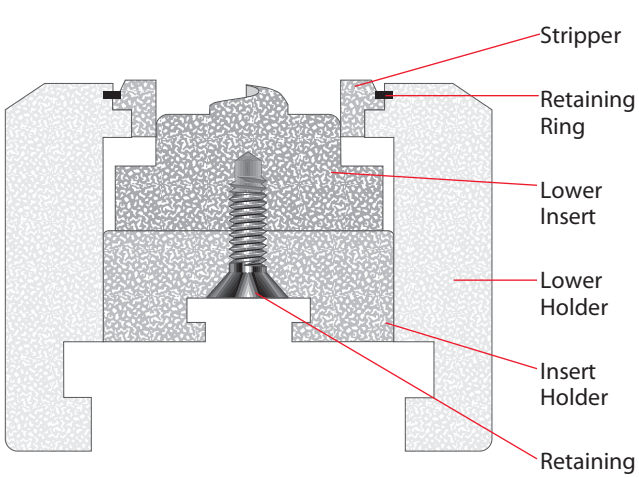
1-20, 41-76 7 TON*

* ALSO AVAILABLE FOR
EI POSITION (UPFORMING)

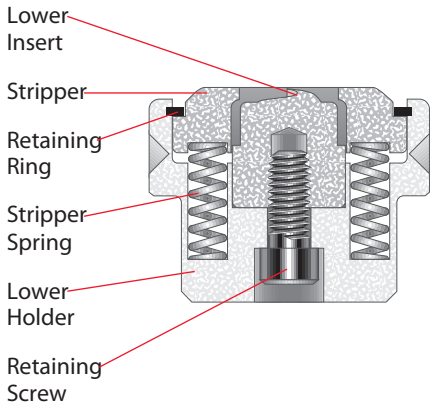


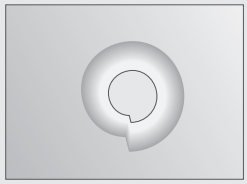




NOTE : USE DR1 FORMING CYCLE



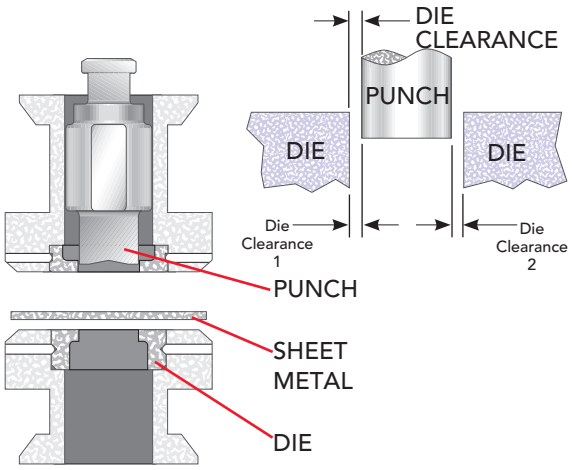



Dimensions in inches (millimeters)

# DIE CLEARANCE AND HOLE QUALITY

## WHAT IS DIE CLEARANCE ?

Die clearance is equal to the space between punch and die when the punch enters the die opening.




Total Die Clearance = Die clearance both sides of Punch

Total Die Clearance = Die Clearance 1 + Die Clearance 2

## RECOMMENDED DIE CLEARANCE

DIE CLEARANCE in terms of percent (%) of material thickness :

| | |
|---|---|
| Minimum Life Clearance | 15% |
| Optimum Clearance | 20 - 25% |
| Extended Life Clearance | 30% |

MATE always refers to TOTAL DIE CLEARANCE — NOT clearance per side.

**Aluminum**

| Material Thickness | Total Clearance |
|---|---|
| .040"(1.0mm) | .006"(0.15mm) |
| .060"(1.5mm) | .009"(0.23mm) |
| .080"(2.0mm) | .012"(0.30mm) |
| .100"(2.5mm) | .018"(0.45mm) |
| .120"(3.0mm) | .024"(0.60mm) |
| .137"(3.5mm) | .028"(0.70mm) |

**Copper**

| Material Thickness | Total Clearance |
|---|---|
| .040"(1.0mm) | .006"(0.15mm) |
| .060"(1.5mm) | .009"(0.23mm) |
| .080"(2.0mm) | .012"(0.30mm) |
| .100"(2.5mm) | .018"(0.45mm) |
| .120"(3.0mm) | .024"(0.60mm) |
| .137"(3.5mm) | .028"(0.70mm) |

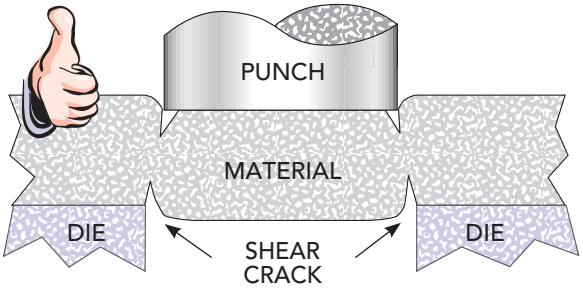
**Mild Steel**

| Material Thickness | Total Clearance |
|---|---|
| .040"(1.0mm) | .008"(0.20mm) |
| .060"(1.5mm) | .012"(0.30mm) |
| .080"(2.0mm) | .016"(0.40mm) |
| .100"(2.5mm) | .020"(0.50mm) |
| .120"(3.0mm) | .030"(0.75mm) |
| .137"(3.5mm) | .034"(0.85mm) |

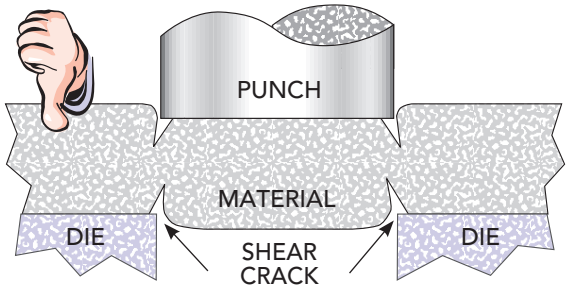
**Stainless Steel**

| Material Thickness | Total Clearance |
|---|---|
| .040"(1.0mm) | .008"(0.15mm) |
| .060"(1.5mm) | .016"(0.40mm) |
| .080"(2.0mm) | .020"(0.50mm) |
| .100"(2.5mm) | .025"(0.64mm) |
| .120"(3.0mm) | .035"(0.90mm) |
| .137"(3.5mm) | .040"(1.00mm) |

## WHY USE PROPER DIE CLEARANCE ?

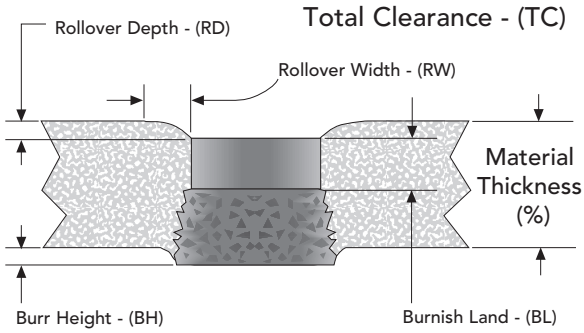



OPTIMUM CLEARANCE — shear cracks join, balancing punching force, piece part quality and tool life.




CLEARANCE TOO SMALL — secondary shear cracks are created, raising punching force and shortening tool life.

## ANATOMY OF A PUNCHED HOLE




EFFECT OF TOTAL CLEARANCE AS A PERCENT (%) OF MATERIAL THICKNESS

| TC | RD | RW | BH | BL |
|---|---|---|---|---|
| 10% | 10% | 50% | 15% | 75% |
| 15% | 12% | 40% | 10% | 55% |
| 25% | 16% | 45% | 6% | 50% |
| 35% | 20% | 50% | 6% | 45% |

Dimensions in inches (millimeters)

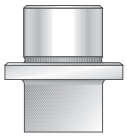
# CALCULATING PUNCHING FORCE



## PUNCHES WITHOUT SHEAR

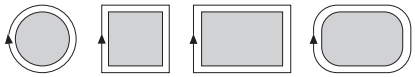
FORMULA:

- Punch perimeter in inches(mm) x
- Material thickness in inches(mm) x
- Material shear strength in lbs/in$^2$(kN/mm$^2$) =
- Punching force in lbs(kN)

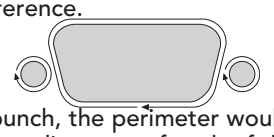


To convert to Imperial Tons: divide lbs by 2000
To convert to Metric Tons: divide kN by 9.81

PUNCH PERIMETER

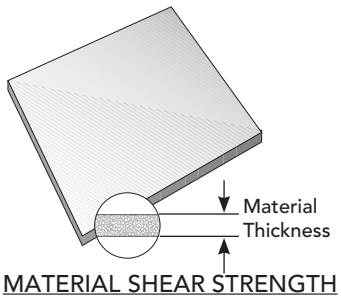


Perimeter is simply the linear distance around a punch of any shape. For a round punch, this would be the circumference.



For a cluster punch, the perimeter would be the sum of the linear distances of each of the punch components.

MATERIAL THICKNESS




Material thickness is the width of the workpiece or sheet that the punch must penetrate in making a hole. Generally the thicker the material the more difficult it is to punch, but this isn't the only factor.

MATERIAL SHEAR STRENGTH

Material shear strength is a measure of maximum internal stress before a given material begins to shear. This property is determined by metallurgical science and expressed as a numerical factor. Popular materials like aluminum, brass, mild steel and stainless steel have approximate shear strengths of:

| MATERIAL : | SHEAR STRENGTH - psi/in$^2$(kN/mm$^2$): |
|---|---|
| Aluminum 5052 H32 | 25000(0.1724) |
| Brass | 35000(0.2413) |
| Mild Steel | 50000(0.3447) |
| Stainless | 75000(0.5171) |

EXAMPLE PUNCHING FORCE PROBLEM

**Example**: using 20.0 mm square punch into 3.0 mm mild steel:
punch perimeter is 80.0 mm,
material thickness is 3.0 mm,
material shear strength is 0.3447 kN/mm$^2$.

**80.0 mm x 3.0 mm x 0.3447 kN/mm$^2$ = 82.7 kN**

## PUNCHES WITH SHEAR

FORMULA:

- Punch perimeter in inches(mm) x
- Material thickness in inches(mm) x
- Material shear strength in lbs/in$^2$(kN/mm$^2$) x • SHEAR FACTOR =
- Punching force in lbs(kN)

PUNCHES WITH SHEAR — CONSIDERATION:

Punch shear tends to lessen punching force. The degree to which this happens is the SHEAR FACTOR. Shear factor does change as the punch becomes less sharp. Note that the factory does not recommend that you use shear to bring punching force within press capacity.

### SHEAR FACTORS for material .050"(1.2mm) to .250"(6.4mm) for punches with shear

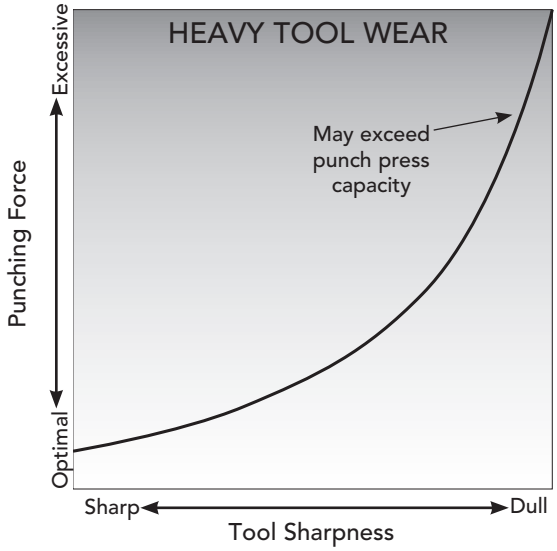
| Material Thickness | .050" 1.2 mm | .060" 1.5 mm | .075" 1.9 mm | .105" 2.7 mm | .120" 3.0 mm |
|---|---|---|---|---|---|
| Shear Depth: .060(1.5) | **.50** | **.50** | **.58** | **.72** | **.75** |

| Material Thickness | .135" 3.4 mm | .165" 4.2 mm | .190" 4.8 mm | .250" 6.4 mm |
|---|---|---|---|---|
| Shear Depth: .060(1.5) | **.78** | **.83** | **.86** | **.90** |

**EXAMPLE**: Formula for punching with shear (20.0 mm punch)
80.0 mm x 3.0 mm x 0.3447 kN/mm$^2$ x .75 = 62.0 kN

**NOTE**: The factory does not recommend using shear to bring punching force within press capacity because dulling tool edges quickly raise punching force and press capacity may be exceeded.

## PUNCHING FORCE CHANGES AS TOOLS BECOME DULL




Dimensions in inches (millimeters)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