90° Forming Punches & Dies

NP-12

F-1/4"
22 Gauge

ND-12

F-1/2"
16 Gauge

F-3/8"
18 Gauge

F-5/8"
14 Gauge

90° Air Forming Punches & Dies

M-8A
1/4" Capacity

F-1-1/4"
9 Gauge

F-1-1/2"
3/16" Capacity

F-2"
1/4" Capacity

M-8B"
3/8" Capacity
Gooseneck punches offer the benefit of clearance for a return flange as in a two stroke channel forming operation.

Dies are shown only to be suggestive of typical set-ups; see pages 6 - 7 for complete die specifications.
30° Forming
Punches & Dies

Flattening
Dies
30° FORMING PUNCHES AND DIES
FLATTENING DIES

AM-4
9 Gauge

AM-5
3/16" Capacity

AF-1"
11 Gauge

AF-1-1/4"
9 Gauge

AF-1-1/2"
3/16" Capacity

AM-F
20 Gauge

180-Y

180-Z
MULTI-VEE BLOCK DIES

4-Way Dies

Die No. | Block Size | 4 Die Openings
---|---|---
2-2MV4 | 2.250 | 0.500 | 0.750 | 1.000 | 1.250
2-7MV4 | 2.750 | 0.625 | 0.875 | 1.125 | 1.500
3-2MV4 | 3.250 | 0.750 | 1.000 | 1.500 | 2.000
3-7MV4 | 3.750 | 0.875 | 1.250 | 2.000 | 2.500
4-2MV4 | 4.250 | 1.000 | 1.500 | 2.000 | 3.000
4-7MV4 | 4.750 | 1.000 | 1.250 | 2.500 | 3.000
5-2MV4 | 5.250 | 1.000 | 2.000 | 3.000 | 4.000
5-7MV4 | 5.750 | 1.250 | 2.000 | 3.000 | 4.000
6-7MV4 | 6.750 | 1.500 | 2.500 | 3.500 | 5.000
7-7MV4 | 7.750 | 2.000 | 3.000 | 3.500 | 6.000
10MV4 | 10.00 | 2.500 | 3.500 | 4.000 | 8.000
12MV4 | 12.00 | 3.000 | 4.000 | 5.000 | 10.00

3-Way Dies

Die No. | Block Size | 3 Die Openings
---|---|---
2-2MV3 | 2.250 | 0.500 | 0.750 | 1.000
2-7MV3 | 2.750 | 0.750 | 1.125 | 1.500
3-2MV3 | 3.250 | 1.000 | 1.500 | 2.000
3-7MV3 | 3.750 | 1.125 | 2.000 | 2.500
4-2MV3 | 4.250 | 1.000 | 2.000 | 3.000
4-7MV3 | 4.750 | 1.250 | 2.000 | 3.000
5-2MV3 | 5.250 | 2.000 | 3.000 | 4.000
5-7MV3 | 5.750 | 1.500 | 2.500 | 4.000
6-7MV3 | 6.750 | 1.500 | 3.000 | 4.000
7-7MV3 | 7.750 | 2.000 | 3.000 | 5.000
10MV3 | 10.00 | 2.500 | 3.500 | 6.000
12MV3 | 12.00 | 3.000 | 4.000 | 10.00

ADJUSTABLE AIR-FORMING DIE

ADJ-77
Considered the most versatile air forming component to complement a press brake. From general forming, to bumping radii.
It is sometimes necessary to fill die space if RAM adjustment is insufficient or if application exists.

In either case, RAM adapters are mounted to the RAM of the press. Height and width are suited to your condition.

Any die holder 4" high or over can be furnished with half moon burnouts for mounting.
**Rotary Benders**

**PCM-1**
- 1" Diameter
- 22 - 14 Ga. (0.030 - 0.075)
- Flange Length-OD: 7/16" - 2"

**PCM-15**
- 1-1/2" Diameter
- 13 - 11 Ga. (0.089 - 0.120)
- Flange Length-OD: 5/8" - 2"

**PCM-2**
- 2" Diameter
- 10 - 8 Ga. (0.134 - 0.164)
- Flange Length-OD: 13/16" - 2"

**Typical Rotary Bender Applications**

- 90° Degree Bends
- Return Bends
- Channel Bends
PIVOT FORM VEE DIE

The Pivot Form Vee Die is designed to offer a wide variety of benefits compared to a conventional die:
- Each die is able to form a wide variety of material thicknesses.
- Ability to form short flanges.
- Minimize marking on parts.
- Minimize distortion of holes and slots near bend line.

The Retractable Vee Die can be designed to fit any press brake.

<table>
<thead>
<tr>
<th>PVT-.50</th>
<th>Diameter Rounds</th>
<th>Max. Material Thickness</th>
<th>Min. Outside Flange</th>
<th>Max. Outside Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/2&quot;</td>
<td>.10&quot;</td>
<td>.27&quot;</td>
<td>.20&quot;</td>
</tr>
<tr>
<td>PVT-1.0</td>
<td>1&quot;</td>
<td>.187&quot;</td>
<td>.54&quot;</td>
<td>.45&quot;</td>
</tr>
</tbody>
</table>
Box Forming

In forming a box, where 4 sides are bent up, the punch must be high enough so that when making the last two bends, the preformed sides do not strike the ram.

These special gooseneck punches shown may be used to form boxes and channels with long return legs.
The tipped forming angle minimizes sheet whip up and provides ram clearance on deep channels.

The tipped angle gooseneck allows deeper channels to be formed.

Allows shorter flanges to be formed that wouldn’t be possible in conventional tools.

TA-22 and TA-24 are recommended for 18 gauge material and lighter, due to side thrust caused by the tip forming angle.

Box forming chart using a tipped forming angle.
Specific Press Brake Dies

**RIB FORMING DIES**

- RB-10
- RB-12
- RB-14
- RB-16

**RADIUS FORMING DIES**

- RS-18
- RS-20
  - Clearance can be added to the punch for pre-formed flanges.
- RS-22
  - Is used to form a radius and angle in multiple hits.
SPECIAL OFFSET DIES

SO-26

SO-28

SO-30

SO-32
| SET CRL-11&22 | Curls of 3/8" dia. and larger are for regular edge beading |
| SET CRL-33&44 | Produce the tightest and roundest curl that can be formed in two strokes |
| SET CRL-55   | Used in place of CRL-44 with on center curl in three strokes |

**CRL-33**
1st Operation

**CRL-44**
2nd Operation

**CRL-55**
3rd Operation

**CRL-66**
Forms a complete off center curl in 3 operations. Whip up minimal due to slight angle involved on the first two operations. Optional on center curl in 4 strokes
All of these die sets are used in high production flanging operations. Material whip up on the operator is non-existent. Capacity for illustrated sets – 16 Gauge.
SS-9
Flattening die required to close hem in second operation.

SS-18
Common standing seam in two operations.

HM-01
Very popular – produces complete hem in two strokes up to 16 Gauge.

HM-02
Stabilizing heel on punch necessary when forming heavier material (Length of hem will be limited).
These sets form an open hem in one handling (2 strokes). These types of die sets are suitable for 14 Gauge mild steel or less.

Double Flange Standing Seam Die sets forms in two operations.

SET SS-27

SET HM-14

SET SS-45A

SET SS-45B

SET HM-22
For high production in hemming wide sheets with no whip up. Recommended for 20 Gauge or lighter.
CHANNEL DIES

SET CHN-1
Used to form flat bottomed channels in one stroke. Release wedge on die, and hook stripper on punch, makes part removable.

SET CHN-2
Recommended for channels with a web over 3/4" wide. Release wedges on both punch and die insure instant removal of part.

SET HCD-3
Forms four right angle bends in one stroke. Pressure pad in die keeps web flat and wedge permits easy part removal.

SET HCD-4
By tapering sides of a hat channel, press tonnage is greatly decreased. Pressure pad assures flatness of web and ejection of part.
At times when material has a high memory value or when an excessive inside radii is required, Set RCD-5 is recommended.

Making rectangular tubes, sets TC-6 and TC-7 are suggested in combination.
OFFSET & JOGGLE DIES

SET JGL-1
For material thickness offsets

SET JGL-2
Adjustable to 5/16" by shimming

SET JGL-3
Adjustable to 5/16" by shimming
USEFUL FORMING INFORMATION

The chart gives you the minimum flange length for each vee opening, and the approx. bed radius when air bending over a particular vee opening.

<table>
<thead>
<tr>
<th>Vee Opening</th>
<th>Minimum Flange</th>
<th>Approx. Bend Radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>.156</td>
<td>.125</td>
<td>.024</td>
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<tr>
<td>.25</td>
<td>.188</td>
<td>.039</td>
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<tr>
<td>.375</td>
<td>.281</td>
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<td>.500</td>
<td>.344</td>
<td>.078</td>
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<tr>
<td>.625</td>
<td>.437</td>
<td>.097</td>
</tr>
<tr>
<td>.75</td>
<td>.562</td>
<td>.117</td>
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<tr>
<td>.875</td>
<td>.656</td>
<td>.136</td>
</tr>
<tr>
<td>1.00</td>
<td>.687</td>
<td>.156</td>
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<tr>
<td>1.125</td>
<td>.812</td>
<td>.175</td>
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<tr>
<td>1.25</td>
<td>.875</td>
<td>.195</td>
</tr>
<tr>
<td>1.500</td>
<td>1.125</td>
<td>.234</td>
</tr>
<tr>
<td>2.00</td>
<td>1.375</td>
<td>.312</td>
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<tr>
<td>2.500</td>
<td>1.750</td>
<td>.390</td>
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<td>3.00</td>
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<td>.468</td>
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<tr>
<td>4.00</td>
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<td>.625</td>
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<td>5.00</td>
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<tr>
<td>6.00</td>
<td>4.500</td>
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<td>8.00</td>
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<td>1.25</td>
</tr>
<tr>
<td>10.00</td>
<td>6.875</td>
<td>1.56</td>
</tr>
</tbody>
</table>

See chart on following page for tonnage calculations
| Gauge | Dec. | 1/4 | 5/16 | 3/8 | 7/16 | 1/2 | 5/8 | 3/4 | 7/8 | 1 | 1-1/8 | 1-1/4 | 1-1/2 | 2 | 2-1/2 | 3 | 3-1/2 | 4 | 5 | 6 | 7 | 8 | 10 | 12 | 14 | 16 | 20 | 24 | 30 |
|-------|------|-----|------|-----|------|-----|-----|-----|-----|----|------|------|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|
| 20    | .0360| 2.5 | 2    | 1.6 | 1.1  | 1.2 |     |     |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 18    | .0478| 3.5 | 2.8  | 2.1 | 1.7  | 1.3 |     |     |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 16    | .0598| 6.0 | 5.3  | 3.7 | 2.8  | 2.2 | 1.7 |     |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 14    | .0747| 5.5 | 4.6  | 3.5 | 3.0  | 2.5 | 2.1 |     |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 13    | .0907| 6.4 | 5.5  | 4.3 | 3.2  | 2.9 |     |     |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 12    | .1046| 9.2 | 6.9  | 6.0 | 5.0  | 4.5 | 3.9 | 3.1 |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 11    | .1196| 10.1| 8.0  | 8.0 | 6.1  | 5.5 | 4.3 | 2.9 |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 10    | .1345| 10.3| 9.8  | 8.8 | 9.0  | 5.0 | 3.6 | 3.7 |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 9     | .1495| 11.9| 11.3 | 9.8 | 9.0  | 7.0 | 5.0 | 3.7 |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 3/16  | .1870| 21.5| 16.9 | 13.9| 12.8 | 11.2| 9.0 | 6.7 | 4.9 |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 1/4   | .2500| 27.5| 22.1 | 15.0| 11.6 | 9.6 | 7.9 | 6.7 |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 5/16  | .3120| 39.2| 36.5 | 33.2| 28.5 | 24.4| 17.4| 15.0| 11.5|    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 3/8   | .3750| 42.7| 31.2 | 23.8| 19.5 | 16.3| 12.4| 9.6 |     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 7/16  | .4380| 45.5| 35.2 | 28.5| 24.4 | 17.4| 15.0| 11.5|     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 1/2   | .5000| 48.5| 39.9 | 33.2| 24.4 | 19.5 |16.1| 13.4|     |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 3/4   | .6250| 57.9| 42.8 | 33.1| 27.3 | 23.3| 17.0|     |      |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 7/8   | .7500| 66.7| 53.5 | 43.6 |36.5 | 27.1 |21.0|     |      |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 1     | 1.000| 81  | 64  | 55  | 39.5 |31.4 |    |      |      |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 1-1/4 | 1.250|     |     |     |      |      |    |      |      |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 1-1/2 | 1.500|     |     |     |      |      |    |      |      |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 1-3/4 | 1.750|     |     |     |      |      |    |      |      |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 2     | 2.000|     |     |     |      |      |    |      |      |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 2-1/2 | 2.500|     |     |     |      |      |    |      |      |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |
| 3     | 3.000|     |     |     |      |      |    |      |      |    |      |      |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |

The shaded figures represent ideal conditions for right angle bending: punch with radius equal to metal thickness and die opening, approximately eight times the metal thickness. Resulting bend has inside radius approximately equal to metal thickness. Bending pressure required for other metals as compared to 60,000 P.S.I. tensile mild steel on chart.

Approximate tons per lineal foot of forming based on Air Bending 90° bend in mild steel.

- **Soft Brass**: 50% of pressure listed
- **Soft Aluminum**: 50% of pressure listed
- **Aluminum Alloy (heat treated)**: Same as steel
- **Stainless Steel**: 50% more than steel
- **Chrome Molybdenum**: 100% more than steel
**PRESS BRAKE – MULTIPLE BEND ALLOWANCES RULE OF THUMB**

<table>
<thead>
<tr>
<th>Shape</th>
<th>Description</th>
<th>Air Form</th>
<th>Bottoming</th>
<th>NOTES</th>
</tr>
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<tbody>
<tr>
<td>V</td>
<td>Vee Die</td>
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<tr>
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<td>Offset</td>
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<td>300</td>
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<td>Preform Curl</td>
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<td>Close Curl</td>
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**Shape Considerations**

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<thead>
<tr>
<th>Large Radii</th>
<th>Mat'l. Thick Radii</th>
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<tr>
<td>Angle Variation</td>
<td>Min. Angle Variation</td>
</tr>
<tr>
<td>Concave or Convex Sides</td>
<td>Maintain Flatness</td>
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</tbody>
</table>

**FORMULA FOR MAKING MULTIPLE BENDS ON PRESS BRAKE**

Shape as shown in mild steel with radii equal the metal thickness unless otherwise noted.

Multiply metal thickness by factor = tons per foot

Stainless Steel (18-8 annealed) Type 304 1.55

Aluminum
- 3303-H14 (1/2 hard) .35
- 5052-H34 (1/2 hard) .65
- 6061-T6 .75

Brass
- 70/30 (1/2 hard) 1.10

**SAFETY WARNING**

It is the responsibility of the owner to make sure that the proper application with due regard to safety in operation is followed. Safety and industrial standards must be considered to insure that point of operation protection is effective.

We do everything possible to supply dies to produce material that fits specifications. However, there is no possible way we can control how the dies are actually used.

Our dies are to never be used in any equipment without some means provided for preventing hands or other parts of the body from extending or remaining in the die space at any time.

Safety requirements are outlined by the American National Standard Bulletin A.N.S.I. #B-11-3, as well as other local, state and federal standards which may apply.

For further safety information and a copy of A.N.S.I. #B-11-3 write to:

American National Standards Institute, Inc.
1430 Broadway
New York, NY 10018.