

Hexagonal Rotary Punch Broaches M-2

Material: M-2 HSS For Cutting Mild Steel Applications

Rotary/Punch Broaches:

- Use in a variety of machines
- Cut polygons in blind holes
- Any type of CNC or manual turning, milling, drilling or screw machine.



Punching Versus Rotary Broaching:

Many applications can be achieved without the rotary broach holder.

For the purpose of merely punching a polygon into an existing pilot hole, these broaches have successfully been used with universal machining methods.

Hexagonal Rotary/Punch Broaches

8mm - .315 Shank Inch

EDP #	Hex Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
66002	.051	0.051	5/64	1-1/4
66004	1/16	0.063	3/32	1-1/4
66005	5/64	0.079	7/64	1-1/4
66006	3/32	0.095	9/64	1-1/4
66007	7/64	0.111	5/32	1-1/4
66008	1/8	0.127	3/16	1-1/4
66009	9/64	0.143	7/32	1-1/4
66010	5/32	0.158	1/4	1-1/4
66012	3/16	0.190	9/32	1-1/4
66014	7/32	0.221	11/32	1-1/4
66016	1/4	0.252	3/8	1-1/4
66018	9/32	0.284	3/8	1-1/4
66020	5/16	0.315	3/8	1-1/4
66022	11/32	0.346	7/16	1-1/4
66024	3/8	0.378	1/2	1-1/4
66026	13/32	0.410	1/2	1-1/4
66028	7/16	0.441	1/2	1-1/4
66030	15/32	0.472	1/2	1-1/4
66032	1/2	0.504	1/2	1-1/4

Hexagonal Rotary/Punch Broaches

8mm - .315 Shank Metric

EDP #	Hex Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
662013	1.3 mm	0.051	3/32	1-1/4
662015	1.5 mm	0.061	3/32	1-1/4
66202	2 mm	0.081	7/64	1-1/4
662025	2.5 mm	0.101	5/32	1-1/4
66203	3 mm	0.120	3/16	1-1/4
662035	3.5 mm	0.139	3/16	1-1/4
66204	4 mm	0.160	1/4	1-1/4
662045	4.5 mm	0.179	1/4	1-1/4
66205	5 mm	0.199	5/16	1-1/4
66206	6 mm	0.238	3/8	1-1/4
66207	7 mm	0.278	3/8	1-1/4
66208	8 mm	0.319	3/8	1-1/4
66209	9 mm	0.358	3/8	1-1/4
66210	10 mm	0.398	1/2	1-1/4
66211	11 mm	0.437	1/2	1-1/4
66212	12 mm	0.476	1/2	1-1/4

Hexagonal Rotary/Punch Broaches

3/4" - .750 Shank Inch

EDP #	Hex Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
66524	3/8	0.379	1/2	2-1/2
66528	7/16	0.442	1/2	2-1/2
66532	1/2	0.505	5/8	2-1/2
66536	9/16	0.567	3/4	2-1/2
66540	5/8	0.631	3/4	2-1/2
66548	3/4	0.754	7/8	2-3/4
66556	7/8	0.883	7/8	2-3/4
66564	1	1.014	7/8	2-3/4

Hexagonal Rotary/Punch Broaches

1/2" - .500 Shank Inch

EDP #	Hex Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
66106	3/32	0.095	9/64	1-3/4
66107	7/64	0.111	5/32	1-3/4
66108	1/8	0.127	3/16	1-3/4
66109	9/64	0.143	7/32	1-3/4
66110	5/32	0.158	1/4	1-3/4
66112	3/16	0.190	9/32	1-3/4
66114	7/32	0.221	9/32	1-3/4
66116	1/4	0.252	3/8	1-3/4
66118	9/32	0.284	7/16	1-3/4
66120	5/16	0.315	1/2	1-3/4
66122	11/32	0.346	9/16	1-3/4
66124	3/8	0.378	9/16	1-3/4
66126	13/32	0.410	5/8	1-3/4
66128	7/16	0.441	5/8	1-3/4
66130	15/32	0.472	5/8	1-3/4
66132	1/2	0.504	5/8	1-3/4
66136	9/16	0.567	5/8	1-3/4
66140	5/8	0.630	7/8	1-3/4
66144	11/16	0.693	7/8	1-3/4
66148	3/4	0.755	7/8	1-3/4

Hexagonal Rotary/Punch Broaches

1/2" - .500 Shank Metric

EDP #	Hex Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
66302	2mm	0.081	5/32	1-3/4
663025	2.5mm	0.101	5/32	1-3/4
66303	3mm	0.120	3/16	1-3/4
66304	4mm	0.160	1/4	1-3/4
66305	5mm	0.199	5/16	1-3/4
66306	6mm	0.238	3/8	1-3/4
66307	7mm	0.278	1/2	1-3/4
66308	8mm	0.319	1/2	1-3/4
66309	9mm	0.358	1/2	1-3/4
66310	10mm	0.398	9/16	1-3/4
66311	11mm	0.437	9/16	1-3/4
66312	12mm	0.476	5/8	1-3/4
66313	13mm	0.516	5/8	1-3/4
66314	14mm	0.556	5/8	1-3/4
66315	15mm	0.597	5/8	1-3/4
66316	16mm	0.636	5/8	1-3/4
66317	17mm	0.674	7/8	1-3/4
66318	18mm	0.714	7/8	1-3/4
66319	19mm	0.754	7/8	1-3/4

The practical forming length of rotary punch broaching is usually up to 1-1/2 times the size of the broach (measured across flats).

*Overall Tool Length Tolerances +/- .015

Hexagonal Rotary Punch Broaches M-42

Material: M-42 HSS With **COBALT CONTENT** For More Difficult To Machine Alloys



Broach Tool Material

These broaches are manufactured from **M-42 Cobalt High Speed Steel**. This material provides edge toughness for standard operations, and resists heat to effect better tool life in machining most metals.

For broaching materials such as ductile iron, tool steel, stainless steels, titanium alloys, or nickel-cobalt alloys, this superior grade of high speed steel with **COBALT CONTENT** provides significantly longer tool life with these more difficult to machine alloys.

Hexagonal Rotary/Punch Broaches

8mm - .315 Shank Metric

EDP #	Hex Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
66202-M42	2mm	0.081	7/64	1-1/4
662025-M42	2.5mm	0.101	5/32	1-1/4
66203-M42	3mm	0.120	3/16	1-1/4
662035-M42	3.5mm	0.139	3/16	1-1/4
66204-M42	4mm	0.160	1/4	1-1/4
662045-M42	4.5mm	0.179	1/4	1-1/4

What Is The Difference Between Rotary, Swiss, Punch & Index?

Rotary:

The tool shape is cut into the customer's part with spindle turning when using a rotary holder system.

Broaching Holder:

Serves two functions

- Holds the broach tool in a free spinning bearing
- Places the broach tool at a 1° angle relative to the centerline of the workpiece.

There are two types of commonly used holders:

Adjustable Rotary Broach Holder

Non-Adjustable Rotary Broach Holder

Swiss Style:

The tool shape is cut into the customer's part with the spindle turning when using a rotary holder system. This is typical when used on a horizontal machining center.

Punch:

The shape is cut into the customer's part with spindle locked in a stationary position, and the broach is then punched into the customer's part without a rotary holder.

Index:

A broaching process that involves a stationary spindle and a partial form of the shape that is to be generated. Once hole preparation is completed, the tool form is generated on a CNC machine by making imprints of the tool to the proper depth while the part is indexed properly to create the full form desired. **See page 23 for more details on Index Broaching.**

For more information see our
Basic Broaching Learning Modules at
www.hassay-savage.com/resource-center



Hexagonal Rotary/Punch Broaches

8mm - .315 Shank Inch

EDP #	Hex Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
66004-M42	1/16	0.063	3/32	1-1/4
66005-M42	5/64	0.079	7/64	1-1/4
66006-M42	3/32	0.095	9/64	1-1/4
66007-M42	7/64	0.111	5/32	1-1/4
66008-M42	1/8	0.127	3/16	1-1/4
66009-M42	9/64	0.143	7/32	1-1/4
66010-M42	5/32	0.158	1/4	1-1/4
66012-M42	3/16	0.190	9/32	1-1/4
66014-M42	7/32	0.221	11/32	1-1/4
66016-M42	1/4	0.252	3/8	1-1/4
66018-M42	9/32	0.284	3/8	1-1/4
66020-M42	5/16	0.315	3/8	1-1/4
66022-M42	11/32	0.346	7/16	1-1/4
66024-M42	3/8	0.378	1/2	1-1/4

Hexagonal Rotary/Punch Broaches

1/2 - .500 Shank Inch

EDP #	Hex Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
66106-M42	3/32	0.095	9/64	1-3/4
66107-M42	7/64	0.111	5/32	1-3/4
66108-M42	1/8	0.127	3/16	1-3/4
66109-M42	9/64	0.143	7/32	1-3/4
66110-M42	5/32	0.158	1/4	1-3/4
66112-M42	3/16	0.190	9/32	1-3/4
66114-M42	7/32	0.221	9/32	1-3/4
66116-M42	1/4	0.252	3/8	1-3/4
66118-M42	9/32	0.284	7/16	1-3/4
66120-M42	5/16	0.315	1/2	1-3/4
66122-M42	11/32	0.346	9/16	1-3/4
66124-M42	3/8	0.378	9/16	1-3/4

*Overall Tool Length Tolerances +/--.015

Square Rotary Punch Broaches

Material: M-2 HSS For Mild Steel Applications. Special Materials Available For More Difficult To Machine Alloys

***Overall Tool Length Tolerances +/- .015**



Square Rotary/Punch Broaches

8mm - .315 Shank Inch Square Size

EDP #	Square Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
68004	1/16	0.063	1/8	1-1/4
68006	3/32	0.095	9/64	1-1/4
68008	1/8	0.127	3/16	1-1/4
68010	5/32	0.158	1/4	1-1/4
68012	3/16	0.190	9/32	1-1/4
68014	7/32	0.221	11/32	1-1/4
68016	1/4	0.252	3/8	1-1/4
68018	9/32	0.284	3/8	1-1/4
68020	5/16	0.315	3/8	1-1/4
68022	11/32	0.346	3/8	1-1/4
68024	3/8	0.378	3/8	1-1/4

Square Rotary/Punch Broaches

1/2" - .500 Shank Inch Square Size

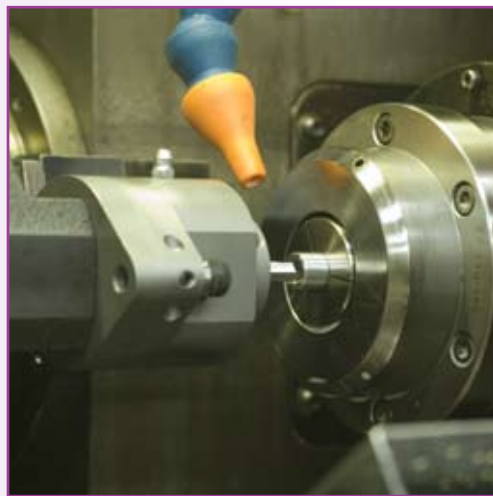
EDP #	Square Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
68106	3/32	0.095	9/64	1-3/4
68108	1/8	0.127	3/16	1-3/4
68110	5/32	0.158	1/4	1-3/4
68112	3/16	0.190	9/32	1-3/4
68114	7/32	0.221	11/32	1-3/4
68116	1/4	0.252	3/8	1-3/4
68118	9/32	0.284	7/16	1-3/4
68120	5/16	0.315	1/2	1-3/4
68122	11/32	0.346	9/16	1-3/4
68124	3/8	0.378	5/8	1-3/4
68128	7/16	0.441	5/8	1-3/4
68132	1/2	0.504	5/8	1-3/4
68136	9/16	0.567	3/4	1-3/4
68140	5/8	0.630	7/8	1-3/4

Use With:

- Screw Machines
- CNC Machines
- Swiss Machines

Other Shanks, Metric,
Square, Octagon &
Spline forms Available.
Please Call

1-800-247-2024
For More Information



Square Rotary/Punch Broaches

3/4" - .750 Shank Inch Square Size

EDP #	Square Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
68532	1/2	0.504	5/8	2-1/2
68536	9/16	0.567	3/4	2-3/4
68540	5/8	0.630	3/4	2-3/4
68548	3/4	0.755	7/8	2-3/4



Square Rotary/Punch Broaches

8mm - .315 Shank Metric Square Size

EDP #	Square Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
682015	1.5mm	0.0605	3/32	1-1/4
68202	2mm	0.0805	7/64	1-1/4
682025	2.5mm	0.101	5/32	1-1/4
68203	3mm	0.120	3/16	1-1/4
682035	3.5mm	0.139	3/16	1-1/4
68204	4mm	0.160	1/4	1-1/4
662045	4.5mm	0.179	1/4	1-1/4
68205	5mm	0.199	5/16	1-1/4
68206	6mm	0.238	3/8	1-1/4
68207	7mm	0.278	3/8	1-1/4
68208	8mm	0.319	3/8	1-1/4
68209	9mm	0.358	3/8	1-1/4
68210	10mm	0.398	1/2	1-1/4

Square Rotary/Punch Broaches

1/2" - .500 Shank Metric Square Size

EDP #	Square Size	Across Flats +.001 / -.000	Max. Depth of Cut	Overall Length*
683015	1.5mm	0.0605	3/32	1-3/4
68302	2mm	0.0805	7/64	1-3/4
683025	2.5mm	0.101	5/32	1-3/4
68303	3mm	0.120	3/16	1-3/4
683035	3.5mm	0.139	3/16	1-3/4
68304	4mm	0.160	1/4	1-3/4
683045	4.5mm	0.179	1/4	1-3/4
68305	5mm	0.199	5/16	1-3/4
68306	6mm	0.238	3/8	1-3/4
68307	7mm	0.278	3/8	1-3/4
68308	8mm	0.319	3/8	1-3/4
68309	9mm	0.358	3/8	1-3/4
68310	10mm	0.398	1/2	1-3/4
68311	11mm	0.437	9/16	1-3/4
68312	12mm	0.476	5/8	1-3/4

The practical forming
length of a rotary/
punch broaching is
usually up to 1-1/2
times the size of the
broach (measured
across flats).

Adjustable Rotary Broach Holders

Accepts A Variety Of Shapes, Such As Internal Hex & Square Rotary Broaches

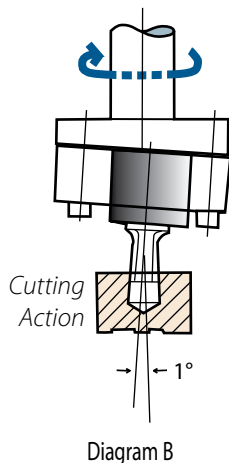
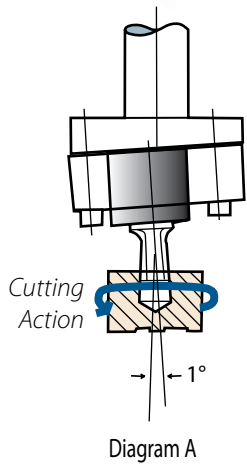
Rotary Broach Holders:

- Use on any type CNC, manual turning, milling or screw machine.

Holders and broaches are sold separately and available from stock for immediate delivery.

For optimal tool life in large production settings these broaches should be used with Rotary Broach Holders.

- The holder has an internal live spindle, which holds the cutting broach tool.
- The centerline of the cutting tool is offset at 1° from the centerline of the work piece.
- This 1° offset causes the broach to wobble creating a shearing effect as the broach is advanced into the work piece.



HEAVY DUTY Adjustable Rotary Broach Holders

Use with 3/4 - .750 Broach Shank Diameter

EDP #	Overall Length	Holder Shank Dia.	Holder Shank Length	Broach Shank Depth
P-67072HDS	7-9/16	1-1/2	3	1.25
P-67076HD	7-9/16	1-3/4	3	1.25

Diagram A - Broaching a Rotating Work Piece

In a turning or screw machine, the holder is mounted stationary while its internal live spindle and the broach rotates after contact with the rotating work piece. At the appropriate feed, the workpiece is sheared by the pressure of the broach through a wobbling type action producing the polygon shape desired.

Diagram B - Broaching a Stationary Work Piece

In a vertical milling or drilling machine, the holder is mounted into and rotates with the machine spindle while its internal live spindle along with the broach remains stationary upon contact with the stationary work piece. While the machine spindle is rotating, the broach's pressure shears the polygon shape into the work piece with a wobbling type action.

Adjustable Rotary Broach Holders

Use with 8mm - .315 Broach Shank Diameter

EDP #	Overall Length	Holder Shank Dia.	Holder Shank Length	Broach Shank Depth
P-67040	3-27/64	5/8	1-1/2	9/16
P-67048S	3-59/64	3/4	2	9/16

Adjustable Rotary Broach Holders

Use with 1/2 - .500 Broach Shank Diameter

EDP #	Overall Length	Holder Shank Dia.	Holder Shank Length	Broach Shank Depth
P-67048	4-17/32	3/4	2	.742
P-67064	4-17/32	1	2	.742
P-67068	5-17/32	1-1/4	3	.742
P-67072	5-17/32	1-1/2	3	.742

HASSAY SAVAGE ROTARY TOOL HOLDER SET-UP PROCEDURE

For Internal Rotary Holders

1. Place the Rotary Tool Holder in the Turret (Lathe) or Tool Holder (Milling) depending on the application which fits your needs.
2. Mount the Set Up Plug or Punch Broach in the spindle of the Rotary Tool Holder and take care that the Plug or Punch is bottomed out in the spindle before tightening the set screw on the Holder's Spindle.
3. Drill and Ream a hole to the proper diameter (.001 larger) for the Set Up Plug in a piece of raw material with a lead chamfer .010-.015 larger than the cross points dimension of the Punch being used. If using the Punch Broach for centering, drill and ream the hole to the diameter of the cross point's dimension.
4. Loosen the 2 cap screws 2-3 turns on the face to generate 3/16 space between the flange portion of the Holder so that it is easily movable in the cup of your hand.
5. Advance the Rotary Tool Holder with the inserted Plug or Punch to .030 away from the part while holding the holder flush against the flange.
6. By hand, insert the Plug or Punch into the reamed hole.
7. Advance the turret or tool holder until the holder and tool is fully engaged in the hole
8. With the Plug or Punch still engaged in the hole, rotate the broach by hand in the hole while tightening the 2 cap screws.
9. Retract the turret or tool holder out of the reamed hole.
10. Remove the set up plug (If using one) and replace with the Punch Broach making sure the Punch Broach is bottomed out in the holder the same as in step 2.

11. See Next Page for Set-Up Plugs!

See Live Set-Up online at www.hassay-savage.com/resource-center under Hex Rotary Broach Holder Set-Up.

Rotary Broaching Set-Up Plugs

Standard Plugs - For Hex Broach Set-Up Only

Rotary Broaching Set-Up Plugs*

8mm Shank Metric

EDP #	Size	Plug Dia. (-.001 in.)	Shank Dia. (-.0050 in.)	Depth of Plug (in.)	OAL Overall Length (in.)
67008	1/8	0.129	8mm	5/16	1-1/4
67012	3/16	0.193	8mm	5/16	1-1/4
67016	1/4	0.257	8mm	5/16	1-1/4
67020	5/16	0.321	8mm	3/8	1-1/4
67024	3/8	0.387	8mm	1/2	1-1/4
67032	1/2	0.515	8mm	1/2	1-1/4

We can also supply you with custom turned diameters for your exact drill and bore size when repeatable set-ups are required for your job on a continuous basis, for both hex and square applications.

These will all come with the standard lengths and shank diameters of: 8mm, .500 and .750.

Contact our **CUSTOMER SERVICE DEPARTMENT** at **800-247-2024** for pricing and **24 hour delivery service**.



Rotary Broaching Set-Up Plugs*

1/2 Shank American Standard Inch

EDP #	Size	Plug Dia. (-.001 in.)	Shank Dia. (-.0050 in.)	Depth of Plug (in.)	OAL Overall Length (in.)
67112	3/16	0.193	.500	5/16	1-3/4
67116	1/4	0.257	.500	5/16	1-3/4
67124	3/8	0.387	.500	5/16	1-3/4
67132	1/2	0.515	.500	1/2	1-3/4
67140	5/8	0.643	.500	1/2	1-3/4

Rotary Broaching Set-Up Plugs*

3/4 Shank American Standard Inch

EDP #	Size	Plug Dia. (-.001 in.)	Shank Dia. (-.0050 in.)	Depth of Plug (in.)	OAL Overall Length (in.)
67524	3/8	0.387	.750	1/2	2-1/2
67532	1/2	0.515	.750	1/2	2-1/2
67540	5/8	0.643	.750	3/4	2-1/2
67548	3/4	0.771	.750	3/4	2-3/4

* Stock inventories are standard diameter gauge-plugs with specifications to use in standard holders.

Swiss Style Rotary Punch Broaches

Medical, Dental & Aerospace Applications with M2 and PM-M4 Materials

- Consistent High-Tolerance Forms for Long Production Runs!
- Superb Surface Finishes!
- Outstanding Tool Life in Stainless & Titanium!
- Special Sizes, Special Tolerances in Less Than 5 Days



Hexagonal Rotary/Punch Broaches

.315 Shank American Standard Inch

EDP # M-2*	EDP # PM-M-4*	Hex Size	Across Flats (+/- .0002)	Max Depth of Cut	OAL Overall Length
76002	77002	0.051	0.0510	5/64	28mm
76004	77004	1/16	0.0645	3/32	28mm
76005	77005	5/64	0.0801	7/64	28mm
76006	77006	3/32	0.0958	9/64	28mm
76007	77007	7/64	0.1113	5/32	28mm
76008	77008	1/8	0.1270	3/16	28mm
76009	77009	9/64	0.1426	7/32	28mm
76010	77010	5/32	0.1585	1/4	28mm
76012	77012	3/16	0.1895	9/32	28mm
76014	77014	7/32	0.2207	11/32	28mm
76016	77016	1/4	0.2520	3/8	28mm

* M-2 for use with mild steel (HSS)

* PM-M-4 for use with stainless, titanium & other high alloy steel

Hexagonal Rotary/Punch Broaches

.315 Shank Metric

EDP # M-2*	EDP # PM-M-4*	Hex Size	Across Flats (+/- .0002)	Max Depth of Cut	OAL Overall Length
762015	772015	1.5mm	0.0610	3/32	28mm
76202	77202	2mm	0.0807	5/32	28mm
762025	772025	2.5mm	0.1004	5/32	28mm
76203	77203	3mm	0.1201	3/16	28mm
762035	772035	3.5mm	0.1398	3/16	28mm
76204	77204	4mm	0.1595	1/4	28mm
762045	772045	4.5mm	0.1792	1/4	28mm
76205	77205	5mm	0.1989	5/16	28mm
76206	77206	6mm	0.2382	3/8	28mm

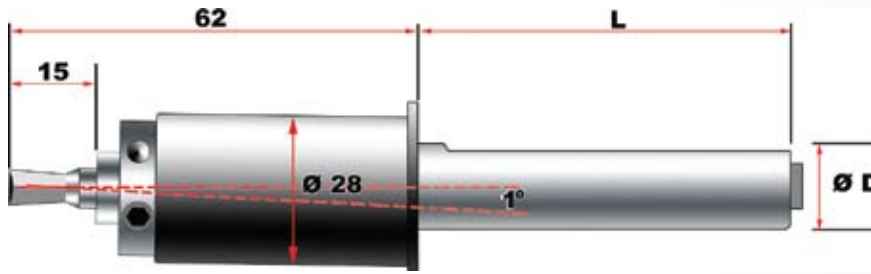
* M-2 for use with mild steel (HSS)

* PM-M-4 for use with stainless, titanium & other high alloy steel

This Swiss Style Tooling Designed for Holders on Page 21

Swiss Style Non-Adjustable Holders

High Performance Results, Quality, And Consistent Tool Life That Keeps Machines Running Longer



Swiss Style Holders

Holds 8mm Shank/Max. Push Force 2,250 lbs.

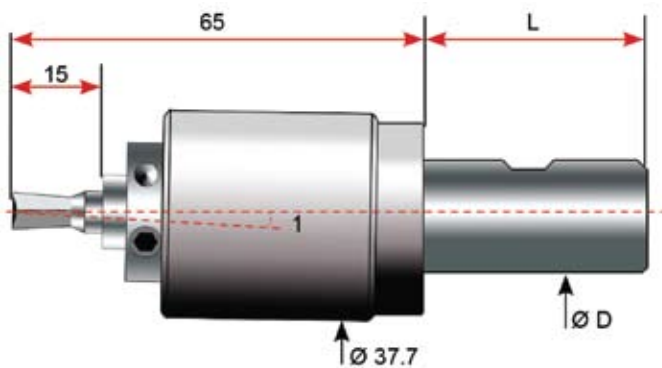
EDP #	D	L	AS/Metric
HSP-2160-158-038	5/8	1-1/2	inch
HSP-2160-190-100	3/4	4	inch
HSP-2160-254-120	1	4-3/4	inch
HSP-2160-120-038	12mm	38mm	metric
HSP-2160-140-038	14mm	38mm	metric
HSP-2160-160-038	16mm	38mm	metric
HSP-2160-200-100	20mm	100mm	metric
HSP-2160-220-100	22mm	100mm	metric
HSP-2160-250-120	25mm	120mm	metric

Swiss Style Holders

- No Center Indicating Required – Self-Centering
- Smaller Head Diameter Eliminates Interference on Tool Blocks
- Longer Shank Can Be Cut To Proper Length
- Short Head Length For Limited Back Work Space
- Built In Wobble Cutting Feature 1° Angle
- Heavy Duty Bearing Takes 2,250 lbs. Pushing Force
- Swiss Made Quality High-Precision
- Fits Most Swiss Type Tool Blocks & Gang Machines



2160 Series Swiss Holder



2100 Series Swiss Holder

Self Centering

Designed for CNC machines, the new 2100 Series Broach Holder meets the challenge. Faster and easier setup.

- Places rotary broach on center, eliminates the need to indicate the holder
- Cylindrical shank design with Weldon Notch perfect for lathe or machining center applications
- Micro-manufacturing includes medical, dental, automotive and aircraft micro components, with micro precision systems that require high precision tolerance and quality



Note: All of our product line groups for Hassay Savage and Magafor companies play an active and integral role in employing high performance results for those customers who demand not only quality, but also consistent tool life that keeps their machines running longer.

www.hassay-savage.com
www.magaforusa.com

Self Centering Holders

Holds 8mm Shank Metric
 Max. Push Force 900 lbs.

EDP #	D	L
HSP-2100-58	15.87mm	38mm
HSP-2102	19.05mm	38mm
HSP-2104	25.4mm	38mm
HSP-2100-16	16mm	38mm
HSP-2101	20mm	38mm
HSP-2103	25mm	50mm

Use Recommendations

Part Preparation:

- The diameter of the pre-drilled hole should be larger than the measurement across the flats on the broach.
- Drill the hole 20% deeper than desired Depth of Cut for chip clearance.
- Countersink with a 90° lead chamfer slightly larger than the largest dimension of the broach face (distance across points) for lead of the broach.

Centering the Broach:

The most critical component in running these tools is having the broach centered as close as possible to the centerline of the work piece. Improper centering will cause uneven hole configurations, oversize holes, spiraling, and excessive cutter/holder wear.

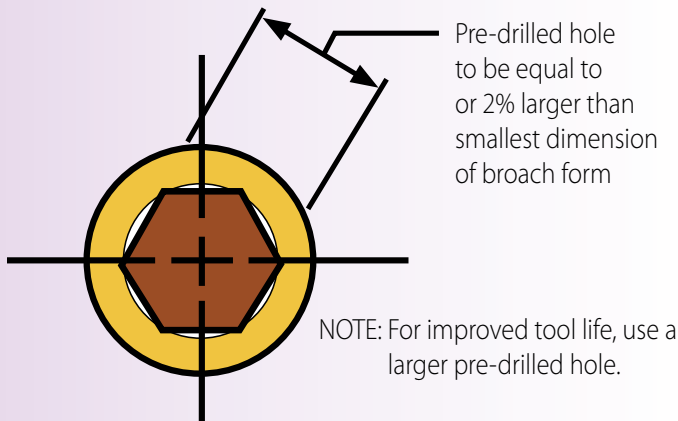
- It is necessary to align the end of the broach tool to the centerline of the work piece diameter by means of adjusting the screws located on the sides of the holder, and the use of set-up plugs.
- Alignment instructions are included with purchase of the tool holder.

Speeds and Feeds:

Rotational speed (RPM) has a direct effect on cutting speed and tool life.

- Start at 800 RPM with a feed rate of .016 times the size of the broach in inches for a feed rate in IPR units.

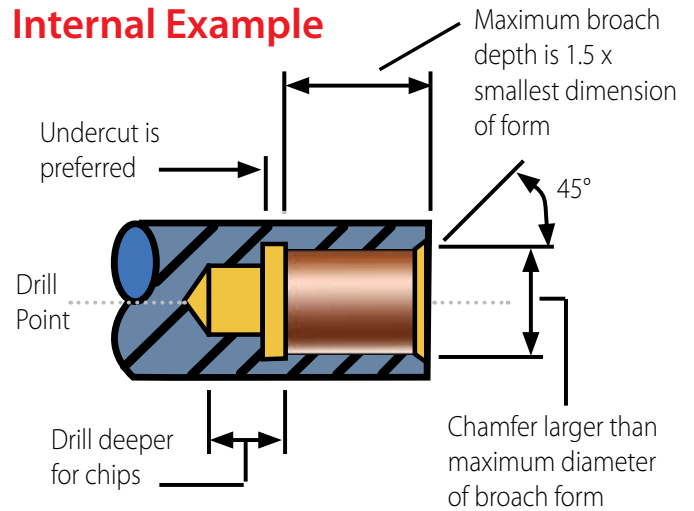
Example: The feed rate for a 1/4" rotary punch broach would be
 $0.016 \times .250 = .004/\text{rev.}$



Broach Tool Material:

Broaches are customarily manufactured from M-2 high speed steel. This material provides the required edge toughness for standard operations, which do not generate enough heat to effect tool life in machining most metals. However, for broaching materials such as ductile iron, tool steel, stainless steels, titanium alloys, or nickel-cobalt alloys, a cobalt or PM-4 (powdered metal) broach would be recommended for optimal tool life. Coatings are also available.

Internal Example



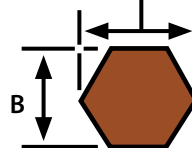
Cutting Principle

- The tool is held at a 1° angle relative to the part centerline.
- The face of the broach tool is the pivot of the 1° angle and is placed on centerline with the part.
- The cutting edge is kept on center and the rest of the tool oscillates around the part centerline with a wobble effect.
- With the faces of the tool and part are at a relative 1° angle, only the leading point of the tool is cutting and not the entire tool profile.
- The wobble effect moves the leading edge to rotate in and out of the cut like a cam.
- It shears the shape into the part with a scalloping effect as it advances forward.
- This reduces the required thrust force up to 80% when it is at the optimum feed.
- Venting can be added to broach to relieve pressure.



Hole Preparation Examples

Hex: B x 1.02
 = Pre-drilled hole, 2% larger
 s.c.* = B x 1.1547



Square: B x 1.10
 = Pre-drilled hole, 10% larger
 s.c.* = B x 1.4142

