



Hassay Savage
Rotary Broaching & Tool Holders

PILLOT

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Hexagonal Rotary Punch Broaches

Material: **MAX Proprietary Alloy** For More Difficult To Machine Materials

MAX Out Your Rotary Broaching

2X Tool Life Compared to a T-15

37% Decrease in Overall CPP (Cost Per Part)

HassayMAX

Manufactured from custom hardened alloys, these hex, square and punch rotary broaches are a **specialty formulated material** that combines high hardness with exceptional abrasion resistance and toughness.

They're ideal for sockets where long tool life is required and are intended for use on materials with hardness up to 50 Hrc, such as:

- Cobalt-Chrome
- Custom 455
- Biodur 108 & 22-13-15
- 17-4 Stainless Steel
- Strain Hardened 316
- Titanium
- Inconel 718
- Monel
- Hardened A286/304
- 303 Stainless Steel

Our rotary broaches offer many **advantages** over conventional coated & uncoated broaching tools, including:

- Edge Toughness for High Production Applications
- Better Heat Resistance
- 2x-10x Longer Tool Life

*Also offered in Swiss style - see pg. 67



Proprietary Alloy

Ideal for Applications in These Industries



Fasteners



Automotive



Electronics



Medical/Dental



Aerospace



Defense

Hexagonal Rotary Punch Broaches M-2 and MAX



Material: **M-2 HSS** for mild steel applications,
MAX Alloy available for more difficult to machine alloys

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 1/2" – 0.500 Shank					
Hex Size (inch)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX
3/32	0.095	7/32	1-3/4	66106	66106-M
7/64	0.111	1/4		66107	66107-M
1/8	0.127	1/4		66108	66108-M
9/64	0.143	5/16		66109	66109-M
5/32	0.158	5/16		66110	66110-M
3/16	0.190	3/8		66112	66112-M
7/32	0.221			66114	66114-M
1/4	0.252	7/16		66116	66116-M
9/32	0.284	7/16		66118	66118-M
5/16	0.315	7/16		66120	66120-M
11/32	0.346	11/16		66122	66122-M
3/8	0.378			66124	66124-M
13/32	0.410	11/16		66126	66126-M
7/16	0.441			66128	66128-M
15/32	0.472			66130	66130-M
1/2	0.504			66132	66132-M
9/16	0.567		66136	66136-M	
5/8	0.630		66140	66140-M	
11/16	0.693		66144	66144-M	
3/4	0.755		66148	66148-M	

Hexagonal Rotary/Punch Broaches 8mm – 0.315 Shank					
Hex Size (inch)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX
.050	0.050	7/64	1-1/4	66002	66002-M
1/16	0.063	5/32		66004	66004-M
5/64	0.079	9/64		66005	66005-M
3/32	0.095	7/32		66006	66006-M
7/64	0.111	7/32		66007	66007-M
1/8	0.127	1/4		66008	66008-M
9/64	0.143	9/32		66009	66009-M
5/32	0.158	5/16		66010	66010-M
3/16	0.190	11/32		66012	66012-M
7/32	0.221	13/32		66014	66014-M
1/4	0.252	7/16		66016	66016-M
9/32	0.284			66018	66018-M
5/16	0.315			66020	66020-M
11/32	0.346			66022	66022-M
3/8	0.378	1/2		66024	66024-M
13/32	0.410			66026	66026-M
7/16	0.441		66028	66028-M	
15/32	0.472		66030	66030-M	
1/2	0.504		66032	66032-M	

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Metric Hexagonal Rotary/Punch Broaches 1/2" – 0.500 Shank					
Hex Size (mm)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX
2.0	0.081	7/32	1-3/4	66302	66302-M
2.5	0.101			663025	663025-M
3.0	0.120	1/4		66303	66303-M
4.0	0.160	5/16		66304	66304-M
5.0	0.199	3/8		66305	66305-M
6.0	0.238	7/16		66306	66306-M
7.0	0.278	1/2		66307	66307-M
8.0	0.320			66308	66308-M
9.0	0.358	9/16		66309	66309-M
10.0	0.399			66310	66310-M
11.0	0.437	5/8		66311	66311-M
12.0	0.476			66312	66312-M
13.0	0.516			66313	66313-M
14.0	0.556			66314	66314-M
15.0	0.597	7/8	66315	66315-M	
16.0	0.636		66316	66316-M	
17.0	0.674		66317	66317-M	
18.0	0.714		66318	66318-M	
19.0	0.754		66319	66319-M	

*Overall Tool Length Tolerances +/- .015

Metric Hexagonal Rotary/Punch Broaches 8mm – 0.315 Shank					
Hex Size (mm)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX
1.3	0.050	5/64	1-1/4	662013	662013-M
1.5	0.061	3/32		662015	662015-M
2.0	0.081	9/64		66202	66202-M
2.5	0.101	7/32		662025	662025-M
3.0	0.120	1/4		66203	66203-M
3.5	0.139	1/4		662035	662035-M
4.0	0.160	5/16		66204	66204-M
4.5	0.179	5/16		662045	662045-M
5.0	0.199	3/8		66205	66205-M
6.0	0.238	7/16		66206	66206-M
7.0	0.278	7/16		66207	66207-M
8.0	0.319	7/16		66208	66208-M
9.0	0.358	7/16	1-1/2	66209	66209-M
10.0	0.399	1/2		66210	66210-M
11.0	0.437	1/2		66211	66211-M
12.0	0.476	1/2		66212	66212-M

Hexagonal Rotary/Punch Broaches 3/4" – 0.750 Shank					
Hex Size (inch)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX
3/8	0.379	3/4	2-3/4	66524	66524-M
7/16	0.442			66528	66528-M
1/2	0.505	66532		66532-M	
9/16	0.567	66536		66536-M	
5/8	0.631	66540		66540-M	
3/4	0.754	66548		66548-M	
7/8	0.883	66556		66556-M	
1.0	1.014	66564		66564-M	

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

Square Rotary Punch Broaches

1/16 thru 3/8 inch

1.5mm thru 12mm

Material: **M-2 HSS** for mild steel applications,
MAX Alloy available for more difficult to machine alloys

Square Rotary/Punch Broaches 8mm-.315 Shank

Square Size (inch)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX*
1/16	0.063	3/16	1-1/4	68004	68004-M
3/32	0.095	3/16		68006	68006-M
1/8	0.127	7/32		68008	68008-M
5/32	0.158	9/32		68010	68010-M
3/16	0.190	11/32		68012	68012-M
7/32	0.221	3/8		68014	68014-M
1/4	0.252	3/8		68016	68016-M
9/32	0.284			68018	68018-M
5/16	0.315			68020	68020-M
11/32	0.346			68022	68022-M
3/8	0.379			68024	68024-M

Metric Square Rotary/Punch Broaches 8mm-.315 Shank

Square Size (mm)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX*
1.5	0.0605	5/32	1-1/4	682015	682015-M
2.0	0.0805	5/32		68202	68202-M
2.5	0.101	3/16		682025	682025-M
3.0	0.120	7/32		68203	68203-M
3.5	0.139			682035	682035-M
4.0	0.160			68204	68204-M
4.5	0.179	5/16		682045	682045-M
5.0	0.199			68205	68205-M
6.0	0.238	3/8		68206	68206-M
7.0	0.278			68207	68207-M
8.0	0.319			68208	68208-M
9.0	0.358			68209	68209-M
10.0	0.398			1/2	68210



Use With:

- Screw Machines
- CNC Machines

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

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Square Rotary/Punch Broaches 1/2-.500 Shank

Square Size (inch)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX*
3/32	0.095	3/16	1-3/4	68106	68106-M
1/8	0.127	7/32		68108	68108-M
5/32	0.158	9/32		68110	68110-M
3/16	0.190	5/16		68112	68112-M
7/32	0.221	3/8		68114	68114-M
1/4	0.252	7/16		68116	68116-M
9/32	0.284	1/2		68118	68118-M
5/16	0.315	9/16		68120	68120-M
11/32	0.346	5/8		68122	68122-M
3/8	0.378	5/8		68124	68124-M
7/16	0.441			68128	68128-M
1/2	0.504			68132	68132-M
9/16	0.567	3/4		68136	68136-M
5/8	0.630	7/8		68140	68140-M

Square Rotary/Punch Broaches 3/4-.750 Shank

Square Size (inch)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX*
1/2	0.504	11/16	2-3/4	68532	68532-M
9/16	0.567	7/8		68536	68536-M
5/8	0.630			68540	68540-M
3/4	0.755	7/8		68548	68548-M

Metric Square Rotary/Punch Broaches 1/2-.500 Shank

Square Size (mm)	Across Flats +0.001 / -0.000	Max. Depth of Cut	Overall Length*	EDP No. Hassay Savage	EDP No. Hassay Savage MAX*
1.5	0.0605	1/8	1-3/4	683015	683015-M
2.0	0.0805	5/32		68302	68302-M
2.5	0.101	3/16		683025	683025-M
3.0	0.120	1/4		68303	68303-M
3.5	0.139	9/32		683035	683035-M
4.0	0.160	5/16		68304	68304-M
4.5	0.179	11/32		683045	683045-M
5.0	0.199	3/8		68305	68305-M
6.0	0.238	13/32		68306	68306-M
7.0	0.278	7/16		68307	68307-M
8.0	0.319			68308	68308-M
9.0	0.358			68309	68309-M
10.0	0.398	1/2	68310	68310-M	
11.0	0.437	9/16	68311	68311-M	
12.0	0.476	5/8	68312	68312-M	

*Overall Tool Length Tolerances +/-0.015

SPECIAL ORDERS: We are fully equipped to manufacture Square Rotary Punch Broaches not listed above. Please contact Pilot Precision Products for details.

Rotary Broaching Set-Up Plugs

Standard plugs - for hex broach set-up only

Metric Rotary Broaching Set-Up Plugs*

8mm Shank

Size	Plug Dia. -0.001 - inch	Shank Dia. -0.013 - mm	Depth of Plug (inch)	OAL Overall Length (inch)	EDP No. Hassay Savage
1/8	0.129	8 mm	5/16	1-1/4	67008
3/16	0.193				67012
1/4	0.257				67016
5/16	0.321		3/8		67020
3/8	0.387				67024
1/2	0.515				67032

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.



Standard Rotary Broaching Set-Up Plugs*

1/2 Inch Shank

Size	Plug Dia. -0.001 - inch	Shank Dia. - 0.0005 - inch	Depth of Plug (inch)	OAL Overall Length (inch)	EDP No. Hassay Savage
3/16	0.193	0.500	5/16	1-3/4	67112
1/4	0.257				67116
3/8	0.387				67124
1/2	0.515		1/2		67132
5/8	0.643				67140

Standard Rotary Broaching Set-Up Plugs*

3/4 Inch Shank

Size	Plug Dia. -0.001 - inch	Shank Dia. -0.0005 - inch	Depth of Plug (inch)	OAL Overall Length (inch)	EDP No. Hassay Savage
3/8	0.387	0.750	1/2	2-3/4	67524
1/2	0.515				67532
5/8	0.643		3/4		67540
3/4	0.771				67548

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

Swiss Style Rotary Punch Broaches

28mm OAL

For use with M2 and MAX Alloy - Medical, Dental & Aerospace

- 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



M-2 for use with mild steel (HSS)

HassayMAX

for use with stainless, titanium & other high alloy steel

Standard Hexagonal Rotary/Punch Broaches

0.315 Shank

Hex Size (inch)	Across Flats +/- 0.0002	Max. Depth of Cut	OAL Overall Length	EDP No. M-2* Hassay Savage	EDP No. Hassay MAX Hassay Savage
0.051	0.051	1/8	28mm	76002	77002-M
1/16	0.0645	3/16		76004	77004-M
5/64	0.0801	3/16		76005	77005-M
3/32	0.0958	7/32		76006	77006-M
7/64	0.1113	7/32		76007	77007-M
1/8	0.1270	1/4		76008	77008-M
9/64	0.1426	9/32		76009	77009-M
5/32	0.1585	5/16		76010	77010-M
3/16	0.1895	11/32		76012	77012-M
7/32	0.2207	13/32		76014	77014-M
1/4	0.2520	7/16		76016	77016-M

Metric Hexagonal Rotary/Punch Broaches

0.315 Shank

Hex Size (mm)	Across Flats +/- 0.0002	Max. Depth of Cut	OAL Overall Length	EDP No. M-2* Hassay Savage	EDP No. Hassay MAX Hassay Savage
1.5	0.0610	5/32	28mm	762015	772015-M
2.0	0.0807	7/32		76202	77202-M
2.5	0.1004			762025	772025-M
3.0	0.1201			76203	77203-M
3.5	0.1398	1/4		762035	772035-M
4.0	0.1595			76204	77204-M
4.5	0.1792	5/16		762045	772045-M
5.0	0.1989			76205	77205-M
6.0	0.2382	7/16		76206	77206-M

This Swiss Style Tooling Designed for Holders on Page 70

SPECIAL ORDERS: We are fully equipped to manufacture 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, 0.500 and 0.750. Please contact Pilot Precision Products for details.

Index Broaching

Hex and Hexalobe



An Alternative To Full Form Rotary Broaching

Index Broaches can be made in the NEW MAX Alloy

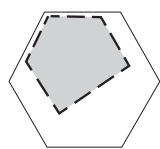
HassayMAX

2 or 4 Point Hex Broach Cutting Process

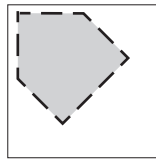
- Hole preparation completed with chamfer & proper pilot hole size
- Machine spindle locked
- Punch enters the work piece, cutting the work piece, then retracts.
- The machine spindle indexes 60° then locks
- The punch enters the work piece a second time, cutting the work piece, then retracts
- Machine spindle indexes 60° then locks
- Punch enters for a third and final imprint
- Drill or boring bar used to make pilot hole can re-enter cut and remove ribbons and chips formed inside the cut



Hex or Square Broach



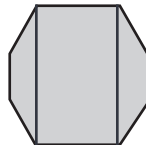
Single Point Hex Broach



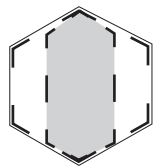
Single Point Square Form



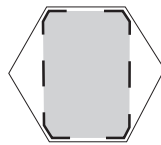
2 Point Hex Index Broach



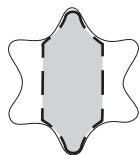
4 Point Index Hex Broach



Full 6 Point Hex Form



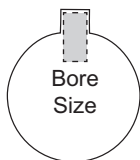
Full 4 Point Hex Form



Full 6 Lobe Form



2 Index Lobe Broach



Keyway Shaper

Required Tooling Includes:

- 90° Spot/Chamfer Tool
- Desired Pilot Drill
- Index Punch Broach

Typical Applications Include:

- Hexagonal
- Double Hexagonal
- 6 Lobe / Hexalobe
- Square
- Keyways / Slots / Splines

2 Point Hex Broach Cutting Procedure is effective for broaching materials with higher tensile strength and relieves overall pressure during the process.



4 Point Hex Broach Cutting Procedure is effective for index broaching titanium and stainless steel materials to help improve better tolerances and surface finishes in the finished part.



6 Lobe Hexalobe Broach Cutting Procedures are similar procedures as 2 point or 4 point broach cutting. The process reduces overall pressure, improves tolerances and surface finishes. Ideal for automated production.



Why Hassay Savage Index Broaches?

- For Longer Production Runs
- Superb Surface Finishes
- Outstanding Tool Life in Stainless & Titanium
- Special Sizes, Special tolerances in Less Than 5 Days
- Produce bone screws to ± 0.0002 Tolerance



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.

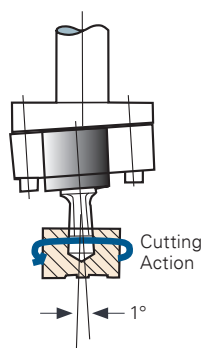


Diagram A
Broaching a Rotating Work Piece

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.

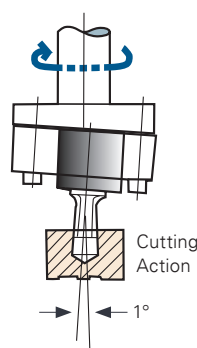


Diagram B
Broaching a Stationary Work Piece

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 – 0.315 Broach Shank Diameters

Overall Length (inch)	Holder Shank Diameter	Holder Shank Length	Broach Shank Depth	EDP No. Hassay Savage
3-27/64	5/8	1-1/2	9/16	P-67040
3-59/64	3/4	2		P-67048S

Adjustable Rotary Broach Holders

Use with 1/2 – 0.500 Broach Shank Diameters

Overall Length (inch)	Holder Shank Diameter	Holder Shank Length	Broach Shank Depth	EDP No. Hassay Savage
4-17/32	3/4	2	0.742	P-67048
	1			P-67064
5-17/32	1-1/4	3		P-67068
	1-1/2			P-67072

Heavy Duty Adjustable Rotary Broach Holders

Use with 3/4 – 0.750 Broach Shank Diameter

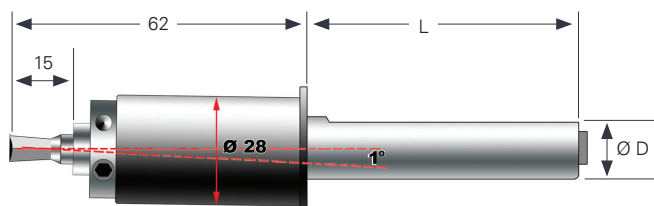
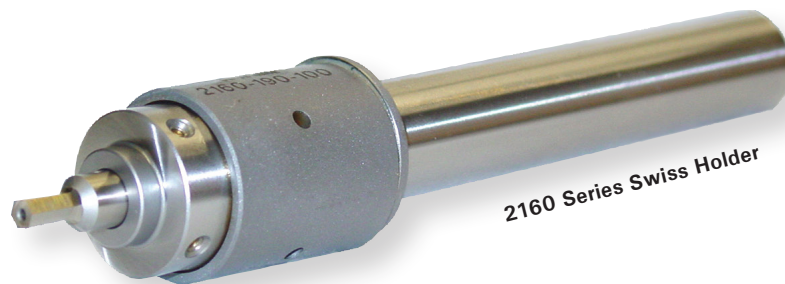
Overall Length (inch)	Holder Shank Diameter	Holder Shank Length	Broach Shank Depth	EDP No. Hassay Savage
7-9/16	1-1/2	3	1.25	P-67072HDS
	1-3/4			P-67076HD

Hassay Savage Internal Rotary Tool Holder Set-Up Procedure

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 (0.001 larger) for the Set Up Plug in a piece of raw material with a lead chamfer 0.010-0.015 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 0.030 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.

Swiss-Style Non-Adjustable Holders

High performance results, quality, and consistent tool life that keeps machines running longer



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
- Excellent for aerospace, medical part / bone screw & dental part production applications
- Recommended profile range for this holder series is 0.050" To 0.375"
- Maintenance-free operation

Swiss Style Holders

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

D	L	(inch/mm)	EDP No. Hassay Savage
5/8	1-1/2	inch	HSP-2160-158-038
3/4	4		HSP-2160-190-100
1	4-3/4		HSP-2160-254-120
12	38	mm	HSP-2160-120-038
14			HSP-2160-140-038
16			HSP-2160-160-038
20	100		HSP-2160-200-100
22			HSP-2160-220-100
25	120		HSP-2160-250-120

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.

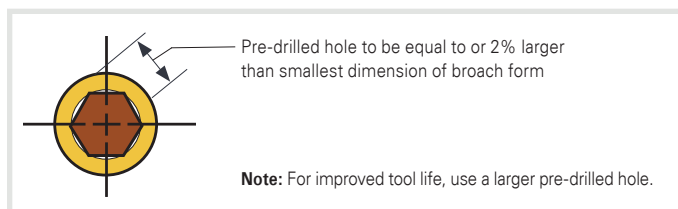
- It is necessary to align the end of the broach tool to the centerline of the work piece diameter by means of adjusting the screws located on the sides of the holder, and the use of set-up plugs.
- Alignment instructions are included with purchase of the tool holder.

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.

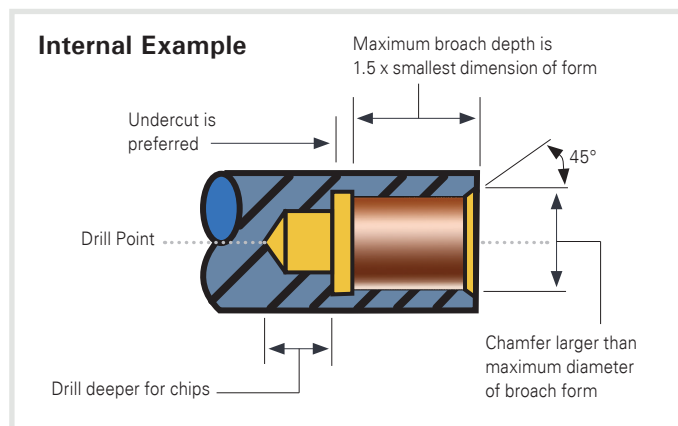
Example: The feed rate for a ¼" rotary punch broach would be
 $0.016 \times .250 = .004/\text{rev.}$



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 MAX Alloy broach would be recommended for optimal tool life. Coatings are also available.



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.
- While 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.

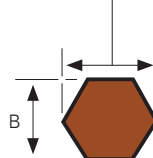


Vented Hex Broach

Hole Preparation Examples

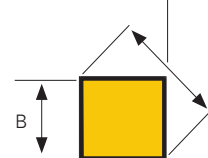
Hex:

$B \times 1.02 = \text{Pre-drilled hole, 2\% larger}$
 $s.c.* = B \times 1.1547$



Square:

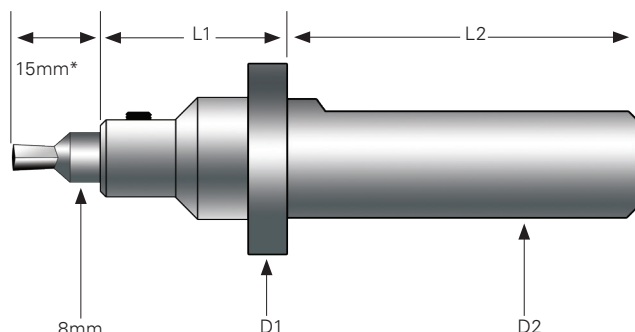
$B \times 1.10 = \text{Pre-drilled hole, 10\% larger}$
 $s.c.* = B \times 1.4142$



*s.c. = sharp corners

Static Index Punch Broach Holders

These Static Holders can also be used for Full Form Hex Broaches up to 1/4" / 7mm



*Only applies when 8mm series broaches are used.



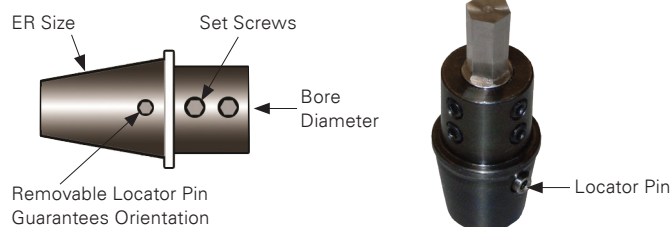
Punch Holders				
D1 (inch)	D2	L1 (inch)	L2 (inch)	EDP No. Hassay Savage
1.00	0.625"	1.25	2.5	HSBH-158250-125-8
	0.750"			HSBH-190250-125-8
	20mm			HSBH-200250-125-8
	22mm			HSBH-220250-125-8
1.10	1.00"			HSBH-254250-125-8

Quick Change ER Collet Punch & Index Broach ER Holder Systems

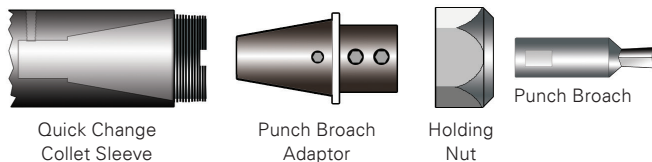
For Swiss and CNC Machining

When orientation and concentricity of an internal polygon profile is crucial, an ER holder can be used to securely hold a punch or index broach tool and accurately align the tool to center, while ensuring perfect alignment of the profile orientation.

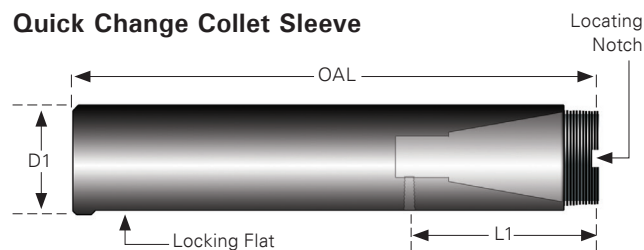
These Quick Change Holders can be preset and reloaded in seconds.



Punch Broach / Boring Adapters & Nuts			
ER Size	Bore Dia.	Nut Thread	EDP No. Hassay Savage
ER16	0.250"	M19 x 1mm Nut & Locator Pin	HSP-PA16-25001
	8mm		HSP-PA16-31501
ER20	0.250"	M24 x 1mm Nut & Locator Pin	HSP-PA20-25001
	8mm		HSP-PA20-31501



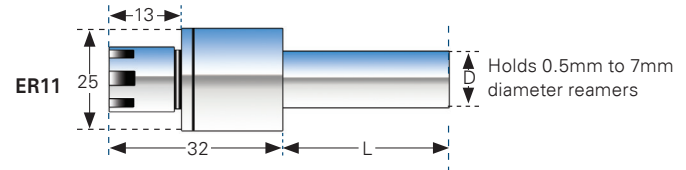
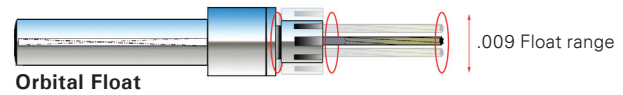
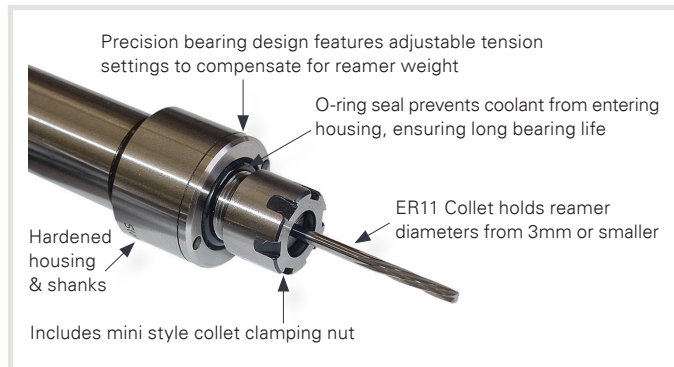
Quick Change Collet Sleeves For Shank Only Holders				
ER Size	D1	L1	OAI	EDP No. Hassay Savage
ER16	0.500"	1.1"	4.5"	HSP-CS16-160500
	0.625"			HSP-CS16-160625
	0.750"			HSP-CS16-160750
	20mm	28mm	71mm	HSP-CS16-160787
	22mm		118mm	HSP-CS16-160866
	25mm		95mm	HSP-CS16-160984
ER20	1"	1.1"	4.5"	HSP-CS16-161000
	0.750"	1.2"		HSP-CS20-200750
	22mm	30mm	114mm	HSP-CS20-200866
	1.00"	1.2"	4.5"	HSP-CS20-201000
	1.250"			HSP-CS20-201250
	32mm	30mm	118mm	HSP-CS20-201260



Ultra-Precision Floating Reamer Holders

Complete Orbital Float for True Alignment

Designed with "True Orbital Float" capability, the micro reamer holder aligns the reamer perfectly to the drilled hole, enabling better size control, reduces "bell-mouthing" and increases tool life.



ER11 Floating Reamer Holder w/ Mini-nut Assembly

Item No.	D	L
HSP-11-010-042	10mm	42.00
HSP-11-090-042	3/4 "	2.75"
HSP-11-200-042	20mm	41.50
HSP-11-220-042	22mm	41.50



Accessory Components

Item No.	Description
HSP-04621	ER11 Wrench
HSP-ER-11-MNS	ER11 Mini Nut

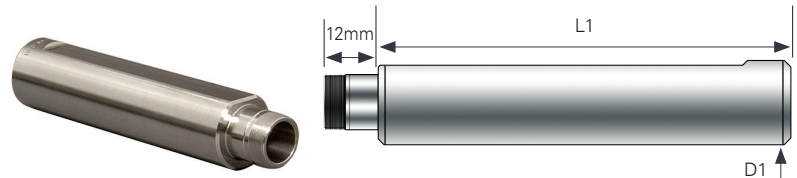
Collet Sets

Item No.	Description
HSP-11R-S7-ISP	7pc ER11 Inch bore Collet Set Size Range 1/16, 3/32, 1/8, 5/32, 3/16, 7/32, 1/4"
HSP-11R-S13-MSP	13pc ER11 Metric Bore Collet Set Size Range .5-7mm in .5mm increments
HSP-11R-S13-MUP	13pc ULTRA PRECISION Metric Bore Collet Set (0.0002" TIR) Size Range 0.5-7mm in 0.5mm increments

Advanced Precision Micro Tool Holders

Extreme Concentricity for Micro Drills TIR < .0002"

- High performance
- Tight tolerance
- Micro parts production



Precision CHK Collets

Item No.	Description
HSP-CHK-1.0	1.0mm CHK Collet
HSP-CHK-1.5	1.5mm CHK Collet
HSP-CHK-2.0	2.0mm CHK Collet
HSP-CHK-2.5	2.5mm CHK Collet
HSP-CHK-3.0	3.0mm CHK Collet
HSP-CHK-3.5	3.5mm CHK Collet



Collet Sleeves

Item No.	Description	D1	L1 (mm)	OAL (mm)
HSP-CHK-127-026	CHK Collet Sleeve 1/2 inch Shank	0.500"	26mm	38mm
HSP-CHK-190-076	CHK Collet Sleeve 3/4 inch Shank	0.750"	76mm	90mm
HSP-CHK-254-121	CHK Collet Sleeve 1 inch Shank	1.00"	121mm	133mm

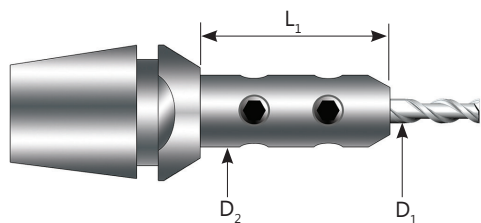
Note: Includes Clamping Nut and Wrench

Accessory Components

Item No.	Description
HSP-CHK - NUT	Precision CHK Collet Clamping Nut
HSP-CHK 14mm	14mm Flat Wrench



Micro-XL Tool Holders - Micro End Mill Extensions NEW for 2022



Pair the bore size (D1) to the shank size of the high-quality micro end mill of your choice for maximum reach and rigidity.



ER8

Item No.	Description	L1	D1	D2
4900-110100	CTE-08-1.00-064100	10	1	6.4
4900-110150	CTE-08-1.50-064100		1.5	6.4
4900-110159	CTE-08-1.59-064100		.062"	6.4
4900-110200	CTE-08-2.00-064100		2	6.4
4900-110300	CTE-08-3.00-070100		3	7
4900-110318	CTE-08-3.18-070100		.125"	7
4900-115100	CTE-08-1.00-064150	15	1	6.4
4900-115150	CTE-08-1.50-064150		1.5	6.4
4900-115300	CTE-08-3.00-070150		3	7
4900-115318	CTE-08-3.18-070150		.125"	7

NOTE: ER8 Holders Include a special M10x.75 clamping nut.

ER11

Item No.	Description	L1	D1	D2
4900-210100	CTE-11-1.00-064100	10	1	6.4
4900-210150	CTE-11-1.50-064100		1.5	6.4
4900-210159	CTE-11-1.59-064100		.062"	6.4
4900-210200	CTE-11-2.00-064100		2	6.4
4900-210300	CTE-11-3.00-080100		3	8
4900-210318	CTE-11-3.18-080100		.125"	8
4900-215300	CTE-11-3.00-080150	15	3	8
4900-215318	CTE-11-3.18-080150		.125"	8
4900-215400	CTE-11-4.00-080150		4	8
4900-220300	CTE-11-3.00-080200	20	3	8
4900-220318	CTE-11-3.18-080200		.125"	8
4900-220400	CTE-11-4.00-080200		4	8

ER16

Item No.	Description	L1	D1	D2
4900-316100	CTE-16-1.00-064160	16	1	6.4
4900-316150	CTE-16-1.50-064160		1.5	6.4
4900-316159	CTE-16-1.59-064160		.062"	6.4
4900-316200	CTE-16-2.00-064160		2	6.4
4900-316300	CTE-16-3.00-095160		3	9.5
4900-316318	CTE-16-3.18-095160		.125"	9.5
4900-316400	CTE-16-4.00-095160		4	9.5
4900-316476	CTE-16-4.76-095160		.187"	9.5
4900-316500	CTE-16-5.00-095160	25	5	9.5
4900-325300	CTE-16-3.00-095250		3	9.5
4900-325300C	CTE-16-3.00-095250C		3	9.5
4900-325318	CTE-16-3.18-095250		.125"	9.5
4900-325318C	CTE-16-3.18-095250C		.125"	9.5
4900-325400	CTE-16-4.00-095250		4	9.5
4900-325476	CTE-16-4.76-095250		.187"	9.5
4900-325500	CTE-16-5.00-095250		5	9.5

* Coolant-Thru Version

ER25

Item No.	Description	L1	D1	D2
4900-525300	CTE-25-3.00-100250	25	3	10
4900-525318	CTE-25-3.18-100250		.125"	10
4900-525400	CTE-25-4.00-100250		4	10
4900-525476	CTE-25-4.76-125250		.187"	12.5
4900-525500	CTE-25-5.00-125250		5	12.5
4900-525600	CTE-25-6.00-125250		6	12.5
4900-525635	CTE-25-6.35-125250		.250"	12.5
4900-525700	CTE-25-7.00-160250		7	16
4900-525794	CTE-25-7.94-160250	25	.312"	16
4900-525800	CTE-25-8.00-160250		8	16

ER20

Item No.	Description	L1	D1	D2
4900-414300	CTE-20-3.00-095140	14	3	9.5
4900-414476	CTE-20-4.76-114140		.187"	11.4
4900-414500	CTE-20-5.00-114140		5	11.4
4900-414600	CTE-20-6.00-125140		6	12.5
4900-414635	CTE-20-6.35-125140	16	.250"	12.5
4900-416318	CTE-20-3.18-095160		.125"	9.5
4900-416400	CTE-20-4.00-095160		4	9.5
4900-416476	CTE-20-4.76-114160		.187"	11.4
4900-425300	CTE-20-3.00-095250	25	3	9.5
4900-425318	CTE-20-3.18-095250		.125"	9.5
4900-425400	CTE-20-4.00-095250		4	9.5
4900-425476	CTE-20-4.76-114250		.187"	11.4
4900-425500	CTE-20-5.00-114250		5	11.4
4900-425600	CTE-20-6.00-125250		6	12.5
4900-425635	CTE-20-6.35-125250		.250"	12.5

Collet Reduction

NOW AVAILABLE!

Item No.	Description	Shank Size	Collet Size	Extension Length
Call For Details	RTE-16-08-100254	ER16	ER8	1.0 in

Replacement Stop Screws

Item No.	Size	Fits
8999-000021	M6	ER11
8999-000206	M8	ER16 & 20
8999-000210	M10	ER25



Replacement Set Screws

Item No.	Size
8999-000011	M3
8999-000007	M4
8999-000214	M5



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