



duMONT Minute Man® Broaching System



The duMONT Company, Greenfield, Massachusetts 01302
www.dumont.com



The duMONT Company

A Reputation for Excellence

The duMONT Company, has been designing and manufacturing Precision Broaches since 1945 – Broaches recognized all over the world for quality, durability, and engineering detail.

We are the largest supplier of Push-Type Broaches in America, offering Broaches to a wide variety of businesses through a vast national and international distribution network. Our record of design ingenuity, fast delivery, and courteous follow-up is unsurpassed.

Materials

All duMONT Broaches and Broaching System Components are manufactured of the finest quality materials. We are equipped to fabricate from a variety of grades to meet your requirements. Contact your industrial distributor or the duMONT Engineering Department for details.

Call Your Industrial Distributor

Your industrial distributor is your best source for Minute Man® Broaches and Broaching System Components. If your regular distributor does not carry duMONT products call us and we will be happy to give you the name of your nearest duMONT distributor. For special technical assistance call the duMONT Engineering Department at 413-773-3674 or 800-628-9648.

Fast Delivery

An order for stock items placed by your industrial distributor with us by 2PM Eastern Standard Time will almost always be shipped on the same working day.

Warning

Cutting tools may shatter. Proper safety equipment including eye protection should be worn wherever and whenever cutting tools are being used.

Material Safety Data Sheet

Available on request or at www.dumont.com.

General Ordering Information

When ordering stock Minute Man® Broaches and Broaching System Components from your distributor please specify EDP No., size, and description to ensure proper order fulfillment.

Transportation

All shipments are made via United Parcel Service where weight limitations allow. Express shipments, both surface and air, are available at your request. Shipments are F.O.B. Greenfield, MA unless otherwise stated.

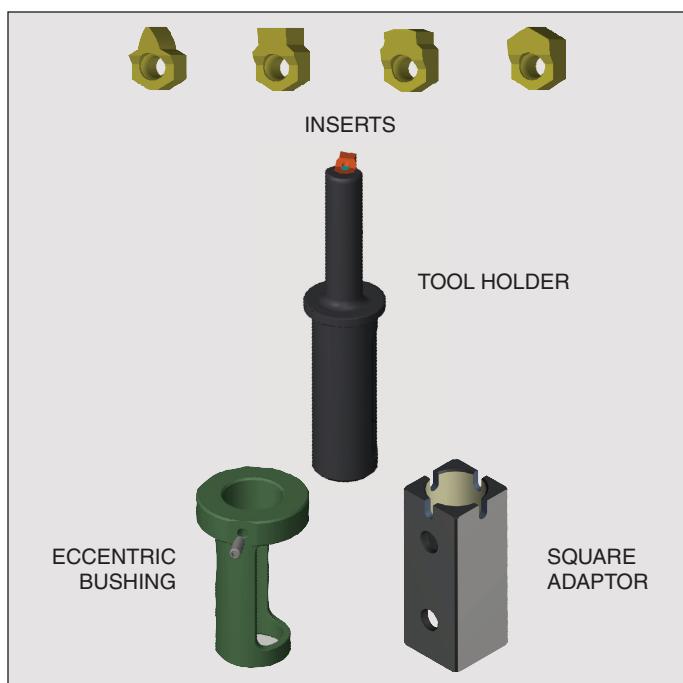
Prices

Please contact us for current pricing or refer to current price list for prices on all stock items. Prices are subject to change without notice.

TiN or TiAIN Coating

All standard items are available with coatings from stock or short delivery. Please contact factory for details.

duMONT Minute Man Broaching System



Introduction

The duMONT Company is pleased to introduce a patented solution for effective and efficient broaching and shaping operations on CNC Lathes and Machining Centers as well as Slotting and Shaping machines. The Broaching System is designed to be flexible while delivering the rigidity and performance required. The duMONT Minute Man Broaching System allows the cutting of through and blind hole keyways, keyways in a tapered bore and shaped or splined holes. A chamfer at the intersection of the bore and the wall of the keyway slot is also an available feature. The Broaching System enables these additional machining operations to be performed while the part remains in the CNC equipment and its coordinate system, promoting both accuracy and time savings. A Square Adaptor which accepts the components of the Broaching System is available for use with Slotting and Shaping machines. Programming assistance is available, please refer to our website or call for details.

duMONT Minute Man Broaching System

System Components

Inserts – Stock Keyway and Slotting Inserts in Inch and Metric Sizes are presented on Page 4.

The Insert designed to work exclusively with a duMONT Tool Holder is manufactured from a sintered steel alloy with a 13% cobalt content, heat treated to a 72 HRC hardness to provide toughness and impact resistance, and TiN coated to further enhanced performance. Stock Inserts may be re-sharpened two to three times depending on the keyway width tolerance and requires recoating after re-sharpening. The Engineering Section discusses additional types of Special Inserts that may be designed and manufactured for specific applications.

Tool Holders – 25mm Shank Tool Holders Page 5 and 32mm Shank Tool Holders Page 6.

The duMONT Tool Holder is designed to work exclusively with the Insert. The Holders are manufactured of heat treated tool steel hardened to 58/60 HRC at the Insert seat, providing resistance to deformation and longer tool life. The seat and mounting system provides ridged support and backing for the Insert. Most Tool Holders come with two 3.5mm holes for Thru Tool Coolant delivery promoting lubrication, cooling and chip flushing, improving finish and tool performance. The Tool Holders come in Standard and Long Lengths and can, in many cases, accommodate more than one insert size. The Stock Tool Holders are often used in conjunction with Special Form Inserts designed for specific applications.

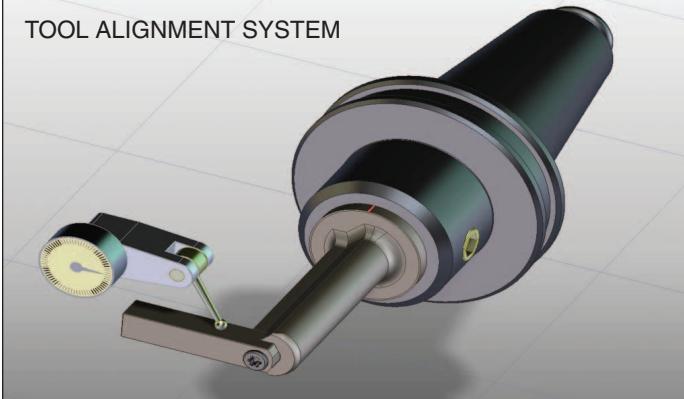
Eccentric Bushings – Eccentric Bushings for 25mm and 32mm Tool Holders Page 7.

The Eccentric Bushings are designed to facilitate the use of the Tooling System in Lathes that do not have a Y axis adjustment. The Bushing, used in conjunction with the Centering Plates discussed later in this section, provides a method for correcting symmetry. The Eccentric Bushing has a range of $+\text{-} .020$ (0.5mm) and provides gradient lines each representing a displacement of .001 (0.03mm). This movement should be sufficient to adjust for any error that may occur on a CNC Lathe and insure proper alignment. The Bushings are also available in the shorter VDI style.

Square Adaptors – Square Adaptors for use on Traditional Slotting, and Shaping Machines Page 7.

The Square Adaptors provide a means of interfacing the Broaching System to a wide variety of conventional Slotting and Shaping Machines. The Square Adaptors are available in 1.378 (35mm) and 1.575 (40mm) size and accept the 25mm Tool Holder and 32mm Tool Holder respectively. The Adaptor offers a locating slot on each of its four sides enabling accurate 90 degree indexing.

TOOL ALIGNMENT SYSTEM



Centering Plates – Centering Plates for use in Tool Holders Page 8.

The appropriate size Centering Plate is mounted in the Tool Holder to facilitate correct mounting and orientation of the Tool Holder with the machine. Through the use of a sensor or dial indicator, the centering of the Plate will be readily transferred to the Insert when mounted in the Tool Holder. The Eccentric Bushing mentioned earlier may also be introduced in instances where a Y axis adjustment is not available.

Sharpening Stems – Sharpening Stems for Stock Inserts Page 8.

Hexagon shanked Sharpening Stems are available for mounting and supporting an Insert during re-sharpening. Inserts that show a decline in surface finish (a sign of wear), can have their life extended through a re-sharpening process. The Inserts are designed to allow two to three re-sharpenings, more if tolerances allow. Recoating of the Insert is required after sharpening. Sharpening must be properly performed using an appropriate grinder and grinding wheel. The original cutting angle must be maintained.

Mounting Screws – Insert Mounting Screws, Drivers and Set Screws Page 9.

Inserts are mounted in the Tool Holder using a Torx Screw or a 5mm Hex Screw. The Screw size varies with the size of the Insert and Tool Holder. Replacement and extra Screws are available to avoid downtime, as are Torx Screw Drivers as needed. Swivel Ball-Bearing Point Set Screws are used only in Lathes without Y axis during Eccentric Bushing rotation to correct symmetry errors. Do not over-tighten the Ball-Bearing Point Set Screw – it must allow the Tool Holder to move up and down as the Bushing is rotated. It is important to confirm the screw/bolt requirements for the existing tooling to be used in the mounting of the Broaching System.

Engineering Section

Broaching System use – Machining Considerations & Preparation Pages 9–11.

Special Inserts – for CNC Equipment and Slotting Machines Page 12.

Ordering Stock and Special Tooling Components Page 12.

Keyway & Slotting Inserts For CNC Equipment & Slotting Machines

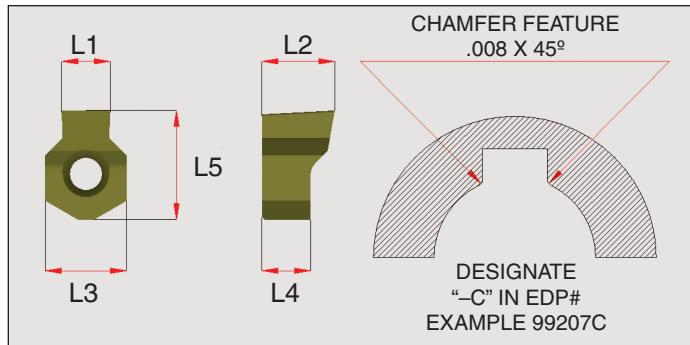
$\frac{3}{32}$ through $\frac{3}{4}$ inch | 2mm through 25mm

Applications:

- Short Run to High Volume Production
- Single Machine Processing

Stock Keyway and Slotting Inserts

The Inserts designed to work exclusively with duMONT Tool Holders are a sintered steel alloy with a 13% cobalt content, heat treated to a 72 HRC hardness providing toughness and impact resistance. A TiN coating is applied to improve wear resistance and lubricity. All Inserts are designed to allow several re-sharpenings. Stock Insert specifications and mild steel application data are provided. A Chamfer Feature is available see note below. See the Engineering Section for process and Special Insert information and available applications — Keyways in Tapered Bore, Square, Hexagon and Involute Internal Gears.



Stock Inserts in the Most Popular Inch Sizes for Keyways and Slotting

Inserts Inch EDP#	Width of Insert (L1) Inch*	Width of Insert (L1) Tolerances	Tool Holder Size 25mm or 32mm Std./Long Length	Minimum Bore Dia. Inch	Insert Height (L2) Inch	Body Width (L3) Inch	Body Height (L4) Inch	Full Length (L5) Inch	Depth of Cut per Stroke Mild Steel	Pressure Required Mild Steel
99202	$\frac{3}{32}$	.0938 - .0948	2	.276	.276	.236	.197	.256	.0040	170 lbs.
99203	$\frac{1}{8}$	.1252 - .1262	3	.335	.276	.236	.197	.315	.0040	226
99206	$\frac{5}{32}$	.1564 - .1574	4	.413	.276	.236	.197	.315	.0038	268
99207	$\frac{3}{16}$	.1877 - .1887	5	.492	.276	.236	.197	.315	.0033	279
99209	$\frac{1}{4}$	.2502 - .2512	6	.650	.354	.394	.236	.531	.0025	282
99210	$\frac{9}{32}$	.2813 - .2823	8	.827	.354	.394	.236	.531	.0023	292
99212	$\frac{5}{16}$	.3127 - .3137	8	.827	.354	.394	.236	.531	.0023	324
99213	$\frac{3}{8}$	.3755 - .3765	10	1.102	.551	.512	.394	.728	.0020	338
99214	$\frac{7}{16}$	.4380 - .4390	12	1.181	.551	.709	.394	.866	.0020	395
99215	$\frac{1}{2}^{**}$	.5006 - .5016	12	1.181	.551	.709	.394	.866	.0018	406
99242	$\frac{9}{16}^{**}$	.5631 - .5641	14/16	1.378	.551	.709	.394	.866	.0017	431
99216	$\frac{5}{8}^{**}$	.6260 - .6270	14/16	1.378	.551	.709	.394	.866	.0017	479
99217	$\frac{3}{4}^{**}$	.7515 - .7525	18/26	1.654	.551	.709	.394	.866	.0015	508

Stock Inserts in the Most Popular Metric Sizes for Keyways and Slotting

Inserts Metric EDP#	Width of Insert (L1) mm*	Width of Insert (L1) Inch	Tool Holder Size 25mm or 32mm Std./Long Length	Minimum Bore Dia. mm	Insert Height (L2) mm	Body Width (L3) mm	Body Height (L4) mm	Full Length (L5) mm	Depth of Cut per Stroke Mild Steel	Pressure Required Mild Steel					
99401	2mm	.0782 - .0791	2	7	.276	6.5	.256	6	.236	.197	6.5	.260	.0040	142 lbs.	
99402	3mm	.1176 - .1185	3	8.5	.335	7	.276	6	.236	.197	7.5	.295	.0040	212	
99403	4mm	.1569 - .1579	4	10.5	.413	7	.276	6	.236	.197	8	.315	.0040	283	
99404	5mm	.1963 - .1972	5	12.5	.492	7	.276	6	.236	.197	8	.315	.0035	310	
99406	6mm	.2356 - .2366	6	16.5	.650	9	.354	10	.394	6	.236	13.5	.532	.0030	319
99407	8mm	.3143 - .3155	8	21	.827	9	.354	10	.394	6	.236	13.5	.532	.0024	340
99408	10mm	.3930 - .3942	10	28	1.102	14	.551	13	.512	10	.394	18.5	.728	.0020	354
99409	12mm**	.4716 - .4730	12	30	1.181	14	.551	13	.512	10	.394	18.5	.728	.0018	383
99410	14mm**	.5503 - .5517	14/16	35	1.378	14	.551	18	.709	10	.394	22	.866	.0016	397
99411	16mm**	.6290 - .6304	14/16	35	1.378	14	.551	18	.709	10	.394	22	.866	.0015	425
99412	18mm**	.7078 - .7092	18/26	42	1.654	16	.630	26	1.024	10	.394	30	1.181	.0015	478
99413	20mm**	.7864 - .7880	18/26	42	1.654	16	.630	26	1.024	10	.394	30	1.181	.0014	496
99414	22mm**	.8651 - .8667	18/26	42	1.654	16	.630	26	1.024	10	.394	30	1.181	.0013	507
99494	25mm**	.9832 - .9848	18/26	42	1.654	16	.630	26	1.024	10	.394	30	1.181	.0012	531

*Chamfer Feature providing a 45 Deg. Chamfer at the intersection of the bore and the walls of the broached section when cut to full depth is available by specifying a "-C" in the EDP# for example — 99207-C.

**It is necessary on larger cuts 12 mm or 1/2 inch Keyways and above to cut in two operations, a roughing pass with a smaller width insert (approximate 1/2 required width) and finishing pass at the desired width. This approach reduces the pressure required.

Tool Holders for CNC Equipment and Slotting Machines

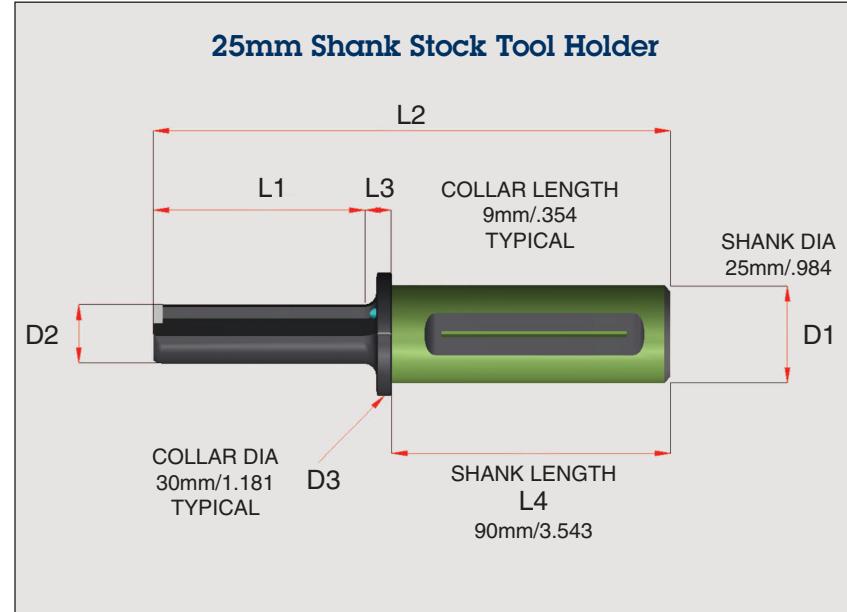
25mm Shank Tool Holders for Keyway & Slotting Inserts

Applications:

- CNC Lathes and Machining Centers
- Slotting Machines

Stock Tool Holders for Inch and Metric Keyway and Slotting Inserts

The Tool Holders designed to work exclusively with duMONT Stock Keyway and Slotting Inserts are heat treated tool steel, hardened to 58/60 HRC at the Insert seat providing resistance to deformation and longer tool life. Most Tool Holders provide two 3.5mm holes for Thru Tool Coolant delivery promoting lubrication, cooling and chip flushing improving finish and tool performance. Available in 25mm (.984 Inch) and 32mm (1.260 Inch) diameters in both Standard and Long Lengths designated by -S and -L respectfully. **Always confirm that the first digit in the Description of the Tool Holder Size matches the Tool Holder Size referenced for the Insert to be used — i.e. Tool Holder Description 6-25-S (EDP# 99008) could be used with Inserts (EDP# 99209) 1/4 Inch or (EDP# 99406) 6mm.** See the Engineering Section for additional process and Special Insert information and available applications — Keyways in Tapered Bore, Square, Hexagon and Involute Internal Gears.



25mm Shank Stock Tool Holders for Stock Inch and Metric Inserts for Keyways and Slotting

Description provides: Tool Holder Size — Shank Diameter — Length Designation Standard or Long.

Always confirm that the first digit in the Description of the Tool Holder Size matches the Tool Holder Size referenced for the Insert to be used — i.e. Tool Holder Description 6-25-S (EDP# 99008) could be used with Inserts (EDP# 99209) 1/4 Inch or (EDP# 99406) 6mm.

EDP #	Description Tool Holder Size	Tool Holder Accessories										Thru Tool Coolant	
		Minimum Bore Dia. mm	Minimum Bore Dia. Inch	Stem Dia. (D2) mm	Stem Dia. (D2) Inch	Stem Length (L1) mm	Stem Length (L1) Inch	Overall Length (L2) mm	Overall Length (L2) Inch	Centering Plate	Mounting Screw	Driver	
99000	2-25-S	7	.276	6.5	.256	25	.984	124	4.882	—	MS-1	T08	Yes
99001	2-25-L	7	.276	6.5	.256	35	1.378	134	5.276	—	MS-1	T08	Yes
99002	3-25-S	8.5	.335	8	.315	30	1.181	129	5.079	CP-1	MS-1	T08	Yes
99003	3-25-L	8.5	.335	8	.315	40	1.575	139	5.472	CP-1	MS-1	T08	Yes
99004	4-25-S	10.5	.413	10	.394	40	1.575	139	5.472	CP-1	MS-1	T08	Yes
99005	4-25-L	10.5	.413	10	.394	56	2.205	155	6.102	CP-1	MS-1	T08	Yes
99006	5-25-S	12.5	.492	12	.472	46	1.811	145	5.709	CP-1	MS-1	T08	Yes
99007	5-25-L	12.5	.492	12	.472	66	2.598	165	6.496	CP-1	MS-1	T08	Yes
99008	6-25-S	16.5	.650	16	.630	56	2.205	155	6.102	CP-2	MS-2	T15	Yes
99009	6-25-L	16.5	.650	16	.630	81	3.189	180	7.087	CP-2	MS-2	T15	Yes
99010	8-25-S	21	.827	20	.787	68	2.677	162	6.378	CP-2	MS-2	T15	Yes
99011	8-25-L	21	.827	20	.787	100	3.937	199	7.835	CP-2	MS-2	T15	Yes
99012	10-25-S*	28	1.102	25	.984	86	3.386	185	7.284	CP-3	MS-3	T20	No
99013	10-25-L	28	1.102	25	.984	126	4.961	225	8.858	CP-3	MS-3	T20	No
99014	12-25-S*	30	1.181	30	1.181	102	4.016	203	7.992	CP-3	MS-3	T20	No
99015	12-25-L	30	1.181	30	1.181	161	6.339	260	10.236	CP-3	MS-3	T20	No

*Collar Length 11mm (.433 inch)

Tool Holders for CNC Equipment and Slotting Machines

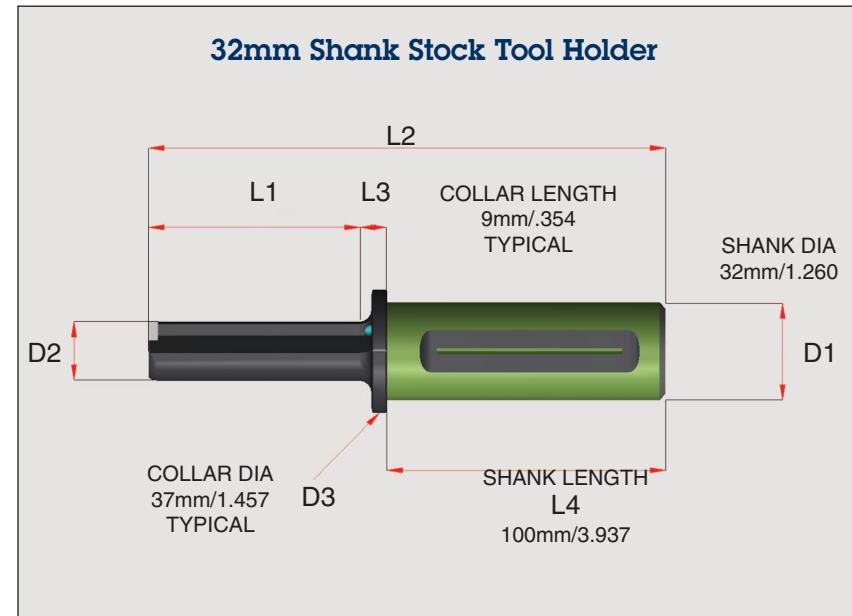
32mm Shank Tool Holders for Keyway & Slotting Inserts

Applications:

- CNC Lathes and Machining Centers
- Slotting Machines

Stock Tool Holders for Inch and Metric Keyway and Slotting Inserts

The Tool Holders designed to work exclusively with duMONT Stock Keyway and Slotting Inserts are heat treated tool steel, hardened to 58/60 HRC at the Insert seat providing resistance to deformation and longer tool life. Most Tool Holders provide two 3.5mm holes for Thru Tool Coolant delivery promoting lubrication, cooling and chip flushing improving finish and tool performance. Available in 25mm (.984 Inch) and 32mm (1.260 Inch) diameters in both Standard and Long Lengths designated by -S and -L respectfully. **Always confirm that the first digit in the Description of the Tool Holder Size matches the Tool Holder Size referenced for the Insert to be used — i.e. Tool Holder Description 6-32-S (EDP# 99038) could be used with Inserts (EDP# 99209) 1/4 Inch or (EDP# 99406) 6mm.** See the Engineering Section for additional process and Special Insert information and available applications — Keyways in Tapered Bore, Square, Hexagon and Involute Internal Gears.



32mm Shank Stock Tool Holders for Inch and Metric Stock Keyway and Slotting Inserts

Description provides: Tool Holder Size — Shank Diameter — Length Designation Standard or Long.

Always confirm that the first digit in the Description of the Tool Holder Size matches the Tool Holder Size referenced for the Insert to be used — i.e. Tool Holder Description 6-32-S (EDP# 99038) could be used with Inserts (EDP# 99209) 1/4 Inch or (EDP# 99406) 6mm.

EDP #	Description Tool Holder Size	Tool Holder Accessories								Thru Tool Coolant			
		Minimum Bore Dia. mm	Minimum Bore Dia. Inch	Stem Dia. (D2) mm	Stem Dia. (D2) Inch	Stem Length (L1) mm	Stem Length (L1) Inch	Overall Length (L2) mm	Overall Length (L2) Inch				
99030	2-32-S	7	.276	6.5	.256	25	.984	134	5.276	—	MS-1	T08	Yes
99031	2-32-L	7	.276	6.5	.256	35	1.378	134	5.276	—	MS-1	T08	Yes
99032	3-32-S	8.5	.335	8	.315	30	1.181	139	5.472	CP-1	MS-1	T08	Yes
99033	3-32-L	8.5	.335	8	.315	40	1.575	149	5.866	CP-1	MS-1	T08	Yes
99034	4-32-S	10.5	.413	10	.394	40	1.575	149	5.866	CP-1	MS-1	T08	Yes
99035	4-32-L	10.5	.413	10	.394	56	2.205	165	6.496	CP-1	MS-1	T08	Yes
99036	5-32-S	12.5	.492	12	.472	46	1.811	155	6.102	CP-1	MS-1	T08	Yes
99037	5-32-L	12.5	.492	12	.472	66	2.598	165	6.496	CP-1	MS-1	T08	Yes
99038	6-32-S	16.5	.650	16	.630	56	2.205	165	6.496	CP-2	MS-2	T15	Yes
99039	6-32-L	16.5	.650	16	.630	81	3.189	190	7.480	CP-2	MS-2	T15	Yes
99040	8-32-S	21	.827	20	.787	68	2.677	172	6.772	CP-2	MS-2	T15	Yes
99041	8-32-L	21	.827	20	.787	100	3.937	209	8.228	CP-2	MS-2	T15	Yes
99042	10-32-S	28	1.102	25	.984	86	3.386	195	7.677	CP-3	MS-3	T20	Yes
99043	10-32-L	28	1.102	25	.984	126	4.961	235	9.252	CP-3	MS-3	T20	Yes
99044	12-32-S	30	1.181	30	1.181	102	4.016	213	8.386	CP-3	MS-3	T20	Yes
99045	12-32-L	30	1.181	30	1.181	160	6.299	270	10.630	CP-3	MS-3	T20	Yes
99046	14/16-32-S	35	1.378	35	1.378	126	4.961	231	9.094	CP-4	MS-3	T20	No
99047	14/16-32-L	35	1.378	35	1.378	180	7.087	285	11.220	CP-4	MS-3	T20	No
99048	18/26-32-S*	42	1.654	40	1.575	140	5.512	249	9.803	CP-5	MS-4	5mm Hex	No
99049	18/26-32-L*	42	1.654	40	1.575	200	7.874	309	12.165	CP-5	MS-4	5mm Hex	No

*Collar Length 11mm (.433 inch)

Eccentric Bushings-CNC Equipment Square Adaptors-Slotting Machines

Use with 25mm and 32mm Tool Holders

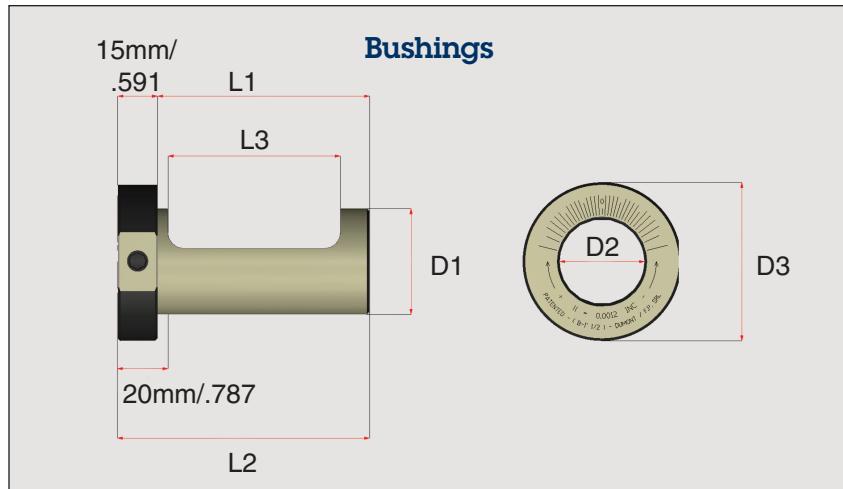
Applications:

- CNC Lathes and Machining Centers
- Slotting Machines

Stock Eccentric Bushings

The Eccentric Bushings are designed to allow the use of the Tool Holders in lathes that do not have a Y axis. The Bushing, manufactured from tool steel, hardened and ground, enables symmetry corrections within a range of +Y 0.5mm (.020 inch) to -Y 0.5mm (.020 inch). The Eccentric Bushings can accommodate Tool Holders with either 25mm or 32mm shanks and are available in various diameters, allowing the Tooling System to be used in a wide variety of machines. Shorter VDI style Eccentric bushings are also available.

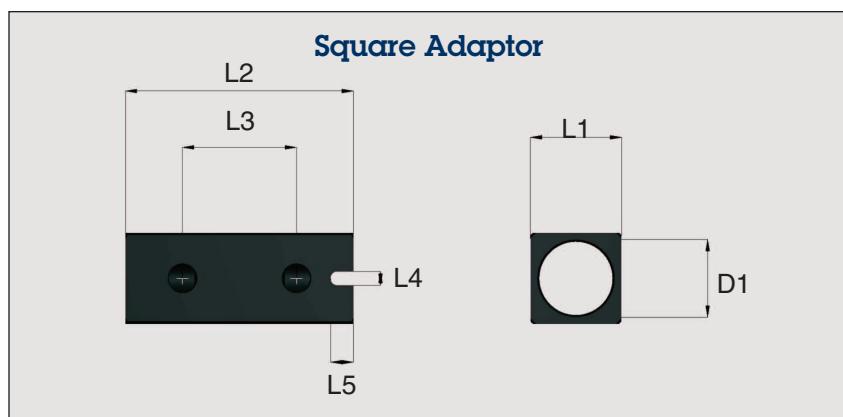
Stock Eccentric Bushings for use with 25mm (.984 inch) and 32mm (1.260 inch) Tool Holders



EDP #	Description	Shank Diameter (D1)		Shank Internal Dia. (D2)		Shank Length (L1)		Overall Length (L2)		Collar Diameter (D3)		Undercut Length (L3)	
		mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch
99060	EB-1-1/4	31.8	1.250	25	0.984	70	2.756	85	3.346	55	2.165	58	2.283
99061	EB-1-1/2	38.1	1.500	32	1.260	80	3.150	95	3.740	55	2.165	66	2.598
99062	EB-2	50.8	2.000	32	1.260	100	3.937	115	4.528	65	2.559	75	2.953
99063	EB-32	32	1.260	25	0.984	70	2.756	85	3.346	55	2.165	58	2.283
99064	EB-40	40	1.575	32	1.260	80	3.150	95	3.740	55	2.165	66	2.598
99065	EB-50	50	1.969	32	1.260	100	3.937	115	4.528	65	2.559	75	2.953
99066	EB-60	60	2.362	32	1.260	100	3.937	115	4.528	80	3.150	75	2.953
99070	EB-1-1/4-VDI	31.8	1.250	25	0.984	50	1.969	65	2.559	55	2.165	38	1.496
99071	EB-1-1/2-VDI	38.1	1.500	32	1.260	65	2.559	80	3.150	55	2.165	51	2.008
99072	EB-2-VDI	50.8	2.000	32	1.260	80	3.150	95	3.740	65	2.559	55	2.165
99073	EB-32-VDI	32	1.260	25	0.984	50	1.969	65	2.559	55	2.165	38	1.496
99074	EB-40-VDI	40	1.575	32	1.260	65	2.559	80	3.150	55	2.165	51	2.008
99075	EB-50-VDI	50	1.969	32	1.260	80	3.150	95	3.740	65	2.559	55	2.165
99076	EB-60-VDI	60	2.362	32	1.260	80	3.150	95	3.740	80	3.150	55	2.165

Stock Square Adaptors

The Square Adaptors are available in two sizes for use with either 25mm or 32mm Tool Holders. The Adaptors provide a method for allowing the Tooling System to be used on traditional machines such as Slotting and Shaping machines. Manufactured from 39NiCrMo3 steel, heat treated and then blued, the Adaptor provides two holes 12 MA threaded for use with two flat head M12 x 8 screws to secure the Tool Holder in place. The Square Adaptor offers a locating slot on each of the four sides.



Stock Square Adaptors

EDP #	Description	Tool Holders		Width & Height (L1)	Overall Length (L2)	Locking		Locating		Locating	
		Shank Dia. (D1)	mm	mm	mm	mm	Inch	Bolt Holes (L3)	Slot Width (L4)	mm	Inch
99535	SA-35	25	.984	35	1.378	90	3.543	40	1.575	6	.236
99540	SA-40	32	1.260	40	1.575	100	3.937	50	1.969	6	.236

Centering Plates

Sharpening Stems

Use with Stock Inserts & Tool Holders

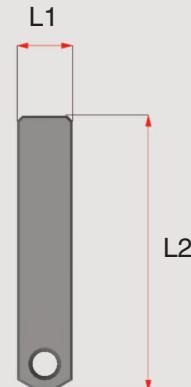
Stock Centering Plates

The Centering Plates are design to fit specific Tool Holders and facilitate correct mounting and orientation of the Tool Holder. The Centering Plate sits in the Tool Holder as does the Insert, and provides a surface to be referenced using a sensor or gauge. The results are used to reference against the axis of the part to be processed. The chart below identifies the Tool Holders that can be used with a particular Centering Plate.

Applications:

- Alignment of Tool Holder
- Sharpening of Stock Inserts

Plates



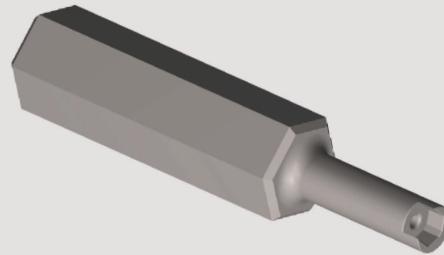
Stock Centering Plates

EDP#	Description	Used With Tool Holders Size	Plate Height(L1) mm	Plate Height(L1) Inch	Plate Length (L2) mm	Plate Length (L2) Inch
99501	CP-1	2, 3, 4, & 5	6	.236	50	1.969
99502	CP-2	6 & 8	10	.394	50	1.969
99503	CP-3	10 & 12	13	.512	60	2.362
99504	CP-4	14/16	18	.709	70	2.756
99505	CP-5	18/26	26	1.024	70	2.756

Stock Sharpening Stems

Insert life can be extended through re-sharpening of Inserts that show a decline in surface finish (a sign of wear). The Sharpening Stems, available in 5 sizes, are designed to accept specific Insert sizes. The Insert is removed from the Tool Holder and mounted on the Sharpening Stem. The Sharpening Stem holds the Insert securely in place as the cutting edge of the Insert is sharpened at its original angle using a suitable grinder and grinding wheel.

Sharpening Tool



Stock Sharpening Stems

EDP#	Description	Used With Insert Inch	Used With Insert mm	Overall Length mm	Overall Length Inch
99521	SS-1	1/8, 5/32, & 3/16	3, 4, and 5mm	150	5.906
99522	SS-2	1/4, 9/32, & 5/16	6 & 8mm	150	5.906
99523	SS-3	3/8, 7/16, & 1/2	10 & 12mm	150	5.906
99524	SS-4	9/16 & 5/8	14 & 16mm	150	5.906
99525	SS-5	3/4	18 thru 25mm	150	5.906

Mounting Screws

Torx Screws & Drivers

Swivel Ball-Bearing Point Set Screws

Applications:

- Securing Inserts
- Securing Tool Holders

Insert Mounting Screws and Torx Screw Drivers

Inserts are mounted in the Tool Holder using a Torx Screw or 5mm Hex screw. The Screw size varies with the size of the Tool Holder. Replacement and extra Screws are available as are the appropriate size Torx Screw Drivers. The charts below lists the individual Screw and Driver sizes and the Tool Holders they are used with.

Stock Insert Mounting Screws and Torx Driver

EDP#	Description	Style	Thread	Used With	
				Tool Holders	Size
99551	MS-1	Torx	M 2.5 x .45	2, 3, 4, & 5	
99552	MS-2	Torx	M 4 x .70	6 & 8	
99553	MS-3	Torx	M 6 x 1.00	10, 12, & 14/16	
99554	MS-4	5mm Hex	M 8 x 1.25	18/26	

Torx Drivers

EDP#	Description	Style	Used With	
			Tool Holders	Size
99561	T08	Torx	2, 3, 4, & 5	
99562	T15	Torx	6 & 8	
99563	T20	Torx	10, 12, & 14/16	

Stock Swivel Ball-Bearing Point Set Screws Used in Lathe Without Y Axis

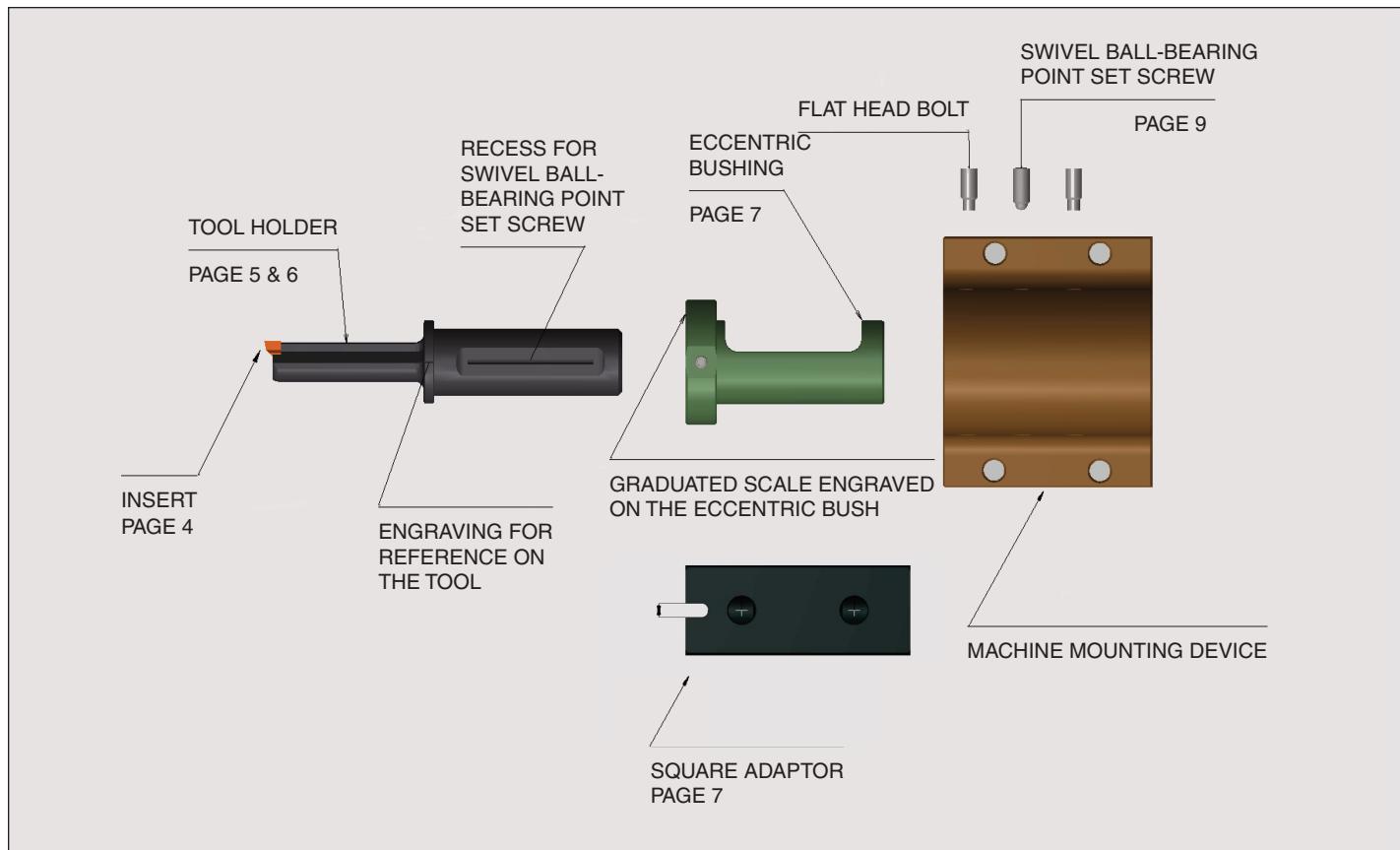
The Set Screws are used only in Lathe without Y axis during Eccentric Bushing rotation to correct symmetry errors. Do not over-tighten Ball-Bearing Point Set Screw it must allow the Tool Holder to move up and down as the Bushing is rotated. It is important to confirm the bolt requirements for the existing tooling to be used in the mounting of the Tooling System.

Stock Swivel Ball-Bearing Point Set Screws

EDP#	Description	Thread	Length
99571	BB-1	M 6 x 1.00	15mm
99572	BB-2	M 8 x 1.25	18mm
99573	BB-3	M 10 x 1.5	23mm
99574	BB-4	M 12 x 1.75	26mm
99575	BB-5	M 14 x 2.00	30mm
99576	BB-6	M 16 x 2.00	33mm
99577	BB-7	UNC 5/16-18	37/64
99578	BB-8	UNC 3/8-16	5/8
99579	BB-9	UNC 1/2-13	3/4
99580	BB-10	UNC 5/8-11	36/64

Engineering Section

Machining Considerations & Preparation



Machining Considerations – When planning to use the Tooling System always refer to the Stock Insert Tables on Page 4 for Inch and Metric Insert specifications. Be aware of the Minimum Bore Diameter an Insert can be used in as well as the Pressure Required (Pounds) to achieve a cut. Unlike typical Broaching applications in which multiple teeth are engaged at one time, the Tooling System and single edge cutting requires considerably less force. **The use of your equipment for this process should be confirmed with your machine manufacturer.**

It is necessary on larger cuts 12mm or 1/2 inch Keyways and above to cut in two operations, a roughing pass with a smaller width insert (Approximate 1/2 required width) and finishing pass at the desired width. This approach reduces the Pressure Required. The Thru Tool Coolant, providing lubrication, cooling, and chip flushing, improves finish and performance but does not remove the challenges associated with Blind Hole Cutting.

When Blind Hole Cutting a Special Insert is required. The Insert's composition and hardness is altered to reduce the risk of chipping. The CNC programs used for Blind Hole Cutting require that special attention be given to the end of each stroke and the retraction of the Insert. A straight X axis move out of the work can result in chipping of the Insert. Programming assistance is available; the manufacturer, model, and controls of the machine to be used as well as a fully dimensioned drawing of the finished part are required. **Allow us to put our experience to work for you.**

In the CNC program it is necessary to establish an approaching value which accounts for the "cord", the distance from the center

of the cutting edge of the Insert to I.D. of the bore at the point the corners of the Insert contact the I.D. of the bore. This distance is a function of Insert width and Bore Diameter. The approaching value being sufficiently lower than the diameter of the bore avoids damage to the Insert. A table providing the Feed, Speed and Pressure Required for various materials when cut with Stock Inserts is provided later in this section for guidance.

Mounting Inserts – All inserts are mounted or seated in the Tool Holder in the same manner. The Tool Holder has a pocket and a threaded hole at its tip. The Insert is designed to fit into the Tool Holder's pocket and secured by a mounting screw. The Insert tables on Page 4 clearly indicate the Tool Holder Size required to be used. Special Form Inserts would mount in a similar fashion.

Tool Holder Mounting – The Broaching System is designed to be used in a wide variety of equipment. The same general mounting approach is used - securing the Tool Holder in a manner appropriate for the machine's fixture. As mentioned above the Tool Holder Size is dependent on the Insert to be used. The machine's holder determines the necessary Shank Diameter of the Tool Holder or the required interface to the Tool Holder. The size of the Eccentric Bushing or Square Adaptor, used to interface with the machine's holder will dictate the Tool Holder's Shank diameter. The five following examples demonstrate the flexibility of the Broaching System made available by the various sizes of Tool Holders, Eccentric Bushing and

Engineering Section

Machining Considerations & Preparation

Square Adaptors. The steps listed below are referenced as required for the five Tool Holder mounting examples.

1. Select the correct interface for the machine's holder, a Tool Holder with a 25mm or 32mm Shank Diameter (Page 5–6), the diameter and style of an Eccentric Bushing (Page 7), or the size of a Square Adaptor (Page 7).
2. The Eccentric Bushing's Shank I.D. or the Square Adaptor's Shank Diameter determines the Shank Diameter of the Tool Holder required.
3. Select Tool Holder based on Insert to be used (Page 4) and Shank Diameter determined by steps 1 or 2.
4. If an Eccentric Bushing or Square Adaptor is required, back off the Set Screw(s) in the collar of the Bushing or body of the Adaptor, apply a few drops of oil to the Tool Holder's shank and slide the Tool Holder into the Bushing or Adaptor.
5. Rotate the Tool Holder to align the white notch on the collar with the Zero on the face of the Eccentric Bushing. This orientation results in the face of the Insert to be at a 90 degree angle from the Zero point, centered on the Y axis, and allows the flat of the Tool Holder to align with the bolt holes of the machine. Tighten the Set Screw on the collar of the Eccentric Bushing and slide the assembly into the holder on the machine. The flat of the Tool Holder, visible in the Eccentric Bushing's undercut, remains perpendicular to the fixture's bolt holes. Use a Swivel Ball-Bearing Point Set Screw in the center hole and flat head bolts on the outside holes to secure. Mount the appropriate Centering Plate on the Tool Holder and use a dial indicator to confirm the Tool Holder is centered in the Y axis.
6. If alignment is required, adjust by loosening the Set Screw and two bolts securing the Holder to the fixture. Also loosen the Set Screw on the collar of the Eccentric Bushing. Rotate the Eccentric Bushing in the direction of the error. Each gradient line on the face of the Bushing represents a .001 (0.03mm) correction. Rotating the Bushing towards you (clockwise) is a Plus to the Y axis and away from you (counter clockwise) is a minus to the Y axis. Once the adjustment is made, tighten the Set Screw in the collar of the Bushing followed by the Set Screw and bolts in the fixture on the machine. Confirm the adjustment.
7. Rotate the Tool Holder to allow the locating pin to slide into one of the locating slots. Secure with the Set Screws.
8. Secure Tool Holder or assembly to the machine's holder using appropriate Set Screws and bolts.
9. Use machine controls, dial indicator and the appropriate Centering Plate mounted on the Tool Holder to confirm alignment. Adjust as required. Once the adjustment is made tighten the appropriate Set Screw. Confirm the adjustment.
10. Remove Centering Plate if required prior to mounting Insert.

Tool Holder Mounting Examples

CNC Lathe Mounting with No Y Axis – for 1-1/4, 1-1/2, and 2 inch also 32, 40, 50, and 60mm in standard length or VDI holders. Steps – 1, 2, 3, 4, 5, 6, and 10.

CNC Lathe Mounting with Y Axis – for 25, and 32mm holders. Steps – 1, 3, 8, 9, and 10.

CNC Lathe Mounting with Y Axis – for 1-1/4, 1-1/2, and 2 inch also 32, 40, 50, and 60mm in standard length or VDI holders. Steps – 1, 2, 3, 4, 5, 9, and 10.

Spindle Mounting using a Weldon Holder or Standard Collet – for 25 and 32mm holders. Steps – 1, 3, 8, 9, and 10.

Mounting to a Slotting Machine or Shaper – for 35 and 45mm square holders. Steps – 1, 2, 3, 4, 7, 8, and 10.

Programming – Allow us to put our experience to work for you. Programming assistance is available; the manufacturer, model, and controls of the machine to be used as well as a fully dimensioned drawing of the finished part are required. In the CNC program it is necessary to establish an approaching value which accounts for the "cord", the distance from the center of the cutting edge of the Insert to I.D. of the bore at the point the corners of the Inserts contact the I.D. of the bore. This distance is a function of Insert width and Bore Diameter. The approaching value being sufficiently lower than the diameter of the bore avoids damage to the Insert. A table providing the Feed, Speed and Pressure Required for various materials when cut with Stock Inserts is provided later in this section.

Sharpening – Re-sharpening extends the life of the Insert and saves money. The Inserts that show a decline in surface finish (a sign of wear), can have their life extended through a re-sharpening process. The Inserts are designed to allow two to three re-sharpenings, more if tolerances allow. A Sharpening Stem is available for mounting and supporting of an Insert during re-sharpening. The Stem's hexagon shank facilitates the re-sharpening process. Sharpening must be properly performed using an appropriate grinder and grinding wheel. The original cutting angle must be maintained. Recoating of the Insert is required after sharpening.

Engineering Section

Machining Considerations & Preparation

Cut per Stroke, Cutting Speed and Pressure Required for Stock Inserts in Various Materials

Width of Insert	Aluminum			Bronze			Mild Steel / Low Alloy Steel			High Alloy Steel			Stainless		
	Cut per Stroke	Cutting Pressure	Speed Required	Cut per Stroke	Cutting Pressure	Speed Required	Cut per Stroke	Cutting Pressure	Speed Required	Cut per Stroke	Cutting Pressure	Speed Required	Cut per Stroke	Cutting Pressure	Speed Required
	Inch	Inches/Min.	Ibs.	Inch	Inches/Min.	Ibs.	Inch	Inches/Min.	Ibs.	Inch	Inches/Min.	Ibs.	Inch	Inches/Min.	Ibs.
3/32	.0060	480	71	.0040	340	132	.0035	300	182	.0030	230	170	.0023	200	141
1/8	.0060	480	94	.0040	340	176	.0035	300	242	.0028	230	211	.0025	200	204
5/32	.0060	480	118	.0040	340	220	.0035	300	302	.0025	230	235	.0023	200	235
3/16	.0060	480	141	.0040	340	263	.0033	300	342	.0025	230	282	.0023	200	281
1/4	.0055	480	172	.0032	340	281	.0025	300	345	.0022	230	331	.0020	200	326
9/32	.0055	400	194	.0032	300	316	.0022	265	341	.0021	200	355	.0020	175	366
5/16	.0050	400	196	.0032	300	351	.0022	265	379	.0020	200	376	.0019	175	387
3/8	.0050	400	235	.0027	300	355	.0019	265	393	.0017	200	384	.0016	175	391
7/16	.0044	400	241	.0027	300	414	.0018	265	434	.0016	200	421	.0015	175	428
1/2	.0042	380	263	.0026	270	456	.0016	230	441	.0015	180	451	.0014	150	456
9/16	.0040	380	282	.0024	270	473	.0016	230	496	.0014	180	473	.0013	150	476
5/8	.0040	380	313	.0023	270	504	.0015	230	517	.0014	180	526	.0013	150	529
3/4	.0035	380	329	.0020	270	526	.0013	230	538	.0012	180	541	.0011	150	538
2mm	.0060	480	59	.0040	340	110	.0035	300	151	.0025	230	118	.0023	200	118
3mm	.0060	480	89	.0040	340	165	.0035	300	227	.0025	230	177	.0023	200	176
4mm	.0060	480	118	.0040	340	220	.0035	300	303	.0025	230	236	.0023	200	235
5mm	.0060	480	148	.0036	340	248	.0033	300	357	.0025	230	295	.0023	200	294
6mm	.0055	480	162	.0032	340	264	.0033	300	429	.0022	230	312	.0020	200	307
8mm	.0055	400	216	.0032	300	353	.0025	265	433	.0020	200	378	.0018	175	368
10mm	.0050	400	246	.0027	300	372	.0020	265	433	.0017	200	401	.0016	175	409
12mm	.0045	380	266	.0027	270	446	.0019	230	494	.0015	180	425	.0014	150	430
14mm	.0040	380	276	.0025	270	482	.0017	230	515	.0013	180	430	.0013	150	466
16mm	.0040	380	315	.0022	270	485	.0015	230	520	.0013	180	491	.0011	150	450
18mm	.0037	380	328	.0020	270	496	.0014	230	546	.0012	180	510	.0010	150	461
20mm	.0034	360	335	.0019	250	523	.0013	200	563	.0012	150	567	.0010	130	512
22mm	.0032	360	346	.0018	250	546	.0012	200	571	.0010	150	520	.0010	130	535
25mm	.0032	360	394	.0017	250	585	.0011	200	595	.0009	150	531	.0009	130	544

Engineering Section

Special Inserts for CNC Equipment & Slotting Machines

Applications:

- Virtually any broaching operation
- Short and long-run production

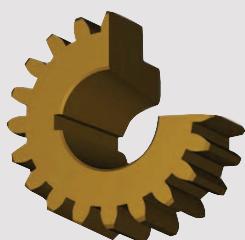


Special Inserts and Applications

The duMONT Minute Man® Tooling System offers a wide range of Special Design Inserts that provide the opportunity to manufacture parts more efficiently and accurately through single machine processing. When location or timing is a critical design element of the part, the Broaching System offers a means to do more work within the same coordinate system. **Allow us to put our experience to work for you. Get the right Insert for the material you are machining, the shape or form you require with the programming needed to get your job done. Please give us a call.**



Blind Hole Inserts – Blind Hole Cutting requires a Special Insert. The Insert's composition and hardness is altered to reduce the risk of chipping. Additional design considerations are required for small diameter holes with restricted chip flow, deep hole cutting, and when working with bars of material in lathe operations. The programs used for Blind Hole Cutting require that special attention be given to the end of each stroke and the retraction of the Insert. A straight X axis move out of the work can result in chipping of the Insert. Programming assistance is available; the manufacturer, model, and controls of the machine to be used as well as a fully dimensioned drawing of the finished part are required. The proper design, Insert material, and programming is essential to success.



Cutting Keyways in a Tapered Bore is made easier on CNC Lathes and Machining Centers as the Tapered Keyway is cut while the work piece remains within the same co-ordinate system. For burr free parts, a Chamfer Feature may be added to the insert. Programming assistance is available.



Cornering Inserts – Machine Squares, Hexagons, and Octagons with Inserts designed with two cutting edges intersecting at the appropriate angle 90, 120 or 135 degrees. Cut the corner, rotate the spindle (C axis) as required for the next cut (re-run of the subroutine) and repeat to completion. The same cornering Inserts may be used to generate a range of sizes of the given shape by simply increasing or decreasing the tool offset.

Internal Toothing and Grooving Inserts – Inserts designed to meet industry standards (ANSI, DIN, ISO etc.) as well as non-standard geometries are available. A chamfering feature may be added in order to produce a burr-free part. One machine processing in the same coordinate system promotes product uniformity and processing efficiencies.

The following are examples of the advantages of using the CNC equipment's "C" axis and positioning capabilities to generate more complex patterns or shapes.



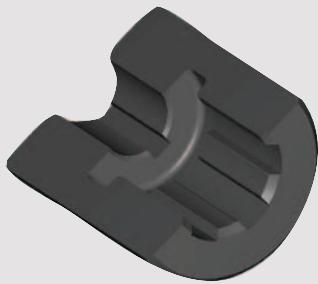
Positioning or Timing of Internal Keyways to external work-piece features may also be accomplished. The availability of the "C" axis and Machining Center positioning make easy work of Multiple Keyway Requirements 90°, 180°, etc. duMONT will provide programming assistance if desired.

Engineering Section

Special Inserts for CNC Equipment & Slotting Machines

Applications:

- Virtually any broaching operation
- Short and long-run production



Grooving Inserts may be designed to produce a wide range of shapes. The Insert then orientated by the "C" axis and Machining Center Positioning is able to cut a wide range of combinations in the I.D. of the bore. Often reducing set-up and machining time as well as tooling cost. duMONT will provide programming assistance if desired.

Toothed Inserts designed to meet Industry Standards are available with a shorter lead time and lower cost than a conventional broaching tool. Reducing both delivery time to your customer and the risk /exposure of using more expense tooling. The positioning of the CNC Lathe with a "C" axis and CNC Machining Centers allow for endless configurations. duMONT will provide programming assistance if desired.

Following is a Limited List of CNC Lathe Applications –
Involute Internal Gears – Keyways in a Tapered Bore – Straight Keyways in a Bore – Multiple Keyways within a Bore – a Square in a Turned Hub – a Hexagon in a Turned Pulley. **Please call to discuss your needs.**

Ordering Stock and Special Tooling Components

duMONT Minute Man Broaching System Components can be ordered from your industrial distributor.

Before ordering **Stock Items** please confirm the **EDP#** of the Components to be ordered and their compatibility. **If you have questions do not hesitate to call (800-628-9648) or e-mail (info@dumont.com).**

If you require a **Special Item** we are pleased to design and manufacture the Tools to meet your specific needs.

What We Need To Know If You Require A Special Item

1. A fully dimensioned drawing of the finished part is required.
2. The type of material to be processed.
3. The manufacturer, model, and controls of the machine to be used.
4. Number of Pieces to be machined.

If you have questions do not hesitate to call (800-628-9648) or e-mail (info@dumont.com).



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