



Automatic Back Spotfacer

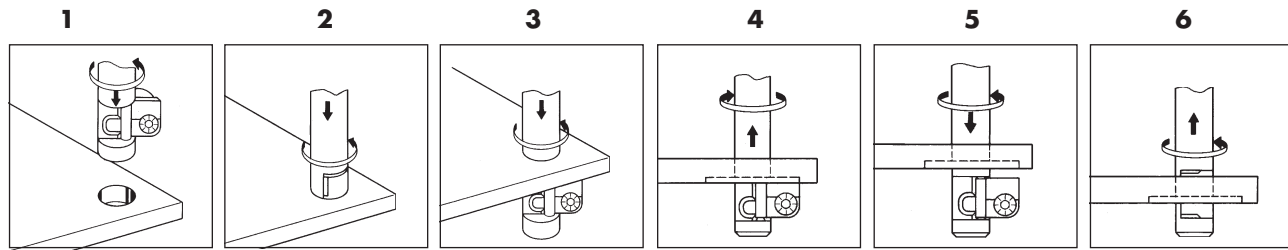
SPOTFACING · CHAMFERING
COUNTERBORING · DEBURRING

INCH TOOLS



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HOW THE ERIX TOOL OPERATES



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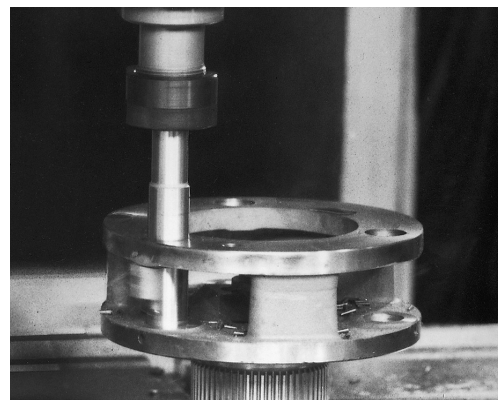
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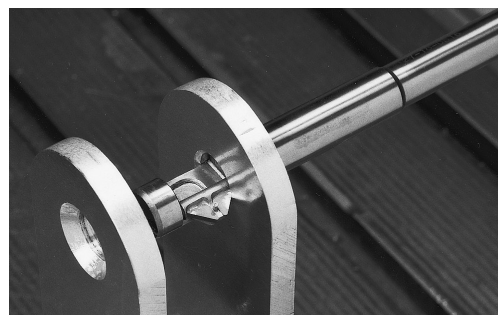
Back spotfacing large valve body.



Spindle with coolant through (CT).



Front and back spotfacing.



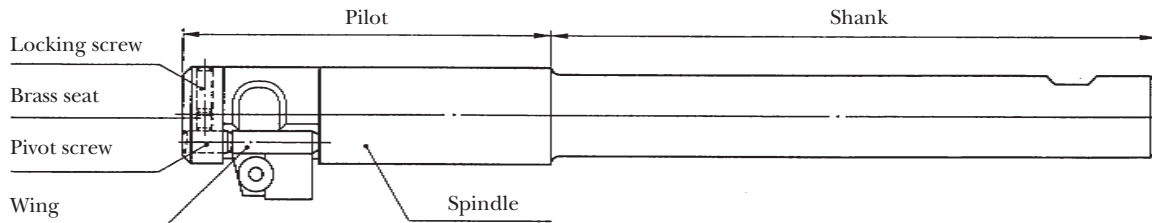
Front and Back chamfering.

SPOTFACING • CHAMFERING • COUNTERBORING • DEBURRING

TECHNICAL DESCRIPTION

Patented Design. Reliable Performance. The Erix tool is an automatic back spotfacing or back chamfering tool consisting of a spindle and a cutter, called a wing, which folds into the spindle recess when the tool enters the hole in the workpiece. Excellent performance is ensured because there is only one moving part.

Save time and money. Working time saved when compared with conventional methods is normally between 60% and 70%, in some cases more than 90%.



SPINDLE.

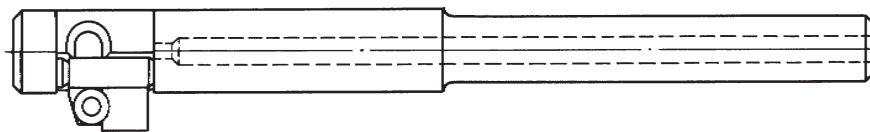
The pilot part of the spindle guides the spotfacer into the hole and takes up the cutting forces. The pilot diameter is less than the nominal hole diameter.

The difference in diameter is as follows:

Hole dia.	Difference
.188 – .375”	.002”
.406 – .500”	.004”
.531 – .969”	.008”
1.000 – 1.156”	.012”
above 1.181”	.012”

Spindles above size 1.181” have a pilot diameter which is .039” less than the hole diameter. These spindles are provided with wear strips, which guide the spotfacer into the hole. All spindles have cylindrical shanks.

COOLANT THROUGH



All spindles with cylindrical shanks, for hole size .394” and above, have coolant through.

WING

During operation the wing must be free to swing. Therefore, when assembling a wing, **the pivot screw should be released about 30 degrees,** before tightening the locking screw.

Smaller wings are made of HSS with integral cutting edge. Larger size wings have square inserts type ISO SPUN or rectangular inserts type ISO/R242.

The inserts are clamped to the wings by means of Secodex **lefthand** threaded screws.

FEED AND SPEED

When operating in different material

Workpiece Material		Hardness HB	Number and Letter Code	
			Wings HSS	Wings Carbide
1. Steel	1,1 Magnetic soft steel	120	35 E	70 E
	1,2 Structural steel	200	30 D	60 D
	1,3 Plain Carbon steel	250	25 D	50 D
	1,4 Alloy steel	250	20 C	40 C
	1,5 Alloy, tempered steel	> 250; 350	15 B	30 B
	1,6 Alloy, tempered steel	> 350	10 A	20 A
2. Stainless steel Stahl	2,1 Free machining, steel	250	15 E	40 E
	2,2 Austenitic	250	10 D	30 D
	2,3 Ferritic, Martensitic	300	5 C	20 C
3. Cast Iron	3,1 Lamellar graphite	150	30 E	40 E
	3,2 Lamellar graphite	> 150; 300	20 E	30 E
	3,3 Malleable Cast Iron	200	15 D	20 D
	3,4 Malleable Cast Iron	> 200; 300	10 D	10 D
4. Titanium	4,1 Titanium unalloyed	200	15 C	40 C
	4,2 Titanium alloyed	270	10 B	20 B
	4,3 Titanium alloyed	> 270; 350	5 B	10 B
5. Nickel	5,1 Nickel, unalloyed	150	10 B	40 B
	5,2 Nickel, alloyed	270	6 B	20 B
	5,3 Nickel, alloyed	> 270; 350	5 A	10 A
6. Copper	6,1 Copper	100	50 C	70 C
	6,2 B-Brass, Bronze	200	45 D	80 D
	6,3 α-Brass	200	40 D	80 D
	6,4 High Strength Bronze	470	20 E	40 E
7. Aluminum Magnesium	7,1 Al, Mg unalloyed	100	60 F	80 F
	7,2 Al alloyed, Si < 0,5%	150	50 F	70 F
	7,3 Al alloyed, 0,5% > Si < 10%	120	40 E	60 E
	7,4 Al alloyed, Si > 10%	120	30 E	40 E
8. Synthetic material	8,1 Thermoplastics	--	60 D	80 D
	8,2 Thermosetting plastics	--	40 B	60 B
	8,3 Reinforced plastic materials	--	30 A	40 A

How to use the tables

1. Enter the table to the left with the correct workpiece material and the relevant wing type (HSS or Carbide) and obtain Number and Letter Code.
Example: Suppose workpiece material is Plain Carbon steel to be cut with a wing fitted with a carbide insert. You will find the Code: 50D.
2. With this code you go to the two tables below, using also the Spotfacing or Chamfering diameter (*Please note! Not hole diameter*).
To the left, using Letter Code, you will find Feed in inch/REV, and to the right, using Number Code, you find Speed in RPM.
Example: Suppose you are going to operate our tool 90-25.4/45.4-CS20. With a Spotfacing diameter of 1.787" (45.4 mm) and the above Code 50D you will find:

Feed: .0055" / REV

Speed: 338 RPM

This would give a feed rate of:
338 x .0055 = 1.859"/min.

Spot-facing/ Chamfering diameter in inch	Feed in inch / REV						Speed in REV / min													
	Letter Code						Number Code – Speed (m/min)													
	A	B	C	D	E	F	5	10	15	20	25	30	35	40	45	50	60	70	80	
.315	.0004	.0006	.0008	.0012	.0016	.0020	200	400	600	800	950	1200	1400	1600	1800	1900	2400	2800	3200	
.433	.0006	.0008	.0010	.0014	.0020	.0024	145	290	435	580	725	870	1015	1160	1300	1450	1740	2030	2320	
.551	.0008	.0010	.0012	.0016	.0024	.0028	115	230	340	455	570	680	795	910	1020	1140	1360	1590	1820	
.709	.0010	.0012	.0014	.0020	.0028	.0031	88	177	265	352	442	530	618	704	796	884	1060	1236	1408	
.827	.0012	.0014	.0016	.0024	.0031	.0039	76	152	228	304	380	456	534	608	687	760	912	1068	1216	
.984	.0014	.0016	.0020	.0031	.0039	.0047	64	128	192	256	320	382	446	512	573	640	764	892	1024	
1.181	.0016	.0020	.0024	.0035	.0047	.0055	53	106	159	212	265	318	371	424	477	530	636	742	850	
1.378	.0018	.0022	.0028	.0043	.0055	.0063	46	92	138	184	227	276	320	368	410	454	552	640	728	
1.575	.0020	.0024	.0031	.0047	.0063	.0071	40	80	120	160	190	240	280	320	360	380	480	560	640	
1.772	.0022	.0028	.0039	.0055	.0071	.0083	36	71	107	142	169	213	249	284	320	338	427	498	569	
1.969	.0024	.0031	.0047	.0063	.0079	.0094	32	64	96	128	160	192	224	256	288	320	384	448	510	
2.362	.0026	.0035	.0051	.0071	.0087	.0106	27	54	81	108	135	162	189	216	243	270	324	378	425	
2.756	.0028	.0039	.0055	.0087	.0098	.0130	23	46	69	92	115	138	160	184	207	230	276	320	364	
3.150	.0030	.0043	.0063	.0094	.0110	.0146	20	40	60	80	95	120	140	160	180	190	240	280	320	
3.150	.0031	.0047	.0071	.0098	.0118	.0157	15	20	50	65	80	95	110	125	145	160	190	220	250	

DIRECTIONS FOR USE of ERIX Spot Facers

BEFORE USING THE TOOL MAKE THE FOLLOWING CHECKS:

TOOL

- Check that the wing is free to swing. To prevent tightening of the wing caused by heat expansion, the **pivot screw** should have been **released about 30 degrees**.
- Spot Facers above size 1.181" have wings provided with a guide tang to keep the wing in a working position even at low speeds and in horizontal position. It is of **utmost importance** to check that the **entire length** of wing **including the guide tang** will **have space** enough within the workpiece to swing free before cutting operation starts. If this is not the case damage to wing and spindle will be caused.
- Check insert quality. Use **ISO K20 for cast iron** and **ISO P40 for steel**. ERIX Spot Facers are normally fitted with insert of grade ISO K20. When changing inserts note that the **clamping screw is lefthand threaded**.

TOOL HOLDER

Thoroughly fasten tool or tool holder with tool into the machine spindle.

WORKPIECE

Since the hole acts as a guiding surface for the Spot Facer, **a few drops of thin oil** in the hole **should be used**. When machining in steel coolant should be used.

OPERATION

Choose machine spindle **speed according to table**.

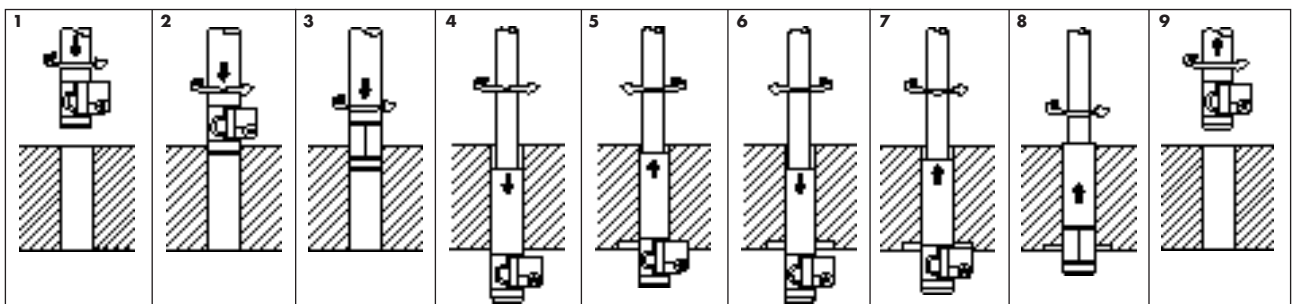
Start the machine spindle **counter-clockwise** (looking away from machine headstock) and **feed** the Spot Facer **rapidly up to the hole**. Since the wing must make contact with the workpiece in order to properly close, the **feedrate should be reduced to maximum .008"/rev. when entering** the hole. The wing will remain folded in, while passing through the hole and will swing out again by centrifugal force after having passed through. **Make sure that the entire length of the wing including the guide tang swings free of workpiece before reversing to clockwise rotation**. Then **apply feed according to table**.

IMPORTANT! The wing closes through contact with the workpiece, not through the centrifugal force.

After spot-facing, rapid traverse the wing away from the spotfaced surface. **If the wing has a guide tang the traverse must also clear the guide tang**.

Now reverse the spindle rotation and **back feed rapidly** until wing (or guide tang) is **near the spot faced surface**. Then the **feedrate should be reduced** again to **maximum .008"/rev.** until the wing is completely closed. The tool may then be withdrawn from the hole in rapid traverse.

IMPORTANT! When cutting in a fillet (interrupted cut), with a horizontal spindle 1.181" or less, **speed should be increased up to 2 times figures given in table. Feed to be reduced by 20-30%.**



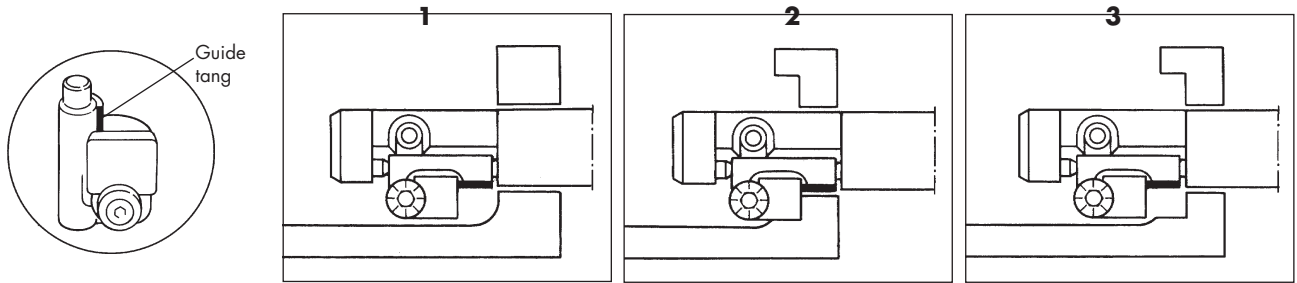
A FEW HINTS FOR SMOOTH OPERATION

1. Small wings of type HSS might be magnetized during the operation. Demagnetize them if necessary.
2. Use coolant. For cast iron use a few drops of thin, non-sticky oil.
3. Tolerance on spotfacing diameter is approximately:

Hole dia.	Tolerance
.188 – .375”	± .004”
.406 – 1.156”	± .008”
1.188 – 2.688”	± .012”
4. To improve the surface finish on the spotfaced surface, reduce the speed and feed at the end of the operation and let the tool dwell for a few seconds.
5. To avoid marks in the finished hole, proceed as follows: drill the hole undersize, back spot face, ream the hole to finished size.
6. Always check that the support for workpiece is strong enough to avoid any form of vibration.
7. Use "coolant through" whenever possible. It has several advantages: chips break, chips are removed, keeps spindle and wing cool, prevents workpiece surface from hardening. If "coolant through" is not available we then recommend that plenty of coolant be applied as close to the cutting operation as possible.
8. Ensure that screws are correctly tightened:
 - a) the pivot-screw, after having been slightly tightened, should be released about 30 degrees and then secured by the locking screw and its brass seat.
 - b) the Secodex clamping screw in the wing is lefthand threaded. When tightening this screw the insert will be secured firmly into the pocket made specially for this purpose in the wing. Furthermore the Secodex-screw has the form of an umbrella with a rim acting like a spring pressing hard and holding the insert. So don't forget to tighten this screw!
 - c) remaining screws. Check that they are tightened.
9. Keep the cutting edge sharp, (except when operating in hard aluminium). Regrind cutting edge or change insert frequently.
10. Ensure that there is space enough for the wing to swing out freely before, during or after the cutting operation.
11. The Erix tool is not designed to cut in a radial direction. If you try to use the tool as a reamer, the wing and/or spindle will break.
12. Ensure that the hole in the workpiece has a +tolerance (i.e. is larger than the nominal diameter), as for instance +.005", - 0.
A drill that produces a -tolerance (smaller than nominal) should not be used.

WINGS WITH GUIDE TANG

Large spotfacing tools run at low speed. When operating in a horizontal position the centrifugal force acting on the wing is insufficient to hold the wing in correct working position. Therefore, spotfacing tools above 1.181" diameter have wings provided with a guide tang.

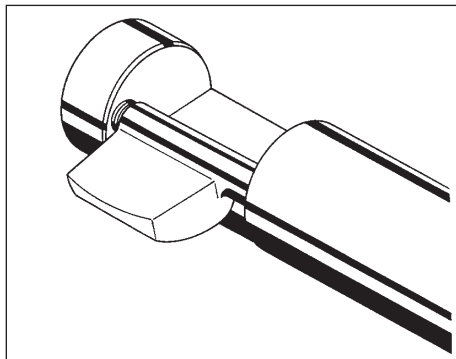


1. When cutting in a fillet the guide tang must enter the hole before the tip of insert cuts the fillet.
2. When the guide tang enters the hole it will keep the wing in its working position.
3. After spotfacing, the spindle must be retracted until the guide tang is free from the hole before the spindle can be reversed.

IMPORTANT!

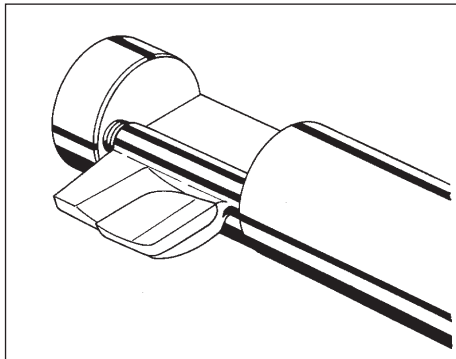
When cutting in a fillet (interrupted cut) with a horizontal spindle increase speed up to 2 times figures given in table and reduce feed by 20–30% (spindles .177-1.181" diameter only).

When operating the tools for hole size above 1.181" see instructions above.



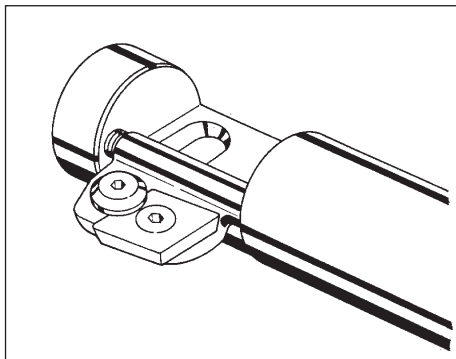
WINGS TYPE HSS ES

When operating conditions are too severe for the ordinary HSS wing the use of the EXTRA STRONG HSS wing is recommended. Such a wing is coded with the suffix ES; e.g. 37-037 ES.



WINGS TYPE HSS BI

Spotfacing wings size 020 and 030, normally made of HSS, can be supplied with BRAZED INSERTS grade K20 (or grade P40 for steel). Such a wing is coded with the suffix BI; e.g. 37-037 BI.



WINGS WITH CENTERLOCK INSERTS

Heavy cutting loads in tough material such as stainless or high alloy steel make stringent demands on the clamping system. To comply with such demands, wings of size 060 or larger, which are normally fitted with square SPUN inserts, can be supplied with centerlocked inserts type SPMA. These wings are coded 38- instead of 37-; e.g. 38-120-2070.

SPECIAL HINTS FOR OPERATION IN SOME DIFFICULT MATERIALS

WORKPIECE MATERIAL

Steel: It can be a little difficult with soft steel to choose the best speed and feed. If speed is too high, vibrations might occur; if too low, material might build up on the cutting edge.

If there is a weld within the area to be spot faced and especially if there is also an interrupted cut, you might experience difficulties due to local high-hardness spots.

Stainless steel: Operating in stainless steel can cause problems similar to those described above.

Cast iron: The surface is often very hard and sometimes you will find grains of sand included in the surface. The cutting edge will quickly become blunt, which can cause the wing to break.

Titanium: Titanium is a very special material. When you have got experience, however, you should not expect difficulties.

Aluminum: Soft aluminum will give long chips.

Hard aluminum will give short chips.

RECOMMENDATIONS

Deviate from recommended figures up and down to find best result.

HSS-wings should - if possible - have brazed inserts, quality P40, (type BI). Larger wings can either have inserts with a centerlock screw (type 38-) (See page 7) or on special request be fitted with brazed inserts (quality P40).

Follow above recommendations. If they are not sufficient, ask us for chip breakers to be ground at the cutting edge of the wing or the insert. To further relieve the stress on the wing it can under certain circumstances be advisable to make the spotface in two diameter-steps.

When using HSS-wings try type BI with brazed inserts quality K20 or, when they are not available, type ES (See page 7). For larger wings use inserts quality K20.

Insert quality P40 is generally recommended. For smaller wings use brazed inserts P40, where available. Otherwise wings type ES. Larger wings should have ordinary inserts P40. If necessary ask for special wings with brazed inserts.

If necessary arrange chip breaker. (See under stainless steel above).

Ask us to supply wings or inserts with a chipping angle reduced from 7,5 degrees (which is our standard) to 0 degrees. It can also be useful to hone the cutting edge to obtain a small (approx .004") negative chipping angle.

PART NUMBERING SYSTEM

Complete tool is coded 90–25.4/45.4–CS19.1

Prefix 90– = back spotfacing 90°

25.4 = hole diameter in mm

45.4 = facing diameter in mm

CS = cylindrical shank

19.1 = shank diameter in mm

Other prefixes:

45– = chamfering 45°

60– = chamfering 60°

30– = chamfering 30°

902– = front and back spotfacing

452– = front and back chamfering 45°

29– = special tool

Spindle is coded 27–25.4–CS19.1

Prefix 27– = spindle, standard or semistandard

25.4 = hole diameter in mm

CS = cylindrical shank

19.1 = shank diameter in mm

Other prefix:

29– = special spindle

Important! To front- and Backspotface with Spindle above 1.181". Please see page 22 and 23.

Wing is coded 37–111 (standard) or

37–110–1450 (semistandard)

Prefix 37– = wing for back spotfacing 90°

Other prefixes:

34– = back chamfering

35– = front and back chamfering

36– = front and back spotfacing

38– = back spotfacing 90° with centerlock screw

39– = special wing

Wings with Centerlock Inserts

Type	Inserts - Type (K 20 or P40*)
------	----------------------------------

38-061	SPMA 080312
38-062	SPMA 090308
38-063	SPMA 090308
38-091	SPMA 120308
38-101	SPMA 090308
38-102	SPMA 090308
38-111	SPMA 120308
38-121	SPMA 150408
38-131	SPMA 150408
38-132	SPMA 190412
38-141	SPMA 150408
38-142	SPMA 190412

Other types – Please request!

* K20 delivered as standard.

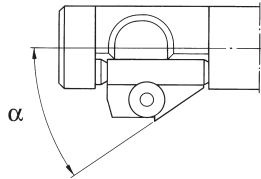
SEMISTANDARD AND SPECIAL TOOLS

In addition to the tools listed in this Catalog we manufacture semistandard and special spindles and wings for ...

1. Hole sizes up to 8.000" in diameter.
2. Holes with diameters between those listed at intervals of .004" (.002" for hole size .188 – .375").
3. Back spotfacing and Front/Back spotfacing at intervals of .004" in facing diameter.
4. Chamfering angles other than 45°, 60° and 30°. Minimum angle is 15°.
5. Special shanks.

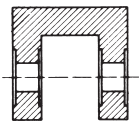
When requesting a quotation for a non-standard tool, please supply the following information ...

- a) Hole diameter to the nearest .004" (or .002" for hole size .188 – .375").
- b) Facing diameter to the nearest .004".
- c) Operation – back spotfacing/chamfering or front and back spotfacing/chamfering.
- d) Chamfering angle α .
- e) Type of shank.
- f) Grade of carbide insert i.e. K20 for cast iron or P40 for steel.

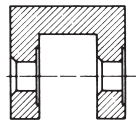


For very special or unusual applications please send a dimensioned sketch of the workpiece.

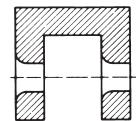
Possibilities for Erix Tool



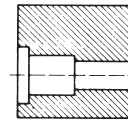
Front spot facing and back spot facing



Front spot facing and back chamfering



Back chamfering with radius

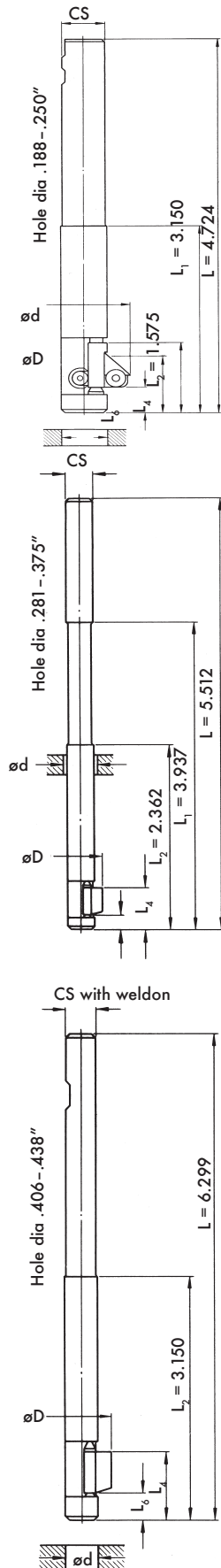
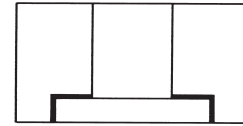


Front spot facing with dual diameters



BACK SPOTFACING

HOLE SIZE .188 – .438"



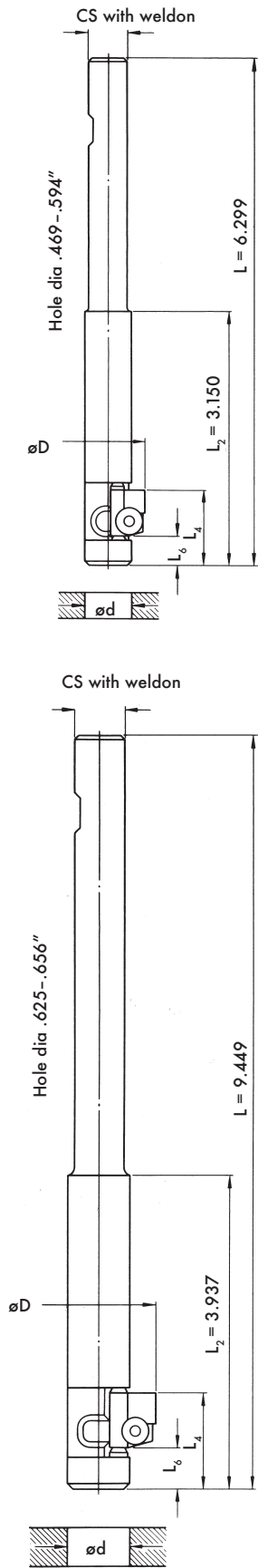
Hole dia	Facing dia	Complete tool	Spindle	Wing	Cutter/Insert	L ₄	L ₆
.188 (3/16)	.323	90- 4.75 / 8.2 -CS9.5	27-4.75-CS9.5	37-011	HSS	.433	.197
	.350	90- 4.75 / 8.9 -CS9.5		-010-0335			
.219 (7/32)	.354	90- 5.55 / 8.9 -CS9.5	27-5.55-CS9.5	37-011	HSS	.433	.197
	.394	90- 5.55 / 10.0 -CS9.5		-012			
	.413	90- 5.55 / 10.5 -CS9.5		-013			
	.433	90- 5.55 / 11.0 -CS9.5		-014			
	.445	90- 5.55 / 11.3 -CS9.5		-010-0415			
.250 (1/4)	.366	90- 6.35 / 9.3 -CS9.5	27-6.35-CS9.5	37-011	HSS	.433	.197
	.406	90- 6.35 / 10.3 -CS9.5		-012			
	.425	90- 6.35 / 10.8 -CS9.5		-013			
	.445	90- 6.35 / 11.3 -CS9.5		-014			
	.500	90- 6.35 / 12.7 -CS9.5		-010-0470			

.281 (9/32)	.406	90- 7.1 / 10.3 -CS9.5	27-7.1-CS9.5	37-020-0320	HSS	.591	.197
	.469	90- 7.1 / 11.9 -CS9.5		-021			
	.547	90- 7.1 / 13.9 -CS9.5		-022			
	.571	90- 7.1 / 14.5 -CS9.5		-023			
	.579	90- 7.1 / 14.7 -CS9.5		-020-0540			
.313 (5/16)	.500	90- 7.9 / 12.7 -CS9.5	27-7.9-CS9.5	37-021	HSS	.591	.197
	.579	90- 7.9 / 14.7 -CS9.5		-022			
	.602	90- 7.9 / 15.3 -CS9.5		-023			
	.657	90- 7.9 / 16.7 -CS9.5		-024			
	.673	90- 7.9 / 17.1 -CS9.5		-020-0620			
.344 (11/32)	.500	90- 8.7 / 12.7 -CS9.5	27-8.7-CS9.5	37-020-0380	HSS	.591	.197
	.516	90- 8.7 / 13.1 -CS9.5		-021			
	.594	90- 8.7 / 15.1 -CS9.5		-022			
	.626	90- 8.7 / 15.9 -CS9.5		-020-0540			
	.673	90- 8.7 / 17.1 -CS9.5		-024			
	.697	90- 8.7 / 17.7 -CS9.5		-025			
	.736	90- 8.7 / 18.7 -CS9.5		-020-0680			
.375 (3/8)	.547	90- 9.5 / 13.9 -CS9.5	27-9.5-CS9.5	37-021	HSS	.591	.197
	.626	90- 9.5 / 15.9 -CS9.5		-022			
	.650	90- 9.5 / 16.5 -CS9.5		-023			
	.705	90- 9.5 / 17.9 -CS9.5		-024			
	.728	90- 9.5 / 18.5 -CS9.5		-025			
	.831	90- 9.5 / 21.1 -CS9.5		-020-0760			

.406 (13/32)	.594	90- 10.3 / 15.1 -CS9.5	27-10.3-CS9.5	37-030-0490	HSS	.945	.394
	.622	90- 10.3 / 15.8 -CS9.5		-031			
	.689	90- 10.3 / 17.5 -CS9.5		-030-0610			
	.720	90- 10.3 / 18.3 -CS9.5		-034			
	.760	90- 10.3 / 19.3 -CS9.5		-035			
	.780	90- 10.3 / 19.8 -CS9.5		-036			
	.807	90- 10.3 / 20.5 -CS9.5		-030-0760			
.438 (7/16)	.635	90- 11.1 / 16.6 -CS9.5	27-11.1-CS9.5	37-031	HSS	.945	.394
	.713	90- 11.1 / 18.1 -CS9.5		-032			
	.732	90- 11.1 / 18.6 -CS9.5		-033			
	.752	90- 11.1 / 19.1 -CS9.5		-034			
	.791	90- 11.1 / 20.1 -CS9.5		-035			
	.811	90- 11.1 / 20.6 -CS9.5		-036			
	.831	90- 11.1 / 21.1 -CS9.5		-037			
	.902	90- 11.1 / 22.9 -CS9.5		-030-0840			

Shank dimensions for "CS with Weldon", see page 17.

HOLE SIZE .469 – .656"



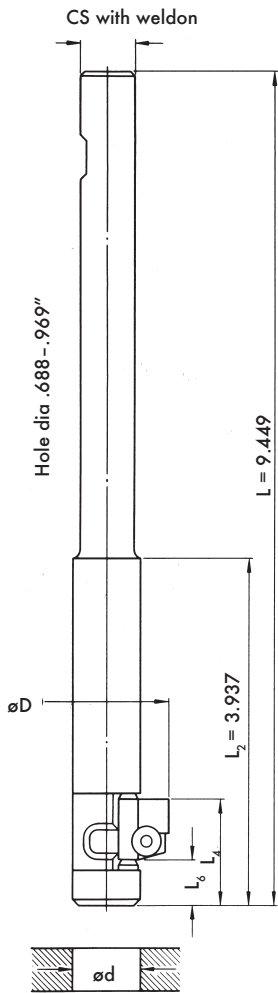
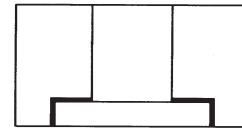
Hole dia	Facing dia	Complete tool	Spindle	Wing	Cutter/Insert	L ₄	L ₆			
.469 (15/32)	.685	90- 11.9 /17.4 -CS9.5	27-11.9-CS9.5	37-031	HSS	.945	.394			
	.744	90- 11.9 /18.9 -CS9.5		-032						
	.764	90- 11.9 /19.4 -CS9.5		-033						
	.783	90- 11.9 /19.9 -CS9.5		-034						
	.823	90- 11.9 /20.9 -CS9.5		-035						
	.843	90- 11.9 /21.4 -CS9.5		-036						
	.862	90- 11.9 /21.9 -CS9.5		-037						
	.996	90- 11.9 /25.3 -CS9.5		-030-0920						
.500 (1/2)	.689	90- 12.7 /17.5 -CS9.5	27-12.7-CS9.5	37-031	HSS	.945	.394			
	.748	90- 12.7 /19.0 -CS9.5		-032						
	.768	90- 12.7 /19.5 -CS9.5		-033						
	.787	90- 12.7 /20.0 -CS9.5		-034						
	.827	90- 12.7 /21.0 -CS9.5		-035						
	.846	90- 12.7 /21.5 -CS9.5		-036						
	.866	90- 12.7 /22.0 -CS9.5		-037						
	.925	90- 12.7 /23.5 -CS9.5		-041						
	1.004	90- 12.7 /25.5 -CS9.5		-043				SM-10-3-2	.984	.354
	1.035	90- 12.7 /26.3 -CS9.5		-040-0965						
	.531 (17/32)	.709		90- 13.5 /18.0 -CS12.7	27-13.5-CS12.7	37-031	HSS	.945	.394	
.780		90- 13.5 /19.8 -CS12.7	-030-0615							
.807		90- 13.5 /20.5 -CS12.7	-034							
.846		90- 13.5 /21.5 -CS12.7	-035							
.866		90- 13.5 /22.0 -CS12.7	-036							
.886		90- 13.5 /22.5 -CS12.7	-037							
.937		90- 13.5 /23.8 -CS12.7	-030-0815							
1.024		90- 13.5 /26.0 -CS12.7	-043	SM-10-3-2		.984				.354
1.106		90- 13.5 /28.1 -CS12.7	-050-1030	C-0820		.906	.354			
.563 (9/16)		.740	90- 14.3 /18.8 -CS12.7	27-14.3-CS12.7		37-031	HSS	.945	.394	
		.799	90- 14.3 /20.3 -CS12.7			-032				
	.819	90- 14.3 /20.8 -CS12.7	-033							
	.839	90- 14.3 /21.3 -CS12.7	-034							
	.878	90- 14.3 /22.3 -CS12.7	-035							
	.898	90- 14.3 /22.8 -CS12.7	-036							
	.917	90- 14.3 /23.3 -CS12.7	-037							
	.996	90- 14.3 /25.3 -CS12.7	-042		SM-10-3-2	.984				.354
	1.075	90- 14.3 /27.3 -CS12.7	-044							
	1.134	90- 14.3 /28.8 -CS12.7	-051		C-0820	.906	.354			
	1.201	90- 14.3 /30.5 -CS12.7	-050-1110		C-0900	.906	.354			
	.594 (19/32)	.772	90- 15.1 /19.6 -CS12.7		27-15.1-CS12.7	37-031	HSS	.945	.394	
		.831	90- 15.1 /21.1 -CS12.7			-032				
		.850	90- 15.1 /21.6 -CS12.7			-033				
.870		90- 15.1 /22.1 -CS12.7	-034							
.909		90- 15.1 /23.1 -CS12.7	-035							
.929		90- 15.1 /23.6 -CS12.7	-036							
.949		90- 15.1 /24.1 -CS12.7	-037							
1.028		90- 15.1 /26.1 -CS12.7	-042	SM-10-3-2		.984				.354
1.106		90- 15.1 /28.1 -CS12.7	-044							
1.185		90- 15.1 /30.1 -CS12.7	-052	C-0820		.906	.354			
1.295		90- 15.1 /32.9 -CS12.7	-050-1190	C-1000						
.625 (5/8)		1.020	90- 15.9 /25.9 -CS12.7	27-15.9-CS12.7		37-061	SM-10-3-2	1.102		
		1.177	90- 15.9 /29.9 -CS12.7			-062	SPU 322	1.181	.433	
	1.295	90- 15.9 /32.9 -CS12.7	-063							
	1.311	90- 15.9 /33.3 -CS12.7	-070-1220		K-1050	1.102				
.656 (21/32)	1.000	90- 16.7 /25.4 -CS15.9	27-16.7-CS15.9	37-060-0785	Brazed	1.102	.433			
	1.051	90- 16.7 /26.7 -CS15.9		-061	SM-10-3-2					
	1.126	90- 16.7 /28.6 -CS15.9		-060-0945						
	1.209	90- 16.7 /30.7 -CS15.9		-062	SPU 322	1.181				
	1.327	90- 16.7 /33.7 -CS15.9		-063						
	1.406	90- 16.7 /35.7 -CS15.9		-070-1300	K-1050	1.102				

Shank dimensions for "CS with Weldon", see page 17.



BACK SPOTFACING

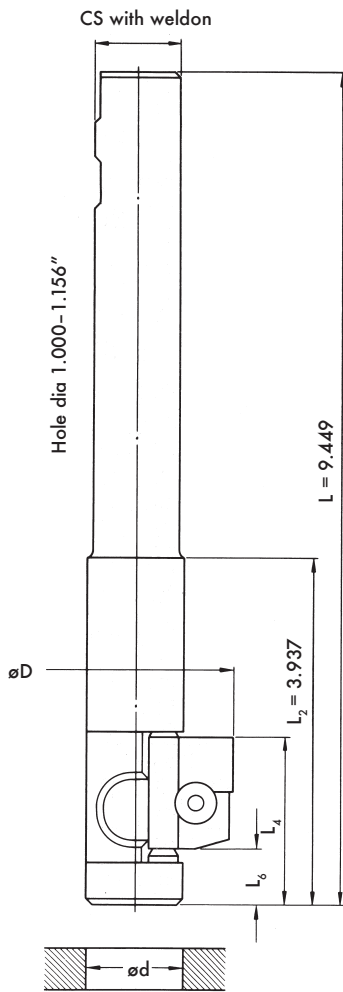
HOLE SIZE .688 – .969"



Hole dia	Facing dia	Complete tool	Spindle	Wing	Cutter/Insert	L ₄	L ₆
.688 (11/16)	1.083	90- 17.5 / 27.5 -CS15.9	27-17.5-CS15.9	37-061	SM-10-3-2	1.102	.433
	1.240	90- 17.5 / 31.5 -CS15.9		-062	SPU 322	1.181	
	1.358	90- 17.5 / 34.5 -CS15.9		-063		1.102	
	1.500	90- 17.5 / 38.1 -CS15.9		-070-1380	K-1150	1.102	
.719 (23/32)	1.102	90- 18.3 / 28.0 -CS15.9	27-18.3-CS15.9	37-061	SM-10-3-2	1.102	.433
	1.260	90- 18.3 / 32.0 -CS15.9		-062	SPU 322	1.181	
	1.378	90- 18.3 / 35.0 -CS15.9		-063		1.102	
	1.571	90- 18.3 / 39.9 -CS15.9		-070-1445	K-1250	1.102	
.750 (3/4)	1.106	90- 19.1 / 28.1 -CS15.9	27-19.1-CS15.9	37-061	SM-10-3-2	1.102	.433
	1.264	90- 19.1 / 32.1 -CS15.9		-062	SPU 322	1.181	
	1.382	90- 19.1 / 35.1 -CS15.9		-063		1.102	
	1.610	90- 19.1 / 40.9 -CS15.9		-080-1490	K-1250	1.102	
.781 (25/32)	1.134	90- 19.8 / 28.8 -CS15.9	27-19.8-CS15.9	37-061	SM-10-3-2	1.102	.433
	1.189	90- 19.8 / 30.2 -CS15.9		-060-0920		1.181	
	1.291	90- 19.8 / 32.8 -CS15.9		-062	SPU 322	1.102	
	1.374	90- 19.8 / 34.9 -CS15.9		-060-1155		1.181	
	1.409	90- 19.8 / 35.8 -CS15.9		-063		1.102	
	1.693	90- 19.8 / 43.0 -CS15.9		-080-1560	K-1250	1.102	
.813 (13/16)	1.165	90- 20.6 / 29.6 -CS19.1	27-20.6-CS19.1	37-061	SM-10-3-2	1.102	.433
	1.323	90- 20.6 / 33.6 -CS19.1		-062	SPU 322	1.181	
	1.441	90- 20.6 / 36.6 -CS19.1		-063		1.102	
	1.787	90- 20.6 / 45.4 -CS19.1		-080-1640	K-1350	1.102	
.844 (27/32)	1.181	90- 21.4 / 30.0 -CS19.1	27-21.4-CS19.1	37-061	SM-10-3-2	1.102	.433
	1.339	90- 21.4 / 34.0 -CS19.1		-062	SPU 322	1.181	
	1.457	90- 21.4 / 37.0 -CS19.1		-063		1.102	
	1.850	90- 21.4 / 47.0 -CS19.1		-080-1700	K-1450	1.102	
.875 (7/8)	1.189	90- 22.2 / 30.2 -CS19.1	27-22.2-CS19.1	37-061	SM-10-3-2	1.181	.512
	1.346	90- 22.2 / 34.2 -CS19.1		-062	SPU 322	1.260	
	1.465	90- 22.2 / 37.2 -CS19.1		-063		1.299	
	1.622	90- 22.2 / 41.2 -CS19.1		-091	SPU 422	1.181	
	1.898	90- 22.2 / 48.2 -CS19.1		-090-1750	K-1450	1.181	
.906 (29/32)	1.220	90- 23.0 / 31.0 -CS19.1	27-23.0-CS19.1	37-061	SM-10-3-2	1.181	.512
	1.378	90- 23.0 / 35.0 -CS19.1		-062	SPU 322	1.260	
	1.496	90- 23.0 / 38.0 -CS19.1		-063		1.299	
	1.654	90- 23.0 / 42.0 -CS19.1		-091	SPU 422	1.181	
	1.992	90- 23.0 / 50.6 -CS19.1		-090-1830	K-1550	1.181	
.938 (15/16)	1.252	90- 23.8 / 31.8 -CS19.1	27-23.8-CS19.1	37-061	SM-10-3-2	1.181	.512
	1.374	90- 23.8 / 34.9 -CS19.1		-060-1005		1.260	
	1.409	90- 23.8 / 35.8 -CS19.1		-062	SPU 322	1.299	
	1.528	90- 23.8 / 38.8 -CS19.1		-063		1.181	
	1.563	90- 23.8 / 39.7 -CS19.1		-090-1245		1.299	
	1.658	90- 23.8 / 42.8 -CS19.1		-091	SPU 422	1.181	
	2.087	90- 23.8 / 53.0 -CS19.1		-090-1910	K-1550	1.181	
.969 (31/32)	1.283	90- 24.6 / 32.6 -CS19.1	27-24.6-CS19.1	37-061	SM-10-3-2	1.181	.512
	1.441	90- 24.6 / 36.6 -CS19.1		-062	SPU 322	1.260	
	1.559	90- 24.6 / 39.6 -CS19.1		-063		1.299	
	1.717	90- 24.6 / 43.6 -CS19.1		-091	SPU 422	1.181	
	2.181	90- 24.6 / 55.4 -CS19.1		-090-1990	K-1650	1.181	

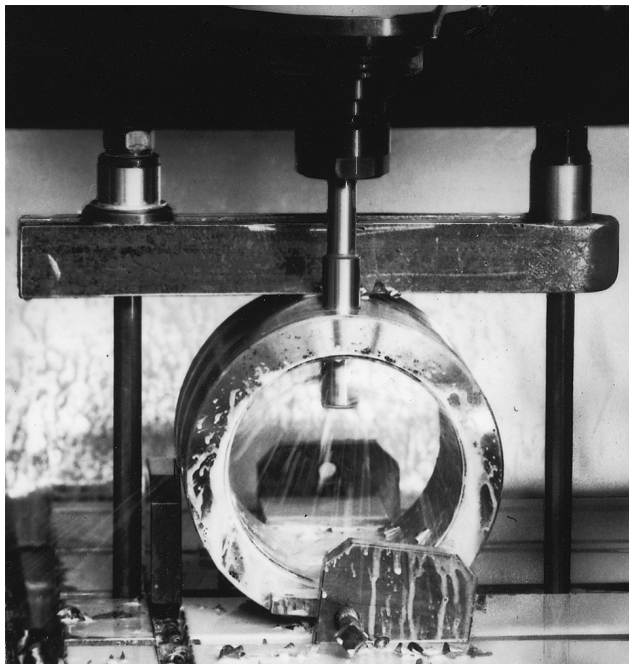
Shank dimensions for "CS with Weldon", see page 17.

HOLE SIZE 1.000 – 1.156"

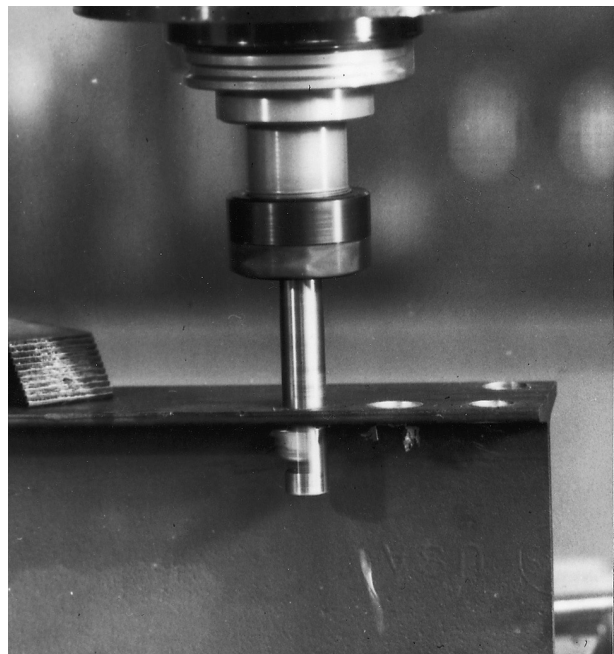


Hole dia	Facing dia	Complete tool	Spindle	Wing	Cutter/Insert	L ₄	L ₆
1.000 (1)	1.315	90- 25.4 / 33.4 -CS19.1	27-25.4-CS19.1	37-101	SPU 322	1.811	.591
	1.591	90- 25.4 / 40.4 -CS19.1		-102			
	1.787	90- 25.4 / 45.4 -CS19.1		-111	SPU 422	1.732	
	1.984	90- 25.4 / 50.4 -CS19.1		-121	SPU 533	1.811	
	2.031	90- 25.4 / 51.6 -CS19.1		-120-1910			
1.031 (1- 1/32)	1.346	90- 26.2 /34.2 -CS25.4	27-26.2-CS25.4	37-101	SPU 322	1.811	.591
	1.622	90- 26.2 /41.2 -CS25.4		-102			
	1.819	90- 26.2 /46.2 -CS25.4		-111	SPU 422	1.732	
	2.016	90- 26.2 /51.2 -CS25.4		-121	SPU 533	1.811	
	2.126	90- 26.2 /54.0 -CS25.4		-120-1990			
1.063 (1-1/16)	1.378	90- 27.0 /35.0 -CS25.4	27-27.0-CS25.4	37-101	SPU 322	1.811	.591
	1.563	90- 27.0 /39.7 -CS25.4		-100-1235			
	1.654	90- 27.0 /42.0 -CS25.4		-102			
	1.813	90- 27.0 /46.0 -CS25.4		-110-1550	SPU 422	1.732	
	1.850	90- 27.0 /47.0 -CS25.4		-111			
	2.047	90- 27.0 /52.0 -CS25.4		-121	SPU 533	1.811	
	2.220	90- 27.0 /56.4 -CS25.4		-120-2070	SPU 632	1.890	
1.094 (1- 3/32)	1.409	90- 27.8 /35.8 -CS25.4	27-27.8-CS25.4	37-101	SPU 322	1.811	.591
	1.685	90- 27.8 /42.8 -CS25.4		-102			
	1.882	90- 27.8 /47.8 -CS25.4		-111	SPU 422	1.732	
	2.079	90- 27.8 /52.8 -CS25.4		-121	SPU 533	1.811	
	2.315	90- 27.8 /58.8 -CS25.4		-120-2150	SPU 632	1.890	
1.125 (1-1/8)	1.441	90- 28.6 /36.6 -CS25.4	27-28.6-CS25.4	37-101	SPU 322	1.811	.591
	1.717	90- 28.6 /43.6 -CS25.4		-102			
	1.913	90- 28.6 /48.6 -CS25.4		-111	SPU 422	1.732	
	2.110	90- 28.6 /53.6 -CS25.4		-121	SPU 533	1.811	
	2.409	90- 28.6 /61.2 -CS25.4		-120-2230	SPU 632	1.890	
1.156	1.472	90- 29.4 /37.4 -CS25.4	27-29.4-CS25.4	37-101	SPU 322	1.811	.591
	1.748	90- 29.4 /44.4 -CS25.4		-102			
	1.945	90- 29.4 /49.4 -CS25.4		-111	SPU 422	1.732	
	2.142	90- 29.4 /54.4 -CS25.4		-121	SPU 533	1.811	
	2.504	90- 29.4 /63.6 -CS25.4		-120-2310	SPU 632	1.890	

Shank dimensions for "CS with Weldon", see page 17.
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Back spotfacing with coolant through the spindle.

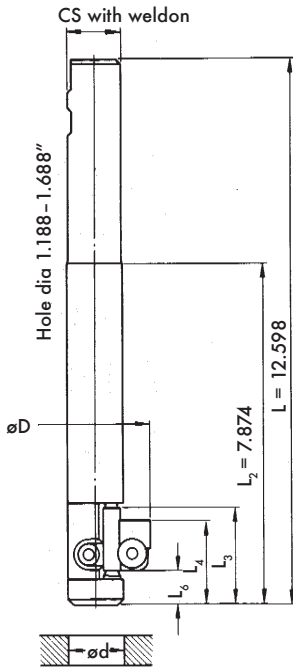
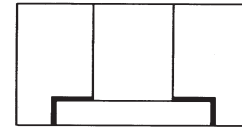


Back spotfacing with filleted corners.



BACK SPOTFACING

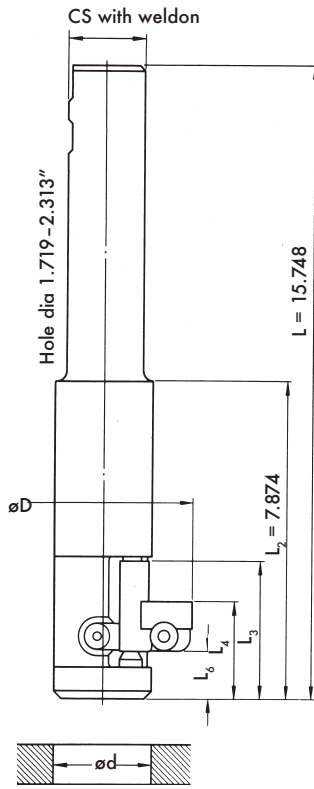
HOLE SIZE 1.188 – 1.688"



Hole dia	Facing dia	Complete tool	Spindle	Wing	Cutter/Insert	L ₃	L ₄	L ₆
1.188 (1-3/16)	1.813	90- 30.2 /46 -CS31.8	27-30.2-CS31.8	37-130-1500	SPU 322	2.283	1.614	.827
	2.000	90- 30.2 /50.8 -CS31.8		-130-1740	SPU 422		1.732	
	2.126	90- 30.2 /54 -CS31.8		-131	SPU 533		18.50	
	2.362	90- 30.2 /60 -CS31.8		-132	SPU 632		1.969	
	2.441	90- 30.2 /62 -CS31.8		-130-2300				
1.219 (1-7/32)	2.126	90- 31.0 /54 -CS31.8	27-31.0-CS31.8	37-131	SPU 533	2.283	1.850	.827
	2.362	90- 31.0 /60 -CS31.8		-132	SPU 632		1.969	
	2.441	90- 31.0 /62 -CS31.8		-130-2300				
1.250 (1-1/4)	2.165	90- 31.8 /55 -CS31.8	27-31.8-CS31.8	37-131	SPU 533	2.283	1.850	.827
	2.402	90- 31.8 /61 -CS31.8		-132	SPU 632		1.969	
	2.559	90- 31.8 /65 -CS31.8		-130-2400				
1.281 (1-9/32)	2.205	90- 32.5 /56 -CS31.8	27-32.5-CS31.8	37-131	SPU 533	2.283	1.850	.827
	2.441	90- 32.5 /62 -CS31.8		-132	SPU 632		1.969	
	2.677	90- 32.5 /68 -CS31.8		-130-2500				
1.313 (1-5/16)	2.000	90- 33.3 /50.8 -CS31.8	27-33.3-CS31.8	37-130-1590	SPU 422	2.283	1.732	.827
	2.244	90- 33.3 /57 -CS31.8		-131	SPU 533		1.850	
	2.250	90- 33.3 /57.2 -CS31.8		-130-1910	SPU 632		1.969	
	2.480	90- 33.3 /63 -CS31.8		-132	SPU 632		1.732	
	2.795	90- 33.3 /71 -CS31.8		-130-2600	EC20			
1.344 (1-11/32)	2.283	90- 34.1 /58 -CS31.8	27-34.1-CS31.8	37-131	SPU 533	2.283	1.850	.827
	2.520	90- 34.1 /64 -CS31.8		-132	SPU 632		1.969	
	2.913	90- 34.1 /74 -CS31.8		-130-2700	EC 20		1.732	
1.375 (1-3/8)	2.283	90- 34.9 /58 -CS31.8	27-34.9-CS31.8	37-131	SPU 533	2.283	1.850	.827
	2.520	90- 34.9 /64 -CS31.8		-132	SPU 632		1.969	
	2.913	90- 34.9 /74 -CS31.8		-130-2700	EC 20		1.732	
1.406 (1-13/32)	2.480	90- 35.7 /63 -CS31.8	27-35.7-CS31.8	37-141	SPU 533	2.677	2.126	1.102
	2.717	90- 35.7 /69 -CS31.8		-142	SPU 632		2.244	
	2.795	90- 35.7 /71 -CS31.8		-140-2650	EC 20		2.008	
1.438 (1-7/16)	2.156	90- 36.5 /54.8 -CS31.8	27-36.5-CS31.8	37-140-1790	SPU 422	2.677	2.008	1.102
	2.438	90- 36.5 /61.9 -CS31.8		-140-2145	SPU 533		2.126	
	2.520	90- 36.5 /64 -CS31.8		-141	SPU 632		2.244	
	2.756	90- 36.5 /70 -CS31.8		-142	SPU 632		2.008	
	2.913	90- 36.5 /74 -CS31.8		-140-2750	EC20			
1.469 (1-15/32)	2.559	90- 37.3 /65 -CS31.8	27-37.3-CS31.8	37-141	SPU 533	2.677	2.126	1.102
	2.795	90- 37.3 /71 -CS31.8		-142	SPU 632		2.244	
	3.031	90- 37.3 /77 -CS31.8		-140-2850	EC 25		2.087	
1.500 (1-1/2)	2.598	90- 38.1 /66 -CS31.8	27-38.1-CS31.8	37-141	SPU 533	2.677	2.126	1.102
	2.835	90- 38.1 /72 -CS31.8		-142	SPU 632		2.244	
	3.150	90- 38.1 /80 -CS31.8		-140-2950	EC 25		2.087	
1.531 (1-17/32)	2.598	90- 38.9 /66 -CS31.8	27-38.9-CS31.8	37-141	SPU 533	2.677	2.126	1.102
	2.835	90- 38.9 /72 -CS31.8		-142	SPU 632		2.244	
	3.150	90- 38.9 /80 -CS31.8		-140-2950	EC 25		2.087	
1.563 (1-9/16)	2.375	90- 39.7 /60.3 -CS31.8	27-39.7-CS31.8	37-140-1915	SPU 422	2.677	2.008	1.102
	2.638	90- 39.7 /67 -CS31.8		-141	SPU 533		2.126	
	2.688	90- 39.7 /68.3 -CS31.8		-140-2315	SPU 632		2.244	
	2.874	90- 39.7 /73 -CS31.8		-142	SPU 632		2.087	
	3.268	90- 39.7 /83 -CS31.8		-140-3050	EC 25			
1.594 (1-19/32)	2.677	90- 40.5 /68 -CS31.8	27-40.5-CS31.8	37-141	SPU 533	2.677	2.126	1.102
	2.913	90- 40.5 /74 -CS31.8		-142	SPU 632		2.244	
	3.386	90- 40.5 /86 -CS31.8		-140-3150	EC 25		2.087	
1.625 (1-5/8)	2.717	90- 41.3 /69 -CS31.8	27-41.3-CS31.8	37-141	SPU 533	2.677	2.126	1.102
	2.953	90- 41.3 /75 -CS31.8		-142	SPU 632		2.244	
	3.504	90- 41.3 /89 -CS31.8		-140-3250	EC25		2.087	
1.656 (1-21/32)	2.756	90- 42.1 /70 -CS31.8	27-42.1-CS31.8	37-141	SPU 533	2.677	2.126	1.102
	2.992	90- 42.1 /76 -CS31.8		-142	SPU 632		2.244	
	3.622	90- 42.1 /92 -CS31.8		-140-3350	EC25		2.087	
1.688 (1-11/16)	2.756	90- 42.9 /70 -CS31.8	27-42.9-CS31.8	37-141	SPU 533	2.677	2.126	1.102
	2.992	90- 42.9 /76 -CS31.8		-142	SPU 632		2.244	
	3.622	90- 42.9 /92 -CS31.8		-140-3350	EC25		2.087	

Shank dimensions for "CS with Weldon", see page 17.

HOLE SIZE 1.719 – 2.313"

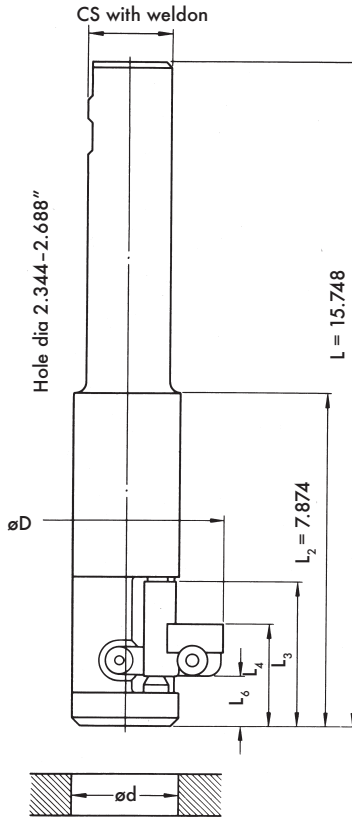
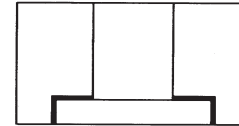


Hole dia	Facing dia	Complete tool	Spindle	Wing	Cutter/Insert	L ₃	L ₄	L ₆
1.719 (1-23/32)	2.756	90- 43.7 /70 -CS38.1	27-43.7-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.386	90- 43.7 /86 -CS38.1		-151	EC25			
	3.425	90- 43.7 /87 -CS38.1		-150-3250				
1.750 (1-3/4)	2.795	90- 44.5 /71 -CS38.1	27-44.5-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.425	90- 44.5 /87 -CS38.1		-151	EC25			
	3.543	90- 44.5 /90 -CS38.1		-150-3350				
1.781 (1-25/32)	2.835	90- 45.2 /72 -CS38.1	27-45.2-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.465	90- 45.2 /88 -CS38.1		-151	EC25			
	3.661	90- 45.2 /93 -CS38.1		-150-3450				
1.811 (1-13/16)	2.750	90- 46.0 /69.9 -CS38.1	27-46.0-CS38.1	37-150-2295	SPU 533	3.071	2.323	1.181
	2.835	90- 46.0 /72 -CS38.1		-150-2400	SPU 632		2.520	
	3.063	90- 46.0 /77.8 -CS38.1		-150-2690			EC25		2.323
	3.465	90- 46.0 /88 -CS38.1		-151				
	3.661	90- 46.0 /93 -CS38.1		-150-3450				
1.844 (1-27/32)	2.874	90- 46.8 /73 -CS38.1	27-46.8-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.504	90- 46.8 /89 -CS38.1		-151	EC25			
	3.701	90- 46.8 /96 -CS38.1		-150-3550				
1.875 (1-7/8)	2.913	90- 47.6 /74 -CS38.1	27-47.6-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.543	90- 47.6 /90 -CS38.1		-151	EC25		2.480	
	3.898	90- 47.6 /99 -CS38.1		-150-3650	EC32			
1.906 (1-29/32)	2.953	90- 48.4 /75 -CS38.1	27-48.4-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.583	90- 48.4 /91 -CS38.1		-151	EC25		2.480	
	4.016	90- 48.4 /102 -CS38.1		-150-3750	EC32			
1.938 (1-15/16)	2.992	90- 49.2 /76 -CS38.1	27-49.2-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.622	90- 49.2 /92 -CS38.1		-151	EC25		2.480	
	4.134	90- 49.2 /105 -CS38.1		-150-3850	EC32			
1.969 (1-31/32)	2.992	90- 50.0 /76 -CS38.1	27-50.0-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.622	90- 50.0 /92 -CS38.1		-151	EC25		2.480	
	4.134	90- 50.0 /105 -CS38.1		-150-3850	EC32			
2.000 (2)	3.031	90- 50.8 /77 -CS38.1	27-50.8-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.661	90- 50.8 /93 -CS38.1		-151	EC25		2.480	
	4.252	90- 50.8 /108 -CS38.1		-150-3950	EC32			
2.031 (2-1/32)	3.071	90- 51.6 /78 -CS38.1	27-51.6-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.701	90- 51.6 /94 -CS38.1		-151	EC25		2.480	
	4.370	90- 51.6 /111 -CS38.1		-150-4050	EC32			
2.063 (2-1/16)	3.110	90- 52.4 /79 -CS38.1	27-52.4-CS38.1	37-150-2400	SPU 533	3.071	2.323	1.181
	3.125	90- 52.4 /79.4 -CS38.1		-150-2420	SPU 632		2.520	
	3.500	90- 52.4 /88.9 -CS38.1		-150-2895			EC25		2.323
	3.740	90- 52.4 /95 -CS38.1		-151	EC32		2.480	
2.094 (2-3/32)	3.701	90- 53.2 /94 -CS50.8	27-53.2-CS50.8	37-161	EC25	3.465	2.323	1.181
	4.252	90- 53.2 /108 -CS50.8		-162	EC32		2.480	
	4.291	90- 53.2 /109 -CS50.8		-160-4050				
2.125 (2-1/8)	3.701	90- 54.0 /94 -CS50.8	27-54.0-CS50.8	37-161	EC25	3.465	2.323	1.181
	4.251	90- 54.0 /108 -CS50.8		-162	EC32		2.480	
	4.291	90- 54.0 /109 -CS50.8		-160-4050				
2.156 (2-5/32)	3.740	90- 54.8 /95 -CS50.8	27-54.8-CS50.8	37-161	EC25	3.465	2.323	1.181
	4.291	90- 54.8 /109 -CS50.8		-162	EC32		2.480	
	4.409	90- 54.8 /112 -CS50.8		-160-4150				
2.188 (2-3/16)	3.779	90- 55.6 /96 -CS50.8	27-55.6-CS50.8	37-161	EC25	3.465	2.323	1.181
	4.331	90- 55.6 /110 -CS50.8		-162	EC32		2.480	
	4.528	90- 55.6 /115 -CS50.8		-160-4250				
2.219 (2-7/32)	3.819	90- 56.4 /97 -CS50.8	27-56.4-CS50.8	37-161	EC25	3.465	2.323	1.181
	4.370	90- 56.4 /111 -CS50.8		-162	EC32		2.480	
	4.646	90- 56.4 /118 -CS50.8		-160-4350				
2.250 (2-1/4)	3.858	90- 57.2 /98 -CS50.8	27-57.2-CS50.8	37-161	EC25	3.465	2.323	1.181
	4.409	90- 57.2 /112 -CS50.8		-162	EC32		2.480	
	4.685	90- 57.2 /121 -CS50.8		-160-4450				
2.281 (2-9/32)	3.858	90- 57.9 /98 -CS50.8	27-57.9-CS50.8	37-161	EC25	3.465	2.323	1.181
	4.409	90- 57.9 /112 -CS50.8		-162	EC32		2.480	
	4.685	90- 57.9 /121 -CS50.8		-160-4450				
2.313 (2-5/16)	3.898	90- 58.7 /99 -CS50.8	27-58.7-CS50.8	37-161	EC25	3.465	2.323	1.181
	4.449	90- 58.7 /113 -CS50.8		-162	EC32		2.480	
	4.882	90- 58.7 /124 -CS50.8		-160-4550			EC40		2.559



BACK SPOTFACING

HOLE SIZE 2.344 – 2.688"

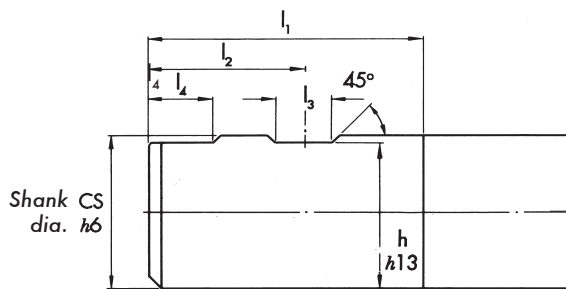
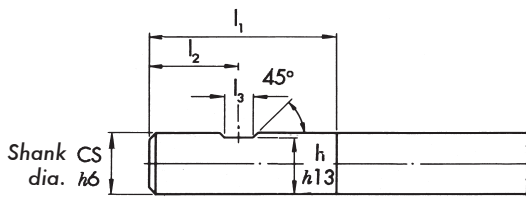


Hole dia	Facing dia	Complete tool	Spindle	Wing	Cutter/Insert	L ₃	L ₄	L ₆
2.344 (2-11/32)	3.937	90- 59.5 /100 -CS50.8	27-59.5-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.488	90- 59.5 /114 -CS50.8		-162	EC32			
	5.000	90- 59.5 /127 -CS50.8		-160-4650	EC40			
2.375 (2-3/8)	3.976	90- 60.3 /101 -CS50.8	27-60.3-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.528	90- 60.3 /115 -CS50.8		-162	EC32			
	5.118	90- 60.3 /130 -CS50.8		-160-4750	EC40			
2.406 (2-13/32)	4.016	90- 61.1 /102 -CS50.8	27-61.1-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.567	90- 61.1 /116 -CS50.8		-162	EC32			
	5.236	90- 61.1 /133 -CS50.8		-160-4850	EC40			
2.438 (2-7/16)	4.016	90- 61.9 /102 -CS50.8	27-61.9-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.567	90- 61.9 /116 -CS50.8		-162	EC32			
	5.236	90- 61.9 /133 -CS50.8		-160-4850	EC40			
2.469 (2-15/32)	4.055	90- 62.7 /103 -CS50.8	27-62.7-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.606	90- 62.7 /117 -CS50.8		-162	EC32			
	5.354	90- 62.7 /136 -CS50.8		-160-4950	EC40			
2.500 (2-1/2)	4.094	90- 63.5 /104 -CS50.8	27-63.5-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.646	90- 63.5 /118 -CS50.8		-162	EC32			
	5.472	90- 63.5 /139 -CS50.8		-160-5050	EC40			
2.531 (2-17/32)	4.134	90- 64.3 /105 -CS50.8	27-64.3-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.685	90- 64.3 /119 -CS50.8		-162	EC32			
	5.591	90- 64.3 /142 -CS50.8		-160-5150	EC40			
2.563 (2-9/16)	4.173	90- 65.1 /106 -CS50.8	27-65.1-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.724	90- 65.1 /120 -CS50.8		-162	EC32			
	5.709	90- 65.1 /145 -CS50.8		-160-5250	EC40			
2.594 (2-19/32)	4.173	90- 65.9 /106 -CS50.8	27-65.9-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.724	90- 65.9 /120 -CS50.8		-162	EC32			
	5.709	90- 65.9 /145 -CS50.8		-160-5250	EC40			
2.625 (2-5/8)	4.213	90- 66.7 /107 -CS50.8	27-66.7-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.764	90- 66.7 /121 -CS50.8		-162	EC32			
	5.748	90- 66.7 /146 -CS50.8		-160-5250	EC40			
2.656 (2-21/32)	4.252	90- 67.5 /108 -CS50.8	27-67.5-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.803	90- 67.5 /122 -CS50.8		-162	EC32			
	5.787	90- 67.5 /147 -CS50.8		-160-5250	EC40			
2.688 (2-11/16)	4.291	90- 68.3 /109 -CS50.8	27-68.3-CS50.8	37-161	EC25	3.465	2.480	1.181
	4.843	90- 68.3 /123 -CS50.8		-162	EC32			
	5.827	90- 68.3 /148 -CS50.8		-160-5250	EC40			

Shank dimensions for "CS with Weldon", see page 17.

WELDON

All spindles from hole size .406 and above are arranged for Weldon fastening.

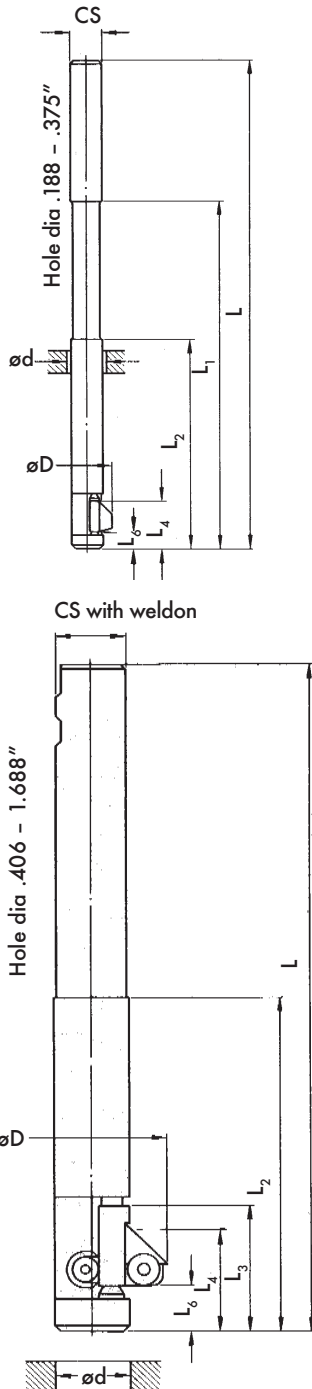
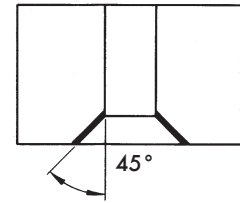


Shank code	Shank dia. + 0 - .0005	l ₁	l ₂	l ₃	l ₄	h + 0 - .016
CS9.5	.375	1.563	.781	.281	-	.325
CS12.7	.500	1.781	.891	.331	-	.440
CS15.9	.625	1.906	.953	.401	-	.560
CS19.1	.750	2.031	1.016	.456	-	.675
CS25.4	1.000	2.281	1.141	.516	.500	.925
CS31.8	1.250	2.281	1.141	.516	.500	1.156
CS38.1	1.500	2.688	1.188	.516	.563	1.406
CS50.8	2.000	3.250	1.844	.701	.844	1.900



BACK CHAMFERING 45°

HOLE SIZE .188-1.688"



Hole dia	L	L ₁	L ₂
.188 - .250	4.724	3.150	1.575
.281 - .375	5.512	3.937	2.362
.406 - .594	6.299	-	3.150
.625 - 1.156	9.449	-	3.937
1.188 - 1.688	12.598	-	7.874

Hole dia.	Facing dia.	Complete tool	Spindle	Wing	Cutter/Insert	L ₃	L ₄	L ₆
.188	.323	45- 4.75 / 8.2 -CS9.5	27 -4.75-CS9.5	34-011	HSS		.433	.197
.219	.354	45- 5.55 / 9.0 -CS9.5	-5.55					
.250	.366	45- 6.35 / 9.3 -CS9.5	-6.35					

.281	.571	45- 7.1 / 14.5 -CS9.5	27 -7.1-CS9.5	34-023	HSS		.591	.197
.313	.602	45- 7.9 / 15.3 -CS9.5	-7.9					
.344	.618	45- 8.7 / 15.7 -CS9.5	-8.7					
.375	.650	45- 9.5 / 16.5 -CS9.5	-9.5					

.406	.760	45- 10.3 / 19.3 -CS9.5	27-10.3-CS9.5	34-035	HSS		.945	.394
.438	.791	45- 11.1 / 20.1 -CS9.5	-11.1					
.469	.823	45- 11.9 / 20.9 -CS9.5	-11.9					
.500	.827	45- 12.7 / 21.0 -CS9.5	-12.7					
.531	.846	45- 13.5 / 21.5 -CS12.7	27-13.5-CS12.7					
.563	.878	45- 14.3 / 22.3 -CS12.7	-14.3					
.594	.909	45- 15.1 / 23.1 -CS12.7	-15.1					

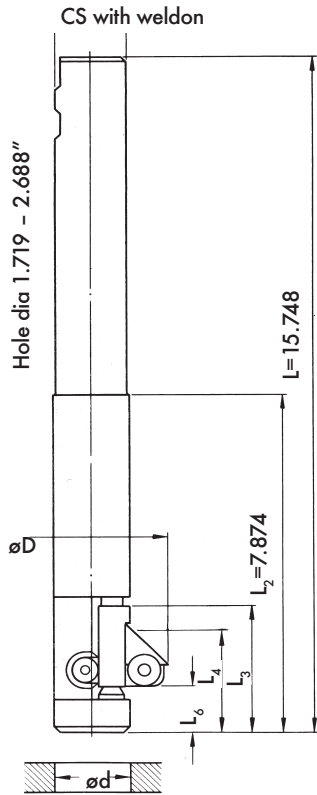
.625	1.295	45- 15.9 / 32.9 -CS12.7	27-15.9-CS12.7	34-063	090308x45		1.181	.433
.656	1.327	45- 16.7 / 33.7 -CS15.9	27-16.7-CS15.9					
.688	1.358	45- 17.5 / 34.5 -CS15.9	-17.5					
.719	1.378	45- 18.3 / 35.0 -CS15.9	-18.3					
.750	1.382	45- 19.1 / 35.1 -CS15.9	-19.1					
.781	1.409	45- 19.8 / 35.8 -CS15.9	-19.8					
.813	1.441	45- 20.6 / 36.6 -CS19.1	27-20.6-CS19.1				1.260	.512
.844	1.457	45- 21.4 / 37.0 -CS19.1	-21.4					
.875	1.465	45- 22.2 / 37.2 -CS19.1	-22.2					
.906	1.496	45- 23.0 / 38.0 -CS19.1	-23.0					
.938	1.528	45- 23.8 / 38.8 -CS19.1	-23.8					
.969	1.559	45- 24.6 / 39.6 -CS19.1	-24.6					
1.000	1.984	45- 25.4 / 50.4 -CS19.1	27-25.4-CS19.1	34-121	150412x45	1.811	.591	
1.031	2.016	45- 26.2 / 51.2 -CS25.4	27-26.2-CS25.4					
1.063	2.047	45- 27.0 / 52.0 -CS25.4	-27.0					
1.094	2.079	45- 27.8 / 52.8 -CS25.4	-27.8					
1.125	2.110	45- 28.6 / 53.6 -CS25.4	-28.6					
1.156	2.142	45- 29.4 / 54.4 -CS25.4	-29.4					

1.188	2.362	45- 30.2 / 60 -CS31.8	27-30.2-CS31.8	34-132	190408X45	2.283	1.969	.827
1.219	2.362	45- 31.0 / 60 -CS31.8	-31.0					
1.250	2.402	45- 31.8 / 61 -CS31.8	-31.8					
1.281	2.441	45- 32.5 / 62 -CS31.8	-32.5					
1.313	2.480	45- 33.3 / 63 -CS31.8	-33.3					
1.344	2.520	45- 34.1 / 64 -CS31.8	-34.1					
1.375	2.520	45- 34.9 / 64 -CS31.8	-34.9					

1.406	2.717	45- 35.7 / 69 -CS31.8	27-35.7-CS31.8	34-142	190408X45	2.677	2.244	1.102
1.438	2.756	45- 36.5 / 70 -CS31.8	-36.5					
1.469	2.795	45- 37.3 / 71 -CS31.8	-37.3					
1.500	2.835	45- 38.1 / 72 -CS31.8	-38.1					
1.531	2.835	45- 38.9 / 72 -CS31.8	-38.9					
1.563	2.874	45- 39.7 / 73 -CS31.8	-39.7					
1.594	2.913	45- 40.5 / 74 -CS31.8	-40.5					
1.625	2.953	45- 41.3 / 75 -CS31.8	-41.3					
1.656	2.992	45- 42.1 / 76 -CS31.8	-42.1					
1.688	2.992	45- 42.9 / 76 -CS31.8	-42.9					

Shank dimensions for "CS with Weldon", see page 17.

HOLE SIZE 1.719-2.688"



Hole dia	Facing dia	Complete tool	Spindle	Wing	Cutter/Insert	L ₃	L ₄	L ₅
1.719	3.110	45- 43.7 /79 -CS38.1	27 -43.7-CS38.1	34-150	190408X45	3.071	2.480	1.181
1.750	3.150	45- 44.5 /80 -CS38.1	-44.5					
1.781	3.189	45- 45.2 /81 -CS38.1	-45.2					
1.811	3.189	45- 46.0 /81 -CS38.1	-46.0					
1.844	3.228	45- 46.8 /82 -CS38.1	-46.8					
1.875	3.268	45- 47.6 /83 -CS38.1	-47.6					
1.906	3.307	45- 48.4 /84 -CS38.1	-48.4					
1.938	3.346	45- 49.2 /85 -CS38.1	-49.2					
1.969	3.386	45- 50.0 /86 -CS38.1	-50.0					
2.000	3.386	45- 50.8 /86 -CS38.1	-50.8					
2.031	3.425	45- 51.6 /87 -CS38.1	-51.6					
2.063	3.465	45- 52.4 /88 -CS38.1	-52.4					

2.094	3.504	45- 53.2 /89 -CS50.8	27 -53.2-CS50.8	34-160	190408X45	3.465	2.480	1.181
2.125	3.504	45- 54.0 /89 -CS50.8	-54.0					
2.156	3.543	45- 54.8 /90 -CS50.8	-54.8					
2.188	3.583	45- 55.6 /91 -CS50.8	-55.6					
2.219	3.622	45- 56.4 /92 -CS50.8	-56.4					
2.250	3.661	45- 57.2 /93 -CS50.8	-57.2					
2.281	3.661	45- 57.9 /93 -CS50.8	-57.9					
2.313	3.701	45- 58.7 /94 -CS50.8	-58.7					
2.344	3.740	45- 59.5 /95 -CS50.8	-59.5					
2.375	3.779	45- 60.3 /96 -CS50.8	-60.3					
2.406	3.819	45- 61.1 /97 -CS50.8	-61.1					
2.438	3.819	45- 61.9 /97 -CS50.8	-61.9					
2.469	3.858	45- 62.7 /98 -CS50.8	-62.7					
2.500	3.898	45- 63.5 /99 -CS50.8	-63.5					
2.531	3.937	45- 64.3 /100 -CS50.8	-64.3					
2.563	3.976	45- 65.1 /101 -CS50.8	-65.1					
2.594	3.976	45- 65.9 /101 -CS50.8	-65.9					
2.625	4.016	45- 66.7 /102 -CS50.8	-66.7					
2.656	4.055	45- 67.5 /103 -CS50.8	-67.5					
2.688	4.094	45- 68.3 /104 -CS50.8	-68.3					

Shank dimensions for "CS with Weldon", see page 17.



Special tool to operate in a diesel engine block.

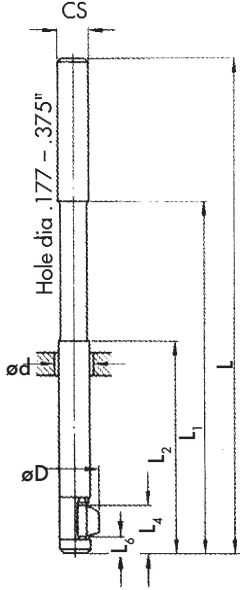
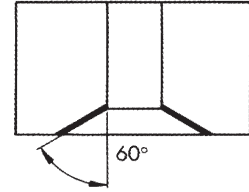


Errix tools in a NC-Machine.

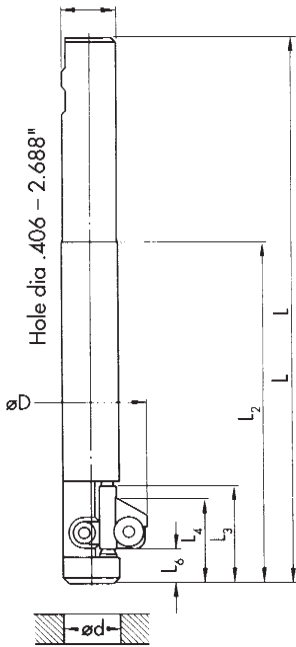


BACK CHAMFERING 60°

HOLE SIZE .188 – 2.688"



CS with weldon



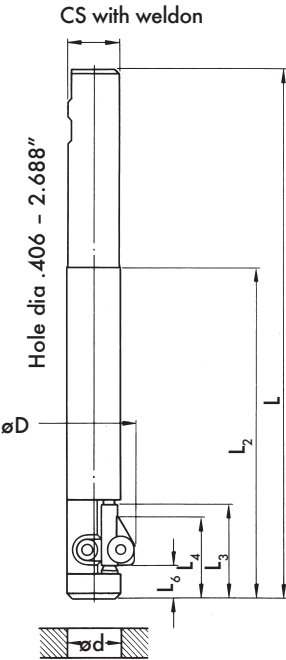
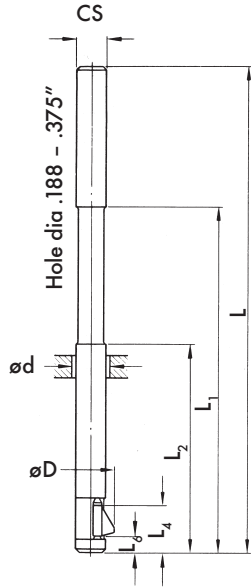
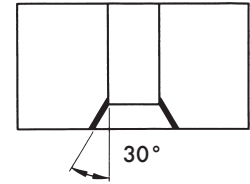
Hole dia	L	L ₁	L ₂
.188 - .250	4.724	3.150	1.575
.281 - .375	5.512	3.937	2.362
.406 - .594	6.299	-	3.150
.625 - 1.156	9.449	-	3.937
1.188 - 1.688	12.598	-	7.874
1.719 - 2.688	15.748	-	7.874

Hole dia .	Facing dia.	Complete tool	Spindle	Wing	Cutter/Insert	L ₃	L ₄	L ₅
.188	.323	60- 4.75 / 8.2 -CS9.5	27 -4.75-CS9.5	34-011-60	HSS		.433	.197
.219	.354	60- 5.55 / 9.0 -CS9.5	-5.55					
.250	.366	60- 6.35 / 9.3 -CS9.5	-6.35					
.281	.571	60- 7.1 / 14.5 -CS9.5	27 -7.1-CS9.5	34-023-60	HSS		.591	.197
.313	.602	60- 7.9 / 15.3 -CS9.5	-7.9					
.344	.618	60- 8.7 / 15.7 -CS9.5	-8.7					
.375	.650	60- 9.5 / 16.5 -CS9.5	-9.5					
.406	.760	60- 10.3 / 19.3 -CS9.5	27 -10.3-CS9.5					
.438	.791	60- 11.1 / 20.1 -CS9.5	-11.1					
.469	.823	60- 11.9 / 20.9 -CS9.5	-11.9	34-035-60	HSS		.945	.394
.500	.827	60- 12.7 / 21.0 -CS9.5	-12.7					
.531	.846	60- 13.5 / 21.5 -CS12.7	27 -13.5-CS12.7					
.563	.878	60- 14.3 / 22.3 -CS12.7	-14.3					
.594	.909	60- 15.1 / 23.1 -CS12.7	-15.1					
.625	1.295	60- 15.9 / 32.9 -CS12.7	27 -15.9-CS12.7					
.656	1.327	60- 16.7 / 33.7 -CS15.9	27 -16.7-CS15.9	34-063-60	090308X60	1.181	.433	
.688	1.358	60- 17.5 / 34.5 -CS15.9	-17.5					
.719	1.378	60- 18.3 / 35.0 -CS15.9	-18.3					
.750	1.382	60- 19.1 / 35.1 -CS15.9	-19.1					
.781	1.409	60- 19.8 / 35.8 -CS15.9	-19.8					
.813	1.441	60- 20.6 / 36.6 -CS19.1	27 -20.6-CS19.1					
.844	1.457	60- 21.4 / 37.0 -CS19.1	-21.4			1.260	.512	
.875	1.465	60- 22.2 / 37.2 -CS19.1	-22.2					
.906	1.496	60- 23.0 / 38.0 -CS19.1	-23.0					
.938	1.528	60- 23.8 / 38.8 -CS19.1	-23.8					
.969	1.559	60- 24.6 / 39.6 -CS19.1	-24.6					
1.000	1.984	60- 25.4 / 50.4 -CS19.1	27 -25.4-CS19.1					
1.031	2.016	60- 26.2 / 51.2 -CS25.4	27 -26.2-CS25.4	34-121-60	150412X60	1.811	.591	
1.063	2.047	60- 27.0 / 52.0 -CS25.4	-27.0					
1.094	2.079	60- 27.8 / 52.8 -CS25.4	-27.8					
1.125	2.110	60- 28.6 / 53.6 -CS25.4	-28.6					
1.156	2.142	60- 29.4 / 54.4 -CS25.4	-29.4					
1.188	2.362	60- 30.2 / 60 -CS31.8	27 -30.2-CS31.8					
1.219	2.362	60- 31.0 / 60 -CS31.8	-31.0	34-132-60	190408X60	2.283	1.969	.827
1.250	2.402	60- 31.8 / 61 -CS31.8	-31.8					
1.281	2.441	60- 32.5 / 62 -CS31.8	-32.5					
1.313	2.480	60- 33.3 / 63 -CS31.8	-33.3					
1.344	2.520	60- 34.1 / 64 -CS31.8	-34.1					
1.375	2.520	60- 34.9 / 64 -CS31.8	-34.9					
1.406	2.717	60- 35.7 / 69 -CS31.8	27 -35.7-CS31.8	34-142-60	190408X60	2.677	2.244	1.102
1.438	2.756	60- 36.5 / 70 -CS31.8	-36.5					
1.469	2.795	60- 37.3 / 71 -CS31.8	-37.3					
1.500	2.835	60- 38.1 / 72 -CS31.8	-38.1					
1.531	2.835	60- 38.9 / 72 -CS31.8	-38.9					
1.563	2.874	60- 39.7 / 73 -CS31.8	-39.7					
1.594	2.913	60- 40.5 / 74 -CS31.8	-40.5	34-150-60	190408X60	3.071	2.480	1.181
1.625	2.953	60- 41.3 / 75 -CS31.8	-41.3					
1.656	2.992	60- 42.1 / 76 -CS31.8	-42.1					
1.688	2.992	60- 42.9 / 76 -CS31.8	-42.9					
1.719	3.110	60- 43.7 / 79 -CS38.1	27 -43.7-CS38.1					
1.750	3.150	60- 44.5 / 80 -CS38.1	-44.5					
1.781	3.189	60- 45.2 / 81 -CS38.1	-45.2	34-160-60	190408X60	3.465	2.480	1.181
1.811	3.189	60- 46.0 / 81 -CS38.1	-46.0					
1.844	3.228	60- 46.8 / 82 -CS38.1	-46.8					
1.875	3.268	60- 47.6 / 83 -CS38.1	-47.6					
1.906	3.307	60- 48.4 / 84 -CS38.1	-48.4					
1.938	3.346	60- 49.2 / 85 -CS38.1	-49.2					
1.969	3.386	60- 50.0 / 86 -CS38.1	-50.0	34-160-60	190408X60	3.465	2.480	1.181
2.000	3.386	60- 50.8 / 86 -CS38.1	-50.8					
2.031	3.425	60- 51.6 / 87 -CS38.1	-51.6					
2.063	3.465	60- 52.4 / 88 -CS38.1	-52.4					
2.094	3.504	60- 53.2 / 89 -CS50.8	27 -53.2-CS50.8					
2.125	3.504	60- 54.0 / 89 -CS50.8	-54.0					
2.156	3.543	60- 54.8 / 90 -CS50.8	-54.8	34-160-60	190408X60	3.465	2.480	1.181
2.188	3.583	60- 55.6 / 91 -CS50.8	-55.6					
2.219	3.622	60- 56.4 / 92 -CS50.8	-56.4					
2.250	3.661	60- 57.2 / 93 -CS50.8	-57.2					
2.281	3.661	60- 57.9 / 93 -CS50.8	-57.9					
2.313	3.701	60- 58.7 / 94 -CS50.8	-58.7					
2.344	3.740	60- 59.5 / 95 -CS50.8	-59.5	34-160-60	190408X60	3.465	2.480	1.181
2.375	3.779	60- 60.3 / 96 -CS50.8	-60.3					
2.406	3.819	60- 61.1 / 97 -CS50.8	-61.1					
2.438	3.819	60- 61.9 / 97 -CS50.8	-61.9					
2.469	3.858	60- 62.7 / 98 -CS50.8	-62.7					
2.500	3.898	60- 63.5 / 99 -CS50.8	-63.5					
2.531	3.937	60- 64.3 / 100 -CS50.8	-64.3	34-160-60	190408X60	3.465	2.480	1.181
2.563	3.976	60- 65.1 / 101 -CS50.8	-65.1					
2.594	3.976	60- 65.9 / 101 -CS50.8	-65.9					
2.625	4.016	60- 66.7 / 102 -CS50.8	-66.7					
2.656	4.055	60- 67.5 / 103 -CS50.8	-67.5					
2.688	4.094	60- 68.3 / 104 -CS50.8	-68.3					

Shank dimensions for "CS with Weldon", see page 17.

BACK CHAMFERING 30°

HOLE SIZE .188 – 2.688"



Hole dia .	Facing dia.	Complete tool	Spindle	Wing	Cutter/Insert	L ₃	L ₄	L ₆
.188	.323	30- 4.75 / 8.2 -CS9.5	27 -4.75-CS9.5	34-011-30	HSS			
.219	.354	30- 5.55 / 9.0 -CS9.5	-5.55					
.250	.366	30- 6.35 / 9.3 -CS9.5	-6.35					
.281	.571	30- 7.1 / 14.5 -CS9.5	27 -7.1-CS9.5	34-023-30	HSS			
.313	.602	30- 7.9 / 15.3 -CS9.5	-7.9					
.344	.618	30- 8.7 / 15.7 -CS9.5	-8.7					
.375	.650	30- 9.5 / 16.5 -CS9.5	-9.5	34-035-30	HSS			
.406	.760	30- 10.3 / 19.3 -CS9.5	27 -10.3-CS9.5					
.438	.791	30- 11.1 / 20.1 -CS9.5	-11.1					
.469	.823	30- 11.9 / 20.9 -CS9.5	-11.9	34-061-30	090308X30			
.500	.827	30- 12.7 / 21.0 -CS9.5	-12.7					
.531	.846	30- 13.5 / 21.5 -CS12.7	27 -13.5-CS12.7					
.563	.878	30- 14.3 / 22.3 -CS12.7	-14.3	34-102-30	150412X30			
.594	.909	30- 15.1 / 23.1 -CS12.7	-15.1					
.625	1.020	30- 15.9 / 25.9 -CS12.7	27 -15.9-CS12.7					
.656	1.051	30- 16.7 / 26.7 -CS15.9	27 -16.7-CS15.9	34-130-30	190408X30			
.688	1.083	30- 17.5 / 27.5 -CS15.9	-17.5					
.719	1.102	30- 18.3 / 28.0 -CS15.9	-18.3					
.750	1.106	30- 19.1 / 28.1 -CS15.9	-19.1	34-140-30	190408X30	2.283	1.969	
.781	1.134	30- 19.8 / 28.8 -CS15.9	-19.8					
.813	1.165	30- 20.6 / 29.6 -CS19.1	27 -20.6-CS19.1					
.844	1.181	30- 21.4 / 30.0 -CS19.1	-21.4	34-150-30	190408X30			
.875	1.189	30- 22.2 / 30.2 -CS19.1	-22.2					
.906	1.220	30- 23.0 / 31.0 -CS19.1	-23.0					
.938	1.252	30- 23.8 / 31.8 -CS19.1	-23.8	34-160-30	190408X30	3.071	2.480	1.181
.969	1.283	30- 24.6 / 32.6 -CS19.1	-24.6					
1.000	1.591	30- 25.4 / 40.4 -CS19.1	27 -25.4-CS19.1					
1.031	1.622	30- 26.2 / 41.2 -CS25.4	27 -26.2-CS25.4	34-150-30	190408X30			
1.063	1.654	30- 27.0 / 42.0 -CS25.4	-27.0					
1.094	1.685	30- 27.8 / 42.8 -CS25.4	-27.8					
1.125	1.717	30- 28.6 / 43.6 -CS25.4	-28.6	34-150-30	190408X30	3.071	2.480	1.181
1.156	1.748	30- 29.4 / 44.4 -CS25.4	-29.4					
1.188	2.008	30- 30.2 / 51 -CS31.8	27 -30.2-CS31.8					
1.219	2.008	30- 31.0 / 51 -CS31.8	-31.0	34-150-30	190408X30			
1.250	2.047	30- 31.8 / 52 -CS31.8	-31.8					
1.281	2.087	30- 32.5 / 53 -CS31.8	-32.5					
1.313	2.126	30- 33.3 / 54 -CS31.8	-33.3	34-150-30	190408X30			
1.344	2.165	30- 34.1 / 55 -CS31.8	-34.1					
1.375	2.165	30- 34.9 / 55 -CS31.8	-34.9					
1.406	2.205	30- 35.7 / 56 -CS31.8	27 -35.7-CS31.8	34-150-30	190408X30			
1.438	2.244	30- 36.5 / 57 -CS31.8	-36.5					
1.469	2.283	30- 37.3 / 58 -CS31.8	-37.3					
1.500	2.323	30- 38.1 / 59 -CS31.8	-38.1	34-150-30	190408X30			
1.531	2.323	30- 38.9 / 59 -CS31.8	-38.9					
1.563	2.362	30- 39.7 / 60 -CS31.8	-39.7					
1.594	2.402	30- 40.5 / 61 -CS31.8	-40.5	34-150-30	190408X30			
1.625	2.441	30- 41.3 / 62 -CS31.8	-41.3					
1.656	2.480	30- 42.1 / 63 -CS31.8	-42.1					
1.688	2.480	30- 42.9 / 63 -CS31.8	-42.9	34-150-30	190408X30			
1.719	2.520	30- 43.7 / 64 -CS38.1	27 -43.7-CS38.1					
1.750	2.560	30- 44.5 / 65 -CS38.1	-44.5					
1.781	2.598	30- 45.2 / 66 -CS38.1	-45.2	34-150-30	190408X30			
1.811	2.598	30- 46.0 / 66 -CS38.1	-46.0					
1.844	2.638	30- 46.8 / 67 -CS38.1	-46.8					
1.875	2.677	30- 47.6 / 68 -CS38.1	-47.6	34-150-30	190408X30			
1.906	2.717	30- 48.4 / 69 -CS38.1	-48.4					
1.938	2.756	30- 49.2 / 70 -CS38.1	-49.2					
1.969	2.756	30- 50.0 / 70 -CS38.1	-50.0	34-150-30	190408X30			
2.000	2.795	30- 50.8 / 71 -CS38.1	-50.8					
2.031	2.835	30- 51.6 / 72 -CS38.1	-51.6					
2.063	2.874	30- 52.4 / 73 -CS38.1	-52.4	34-150-30	190408X30			
2.094	2.913	30- 53.2 / 74 -CS50.8	27 -53.2-CS50.8					
2.125	2.913	30- 54.0 / 74 -CS50.8	-54.0					
2.156	2.953	30- 54.8 / 75 -CS50.8	-54.8	34-150-30	190408X30			
2.188	2.992	30- 55.6 / 76 -CS50.8	-55.6					
2.219	3.031	30- 56.4 / 77 -CS50.8	-56.4					
2.250	3.071	30- 57.2 / 78 -CS50.8	-57.2	34-150-30	190408X30			
2.281	3.071	30- 57.9 / 78 -CS50.8	-57.9					
2.313	3.110	30- 58.7 / 79 -CS50.8	-58.7					
2.344	3.150	30- 59.5 / 80 -CS50.8	-59.5	34-150-30	190408X30			
2.375	3.189	30- 60.3 / 81 -CS50.8	-60.3					
2.406	3.228	30- 61.1 / 82 -CS50.8	-61.1					
2.438	3.228	30- 61.9 / 82 -CS50.8	-61.9	34-150-30	190408X30			
2.469	3.268	30- 62.7 / 83 -CS50.8	-62.7					
2.500	3.307	30- 63.5 / 84 -CS50.8	-63.5					
2.531	3.346	30- 64.3 / 85 -CS50.8	-64.3	34-150-30	190408X30			
2.563	3.386	30- 65.1 / 86 -CS50.8	-65.1					
2.594	3.386	30- 65.9 / 86 -CS50.8	-65.9					
2.625	3.425	30- 66.7 / 87 -CS50.8	-66.7	34-150-30	190408X30			
2.656	3.465	30- 67.5 / 88 -CS50.8	-67.5					
2.688	3.504	30- 68.3 / 89 -CS50.8	-68.3					

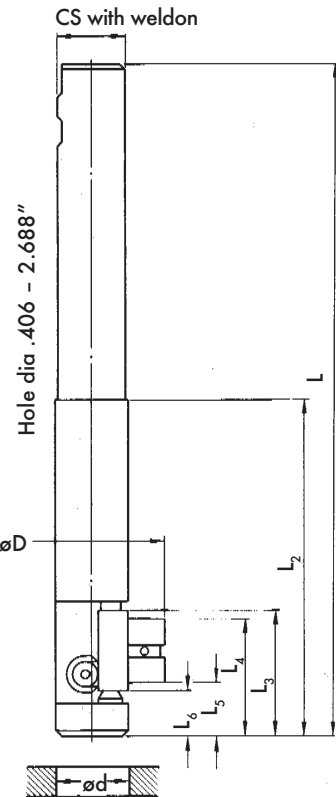
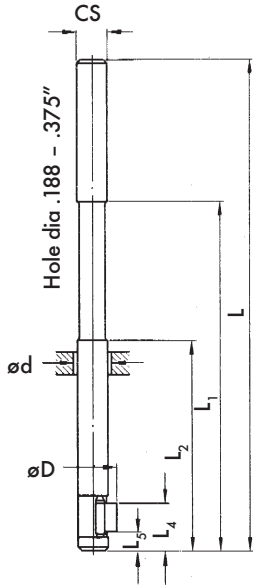
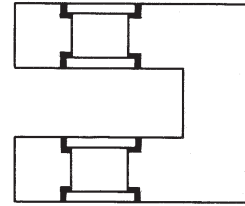
Hole dia	L	L ₁	L ₂
.188 - .250	4.724	3.150	1.575
.281 - .375	5.512	3.937	2.362
.406 - .594	6.299	-	3.150
.625 - 1.156	9.449	-	3.937
1.188 - 1.688	12.598	-	7.874
1.719 - 2.688	15.748	-	7.874

Shank dimensions for "CS with Weldon", see page 17.



FRONT AND BACK SPOTFACING

HOLE SIZE .188 – 2.688"



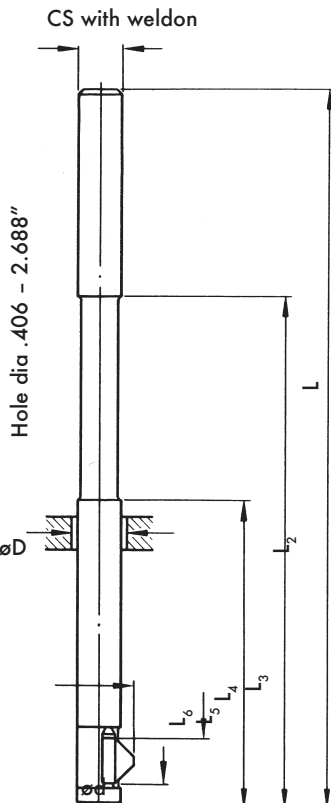
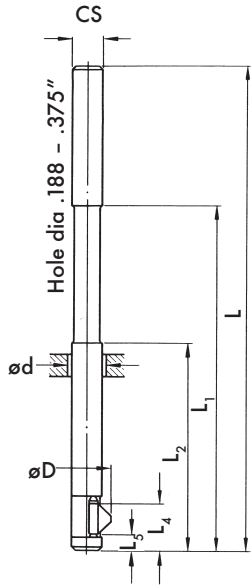
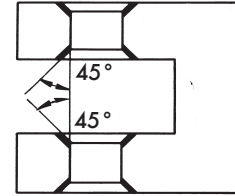
Hole dia .	Facing dia.	Complete tool	Spindle	Wing	Cutter/Insert	L ₃	L ₄	L ₅	L ₆
.188	.350	902- 4.75 /8.9 -CS9.5	27-4.75-CS9.5	36-010-0335					
.219	.445	902- 5.55 /11.3 -CS9.5	-5.55	-0415	HSS		.433	.236	
.250	.500	902- 6.35 /12.7 -CS9.5	-6.35	-0470					
.281	.579	902- 7.1 / 14.7 -CS9.5	27-7.1-CS9.5	36-020-0540					
.313	.673	902- 7.9 / 17.1 -CS9.5	-7.9	-0620	HSS		.591	.236	
.344	.736	902- 8.7 / 18.7 -CS9.5	-8.7	-0680					
.375	.831	902- 9.5 / 21.1 -CS9.5	-9.5	-0760					
.406	.807	902- 10.3 / 20.5 -CS9.5	27-10.3-CS9.5	36-030-0760					
.438	.902	902- 11.1 / 22.9 -CS9.5	-11.1	-0840	HSS		.945	.472	
.469	.996	902- 11.9 / 25.3 -CS9.5	-11.9	-0920					
.500	1.035	902- 12.7 / 26.3 -CS9.5	-12.7	-040-0965					
.531	1.106	902- 13.5 / 28.1 -CS12.7	27-13.5-CS12.7	-050-1030	Brazed		.906	.433	
.563	1.201	902- 14.3 / 30.5 -CS12.7	-14.3	-1110					
.594	1.295	902- 15.1 / 32.9 -CS12.7	-15.1	-1190					
.625	1.311	902- 15.9 / 33.3 -CS12.7	27-15.9-CS12.7	36-070-1220					
.656	1.406	902- 16.7 / 35.7 -CS15.9	27-16.7-CS15.9	-1300					
.688	1.500	902- 17.5 / 38.1 -CS15.9	-17.5	-1380					
.719	1.571	902- 18.3 / 39.9 -CS15.9	-18.3	-1445					
.750	1.610	902- 19.1 / 40.9 -CS15.9	-19.1	-080-1490			1.102	.512	
.781	1.693	902- 19.8 / 43.0 -CS15.9	-19.8	-1560					
.813	1.787	902- 20.6 / 45.4 -CS19.1	27-20.6-CS19.1	-1640	Brazed				
.844	1.850	902- 21.4 / 47.0 -CS19.1	-21.4	-1700					
.875	1.898	902- 22.2 / 48.2 -CS19.1	-22.2	-090-1750					
.906	1.992	902- 23.0 / 50.6 -CS19.1	-23.0	-1830			1.181	.591	
.938	2.087	902- 23.8 / 53.0 -CS19.1	-23.8	-1910					
.969	2.181	902- 24.6 / 55.4 -CS19.1	-24.6	-1990					
1.000	2.031	902- 25.4 / 51.6 -CS19.1	27-25.4-CS19.1	36-120-1910					
1.031	2.126	902- 26.2 / 54.0 -CS25.4	27-26.2-CS25.4	-1990			1.732	.827	
1.063	2.220	902- 27.0 / 56.4 -CS25.4	-27.0	-2070					
1.094	2.315	902- 27.8 / 58.8 -CS25.4	-27.8	-2150	Brazed		1.654	.866	
1.125	2.409	902- 28.6 / 61.2 -CS25.4	-28.6	-2230					
1.156	2.504	902- 29.4 / 63.6 -CS25.4	-29.4	-2310					
1.188	2.441	902- 30.2 / 62 -CS31.8	27-30.2-CS31.8 (F/B)	36-130-2300					
1.219	2.441	902- 31.0 / 62 -CS31.8	-31.0	-2300					
1.250	2.559	902- 31.8 / 65 -CS31.8	-31.8	-2400					
1.281	2.677	902- 32.5 / 68 -CS31.8	-32.5	-2500	Brazed	2.283	1.929	1.181	.827
1.313	2.795	902- 33.3 / 71 -CS31.8	-33.3	-2600					
1.344	2.913	902- 34.1 / 74 -CS31.8	-34.1	-2700					
1.375	2.913	902- 34.9 / 74 -CS31.8	-34.9	-2700					
1.406	2.795	902- 35.7 / 71 -CS31.8	27-35.7-CS31.8 (F/B)	36-140-2650					
1.438	2.913	902- 36.5 / 74 -CS31.8	-36.5	-2750					
1.469	3.031	902- 37.3 / 77 -CS31.8	-37.3	-2850					
1.500	3.150	902- 38.1 / 80 -CS31.8	-38.1	-2950					
1.531	3.150	902- 38.9 / 80 -CS31.8	-38.9	-2950	Brazed	2.677	2.323	1.457	1.102
1.563	3.268	902- 39.7 / 83 -CS31.8	-39.7	-3050					
1.594	3.386	902- 40.5 / 86 -CS31.8	-40.5	-3150					
1.625	3.504	902- 41.3 / 89 -CS31.8	-41.3	-3250					
1.656	3.622	902- 42.1 / 92 -CS31.8	-42.1	-3350					
1.688	3.622	902- 42.9 / 92 -CS31.8	-42.9	-3350					
1.719	3.425	902- 43.7 / 87 -CS38.1	27-43.7-CS38.1 (F/B)	36-150-3250					
1.750	3.543	902- 44.5 / 90 -CS38.1	-44.5	-3350					
1.781	3.661	902- 45.2 / 93 -CS38.1	-45.2	-3450					
1.811	3.661	902- 46.0 / 93 -CS38.1	-46.0	-3450					
1.844	3.701	902- 46.8 / 96 -CS38.1	-46.8	-3550					
1.875	3.898	902- 47.6 / 99 -CS38.1	-47.6	-3650	Brazed	3.071	2.598	1.654	1.181
1.906	4.016	902- 48.4 / 102 -CS38.1	-48.4	-3750					
1.938	4.134	902- 49.2 / 105 -CS38.1	-49.2	-3850					
1.969	4.134	902- 50.0 / 105 -CS38.1	-50.0	-3850					
2.000	4.252	902- 50.8 / 108 -CS38.1	-50.8	-3950					
2.031	4.370	902- 51.6 / 111 -CS38.1	-51.6	-4050					
2.063	4.488	902- 52.4 / 114 -CS38.1	-52.4	-4150					
2.094	4.291	902- 53.2 / 109 -CS50.8	27-53.2-CS50.8 (F/B)	36-160-4050					
2.125	4.291	902- 54.0 / 109 -CS50.8	-54.0	-4050					
2.156	4.409	902- 54.8 / 112 -CS50.8	-54.8	-4150					
2.188	4.528	902- 55.6 / 115 -CS50.8	-55.6	-4250					
2.219	4.646	902- 56.4 / 118 -CS50.8	-56.4	-4350					
2.250	4.685	902- 57.2 / 121 -CS50.8	-57.2	-4450					
2.281	4.685	902- 57.9 / 121 -CS50.8	-57.9	-4450					
2.313	4.882	902- 58.7 / 124 -CS50.8	-58.7	-4550					
2.344	5.000	902- 59.5 / 127 -CS50.8	-59.5	-4650					
2.375	5.118	902- 60.3 / 130 -CS50.8	-60.3	-4750					
2.406	5.236	902- 61.1 / 133 -CS50.8	-61.1	-4850	Brazed	3.465	2.795	1.850	1.181
2.438	5.236	902- 61.9 / 133 -CS50.8	-61.9	-4850					
2.469	5.354	902- 62.7 / 136 -CS50.8	-62.7	-4950					
2.500	5.472	902- 63.5 / 139 -CS50.8	-63.5	-5050					
2.531	5.591	902- 64.3 / 142 -CS50.8	-64.3	-5150					
2.563	5.709	902- 65.1 / 145 -CS50.8	-65.1	-5250					
2.594	5.748	902- 65.9 / 145 -CS50.8	-65.9	-5250					
2.625	5.787	902- 66.7 / 146 -CS50.8	-66.7	-5250					
2.656	5.827	902- 67.5 / 148 -CS50.8	-67.5	-5250					
2.688	5.551	902- 68.3 / 148 -CS50.8	-68.3	-5250					

Hole dia	L	L ₁	L ₂
.188 - .250	4.724	3.150	1.575
.281 - .375	5.512	3.937	2.362
.406 - .594	6.299	-	3.150
.625 - 1.156	9.449	-	3.937
1.188 - 1.688	12.598	-	7.874
1.719 - 2.688	15.748	-	7.874

Shank dimensions for "CS with Weldon", see page 17.

FRONT AND BACK CHAMFERING 45°

HOLE SIZE .188-2.688"



Hole dia	L	L ₁	L ₂
.188 - .250	4.724	3.150	1.575
.281 - .375	5.512	3.937	2.362
.406 - .594	6.299	-	3.150
.625 - 1.156	9.449	-	3.937
1.188 - 1.688	12.598	-	7.874
1.719 - 2.688	15.748	-	7.874

Hole dia.	Facing dia.	Complete tool	Spindle	Wing	Cutter/Insert	L ₃	L ₄	L ₅	L ₆
.188	.323	452- 4.75 / 8.2 -CS9.5	27-4.75-CS9.5	35-011	HSS		.433	.236	
.219	.354	452- 5.55 / 9.0 -CS9.5	-5.55						
.250	.366	452- 6.35 / 9.3 -CS9.5	-6.35						
.281	.547	452- 7.1 / 13.9 -CS9.5	27-7.1-CS9.5	35-022	HSS		.551	.236	
.313	.579	452- 7.9 / 14.7 -CS9.5	-7.9						
.344	.594	452- 8.7 / 15.1 -CS9.5	-8.7						
.375	.626	452- 9.5 / 15.9 -CS9.5	-9.5						
.406	.760	452- 10.3 / 19.3 -CS9.5	27-10.3-CS9.5						
.438	.791	452- 11.1 / 20.1 -CS9.5	-11.1						
.469	.823	452- 11.9 / 20.9 -CS9.5	-11.9	35-035	HSS		.945	.433	
.500	.827	452- 12.7 / 21.0 -CS9.5	-12.7						
.531	.846	452- 13.5 / 21.5 -CS12.7	27-13.5-CS12.7						
.563	.878	452- 14.3 / 22.3 -CS12.7	-14.3						
.594	.909	452- 15.1 / 23.1 -CS12.7	-15.1						
.625	1.091	452- 15.9 / 27.7 -CS12.7	27-15.9-CS12.7						
.656	1.122	452- 16.7 / 28.5 -CS15.9	27-16.7-CS15.9						
.688	1.154	452- 17.5 / 29.3 -CS15.9	-17.5	35-060	Brazed	1.220	.512		
.719	1.173	452- 18.3 / 29.8 -CS15.9	-18.3						
.750	1.177	452- 19.1 / 29.9 -CS15.9	-19.1						
.781	1.205	452- 19.8 / 30.6 -CS15.9	-19.8						
.813	1.236	452- 20.6 / 31.4 -CS19.1	27-20.6-CS19.1						
.844	1.252	452- 21.4 / 31.8 -CS19.1	-21.4						
.875	1.260	452- 22.2 / 32.0 -CS19.1	-22.2						
.906	1.291	452- 23.0 / 32.8 -CS19.1	-23.0						
.938	1.323	452- 23.8 / 33.6 -CS19.1	-23.8						
.969	1.354	452- 24.6 / 34.4 -CS19.1	-24.6						
1.000	1.591	452- 25.4 / 40.4 -CS19.1	27-25.4-CS19.1	35-102	Brazed	1.732	.709		
1.031	1.622	452- 26.2 / 41.2 -CS25.4	27-26.2-CS25.4						
1.063	1.654	452- 27.0 / 42.0 -CS25.4	-27.0						
1.094	1.685	452- 27.8 / 42.8 -CS25.4	-27.8						
1.125	1.717	452- 28.6 / 43.6 -CS25.4	-28.6						
1.156	1.748	452- 29.4 / 44.4 -CS25.4	-29.4	35-130	Brazed	2.283	2.008	1.102	.827
1.188	1.813	452- 30.2 / 46 -CS31.8	27-30.2-CS31.8 (F/B)						
1.219	1.813	452- 31.0 / 46 -CS31.8	-31.0						
1.250	1.850	452- 31.8 / 47 -CS31.8	-31.8						
1.281	1.890	452- 32.5 / 48 -CS31.8	-32.5						
1.313	1.929	452- 33.3 / 49 -CS31.8	-33.3						
1.344	1.969	452- 34.1 / 50 -CS31.8	-34.1						
1.375	2.969	452- 34.9 / 50 -CS31.8	-34.9						
1.406	2.008	452- 35.7 / 51 -CS31.8	27-35.7-CS31.8 (F/B)	35-140	Brazed	2.677	2.362	1.457	1.102
1.438	2.047	452- 36.5 / 52 -CS31.8	-36.5						
1.469	2.087	452- 37.3 / 53 -CS31.8	-37.3						
1.500	2.126	452- 38.1 / 54 -CS31.8	-38.1						
1.531	2.126	452- 38.9 / 54 -CS31.8	-38.9						
1.563	2.165	452- 39.7 / 55 -CS31.8	-39.7						
1.594	2.205	452- 40.5 / 56 -CS31.8	-40.5						
1.625	2.244	452- 41.3 / 57 -CS31.8	-41.3						
1.656	2.283	452- 42.1 / 58 -CS31.8	-42.1						
1.688	2.283	452- 42.9 / 58 -CS31.8	-42.9						
1.719	2.362	452- 43.7 / 60 -CS38.1	27-43.7-CS38.1 (F/B)	35-150	Brazed	3.071	2.717	1.535	1.181
1.750	2.402	452- 44.5 / 61 -CS38.1	-44.5						
1.781	2.441	452- 45.2 / 62 -CS38.1	-45.2						
1.811	2.441	452- 46.0 / 62 -CS38.1	-46.0						
1.844	2.480	452- 46.8 / 63 -CS38.1	-46.8						
1.875	2.520	452- 47.6 / 64 -CS38.1	-47.6						
1.906	2.559	452- 48.4 / 65 -CS38.1	-48.4						
1.938	2.598	452- 49.2 / 66 -CS38.1	-49.2						
1.969	2.598	452- 50.0 / 66 -CS38.1	-50.0						
2.000	2.638	452- 50.8 / 67 -CS38.1	-50.8						
2.031	2.677	452- 51.6 / 68 -CS38.1	-51.6	35-160	Brazed	3.465	3.071	1.575	1.181
2.063	2.717	452- 52.4 / 69 -CS38.1	-52.4						
2.094	3.228	452- 53.2 / 82 -CS50.8	27-53.2-CS50.8 (F/B)						
2.125	3.228	452- 54.0 / 82 -CS50.8	-54.0						
2.156	3.268	452- 54.8 / 83 -CS50.8	-54.8						
2.188	3.307	452- 55.6 / 84 -CS50.8	-55.6						
2.219	3.346	452- 56.4 / 85 -CS50.8	-56.4						
2.250	3.386	452- 57.2 / 86 -CS50.8	-57.2						
2.281	3.386	452- 57.9 / 86 -CS50.8	-57.9						
2.313	3.425	452- 58.7 / 87 -CS50.8	-58.7						
2.344	3.465	452- 59.5 / 88 -CS50.8	-59.5						
2.375	3.504	452- 60.3 / 89 -CS50.8	-60.3						
2.406	3.543	452- 61.1 / 90 -CS50.8	-61.1						
2.438	3.543	452- 61.9 / 90 -CS50.8	-61.9						
2.469	3.583	452- 62.7 / 91 -CS50.8	-62.7						
2.500	3.622	452- 63.5 / 92 -CS50.8	-63.5						
2.531	3.661	452- 64.3 / 93 -CS50.8	-64.3						
2.563	3.701	452- 65.1 / 94 -CS50.8	-65.1						
2.594	3.701	452- 65.9 / 94 -CS50.8	-65.9						
2.625	3.740	452- 66.7 / 95 -CS50.8	-66.7						
2.656	3.779	452- 67.5 / 96 -CS50.8	-67.5						
2.688	3.819	452- 68.3 / 97 -CS50.8	-68.3						

Shank dimensions for "CS with Weldon", see page 17.

COMBINATION TABLE

In this table are listed all combinations, to do various spotfaces, which are possible with spindles and backspotfacing wings listed in the metric and inch catalogues.

Spindles are specified by hole diameter and listed along the top of each table horizontally. Wings are specified by part number and located vertically along the lefthand margin of the table. The spotfacing diameters these spindles and wings will produce are located in the several columns located below the hole diameters and to the right of the wing part numbers. These spotfacing diameters are given in inch.

To locate a particular combination, first select a hole dimension from those listed at the top of the chart. Second, follow the column of numbers below the hole dimension until you locate the required spotface diameter. Third, move to the left until you find a wing part number. This is the wing that is required for the spotface diameter selected.

The spindle used for the hole selected can be found in either the metric or inch catalogues, under hole diameter.

On page 27 all Cutters/Inserts (C) are specified.

C	Hole dia. Ø	.177	.188	.217	.219	.250	.256	C	Hole dia. Ø	.276	.281	.313	.331	.344	.354	.375	
	Wing								Wing								
A	37-011	.315	.323	.354	.354	.366	.374	A	37-020-0320	.402	.406	.437	.449	.453	.465	.484	
A	-010-0315	.327	.335	.366	.366	.378	.386	A	-020-0380	.449	.453	.484	.496	.500	.512	.531	
A	-010-0335		.350	.382	.382	.394	.402	A	-021	.465	.469	.500	.512	.516	.528	.547	
A	-012			.394	.394	.406	.413	A	-020-0480	.528	.531	.563	.575	.579	.591	.610	
A	-013			.413	.413	.425	.433	A	-022	.543	.547	.579	.591	.594	.606	.626	
A	-014			.433	.433	.445	.453	A	-023	.567	.571	.602	.614	.618	.630	.650	
A	-010-0415			.445	.445	.457	.465	A	-020-0540		.579	.610	.622	.626	.638	.657	
A	-010-0470					.500	.508	A	-024			.657	.669	.673	.685	.705	
A	-015						.512	A	-020-0620				.673	.685	.689	.701	
A	-010-0490						.524	A	-025					.693	.697	.709	
								A	-020-0650					.709	.713	.724	
								A	-020-0660					.717	.720	.732	
								A	-020-0680						.736	.748	
								A	-020-0710							.772	
								A	-020-0760								.831

C	Hole dia. Ø	.984	1.000	1.024	1.031	1.063	1.094	1.102	1.125	1.142	1.156	1.181
Wing												
D	37-101	1.299	1.315	1.339	1.346	1.378	1.409	1.417	1.441	1.457	1.472	1.496
D	-100-1235	1.484	1.500	1.524	1.531	1.563	1.594	1.602	1.626	1.642	1.657	1.681
D	-100-1250	1.496	1.512	1.535	1.543	1.575	1.606	1.614	1.638	1.654	1.669	1.693
D	-100-1300	1.535	1.551	1.575	1.583	1.614	1.646	1.654	1.677	1.693	1.709	1.732
D	-102	1.575	1.591	1.614	1.622	1.654	1.685	1.693	1.717	1.732	1.748	1.772
D	-100-1400	1.614	1.630	1.654	1.661	1.693	1.724	1.732	1.756	1.772	1.787	1.811
E	-110-1450	1.654	1.669	1.693	1.701	1.732	1.764	1.772	1.795	1.811	1.827	1.850
E	-110-1550	1.732	1.748	1.772	1.780	1.811	1.843	1.850	1.874	1.890	1.906	1.929
E	-111	1.772	1.787	1.811	1.819	1.850	1.882	1.890	1.913	1.929	1.945	1.969
E	-110-1750	1.890	1.906	1.929	1.937	1.969	2.000	2.008	2.031	2.047	2.063	2.087
F	-121	1.969	1.984	2.008	2.016	2.047	2.079	2.087	2.110	2.126	2.142	2.165
F	-120-1870	1.984	2.000	2.024	2.031	2.063	2.094	2.102	2.126	2.142	2.157	2.181
F	-120-1910		2.031	2.055	2.063	2.094	2.126	2.134	2.157	2.173	2.189	2.213
F	-120-1970			2.102	2.110	2.142	2.173	2.181	2.205	2.220	2.236	2.260
F	-120-1990				2.126	2.157	2.189	2.197	2.220	2.236	2.252	2.276
G	-120-2070					2.220	2.252	2.260	2.283	2.299	2.315	2.339
G	-120-2150						2.315	2.323	2.346	2.362	2.378	2.402
G	-120-2170							2.339	2.362	2.378	2.394	2.417
G	-120-2230								2.409	2.425	2.441	2.465
G	-120-2270									2.457	2.472	2.496
G	-120-2310										2.504	2.528
G	-120-2370											2.575

C	Hole dia. Ø	1.188	1.219	1.250	1.260	1.281	1.299	1.313	1.339	1.344	1.375	1.378
Wing												
D	37-130-1500	1.811	1.811	1.850	1.850	1.890	1.890	1.929	1.929	1.969	1.969	1.969
E	-130-1590	1.882	1.882	1.921	1.921	1.961	1.961	2.000	2.000	2.039	2.039	2.039
E	-130-1740	2.000	2.000	2.039	2.039	2.079	2.079	2.118	2.118	2.157	2.157	2.157
E	-130-1750	2.008	2.008	2.047	2.047	2.087	2.087	2.126	2.126	2.165	2.165	2.165
F	-131	2.126	2.126	2.165	2.165	2.205	2.205	2.244	2.244	2.283	2.283	2.283
F	-130-1910	2.134	2.134	2.173	2.173	2.213	2.213	2.252	2.252	2.291	2.291	2.291
G	-130-2150	2.323	2.323	2.362	2.362	2.402	2.402	2.441	2.441	2.480	2.480	2.480
G	-132	2.362	2.362	2.402	2.402	2.441	2.441	2.480	2.480	2.520	2.520	2.520
G	-130-2300	2.441	2.441	2.480	2.480	2.520	2.520	2.559	2.559	2.598	2.598	2.598
G	-130-2400		2.559	2.559	2.598	2.598	2.638	2.638	2.677	2.677	2.677	
G	-130-2500				2.677	2.677	2.717	2.717	2.756	2.756	2.756	
R	-130-2600						2.795	2.795	2.835	2.835	2.835	
R	-130-2700								2.913	2.913	2.913	

C	Hole dia. Ø	1.406	1.417	1.438	1.457	1.469	1.496	1.500	1.531	1.535	1.563	1.575	1.594	1.614	1.625	1.654	1.656	1.688	1.693
Wing																			
E	37-140-1750	2.087	2.087	2.126	2.126	2.165	2.165	2.205	2.205	2.244	2.244	2.283	2.283	2.323	2.323	2.362	2.362	2.362	2.362
E	-140-1790	2.118	2.118	2.157	2.157	2.197	2.197	2.236	2.236	2.276	2.276	2.315	2.315	2.354	2.354	2.394	2.394	2.394	2.394
E	-140-1800	2.126	2.126	2.165	2.165	2.205	2.205	2.244	2.244	2.283	2.283	2.323	2.323	2.362	2.362	2.402	2.402	2.402	2.402
E	-140-1915	2.217	2.217	2.256	2.256	2.295	2.295	2.335	2.335	2.374	2.374	2.413	2.413	2.453	2.453	2.492	2.492	2.492	2.492
E	-140-1950	2.244	2.244	2.283	2.283	2.323	2.323	2.362	2.362	2.402	2.402	2.441	2.441	2.480	2.480	2.520	2.520	2.520	2.520
E	-140-2000	2.283	2.283	2.323	2.323	2.362	2.362	2.402	2.402	2.441	2.441	2.480	2.480	2.520	2.520	2.559	2.559	2.559	2.559
F	-140-2145	2.398	2.398	2.437	2.437	2.476	2.476	2.516	2.516	2.555	2.555	2.594	2.594	2.634	2.634	2.673	2.673	2.673	2.673
F	-141	2.480	2.480	2.520	2.520	2.559	2.559	2.598	2.598	2.638	2.638	2.677	2.677	2.717	2.717	2.756	2.756	2.756	2.756
F	-140-2315	2.531	2.531	2.571	2.571	2.610	2.610	2.650	2.650	2.689	2.689	2.728	2.728	2.768	2.768	2.807	2.807	2.807	2.807
G	-140-2500	2.677	2.677	2.717	2.717	2.756	2.756	2.795	2.795	2.835	2.835	2.874	2.874	2.913	2.913	2.953	2.953	2.953	2.953
G	-142	2.717	2.717	2.756	2.756	2.795	2.795	2.835	2.835	2.874	2.874	2.913	2.913	2.953	2.953	2.992	2.992	2.992	2.992
R	-140-2650	2.795	2.795	2.835	2.835	2.874	2.874	2.913	2.913	2.953	2.953	2.992	2.992	3.031	3.031	3.071	3.071	3.071	3.071
R	-140-2750		2.913	2.913	2.953	2.953	2.992	2.992	3.031	3.031	3.071	3.071	3.110	3.110	3.150	3.150	3.150	3.150	3.150
S	-140-2850				3.031	3.031	3.071	3.071	3.110	3.110	3.150	3.150	3.189	3.189	3.228	3.228	3.228	3.228	3.228
S	-140-2950						3.150	3.150	3.189	3.189	3.228	3.228	3.268	3.268	3.307	3.307	3.307	3.307	3.307
S	-140-3050									3.268	3.268	3.307	3.307	3.346	3.346	3.386	3.386	3.386	3.386
S	-140-3150										3.386	3.386	3.425	3.425	3.465	3.465	3.465	3.465	3.465
S	-140-3250												3.504	3.504	3.543	3.543	3.543	3.543	3.543
S	-140-3350														3.622	3.622	3.622	3.622	3.622

C	Hole dia. Ø	1.719	1.732	1.750	1.772	1.781	1.811	1.844	1.850	1.875	1.890	1.906	1.929	1.938	1.969	2.000	2.008	2.031	2.047	2.063	2.087
Wing																					
F	37-150-2150	2.559	2.559	2.598	2.598	2.638	2.638	2.677	2.677	2.717	2.717	2.756	2.756	2.795	2.795	2.835	2.835	2.874	2.874	2.913	2.913
F	-150-2295	2.673	2.673	2.713	2.713	2.752	2.752	2.791	2.791	2.831	2.831	2.870	2.870	2.909	2.909	2.949	2.949	2.988	2.988	3.028	3.028
F	-150-2300	2.677	2.677	2.717	2.717	2.756	2.756	2.795	2.795	2.835	2.835	2.874	2.874	2.913	2.913	2.953	2.953	2.992	2.992	3.031	3.031
F	-150-2400	2.756	2.756	2.795	2.795	2.835	2.835	2.874	2.874	2.913	2.913	2.953	2.953	2.992	2.992	3.031	3.031	3.071	3.071	3.110	3.110
F	-150-2420	2.772	2.772	2.811	2.811	2.850	2.850	2.890	2.890	2.929	2.929	2.969	2.969	3.008	3.008	3.047	3.047	3.087	3.087	3.126	3.126
G	-150-2690	2.984	2.984	3.024	3.024	3.063	3.063	3.102	3.102	3.142	3.142	3.181	3.181	3.220	3.220	3.260	3.260	3.299	3.299	3.339	3.339
G	-150-2895	3.146	3.146	3.185	3.185	3.224	3.224	3.264	3.264	3.303	3.303	3.343	3.343	3.382	3.382	3.421	3.421	3.461	3.461	3.500	3.500
S	-150-2950	3.189	3.189	3.228	3.228	3.268	3.268	3.307	3.307	3.346	3.346	3.386	3.386	3.425	3.425	3.465	3.465	3.504	3.504	3.543	3.543
S	-151	3.386	3.386	3.425	3.425	3.465	3.465	3.504	3.504	3.543	3.543	3.583	3.583	3.622	3.622	3.661	3.661	3.701	3.701	3.740	3.740
S	-150-3250	3.425	3.425	3.465	3.465	3.504	3.504	3.543	3.543	3.583	3.583	3.622	3.622	3.661	3.661	3.701	3.701	3.740	3.740	3.780	3.780
S	-150-3350			3.543	3.543	3.583	3.583	3.622	3.622	3.661	3.661	3.701	3.701	3.740	3.740	3.780	3.780	3.819	3.819		

C	Hole dia. Ø	2.094	2.125	2.156	2.165	2.188	2.205	2.219	2.244	2.250	2.281	2.283	2.313	2.323	2.344	2.362	2.375	2.402
	Wing																	
S	37-161	3.701	3.701	3.740	3.740	3.780	3.780	3.819	3.819	3.858	3.858	3.858	3.898	3.898	3.937	3.937	3.976	3.976
T	-162	4.252	4.252	4.291	4.291	4.331	4.331	4.370	4.370	4.409	4.409	4.409	4.449	4.449	4.488	4.488	4.528	4.528
T	-160-4050	4.291	4.291	4.331	4.331	4.370	4.370	4.409	4.409	4.449	4.449	4.449	4.488	4.488	4.528	4.528	4.567	4.567
T	-160-4150			4.409	4.409	4.449	4.449	4.488	4.488	4.528	4.528	4.528	4.567	4.567	4.606	4.606	4.646	4.646
T	-160-4250					4.528	4.528	4.567	4.567	4.606	4.606	4.606	4.646	4.646	4.685	4.685	4.724	4.724
T	-160-4350							4.646	4.646	4.685	4.685	4.685	4.724	4.724	4.764	4.764	4.803	4.803
T	-160-4450								4.764	4.764	4.764	4.803	4.803	4.843	4.843	4.882	4.882	
U	-160-4550											4.882	4.882	4.921	4.921	4.961	4.961	
U	-160-4650													5.000	5.000	5.039	5.039	
U	-160-4750																5.118	5.118

C	Hole dia. Ø	2.406	2.438	2.441	2.469	2.480	2.500	2.520	2.531	2.559	2.563	2.594	2.598	2.625	2.638	2.656	2.677	2.688	2.717
	Wing																		
S	37-161	4.016	4.016	4.016	4.055	4.055	4.094	4.094	4.134	4.134	4.173	4.173	4.173	4.213	4.213	4.252	4.252	4.291	4.291
T	-162	4.567	4.567	4.567	4.606	4.606	4.646	4.646	4.685	4.685	4.724	4.724	4.724	4.764	4.764	4.803	4.803	4.843	4.843
T	-160-4050	4.606	4.606	4.606	4.646	4.646	4.685	4.685	4.724	4.724	4.764	4.764	4.764	4.803	4.803	4.843	4.843	4.882	4.882
T	-160-4150	4.685	4.685	4.685	4.724	4.724	4.764	4.764	4.803	4.803	4.843	4.843	4.843	4.882	4.882	4.921	4.921	4.961	4.961
T	-160-4250	4.764	4.764	4.764	4.803	4.803	4.843	4.843	4.882	4.882	4.921	4.921	4.921	4.961	4.961	5.000	5.000	5.039	5.039
T	-160-4350	4.843	4.843	4.843	4.882	4.882	4.921	4.921	4.961	4.961	5.000	5.000	5.000	5.039	5.039	5.079	5.079	5.118	5.118
T	-160-4450	4.921	4.921	4.921	4.961	4.961	5.000	5.000	5.039	5.039	5.079	5.079	5.079	5.118	5.118	5.157	5.157	5.197	5.197
U	-160-4550	5.000	5.000	5.000	5.039	5.039	5.079	5.079	5.118	5.118	5.157	5.157	5.157	5.197	5.197	5.236	5.236	5.276	5.276
U	-160-4650	5.079	5.079	5.079	5.118	5.118	5.157	5.157	5.197	5.197	5.236	5.236	5.236	5.276	5.276	5.315	5.315	5.354	5.354
U	-160-4750	5.157	5.157	5.157	5.197	5.197	5.236	5.236	5.276	5.276	5.315	5.315	5.315	5.354	5.354	5.394	5.394	5.433	5.433
U	-160-4850	5.236	5.236	5.236	5.276	5.276	5.315	5.315	5.354	5.354	5.394	5.394	5.394	5.433	5.433	5.472	5.472	5.512	5.512
U	-160-4950				5.354	5.354	5.394	5.394	5.433	5.433	5.472	5.472	5.472	5.512	5.512	5.551	5.551	5.591	5.591
U	-160-5050						5.472	5.472	5.512	5.512	5.551	5.551	5.551	5.591	5.591	5.630	5.630	5.669	5.669
U	-160-5150								5.591	5.591	5.630	5.630	5.630	5.669	5.669	5.709	5.709	5.748	5.748
U	-160-5250										5.709	5.709	5.709	5.748	5.748	5.787	5.787	5.827	5.827

C	Hole dia. Ø	2.719	2.750	2.756	2.781	2.795	2.813	2.835	2.844	2.875	2.906	2.913	2.938	2.953	2.969	2.992	3.000
	Wing																
T	37-171	4.882	4.882	4.882	4.921	4.921	4.961	4.961	5.000	5.000	5.039	5.039	5.079	5.079	5.118	5.118	5.157
U	-172	5.512	5.512	5.512	5.551	5.551	5.591	5.591	5.630	5.630	5.669	5.669	5.709	5.709	5.748	5.748	5.787
U	-170-5250	5.551	5.551	5.551	5.591	5.591	5.630	5.630	5.669	5.669	5.709	5.709	5.748	5.748	5.787	5.787	5.827
U	-170-5350				5.669	5.669	5.709	5.709	5.748	5.748	5.787	5.787	5.827	5.827	5.866	5.866	5.906
U	-170-5450						5.787	5.787	5.827	5.827	5.866	5.866	5.906	5.906	5.945	5.945	5.984
U	-170-5550								5.906	5.906	5.945	5.945	5.984	5.984	6.024	6.024	6.063
U	-170-5650										6.024	6.024	6.063	6.063	6.102	6.102	6.142

Cutter/Insert (C)		
A HSS	H C-0820	O K-1450
B Brazed	I C-0900	P K-1550
C SM-10-3-2	J C-1000	Q K-1650
D SPU 322	K K-1050	R EC20
E SPU 422	L K-1150	S EC25
F SPU 533	M K-1250	T EC32
G SPU 632	N K-1350	U EC40
ISO-K20 for Cast iron		ISO-P40 for Steel

FOR OPERATIONS IN YOUR NC/CNC MACHINE

ERIX TOOL

90-33.3/63-CS31.8

$L3 = 2.283''$

$L4 = 1.969''$

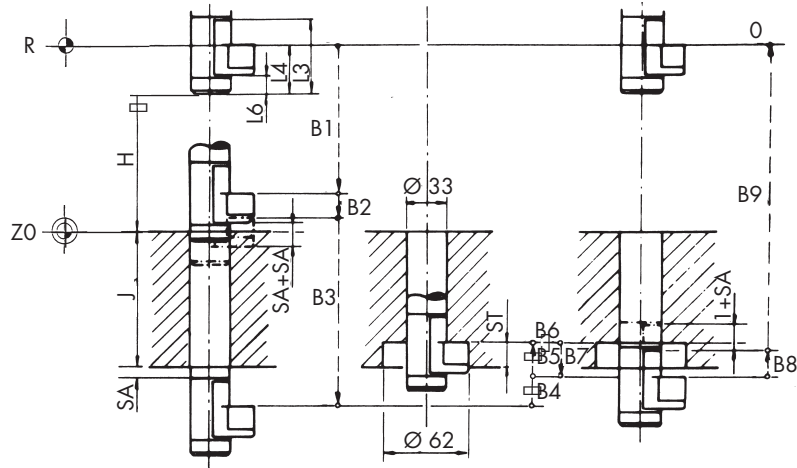
$L6 = .827''$

$H = 4.0''$

$J = 2.75''$

$ST = .315''$

$SA = .2''$ (security distance)



MACHINE TIME

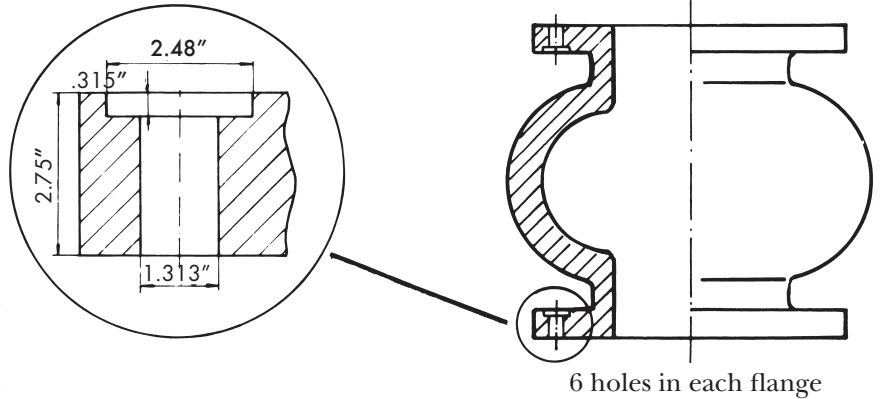
Workpiece: Flange according to drawing below

Material: Cast steel

Numbers of Components: 100

Numbers of Operation: 1200

Step	Z-Length	Feed inch/min	Time
B1	$H + L6 - SA = 4.627$	70.00	3,5
B2	$SA + SA = .4$	2.56	9,2
B3	$J + (L3 - L6) = 1.294$	70.00	3,2
B4	$SA + .16 = .36$	2.56	8,3
B5	$(L3 - L4) - .16 + ST = .469$	2.30	12,4
B6	Rotation	-	3
B7	$(L3 - L4) + .04 = .354$	2.56	8,3
B8	$.04 + SA = .24$	2.56	5,6
B9	$J - ST - SA +$ $(L3 - L4) + H + L4 = 8.518$	70.00	6,5
Tot. time			60,0



RESULT

By using the ERIX Tool in this case...

Costs were reduced by 3 600 USD

or

60 hours were saved, which can be used for the machining of other components.

COST ANALYSIS

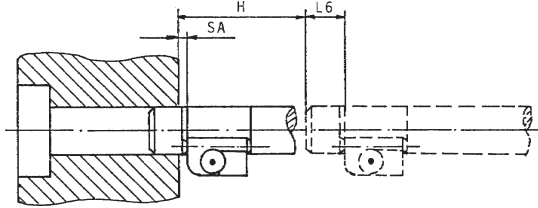
Tool:	Conventional HSS-Tool with manual cutter change	ERIX Tool 90-33.3/63-CS31.8
Cutter:	HSS	Carbide inserts
Cutting Speed:	1.00"/min	2.00"/min
Machining time:	4,0 min	1,0 min
Man and Machine costs:	60 USD/hour	60 USD/hour
Costs per spotfacing:	4 USD	1 USD
Total cost:	4800 USD	1200 USD

PROGRAMMING INSTRUCTIONS ON NEXT PAGE

ERIX-Tools up to Spindle 1.181"
(without guide tang)

1. Program - Step A1

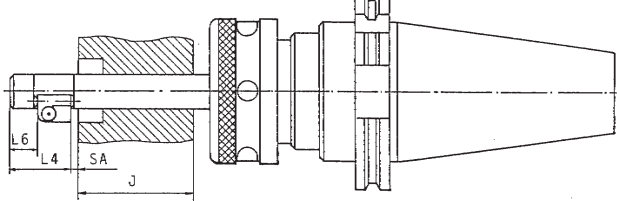
Counter-clockwise rotation at recommended speed: rapid feed until the wing is a few thousandths, security distance (SA), from the workpiece.



Rotation : Counter-clockwise
 Speed : RPM S
 Feed : Rapid F
 Formula for Z : $H + L6 - SA$ inch
 Stop at Z+ : $(L4 - L6) + SA$ Z+

3. Program - Step A3

Counter-clockwise rotation: rapid feed forward until the entire length of the wing swings completely free.



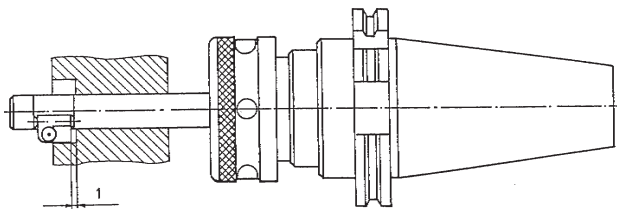
Rotation : Counter-clockwise
 Feed : Rapid F
 Formula for Z : $J + (L4 - L6)$ inch
 Stop at Z- : $-(J + SA)$ Z-

5. Program - Step A5

Stop feeding and let the tool dwell for 5 seconds.

6. Program - Step A6

After spotfacing back the tool away until the wing swings completely free. Reverse again to counter-clockwise rotation.



Rotation : Clockwise
 Feed : Rapid F
 Distance for Z : $.04$ inch
 Stop at Z- : $-(J - ST + .04)$ Z-

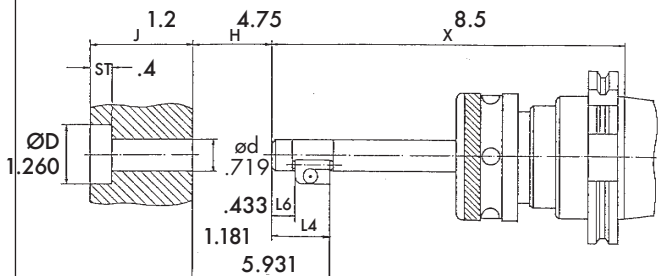
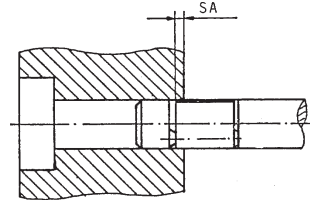


Figure 1

Security distance
 SA: $.2$ "

2. Program - Step A2

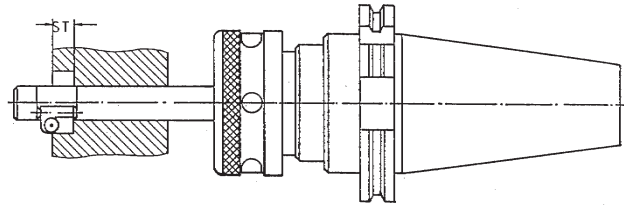
Counter-clockwise rotation: feedrate reduced to $.008$ " per rev. until the wing has folded into the spindle recess.



Rotation : Counter-clockwise
 Feed : $.008$ /rev
 Feed/min : Feed x Speed F
 Formula for Z : $SA + SA$ inch
 Stop at Z+ : $(L4 - L6) - SA$ Z+

4. Program - Step A4

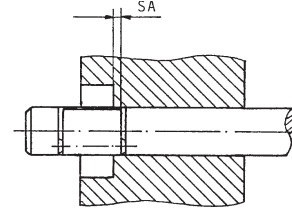
Reverse to clockwise rotation: cutting operation with feedrate according to recommendations.



Rotation : Clockwise
 Feed according to table : inch/rev
 Feed/min : Feed x Speed F
 Formula for Z : $SA + ST$ inch
 Stop at Z- : $-(J - ST)$ Z-

7 Program - Step A7

Counter-clockwise rotation: reduce feedrate to $.008$ " per rev. until the wing has folded into the spindle recess.



Rotation : Counter-clockwise
 Feed : $.008$ /rev
 Feed/min : Feed x Speed F
 Formula for Z : $.04 + SA$ inch
 Stop at Z- : $-(J - ST - SA)$ Z-

8. Program - Step A8

Rapid feed back to the starting point R.

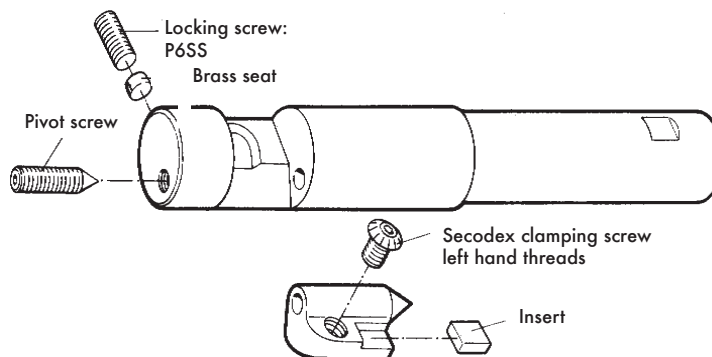
Feed : Rapid F
 Formula for Z : $J - ST - SA + H + L4$ inch
 Stop at Z+ : Reference point - R Z+

Workpiece	Cast iron					
Speed	inch/min	: 1.6"				
Speed	RPM	: 320		S		
Feed	inch/rev	: .0063				
Feed/min	inch/min.	: 2.02		F		

Step	Formula for Z	Z inch	Stop at Z	Speed RPM	Rotation	Feed
A1	$H + L6 - SA$	4.983	.948	320	Counter-clockwise	70.00
A2	$SA + SA$	.4	.541	320	Counter-clockwise	2.56
A3	$J + (L4 - L6)$	1.948	-1.400	320	Counter-clockwise	70.00
A4	$SA + ST$	.6	-.800	320	Clockwise	2.02
A5	Rotation	0	-.800	320	Clockwise	stop
A6	$.040$ "	.04	-.840	320	Clockwise	24.00
A7	$.040 + SA$	.24	-.600	320	Counter-clockwise	2.56
A8	$J - ST - SA + H + L4$	6.531	5.931	320	Counter-clockwise	70.00

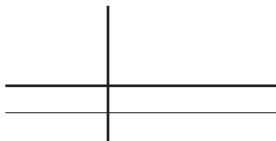
SPARE PARTS

HOLE SIZE .188-1.156"



SPINDLE

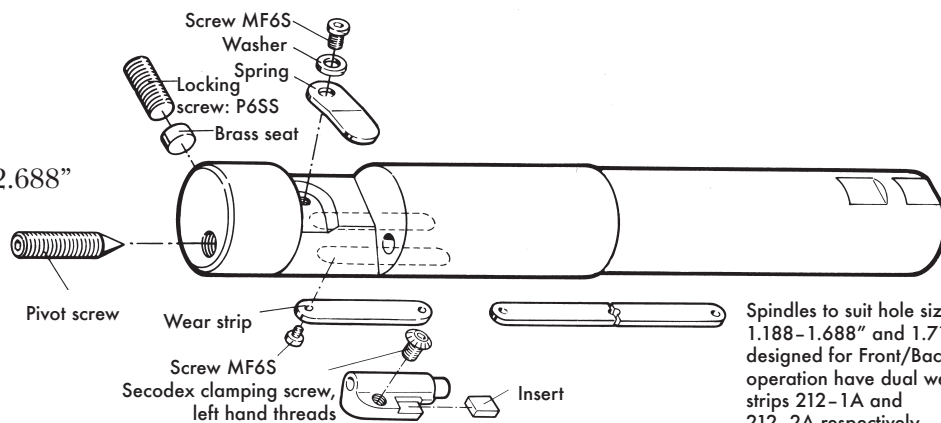
Hole dia ø	Pivot screw	Allen wrench	Locking screw	Allen wrench	Brass seat ø
.188 - .250	211-10	89	M2x2,50	89	1,5
.281 - .375	-2	1,27	M2x2,50	89	1,5
.406 - .594	-3	2	M3x 4	1,5	2,2
.625 - .969	-4	3	M4x 5	2	3
1.000-1.156	-5	5	M4x 12	2	3



WING

	Spotfacing and chamfering standard and semistandard wings	Clamping screw	Allen wrench
Standard	37 -041... -061	4-631	2,5
	37 -062... -102	5-639	3
	37 -111, -121	6-635	4
Semi-standard	37 -040 -0965... -060-1005	4-631	2,5
	37 -060 -1155... -100-1235	5-639	3
	37 -110 -1550... -120-2310	6-635	4
Chamfering 45°	34 -063	5-639	3
	34 -121	6-635	4
Chamfering 60°	34 -063 -60	5-639	3
	34 -121 -60	6-635	4
Chamfering 30°	34 -061 -30	4-631	2,5
	34 -102 -30	5-639	3

HOLE SIZE 1.188 - 2.688"



Spindles to suit hole size 1.188 - 1.688" and 1.719 - 2.688" designed for Front/Back operation have dual wear strips 212-1A and 212-2A respectively.

SPINDLE

Hole dia ø	Pivot screw	Allen wrench	Locking screw	Allen wrench	Brass seat ø
1.188 - 1.375	211-6	5	M5x12	2,5	4
1.406 - 1.688	-7	6	M5x12	2,5	4
1.719 - 2.063	-8	8	M5x12	2,5	4
2.094 - 2.688	-8	8	M5x12	2,5	4

Hole dia ø	Spring	Washer	Screw for spring	Allen wrench
1.188 - 1.375	213-1	214-1	M4x8	2,5
1.406 - 1.688	-2	-1	M4x8	2,5
1.719 - 2.063	-3	-2	M5x10	3
2.094 - 2.688	-4	-2	M5x10	3

Hole dia ø	Wear strip	Screw	Allen wrench
1.188 - 1.375	212-1	M4x8	2,5
1.406 - 1.688	-1	M4x8	2,5
1.719 - 2.063	-2	M5x10	3
2.094 - 2.688	-2	M5x10	3

WING

	Spotfacing and chamfering standard and semistandard wings	Clamping screw	Allen wrench
Standard	37 -131, -132	6-635	4
	37 -141, -142	6-645	4
	37 -151, -152, -162	8-649	5
Semi-standard	37 -130 -1500	5-639	3
	37 -130 -1740... -130-2700	6-635	4
	37 -140 -1790... -140-3350	6-645	4
	37 -150 -2295... -160-4450	8-649	5
	37 -160 -4550... -160-5250	2X8-649	5
Chamfering 45°	34 -132	6-635	4
	34 -142	6-645	4
	34 -150, -160	8-649	5
Chamfering 60°	34 -132 -60	6-635	4
	34 -142 -60	6-645	4
	34 -150 -60, -160-60	8-649	5
Chamfering 30°	34 -130 -30	6-635	4
	34 -140 -30	6-645	4
	34 -150 -30, -160-30	8-649	5

The Erix Automatic Back Spotfacer was invented in the early 70's by an employee at Eriksbergs Mekaniska Verkstad in Gothenburg – one of the most famous shipyards in the world at that time.

Huge diesel engines for ship propulsion were manufactured in the machine shop. Several parts needed back spotfacing, which was difficult and time consuming using traditional methods. This new back spotfacing tool substantially improved the operation.

The production and marketing of this tool was handed over to a newly founded separate company in 1977. The name – with reference and reverence to the shipyard – was ERIX TOOL AB.

Since this time the automatic back spotfacer is sold worldwide. More than 30 representatives in most industrialized countries distribute the tool to manufacturers of very different kinds of products – from tiny camera parts to large nuclear powered machinery.

Other examples include: engines, turbines, pumps, valves, printing machines, road building machinery, farming equipment and both hand-operated and numerically controlled machine tools, just to mention some.

Sooner or later nearly every metal working industry will find the use of the Erix Automatic Back Spotfacer as an ideal solution. Whether it is a simple or a complicated operation, whether using a small hand-operated machine, or an enormous machine tool equipped for untended production, or even an automatic multi-spindle set-up the Erix Automatic Back Spotfacer will save you time and money.



ERIX TOOL AB, Gamla Tuvevagen 15 C, SE-417 05 Gothenburg, Sweden
Tel. +46 31 50 08 50 - Fax +46 31 23 56 69 - E-mail: e@erixtool.com