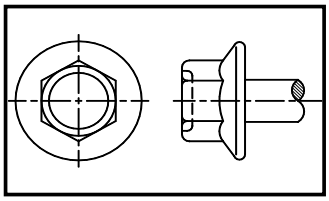
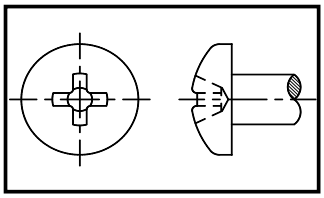
General Fastener Specification

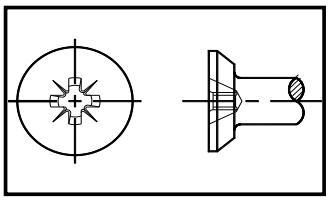
Head Styles



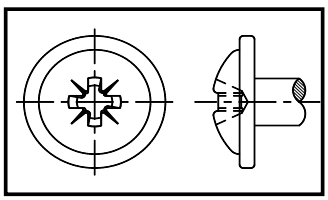
Hex-Flange



Pan

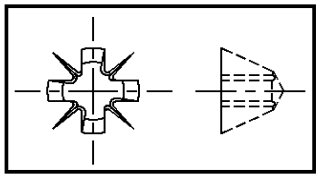


Counter-Sunk

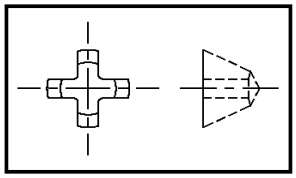


Pan-Flange

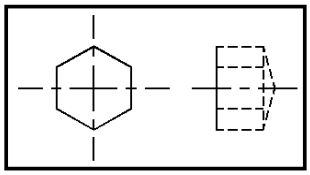
Drive Types



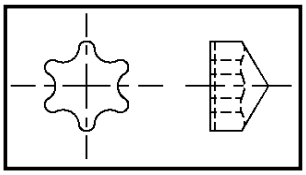
Pozi Recess



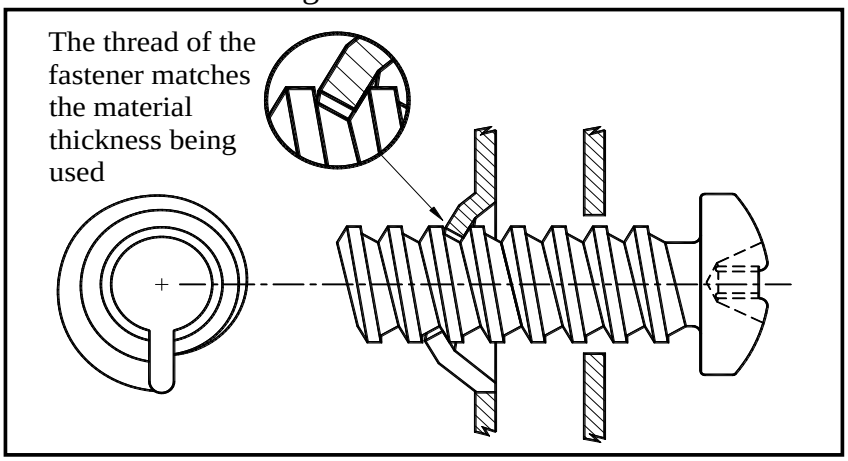
Phillips Recess



Allen Recess



TORX Recess®

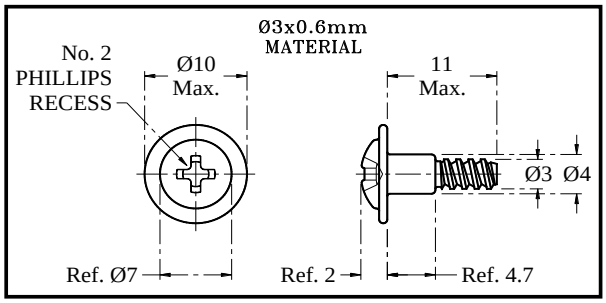


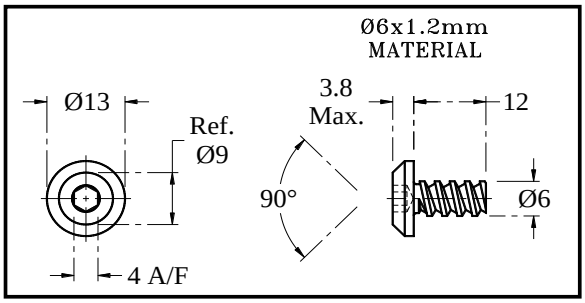
Material Thickness			Thread Diameters Available									
Imperial	UK Wire	Metric	Ø2.5	Ø3.0	Ø3.5	Ø4.0	Ø5.0	Ø6.0	Ø8.0	Ø10.0	Ø12.0	Ø14.0
0.020/0.024	25	0.5/0.6	X	X	X	X	X	X				
0.028/0.032	22/21	0.7/0.8		X	X	X	X	X	X			
0.036/0.040	20/19	0.9/1.0				X	X	X	X	X		
0.043/0.047	18	1.1/1.2					X	X	X	X	X	
0.051/0.055	17	1.3/1.4						X	X	X	X	
0.059/0.063	16	1.5/1.6						X	X	X	X	X
0.067/0.071	15	1.7/1.8							X	X	X	X
0.074/0.078	14	1.9/2.0							X	X	X	X
0.093/0.099	13	2.4/2.5								X	X	X

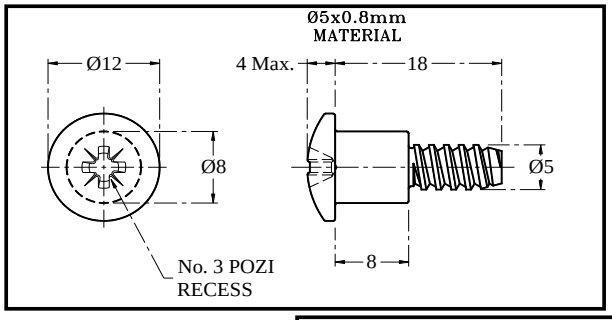
	Thread Diameters									
	Ø2.5	Ø3.0	Ø3.5	Ø4.0	Ø5.0	Ø6.0	Ø8.0	Ø10.0	Ø12.0	Ø14.0
Minimum Thread Length's	**4.5**	**5**	**6**	**7**	**8.5**	**10**	**15**	**20**	**25**	**25**

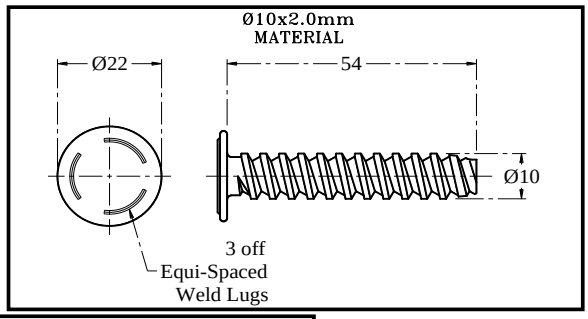
Above Dimension's for Fastener Length's and Diameters are in Millimetres
The tables above give a guide to the options available with High Torque Fastener Systems

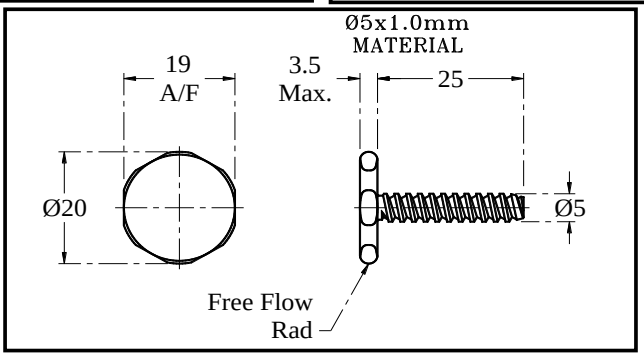
Cross Section of Fastener Specifications



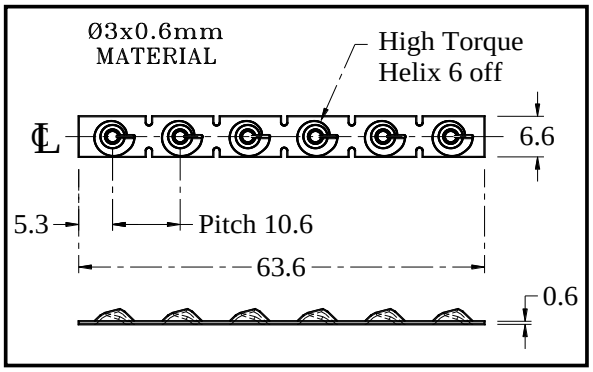


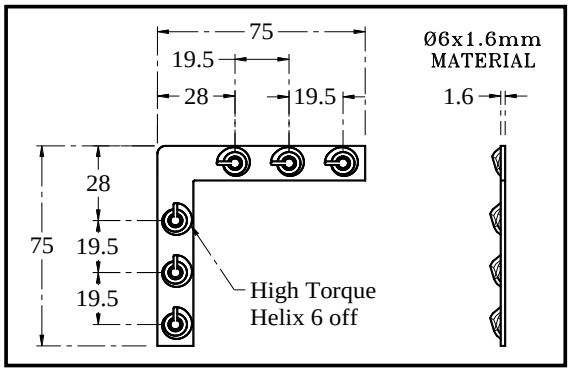


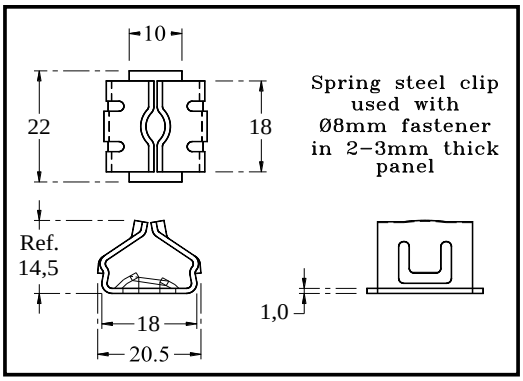




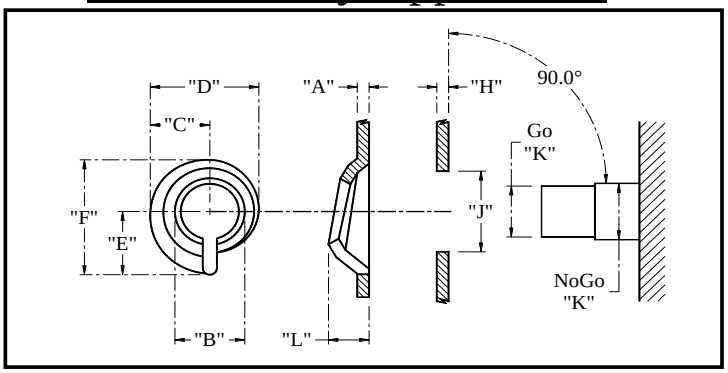
Custom Pressing Specifications







Will it Fit My Application



Material Thickness "A"			Thread diameter "B"	Dimensions				Min. "H"	Clearance Hole Ø"J"	Gauge Diameter "K"		Helix Height "L"
Imperial	UK Wire	Metric		"C"	"D"	"E"	"F"		Min. - Max.	Go	No-Go	Min. - Max.
0.020/0.024	25	0.5/0.6	3	3.2	5.7	3.5	6.3	0.4	3.3 - 4.0	2.17	2.30	1.8 - 2.1
			3.5	3.4	6.2	3.7	6.8		3.8 - 4.5	2.67	2.80	
			4	3.7	6.7	4.0	7.3		4.3 - 5.0	3.17	3.30	
			5	4.2	7.7	4.5	8.3		5.3 - 6.0	4.17	4.30	
			6	4.7	8.7	5.0	9.3		6.3 - 7.0	5.17	5.30	
0.028/0.032	22/21	0.7/0.8	3	3.0	5.3	3.4	6.1	0.7	3.5 - 4.5	1.89	2.07	2.1 - 2.4
			3.5	3.2	5.8	3.6	6.6		4.5 - 5.0	2.39	2.57	
			4	3.5	6.3	3.9	7.1		4.5 - 5.5	2.89	3.07	
			5	4.0	7.3	4.4	8.1		5.5 - 6.5	3.89	4.07	
			6	4.5	8.3	4.9	9.1		6.5 - 7.5	4.89	5.07	
0.036/0.040	20/19	0.9/1.0	4	4.4	7.7	5.0	8.9	0.7	4.5 - 6.0	2.62	2.83	2.9 - 3.6
			5	4.9	8.7	5.5	9.9		5.5 - 7.0	3.62	3.83	
			6	5.4	9.7	6.0	10.9		6.5 - 8.0	4.62	4.83	
			8	6.4	11.7	7.0	12.9		8.5 - 10.0	6.62	6.83	
			10	7.4	13.7	8.0	14.9		10.5 - 12.0	8.62	8.83	
0.043/0.047	18	1.1/1.2	5	5.0	9.0	5.6	10.3	1.0	5.5 - 7.5	3.27	3.54	3.6 - 3.8
			6	5.5	10.0	6.1	11.3		6.5 - 8.5	4.27	4.54	
			8	6.5	12.0	7.1	13.3		8.5 - 10.5	6.27	6.54	
0.051/0.055	17	1.3/1.4	6	5.8	10.6	6.3	11.6	1.0	6.5 - 8.5	4.06	4.37	4.4 - 4.6
			8	6.8	12.6	7.3	13.6		8.5 - 10.5	6.06	6.37	
0.059/0.063	16	1.5/1.6	6	6.2	11.3	6.8	12.6	1.0	6.5 - 9.0	3.99	4.33	4.7 - 5.1
			8	7.3	13.3	8.0	14.6		9.0 - 11.5	5.79	6.13	
			10	8.3	15.3	9.0	16.6		11.0 - 13.5	7.79	8.13	
			12	9.3	17.3	10.0	18.6		13.0 - 15.5	9.79	10.13	
0.067/0.071	15	1.7/1.8	8	7.5	13.3	8.3	15.0	1.3	9.0 - 11.5	5.51	5.90	5 - 5.8
0.074/0.078	14	1.9/2.0	8	7.9	13.9	9.0	15.6	1.3	9.0 - 11.5	5.23	5.67	5.4 - 6.1
			10	8.9	15.9	10.0	17.6		11.0 - 13.5	7.23	7.67	
			12	9.9	17.9	11.0	19.6		13.0 - 15.5	9.23	9.67	
0.093/0.099	13	2.4/2.5	10	9.9	17.4	11.0	19.7	2.0	11.0 - 14.0	6.54	7.08	7.3 - 7.5

The information above is meant as a guide, High Torque Fastener Systems reserves the right to alter the above information at any time. Above dimensions B, C, D, E, F, H, J, K and L are in millimetres.

Above helix details can be transferred to your Computer Aided Design systems, various file formats are available. General 2-D translator - DXF & Autocad 2000i DWG, 3-D models can be transferred by IGES, STEP, or direct IDEAS or Mechanical Desktop model files. As a general viewer, details can also be exported as PDF files

Important

Dimensions (C, D, E and F) have been verified using mild steel, variations may occur with the use of different materials.
Maximum recommended material gauge thickness variations to BS 1449-1.1:1991

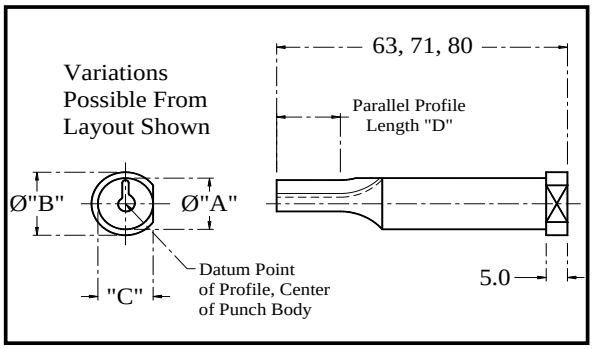
Installation and Assembly Guidelines

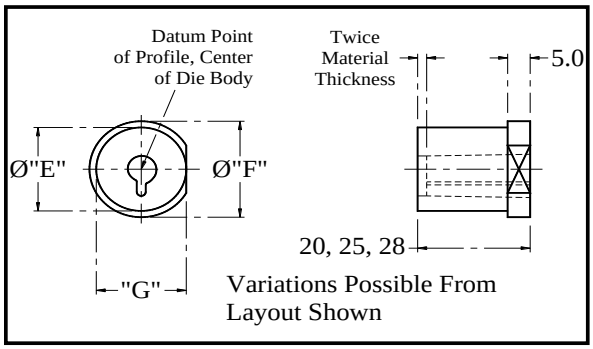
The information below is provided from independent tests conducted by
Swansea Institute of Higher Education, (www.sihe.ac.uk).
Copies of the independent test reports are available on request for a variety of sizes.
Note. Pre-coated material thickness includes coating and material substrate.
Tightening torque values indicated below, are guidelines when used in automated assembly systems.
Non automated assembly methods (hand held drivers) can also be used to achieve system lockdown.

Material Thickness			Screw Diameter	Recommended Tightening Torque			
				Minimum		Maximum	
Imperial	UK Wire	Metric		Nm	Lbs. Inch	Nm	Lbs. Inch
0.020/0.024	25	0.5/0.6	Ø3	0.6	5.3	0.8	7.1
			Ø3.5	0.8	7.1	1.0	8.8
			Ø4	0.8	7.1	1.0	8.8
0.028/0.032	22/21	0.7/0.8	Ø3	0.8	7.1	1.0	8.8
			Ø3.5	1.0	8.8	1.2	10.6
			Ø4	1.2	10.6	1.4	12.4
			Ø5	1.4	12.4	1.6	14.1
			Ø6	2.0	17.7	2.4	21.2
0.036/0.040	20/19	0.9/1.0	Ø4	2.0	17.7	2.4	21.2
			Ø5	2.4	21.2	2.8	24.8
			Ø6	2.8	24.8	3.5	31.0
			Ø8	3.5	31.0	5.0	44.2
0.043/0.047	18	1.1/1.2	Ø5	2.2	19.4	3.0	26.5
			Ø6	2.6	23.0	3.4	30.0
			Ø8	3.0	26.5	4.0	35.4
0.051/0.055	17	1.3/1.4	Ø6	3.2	28.3	5.0	44.2
0.059/0.063	16	1.5/1.6	Ø6	4.0	35.4	8.0	70.8
			Ø8	8.0	70.8	14.0	123.9
			Ø10	10.0	88.5	16.0	141.6
0.067/0.071	15	1.7/1.8	Ø8	12.0	106.2	18.0	159.3
0.074/0.078	14	1.9/2.0	Ø8	16.0	141.6	22.0	194.7
			Ø10	20.0	177.0	28.0	247.8
0.093/0.099	13	2.4/2.5	Ø10	40.0	354.0	55.0	486.0

Material used during the testing process (CS1 - Mild Steel), High Torque Fastener Systems, recommends that due to variations in material specification, and in concert with the application design the above values may vary and should be confirmed with the specific grade of material being used.

FIXED TOOLING - Standard Punch and Die Inserts





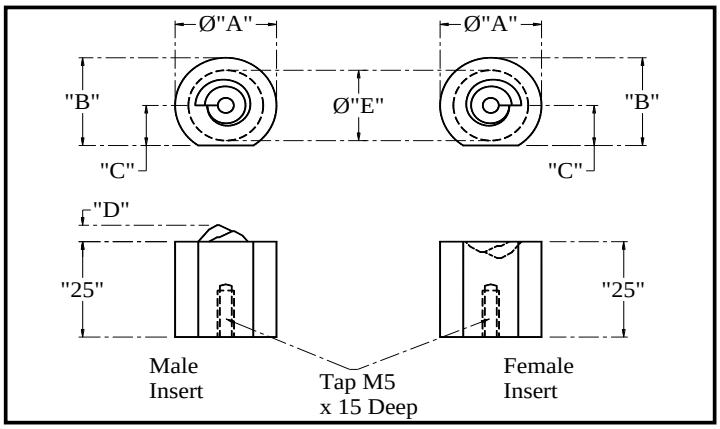
For all punches and dies please contact:

A.W. Precision Ltd, Cosford Lane, Rugby
Warwickshire, CV21 1QN.
Tel. 44 (0) 1788 542271 Fax. 44 (0) 1788 561256
www.awprecision.co.uk

Material Thickness			Screw Ø	Ø"A"	Ø"B"	"C"	"D"	Ø "E"	Ø "F"	"G"
Imperial	UK Wire	Metric								
0.020/0.024	25	0.5/0.6	3	6	9	6	10	10	13	10
			3.5	8	11	8	10	13	16	13
			4	8	11	8	10	13	16	13
			5	8	11	8	15	13	16	13
			6	10	13	10	15	16	19	16
0.028/0.032	22/21	0.7/0.8	3	8	11	8	10	13	16	13
			3.5	8	11	8	10	13	16	13
			4	8	11	8	10	13	16	13
			5	10	13	10	15	16	19	16
			6	10	13	10	15	16	19	16
0.036/0.040	20/19	0.9/1.0	4	10	13	10	15	13	16	13
			5	10	13	10	15	16	19	16
			6	13	16	13	15	16	19	16
			8	13	16	13	20	20	23	20
			10	16	19	16	20	25	28	25
0.043/0.047	18	1.1/1.2	5	13	16	13	15	16	19	16
			6	13	16	13	15	20	23	20
			8	16	19	16	20	20	23	20
0.051/0.055	17	1.3/1.4	6	13	16	13	15	20	23	20
			8	16	19	16	20	20	23	20
0.059/0.063	16	1.5/1.6	6	16	19	16	15	20	23	20
			8	16	19	16	15	25	28	25
			10	20	23	20	20	25	28	25
			12	20	23	20	20	32	35	32
0.067/0.071	15	1.7/1.8	8	20	23	20	20	25	28	25
0.074/0.078	14	1.9/2.0	8	20	23	20	20	25	28	25
			10	20	23	20	20	25	28	25
			12	25	28	25	20	32	35	32
0.093/0.099	13	2.4/2.5	10	25	28	25	20	32	35	32
		General Tolerance:		+0.01 -0	+0 -0.5	+0.01 -0		+0.01 -0	+0 -0.5	+0.01 -0

Preferred sizes to ISO standards, variations from above available on request. Above dimensions are in millimetres.

FIXED TOOLING - Standard Forming Inserts



A.W. Precision Ltd, Cosford Lane,
Rugby, Warwickshire, CV21 1QN.
Tel. 44 (0) 1788 542271
Fax. 44 (0) 1788 561256
www.awp-ltd.com

Milwaukee Punch Corporation,
6755 Industrial Loop, P.O. Box 313,
Greendale, WI 53129, U.S.A
Tel. 001 414 421 8482
www.milwpunch.com

Material Thickness			Screw Ø	Dimensions			Reference "D"	Minimum Diameter "E"
Imperial	UK Wire	Metric		Ø"A"	"B"	"C"		
0.020/0.024	25	0.5/0.6	3	13	11.5	// 0.05	2.0	8.5
			3.5	13	11.5			9
			4	13	11.5			9.5
			5	16	14			10.5
			6	16	14			11.5
0.028/0.032	22/21	0.7/0.8	3	13	11.5	// 0.05	2.5	10.5
			3.5	13	11.5			10.5
			4	13	11.5			11
			5	16	14			12
			6	16	14			13
0.036/0.040	20/19	0.9/1.0	4	13	11.5	// 0.05	3.0	12.8
			5	16	14			14
			6	16	14			14.8
			8	16	14			16
			10	25	23			18.8
0.043/0.047	18	1.1/1.2	5	16	14	// 0.05	3.8	16
			6	16	14			16
			8	25	23			19
0.051/0.055	17	1.3/1.4	6	16	14	// 0.05	4.5	16
			8	25	23			20.5
0.059/0.063	16	1.5/1.6	6	20	18	// 0.05	5.0	20
			8	25	23			22
			10	25	23			24
			12	25	23			25
0.067/0.071	15	1.7/1.8	8	25	23	// 0.05	5.2	20.2
0.074/0.078	14	1.9/2.0	8	25	23	// 0.05	6.0	21.6
			10	25	23			23.6
			12	25	23			25
0.093/0.099	13	2.4/2.5	10	32	30	// 0.05	7.2	27
				General Tol. +0 -0.05				

The information above is meant as a guide, High Torque Fastener Systems reserves the right to alter the above information at any time. Above dimensions A, B, C, D and E are in millimetres.

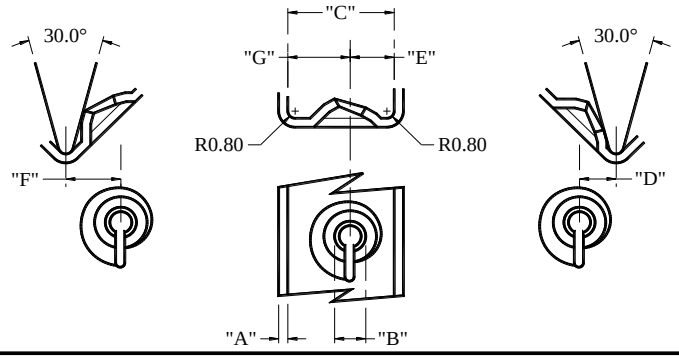
CNC Turret and Press Brake Tooling

The High Torque Fastener System is very versatile and can be incorporated into many punch press machines and tooling systems including Thick Turret, Thin Turret and Trumpf.

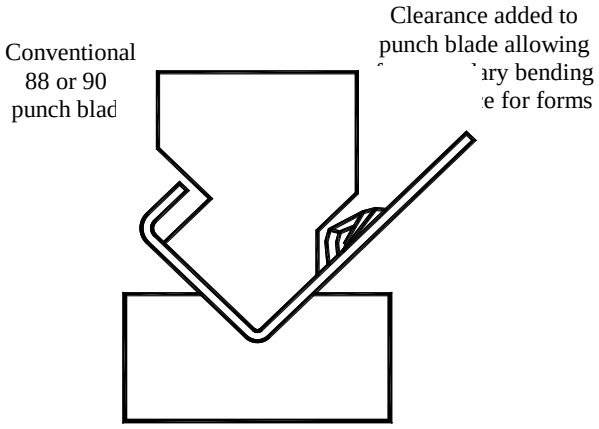
Most of the major tooling contractors are aware of our system and they will assist you in evaluating your tooling needs, tailored towards your production requirements and the machine you are using. If you have a tooling contractor who is unaware of the system, please ask them to contact us and we will be happy to work with them to meet your requirements.

The table below indicates how close to the formed helix, a bend line can be formed using acute angle press brake tooling

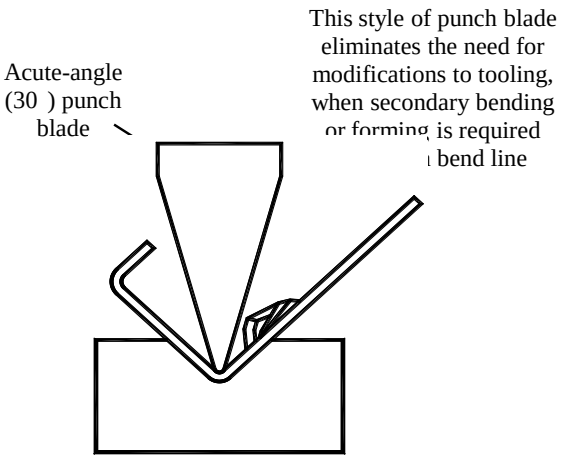
Press Brake Bending Information
Using Acute-Angle (30°) Punches



CNC Turret / Bending Variations

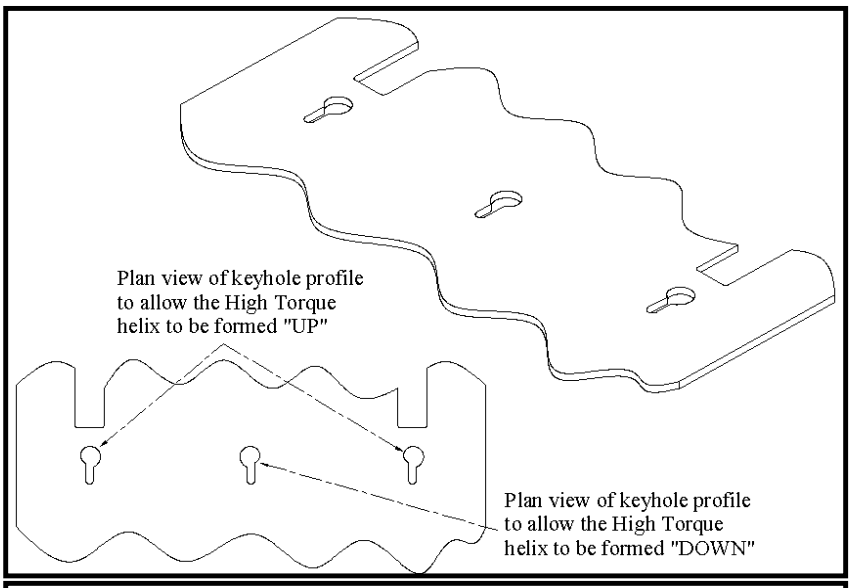


Views showing general styles / types of bending tools available for CNC brake press. View above indicating modifications to allow clearance.

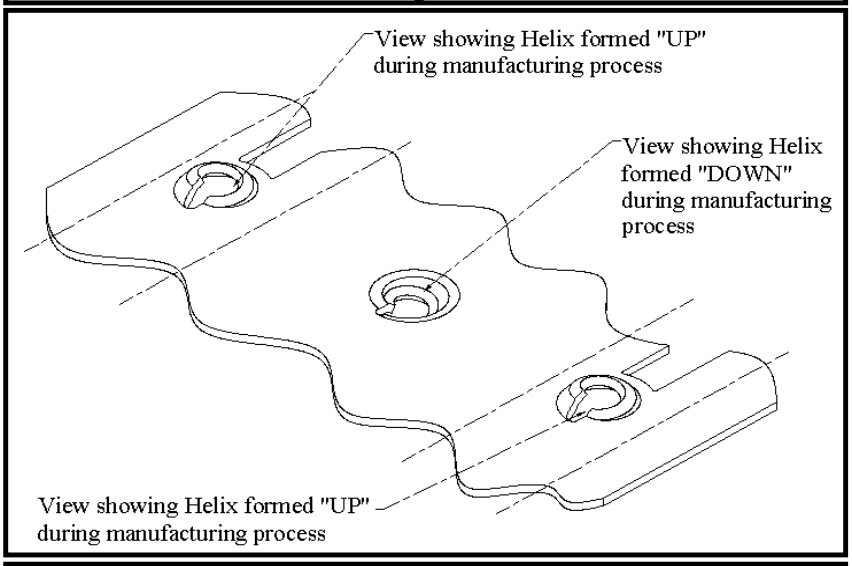


Material Thickness "A"			Screw Ø	Dimensions				
Imperial	UK Wire	Metric		"C"	"D"	"E"	"F"	"G"
0.020/0.024	25	0.5/0.6	3	8.9	3.0	3.8	4.3	5.1
			3.5	9.9	3.5	4.3	4.8	5.6
			4	9.9	3.5	4.3	4.8	5.6
			5	10.9	4.0	4.8	5.3	6.1
			6	11.9	4.5	5.3	5.8	6.6
0.028/0.032	22/21	0.7/0.8	3	10.1	3.5	4.3	5.0	5.8
			3.5	10.1	3.5	4.3	5.0	5.8
			4	10.1	3.5	4.3	5.0	5.8
			5	11.1	4.0	4.8	5.5	6.3
			6	12.1	4.5	5.3	6.0	6.8
0.036/0.040	20/19	0.9/1.0	4	11.6	4.0	4.8	6.0	6.8
			5	12.6	4.5	5.3	6.5	7.3
			6	13.6	5.0	5.8	7.0	7.8
			8	15.6	6.0	6.8	8.0	8.8
			10	17.6	7.0	7.8	9.0	9.8
0.043/0.047	18	1.1/1.2	5	13.2	4.8	5.6	6.8	7.6
			6	14.2	5.3	6.1	7.3	8.1
			8	16.2	6.3	7.1	8.3	9.1
0.051/0.055	17	1.3/1.4	6	16.1	6.0	6.8	8.5	9.3
			8	18.1	7.0	7.8	9.5	10.3
0.059/0.063	16	1.5/1.6	6	17.6	6.5	7.3	9.5	10.3
			8	19.6	7.5	8.3	10.5	11.3
			10	21.6	8.5	9.3	11.5	12.3
			12	23.6	9.5	10.3	12.5	13.3
0.067/0.071	15	1.7/1.8	8	20.1	7.5	8.3	11.0	11.8
0.074/0.078	14	1.9/2.0	8	20.1	7.5	8.3	11.0	11.8
			10	22.1	8.5	9.3	12.0	12.8
			12	24.1	9.5	10.3	13.0	13.8
0.093/0.099	13	2.4/2.5	10	25.6	9.8	10.6	14.2	15.0

Up or Down Forming in Relation to Bending

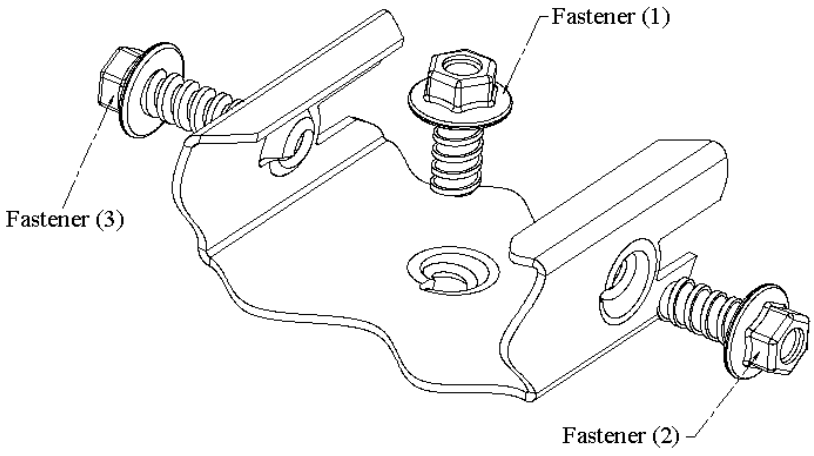


View showing pierce profile in panel during the manufacturing process, shape of keyhole aperture is relevant to the direction of the formed helix.



View showing helix formed in panel (UP and DOWN) during next manufacturing stage.

View showing fasteners engaging into the component after bending.
Fastener (1) engaging from the inside of the component using the "DOWN" formed helix
Fasteners (2 & 3) engaging from the outside of the component using the "UP" formed helix



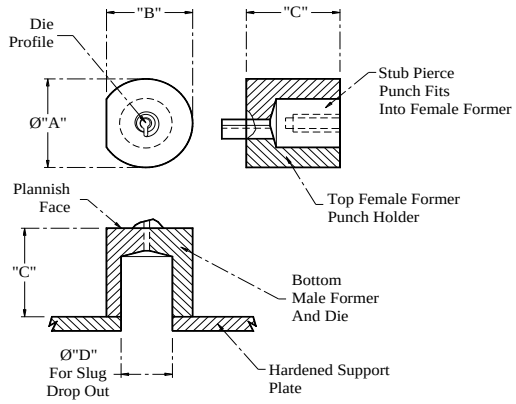
View showing fasteners being inserted during the assembly operation from different directions. Allowing for internal or external components to be fitted to the application.

One Stroke Pierce and Form

Variants of this option are available for both CNC Turret and Fixed tooling for the sizes listed below.

Tooling Inserts to allow "UP" forming

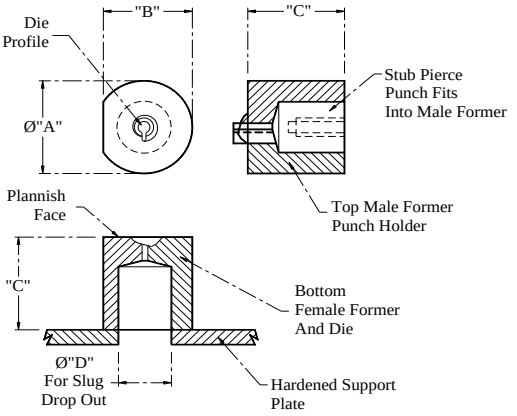
Material Thickness Imperial	UK Wire	Metric	Screw Diameter Ø	Dimension's Ø"A"	"B"	"C"	Ø"D"
0.020/0.024	25	0.5/0.6	4,5,6	25	23	25	14.0
0.028/0.032	22/21	0.7/0.8	4,5,6				
0.036/0.040	20/19	0.9/1.0	4,5,6,8				
0.043/0.047	18	1.1/1.2	5,6,8				
0.051/0.055	17	1.3/1.4	6				
0.059/0.063	16	1.5/1.6	6,8				16.0
			10	32	30		20.0
0.067/0.071	15	1.7/1.8	8				
0.074/0.078	14	1.9/2.0	10				



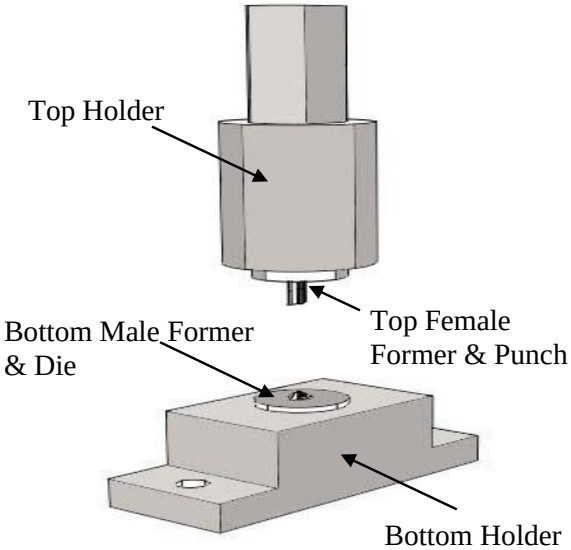
Tooling Inserts to allow "DOWN" forming

Material Thickness Imperial	UK Wire	Metric	Screw Diameter Ø	Dimension's Ø"A"	"B"	"C"	Ø"D"
0.020/0.024	25	0.5/0.6	4,5,6	25	23	25	14.0
0.028/0.032	22/21	0.7/0.8	4,5,6				
0.036/0.040	20/19	0.9/1.0	4,5,6,8				
0.043/0.047	18	1.1/1.2	6,8				

Above dimensions A, B, C and D are in millimetres.
General Tolerance ("A" & "B" +0 -0.05), ("C" & "D" +0.5, -0)
Designs may vary depending on machine type and manufacturer



Tool Layout



1. This option is available for both "UP and DOWN" forming of the helix in the sheet material.

2. Forming inserts to be set on hardened support plates to eliminate the possibility of bedding down during production.

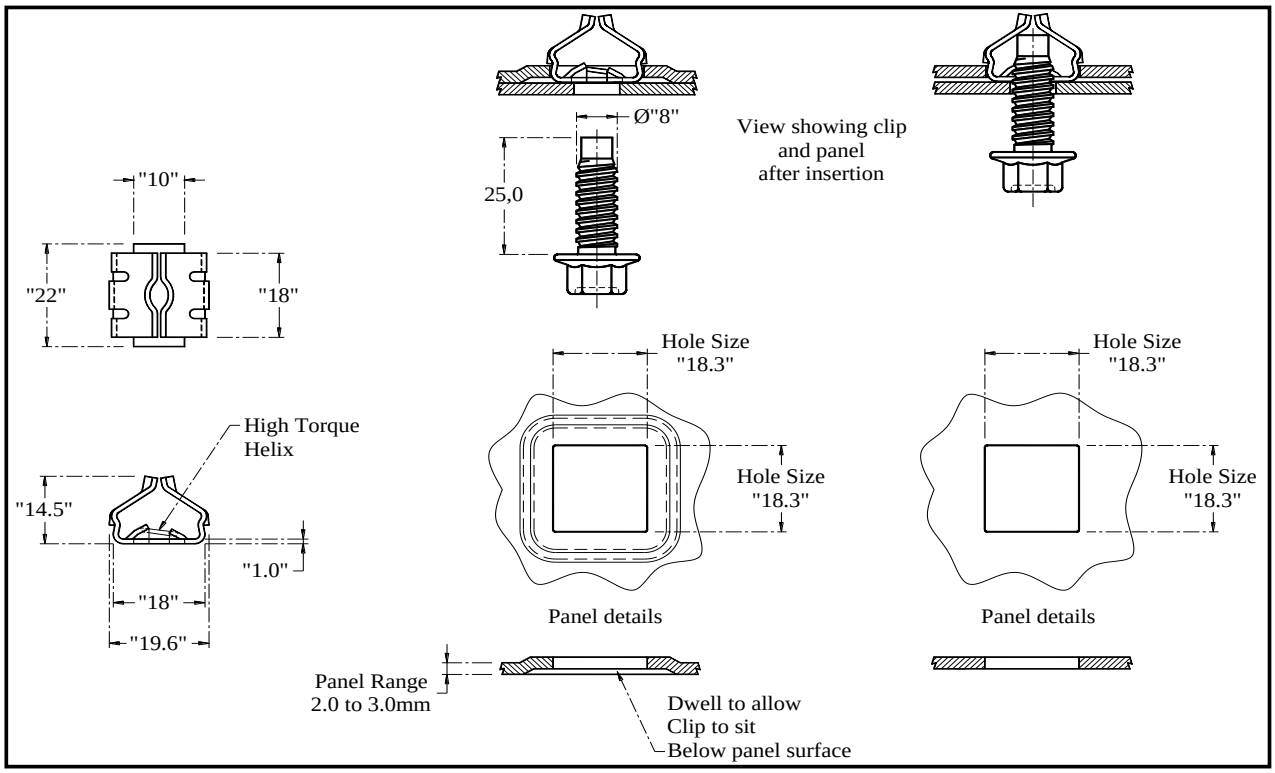
3. To reduce the possibility of material build-up beneath the bottom former/die insert and to achieve maximum support it is recommended that the hole clearance in the fitted hardened support plate be (Ø"D" -0, +2mm).

4. The drawing layout above does not show any stripping requirements which need to be evaluated with each machine type and product variations.

5. This option can also be used for prototyping and engineering feasibility prior to full scale production.

High Torque (Front Loading) Clip

Suitable for Panel Range 2.0mm to 3.0mm



Torque to Failure

Diameter	Newton / meters				Lbs Ft				Lbs in			
	MIN	MAX	MEAN	SD	MIN	MAX	MEAN	SD	MIN	MAX	MEAN	SD
8	27.5	35	30.84	1.84	20.28	25.81	22.75	1.36	243.4	309.78	272.96	16.33

Clamp Load

Diameter	Newtons			Lbs Force			% Decrease	
	INITIAL	AFTER 30 MINS	AFTER 24 HRS	INITIAL	AFTER 30 MINS	AFTER 24 HRS	AFTER 30 MINS	AFTER 24 HRS
8	5874	5837	5776	1320.6	1312.2	1298.4	0.6	1.6