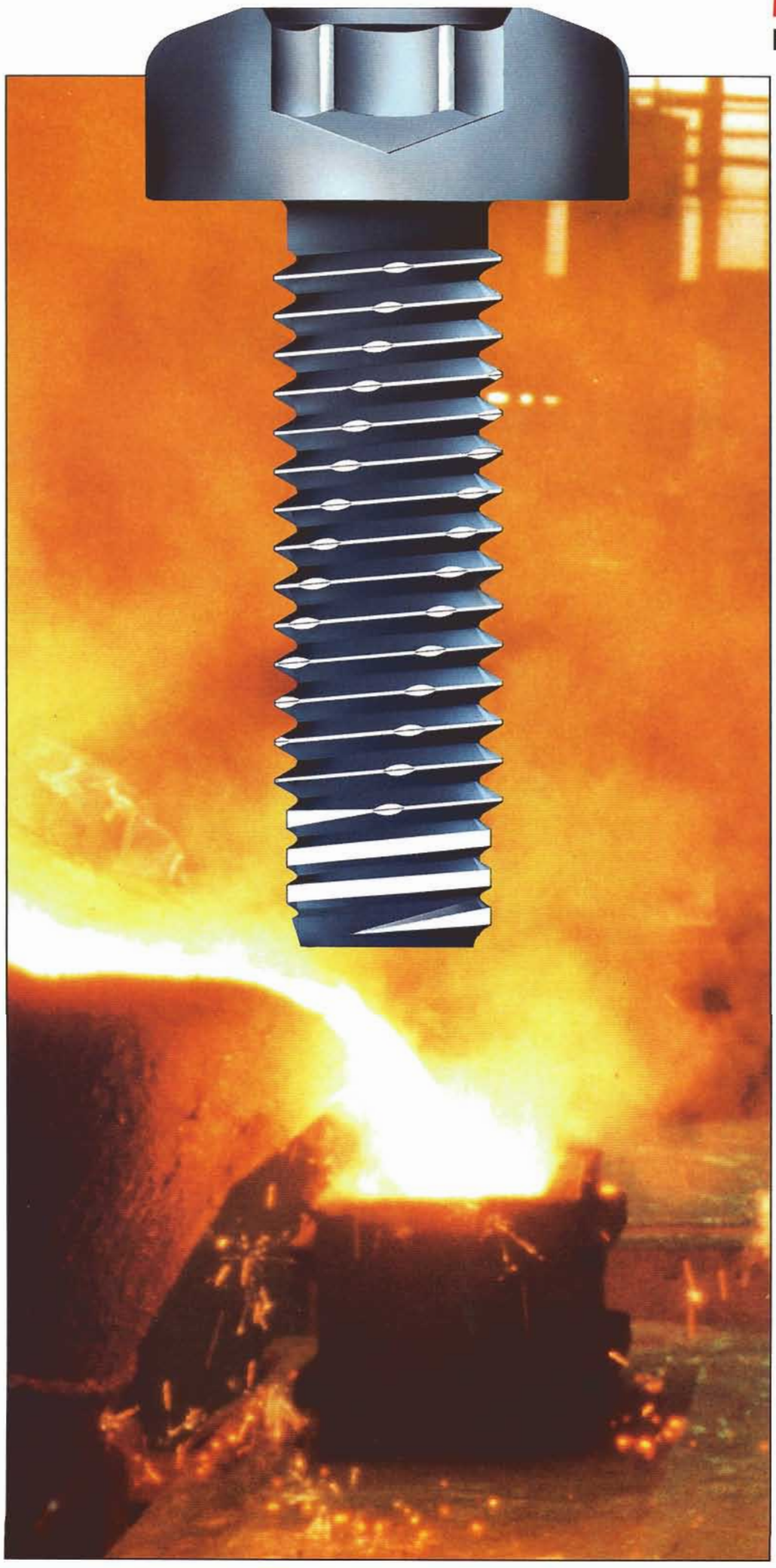
EJOT®
FASTENING SYSTEMS

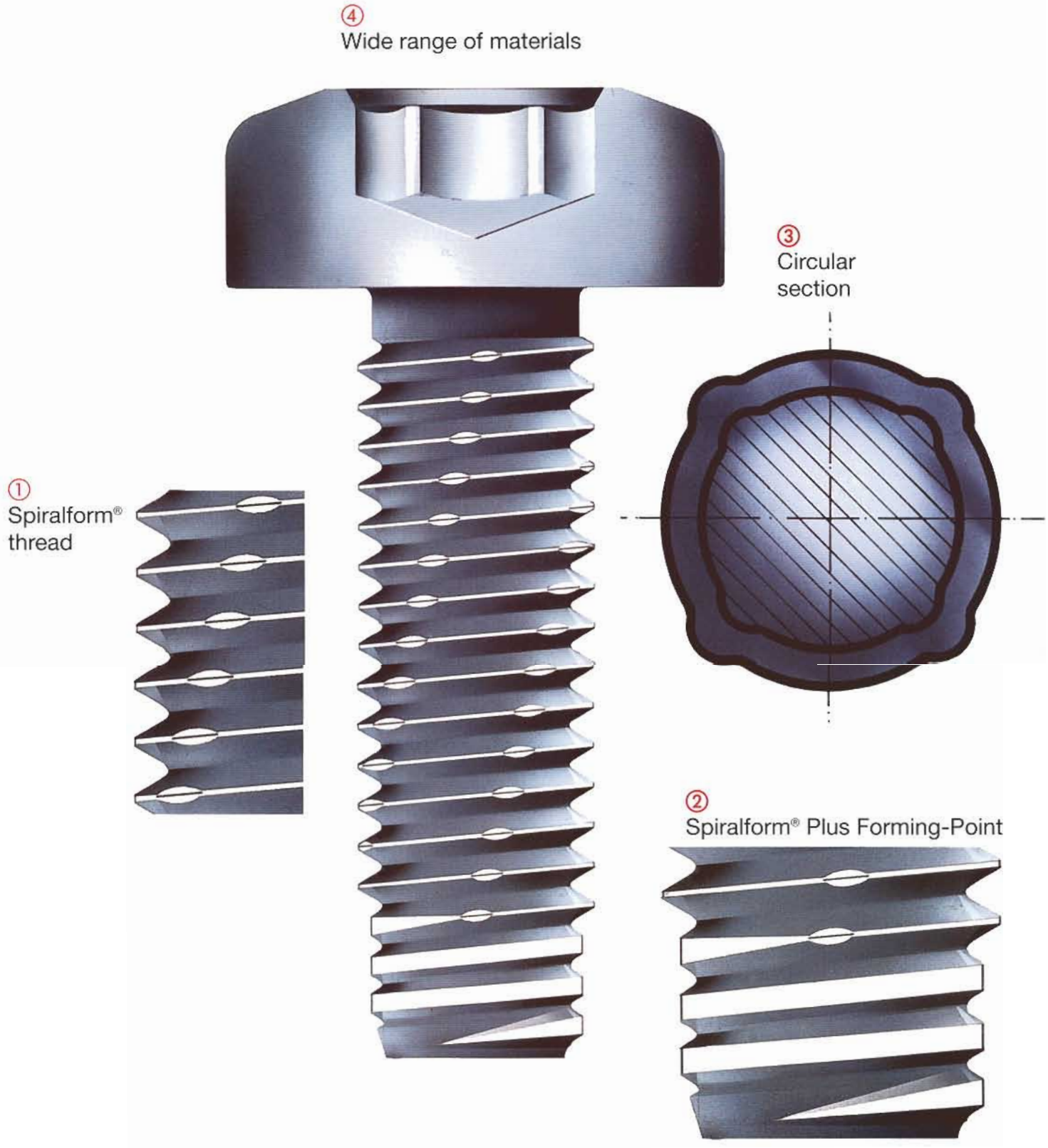


EJOT SPIRALFORM®

The thread formers for metals

EJOT The quality connection

EJOT Spiralform® screws are special fasteners for safe and problem-free screw fixings into metallic materials.



①
EJOT Spiralform® screws have four small lobes that are positioned at 90° around the diameter of the screw and run spirally along the length of the thread. The thread that is formed by the lobes corresponds to metric ISO-standard thread DIN 13, tolerance class 6H. This also meets the requirements of VDE.

②
The new Spiralform Plus-Point and cylindrical thread is designed to achieve low thread forming torque making the initial thread forming process easier.

③
The circular section and small lobes of the Spiralform thread allows the thread to be formed easily but at the same time ensuring that optimum contact between the screw thread and mating material is achieved. This results in a consistently high strength process capable joint.

④
EJOT Spiralform® screws are in a range of different strengths and materials (see table).

The EJOT Spiralform® product family

The requirements for thread forming screws differ from application to application therefore we have developed an EJOT Spiralform® product family which meets the different demands.

Type	Versions	Applications
Spiralform® 	– case hardened acc. to DIN 7500 surface hardness min. 450 HV – stainless steel	steel St 37 - HB 120 for low installation depths
Spiralform® Plus 	– surface: zinc organic, inorganic	steel St 37 - HB 120; the advanced development for low thread forming torques

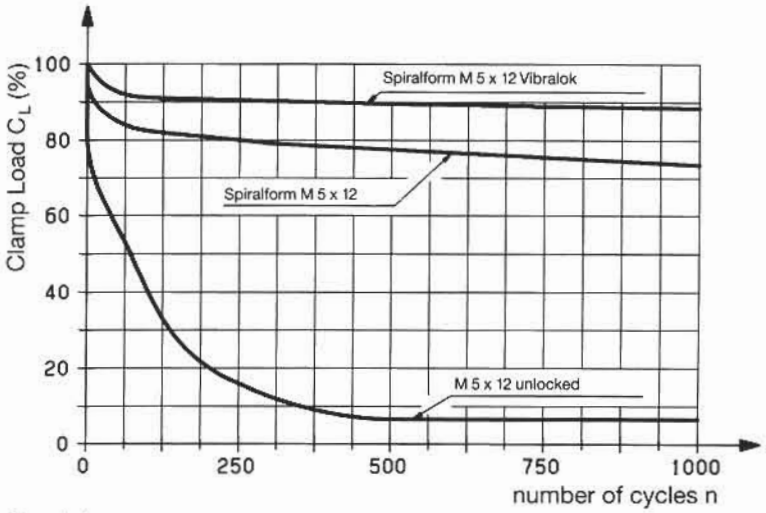
Table: Spiralform® product family

Other versions e.g. property class 10.9 (SF 10) or special surfaces are available upon request.

Thread forming - v - Pre-cut threads

Thread Forming - The better Technical Solution

- The thread forming operation of a Spiralform® screw ensures that the contact area between the screw thread and the mating material is optimised when compared to a pre-cut thread. (see figures 1 & 2)
- The optimised contact area of the Spiralform® ensures a higher degree of safety against loosening under dynamic and thermal demands. (see graph 1)*
- The Spiralform thread carries loads over its whole length providing higher pull-out forces compared to the pre-cut thread.
- Unlike the pre-cut thread the Spiralform® screw forms a thread without chips or swarf. This can be a significant advantage in some application areas like electronic or pneumatics.



Graph 1

* The resistance against loosening under dynamic and thermal demands can be improved further when the EJOT Spiralform® is used in conjunction with EJOT Vibralok® screw locking feature that can be made to be an integral part of the screw.

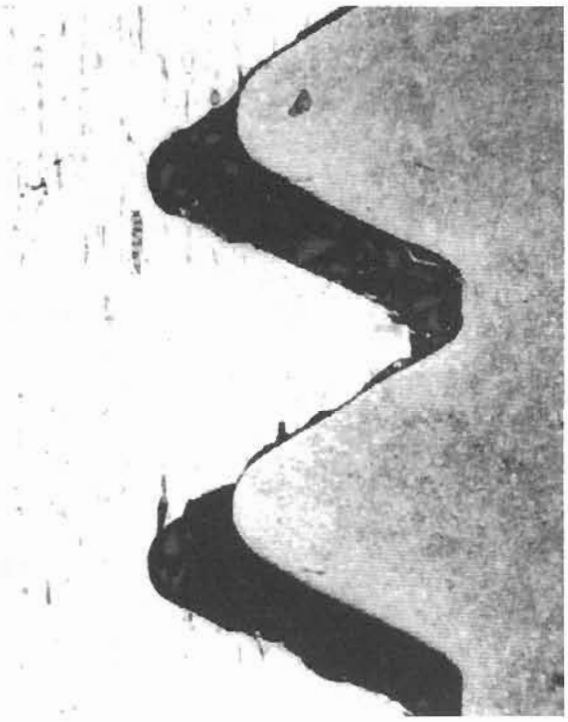


Fig. 1: M 4 x 16 in a pre-cut thread

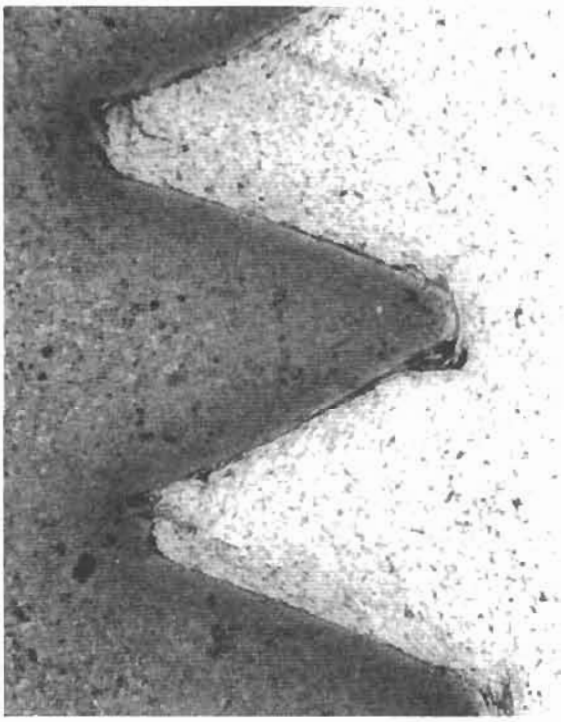
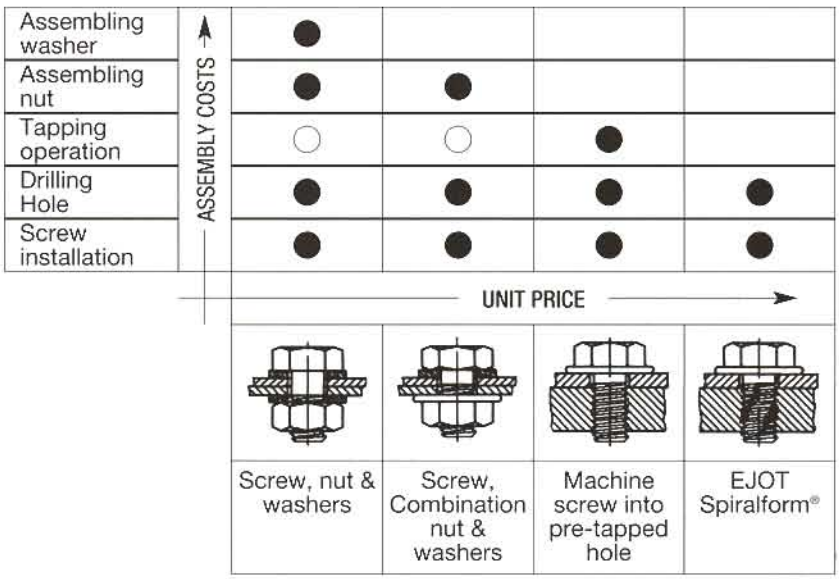


Fig. 2: Spiralform® M 4 x 16

Thread Forming -
The better Economical solution

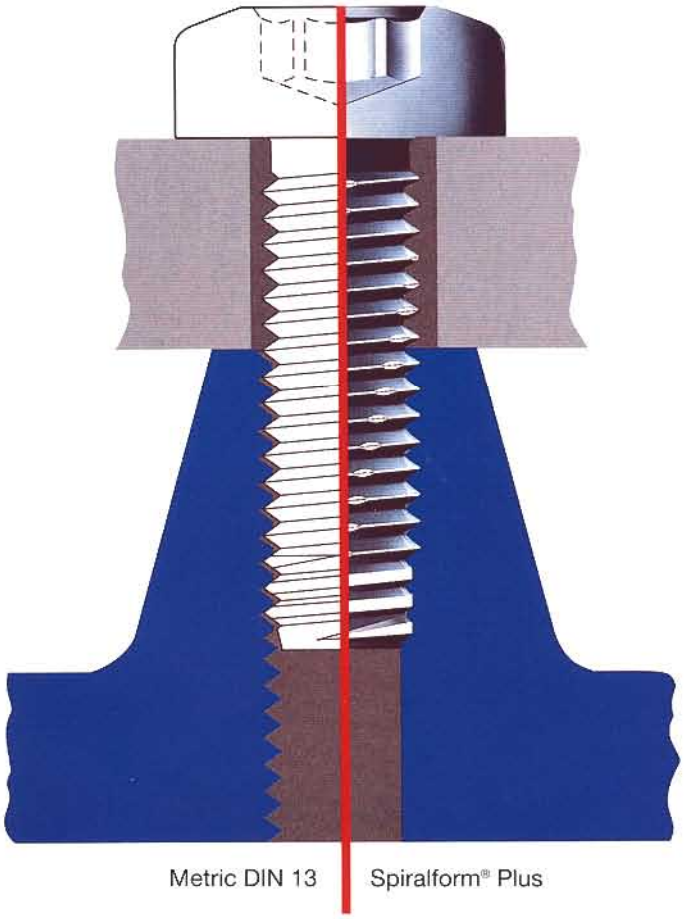


Generally the cost of the screw in comparison to the total cost of the joint is approximately only 20% of that cost. The remaining 80% of the cost is taken up with the preparation of the joint and the associated manufacturing costs.

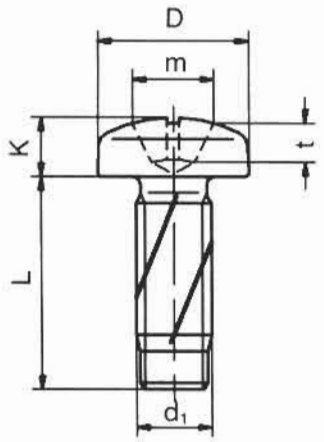
Typically these costs can be identified as follows:

- Thread Cutting
- De-burring
- Thread Cleaning
- Screw Taps & Plug Gauges
- Control Equipment
- Re-working
- Down Time
- Component handling
- Cost of quality

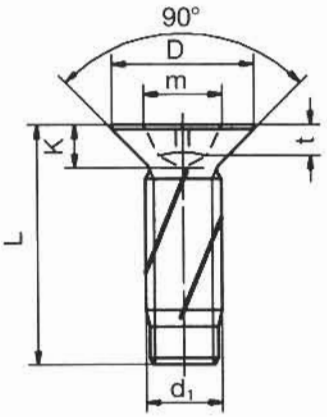
When using the EJOT Spiralform® thread forming screw most of the above costs are simply eliminated. Therefore high productivity efficiencies can be achieved leading to significant cost savings.



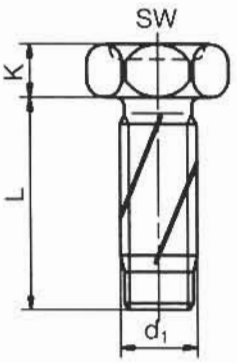
WN 1342



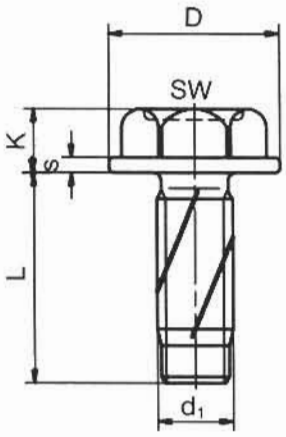
WN 1343



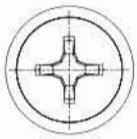
WN 1346



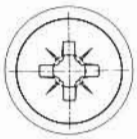
WN 1347



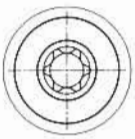
H-cross recess



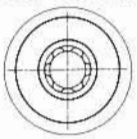
Z-cross recess



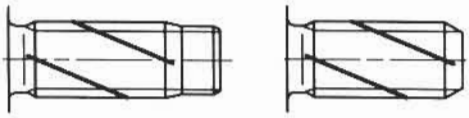
TORX®



Recommended
TORX plus® / AUTOSERT®



Recommended: Plus Type K



Material:

Case hardened steel,
stainless steel A2

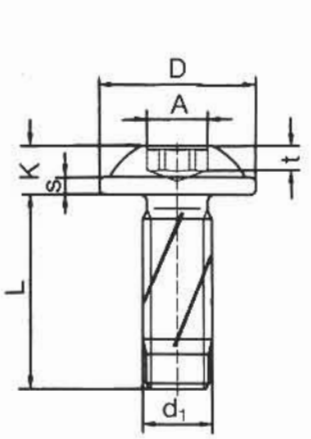
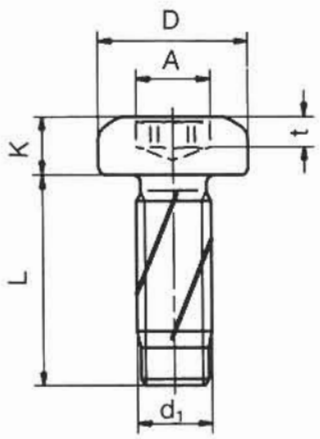
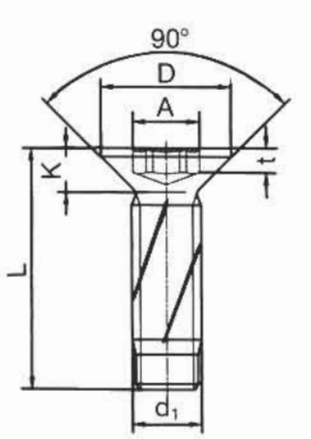
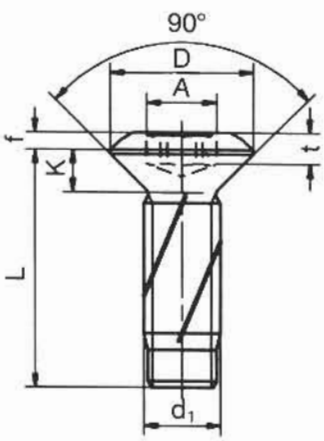
How to specify:
Specification of an EJOT Spiralform® screw with Z-cross recess, type Plus, nominal Ø 4,0 and length L = 20
EJOT SF Plus M 4 x 20 WN 1342-Z

Special designs:

DIN EN ISO 1580, DIN EN ISO 2009, DIN EN ISO 2010, captive washers, undetachable assembled washers, combination cross recesses, combination-TORX®

EJOT VIBRALOK®
screw locking-device

Head	Nominal Ø				SF M 2,5	SF M 3	SF M 3,5	SF M 4	SF M 5	SF M 6	SF M 8
WN 1342	External thread Ø			d_1	2,5	3,0	3,5	4,0	5,0	6,0	8,0
	Head Ø			$D_{max.}$	5,0	6,0	7,0	8,0	10,0	12,0	16,0
	Head height			K	2,0	2,4	2,7	3,1	3,8	4,6	6,0
	H	H-cross recess	width/size	m	2,7/1	3,1/1	4,2/2	4,6/2	5,3/2	6,8/3	9,0/4
			depth t	min.	1,30	1,70	1,74	2,04	2,77	3,03	4,18
				max.	1,60	2,00	2,24	2,54	3,27	3,53	4,68
	Z	Z-cross recess	width/size	m	2,6/1	3,0/1	4,0/2	4,3/2	5,0/2	6,7/3	8,8/4
			depth t	min.	1,27	1,68	1,65	1,90	2,64	3,02	4,06
				max.	1,52	1,93	2,11	2,36	3,10	3,48	4,52
WN 1343	External thread Ø			d_1	2,5	3,0	3,5	4,0	5,0	6,0	8,0
	Head Ø			$D_{max.}$	4,7	5,6	6,5	7,5	9,2	11,0	14,5
	Head height			K	1,5	1,65	1,93	2,2	2,5	3,0	4,0
	H	H-cross recess	width/size	m	2,7/1	2,9/1	3,9/2	4,4/2	4,6/2	6,6/3	8,7/4
			depth t	min.	1,25	1,50	1,40	1,90	2,10	2,80	3,90
				max.	1,55	1,80	1,90	2,40	2,60	3,30	4,40
	Z	Z-cross recess	width/size	m	2,5/1	2,8/1	3,7/2	4,0/2	4,4/2	6,1/3	8,5/4
			depth t	min.	1,22	1,48	1,34	1,60	2,05	2,46	3,86
				max.	1,47	1,73	1,80	2,06	2,51	2,92	4,32
WN 1346	External thread Ø			d_1	2,5	3,0	3,5	4,0	5,0	6,0	8,0
	Head height			K	1,7	2,0	2,4	2,8	3,5	4,0	5,3
	Spanner width			SW	5,0	5,5	6,0	7,0	8,0	10,0	13,0
WN 1347	External thread Ø			d_1			3,5	4,0	5,0	6,0	8,0
	Washer Ø			D			8,0	9,0	11,0	13,0	17,0
	Head height			K			3,0	3,4	4,3	5,0	6,6
	Spanner width			SW			6,0	7,0	8,0	10,0	13,0
	Washer thickness			S			0,8	0,8	1,0	1,0	1,0

WN 1321	WN 1352	WN 1323	WN 1353
			

Head	Nominal Ø		SF M 2,5	SF M 3	SF M 3,5	SF M 4	SF M 5	SF M 6	SF M 8
WN 1321	External thread Ø	d_1	2,5	3,0	3,5	4,0	5,0	6,0	8,0
	Head Ø	$D_{max.}$	6,0	7,5	9,0	10,0	11,5	14,5	19,0
	Head height	$K_{max.}$	2,10	2,35	2,60	3,05	3,55	4,55	5,90
	Washer thickness	$S_{min.}$	0,50	0,60	0,70	0,90	1,05	1,40	1,80
	TORX®		T 8	T 10	T 15	T 20	T 25	T 30	T 40
		A	2,40	2,80	3,35	3,95	4,50	5,60	6,75
		t min.	0,90	1,00	1,10	1,25	1,60	2,00	2,70
		t max.	1,15	1,30	1,40	1,70	2,00	2,40	3,20
	TORXplus®/AUTOSERT®		8 IP	10 IP	15 IP	20 IP	25 IP	30 IP	40 IP
		A	2,40	2,80	3,35	3,95	4,50	5,60	6,75
		t min.	0,90	1,00	1,10	1,30	1,50	1,90	2,60
		t max.	1,15	1,30	1,40	1,65	1,90	2,30	3,10
WN 1352	External thread Ø	d_1	2,5	3,0	3,5	4,0	5,0	6,0	8,0
	Head Ø	D	5,0	6,0	7,0	8,0	10,0	12,0	16,0
	Head height	K	2,0	2,4	2,7	3,1	3,8	4,6	6,0
	TORX®		T 8	T 10	T 15	T 20	T 25	T 30	T 40
		A	2,40	2,80	3,35	3,95	4,50	5,60	6,75
		t min.	0,90	1,00	1,20	1,40	1,60	2,00	2,70
		t max.	1,15	1,30	1,50	1,80	2,00	2,40	3,20
	TORXplus®/AUTOSERT®		8 IP	10 IP	15 IP	20 IP	25 IP	30 IP	40 IP
		A	2,40	2,80	3,35	3,95	4,50	5,60	6,75
		t min.	0,90	1,10	1,10	1,50	1,75	2,20	2,60
		t max.	1,10	1,30	1,40	1,80	2,10	2,60	3,10
WN 1323	External thread Ø	d_1	2,5	3,0	3,5	4,0	5,0	6,0	8,0
	Head Ø	$D_{max.}$	4,7	5,5	7,3	8,4	9,3	11,3	15,8
	Head height	K	1,75	1,85	2,60	2,95	2,95	3,60	4,90
	TORX®		T 8	T 10	T 15	T 20	T 25	T 30	T 40
		A	2,40	2,80	3,35	3,95	4,50	5,60	6,75
		t min.	0,70	0,75	0,85	1,10	1,15	1,40	1,75
		t max.	0,90	1,10	1,15	1,55	1,55	1,80	2,25
	TORXplus®/AUTOSERT®		8 IP	10 IP	15 IP	20 IP	25 IP	30 IP	40 IP
		A	2,40	2,80	3,35	3,95	4,50	5,60	6,75
		t min.	0,70	0,75	0,90	1,10	1,25	1,55	1,85
		t max.	0,90	1,05	1,20	1,45	1,60	2,00	2,40
WN 1353	External thread Ø	d_1	2,5	3,0	3,5	4,0	5,0	6,0	8,0
	Head Ø	$D_{max.}$	4,7	5,6	6,5	7,5	9,2	11,0	14,5
		f~	0,60	0,75	0,90	1,00	1,25	1,00	2,00
	Head height	K	1,50	1,65	1,93	2,20	2,50	3,00	4,00
	TORX®		T 8	T 10	T 15	T 20	T 25	T 30	T 40
		A	2,40	2,80	3,35	3,95	4,50	5,60	6,75
		t min.	0,90	1,00	1,20	1,40	1,60	2,00	2,70
		t max.	1,15	1,30	1,50	1,80	2,00	2,40	3,20
	TORXplus®/AUTOSERT®		8 IP	10 IP	15 IP	20 IP	25 IP	30 IP	40 IP
		A	2,40	2,80	3,35	3,95	4,50	5,60	6,75
		t min.	0,90	1,10	1,10	1,50	1,50	1,90	2,60
		t max.	1,10	1,30	1,40	1,80	1,85	2,30	3,10

Notes for the Designer

The performance of the fastener depends on several important parameters that need to be considered, these are:

- The hole diameter
- Type and Strength of component material
- The installation depth or material thickness
- Type of surface treatment for the screw & mating component
- Any Lubricant used

When using the Spiralform® Plus thread geometry the installation depth in blind holes or thread protrusion through the mating component should be increased by 4 pitches of the thread to accommodate sufficient clearance of the Plus forming point.

For thin sheet metals with a thickness of 0.4 mm to 1.0 mm the EJOT FDS® fastener is recommended.

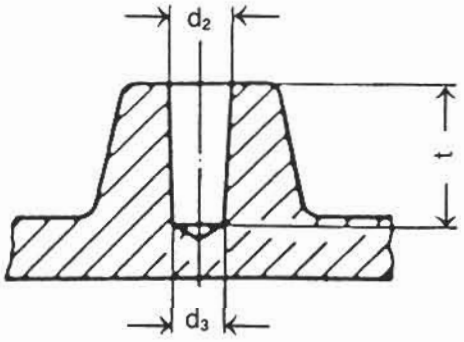
In order to help selection and design, in the first instance please refer to one of the three tables below.

For assistance please consult EJOT application engineering.

Nominal Ø	2,5	3,0	3,5	4,0	5,0	6,0	8,0
length of the forming point (4 xp)	1,8	2,0	2,4	2,8	3,2	4,0	5,0

p = pitch

Construction of the boss for casting materials

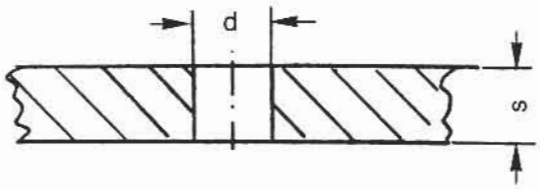


Core hole diameter for casted holes into casting alloys of aluminium and zinc							
Nominal thread dia. d_1	M 2,5	M 3	M 3,5	M 4	M 5	M 6	M 8
d_2 mm	2,40 2,30	2,85 2,75	3,30 3,18	3,75 6,63	4,70 4,85	5,70 5,58	7,60 7,45
d_3 mm	2,30 2,20	2,70 2,60	3,20 3,08	3,60 3,48	4,50 4,38	5,50 5,38	7,30 7,15
External boss dia. min. mm	4,2	5,0	5,8	6,7	8,3	10,0	13,3
Installation depth	$t \geq (1,5 \times d_1)$						

Note: When using die castings we recommend the EJOT ALtracs® screw.

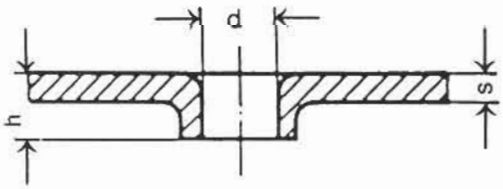
In case of punched holes the punching direction should correspond to the installation direction.

Hole dimensioning for sheet metals



Core hole dia. for drilled and punched holes in steel and light alloys in mm								
Material	Sheet metal thickness or installation length s [mm]	Nominal thread diameter						
		M 2,5	M 3	M 3,5	M 4	M 5	M 6	M 8
Steel 110 - 130 HV	over 0,5 - 1,5 [1]	2,26 2,20	2,71 2,65	3,175 3,10	3,625 3,55	- -	- -	- -
	over 1,5 - 2,5	2,26 2,20	2,76 2,70	3,175 3,10	3,625 3,55	4,575 4,50	5,475 5,40	- -
	over 2,5 - 4,0	2,31 2,25	2,76 2,70	3,225 3,15	3,675 3,60	4,625 4,55	5,525 5,45	7,34 7,25
	over 4,0 - 6,3	2,36 2,30	2,81 2,75	3,225 3,15	3,725 3,65	4,675 4,60	5,575 5,50	7,44 7,35
	over 6,3 - 10,0	- -	2,81 2,75	3,275 3,20	3,775 3,70	4,725 4,65	5,625 5,55	7,54 7,45
	over 10,0	- -	- -	- -	- -	- -	5,675 5,60	7,59 7,50
Light alloys 80 - 120 HV	over 0,5 - 1,5 [1]	2,26 2,20	2,71 2,65	3,175 3,10	3,625 3,55	- -	- -	- -
	over 1,5 - 2,5	2,26 2,20	2,71 2,65	3,175 3,10	3,625 3,55	4,575 4,50	5,475 5,40	- -
	over 2,5 - 4,0	2,31 2,25	2,76 2,70	3,225 3,15	3,625 3,55	4,575 4,50	5,475 5,40	7,34 7,25
	over 4,0 - 6,3	2,36 2,30	2,81 2,75	3,225 3,15	3,675 3,60	4,625 4,55	5,525 5,45	7,39 7,30
	over 6,3 - 10,0	- -	2,81 2,75	3,275 3,20	3,725 3,65	4,675 4,60	5,525 5,45	7,44 7,35
	over 10,0	- -	- -	- -	- -	- -	5,575 5,50	7,49 7,40

Hole dimensioning for sheet metal through drafts



Core hole diameter for sheet metal through drafts in steel HB 110 - 130							
Norminal thread dia.	M 2,5	M 3	M 3,5	M 4	M 5	M 6	M 8
Core hole dia. d mm	2,25 2,31	2,70 2,76	3,15 3,23	3,60 3,68	4,50 4,58	5,40 5,47	7,30 7,39
Through draught depth	h=(1,5 - 2) S						

For other materials contact our hotline, tel. +49 (27 52) 1 09-1 23, fax 1 09-2 68, e-mail: hotline@ejot.de.

[1] If you use thin sheet metals (0,4 mm - 1,0 mm) we recommend the EJOT FDS® screw.

Notes for assembly

The thread forming torque is influenced by the following:

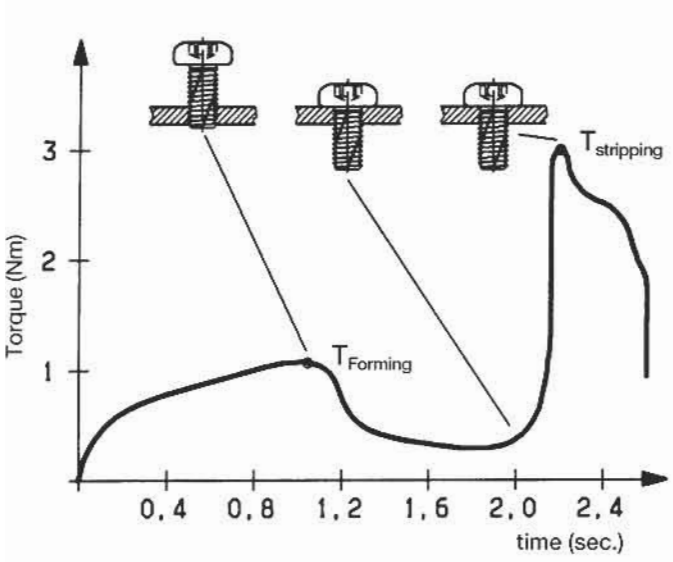
- The external screw diameter
- The hole diameter
- The surface condition of the screw and material of the component
- The material of the component

When using the EJOT Spiralform® Plus screw the selection of the hole diameter must ensure that a load carrying thread is engaged in the component material.

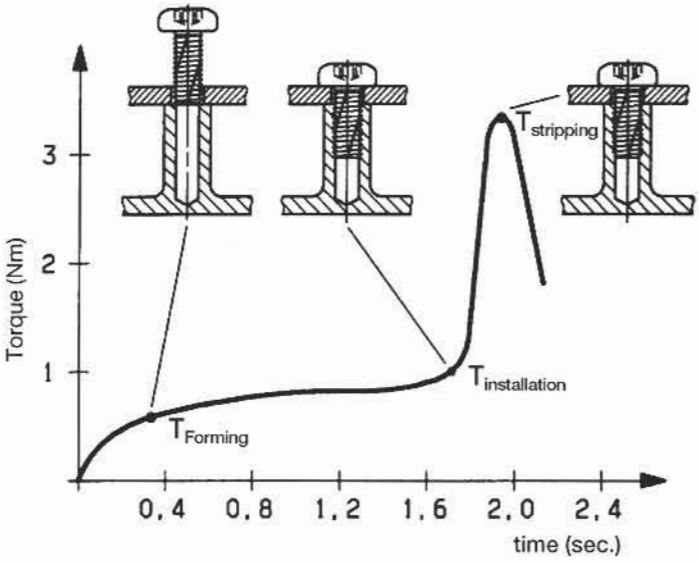
The two graphs below show the forming torque of the EJOT Spiralform® Plus when installed into sheet material (graph 2) and thick section material (graph 3).

EJOT Spiralform® screws can be installed with standard manual or fully automated tooling. EJOT recommend standard tools are used that are fitted with an adjustable torque limitation clutch.

Analysis of measuring process



Graph 2



Graph 3

Specification	Nominal thread diameter						
	M 2,5	M 3	M 3,5	M 4	M 5	M 6	M 8
External diameter max. mm	2,48 2,58	2,98 3,10	3,48 3,61	3,98 4,12	4,98 5,12	5,97 6,12	7,97 8,12
Drilling hole diameter of working part mm	2,3	2,75	3,2	3,6	4,6	5,5	7,4
Thickness of working part, DIN 7500 mm	2,5	3,0	3,5	4,0	5,0	6,0	8,0
Forming torque DIN 7500 max. Nm	0,6	1,0	1,6	2,4	4,7	8,0	20,0
Min. breaking torque Nm	1,0	1,5	2,3	3,4	7,1	12,0	29,0
Min. tensile breaking load N	2700	4000	5400	7000	11400	16000	29000

Table: Extract from DIN 7500

Service for automated assembly

One of the major concerns with automated assembly of screw is contamination by foreign parts, because of this EJOT® offers our EJOMAT® quality that ensures very low rates of ppm on assembly.

Application Engineering

EJOT® has a fully equipped modern test laboratory specifically designed to assist with application testing and design, this is supported by a team of specialist joint fixing application engineers.

Optimise your joint

In order to get the best from your design with advice from the experts involve EJOT® at the earliest possible opportunity in the design process.

Contact:

EJOT® Hotline
tel. +49 (27 52) 1 09 -1 23
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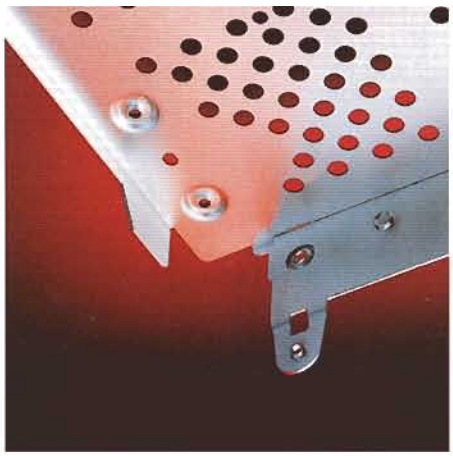
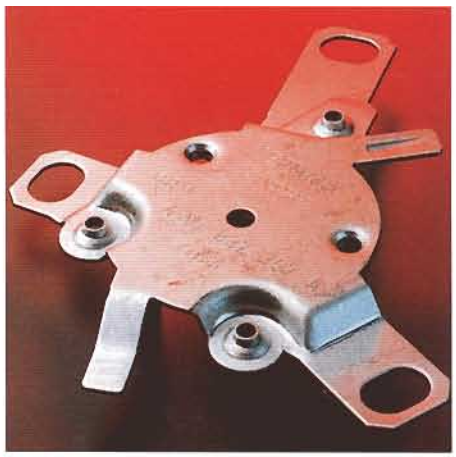
e-mail: hotline@ejot.de

Alternately your local sales office for sales engineering support (see back cover for contact number).





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