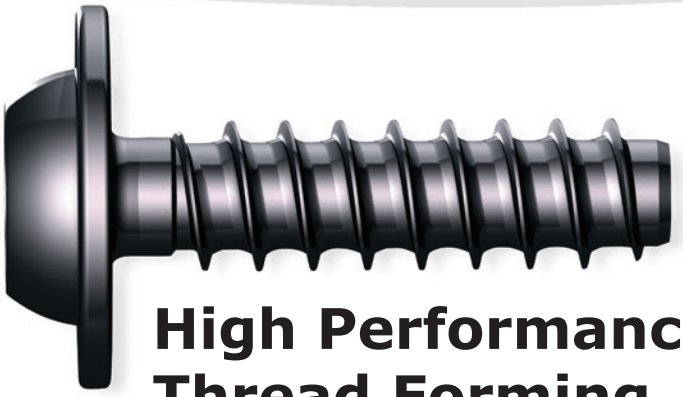
Semblex

DELTA PT®



High Performance Thread Forming Screw for Plastic

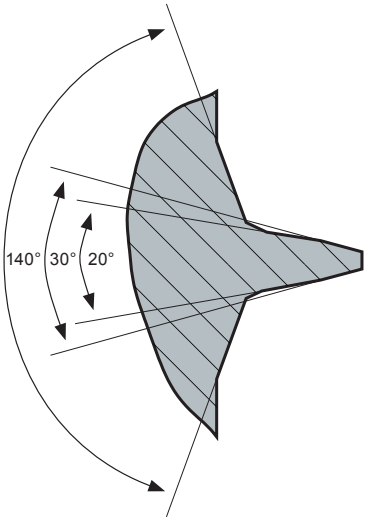
Semblex

DELTA PT®

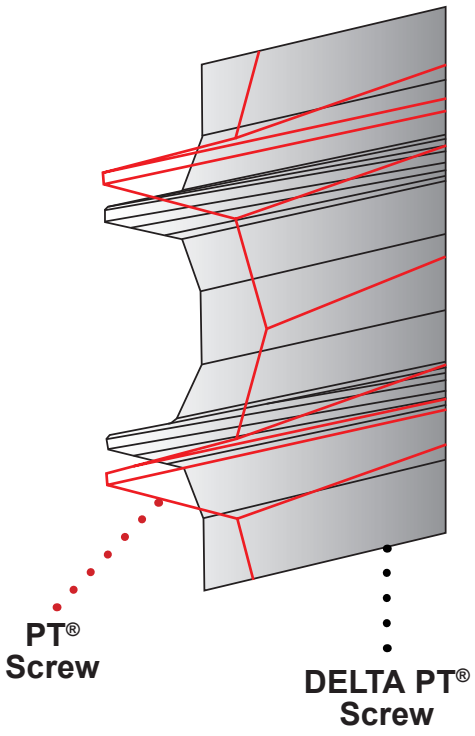
Features and Benefits

Improvements over the original PT®:

- ***New designed flank geometry for optimal flow of the plastic material during the fastening process.***
- ***The service life of the joint is substantially increased, under both static and dynamic stress.***
- ***Up to 50% improved torsional and tensile strength (for the same nominal diameter).***
- ***Use of shorter fasteners and/or smaller diameters is possible due to larger core and reduced thread pitch length.***
- ***The DELTA CALC calculation program created to provide theoretical performance data in many common materials used today.***
- ***Increased vibrational safety by improved pitch.***



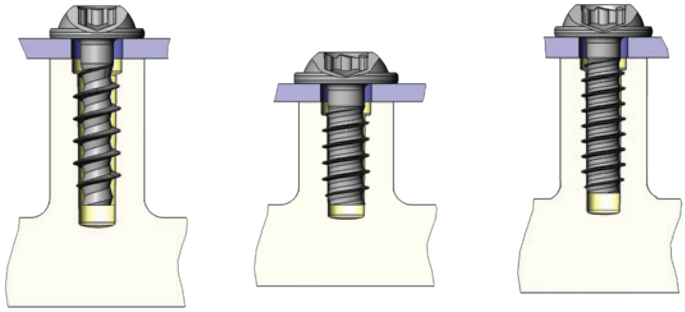
Flank Geometry



Semblex

DELTA PT®

Features and Benefits



Initial Situation
PT® K 50x16

Alternative A
DELTA PT® 50x12

Alternative B
DELTA PT® 40x16

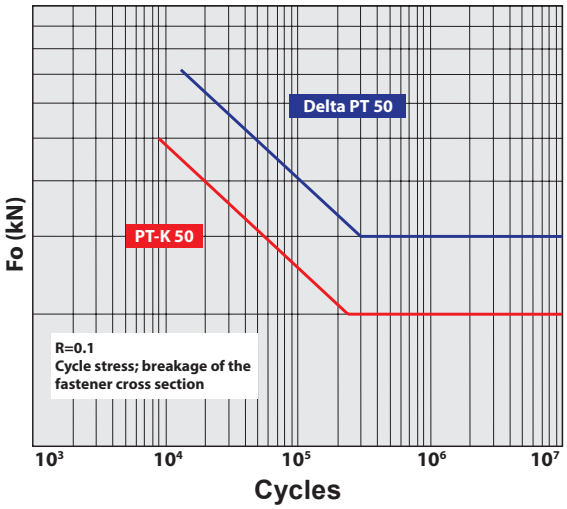
Reduction of Fastener Size

The graphics at left display the possibility of fastener size reduction by switching from a PT® fastener to a Delta PT® fastener. Alternative A represents a reduction in length and Alternative B, a reduction in diameter. In each scenario, the total thread flank engagement is maintained due to the reduced pitch of the Delta PT®. Because of this, boss diameters or heights can be reduced resulting in material savings without sacrificing joint performance.

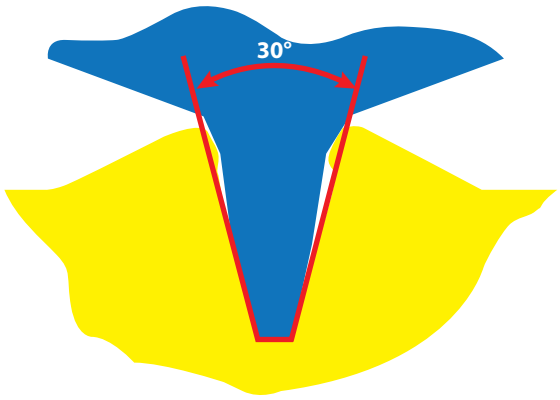
Increased Dynamic Safety

The permanent strength of the fastener cross section was essentially improved by an extended core diameter and an optimum thread design.

To further increase the dynamic safety, the thread teeth were stabilized which led to an improved safety against flank breakage. The improved pitch allows a better flank engagement and provides better conditions against stress fracture of the thread flank.



Cycle stress by PT® and Delta PT®; breakage of the fastener cross section



- **PT® thread flank**
- **Delta PT® thread flank**
- **Thermoplastic material**

Threaded Flank Supports Material Deformation

Optimum thread forming without any material damage, by newly developed flank design

By means of detailed analysis of the material disposition while thread-forming, it was possible to create an optimal flank geometry. During material deformation, lowest resistance can be observed, which prevents friction-inflicted heating.

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DELTA PT®

Fastener Standards

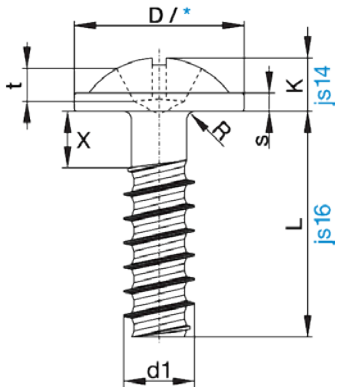
H-cross recess (Phillips®)

Z-cross recess (PoziDriv®)

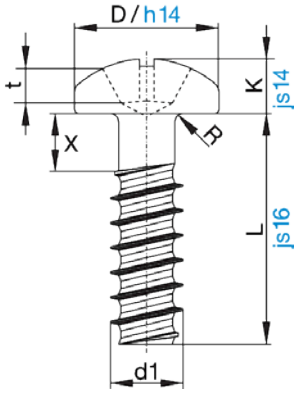
TORXplus® / AUTOSERT®



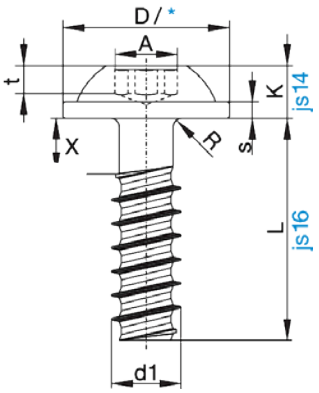

DELTA PT® screws can also be manufactured with combination and other popular drive systems.



WN 5411

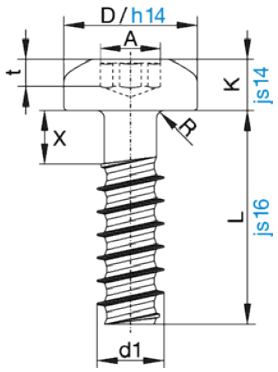


WN 5412

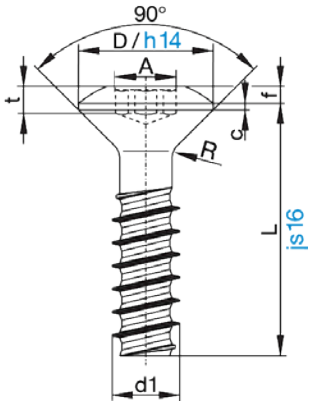


WN 5451

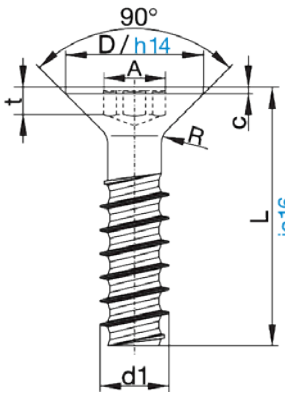
Delta PT®			18	20	22	25	30	35	40	45	50	60	70	80	100
Major Diameter-Ø		d_1	1.80	2.0	2.2	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	10.0
Core Diameter-Ø		d_2	1.22	1.36	1.51	1.72	2.09	2.45	2.81	3.17	3.53	4.26	4.98	5.70	7.15
Thread Pitch		P	0.71	0.78	0.85	0.95	1.12	1.29	1.46	1.63	1.80	2.14	2.48	2.82	3.50
Thread Run-out		x_{max}	0.90	1.0	1.1	1.3	1.5	1.8	2.0	2.3	2.5	3.0	3.5	4.0	5.0
WN 5411															
Head-Ø		D	upon request	4.5	5.0	5.5	6.5	7.5	9.0	10.0	11.0	13.5	15.5	upon request	upon request
Head Height		K		1.40	1.60	1.80	2.10	2.40	2.50	2.50	3.20	4.00	4.60		
Radius		R_{max}		0.35	0.35	0.40	0.50	0.50	0.60	0.60	0.70	0.80	0.90		
Washer Thickness		s		0.6	0.6	0.7	0.8	0.9	1.0	1.0	1.2	1.4	1.6		
Type 1 cross-recess	Penetration	t min.		0.51	0.68	0.82	1.15	1.07	1.33	1.33	1.98	2.24	2.84		
	Depth	t max.		0.97	1.14	1.28	1.61	1.70	1.96	1.96	2.61	2.90	3.50		
Type 1A cross-recess	Penetration	t min.		0.73	0.86	1.01	1.26	1.08	1.40	1.40	2.01	2.27	2.91		
	Depth	t max.		0.98	1.11	1.26	1.51	1.54	1.86	1.86	2.47	2.73	3.37		
Driver Size				1	1	1	1	2	2	2	2	3	3		
WN 5412															
Head-Ø		D	upon request	3.5	3.9	4.4	5.3	6.1	7.0	7.5	8.8	10.5	12.3	upon request	upon request
Head Height		K		1.60	1.60	1.90	2.30	2.70	3.10	3.20	3.50	4.20	5.10		
Radius		R_{max}		0.35	0.35	0.40	0.50	0.50	0.60	0.60	0.70	0.80	0.90		
Type 1 cross-recess	Penetration	t min.		0.64	0.74	0.92	1.19	1.23	1.51	1.51	2.12	2.44	3.00		
	Depth	t max.		1.10	1.20	1.38	1.65	1.86	2.14	2.14	2.75	3.10	3.66		
Type 1A cross-recess	Penetration	t min.		0.82	0.92	1.08	1.36	1.26	1.62	1.62	2.23	2.57	3.14		
	Depth	t max.		1.07	1.17	1.33	1.61	1.72	2.08	2.08	2.67	3.03	3.61		
Driver Size				1	1	1	1	2	2	2	2	3	3		
WN 5451															
Head-Ø		D	4.0	4.5	5.0	5.5	6.5	7.5	9.0	10.0	11.0	13.5	15.5	18.0	21.5
Head Height		K	1.35	1.6	1.6	1.9	2.3	2.7	3.1	3.2	3.5	4.2	4.9	5.6	6.6
Radius		R_{max}	0.25	0.35	0.35	0.40	0.50	0.50	0.60	0.60	0.70	0.80	0.90	0.95	1.10
Washer Thickness		s	0.60	0.6	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.4	1.6	1.8	2.2
TORXplus® / AUTOSERT®			6IP	6IP	6IP	8IP	10IP	15IP	20IP	20IP	25IP	30IP	30IP	40IP	50IP
		A	1.75	1.75	1.75	2.40	2.80	3.35	3.95	3.95	4.50	5.60	5.60	6.75	8.95
Penetration Depth		t min.	0.50	0.65	0.65	0.80	1.00	1.10	1.40	1.40	1.50	1.90	2.30	2.60	3.00



WN 5452



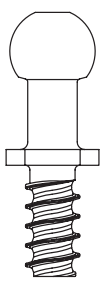
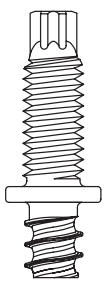
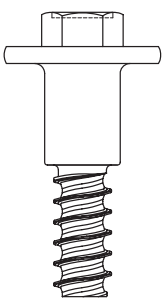
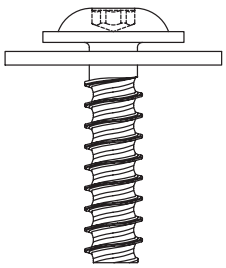
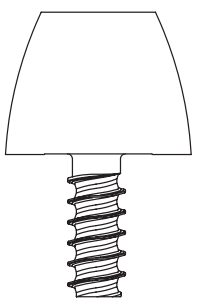
WN 5453



WN 5454

Delta PT®		18	20	22	25	30	35	40	45	50	60	70	80	100
Major Diameter-Ø	d_1	upon request	2.0	2.2	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	10.0
Core Diameter-Ø	d_2		1.36	1.51	1.72	2.09	2.45	2.81	3.17	3.53	4.26	4.98	5.70	7.15
Thread Pitch	P		0.78	0.85	0.95	1.12	1.29	1.46	1.63	1.80	2.14	2.48	2.82	3.50
Thread Run-out	x_{max}		1.0	1.1	1.3	1.5	1.8	2.0	2.3	2.5	3.0	3.5	4.0	5.0
WN 5452														
Head-Ø	D	upon request	3.5	3.9	4.4	5.3	6.1	7.0	7.5	8.8	10.5	12.3	14.1	17.0
Head Height	K		1.6	1.6	1.9	2.3	2.7	3.1	3.2	3.5	4.2	4.9	5.6	6.6
Radius	R_{max}		0.35	0.35	0.40	0.50	0.50	0.60	0.60	0.70	0.80	0.90	0.95	1.10
TORX plus® / AUTOSERT®			6IP	6IP	8IP	10IP	15IP	20IP	20IP	25IP	30IP	30IP	40IP	50IP
	A		1.75	1.75	2.40	2.80	3.35	3.95	3.95	4.50	5.60	5.60	6.75	8.95
Penetration Depth	t min.		0.65	0.65	0.80	1.00	1.10	1.40	1.40	1.50	1.90	2.30	2.60	3.00
WN 5453														
Head-Ø	D	upon request	4.0	4.4	5.0	6.0	7.0	8.0	9.0	10.0	12.0	14.0	16.0	20.0
Flat on Head	c_{max}		0.35	0.35	0.55	0.55	0.65	0.70	0.70	0.75	0.85	0.90	0.95	1.10
	≈ f		0.40	0.40	0.50	0.70	0.80	1.00	1.00	1.20	1.20	1.30	1.40	1.60
Radius	R_{max}		0.80	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.40	2.60	3.20	4.50
TORX plus® / AUTOSERT®			6IP	6IP	8IP	10IP	15IP	20IP	20IP	25IP	30IP	30IP	40IP	50IP
	A		1.75	1.75	2.40	2.80	3.35	3.95	3.95	4.50	5.60	5.60	6.75	8.95
Penetration Depth	t min.		0.65	0.65	0.80	1.00	1.10	1.40	1.40	1.50	1.90	2.30	2.60	3.00
WN 5454														
Head-Ø	D	upon request	4.0	4.4	5.0	6.0	7.0	8.0	9.0	10.0	12.0	14.0	16.0	20.0
Flat on Head	c_{max}		0.35	0.35	0.55	0.55	0.65	0.70	0.70	0.75	0.85	0.90	0.95	1.10
Radius	R_{max}		0.80	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.40	2.60	3.20	4.50
TORX plus® / AUTOSERT®			6IP	6IP	8IP	10IP	15IP	20IP	20IP	25IP	30IP	30IP	40IP	50IP
	A		1.75	1.75	2.40	2.80	3.35	3.95	3.95	4.50	5.60	5.60	6.75	8.95
Penetration Depth	t min.		0.50	0.50	0.70	0.75	0.95	1.10	1.25	1.25	1.50	2.30	2.40	3.00

Specials / Examples

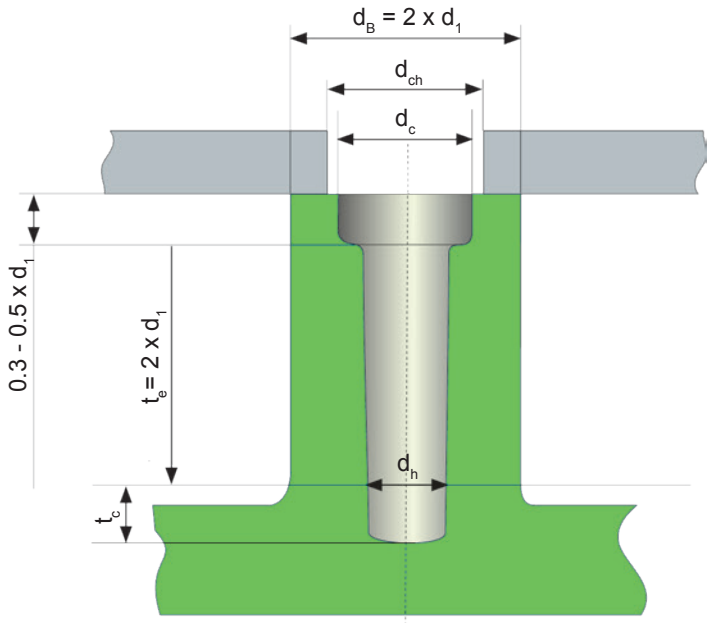
Boss Design

In principle, the boss design should correspond to the following design recommendation. The counterbore is of special importance, as it ensures a favorable stress, thus preventing boss cracking. In addition, the counterbore acts as guide during setting and initial thread forming.

The most favorable hole diameter is:

$$d_h = 0.8 \times d_1$$

For higher filled materials or materials with increased strength, the hole diameter may be increased.

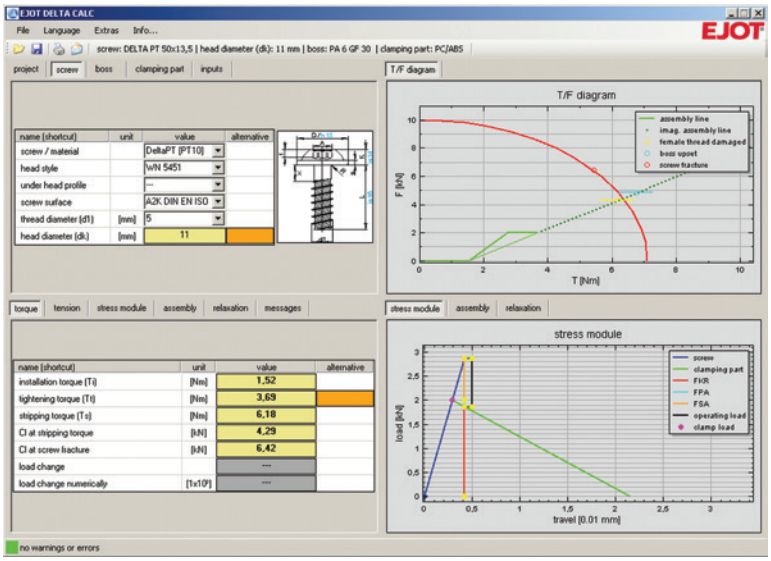


d_1 = Nominal-Ø of the screw

$d_c = d_1 + 0.2$ mm

Design recommendations have been developed through laboratory tests. In practical operations, variations of these recommendations may occur due to:

- Processing conditions of the material
- Design of the injection molding tool
- Distance to the injection point
- The formation of welding lines
- Local textures caused by additives and fillers
- Materials often show different structures



DELTA CALC Program

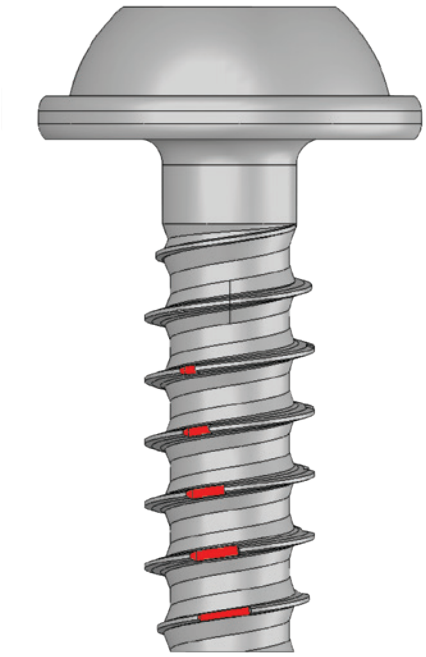
This calculation program was developed specifically for the Delta PT® product.

The software can validate application designs by providing theoretical assembly parameters and performance. This greatly speeds up engineering development time.

Semblex

DELTA PT®

DELTA PT® DS



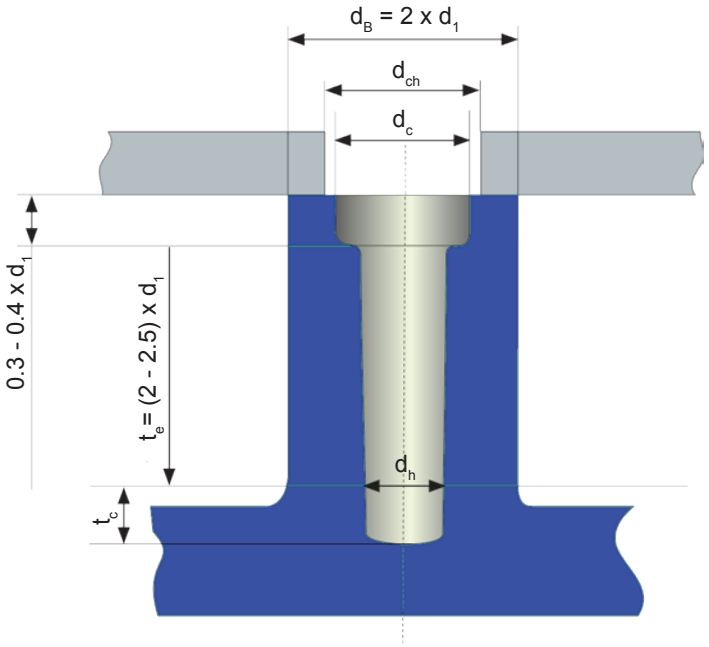
Some designs require the use of thermosets, which pose special demands on the direct assembly because of their hardness and brittleness.

In response to these challenging conditions, the DELTA PT® DS screw was developed. Special grooves which help to cut the female thread have been added to the thread geometry of the established DELTA PT®. These grooves are especially distinct at the tip of the thread and taper off towards the screw head. This thread forming zone enables a low tightening torque while maintaining high stripping torque.

Advantages of DELTA PT® DS compared to screws with machine milled cutting edge:

- ***Smaller hole depth possible because less chip space is required compared to screws with a traditional cutting edge.***
- ***Cost saving potential through standardization – only one screw for thermosets and thermoplastics.***
- ***Removal of costly inserts possible due to the multiple reusability feature provided by the thread design.***
- ***Wider production range regarding screw diameter and length.***
- ***Larger thread engagement area for the same insertion depth.***

Boss Design Guide for DELTA PT® DS



d_h = Hole- Ø = 0.83 - 0.90 x d_1
d_1 = Nominal Ø of the screw
d_c = Counterbore diameter = d_1 + 0.2 mm
t_c = Chip space = 0.8 - 1.2 x d_1

Engineering Services

Design & Technical Assistance
VA/VE Project Support
Product Engineering Samples
Training Programs
On-Site Technical Support
Application Testing
Product Teardowns

Value Added Services

Technical Sales Team
Integrated Supply Base
Sourcing Solutions
Customized Labeling and Packaging
EDI Capable
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