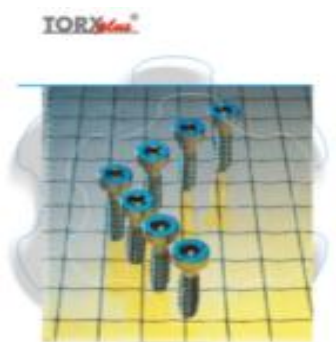


Main Content 主要内容

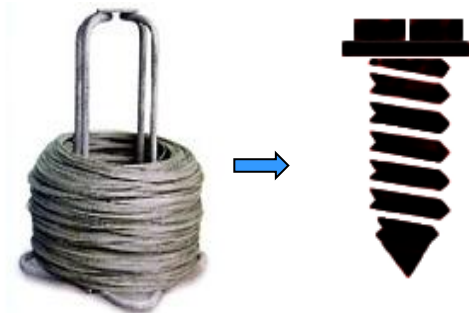
A Product introduction 产品简介



A Production capacity 生产能力



A Process flow 工艺流程



A Applications 产品应用



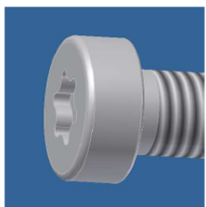
PRODUCT INTRODUCTION

产品简介



Head Types 头型

CHE HEAD



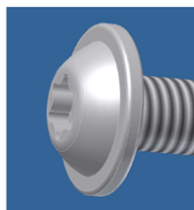
圆柱头 (象棋头)

PAN HEAD



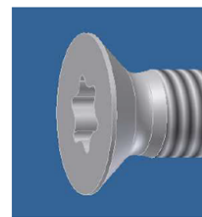
盘头

MU HEAD



蘑菇头

COU HEAD



沉头

ET-FLA HEAD



外Torx 法兰面

RCOU HEAD



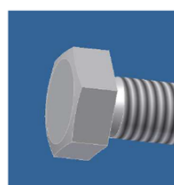
半沉头

ROU HEAD



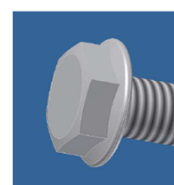
扁圆头

HEX HEAD



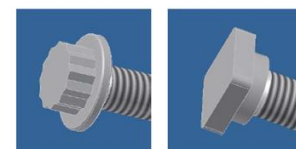
六角头

HEX-FLA HEAD



六角头 法兰面

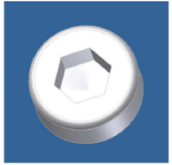
SPL HEAD



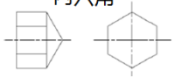
特殊头型

Drive System 驱动系统

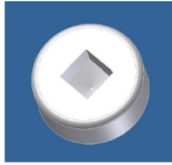
Internal Hexagon IHV



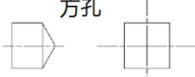
内六角



Internal Squard ISQ



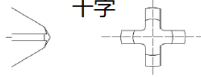
方孔



Philips H



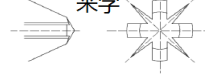
十字



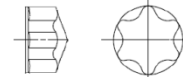
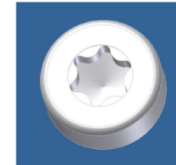
Pozidriv Z



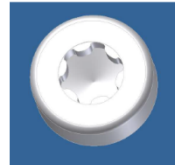
米字



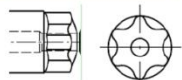
TORX®



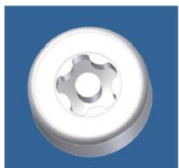
TORX PLUS®



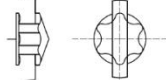
**Torx®
Tamper Resistant**



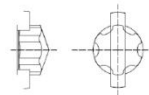
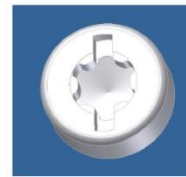
**Torx Plus®
Tamper Resistant**



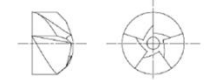
Combi-Torx®



Combi-Torx Plus®



Loctec®



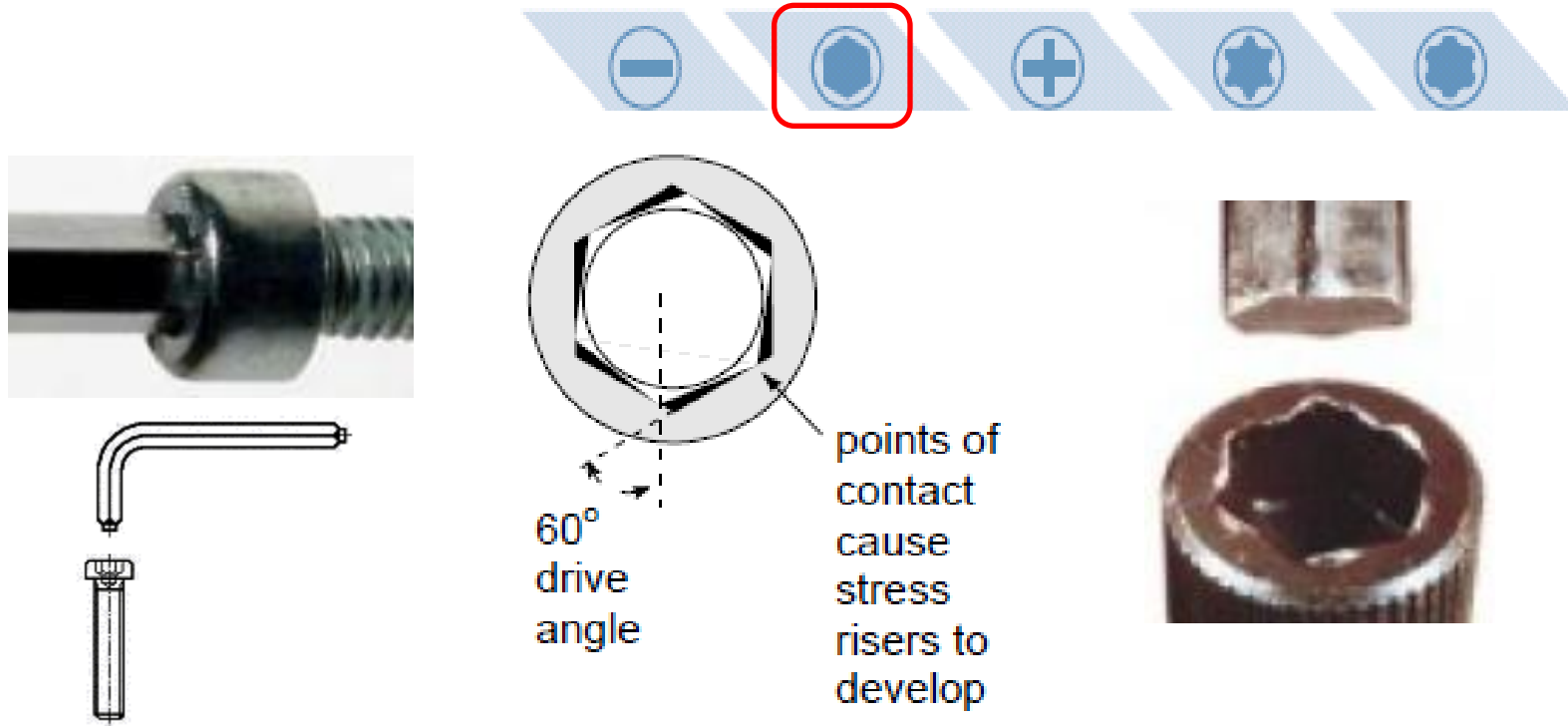
Slot



一字



Drive systems and difference 驱动系统及差别



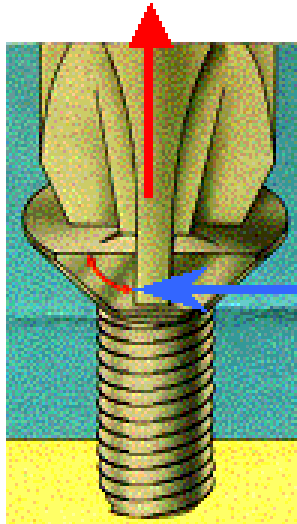
Point contact causes stress to develop, which damages driver bit and fastener recess

点接触会产生应力，从而损坏批头和紧固件驱动槽

60° drive angle is inefficient in transferring torque

60度的驱动角在传递扭矩方面效率也是比较低的

Drive systems and difference 驱动系统及差别



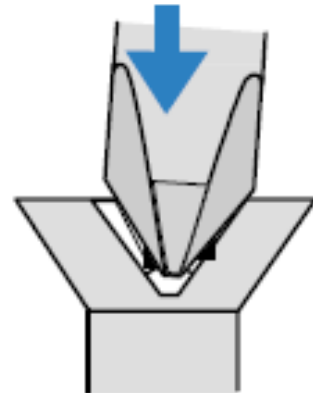
Driving force is carried up sloped sides, forcing driver up and out of recess (camout)

驱动力通过倾斜的侧面传递，迫使批头向上且退出驱动槽



To counteract cam-out, additional force (end load) must be placed against the driver

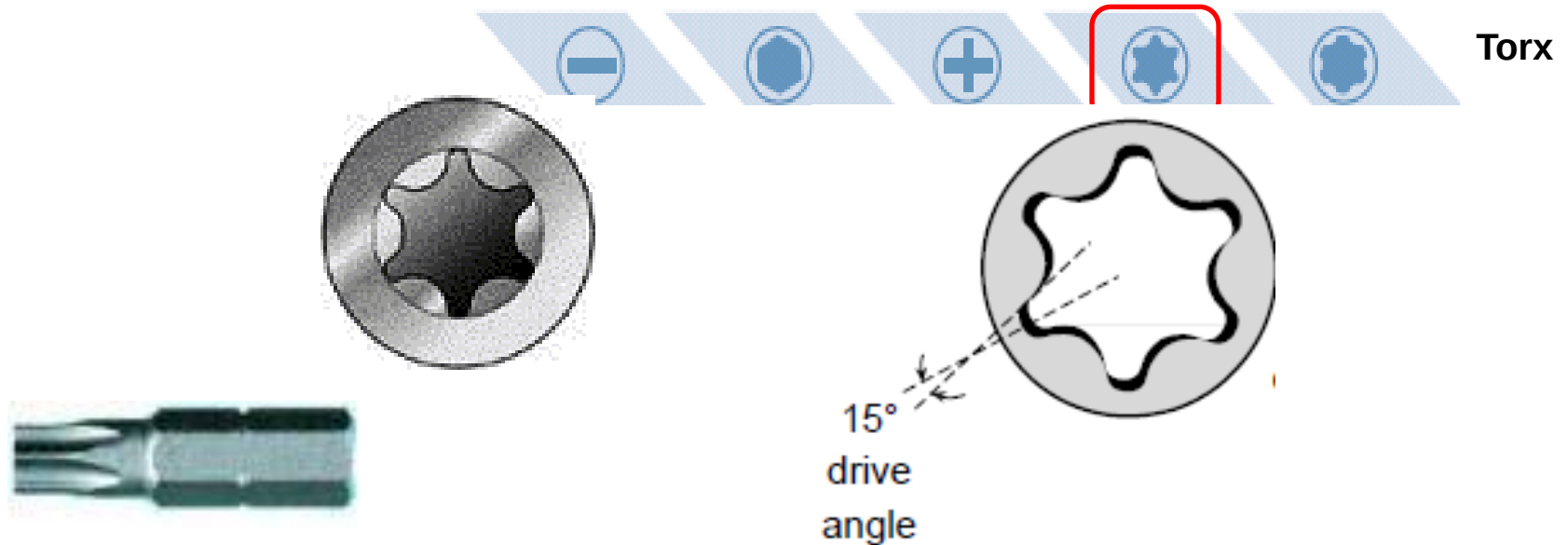
为了抵消这种状况，必须对批头施加额外的力（末端载荷）



The screwdrivers may become damaged. At the same time the drive may get so damaged, that the fastener can no more be removed.

批头可能会因此而损坏。同时，驱动可能会损坏得很厉害，造成无法再卸紧固件。

Drive systems and difference 驱动系统及差别



Point Allows higher torque transmission

点可以获得更高的扭矩传递

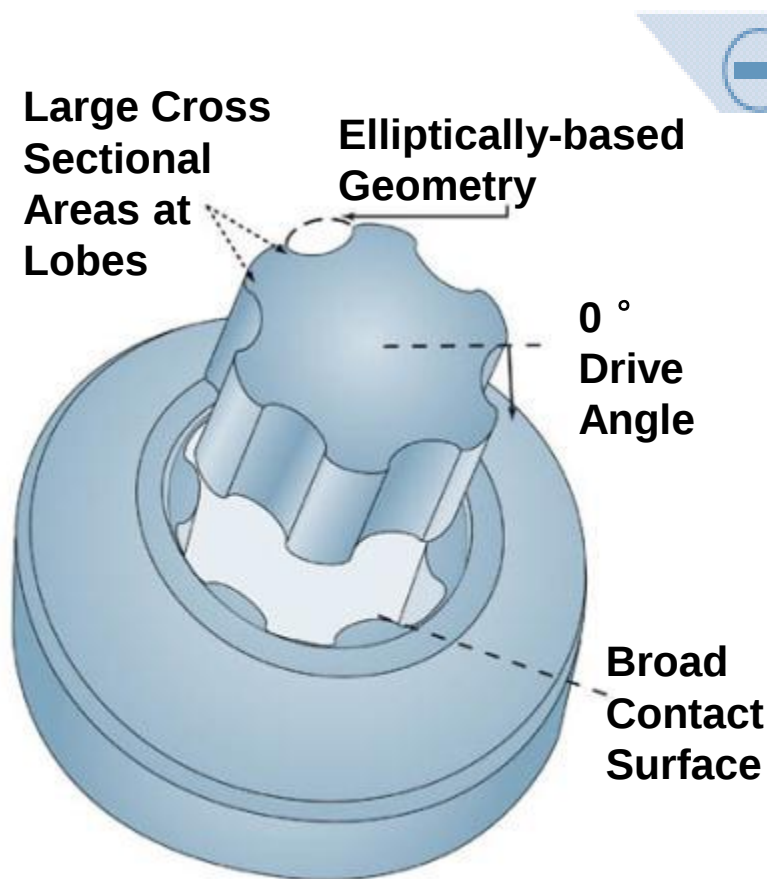
15° drive angle still permits a small amount of radial stress, which can reduce bit life

15度的驱动角仍然允许少量会缩减批头寿命的径向应力。

Tool may be difficult to align properly in high-speed assemblies

批头可能难以在高速装配中的更好的对准。

Drive systems and difference 驱动系统及差别



Torx Plus

0° Drive Angle 0° 驱动角

Elliptically-based Geometry

椭圆形的几何设计

Six Lobes with Large Cross-Sectional Areas

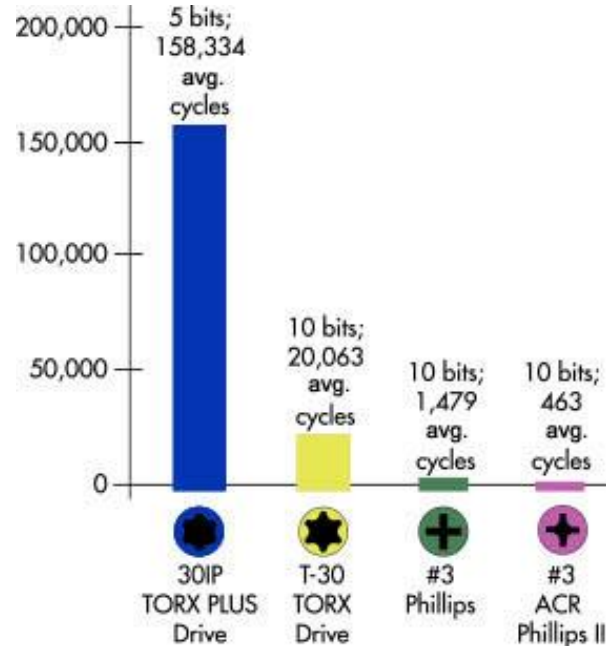
具有很大面积的六个圆形凸起

Vertical Sidewalls 竖直方向接触面

Drive systems and difference 驱动系统及差别

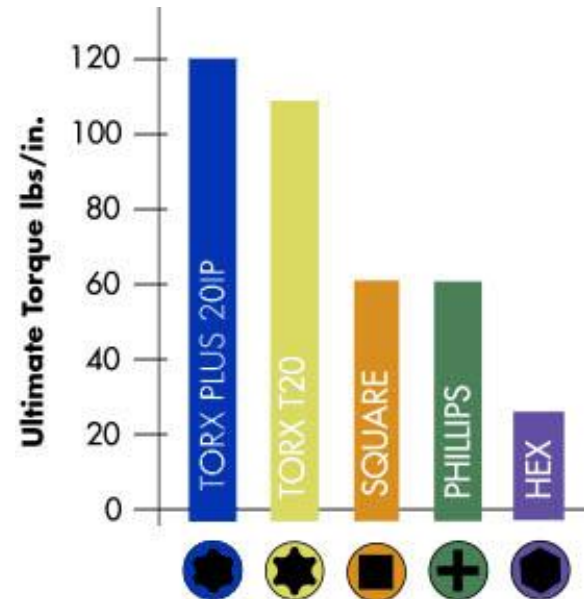


Drive Durability Test 紧固系统耐用性测试



The TORX PLUS Drive has been proven to significantly outlast all other drive systems.

Ultimate Torsion Strength Test 极限扭矩测试

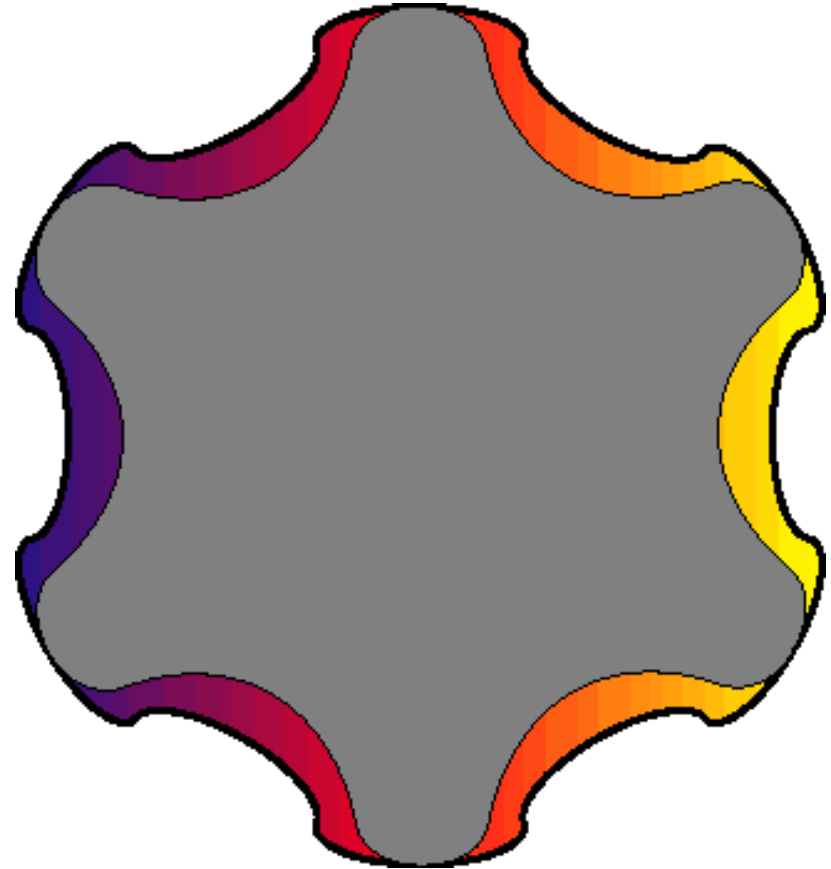


The torque transfer capabilities of the TORX PLUS are higher than other Drive Systems.

TORX PLUS[®] DRIVE SYSTEM

Elliptical lobes increase the cross-sectional area of the shape of TORX PLUS[®].

TORX[®] drive tools will work with TORX PLUS[®] fasteners. But the effect is not very good.

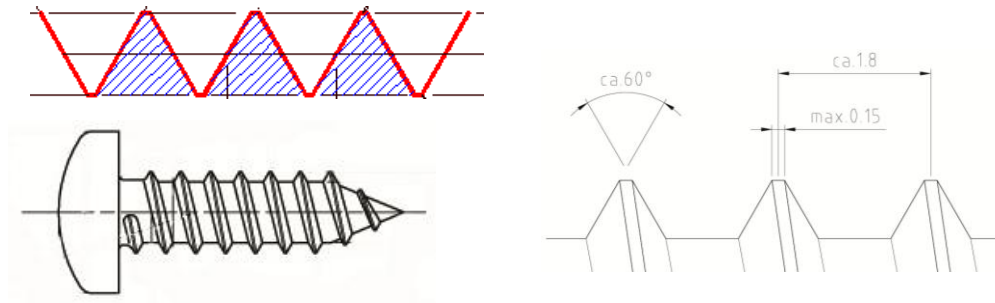


torxPlusApr07.exe

Thread Types 螺纹类型

Metric thread
公制螺纹

Self-Tapping
自攻钉

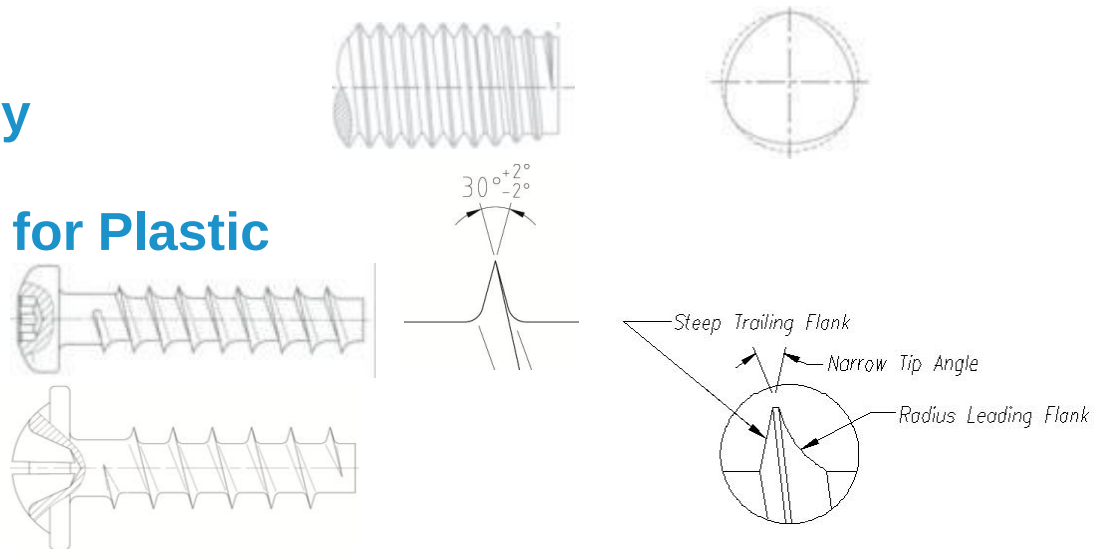


Thread forming for Metal
金属自挤螺钉

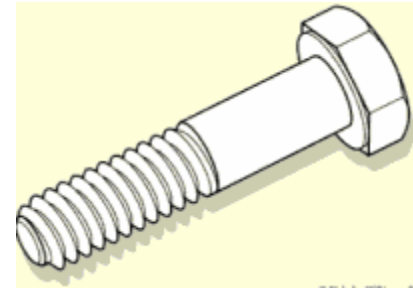
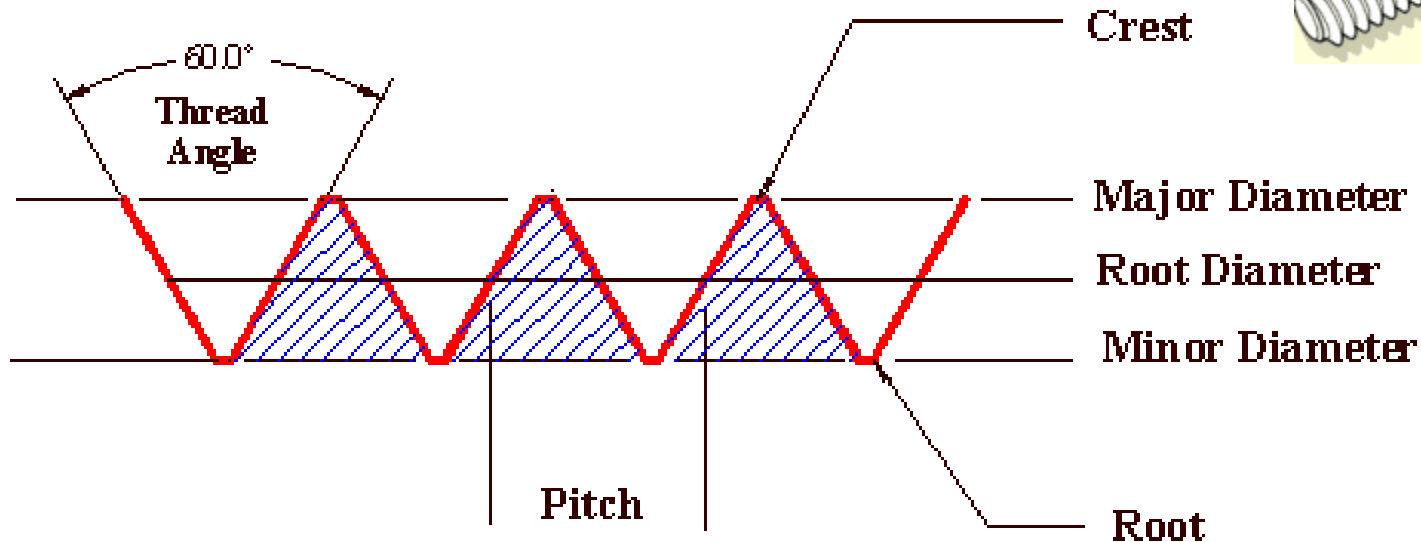
Taptite[®] family

Thread forming for Plastic
塑料自挤螺钉

KT
Remform[®]



Metric thread 公制螺纹



Metric thread 公制螺纹

Thread--ISO Tolerance – Example

M3 – 6g What is the Major Diameter Range?

Tolerance Grade: 6

Tolerance Grade 6, Range: 106um

Tolerance Position: g

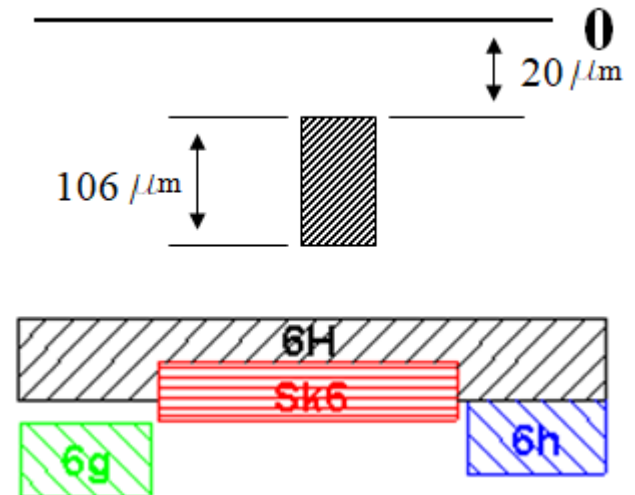
Tolerance Position g, Range: 20um

M3 Major Diameter is,

$$3.00 - 0.020 = 2.980 \text{ mm}$$

$$3.00 - 0.126 = 2.874 \text{ mm}$$

Diameter Range: 2.874 ~ 2.980 mm



Heat Treatment 热处理

Materials 材料

- Carbon Steels 碳钢 Property Class 3.6 – 8.8
- Alloy Steels 合金钢 Property Class 10.9 – 12.9
- Stainless Steels 不锈钢 300 Series and 400 Series
- Magnesium 镁
- Aluminum 铝
- Brass 黄铜
- Nickel Silver 镍黄铜

Actual Samples for Property Class



General introduction of property class

Property class 3.6, 4.6, 4.8, 5.6, 5.8, 6.8, 8.8, 9.8, 10.9, 12.9 ...

PC 4.6

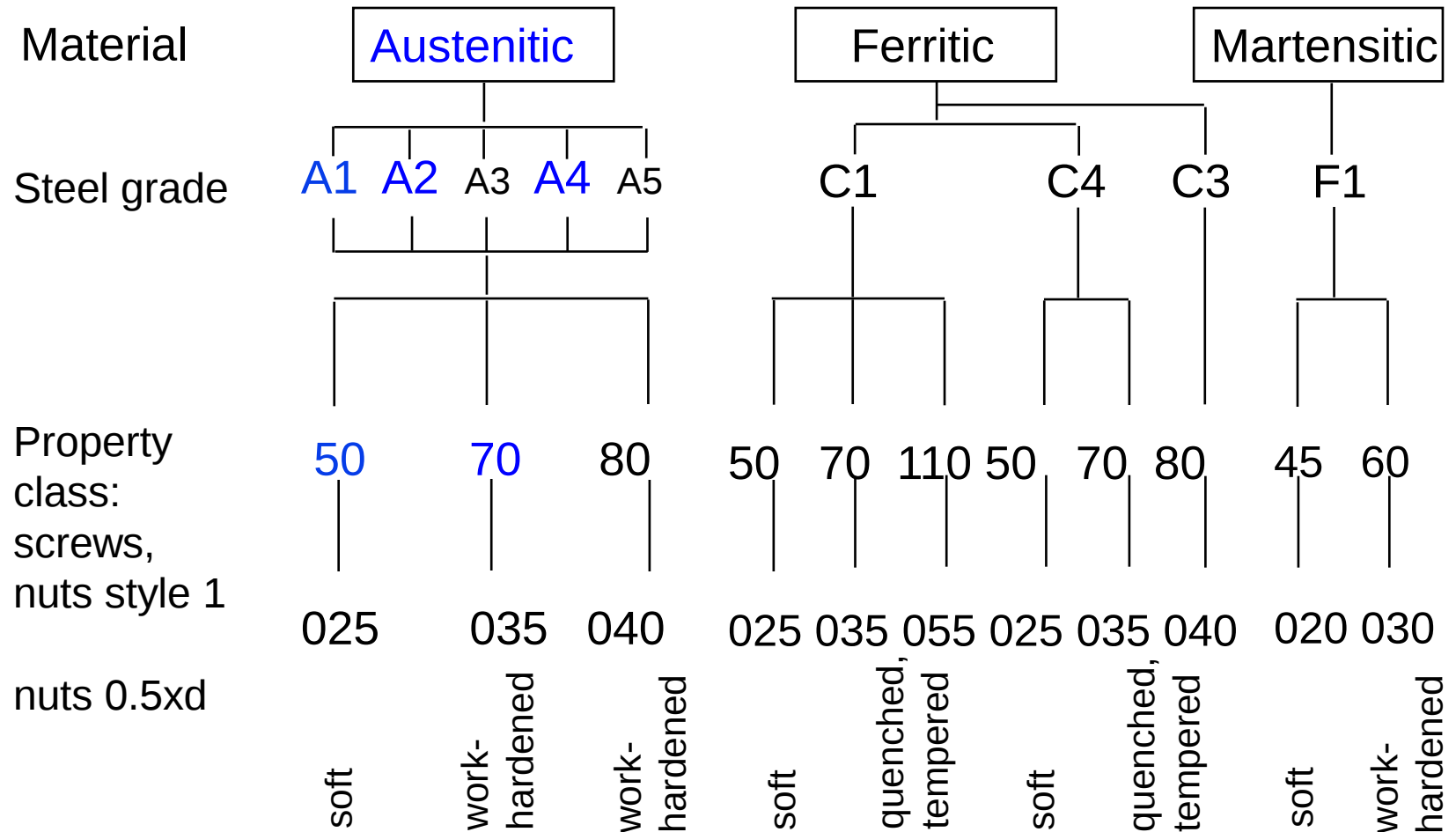
1. Class of Tensile strengths: 400 MPa
2. Tensile strengths (R_m) = $4 \times 100 = 400 \text{ N/mm}^2$
3. Class Yield strengths: $4 \times 100 \times 0.6 = 240 \text{ Mpa}$
4. Yield strengths (R_e) = $4 \times 100 \times 0.6 = 240 \text{ N/mm}^2$

PC X.Y

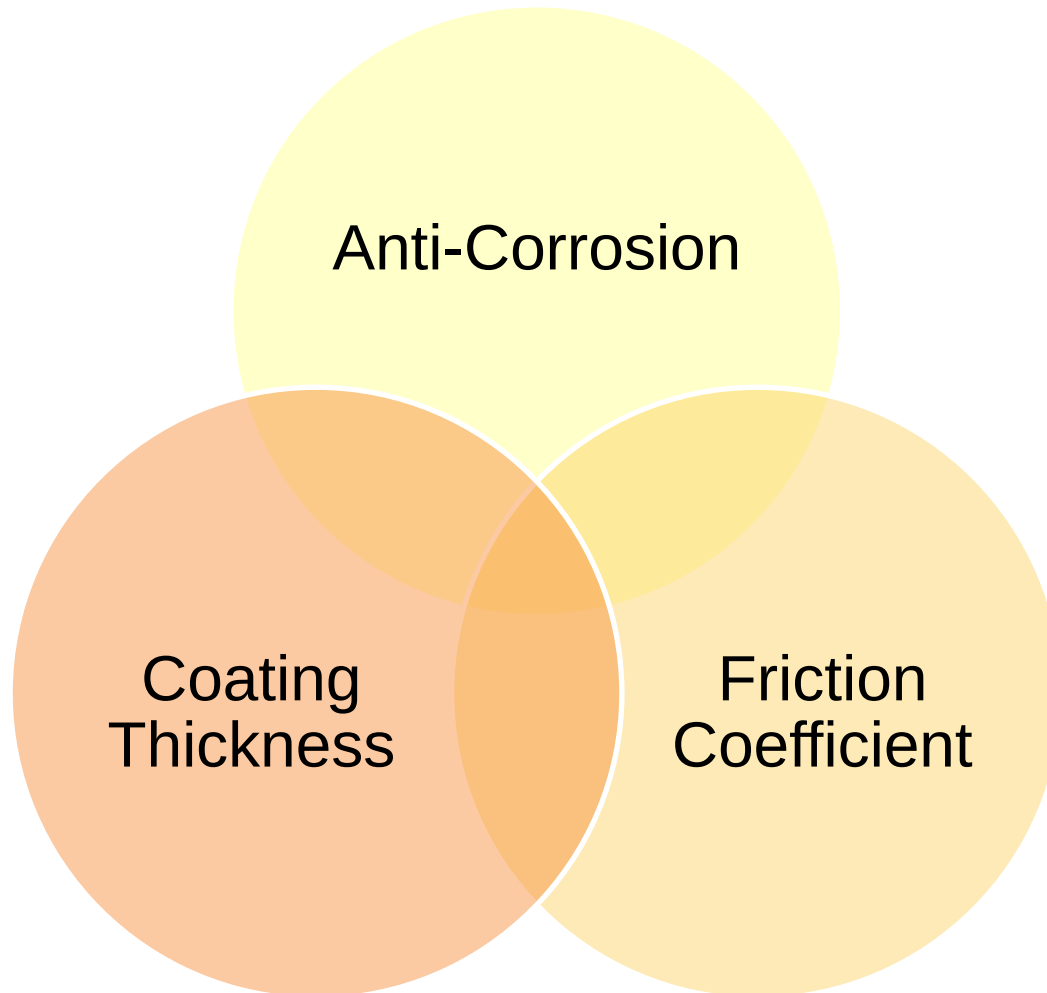
1. Class of Tensile strengths Mpa  $X \times 100$
2. Tensile strengths (R_m) N/mm²
3. Class of Yield strengths Mpa  $X \times Y \times 100$
4. Yield strengths (R_e) N/mm²

Property Class	Tensile strengths		Yield strengths	
	R_m	N/mm ²	R_e	N/mm ²
12.9	1200		1080	
10.9	1000		900	
9.8	900		720	
8.8	800		640	
6.8	600		480	
5.8	500		400	
5.6	500		300	
4.8	400		320	
4.6	400		240	
3.6	300		180	

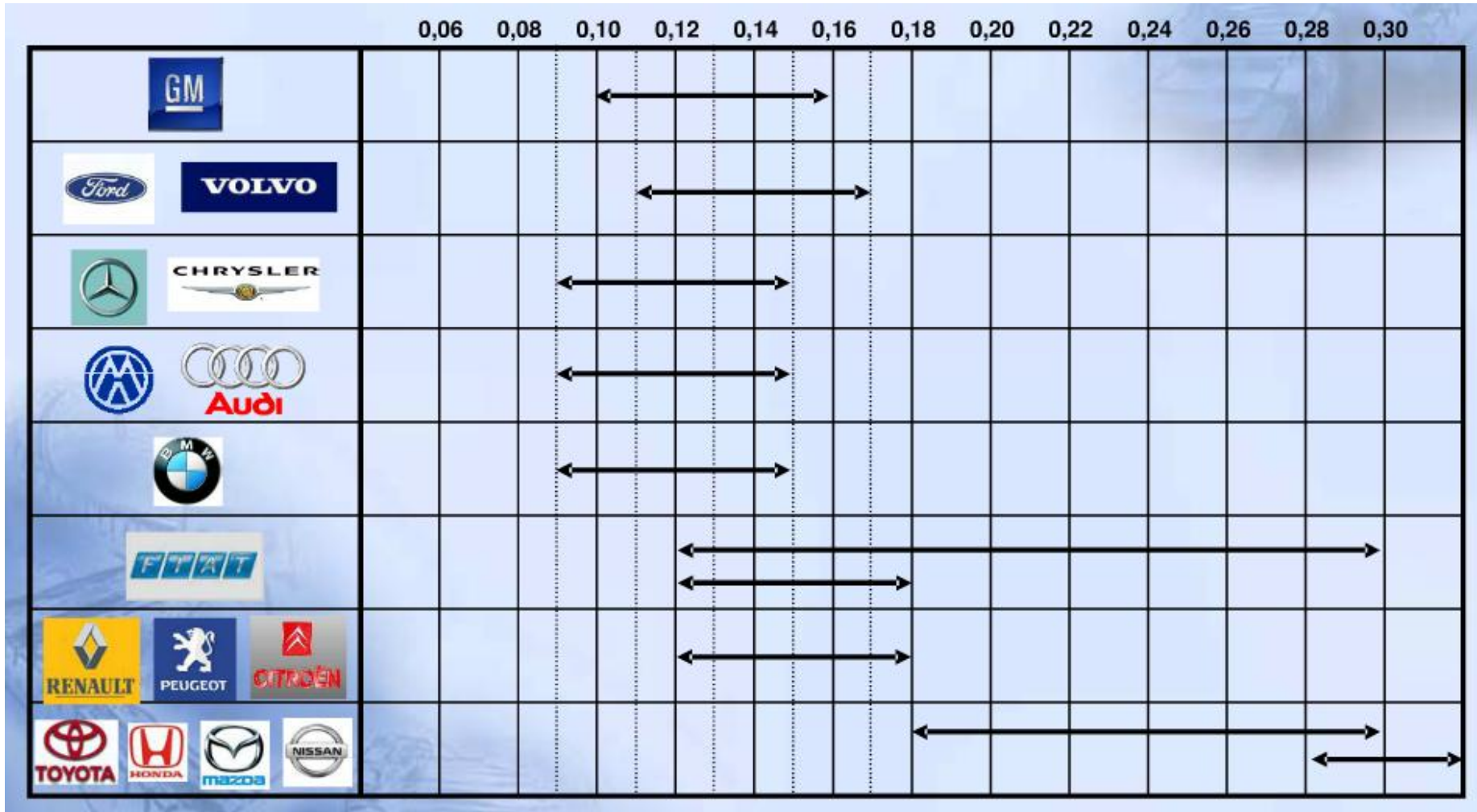
Mechanical Property of Stainless Steel



Coating Requirement of Auto Industry



Friction Coefficient from Auto



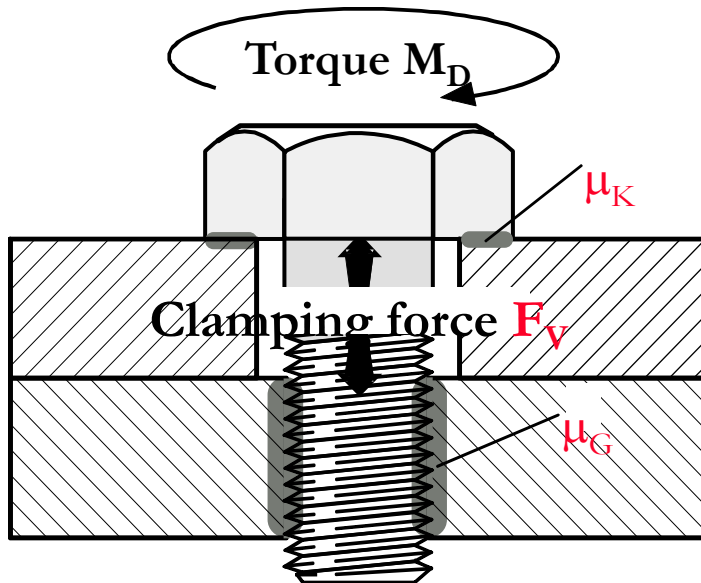
Torque, Friction and Clamp force

Clamping force is dependent of torque and other factors ---mainly friction:
 夹紧力取决于扭矩和其他因素---主要是摩擦力

- $$F_m = T / \left(\frac{0.16P}{\text{螺距Pitch}} + \frac{(\mu_g * 0.58 * d_2)}{\text{螺纹副Thread}} + \frac{(D_{km}/2) * \mu_k}{\text{螺栓头Head}} \right)$$
- 定义Definitions
 - F_m = 夹紧力clamping force
 - P = 螺距pitch of thread
 - μ_g = 螺纹副摩擦系数friction value in thread
 - d_2 = 螺栓直径diameter bolt
 - D_{km} = 螺栓头表面尺寸 size of surface bolt (nut)-head
 - $D_{km} = (d_w + d_h)/2$
 - μ_k = 螺栓头表面摩擦系数friction value surface bolt-head

Torque, Friction and Clamp force

Where the Torque has Gone?



To achieve a specific tension...
If M_D input = **100Nm**

- a. Friction in the thread, μ_G ?
- b. Friction under the head, μ_K ?
- c. Clamping force, F_v ?

Torque, Friction and Clamp force

- Assembly guide according to VDI2230 standard:

Abm. Size	Fest.- Klasse Strength Grade	Montagevorspannkräfte/Assembly preload $F_{M Tab}$ in kN für $\mu_G =$							Anziehdrehmomente/Tightening torque M_A in Nm für $\mu_K = \mu_G =$						
		0,08	0,10	0,12	0,14	0,16	0,20	0,24	0,08	0,10	0,12	0,14	0,16	0,20	0,24
M 6	8.8	10,7	10,4	10,2	9,9	9,6	9,0	8,4	7,7	9,0	10,1	11,3	12,3	14,1	15,6
	10.9	15,7	15,3	14,9	14,5	14,1	13,2	12,4	11,3	13,2	14,9	16,5	18,0	20,7	22,9
	12.9	18,4	17,9	17,5	17,0	16,5	15,5	14,5	13,2	15,4	17,4	19,3	21,1	24,2	26,8
M 7	8.8	15,5	15,1	14,8	14,4	14,0	13,1	12,3	12,6	14,8	16,8	18,7	20,5	23,6	26,2
	10.9	22,7	22,5	21,7	21,1	20,5	19,3	18,1	18,5	21,7	24,7	27,5	30,1	34,7	38,5
	12.9	26,6	26,0	25,4	24,7	24,0	22,6	21,2	21,6	25,4	28,9	32,2	35,2	40,6	45,1
M 8	8.8	19,5	19,1	18,6	18,1	17,6	16,5	15,5	18,5	21,6	24,6	27,3	29,8	34,3	38,0
	10.9	28,7	28,0	27,3	26,6	25,8	24,3	22,7	27,2	31,8	36,1	40,1	43,8	50,3	55,8
	12.9	33,6	32,8	32,0	31,1	30,2	28,4	26,6	31,8	37,2	42,2	46,9	51,2	58,9	65,3

- To get a reference:
 - Bolt Size
 - Bolt Properties Class
 - Coefficient of Friction

Adhesive for screw locking

Main Products



耐螺扣 (NYLOK)



PRECOTE

微胶囊化学粘合剂

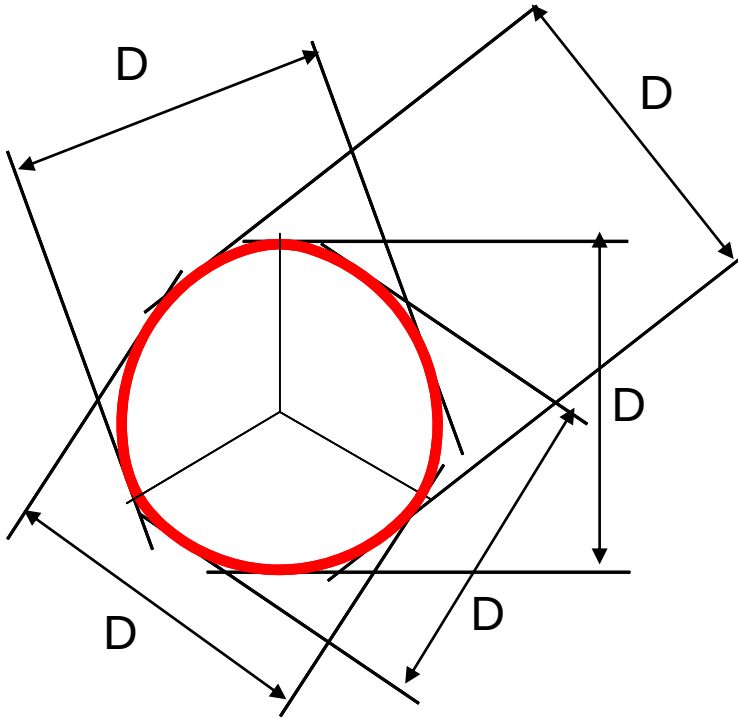


3M

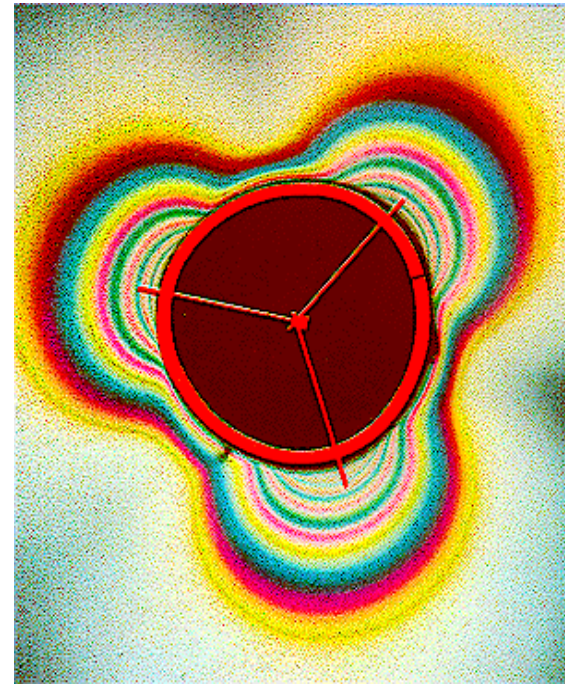
Thread forming for metal-Taptite



Taprite[®]2000



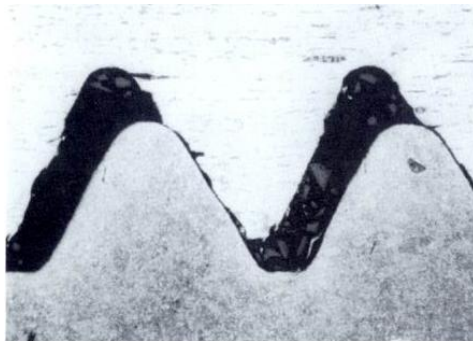
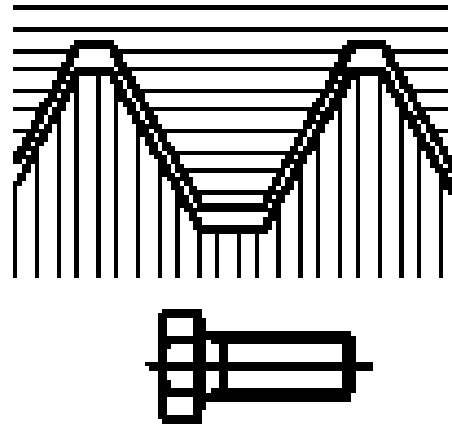
Trilobular cross- section:
everywhere the same diameter



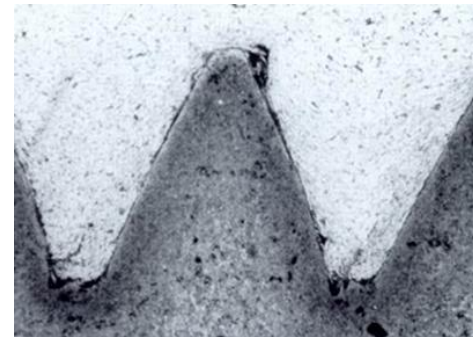
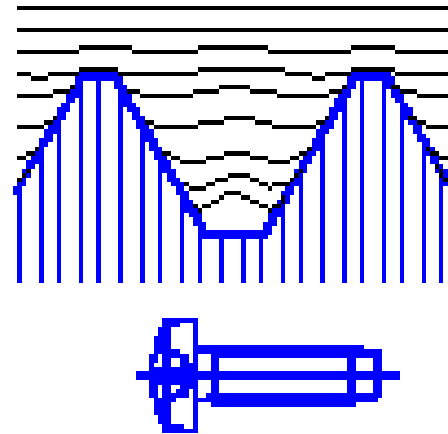
Compressive stresses
around the formed
internal thread

Thread forming for metal-Taptite

Taptite zero clearance thread fit



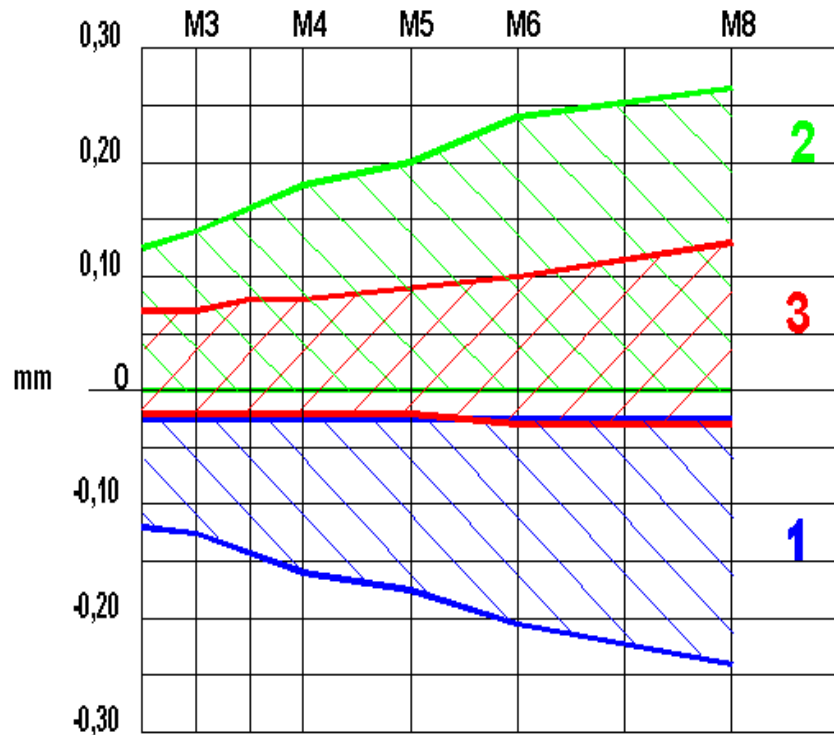
Metric screw



Taptite screw

Thread forming for metal-Taptite

Thread forming screws- Dimension



Tolerances of thread- O.D.:

1 standard metric screw thread
tolerance 6g

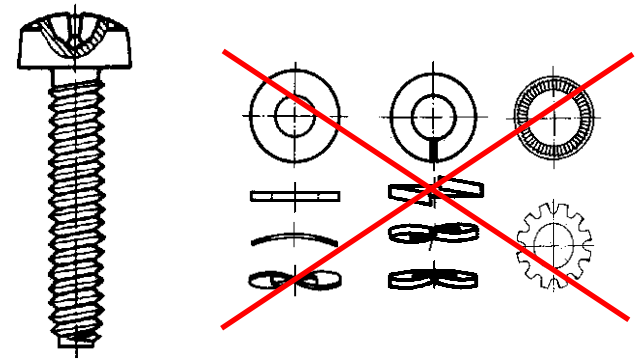
2 standard metric nut thread
tolerance 6H

3 internal thread formed by a
Taptite® screw

Thread forming for metal-Taptite

There are no internal thread need, no procurement and assembly costs for spring lock washers, serrated lock washers, and locking adhesives.

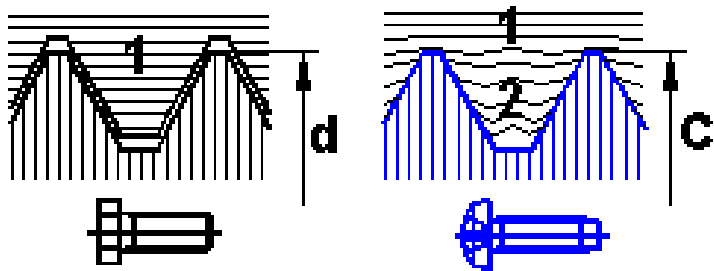
不需要内螺纹，也不需要防松垫片和防松胶的采购和安装成本。



Thread forming screws- Cost Efficient

Thread forming for metal-Taptite

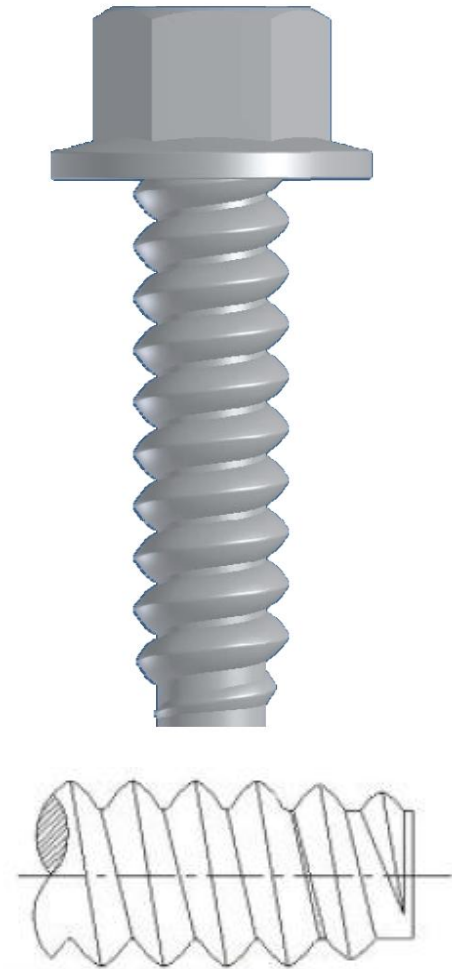
- The grain structure in the material of the mating part is not interrupted, thread forming only deforms the grain structure; 攻入过程只会使对手件晶粒结构变形而不会破坏它；
- The material is compressed and work hardened during thread forming. The strength is higher in area 2 than in the area 1. 区域2的强度要大于区域1.



The pull-out resistance of Taptite screws is higher than regular screws!

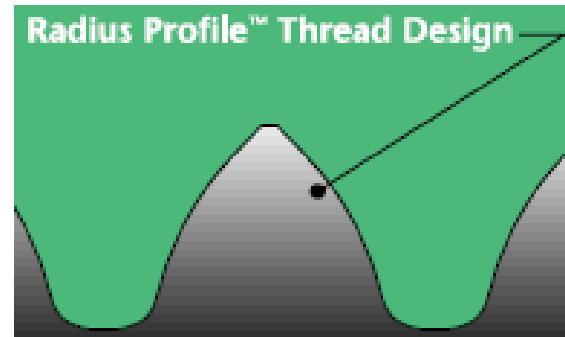
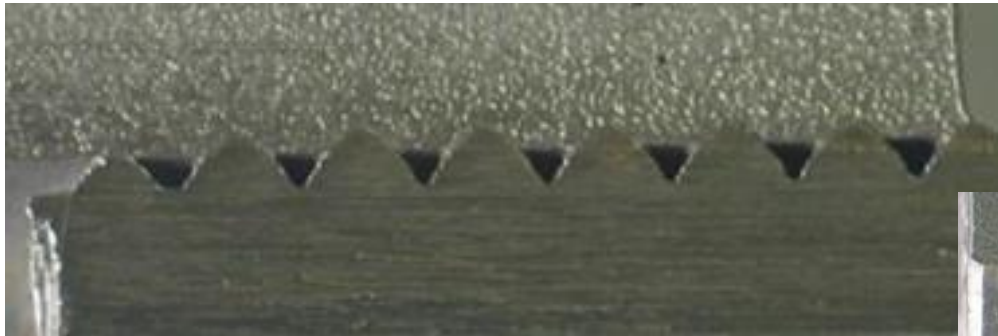
For Magnesium Alloys-Magtite®2000™

- Generates minimal debris during thread forming.
在螺纹成型过程中产生极少的碎屑。
- Radius Profile™ thread design.
Radius Profile™ 弧形螺牙。
- Allows for multiple insertions.
允许多次安装拆卸。



For Magnesium Alloys-Magtite®2000™

- Thread combined Radius Profile™ with the subtle TRILOBULAR™ shape, avoid damaging the magnesium by not exceeding the ductility limits of the material.
- 弧形螺纹与TRILOBULAR™形状相结合,以避免超过材料延展性的情况下损坏镁。



For Magnesium Alloys-Magtite®2000™

- The following compares a MAGTITE® 2000™ and a thread forming screw, which has formed an internal thread in magnesium. Each screw was driven in and for three cycles. The debris generated by each screw.
- 下面对MAGTITE®2000™和普通自攻螺钉进行了比较。每个螺丝被拧入和拧出镁三个循环。每个螺丝产生的累积碎屑量

MAGTITE® 2000™ SCREW



COMPETITOR'S PRODUCT



Thread forming for plastic

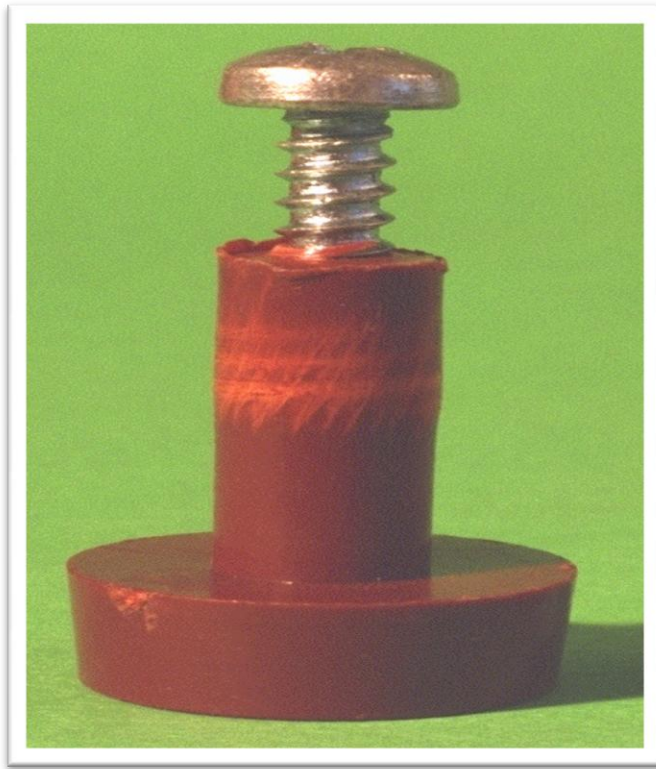


REMFORM[®]

More secure when joining plastics

- asymmetric thread
- optimised material flow
- minimum tube load
- reliable planning
- Fast Designer *PLASTICS*
- high level of process reliability

Thread forming for plastic-Remform



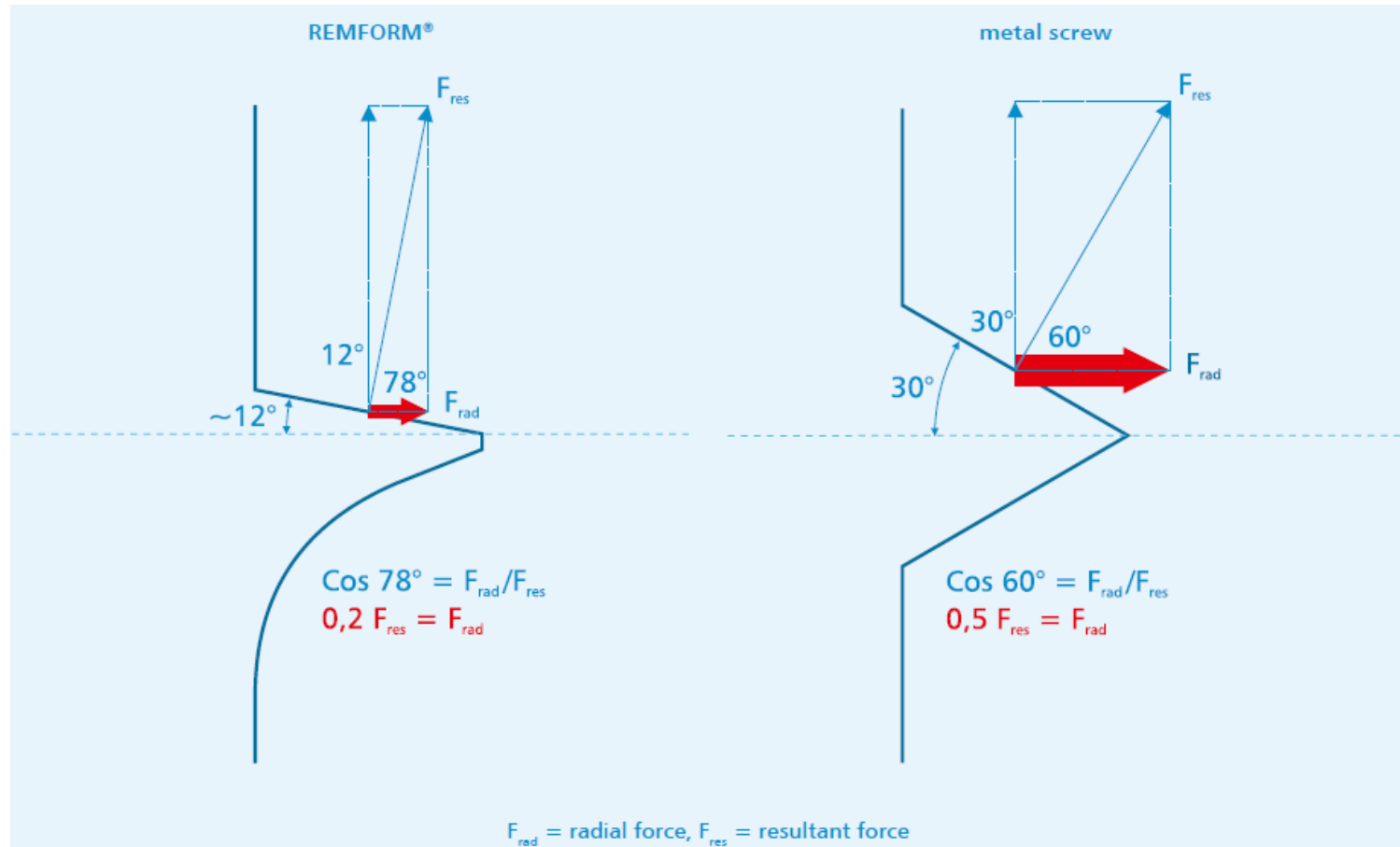
Self-tapping



Remform

Thread forming for plastic

Thread contrast



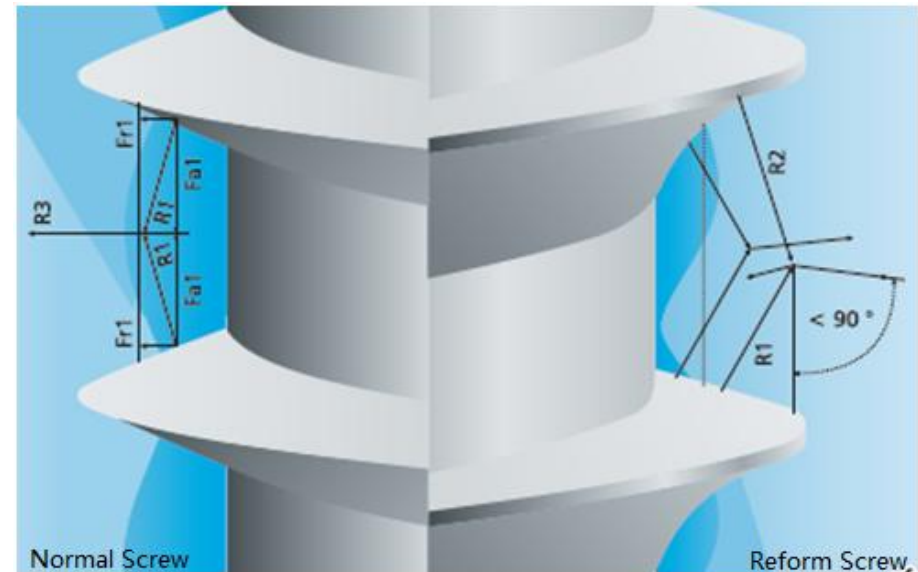
Thread forming for plastic-Remform

Asymmetric thread flanks 非对称的螺纹牙面

- Optimum material flow due to radius profile 更好的材料流动性

- Easy assembly 易于安装

- Reduced ring stress 降低了环向应力

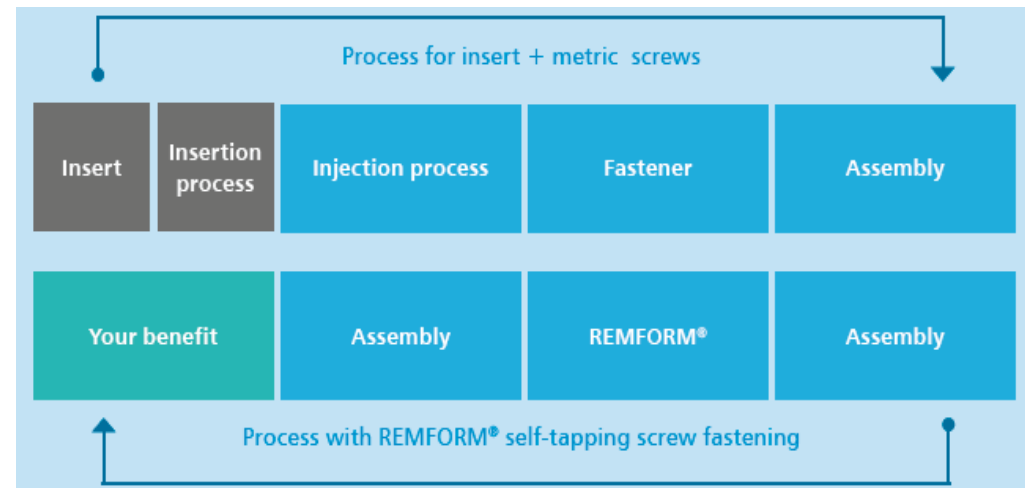


Thread forming for plastic-Remform

Cost Efficient

Compared with insert solutions, REMFORM® saves your time and money:

- No additional elements needed.
不需要额外的安装因素。
- No additional insertion process.
不需要额外的嵌入步骤。
- Greatly reduced cycle time.
很大程度上减少了安装周期时间。

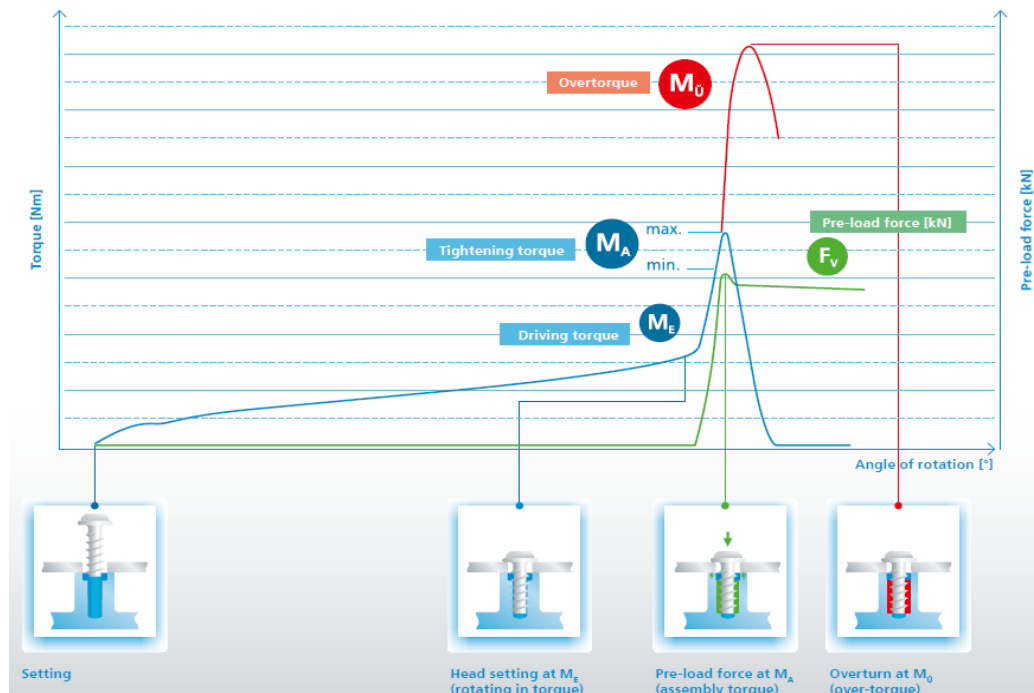


Thread forming for plastic-Remform

Easy assembly

- A large difference between the form moment and the failure torque facilitates assembling with a tightening torque which can vary in a wide tolerance rang between form moment and failure torque.

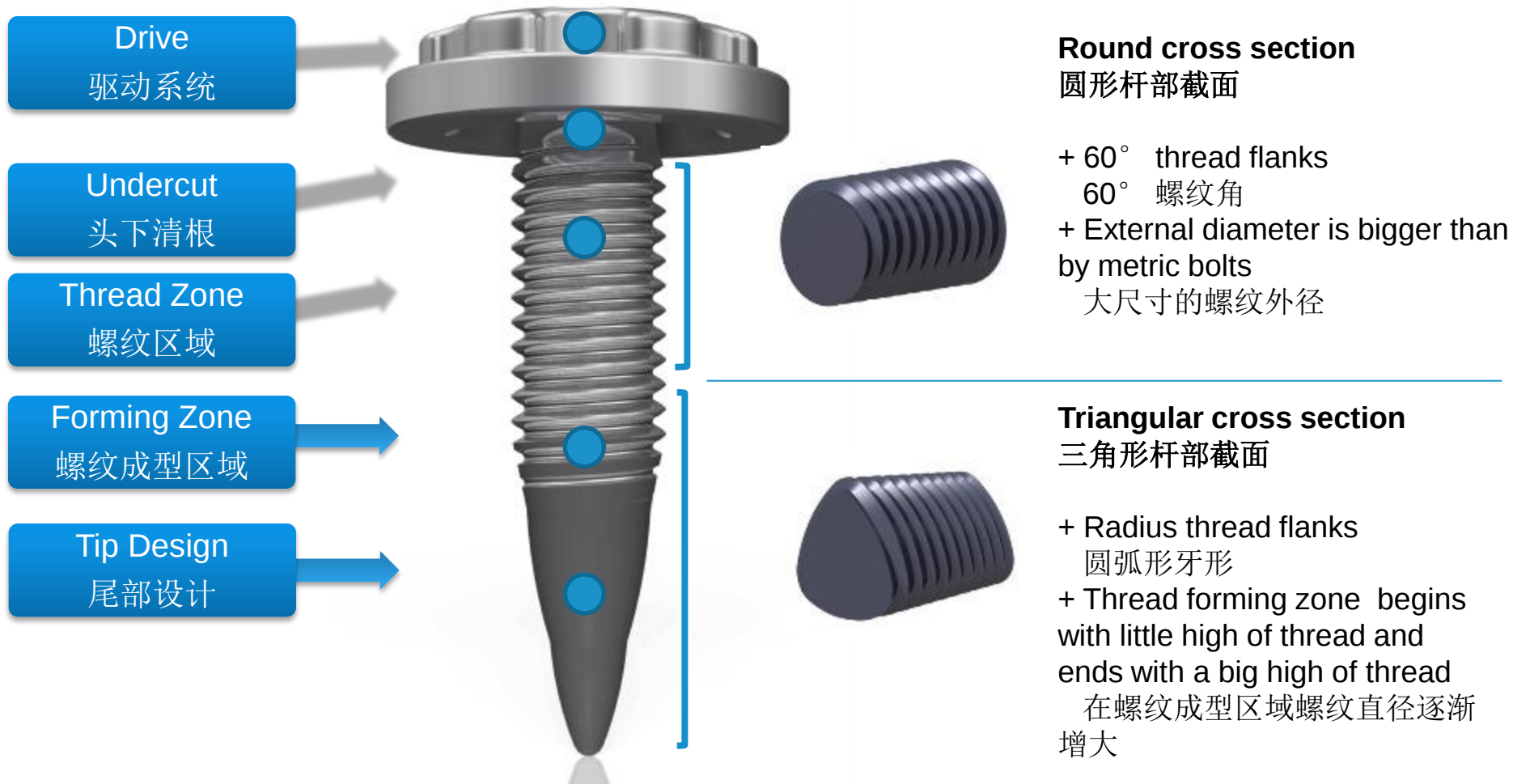
攻入扭矩和失效扭矩之间的巨大差异有助于安装，这个差异为夹紧扭矩 提供了很宽的选择范围。





FLOWFORM® and FLOWFORM® PLUS
用于轻量化设计的单向连接技术

FLOWFORM® and FLOWFORM® PLUS





FLOWFORM® and FLOWFORM® PLUS
用于轻量化设计的单向连接技术

FLOWFORM® and FLOWFORM® PLUS

No clearance hole
无需预钻孔



One sided joinings
单向攻入



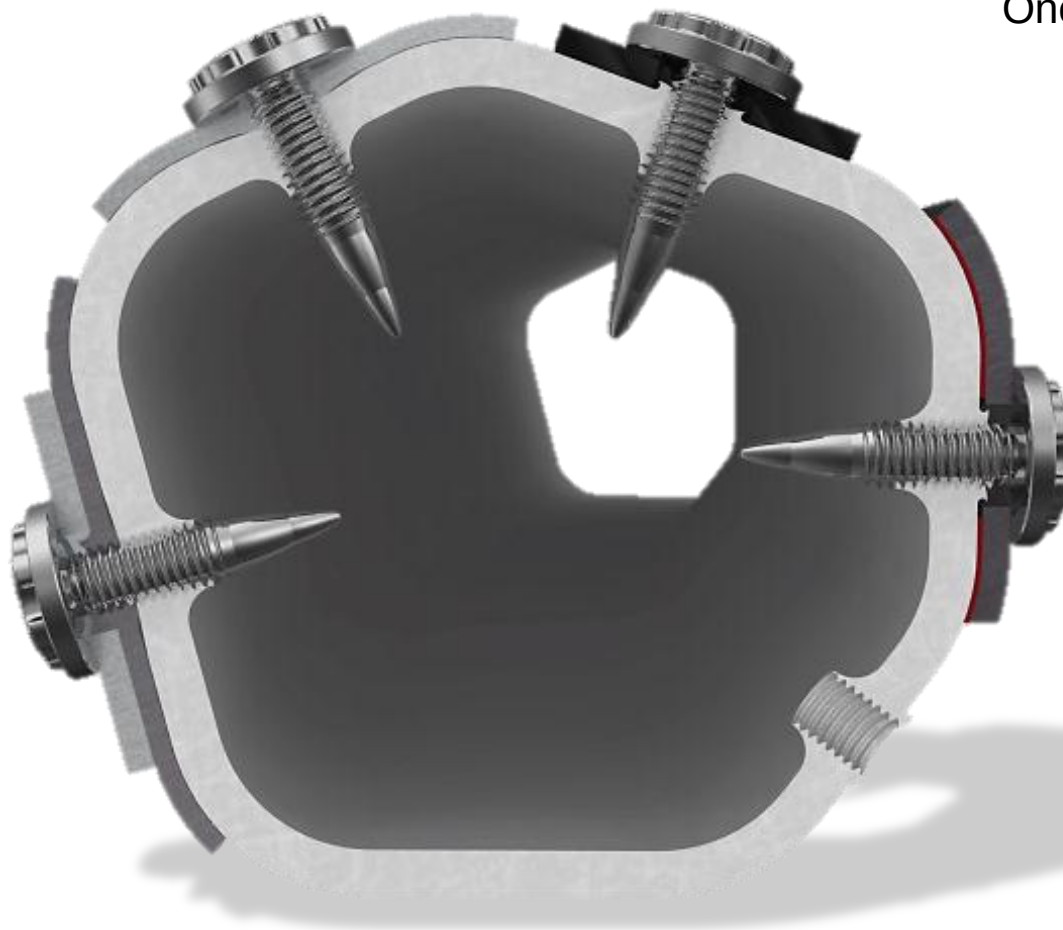
Hybrid structures
涂胶结构



Multi-Material-System
多重材料连接



Disassembly
可拆卸





FLOWFORM® and FLOWFORM® PLUS
用于轻量化设计的单向连接技术



FLOWFORM® - customer applications 客户应用



B/S/H/
BSH BOSCH UND SIEMENS HAUSGERÄTE GMBH



Eberspächer



JAGUAR

NAGOLD GMBH
WAGON
AUTOMOTIVE

NIO



ThyssenKrupp

ThyssenKrupp System Engineering



TESLA MOTORS



BOSCH

PRODUCTION CAPACITY

生产能力



Capability 能力



Big part: HEX-FLA-WA-MET-M12X95.0-10.9

Small part: PAN-REM-Ø2X26.5-PC10-T6



BUSHING-11.5X17.5-10B21

Special Part 特殊件



DTB-MET/DURO-6.0/6.0X33.6-10.9-E5



COU-MET-6.0X31.4-10.9-30IPR



DTB-SPL-MET-8.0/8.5X30.94-5.8



HEX-FLA-MET-6.0X22.0/11.0-8.8

Special Part 特殊件



CHE-FLA-MET-6.0x35.0/12.0-8.8



ROU-WA-MET-8.0X44.0/27.0-8.8



SPL-MET-6.0X12.0-8.8



ECS_SPL-MET-6.0X17.0-8.8

Special Part 特殊件



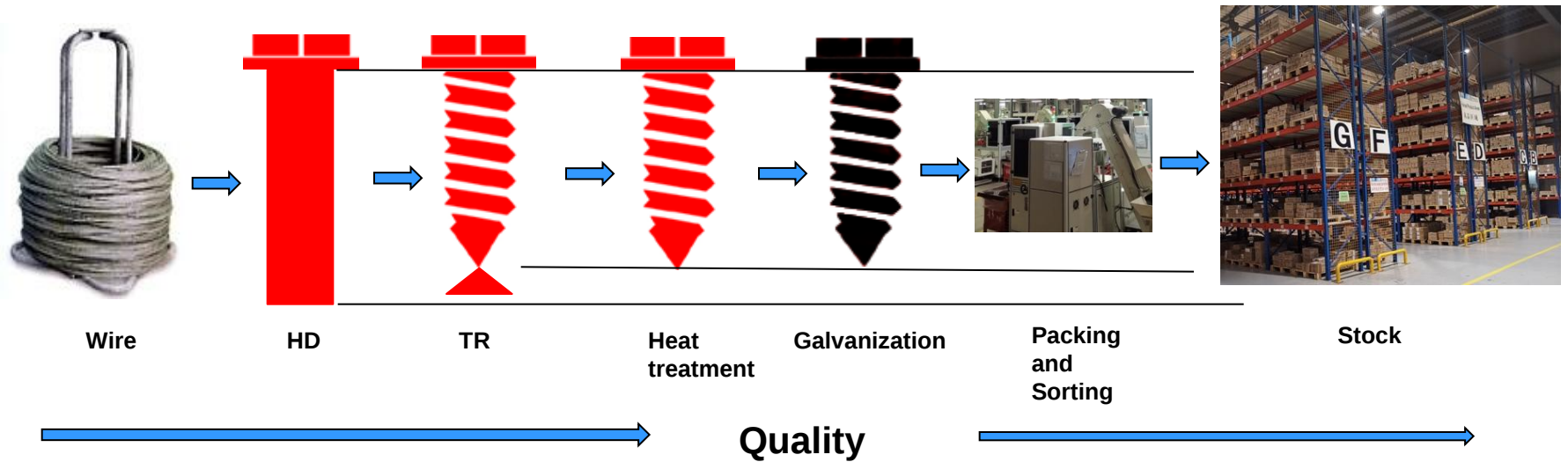
ET-FLA-MET-6.0x23.0-8.8-E10+O-RING+Bushing

PROCESS FLOW

工艺流程



Main production process 主要生产工艺



Wire 线材

1. Carbon steel ➡ SWCH18A
 SWCH22A
 10B21
- Alloy steel : Cr, Ni, Mo, Si 10.9 ;12.9-
SCM435
2. Stainless steel ➡ Austenitic Cr%=18% A2-50 ; 70



Heading 打头



41_1 die 2 blows, Chunzhu,
Lianteng & Nakashimada
4_ CBP-105S 5 dies 5 blows,
Chunzhu
5_ 4 dies 4 blows, Chunzhu &
Jernyao
2_ 3 dies 3 blows, Jernyao
6_ 2 dies 2 blows, Asahi, Chunzhu &
Jernyao
3_ Re-header, Tze ping, total 61



Thread Rolling 搓丝



43 Thread rolling machines

2_chunzhu AF5

3_chunzhu AF6

2_chunzhu CPR3

16_chunzhu CPR6S

8_chunzhu CPR8L

2_chunzhu CPR10L

2_chunzhu DPR8L

2_chunzhu CPR12S

1_Sanmei THI-4R

2_EWMenn AF102

3_Jiancai CTR8N

Heat Treatment 热处理

2 computer-controlled heat treatment line
Hardening + Tempering & Case-hardening



Galvanization 电镀

- Zn & ZnNi plating internal process
- Special surfaces(Zinc flake, phosphate) by external



Surface Validation 表面特性验证



Fisher Scope

Application scope 应用范围: check the coating layer thickness



Salt spray tester 盐雾实验设备

Application Scope 应用范围: corrosion resistance test

Laboratory 实验室



Sorting & Packing 分选包装



APPLICATIONS

产品应用

Joining metals - Taptite 2000[®]

Continental Automotive Systems (Tianjin)

大陆汽车系统(天津)有限公司



Taptite for Continental Tianjin

MU-TT2K-3.0X9.0-8.8-10IP	11,800,000
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双向离合器单元 (Clutch Transmission Unit)



Joining metals - Taptite 2000[®]

Shanghai Sinotec Co., Ltd

上海华培动力科技有限公司



Taptite for Huapei Shanghai

PAN-TT2K-3X9-8.8-10IP	1,200,000
PAN-TT2K-3X27-8.8-10IP	1,200,000

涡轮壳(Turbine shell)



Joining metals - Taptite 2000[®]

Magna Powertrain (Changzhou) Co., Ltd.

麦格纳动力总成（常州）有限公司

Taptite for Magna Changzhou

PAN-TT2K-4.0X12.0-10.9-20IP	86,463
PAN-TT2K-6X16-8.8-T25	2,225,429

真空泵（Pump）

 **MAGNA**



Joining metals - Taptite 2000[®]

ELTEK Electromechanical Products (Yantai) Co., Ltd

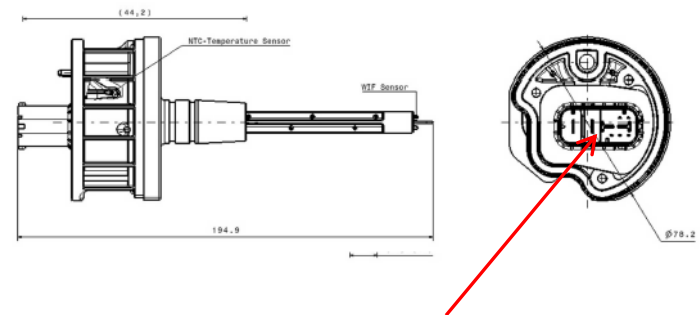
爱尔泰电动机械（烟台）有限公司



Taptite for Eltek Yantai

PAN-TT2K-2.5X6.0-SL-T08	4,000,000
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柴油加热传感器（ Diesel Heater with Integrated Sensors ）



Joining synthetic materials

Remform® -Application examples

BHTC SHANGHAI CO. LTD.

贝洱海拉温控系统（上海）有限公司

Remform Screw for Behr-Hella Shanghai

PAN-REM-2.5X12.0-FK10-08IP	1,000,000
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温控系统（**Climate Control Units**）



Joining synthetic materials

Changchun Faway- Johnson controls Automotive system Co., Ltd.

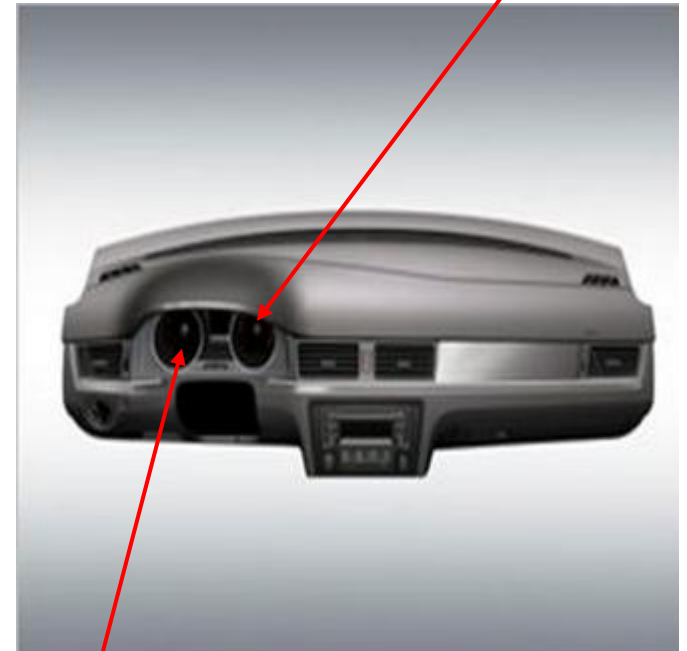
长春富维-江森自控汽车饰件系统有限公司



Remform® Screw for Changchun Faway

PAN-REM-3.0X12.0-9.8-10IP	1000000
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仪表盘 (**Instrument panel**)



Joining synthetic materials

Fuba Automotive Electronics (Suzhou) Co., Ltd.

福霸汽车天线(苏州)有限公司

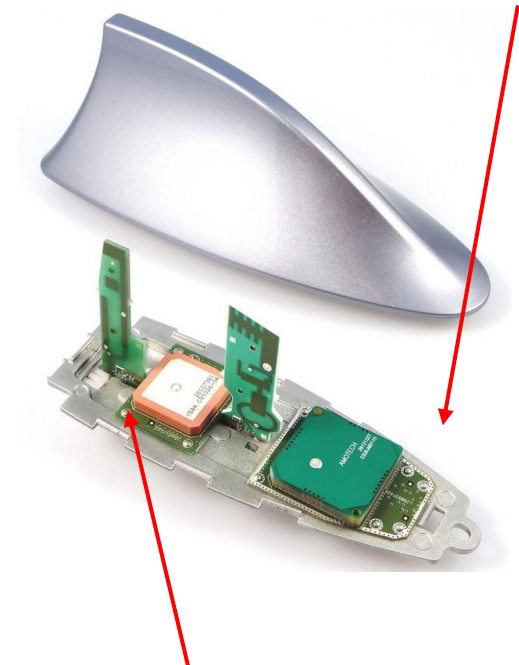


Remform® Screw for Fuba Suzhou

COU-REM-2.5X8.0-PC10-7IP	900000
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车顶接收器

(GPS)



Joining sheet metals - FLOWFORM[®]

FLOWFORM[®] - BMW Application project



BMW – 7er/5er/5er-Li/X3

Screws per car	7er = 180 pcs 5er /5er Li= 180 pcs X3 = ca. 100 pcs
Screw no.	M5x20 DS Special EP12
Surface treatment	ZnicNickel



Joining sheet metals - FLOWFORM[®]

Flowform[®]-Application for Cadillac CT6



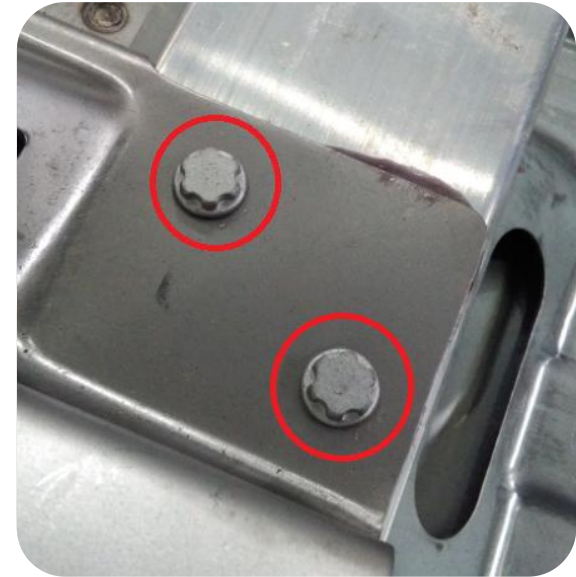
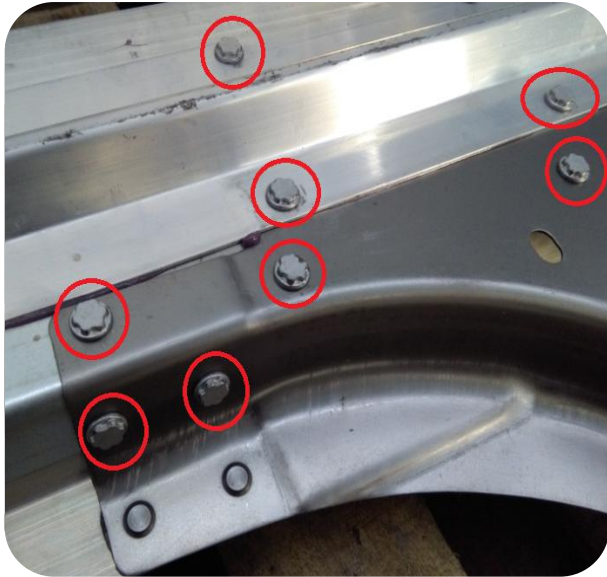
Front cockpit floor
前驾驶舱地板



back cockpit floor and trunk
后驾驶舱地板和后备箱

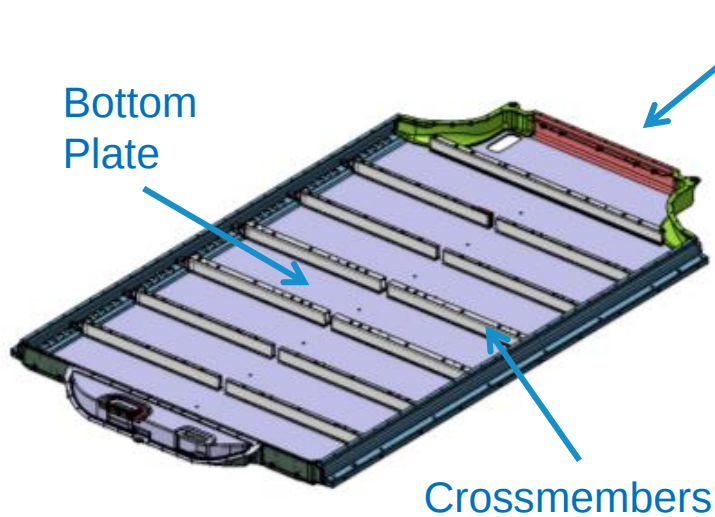
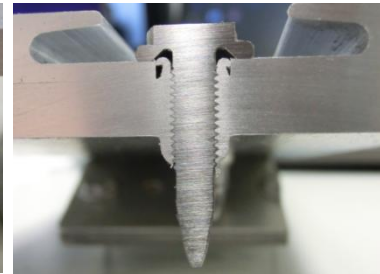
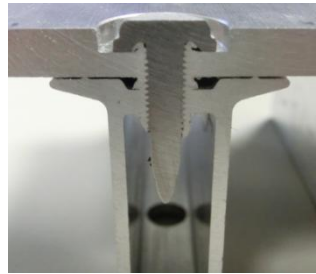
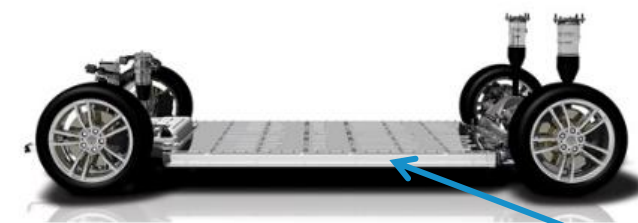
Joining sheet metals - FLOWFORM[®]

Flowform[®]-Application for Cadillac CT6



Joining sheet metals - FLOWFORM[®]

FLOWFORM[®] - TESLA Application project



Battery Pack

