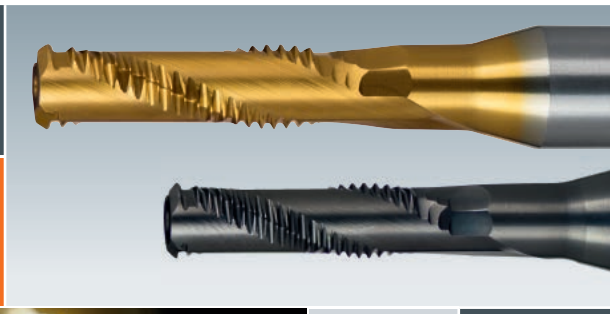
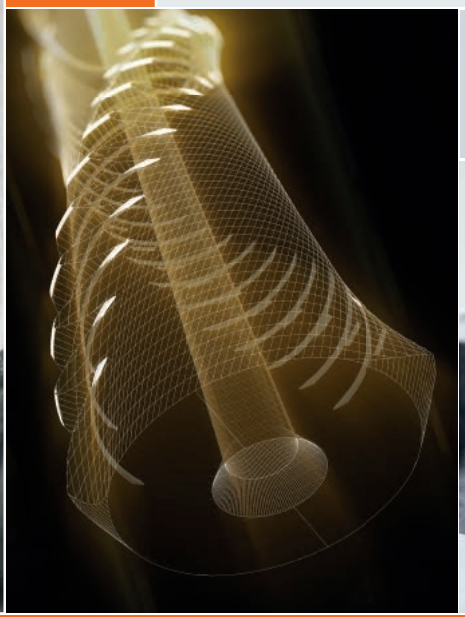
EMUGE FRANKEN

Made in Germany





最短路径 | The Shortest Way

EMUGE PunchTap

全新的螺纹成型技术

New Technology Helical Thread-Forming

EMUGE的 PunchTap 技术是除切削丝锥,挤压丝锥和螺纹铣刀之外,又一种创新型的内螺纹加工技术。由于其创造性的非常短的运动过程,使生产力达到了一个全新的高度。

EMUGE的 PunchTap 丝锥与传统的切削丝锥或者挤压丝锥在加工路径上的对比显示，以加工一个M6，深15mm的螺纹孔为例， PunchTap 的丝锥加工路径，大约缩短为传统加工路径的十五分之一。

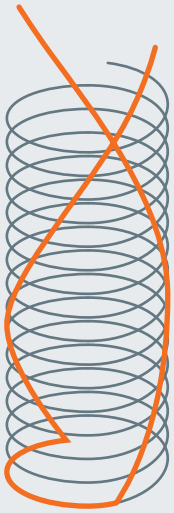
其结果就是在一个螺纹加工周期中可以节省75%的时间。

The EMUGE PunchTap technology constitutes besides tapping,cold-forming of threads and thread milling another technology for internal thread production. Thanks to its innovative, very short motion process, it establishes an entirely new dimension of productivity.

A comparison between the tool path of the EMUGE PunchTap with the tool path of conventional taps or cold-forming taps shows that the path of the PunchTap is approximately 15 times shorter for a thread M6 with thread depth of 15 mm.

The result is a significant time savings of up to 75% in a threading cycle.

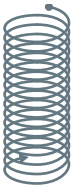
运动过程 Motion process



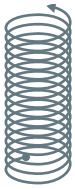
Punch Tap

冲压 Punch (Plunge)	挤压 Thread-forming	退回 Retraction
		
步骤1 • Step 1	步骤2 • Step 2	步骤3• Step 3

传统的切削丝锥和挤压丝锥
Conventional taps or cold-forming taps



进入工件-螺纹加工
Entering workpiece = Threading operation



退回
Retraction

工具路径 Tool path

传统的切削丝锥和挤压丝锥
Conventional taps or cold-forming taps

Punch Tap- 最短路径
Punch Tap – the shortest way

加工时间 Time consumption

传统的切削丝锥或挤压丝锥
Conventional taps or cold-forming taps

Punch Tap-最短路径
Punch Tap – the shortest way

结果 Result

EMUGE Punch Tap 能够在单个螺纹加工过程中节省高达75%的时间，这全得益于它较短的切削路径。

The EMUGE Punch Tap achieves a time saving of up to 75% in a threading cycle thanks to its shorter tool paths.

标记
Marking

为的是将刀具装到刀柄正确的位置上，配合斜夹持面

For assembly of the tool with the tool holder in the correct position, fits the inclined clamping flat

强化的冲压齿
Reinforced punch tooth

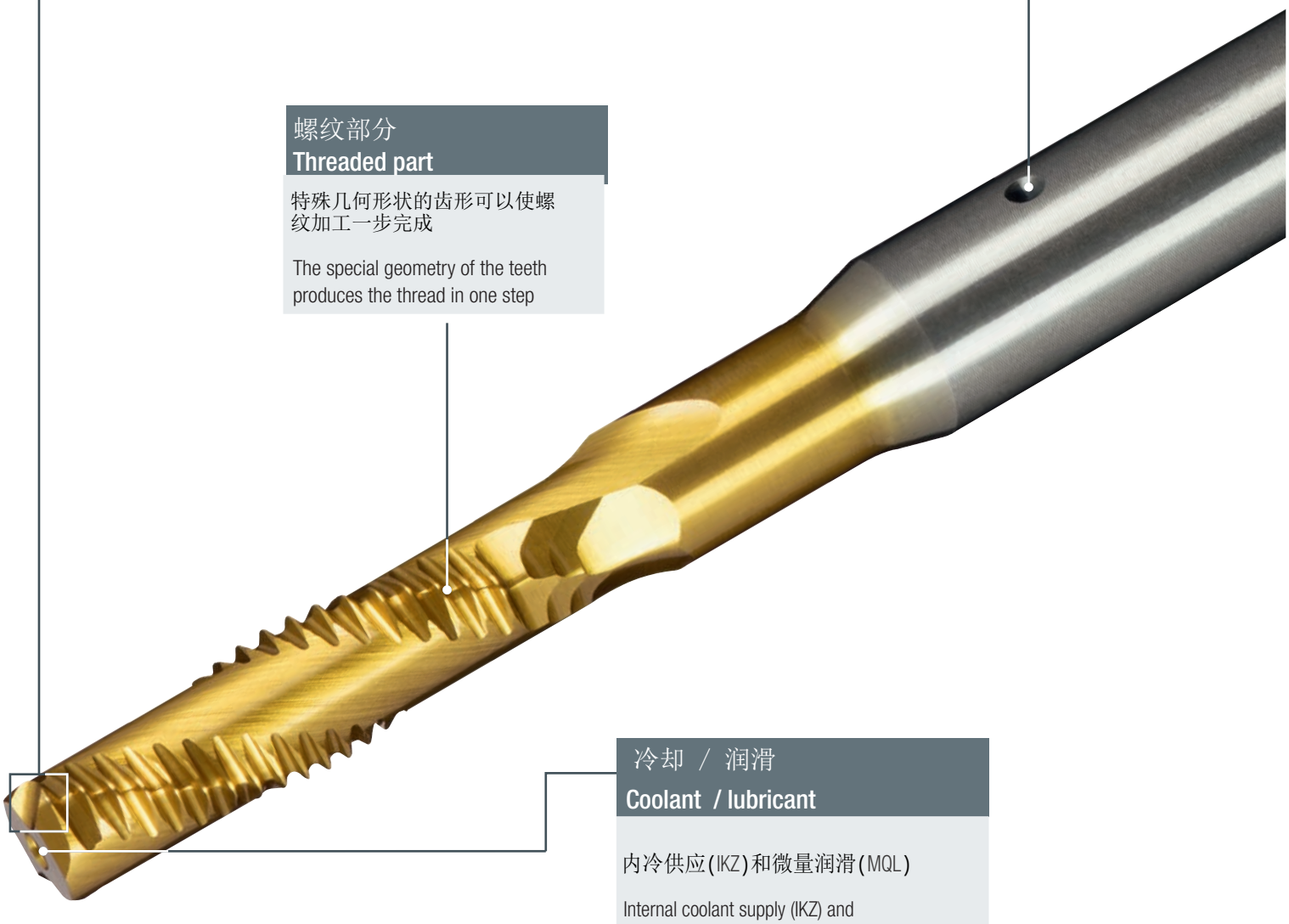
在实际加工螺纹之前，用于螺旋槽的形成和材料引导

Production of the helical groove and material guidance prior to actual threading

螺纹部分
Threaded part

特殊几何形状的齿形可以使螺纹加工一步完成

The special geometry of the teeth produces the thread in one step



冷却 / 润滑
Coolant / lubricant

内冷供应(IKZ)和微量润滑(MQL)

Internal coolant supply (IKZ) and minimum quantity lubrication (MQL) possible

强化的精密柄
Reinforced precision shank

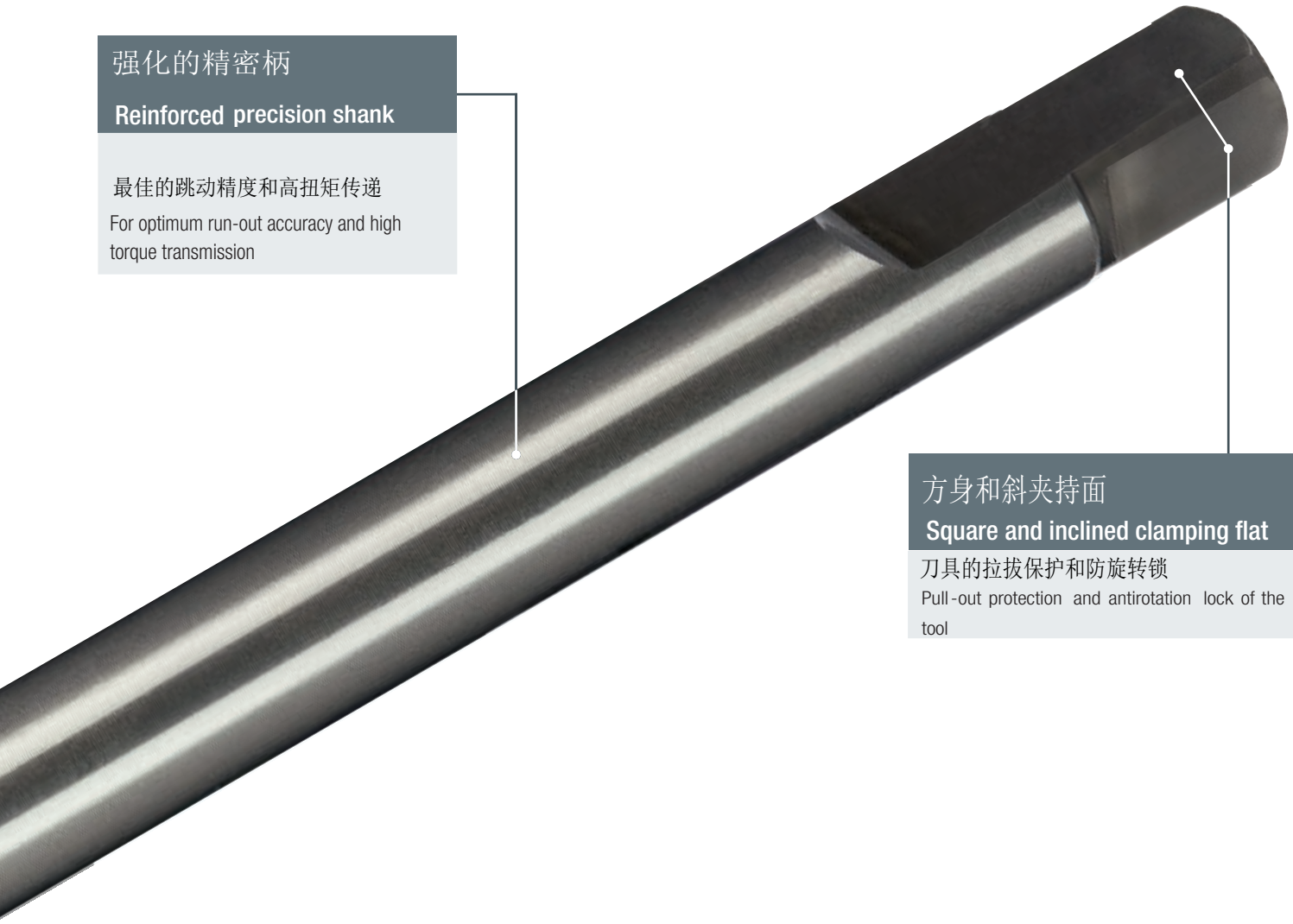
最佳的跳动精度和高扭矩传递

For optimum run-out accuracy and high torque transmission

方身和斜夹持面
Square and inclined clamping flat

刀具的拉拔保护和防旋转锁

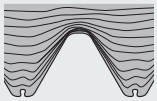
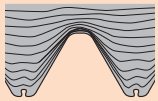
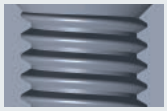
Pull-out protection and antirotation lock of the tool



Punch Tap 刀柄
Punch Tap Holder

- 通过一个圆柱形ER筒夹的强制索紧，能够确保高扭矩，增大的夹紧力和优秀的跳动精度
- 方身整合在刀柄内部（缩小公差）
- 压在径向斜定位面上的压紧螺钉起到防拉拔的作用
- 长度调节螺钉可配置乳化液，油冷和微量润滑

- The force-locked rigid clamping via a cylindrical ER collet enables a high torque, an increased clamping force as well as an excellent run-out accuracy
- Square integrated in holder (narrowed tolerances)
- Clamping screw positioned radially on inclined clamping flat serves as pull-out protection
- Length adjustment screws, configurable for emulsion / oil / minimum quantity lubrication (MQL)

	切削技术 Cutting technology		挤压技术 Cold-forming technology	
工艺 Process	攻丝 Tapping	螺纹铣 Thread milling	挤压螺纹 Cold-forming of thread	螺旋冲压 Punch Tap Helical thread-forming Punch Tap
纹理结构 Grain structure				
视觉特征 Visual characteristics of threads				
特性 Properties	• 切削工件材料原理 • Cutting of workpiece material fibres		•连续的纹理结构 •硬化工件材料 •齿顶有凹陷 • Continuous fibre structure • Work hardened workpiece material • Unformed core	•连续的纹理结构 •硬化工件材料 •齿顶有凹陷 •存在螺旋槽 •半圈完成挤压 • Continuous fibre structure • Work hardened workpiece material • Unformed core • Helical grooves • Cold-forming completed with half a turn
结论 Consequences	•极限应力减弱 •不利的应力分布 •接触率降低 • Stress limit is reduced • Unfavorable distribution of stress • Contact area ratio is reduced		•更高的强度 • Higher strength	• 强度和挤压丝锥接近（来源: 多特蒙德大学) • Strength comparable to cold-forming of threads (source: TU Dortmund)
特殊特征 Special feature	• 无 • None		• 无 • None	• 螺纹上的凹槽 • Groove in thread

使用Punch Tap 技术的可行性取决于工艺条件， 由单独案例的具体情况而决定。
有三种不同的加工版本可供选择，依据实际加工工况可作调整。

The possibility of using the PunchTap depends on the process conditions and is determined in each individual case.
Three different process versions are available which can be additionally modified depending on the preconditions.

	工艺多样性 Process variants		
	Performance PT1.0	Medium PT1.5	Soft PT2.0
循环描述 Description of cycle	快速加工过程只有三个步骤 Fastest process in only 3 steps	增加加工步骤通过加工过程中很小的拉伸力“去毛刺“ Process with less tensile forces thanks to additional process step “pressure deburring”	依据材料特性增加加工步骤，获取加工过程中很小的力，确保在“无毛刺”的状态下形成螺纹 Process with less tensile forces for demanding materials thanks to additional process steps “pressure deburring” and postforming of threads
时间节省 Time savings	75% 1)	72% 1)	65%
工件所需的稳定性 Required stability of workpiece	高 High	中等到高 Medium to high	中等到高 Medium to high
机床负载 Machine load	高拉伸负载 High tensile load	拉伸力降低90%2) Tensile forces reduced by up to 90% 2)	拉伸力降低90% 2) Tensile forces reduced by up to 90% 2)
加工工件 Machining of workpiece	常规 Regular	常规 Regular	适合韧性强的材料 Suitable for demanding tough materials
工件夹紧 Clamping of workpiece	非常稳固 Very stable	非常稳固 Very stable	稳固 Stable

1) 与同步螺纹成型相比
Compared with synchronous thread-forming

2)与Performance PT1.0过程相比
Compared with process “Performance PT1.0”

Punch Tap技术的控制单元块，许多机床制造商生产的设备都已经可以支持。

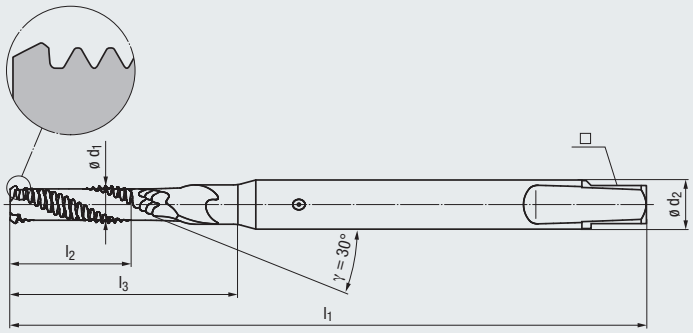
我们很乐意在调试期间协助您使用这些刀具。

Numerous manufacturers of machine tools already support the control unit of the PunchTap process.

We look forward to supporting your initial set-up and the application of the tools.

M

ISO公制粗牙螺纹DIN13
ISO Metric coarse thread DIN 13



技术信息 Technical information	公差 · Tolerance	6HX / 6HX
	涂层 · Coating	TIN-T26 / TIN-T26
	刀具材料 · Cutting material	HSSE-PM / HSSE-PM
		E / 1,5-2 [1] / F / 1-1,5 [1]
		E / O / M / E / O / M
螺纹深度和孔型 Thread depth and hole type		max. 3 x d_1
应用范围-材料 Application – material		N 1.1-6 / N 1.1-6

	ø d_1 mm	P mm	P_D [3] mm	l_1	l_2	l_3	ø d_2	□	[2]	Punch Tap Form E-IKZ TIN-T26	Punch Tap Form F-IKZ TIN-T26
M	3	0,5	16	110	10	21	8	6,2	2,8	○	○
	4	0,7	22,4	120	13	26	8	6,2	3,7	○	○
	5	0,8	28	120	16	35	8	6,2	4,65	○	○
	6	1	31,5	120	20	37	8	6,2	5,55	○	○
	7	1	38	130	23	39	12	9	6,55	○	○
	8	1,25	45	135	26	46	12	9	7,35	○	○
	10	1,5	56	145	33	58	12	9	9,35	○	○

1)冲压齿部位，由类似于清根的倒角刀组成。
Punch tooth area, consists of an undercut similar to a chamfer

其它设计（如超小螺纹，特殊尺寸等）可根据要求提供
Further designs (e.g. fi ne threads, special dimensions, etc.) upon request

2)底孔直径跟加工材料有关
Preparatory diameter may vary depending on material

3) 冲入螺纹底孔时，输入机床的旋转角度PD由螺纹直径d1和旋转角 γ 决定。
The helical pitch P_D to be entered into the machine control unit arises from thread diameter d_1 and helix angle γ

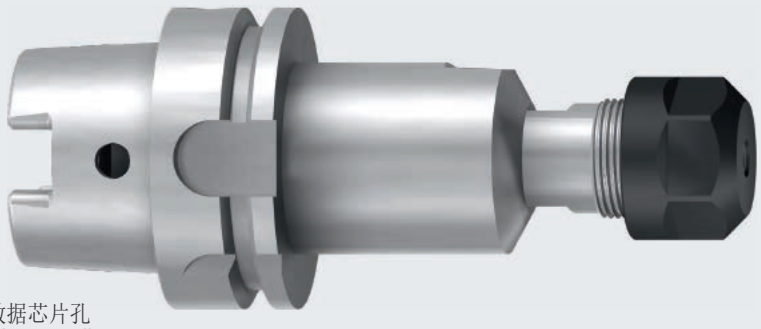
内部冷却供应，可根据要求开在螺旋槽上（IKZN）
Internal coolant supply exiting in the flutes (IKZN) upon request

冷却液: / Coolant-lubricants:
E = 乳化液 / Emulsion
O = 油 / Oil
M = 微量润滑 / MQL

应用范围-材料 Applications – material					材料-事例 Material examples	材料-代号 Material numbers
N		有色金属	Non-ferrous materials			
		铝合金	Aluminium alloys			
	1.1	锻铝合金	Wrought aluminium alloys	≤ 200 N/mm²	EN AW-AlMn1	EN AW-3103
	1.2			≤ 350 N/mm²	EN AW-AlMgSi	EN AW-6060
	1.3			≤ 550 N/mm²	EN AW-AlZn5Mg3Cu	EN AW-7022
	1.4	铸铝合金	Aluminium cast alloys	Si ≤ 7%	EN AC-AlMg5	EN AC-51300
	1.5			7% < Si ≤ 12%	EN AC-AlSi9Cu3	EN AC-46500
	1.6			12% < Si ≤ 17%	GD-AlSi17Cu4FeMg	

○ = 如有询价，可短时间内提供报价 · Available on short notice, price upon inquiry

PT Synchro
DIN 69893 A



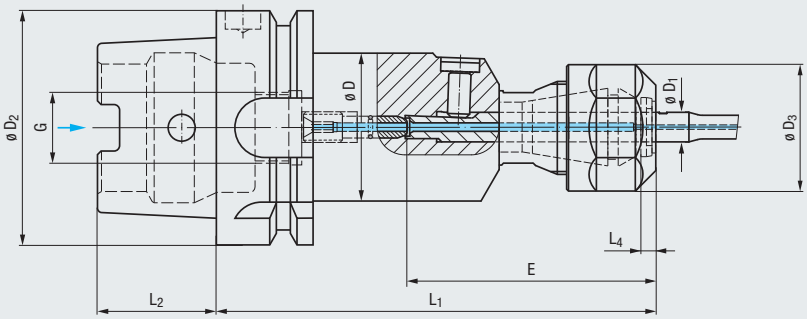
IKZ

MMS MQL

pmax 100bar (1400psi)

pmax 6bar (85psi)

根据DIN69873带有数据芯片孔
With bore for data chip according to DIN69873



类型 Type	ø D_1			ø D_2	ø D	ø D_3	L_1	L_2	L_4	G	E 1) min.	E 1) max.	
PT Synchro 8	8	ER 20	Hi-Q/ERC 20	HSK-A50	40	34	119	25	5	M16 x 1	68	71	●
				HSK-A63	40	34	121	32	5	M18 x 1	68	71	●
				HSK-A100	40	34	127,5	50	5	M24 x 1,5	68	71	●
PT Synchro 12	12	ER 25	Hi-Q/ERC 25	HSK-A50	42	42	128	25	5	M16 x 1	76	79	●
				HSK-A63	43	42	129	32	5	M18 x 1	76	79	●
				HSK-A100	43	42	137	50	5	M24 x 1,5	76	79	○

1) 夹持长度E
Clamping depths E

更多设计可根据要求提供
Further designs upon request

交货时，包含使用密封圈的锁紧螺母
Clamping nut for sealing disks and length adjustment screw is included in the delivery

单通道MQL系统或双通道MQL系统可根据要求提供
For 1-channel MQL system or 2-channel MQL system upon request

附件
Accessories

筒夹ER类型
Collets type ER

密封盘DS/ER类型
Sealing disks type DS/ER

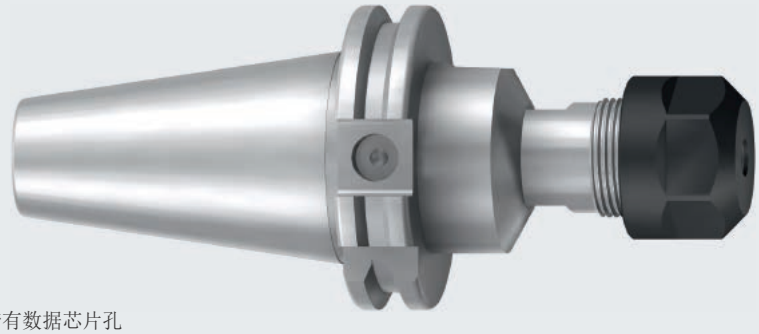
冷却润滑管和扳手 (仅适用于带内部冷却的型号 – IKZ)
Coolant tubes and wrenches (only for design with internal coolant supply – IKZ)

扭矩扳手TORCO-FIX
Torque wrenches TORCO-FIX

● = 库存刀具，参考价格清单· Stock tool, see price list
○ = 如有询价，可短时间内提供报价 · Available on short notice, price upon inquiry

PT Synchro

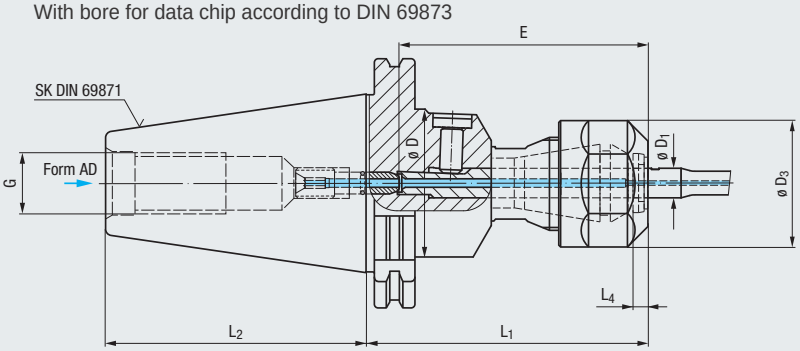
DIN 69871 AD



IKZ

pmax 100bar (1400psi)

根据DIN69873 带有数据芯片孔
With bore for data chip according to DIN 69873



Typ Type	ø D_1			SK	ø D	ø D_3	L_1	L_2	L_4	G	E 1) min.	E 1) max.	
PT Synchro 8	8	ER 20	Hi-Q/ERC 20	SK 40 AD	40	34	85	68,4	5	M16	68	71	○
				SK 50 AD	40	34	85	101,75	5	M24	68	71	○
PT Synchro 12	12	ER 25	Hi-Q/ERC 25	SK 40 AD	43	42	88	68,4	5	M16	76	79	○
				SK 50 AD	43	42	88	101,75	5	M24	76	79	○

1) 夹持长度E
Clamping depths E

更多设计可根据要求提供
Further designs upon request

交货时，包含了使用密封圈的锁紧螺母
Clamping nut for sealing disks and length adjustment screw is included in the delivery

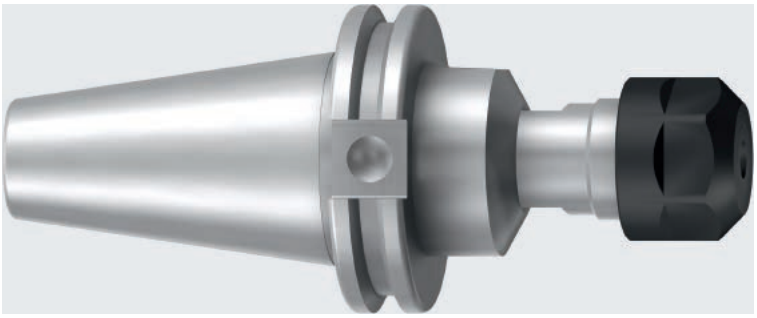
附件
Accessories

筒夹ER类型
Collets type ER

密封圈DS/ER类型
Sealing disks type DS/ER

扭矩扳手TORCO-FIX
Torque wrenches TORCO-FIX

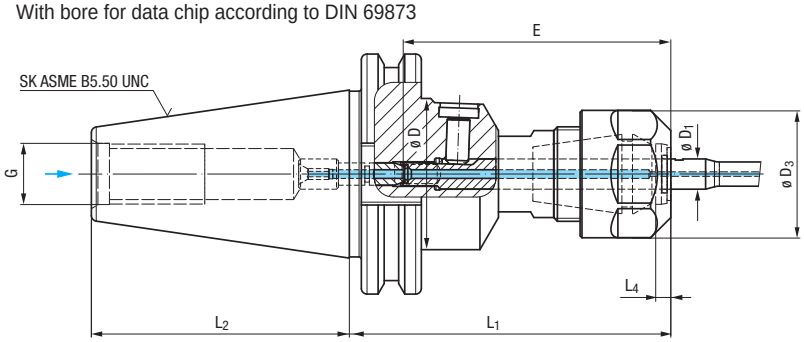
PT Synchro
ASME B5.50 UNC



IKZ

pmax 100bar (1400psi)

根据DIN69873 带有数据芯片孔
With bore for data chip according to DIN 69873



Typ Type	ø D_1			SK	ø D	ø D_3	L_1	L_2	L_4	G	E 1) min.	E 1) max.	
PT Synchro 8	8	ER 20	Hi-Q/ERC 20	CAT40	40	34	85	68,25	5	5/8 - 11	68	71	○
PT Synchro 12	12	ER 25	Hi-Q/ERC 25	CAT40	43	42	88	68,25	5	5/8 - 11	76	79	○

1) 夹持长度E
Clamping depths E

更多设计可根据要求提供
Further designs upon request

交货时，包含了使用密封圈的锁紧螺母
Clamping nut for sealing disks and length adjustment screw is included in the delivery

附件
Accessories

筒夹ER类型
Collets type ER

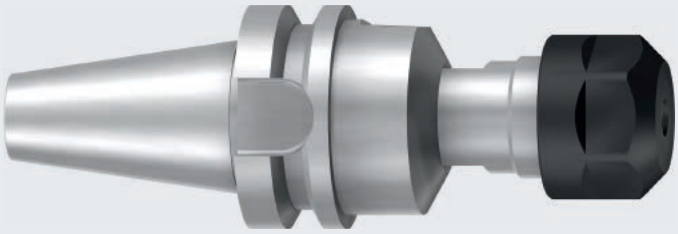
密封圈DS/ER类型
Sealing disks type DS/ER

扭矩扳手TORCO-FIX
Torque wrenches TORCO-FIX

● = 库存刀具，参考价格清单 · Stock tool, see price list
○ = 如有询价，可短时间内提供报价 · Available on short notice, price upon inquiry

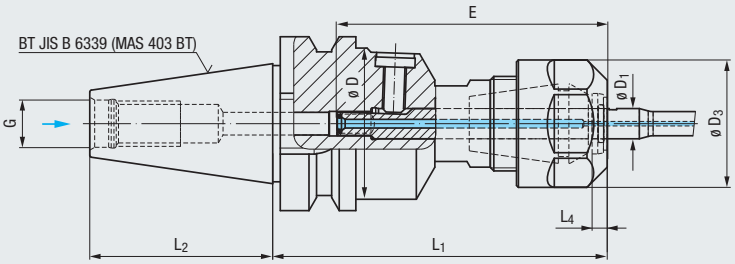
PT Synchro

JIS B 6339
(MAS 403 BT)



IKZ

pmax 100bar (1400psi)



Typ Type	ø D_1			SK	ø D	ø D_3	L_1	L_2	L_4	G	E 1) min.	E 1) max.	
PT Synchro 8	8	ER 20	Hi-Q/ERC 20	BT30	40	34	88,5	48,4	5	M12	71,5 2)		●
				BT40	40	34	93,5	65,4	5	M16	68	71	●
PT Synchro 12	12	ER 25	Hi-Q/ERC 25	BT30	43	42	92	48,4	5	M12	80 2)		○
				BT40	43	42	97	65,4	5	M16	76	79	

1) 夹持长度E
Clamping depths E

更多设计可根据要求提供
Further designs upon request

2 没有长度调节螺丝
Without length adjustment screw

交货时，包含了使用密封圈的锁紧螺母
Clamping nut for sealing disks and length adjustment screw is included in the delivery

附件
Accessories

筒夹ER类型
Collets type ER

密封圈DS/ER类型
Sealing disks type DS/ER

扭矩扳手TORCO-FIX
Torque wrenches TORCO-FIX

螺纹塞规通/止规（一体式），用于中径检测

Thread plug gauges go/no-go for inspection of the pitch diameter

M ISO 公制粗牙螺纹 DIN13
ISO Metric coarse thread DIN 13

量规尺寸执行DIN ISO 1502 标准
Gauge dimensions acc. DIN ISO 1502

		公差 · Tolerance	6H
	ø d_1 mm	P mm	G-GR-LD
M	3	0,5	●
	4	0,7	●
	5	0,8	●
	6	1	●
	7	1	●
	8	1,25	●
	10	1,5	●

用于螺纹底孔的光滑通/止规(一体式)，用于小径检测

Smooth plug gauges go/no-go for thread holes for inspection of the minor diameter

M ISO公制粗牙螺纹 DIN13
ISO Metric coarse thread DIN 13

用于挤压螺纹
For cold- formed threads

量规尺寸执行DIN ISO 1502 标准
Gauge dimensions acc. DIN ISO 1502

根据DIN 13-50，挤压螺纹中经公差为6H，内螺小径公差为7H

According to DIN 13-50, in a cold-formed thread the **tolerance** for the pitch diameter is 6H, for the **minor diameter of the internal thread** it is **7H.**

		公差 · Tolerance		7H
	公制螺纹 Metric threads	内螺纹小径 Minor dia. of the internal thread min.	max.	Glatt-GR-LD
M	3	2,459	2,639	●
	4	3,242	3,466	●
	5	4,134	4,384	●
	6	4,917	5,217	●
	7	5,917	6,217	●
	8	6,647	6,982	●
	10	8,376	8,751	●

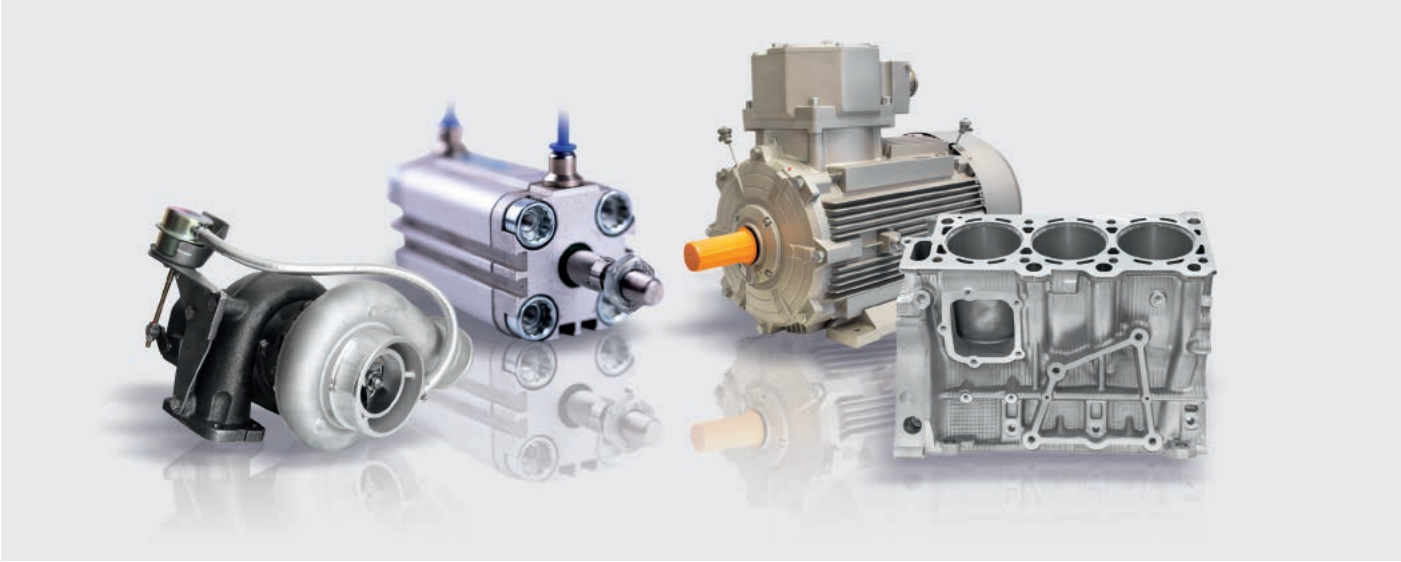
● = 库存刀具，参考价格清单 · Stock tool, see price list

PunchTap螺纹技术运用非常广泛。在一些行业，如汽车，温度控制技术，气动，壳体和发动机等行业，PunchTap的内螺纹加工方法开启了高效加工的新纪元。

PunchTap主要应用于铸铝合金和锻铝合金的加工。也适用于有色金属和具有类似延性性能的轻金属。

The PunchTap thread technology is usable in many applications. In numerous industries such as automotive, temperature control technology, pneumatics, housing and plant engineering, the internal threading technology PunchTap has opened up new time saving potentials.

PunchTap is mainly used for machining aluminium cast alloys and aluminium wrought alloys. It can be used as well for non-ferrous metals and light metals with similar ductile properties.



Punch-Tap的应用范围

变速器
汽缸盖
气缸曲轴箱
喷射泵
散热片
散热器板
换热器
气动阀门
气缸
旋转轴承
压缩机体壳
机架盖
水泵
悬架组件
轴承架

Sample applications for PunchTap:

- Gearbox housing
- Cylinder head
- Crankshaft housing
- Injection pump
- Cooling element
- Cooler grills
- Head exchanger
- Pneumatic valve
- Pneumatic cylinder
- Hinge bearing
- Compressor housing
- Housing cap
- Water pump
- Engine connecting parts
- Bedplate

更多信息，请参考 www.punchtap.com

If interested, please contact us.
For more information, see www.punchtap.com

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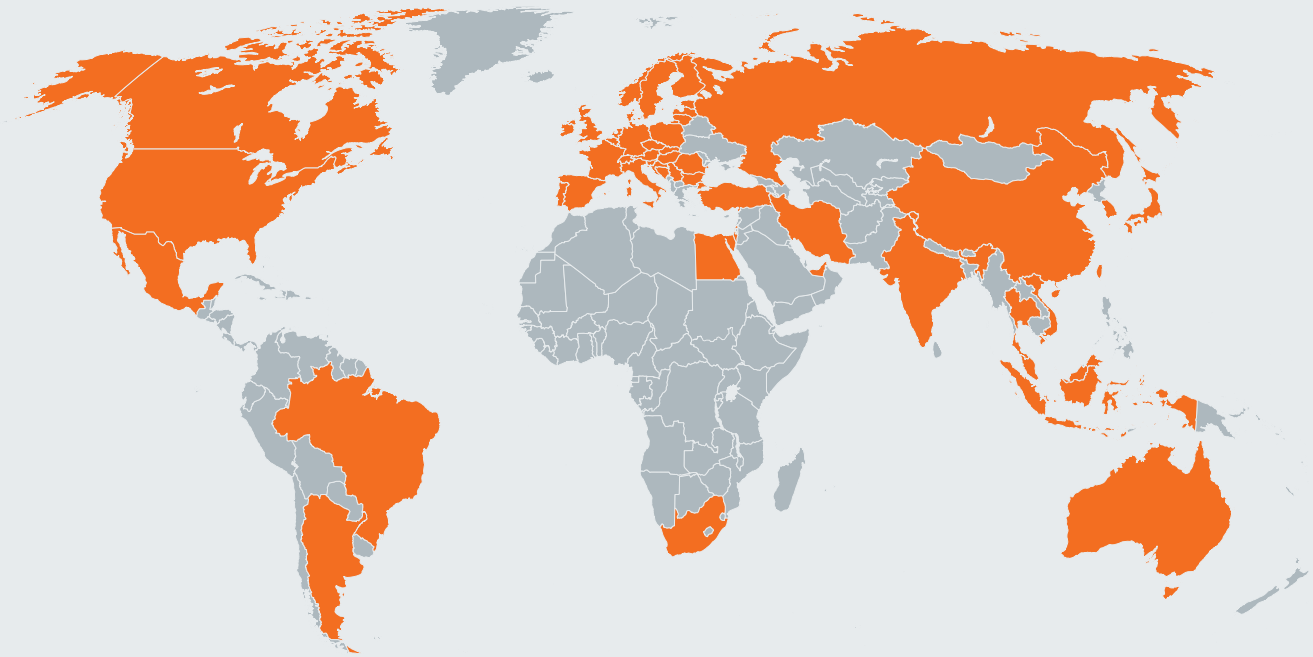

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EMUGE-FRANKEN sales partners, please see www.emuge-franken.com/sales

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