



■ Made
■ in
■ Germany



Strenx®

Hardox®
wear plate

Toolox®

Armox®



Machining Special Grade Steels

Taking Risk and Cost out of your Business
Tooling and Clamping Solutions from EMUGE-FRANKEN

High-strength structural steels and wear-resistant steels such as the **SSAB steels Strenx®**, **Hardox® wear plate**, **Toolox®** or **Armox®** offer a range of advantages. Thanks to their combination of hardness, wear resistance and toughness, they can extend the lifetime of many components. However, it is precisely this combination of hardness and toughness that makes machining these steels challenging.



www.ssab.com

Strenx®	Strenx® performance steel has properties suitable for a wide range of demanding structural applications.
Hardox® wear plate	Hardox® wear plate is the leading abrasion-resistant steel. Hard through and through, from the surface deep down to its core. Delivering extended service life and high productivity, it exceeds expectations in the most challenging, extreme wear environments.
Toolox®	Many production environments today face pressure to produce better and faster in order to stay competitive. Toolox® rises to these challenges by providing a modern engineering and tool steel of unmatched hardness and toughness.
Armox®	Armox® steel is widely used for the protection of people and valuables in all kinds of environments all over the world. They can withstand extreme forces from piercing objects hitting the steel at high speed, as well as having the toughness needed to resist shock forces.

Strenx®, Hardox® wear plate, Toolox® and Armox® are trademarks of the SSAB group of companies

Thanks to extensive development and testing, **EMUGE-FRANKEN** can offer various approved tool solutions for machining in high-strength materials.



With this brochure we would like to give you an overview of our product portfolio. Our entire range of tools and clamping solutions would far exceed the scope of a brochure. You can find the full range of standard solutions on our website: www.emuge-franken.com

Twist drills



EMUGE BasicDrill – affordable, top quality carbide drills for high mix / low volume operations and a wide range of materials. The BasicDrill provides longer tool life and productivity – an ideal high-penetration rate drill for everyday use, which can also be used in high-strength materials.



EMUGE SteelDrill – in addition to BasicDrill, is a higher performance drill with specialized geometries for specific material groups or applications where cycle time is critical. The SteelDrill delivers outstanding results and is the first choice for drilling in high-strength structural steels and wear-resistant steels.

Taps



EMUGE offers a comprehensive range of high-performance tools for threading demanding high-strength materials, including taps with a substrate of HSSE, Powder metal (PM) and solid carbide. With innovative geometry designs and advanced multi-layer coating systems, our taps produce uniform, controllable chip formation that is smoothly released for fast and efficient chip evacuation. We have an extensive range of tools, each specifically designed for machining blind holes and through holes. For optimum results, use our recommended cutting values and lubrication recommendations.

Continuous improvement



Material:	Hardox® 500	Size:	M10 - ISO 2/6H
Machine:	CNC Machining center	Thread type:	Through hole
Tool holder:	EMUGE Softsynchro® tap holder	Lubrication:	Emulsion
Tool new:	EMUGE Rekord 1B-STEEL-H-PM-ALCR-101	Thread depth:	2.5 x d ₁
Tool old:	EMUGE Rekord 1B-STEEL-PM-TIN	v_c:	3 m/min

With our newly designed tool, the Rekord 1B-STEEL-H-PM-ALCR-101 we were able to increase tool life by 8 times.
 It has always been our goal to continuously improve tools, and in Hardox® 500 we have succeeded in doing just that.

Cold-forming taps



Advanced geometry designs in combination with advanced coating systems and high grade substrate materials, allow cost-effective machining of materials such as Strenx® 900, Toolox® 33 or Armox® 370T.

However, it must also be mentioned that there are high-strength steels that cannot be made flowable and therefore cold forming is not possible.

Thread milling cutters



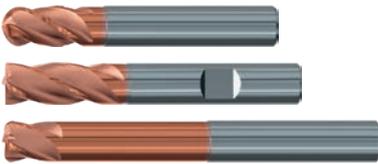
EMUGE offers its customers a wide range of tool options in the field of thread milling. The various basic types with their specific geometries have been developed to meet the high demands of our customers in thread milling. Circular drill thread mills for the production of thread hole, chamfer and internal thread reduce tool costs, tool change times and storage space in the tool magazine. Thread milling cutters with alternating tooth rows significantly reduce radial forces and thus increase tool life. Circular thread milling bodies are extremely versatile thanks to indexable or exchangeable inserts.

Milling cutters

The FRANKEN milling portfolio for machining high-strength steels covers a wide range of tool types. The most important product lines are:

**FRANKEN
Multi-Cut**

FRANKEN Multi-Cut end mills were developed for high performance roughing applications. All products have variable spacing combined with a roughing profile to reduce vibrations and maximize metal removal rates in a broad range of materials. Multi-Cut carbide end mills are typically coolant fed to improve evacuation and allow for accelerated feed rates. This family of high-performance end mills provides the ultimate roughing tool solution for manufacturers looking to reduce cycle times.

**FRANKEN
TOP-Cut**

FRANKEN TOP-Cut end mills are versatile solid carbide end mills which can be used in a wide range of materials. These tools have a variable helix design with high performance surface coatings and are manufactured to the strictest tolerance and quality standards.

**FRANKEN
Hard-Cut**

The FRANKEN Hard-Cut series of end mills was developed for machining hardened materials. These solid carbide end mills use a specialized grade of carbide substrate for extreme wear resistance along with PVD coatings developed for high heat applications. Variable spacing along with higher flute counts are combined with larger core diameters for high tensile strength materials.

**FRANKEN
Jet-Cut**

FRANKEN Jet-Cut style carbide end mills were developed specifically for High Performance Cutting (HPC) and High-Speed Cutting (HSC) machining strategies. Some of the characteristics of an HPC milling cutter are variable flute spacing with enlarged chip gashes and radial chip formers. HSC milling cutters have increased flute counts and unique carbide substrate grades for high metal removal rates and improved surface finishes. Jet-Cut end mills are also available in specialized trochoidal milling designs for high feed milling applications.



Thread gages

EMUGE's comprehensive line of thread gages consist of plug gages, thread depth plug gages and ring gages. A Certificate of Accuracy will be issued on request. Gages inspect the pitch diameter and functional thread for threaded components.

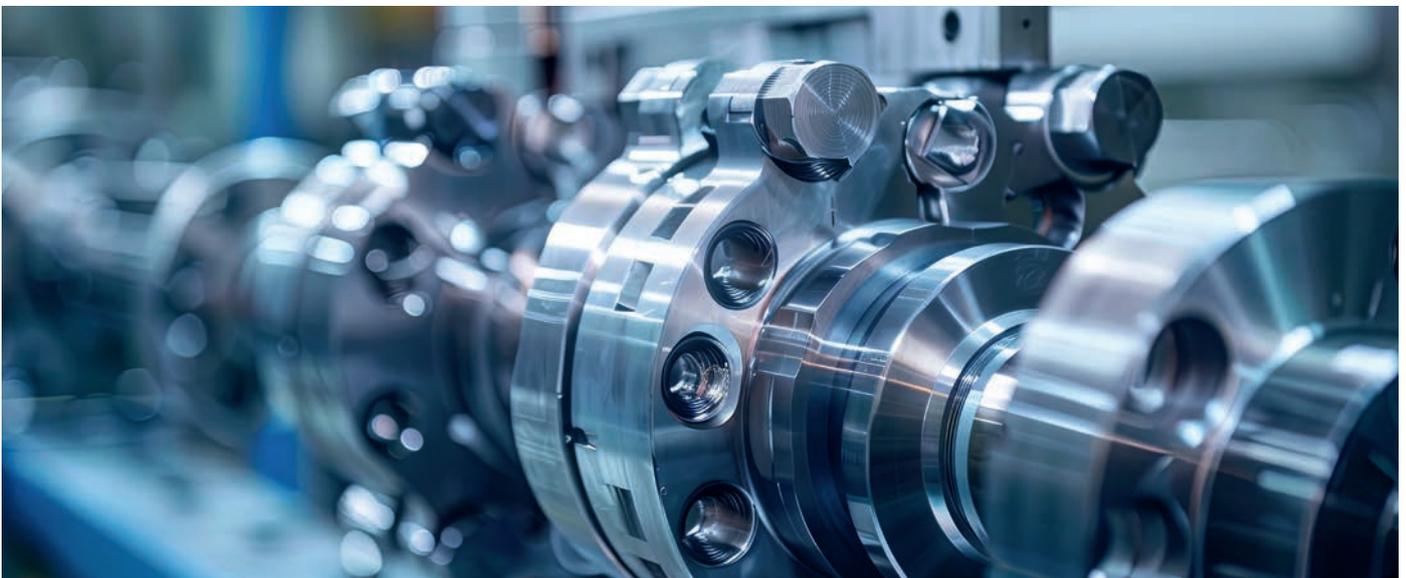
Features:

- Exceptionally hardened tool steel and highly accurate
- Full range of inch and metric sizes in coarse and fine: M, MF, UNC, UNF, UNEF, STI, NPT, NPTF, along with EMUGE SELF-LOCK thread profile
- Stable thread start for easy insertion
- Eliminate thread damage in demanding environments
- Certificates of Accuracy are available upon request

Gage certification is performed by accredited calibration laboratory "DECOM UGK GmbH" at EMUGE.

Thread cutting oils and pastes

EMUGE offers an extensive range of coolant-lubricants for the threading process. All oils and pastes are chlorine-free for best environmental protection. EMUGE coolant-lubricants are specially designed for the materials they are recommended for, and for typical modern work conditions is from our experience known to make the threading process reliable and to extend tool life.



Tool clamping

EMUGE-FRANKEN offers an extensive line of high-performance tool holder solutions for a full range of applications.

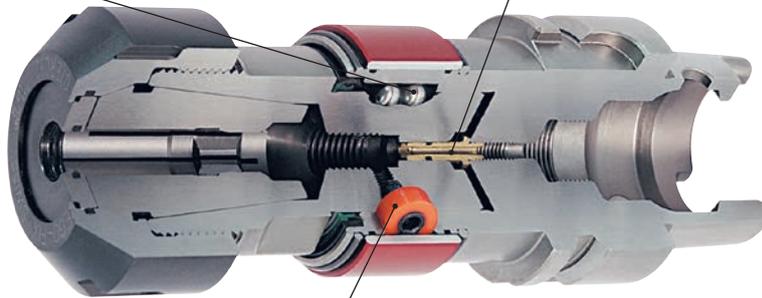
Tap holder



EMUGE is widely recognized in the industry as the leader in designing and manufacturing exceptionally high performance, highest quality taps. With EMUGE's Softsynchro® tap holder technology, you can take EMUGE taps to the next level and beyond with maximum tool life, thread quality, tapping speed and performance. Having the correct tap for the job is not enough. You need the best tap holder to drive the best taps in the world to their optimum levels.

100% transfer of torque via ball bearings
in precision ground grooves.

Internal coolant supply
is standard on almost all Softsynchro® tap holders.



Elastomer springs
that absorb excessive axial forces and compensate for small errors in the machining process.

Milling and drilling chucks

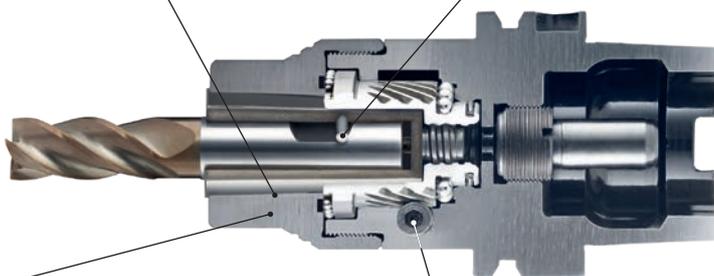


FRANKEN high precision and performance FPC mill / drill chucks provide unprecedented rigidity, vibration dampening, concentricity, machining speed, and tool life vs. conventional chuck technologies for milling and drilling applications. Available in a wide range of styles. Internal and peripheral coolant options, and MQL-adaptable.

The patented high precision collet holders FPC are the only power chucks worldwide with an integrated 1:16 worm gear with a traction force of 30 kN.

Maximum dampening
The clamping system reduces vibrations.

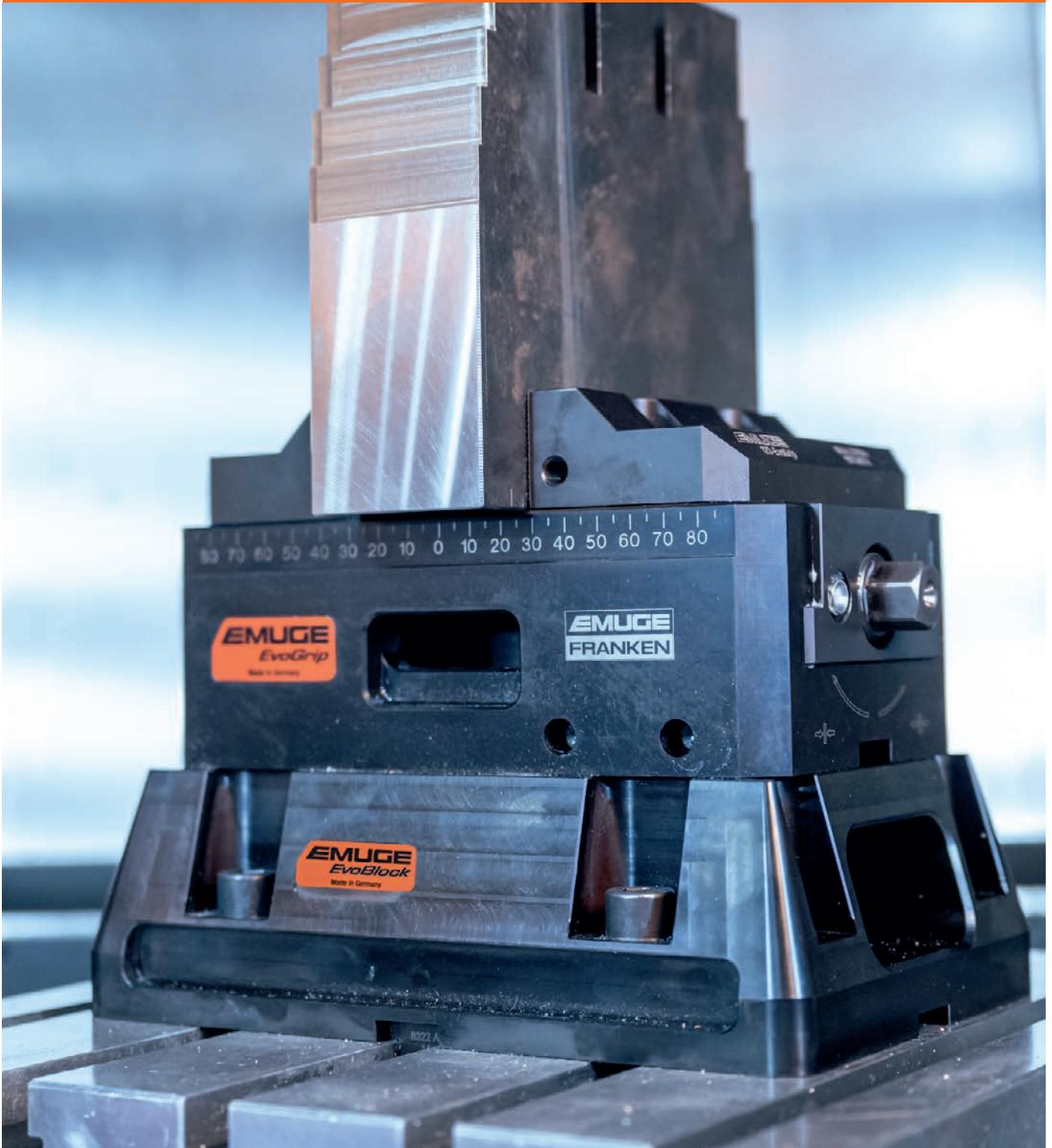
Pull-out prevention "Pin-Lock"
The "Pin-Lock" system guarantees 100% pull-out prevention!



High rigidity
Patented design and body provides 100% holding power.

Simple and secure clamping
Mechanical drive actuated with a hex wrench. Highly accurate and safe design.

Workpiece clamping



With the EvoGrip, EvoPoint and EvoBlock, EMUGE has developed high-performance clamping devices including a zero-point clamping system and spacers.

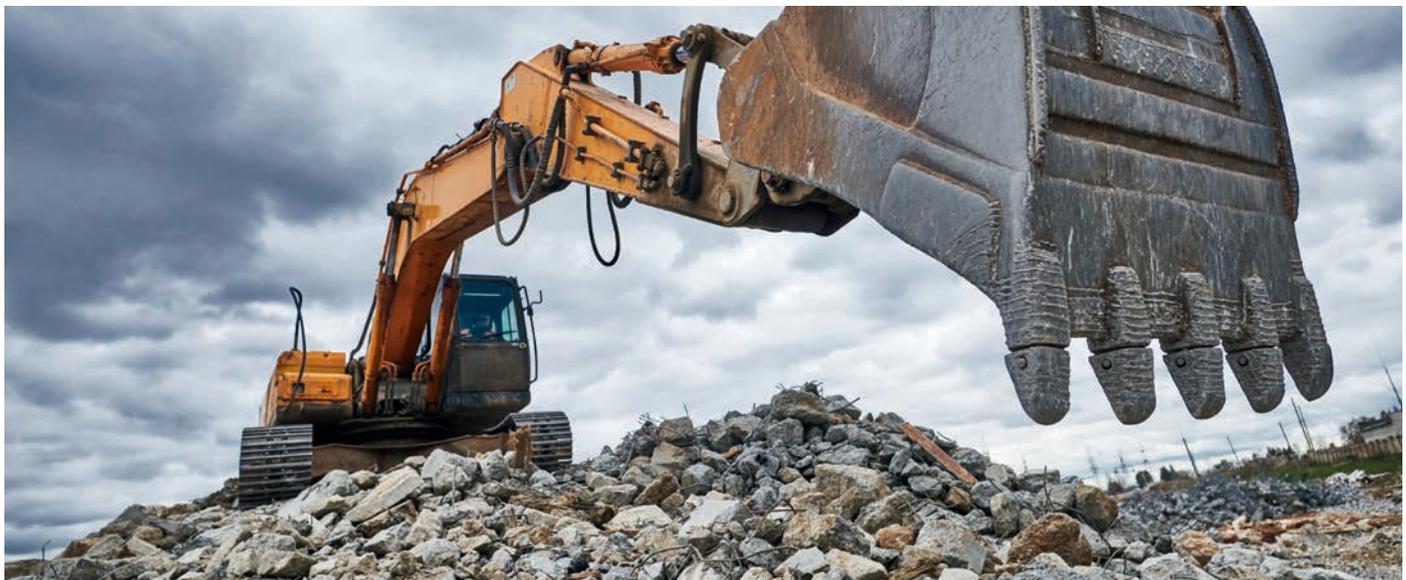
With over 7.5 metric tons of clamping force* and a screw shaft tested for over 50,000 cycles, this clamping system can withstand the highest loads, keeps the machining process low-vibration and therefore perfectly meets the requirements of heavy-duty machining.

For more information



* Clamping force EvoGrip 120 mm width

SSAB products	R _m [N/mm ²]	Drilling	Tapping		Cold forming
			Blind hole	Through hole	
					
Strenx® (Weldox) 500	1050	BasicDrill or SteelDrill	Enorm-Z-PM-GLT-1	Rekord B-Z-PM-TIN-70	InnoForm-Z-SN-PM-TIN-80
Strenx® (Weldox) 1300	1550		VHM-Rekord A-HCUT/D-TICN	-	
Hardox® 400	1250		Rekord D-TI-TICN	Rekord B-STEEL-H PM-ALCR-101	-
Hardox® 450	1400		VHM-Rekord A-HCUT/D-TICN		-
Hardox® 500	1670		VHM-Rekord A-HCUT/D-TICN		-
Hardox® 600	2000		VHM-Rekord A-HCUT/D-TICN		-
Hardox® Extreme	2400		VHM-Rekord A-HCUT/D-TICN		-
Toolox® 33	970		Enorm-Z-PM-GLT-1	Rekord B-Z-PM-TIN-70	InnoForm-Z-SN-PM-TIN-80
Toolox® 40	1250		Rekord D-TI-TICN		Rekord C-TI-TICN
Toolox® 44	1450		Rekord A-HCUT-PM-TICN	Rek. B-STEEL-H-PM-ALCR-101	
Toolox® 46	1720		Rekord A-HCUT-PM-TICN	Rekord C-TI-TICN	-
Armox® 370T Class 2	1250		Enorm-Z-PM-GLT-1	Rekord B-Z-PM-TIN-70	InnoForm-H-SN-PM-TIN-T26
Armox® 370H	1250		Rekord D-TI-TICN		Rekord C-TI-TICN
Armox® 440T	1500		Rekord A-HCUT-PM-TICN	Rekord C-TI-TICN	
Armox® 500T	1730		Rekord A-HCUT-PM-TICN	Rekord C-TI-TICN	-
Armox® 560T	1950		Rekord A-HCUT-PM-TICN		-
Armox® 600T	2100	VHM-Rekord A-HCUT/D-TICN		-	



Thread milling	Milling				SSAB products
	Roughing	Finishing	Ball nose and torus	Trochoidal	
 <p>A wide range of thread milling cutters for all needs are available</p>					Strenx® (Weldox) 500
	Multi-Cut	TOP-Cut	TOP-Cut	Jet-Cut	Strenx® (Weldox) 1300
	Hard-Cut "Base"	TOP-Cut	TOP-Cut	Jet-Cut	Hardox® 400
		Hard-Cut	Hard-Cut	-	Hardox® 450
					Hardox® 500
	Hardox® 600				
	Hardox® Extreme				
	Multi-Cut	TOP-Cut	TOP-Cut	Jet-Cut	Toolox® 33
	Multi-Cut	TOP-Cut	TOP-Cut	Jet-Cut	Toolox® 40
					Toolox® 44
Toolox® 46					
Multi-Cut	TOP-Cut	TOP-Cut	Jet-Cut	Armox® 370T Class 2	
Hard-Cut "Base"	TOP-Cut	TOP-Cut	-	Armox® 370H	
				Armox® 440T	
				Armox® 500T	
Armox® 560T					
Armox® 600T					

Our extensive portfolio and the application recommendations can be found on our website www.emuge-franken.com

If you enter e.g. toolox in the search field for the material selection, you will be offered various materials to choose from.

Please select the appropriate material, add further tool or application criteria and you will be offered a selection of tools. The technically best tool according to your selection criteria will be displayed first. It works the same for all threading, drilling and milling tools.

Designation	Description	Tensile strength	Hardness	Material
<input type="checkbox"/> Toolox 33	tempered, pre-hardened tool steel	930 - 1100 MPa		X1.30
<input type="checkbox"/> Toolox 40	tempered, pre-hardened tool steel	1220 - 1430 MPa		X1.31
<input type="checkbox"/> Toolox 44	tempered, pre-hardened tool steel	1385 - 1630 MPa		X1.32

Customer trial in Hardox® 600 – Drilling



Material:	Hardox® 600 - H3.1
Work piece:	Excavator wear part
Machine:	CNC Machining center
Tool holder:	Hydro-expansion chuck
Tool EMUGE:	EMUGE BasicDrill BD101-5xD
Ident no.:	TA211344.1450
Tool competition:	Twist drill dia. 14.5 mm
Hole type:	Through hole
Lubrication:	Emulsion, 30 bar
Drill depth:	25 mm
Cutting speed competition v_c:	30 m/min
Cutting speed EMUGE v_c:	40 m/min
Feed competition f:	0.08 mm/rev.
Feed EMUGE f:	0.17 mm/rev.

By switching to BasicDrill, the machining time was significantly reduced and tool costs were cut in halve.

Customer trial in Hardox® 600 – Tapping



Material:	Hardox® 600 - H3.1
Workpiece:	Machine component
Machine:	CNC Machining center
Tool holder:	Collet chuck
Tool:	EMUGE VHM-Rekord 1A-HCUT/D-TICN
Ident no.:	B016K101.0116
Thread size:	M16 - ISO 2/6H
Hole type:	Through hole
Lubrication:	Paste no. 6+
Drill depth:	50 mm
Thread depth:	50 mm (3xD)
Pre-drill dia.:	14.20 mm
Cutting speed v_c:	3 m/min

Customer was using a tap with a brazed tungsten carbide head and internal coolant supply. EMUGE was able to increase the tool life from 2 to 250 threads.

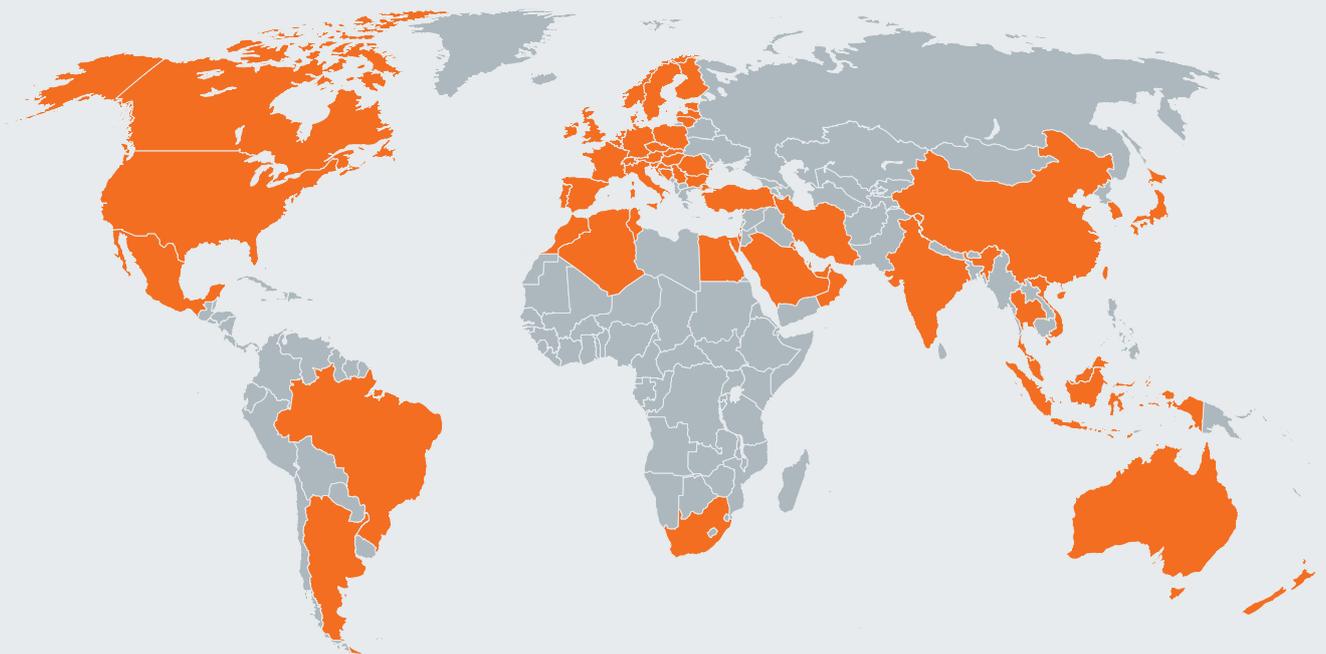
Customer trial in Hardox® 600 – Milling



Material:	Hardox® 600 - H3.1
Workpiece:	Machine wear part
Machine:	CNC Machining center
Tool holder:	HSK-A63 – Weldon
Tool:	FRANKEN Jet-Cut
Ident no.:	2851A.012
Size:	Dia. 12 mm
Operation:	Finishing
Cutting speed v_c:	50 m/min
Feed per tooth f_z:	0.03 mm
Radial depth of cut a_e:	1.7 ... 1.3 ... 0.1 mm
Axial depth of cut a_p:	15 mm
Speed:	1327 rpm
Lubrication:	Air / dry
Cutting direction:	Climb milling
Result:	90 minutes tool life

The customer is able to finish two parts with one FRANKEN Jet-Cut.





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

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