CYSTIR

CYTEC SYSTEMS

FRICTION STIR WELDING COMPONENTS

COMPONENTS PERFECTION.

CYTEC SYSTEMS TECHNOLOGY INSIDE COMPONENTS PERFECTION

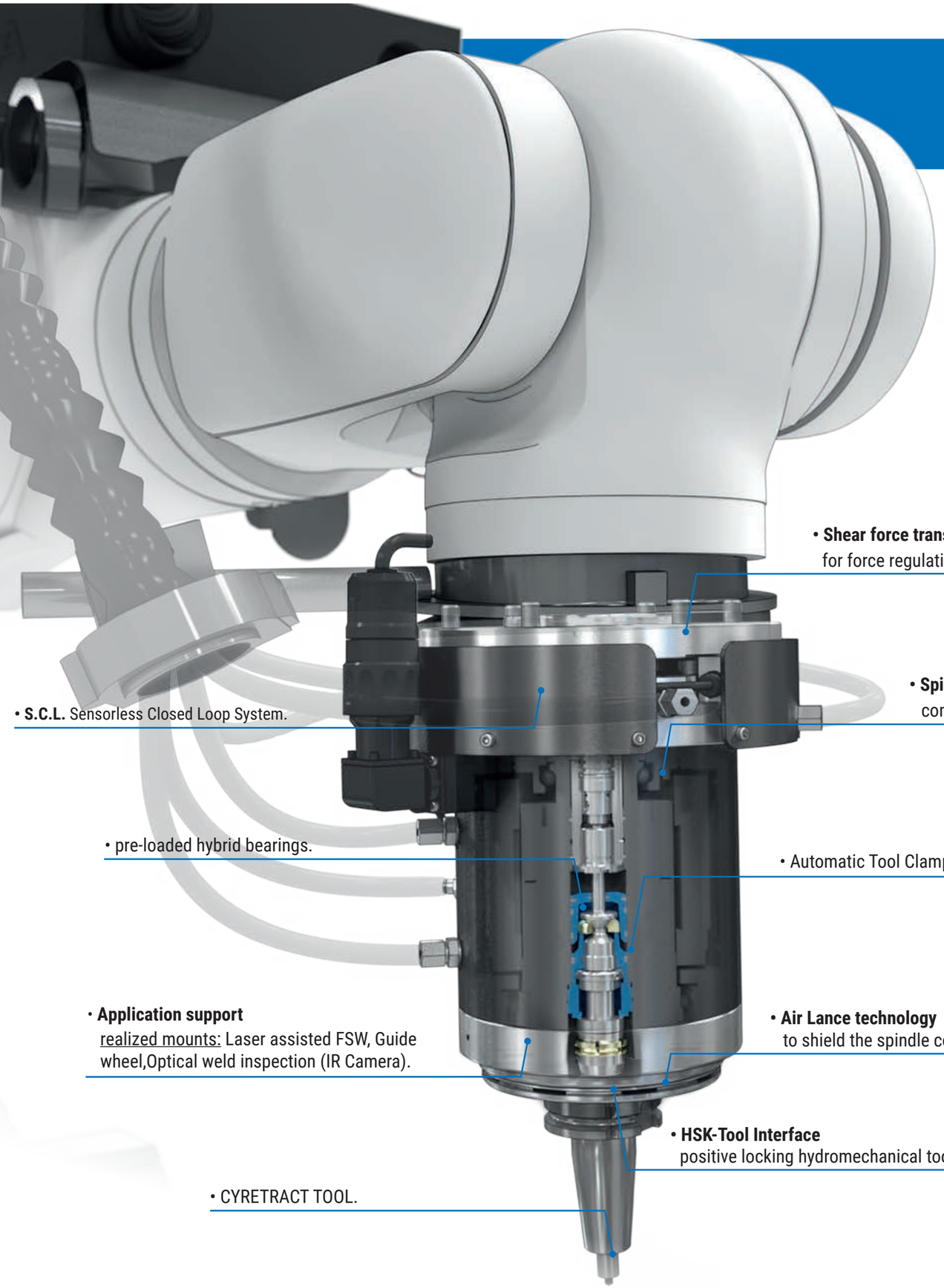
MADE IN GERMANY

CYTEC TECHNOLOGY

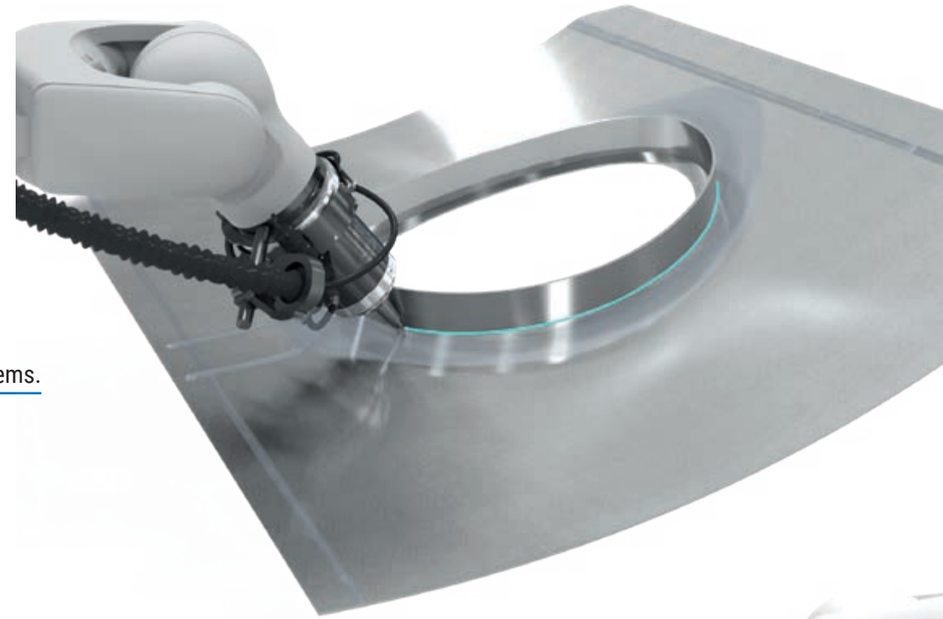
inside for excellent friction stir welding

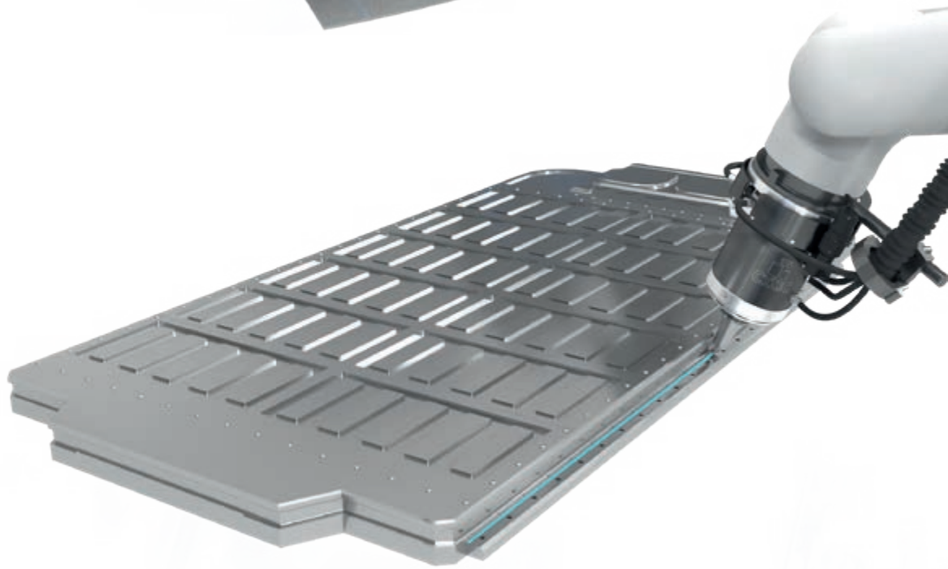
The Cystir motor spindle and the 2-axis welding head are specifically designed for friction stir welding to create a perfectly fused conjunction between similar and non-similar metals.

As a result, the Cytec friction stir welding technology achieves a perfect state of plasticity and a strong conjunction between different materials

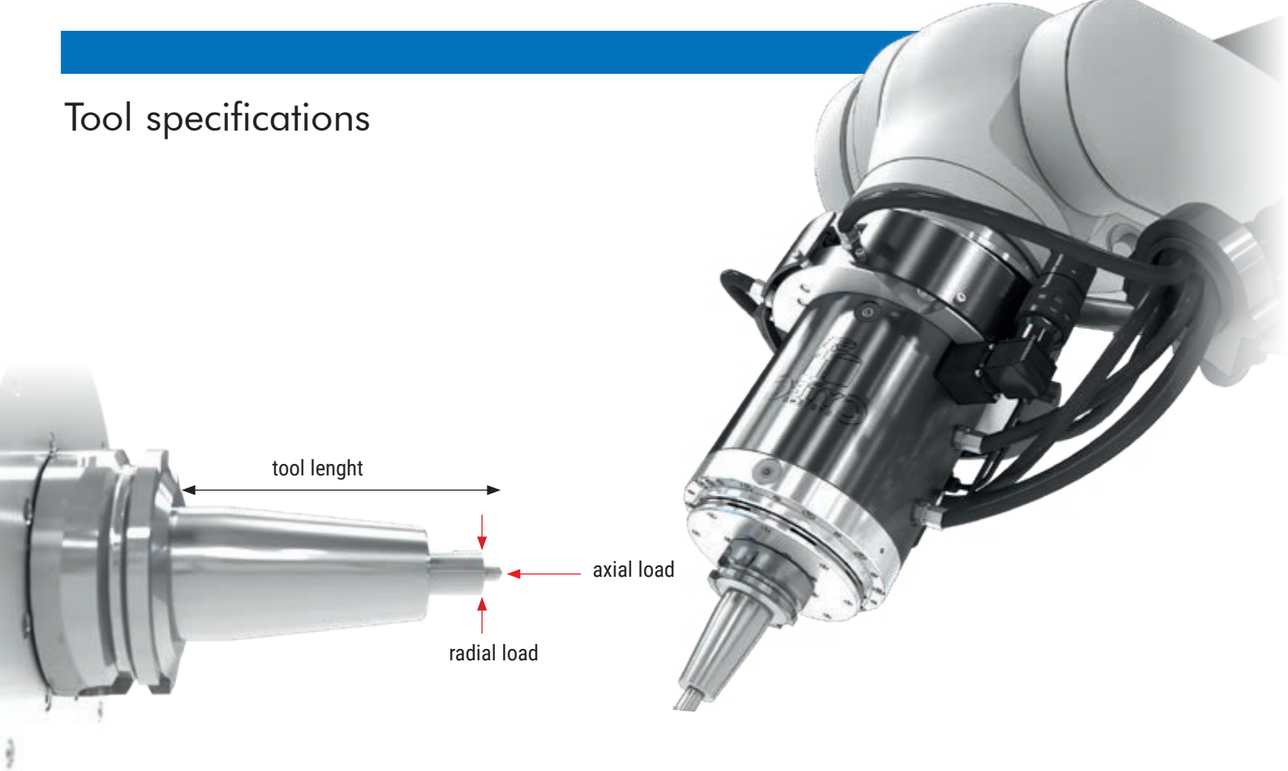


- **Shear force transducer**
  for force regulation during welding process.
- **S.C.L.** Sensorless Closed Loop System.
- **Spindle-torque motor**
  combined with all common control systems.
- pre-loaded hybrid bearings.
- Automatic Tool Clamping system.
- **Application support**
  realized mounts: Laser assisted FSW, Guide wheel,Optical weld inspection (IR Camera).
- **Air Lance technology**
  to shield the spindle components from process heat.
- **HSK-Tool Interface**
  positive locking hydromechanical tool clamping system.
- CYRETRACT TOOL.





Tool specifications

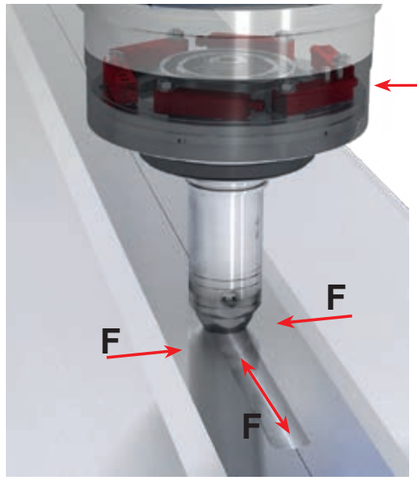


FSW TOOL

Max. tool length	mm	250
Axial load	N	< 10.000
Radial load	N	< 5.000
Tool length	mm	100
Max. axial load	N	< 40.000
Max. radial load	N	< 20.000

SHEAR FORCE TRANSDUCERS

Nom. load	mkN	20
Accuracy	% f.s.	0,1
Initial signal	mA	12 +/-8
Zero point	mA	12



Shear force transducers
(4-20mA analog), 6 pcs.

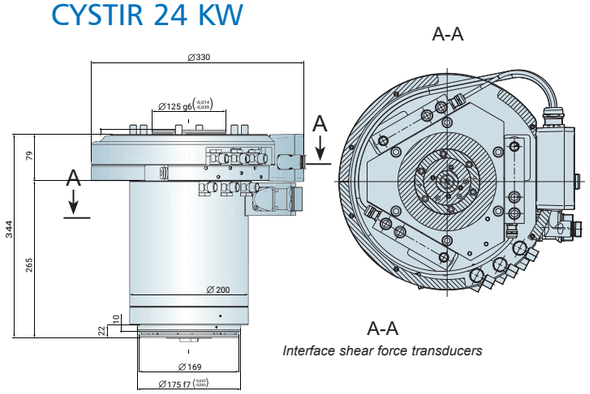
Evaluation electronic
(Sum signal) Σ

CYTEC has developed the CYSTIR motor spindle designed specifically for friction stir welding.

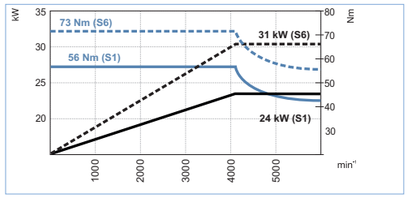
Characteristics :

- HSK tool interface with hydromechanical CYTWIST tool clamping system
- CYTORQUE motor (combinable with all common control systems)
- Pre-loaded CYRT hybrid bearing
- Shear force transducers to regulate forces during the welding process
- Rotary union for clamping and release hydraulics

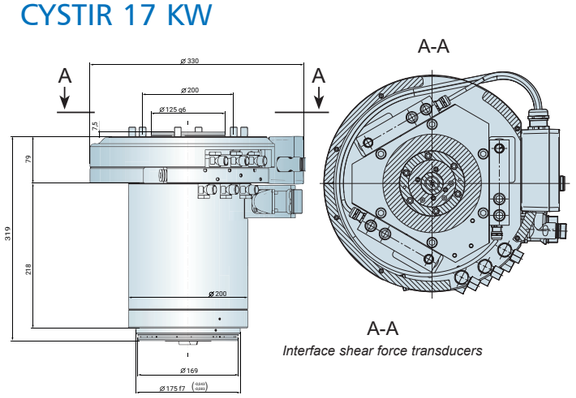
CYSTIR 24 KW



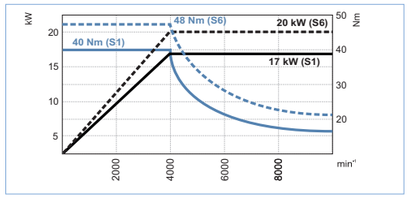
Interface shear force transdusers



CYSTIR 17 KW



Interface shear force transdusers



MOTOR SPECIFICATION

Power	kW	24 (S1)	31 (S6)	Power	kW	17 (S1)	20 (S6)
Torque	Nm	56 (S1)	73 (S6)	Torque	Nm	40 (S1)	48 (S6)
Speed	min^{-1}	4.050 rpm	4.050 rpm	Speed	min^{-1}	4.000 rpm	4.000 rpm
Current	A	42	54	Current	A	48	57

OPERATING DATA

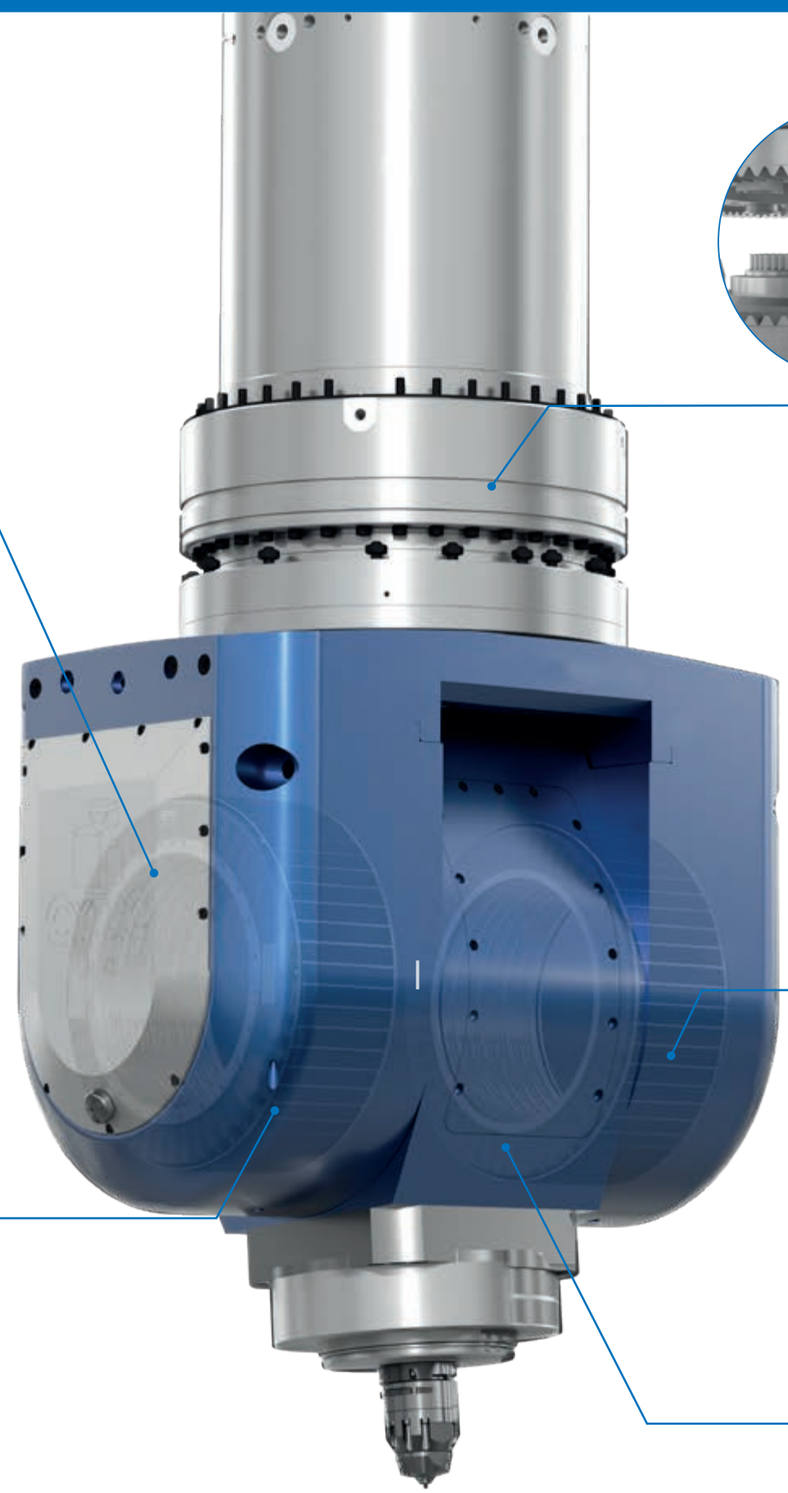
Speed	min^{-1}	5.000		Speed	min^{-1}	9.000	
Max. axial load	kN	15		Max. axial load	kN	15	
Max. radial load	kN	5		Max. radial load	kN	5	
Weight	kg	95		Weight	kg	88	

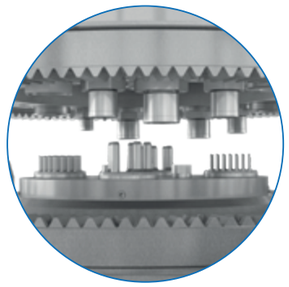
CLAMPING SYSTEM

Tool interface	HSK	E63 / A63
Clamping force	kn	22
Clamping pressure	bar	55
Clamping monitoring	-	CyCon K11
Further Interface response		

CYTEC TECHNOLOGY

The FSW Fork head





The FSW Fork head incorporates the finest technologies produced by CYTEC. Besides the powerful 42kW CYTEC motor spindle with an HSK-A 100 tool-interface, the CYWELD is equipped with 6 spherical arranged shear force transducers.
These sensors are used to detect the radial and axial forces during the welding process in TCP direction.

• Temperature stable and distortion free design.

ZERO TEMPERATURE CONTROL

• The most advanced cooling technology in all drives.

• Highest power density: light compact, rigid and brutal torque in every axis.

• One part swivel housing for highest accuracy in all dimensions.

• **Shear force transducer**
for force regulation during welding process.

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- Pre-loaded hybrid bearing
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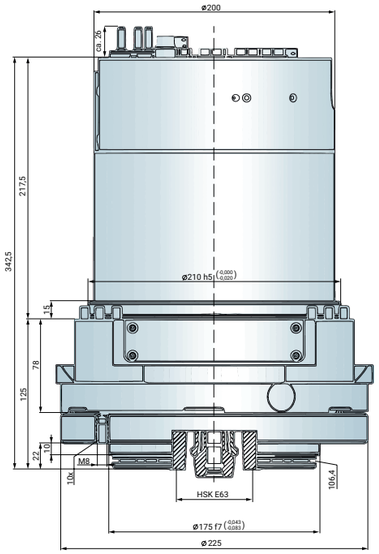
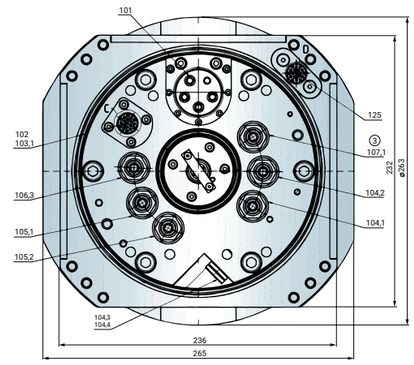
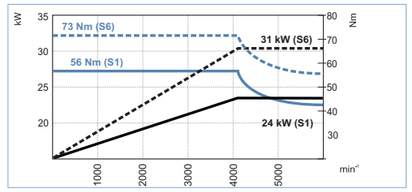
- Rotary feedthrough for clamping and release hydraulics







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Max. axial load	kN	15
Max. radial load	kN	5
Weight	kg	80

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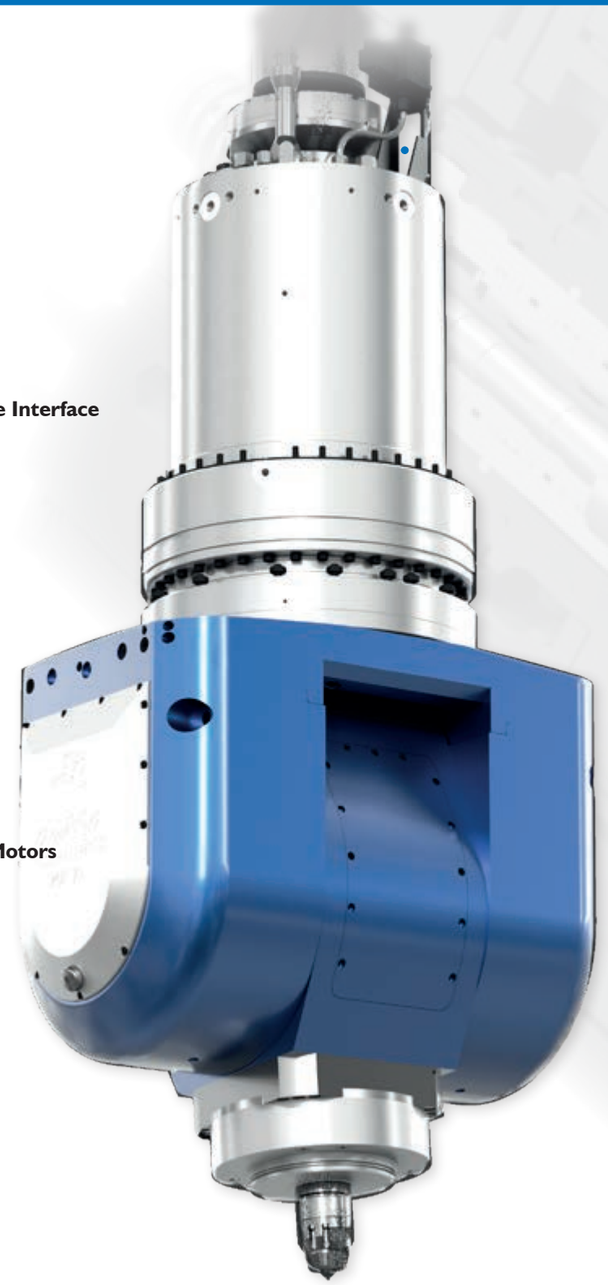
Clamping force	KN	22
Clamping pressure	bar	55

CYTEC TECHNOLOGY

CYTEC Technology Exchange Interface



CYTEC Technology Exchange Interface

Unlimited Flexibility for

Multi-Technology Machining

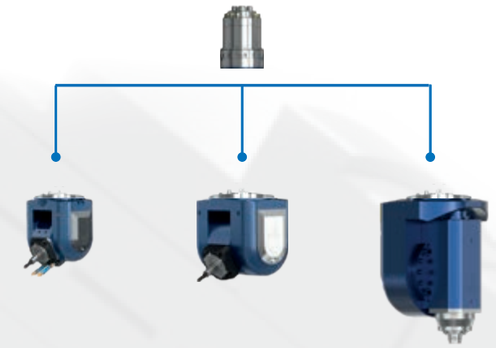
CYTEC Ultra High Torque Motors

Maximum Power and Precision

Delta Zero

Temperature Control

CYTEC Technology Exchange- Interface



\+ Other options are possible


Horizontaler Kopf


Vertikaler Kopf


Bohrkopf

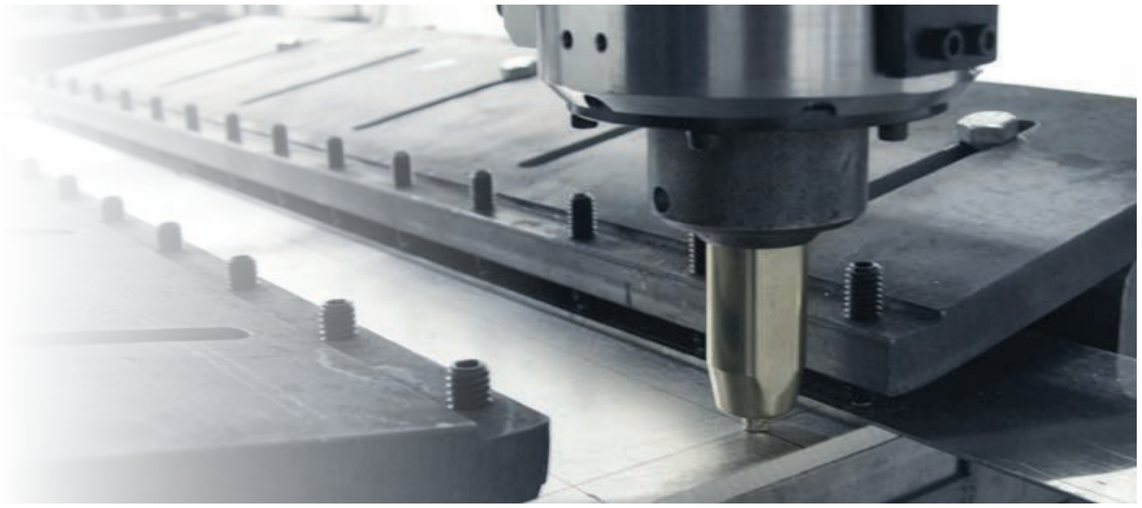
CYTEC TECHNOLOGY

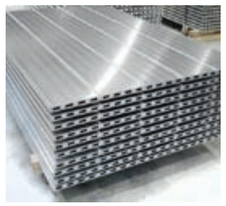
The Applications Friction Stir Welding

- Aircraft Engineering
- Space travel
- Defense
- Aircraft industry
- Automotive industry
- Fuel tanks

- Atomizer
- Aggregate
- Coil joining
- Connection of deck plates

...and many other
production parts in different markets





RETRACT

FLEXTOOLS

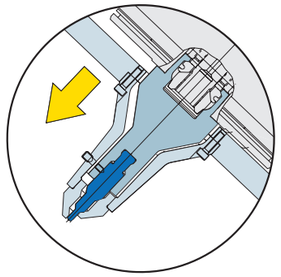
High surface finish, less process force and heat, highly dynamic welding enabled by non-rotating tool shoulder separate retraction of the Pin or separate pushing shoulder.

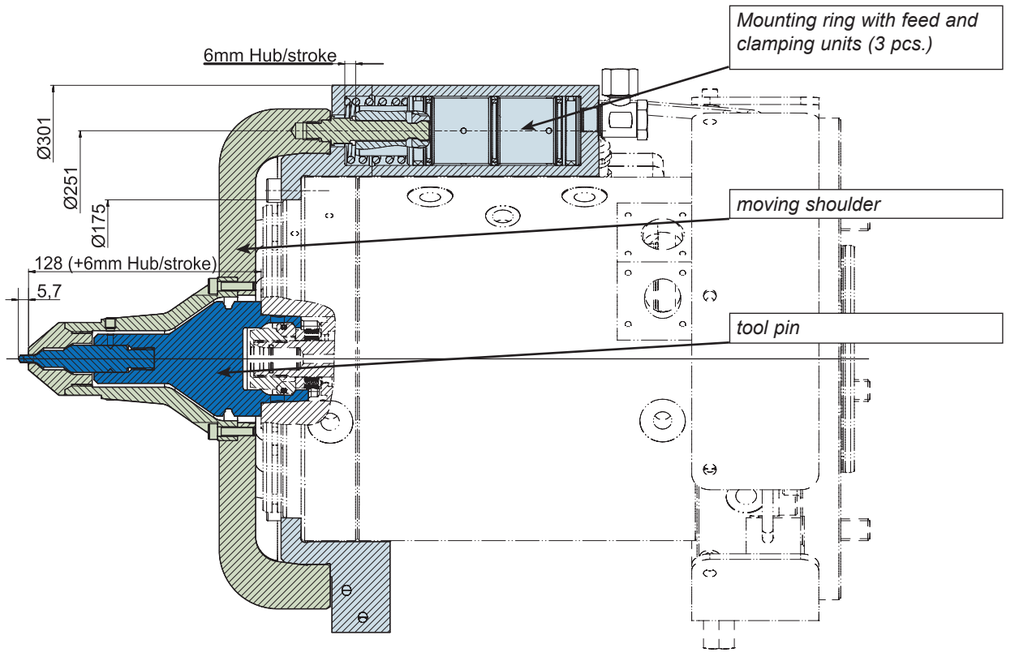
This joining process is more sensitive and offers a better surface finish.. The friction pin rotates into the material. The non rotating shoulder gives a slight pressure to the welding surface. This process create less force and heat. This type of FSW tool is often used on thin workpieces. With the Flextool an axial shoulder compression at the end of the welding process is possible. During the shoulder remains on the surface the Pin returns from the material.

Tool Pin retreat Pin
and shoulder rotating Pin
retreat

Moving shoulder tool
Pin and shoulder rotating
Pushing shoulder.

To achieve an especially clean and smooth weld seam, the spindle can be equipped with the tool system FlexTool. It consists of the actual stir welding tool with HSK interface and a ring shaped shoulder for the tool pin which can be docked on and off automatically. During the welding process the shoulder remains in retracted position. Shortly before the end of the process the shoulder extends in axial direction and encloses the tool pin so that the seam is finished in high quality.



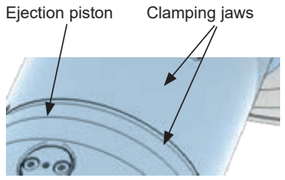


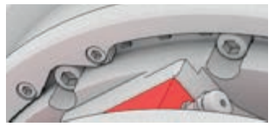
Option FlexTool

Max. axial load:	15 kN
Max. radial load:	5 kN
Stroke feed:	6 mm
Preloaded spring force feed unit:	430 N
Max. clamping force of the clamping system:	3 x 11 kN
Max. clamping pressure of the clamping system:	70 bar
Weight tool pin:	1.2 kg
Weight moving shoulder:	8.2 kg
Total weight:	28.4 kg

Clamping system & Control signal processing

As standard the friction stir welding heads are equipped with an automatic hydromechanical tool clamping system.
The tools are inserted either manually or by a pickup station into the tool interface.
The Process Logic Controller (PLC) triggers the hydraulic operation to lock the tool high clamping force.
The tool clamping is controlled by an analog volume flowmeter combined with an electronic evaluation device integrated in the control cabinet.





Function of the clamping system

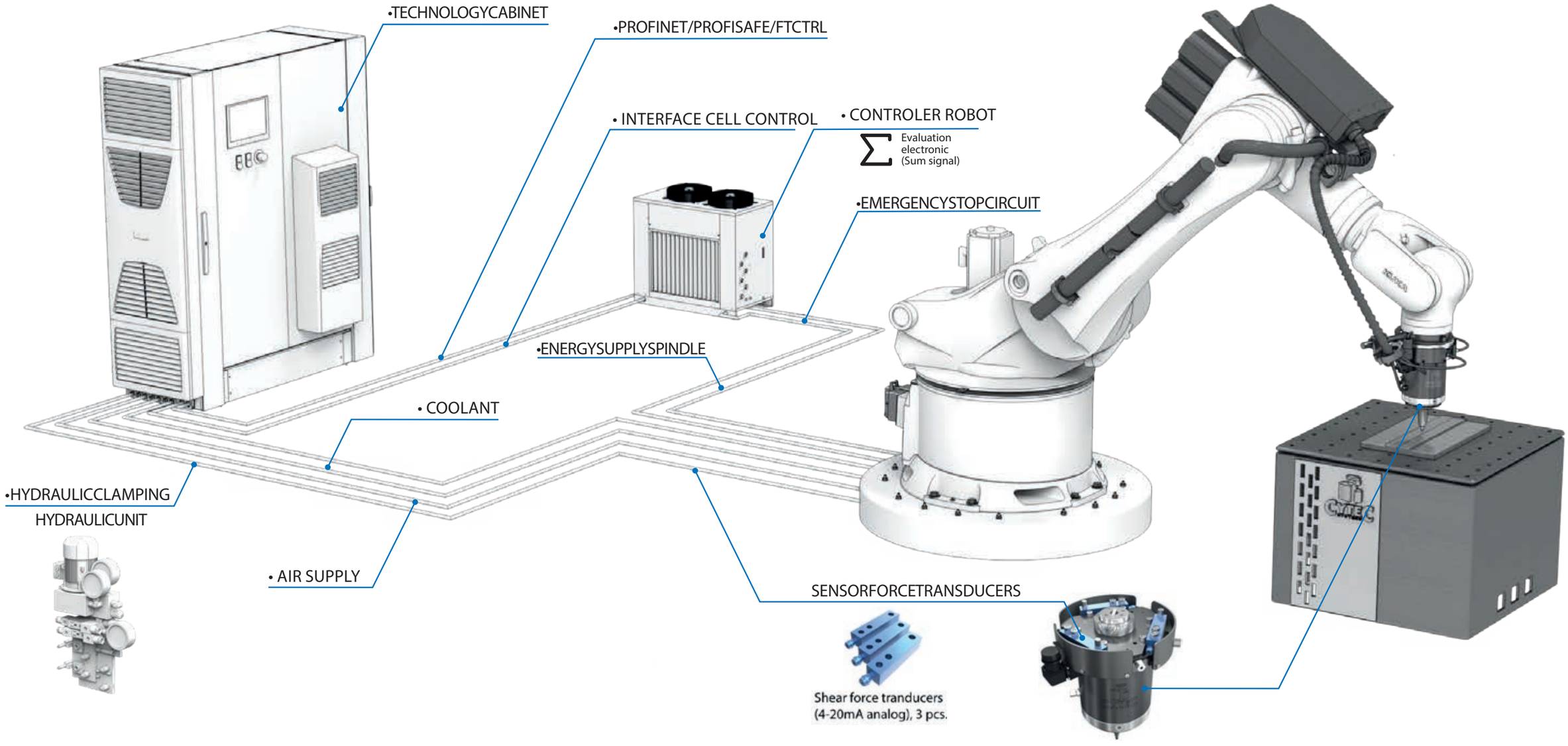
The grasping and clamping of the tool is operated by the clamping slide: in the released position it is supplied with
hydraulic pressure.

The functional elements move into a final position so that the draw bolt retracts and draws in the tool against the face contact surface of the spindle. So transmission of the clamping force with a force intensification comes into effect. In this position the tool is positively locked with high secure and rigid clamping.

The clamping pressure is not necessary any more because the clamping force is maintained only mechanically by its self retention. Only by pressurising the release connection the functional elements can reach the initial position. The piston of the draw bolt ejects the tool safely.

Industrie 4.0

Control signal processing



For a proper, reliable and user friendly operation this communication is reduced to the most important command functions:

- spindle start / stop
- clockwise or counter clockwise rotation
- rotational speed
- tool clamp / release.

CYTEC WORLD WIDE

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Shenyang City, China | Taichung City, Taiwan

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