Friction Stir Welding components

CYTEC SYSTEMS

CyStir Motor Spindles

CyWeld Fork Head

CYTEC PRODUCTS

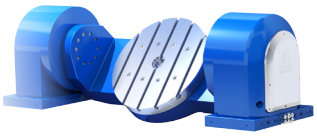
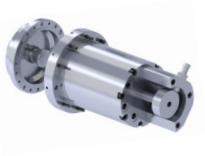
MILLING HEADS
MOTOR SPINDLES
ROTARY TABLES
YRT BEARINGS

CYTEC is a German multinational company that serves the market with highTec fabrication machine parts.

For over 30 years CYTEC develops and produces components, such as
cylinders, clamping systems, motor spindles, milling heads, turning and rotary tables at the highest standards.
In Due to the well-engineered components, CYTEC is the holder of several patents regarding its products.

So we can proudly say: “we know what we are doing”




CyMill
Machining Head Series Fork
and Series 45° Universal

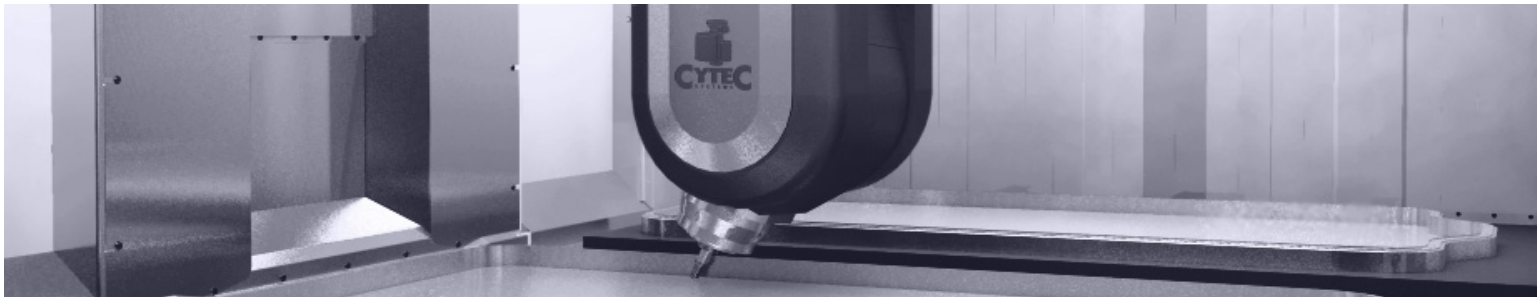
CyTurn
Horizontal Tables / Vertical Tables/
Rotary tilt Tables / Grinding Tables

CyLock
Core-pulling Cylinders

CySpeed
Powerful highspeed and heavy
Milling, turning, grinding, drilling...

CyYRT
High-precision Radial-/Axial Bearing

CyTab
Clamping Technology



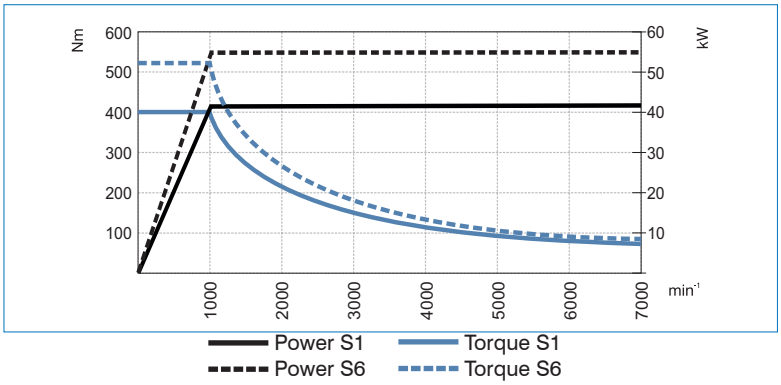
The FSW Fork head

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.

Technical data

Series G30 Fork		
Head	C-Axis	A-Axis Fork
Max. swivel torque	5.100 Nm	8.100 Nm
Clamping torque	14.000 Nm (50 - 70 bar)	12.000 Nm (50 - 70 bar)
Swivel angle	+/-360° (option continuously)	+/-90°
Power dissipation	5 kW (10 l/min)	
Positioning accuracy	± 2“	± 2,5“

Drive		
Power:	42kW (S1)	53 kW (S6)
Nom. speed:	1000 r.p.m	
Max. torque:	400 (S1) Nm	510 (S6) Nm
Max. speed:	4000 r.p.m	
Tool system:	HSK A100	
Clamping system:	hydr. operated	
Clamping force:	40 kN /75 bar	
Clamping monitoring:	CyCon K11	
Max. pressure:	120 bar	
Max. axial load:	40 kN	
Max. radial load:	20 kN	
Motor cooling:	liquid coolant	



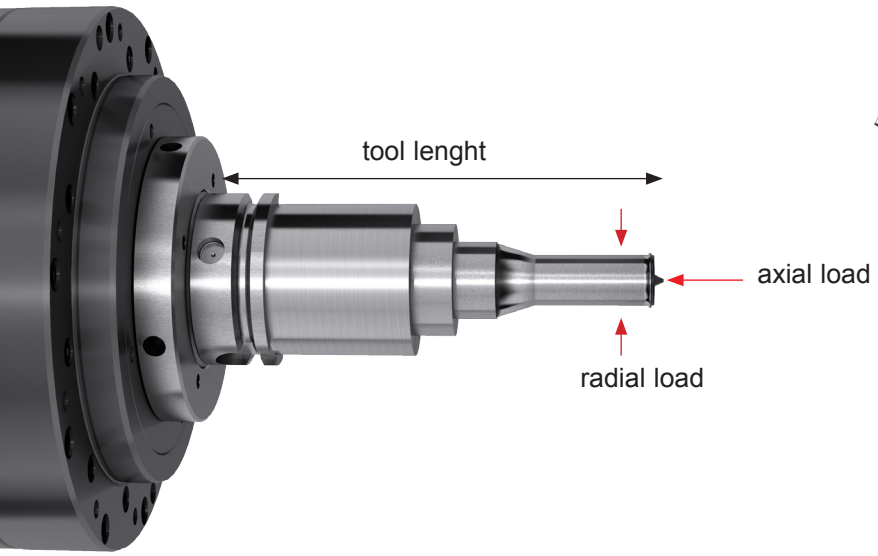
Options:

The well-engineered **CYTEC** FSW fork-head allows to add optional devices within the control panel to monitor the welding process.

These devices can be for example:

- Cameras
- Lasers
- Mechanical auxiliaries

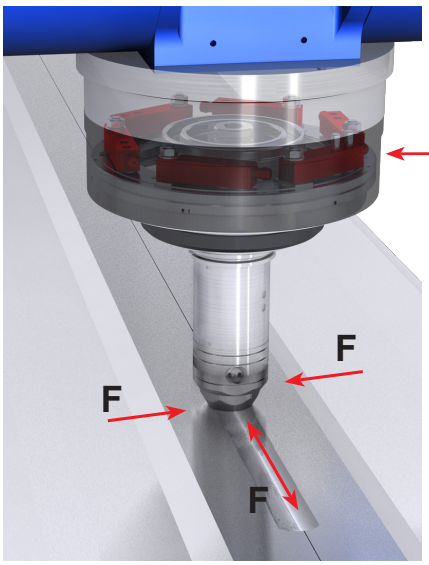
Tool specifications



FSW Tool	
Max. tool length	250 mm
axial load	< 10.000 N
Radial load	< 5.000 N

Tool length	100 mm
Max. axial load	< 40.000 N
Max. radial load	< 20.000 N

shear force transducers	
nom. load:	20 kN
accuracy:	0,1 % f. s.
initial signal:	12 +/- 8 mA
zero point:	12 mA



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

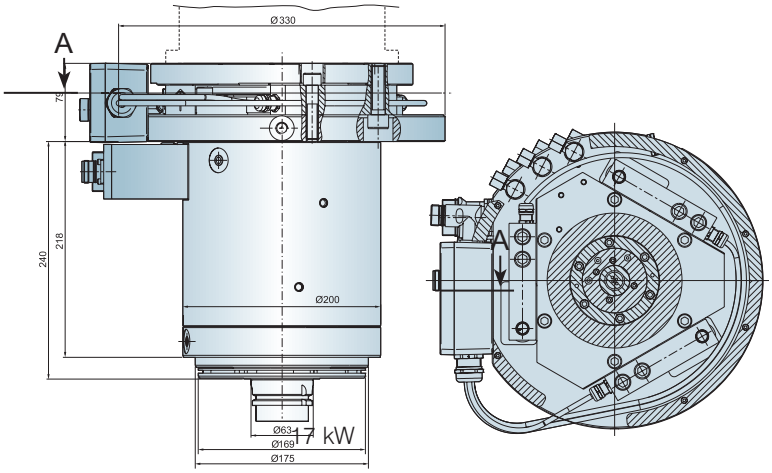
Evaluation electronic (Sum signal) Σ

CyStir is development of the CySpeed motorspindle, especially designed for friction stir welding.

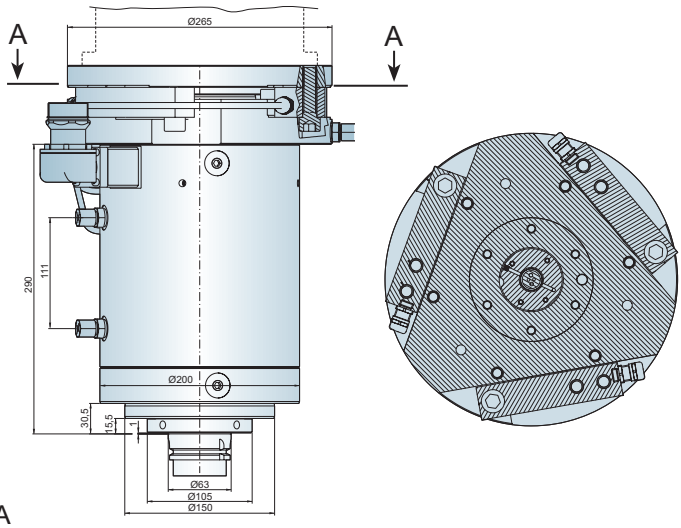
Characteristics :

- HSK tool interfacewith hydromechanical CyTwist tool clamping system
- CyTorque motor (combindable with all common control systems)
- Pre-loaded CyRt hybrid bearing
- Shear force transducers to regulate forces during the welding process
- Rotary feedthrough for clamping and release hyrdaulics

CyStir 17 kW



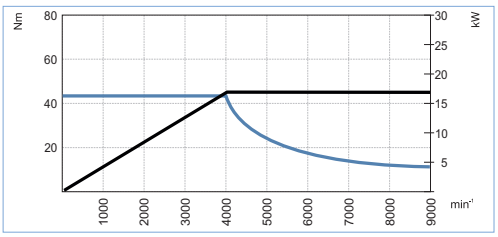
CyStir 24kW

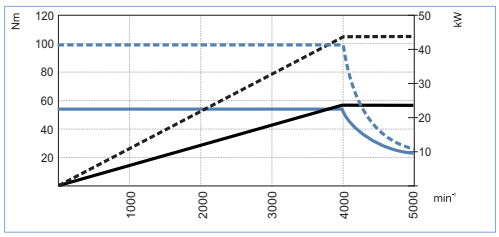


A-A

Interface shear force transducers

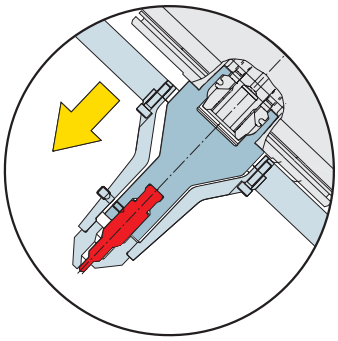
Power:	17 kW (S1)	24 kW (S1)
Nom. speed:	4.000 r.p.m.	5.000 r.p.m.
Max. torque:	43 Nm (S1)	55 Nm (S1)
Max. speed:	9.000 r.p.m.	5.000 r.p.m.
Tool system:	HSK-E63	
Clamping system:	hydr. operated	
Clamping force:	12 kN/50 bar	
Clamping monitoring:	CyCon K 11	
Max. pressure:	120 bar	
Max. axial load:	15 kN	
Max. radial load:	5 kN	
Motor cooling:	Liquid coolant (Antifrogen N/Tyfocor)	

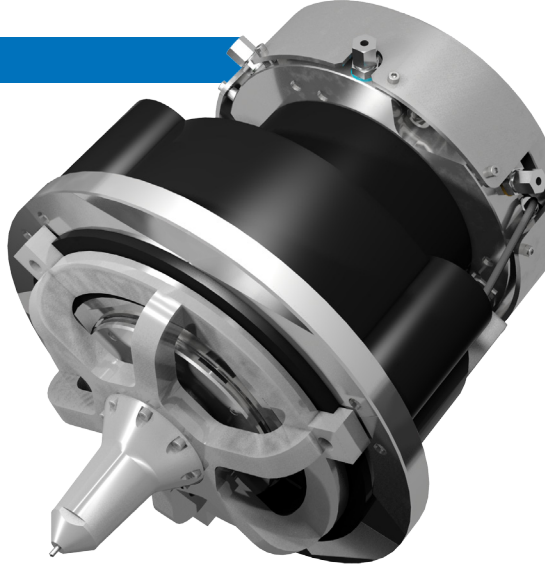




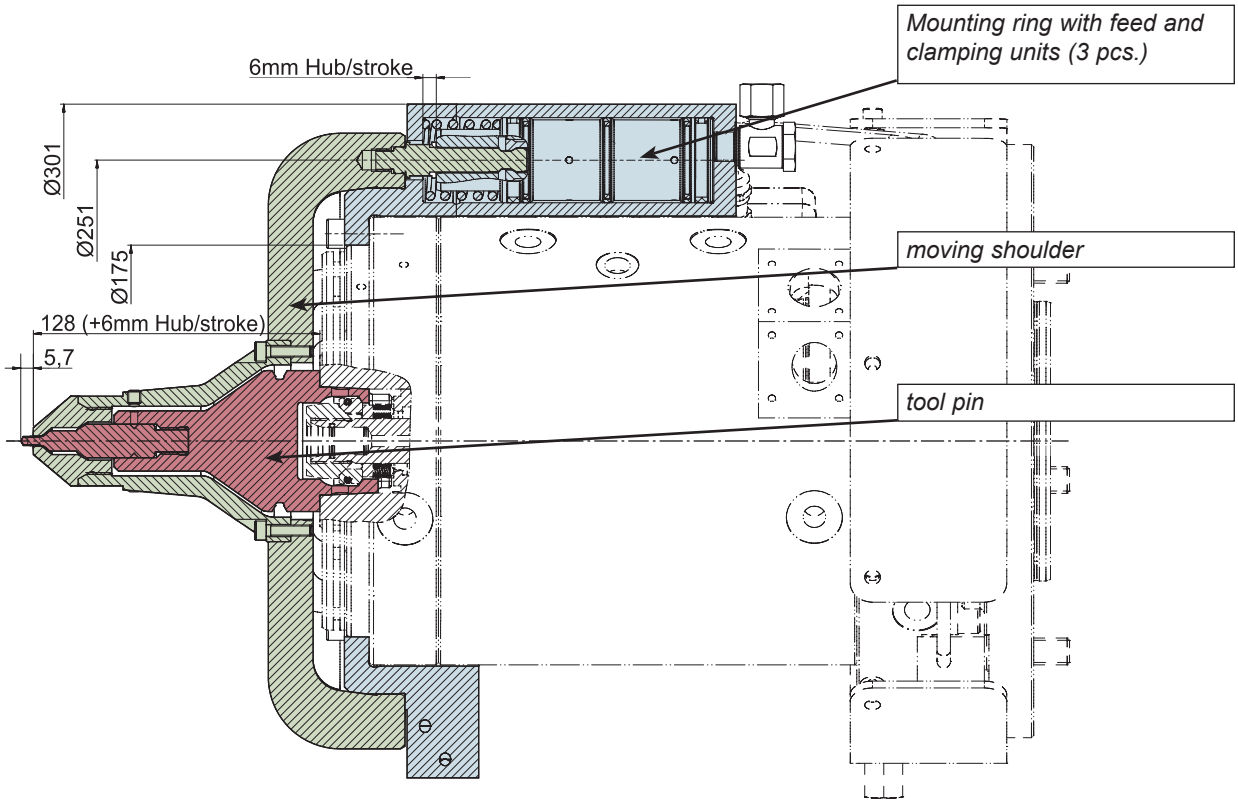
Power S1
Power S6
Torque S1
Torque S6

Option: FlexTool





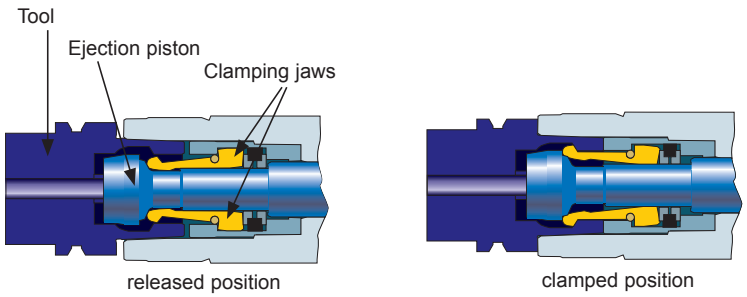
To achieve an especially clean and smooth weld seam, the spindle can be equipped with the tool system FlexTool. It consists of the actual stir welding tool with HSK interface and a ring shaped shoulder for the tool pin which can be docked on and off automatically. During the welding process the shoulder 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 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 grasping security rigidity.

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.

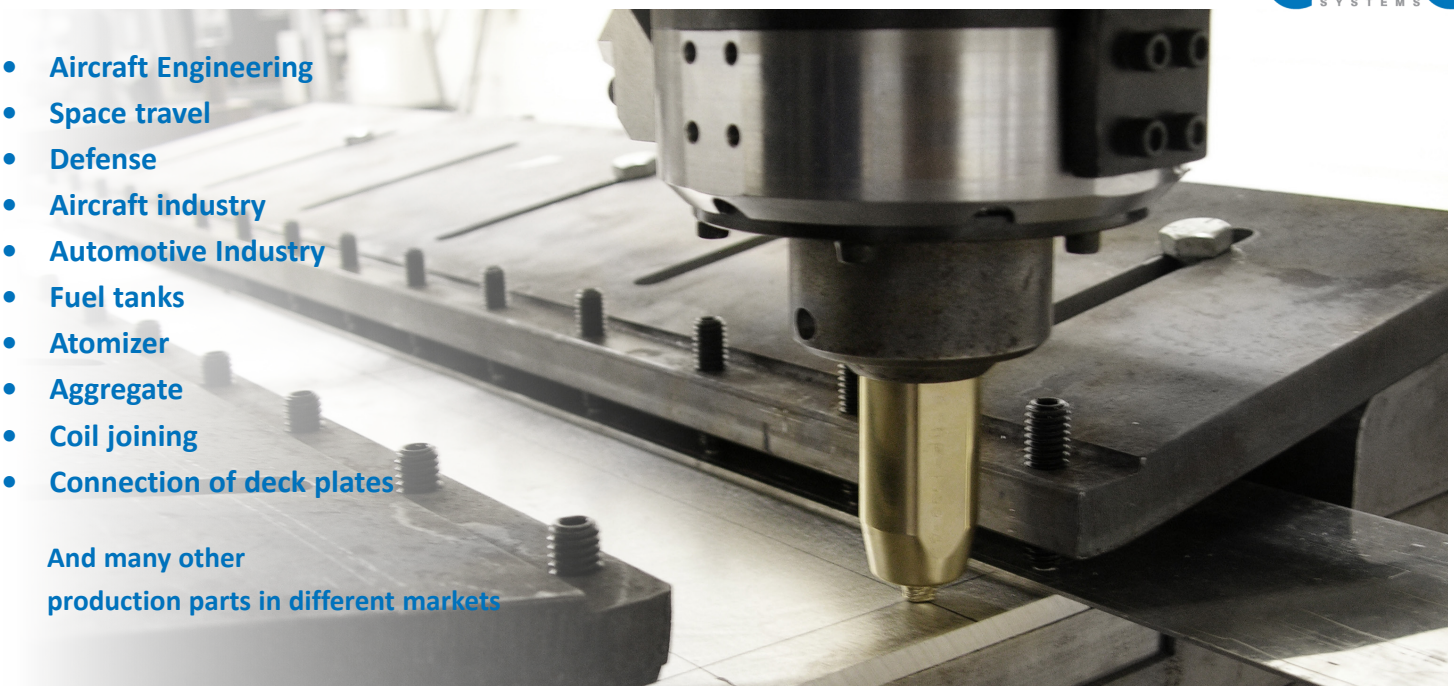
Control signal processing

The central control of the FSW unit is carried out by the FSW control cabinet.
The power module enables the triggering of the FSW spindle.
All internal control and regulation tasks are done autarkical by
IM 151 CPU of series ET 200S.
It also carries out the communication with the superior control system.
For a proper, reliable and user friendly operation,
these communication is reduced to the most important

command functions:

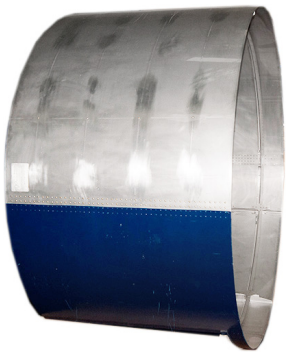
- spindle start / stop
- clockwise or counter clockwise rotation
- rotational speed
- tool clamp / release.

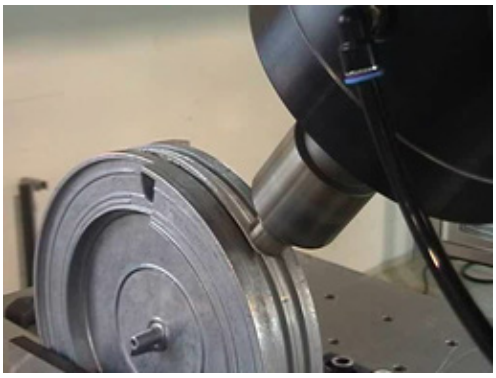
Applications Friction Stir Welding

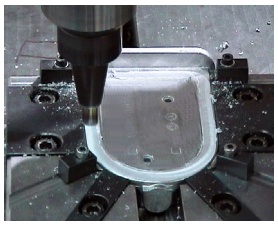


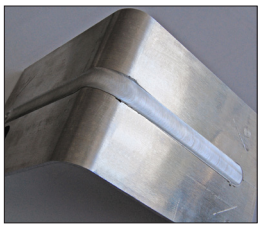
- Aircraft Engineering
- Space travel
- Defense
- Aircraft industry
- Automotive Industry
- Fuel tanks
- Atomizer
- Aggregate
- Coil joining
- Connection of deck plates

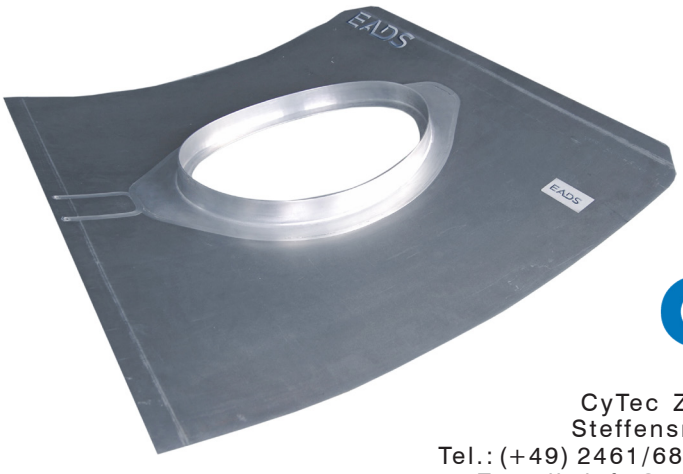
And many other
production parts in different markets











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