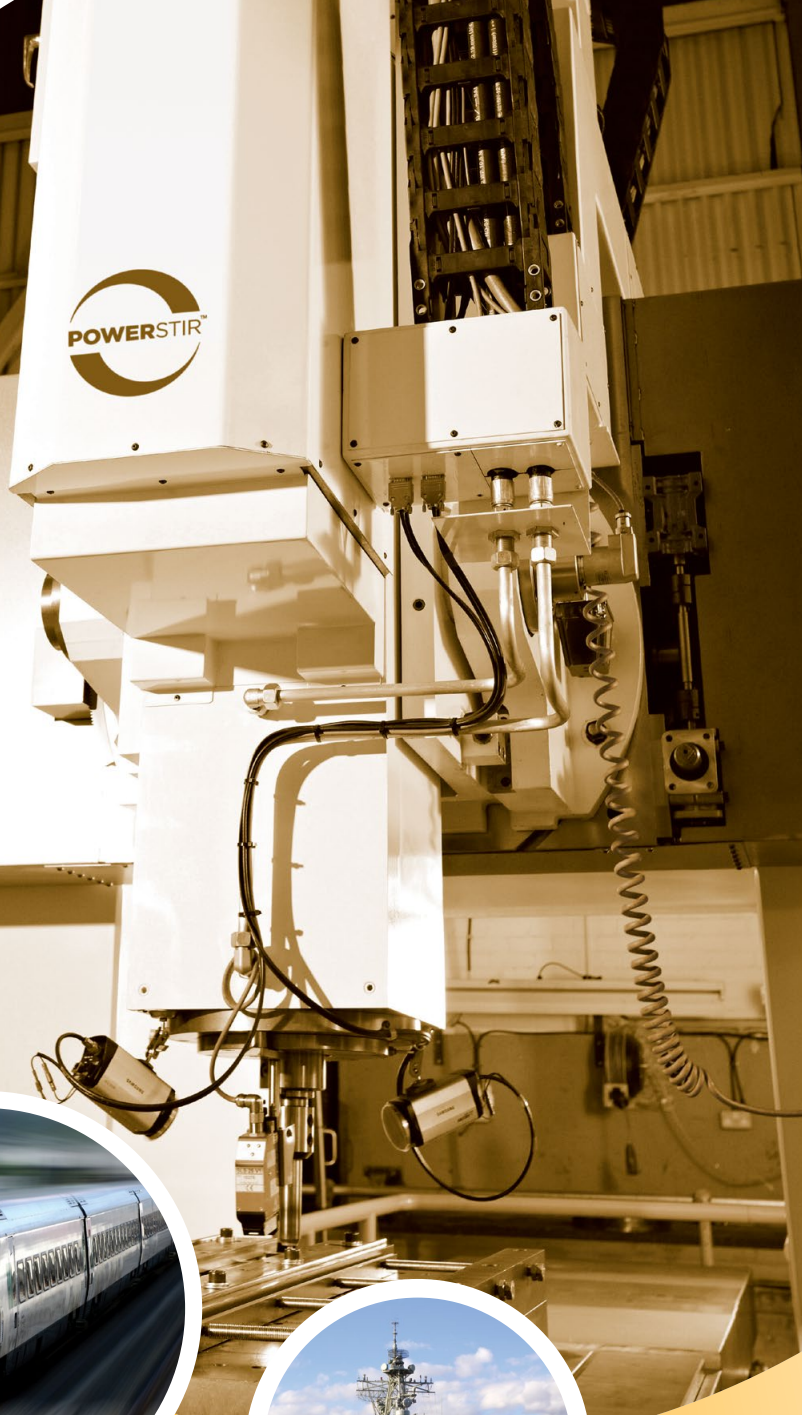




POWERSTIR®
FRICTION STIR
WELDING



PTG FRICTION STIR WELDING



ABSOLUTE PRECISION IN MACHINE TOOL DESIGN AND BUILD

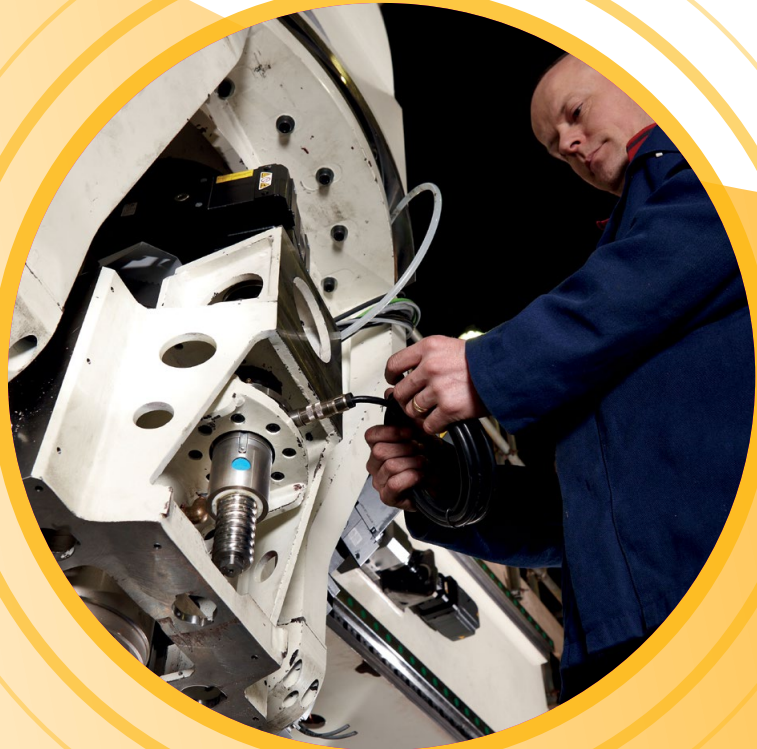
Our Powerstir Friction Stir Welding (FSW) technology is unique to PTG Group.

We offer unrivalled expertise in the design and manufacture of friction stir welders. Our reputation for uncompromising engineering solutions, manufacturing excellence and first-rate service extends across a host of industrial sectors globally, including aerospace, rail and marine, steel, oil and gas, and automotive.

Our capabilities in friction stir welding range from small travelling table research and development machines to large gantry, multi-axis models, as used across the avionics and high speed rail sectors.

Watch Powerstir Friction Stir Welding in action at www.youtube.com/ptgholroyd

www.holroyd.com



The Friction Stir Welding process is patented by TWI (The Welding Institute). Powerstir is a registered trademark of Precision Technologies Group (PTG) Limited



PRECISION + PERFORMANCE = POWERSTIR FSW

Superior, high strength welded joints with a proven track record.

For almost two decades Powerstir Friction Stir Welding machines have been proved as the ultimate technology for creating superior, high strength welded joints without the unsightly visible effects typically associated with conventional welding.

Developed for a broad range of applications - with special attention paid to structural rigidity and the load-sensing requirements of the FSW process - Powerstir machines are able to accommodate the heaviest of welding loads, ensuring precise force control and minimum deflection.

Powerstir models offer precise position control, force control, load sensing, real-time data logging of weld parameters, seam tracking and height sensing, and are ideal for jointing traditionally difficult to weld alloys.

Materials

- Aluminium
- Magnesium
- Copper
- Titanium
- Steel
- Lead
- Zinc

The Friction Stir Welding Process

A unique and innovative method of joining metals, friction stir welding uses frictional heat combined with precisely controlled forging pressure to produce high integrity, full penetration welded joints that are virtually defect free. Due to a very low welding temperature, mechanical distortion is practically eliminated, with minimal Heat Affected Zone (HAZ), and an excellent surface finish. The FSW process is effective on flat plates, cylindrical components and even parts of irregular thickness.



POWERSTIR TECHNOLOGIES

A range of stirring solutions.

From small research machines to specialist models for ellipsoidal and spherical contour welding, static gantry and moving heavy gantry models, Powerstir FSW machines have been developed for a broad range of applications.



Table Friction Stir Welders

Typically used for educational purposes or for the manufacture of small components, in table models all processes can be shielded in the machine chamber. Table models are particularly suited to welding thin wall sections. Examples include: hydraulic cylinders, suspension dampers and heat exchanger components.

Static Gantry, Moving Table Friction Stir Welders

Available in a range of sizes and capabilities, static gantry machines are widely used in development work, especially in the aircraft and space industries. Increasingly FSW is used in automotive applications, as FSW welds enable a reduction in the thickness of various components without loss of robustness.

Moving Gantry/Heavy Gantry Friction Stir Welders

The Powerstir FSW moving gantry range includes models built especially for use in the manufacture of railway car bodies. Examples include the design and build of 30m x 4m gantry machines, as used to produce carriage floor, sidewall and endwall panels. Heavy gantry, double beam models are also available for heavy section jointing applications.



POWERSTIR FSW

A robust, yet lightweight solution for electric and hybrid car batteries.

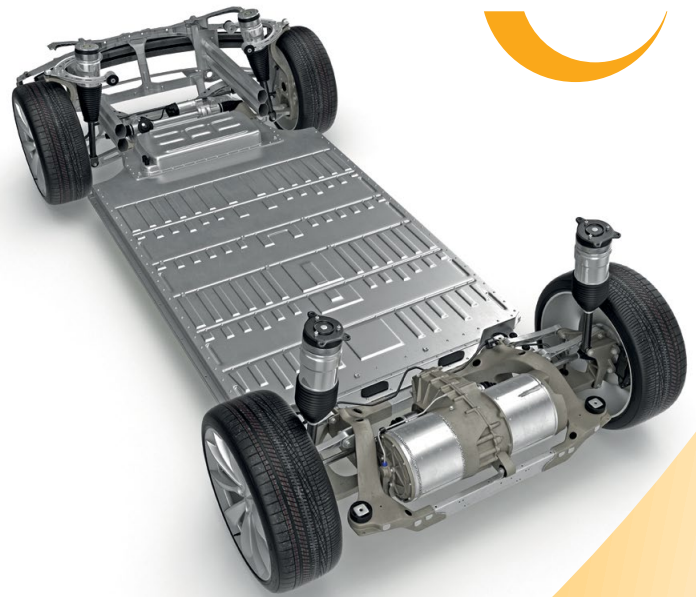
With Governments all over the world pushing the development of green energy solutions, the spotlight is firmly on the automotive sector to develop high-performance electric and hybrid vehicles.

The challenge is to achieve excellence in both performance and economy, with vehicle weight being a critical factor in achieving this balance.

Battery powered vehicles present many weight challenges, but Powerstir FSW technology enables the production of lightweight aluminium battery trays which can help extend the range of the vehicle between charges.

FSW joints have higher integrity and strength than traditional MIG welding and this enables a reduction in the thickness of aluminium extruded panels with resultant weight benefits.

As well as battery trays, this technique can also be applied to water cooled controlled panel boxes and car body panels to achieve the necessary weight savings targets.



PRECISION TOOLING

Precision tooling lies at the heart of Powerstir Friction Stir Welding.

Our technology enables us to offer tailor-made tooling solutions for any application requiring a FSW process.

Optimised to provide uncompromising weld quality and long service life, tooling is available for a full range of materials, including: aluminium alloys, magnesium alloy, copper alloys, titanium alloys, steel, lead and zinc.

Standard tooling options include: thin-walled structure, thick-walled structure, without keyhole, self-adaptive bobbin, stationary bobbin and plug welding tooling.



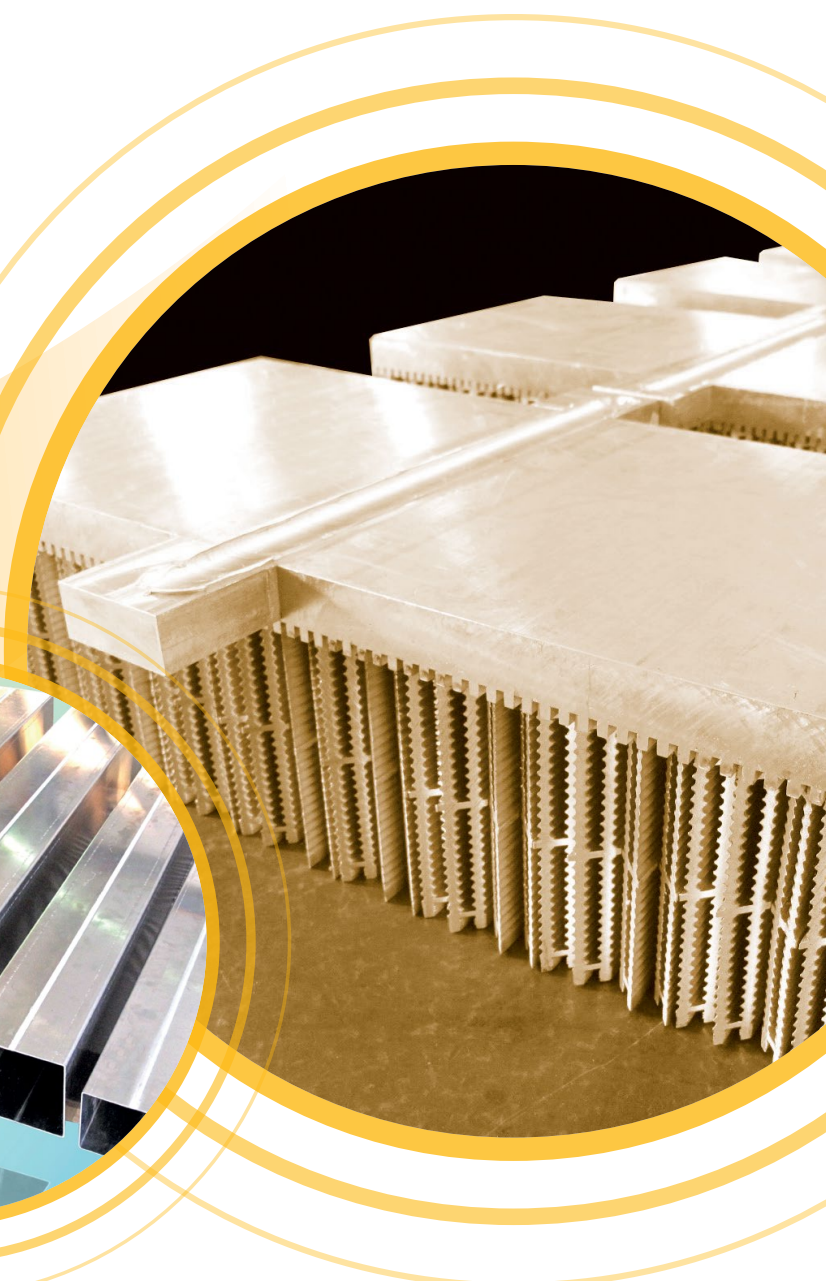
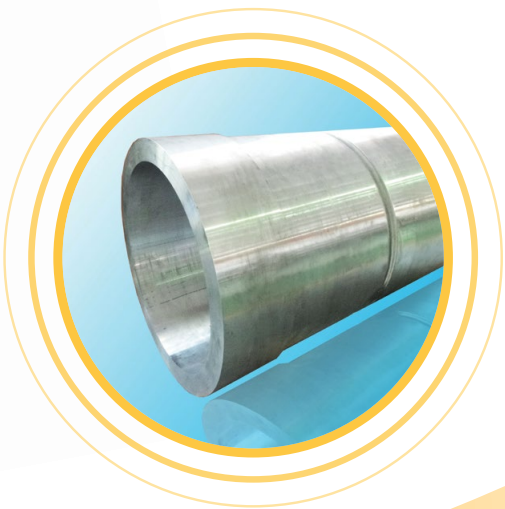
CREATED BY POWERSTIR

Structures and components.



The Powerstir FSW provides the solution to any process where high speed, high quality welding is required, together with low distortion and superior joint strength.

From small, intricate components to automotive products, aircraft manufacturing, railway carriage panels and shipbuilding, Powerstir FSW provides a clean, highly aesthetic alternative to traditional welding. Offering excellent mechanical properties and virtually no porosity, this process delivers guaranteed weld quality.



KEY FEATURES

CNC Control

Model-specific, full CNC process control, typically comprising: advanced touchscreen interface, data acquisition and weld monitoring systems.

Production Monitoring

The operator can select the type of control to perform the weld - position, force or height control. Optional camera-fed visual monitoring provides safe viewing of the weld production environment.

Force Control

As continual load monitoring is a key aspect of friction stir welding, load cells measure and maintain a 'Force', as defined in the 'Force' parameter, for the whole of the welding process.

Weld Temperature Monitoring

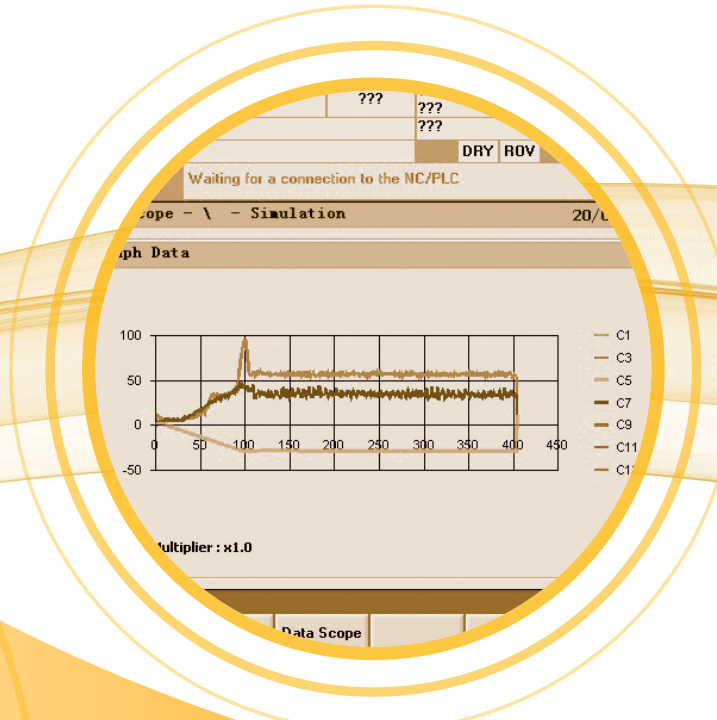
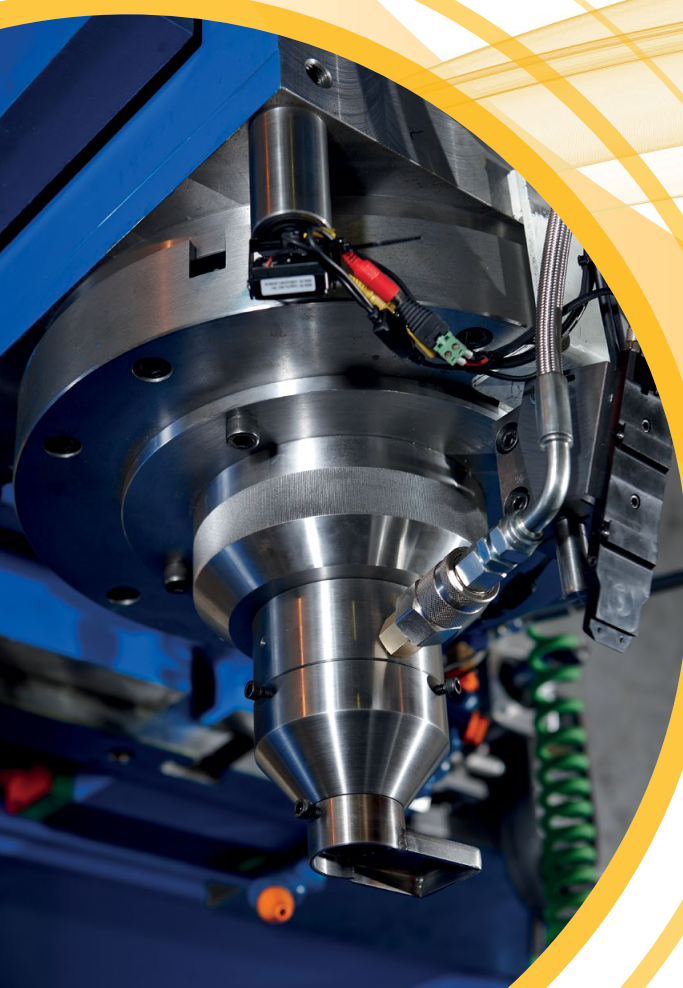
A number of remote IO stations around the FSW machine allow features such as non-contact 'spot' measurement of the weld to be constantly relayed back to the machine control system in real time.

Height Sensing

Non-contact measuring heads continually measure the relative position of the tool to the component, holding it within the $\pm 0.05\text{mm}$ tolerance band.

Machine Fixturing

Optional machines fixtures - such as side clamps, mandrels and supports - can be incorporated into the machine design.





Joint Tracking

The tracking system is used to follow the seam of the weld - the FSW Control software monitors the tracking system and moves the Y axis to ensure the welding tool stays on the weld seam.

The FSW Control software provides a graphical display of the status of the tracking system.

Gas Shielding

Optional argon gas shielding protects the welding area from atmospheric gases to create an inert gas atmosphere when working with parent materials that produce high temperature welds such as steel and titanium.

Data Acquisition System

All Powerstir machines are equipped to measure and record all available weld data. The operator can select which process variables are displayed on the graph, by the check boxes provided. However all the process data is archived to the local hard disk. Data acquisition includes: axial down force, traverse forces, rotation speed of spindle and tool traversing speed and direction, for full MES compatibility.



TYPICAL POWERSTIR APPLICATIONS

- Locomotive train and carriage panels (aluminium)
- Aircraft fuselage and avionics development
- Truck bodies, caravans and space frames
- Heat sinks and electronics enclosures
- Flat and cylindrical fuel tanks and bulk liquid containers
- Boat and ship panel sections
- Aluminium bridge sections, architectural structures and frames
- Pipelines and heat exchangers
- Electrical motor housings
- Hybrid vehicle battery trays, water cooled panel boxes and car body panels



Producing the longest welds for China's fastest trains

POWERSTIR SPECIFICATIONS



SPECIFICATIONS						
Models	Table		Static Gantry		Moving Gantry	
Tooling	• Solid		• Solid • Retracting Pin • Outer / Inner Independent Rotating		• Solid • Retracting Pin • Outer / Inner Independent Rotating	
Weld Shape	• Linear • Non-linear		• Linear • Non-linear		• Linear • Non-linear	
Maximum Thickness	Aluminium	1 - 25 mm	1 - 50 mm		1 - 100+ mm	
	Magnesium	1 - 25 mm	1 - 50 mm		1 - 50 mm	
	Copper	1 - 25 mm	1 - 25 mm		1 - 25 mm	
	Titanium	-	1 - 15 mm		1 - 15 mm	
	Steel	-	1 - 12 mm		1 - 12 mm	
	Lead	Good results on 3 mm sheet				
	Zinc	Demonstrated on 0.88 mm sheet				
Spindle Power	10 - 45 kW		10 - 65 kW		15 - 130 kW	
Stroke	X Axis	0 - 1,000 mm	0 - 8,000 mm		0 - 90,000+ mm	
	Y Axis	0 - 900 mm	0 - 4,000 mm		0 - 9,000+ mm	
	Z Axis	0 - 300 mm	0 - 2,500 mm		0 - 4,000+ mm	
	V Axis (Pin)	-	20 - 100+ mm		20 - 100+ mm	
A Axis	0 - 5° Manual		±5 - ±15°	Manual or CNC	±5 - 360°	Manual or CNC
B Axis	-		±5 - ±30°	Manual or CNC	±5 - ±30°	Manual or CNC
C Axis (Component)	0 - 360° CNC		0 - 360° CNC		0 - 360° CNC	
Control System	Fanuc / Siemens					



ABSOLUTE PRECISION MAKES ALL THE DIFFERENCE



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FRICTION STIR
WELDING**

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YOUKU



YouTube



FM 09259

PTG operate a quality management system which complies with the requirements of BS EN ISO 9001:2015



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