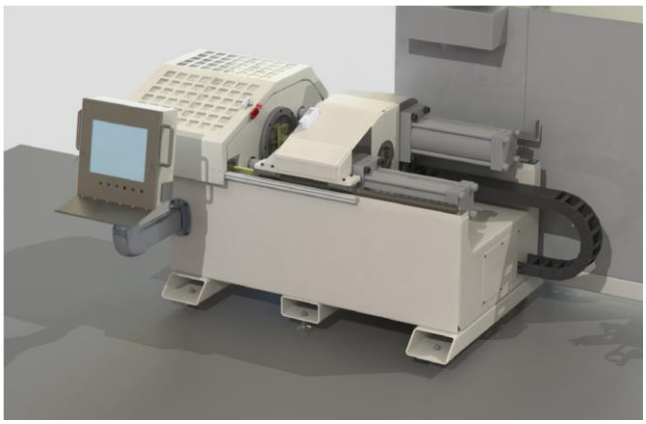
FE SERIES

TEMPERATURE TRANSMITTER FOR FRICTION STIR WELDING

The FE-Series machines manufactured by Bond are the first ever purpose-built machines for the friction extrusion process. The very high forces and spindle torque required for commercial exploitation of the process can only be attained with a machine that is specifically designed for this purpose.



MODEL FE100 FEATURES

- 1,000 kN {225,000 lbs} maximum forge force
- 508 mm {20 in} forge stroke
- 3,561 Nm {2,626 ft-lb} spindle torque
- Two-speed spindle gearbox
- High-speed data collection
  - Sampling at up to 1,200 Hz, minimum of 10 Hz

THE PROCESS

· Rotation and axial force of a die against the charge material produces severe plastic deformation

· Material is extruded into a solid cylindrical rod, wire or tube, depending on tooling configuration

· Processed material exhibits fine grain size with high ductility

FE APPLICATIONS

Consolidation of Custom Powders
Severe plastic deformation directly consolidates custom-formulated powders into bulk solids with high ductility and fine grain size

Consolidation of Swarf
Simultaneously heating, consolidation and refinement of machining scraps

Refinement of Embedded Particles
In-situ hard particles are fragmented and uniformly dispersed within the matrix, useful for oxide dispersion in a matrix

Materials
FE has been demonstrated for a number of materials, including aluminum and magnesium. Other materials are certainly possible with correct tooling.

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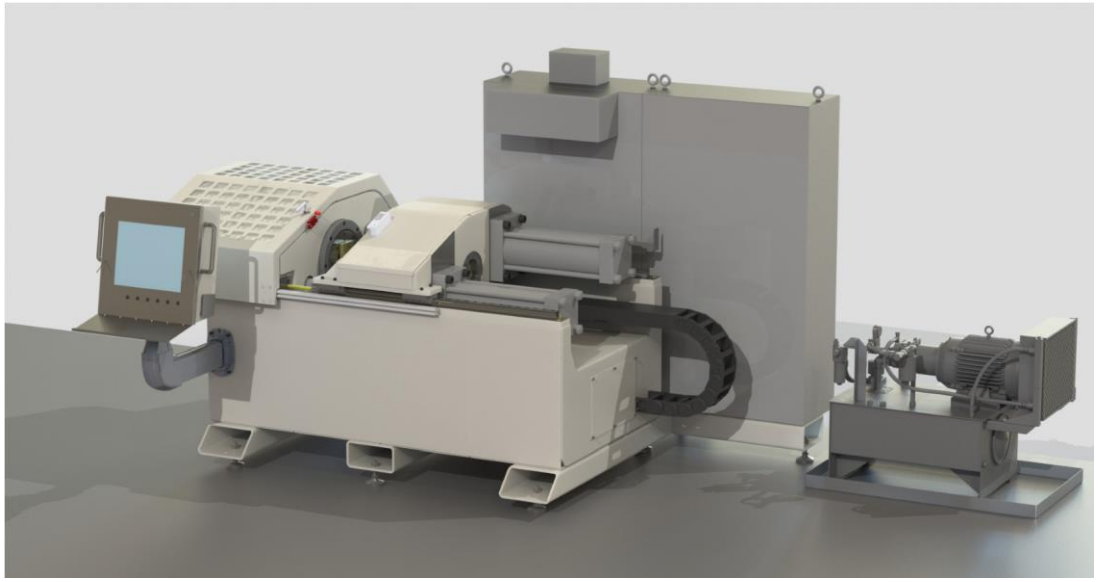
FE SERIES SPECIFICATIONS

	FE100	
FORGE AXIS	**STROKE**	
	508 mm [20 in]	
	VELOCITY	
	305 mm/min [12 in/min]	
	FORCE	
	1,000 kN [225,000 lbs]	
SPINDLE	**MOTOR SPEED RANGE**	
	0-1,000 rev/min	
	1ST GEAR TORQUE	
	3,561 Nm [2,626 ft-lb] @ 25 to 134 RPM (constant torque) 50 kW [67 hp] constant power from 134 to 348 RPM	
	2ND GEAR TORQUE	
	937 Nm [691 ft-lb] @ 50 to 510 RPM (constant torque) 50 kW [67 hp] constant power from 510 to 1,000 RPM	
CANISTER	**EXIT DIAMETER**	**BILLET VOLUME**
	77 mm	39,000 mm^3
TOOLING INTERFACE	Piloted face, tapped hole pattern	
OPTIONS	Tooling for direct or indirect extrusion Rotary union for power, signal, coolant and inert gas to headstock when extruding through tailstock	



*Actual values may vary slightly