### LINEAR FRICTION WELDING

AEROSPA

ENERGY



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AUTOMOTIVE

TRANSPORTATION

AUTOMATION • RESISTANCE WELDING • COIL JOINING • MATERIAL HANDLING • INDUCTION HEATING • FIELD SERVICE

# LINEAR FRICTION WELDING

### UTILIZING THE MOST SIGNIFICANT PATENTED BREAKTHROUGH IN LINEAR FRICTION WELDING

Linear Friction Welding has been proven to produce the best solid state bond between parts of the same or different material, various geometries and is applicable for nearly any metal welding application.



Taylor-Winfield Technologies has developed a line of advanced Linear Friction Welding machines in collaboration with APCI. As the exclusive licensee of their patented electro/mechanical oscillation technology, TWT provides their customers a valuable revolutionized process of solid state bonding.

This breakthrough is far superior to traditional Linear Friction Welding technologies. The advantages are:

- Smaller Machine Footprint
- Cost Effective
- Higher Production Rates
- Repeatable Weld Results
- Positional Accuracy
- Lower Power Consumption
- Ease of use and Maintenance
- Ability to Adjust Frequency & Amplitude during the process
- Stopping Time Less than 0.1 second
- Minimal Material Loss
- Full Interface Weld

### ADVANTAGES OF LINEAR FRICTION WELDING

Linear Friction Welding provides increased performance and accuracy over traditional manufacturing processes.

### HERE'S WHY:

- LFW is the most robust solid state bonding process
- LFW can produce welds faster than other welding processes
- LFW is flexible enough to join different shapes, sizes, and dissimilar materials
- · LFW can join long parts together
- LFW can make multiple welds simultaneously
- · LFW can pre-heat metals during the process
- · LFW can weld powdered metal, castings, forgings, and wrought materials

### OTHER ADVANTAGES OF OUR TECHNOLOGY INCLUDE:

- Limited joint preparation required
- No solidification flaws, gas porosity, separation or slag inclusion
- · Eliminates human error- the process is completely machine controlled and monitored
- Materials and Geometry are pre-calculated parameters
- · Easily monitor process parameters and weld history
- No special foundations or power supplies are required
- The process can be mathematically scaled
- "Smart machine" capabilities

# AEROSPACE

### LFW for AEROSPACE

Thousands of applications have been identified by major Aerospace companies. LFW is a technology capable of manufacturing Ti-6AL-4V aircraft structural components along with other alloys.

Buy-To-Fly ratios as low as 2:1 have been quoted for machined near-net shaped components. This provides the ability to reduce material and machining time of titanium components.

#### Examples:

- Tailored or Near Net Shaped Components
- Blisk
- Aluminum Wing Ribs
- Seat Tracks
- T-Clips
- L-Profiles
- Single Crystal Alloys

# AUTOMOTIVE

### LFW for AUTOMOTIVE

Current welding technologies are cost prohibitive and do not produce consistent, high quality results. One of the main advantages for LFW in the automotive industry enables dissimilar materials to be bonded together.

Our LFW technology not only enables implementation of new geometries, but also eliminates extra manufacturing process steps. It can save weight, improve strength, reduce costs and employ lightweighting ideas.

#### Examples:

- Drive Shafts
- Engine Valves
- Turbo Chargers
- Torque Converters
- Square Axle Housings
- Round Axle Housings
- Air Conditioner parts
- Power Yokes & Splines
- Drivetrain components
- Powertrain components



## TRANSPORTATION

### LFW FOR TRANSPORTATION

LFW can bond continuous rail and other structural type geometries reducing the amount of scrap material. The LFW process uses less energy in producing parts. It can be used for applications to produce buses, heavy equipment, trailers, trucks and other transportation type vehicles.

#### Examples:

- Axles
- Body Frames
- Suspension Components
- Drivetrain components
- Powertrain components

# ENERGY

#### LFW FOR ENERGY

Oil and natural gas exploration can rely on LFW bonding for drill casings, pipe joining and continuous rods used in pumping fluids. Also used for main components in wind turbine energy fields and in electrical turbine generators.

#### Examples:

- Umbilical Lines
- Expandable Casings
- Pipe Couplers
- Drill Ends
- Sucker Rods



This patented technology was created to address the technical limitations of traditional LFW machines. The basic idea was to eliminate the troublesome hydraulics from the oscillation mechanism and utilize digital controls and an advanced electromechanical system to create precisely controlled sinusoidal oscillation.

HEAT







The lateral motion of the weld eliminates the need

Residual stress of the joint is significantly lower and in some cases eliminated.



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