

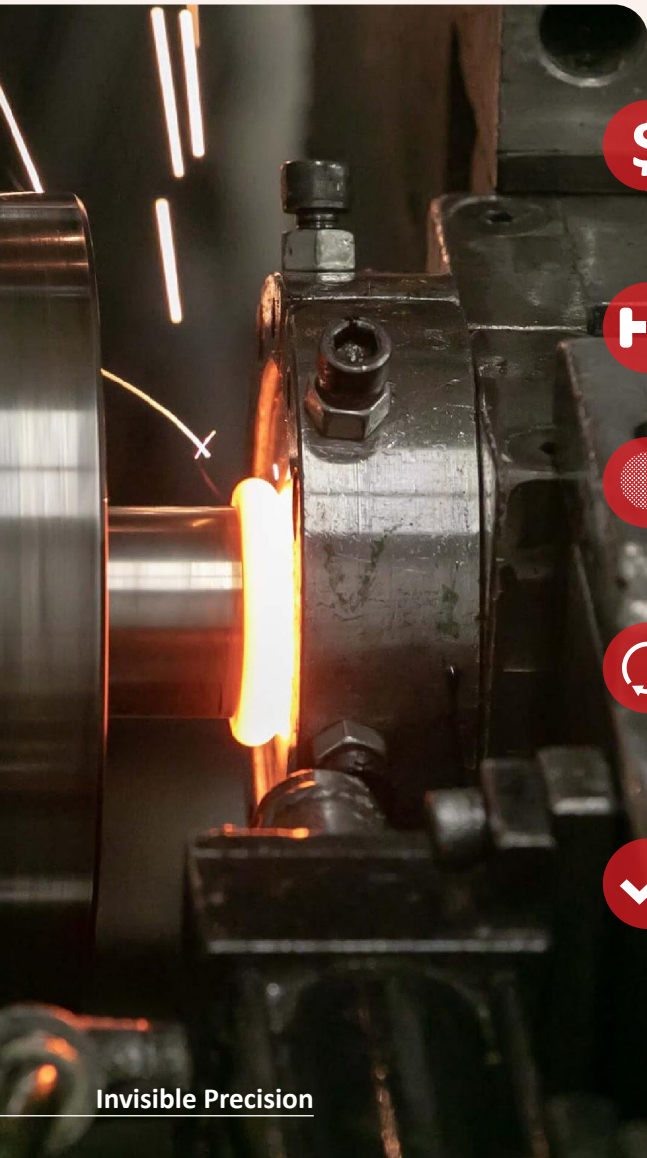
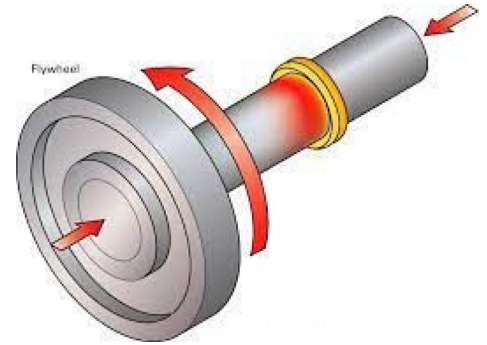


ENBI INERTIA FRICTION WELDING
AND CYLINDRICAL ROLL FORMING
PERFORMANCE IN DEMANDING APPLICATIONS

WHAT IS INERTIA FRICTION WELDING?

THE PROCESS OF INERTIA FRICTION WELDING

The major difference between inertia friction welding and traditional welding is that inertia friction welding is a solid-state welding process, where the material never reaches a melted liquid form. Instead, materials being welded reach a plasticized state. The process uses kinetic energy to spin one piece and then lateral force to join materials together. This is also considered a forge welding technique.



KEY ADVANTAGES



COST EFFECTIVE

The greatest advantage of inertia friction welding is that is COST. Typical saving are up to 35% less than traditional welding methods and it does not require the costly forging or castings.



JOINT STRENGTH

Inertia welded joints normally a joint that is made is even stronger than the parent metal.



CAN BE USED FOR DISSIMILAR METALS

Inertia friction welding can also be used to join dissimilar metals. The strength of the bond formed will still be strong and durable.



ACCURATE RESULTS

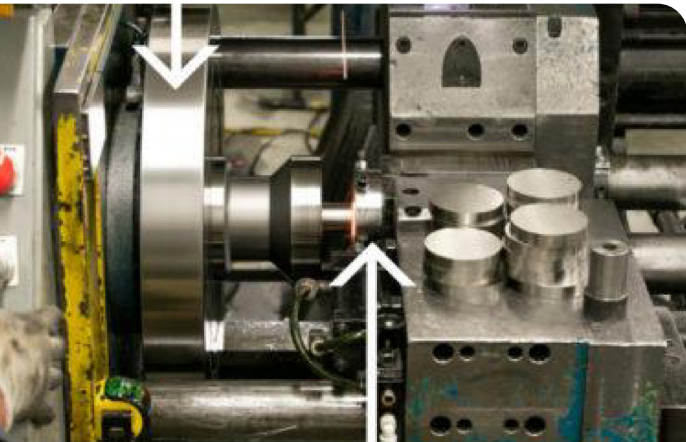
In inertia friction welding the complete process is controlled by a machine. Since it is operated and controlled by machines any chance of human error is removed, creating a product that is highly accurate and repeatable.



HIGH INTEGRITY WELDING

In inertia friction welding the structure accurateness and performance are paramount. It does not suffer from inclusion and gas porosity.

HOW DOES INERTIA FRICTION WELDING WORK?



PRE-CONTACT (INERTIA)

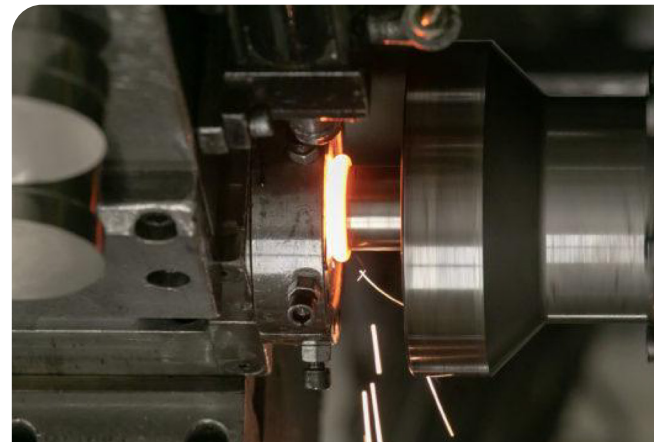
The two pieces to be welded are inserted into the appropriate receptacle. One piece will be inserted into spindle chuck with flywheel, and this is the piece which will spin. A second piece is inserted into a non-rotating chuck/fixture, which can move on a lateral hydraulic axis.

The first piece begins to spin, reaching the amount of speed pre-determined by the type of material. As the spinning reaches the top speed, the **INERTIA** of spinning will build up tremendous amounts of kinetic energy into the first piece.

CONTACT (FRICTION)

Once the flywheel has reached the predetermined speed, powered rotation stops, leaving the flywheel spinning in a freewheel state with the built-up kinetic energy. The non-rotating part is then thrust forward so that the two pieces come together. This causes extreme **FRICTION**.

This friction then slows down the flywheel and converts all that stored up kinetic energy into frictional heat. This heat is enough to soften the metal on both pieces, but will not actually melt them into a liquid state. Instead, both pieces now have metal in a plasticized state, which means they are soft and malleable.



BONDING

Additional thrust from the non-rotating piece will cause plastic displacement, meaning materials from each piece will flow evenly into each other, creating a full cross-sectional bond. As complex as this process sounds, the actual weld happens in a matter of seconds.

One of the more incredible aspects of inertia friction welding happens here: due to the spinning and hot-working of the metal interface, all impurities and voids are expelled.

CYLINDRICAL ROLL FORMING

BENEFITS

Cylindrical roll forming creates custom designs using standard stock tube material. In the cylindrical roll forming process, the rotating tube is heated using direct heat. Once the tube reaches the specified temperature, CNC controlled forming mandrels produce the desired 'neck' section, or completely seal the end of the tube to provide an air tight enclosure.

This process produces a near net shape to the finished product, significantly reducing the amount of raw material and additional machining requirements. This innovative process can be performed on a range of wall thicknesses and generally any material available in tube, including steel, stainless steel, and aluminum.



ADVANTAGES

- Large variety of wall thicknesses and shapes can be attained.
- Significantly reduces the need for additional machining after forming to achieve finished product dimensions.
- Compared to a multi-piece assembly, requires less overall labour and materials to achieve finished product.
- Cylindrical roll forming can be combined with inertia friction welding to provide greater design and fabrication flexibility.



BENEFITS TO YOU

- Large variety of wall thicknesses and shapes can be attained.
- Single piece design giving lower material costs.
- Simplified designs.
- Produces near net shape on first run: minimal additional machining.
- Can produce a wide variety of shapes.
- Can completely seal the end of tube, airtight enclosure.

APPLICATIONS



MATERIAL HANDLING

Simplified design using both cylindrical roll forming and inertia friction welding to create a more robust and faster to produce roller for high-speed continuous operations.

DOWN WELL APPLICATIONS

Inertia friction welding of Drill Rods for down hole applications for the extraction of liquids and sludges.



Invisible Precision



DIGITAL IMAGING

Rollers for use in feed and take off systems for production printers.

Our mission is to deliver the highest level of service and comprehensive support to our OEM customers through our innovative solutions, cost-effective global footprint, and dedicated workforce driven by our flexible operating model. At the same time, we provide a safe and rewarding environment for our team members.

Enbi's headquarters in Shelbyville, Indiana, USA. Our manufacturing facilities are strategically positioned around the world in North America, Europe and Asia.

QUESTIONS

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