Innovative products developed
by
Department of Mechanical Engineering

1. Friction Stir Welding Fixture

Friction Stir Welding (FSW) is a relatively new solid state welding technology which is being extensively used to join conventionally unweldable aluminium alloys. In order to accomplish this process, a robust FSW work fixture was designed in-house and patented, which is required to firmly clamp the base metals that are to be welded. The design was made by Dr. Noor Zaman Khan, under the guidance of Professor Arshad Noor Siddiquee, Department of Mechanical Engineering. The metals to be joined are held with rigidity with the help of specifically designed clamps as shown in Fig. 1. The design of the fixture facilitates the clamping of base metal with variable thickness.

Fig. 1: Friction Stir Welding Fixture

The fixture applies clamping force on the base metals from the top, transverse and trailing directions. To accomplish this, a plate stopper strip, a trailing end retainer and a side retainer plate was imbibed in the design. For optimum productivity, it was kept in consideration that the time required to clamp and declamp is minimum. Robust anvil was used to prevent vibrations and bending due to heavy forces developed during the FSW process. The fixture is mounted on the bed of vertical milling machine retrofitted for performing FSW. Load cell adaption was also provided in the fixture design, in order to measure the traverse force during welding. The developed fixture was successfully utilised for FSW of dissimilar aluminium alloys AA7475 and AA2219 in butt-joint configuration.

2. Temperature Acquisition Tool Adaptor

The specially developed tool holder/adapter shown on Fig. 2 consists of a straight shank and a precision collet nut. The shank is capable of holding 10 to 28 mm diameter Friction stir welding/processing tool by using ER32 collet. The collet nut is housed in a large casing to act as

a heat sink and saves the machine from the high heat during FSW/P. The peak temperature of the tool and workpiece interface is measured by bimetallic thermocouple. A patent for this innovative adapter has been filed by Dr. Noor Zaman Khan, Prof. Arshad Noor Siddiquee and Prof. Zahid A. Khan.

Fig. 2: Tool Holder/Adapter

3. Linear Friction Welding Setup

Linear Friction Welding (LFW) is a type of solid-state welding in which a joint is obtained by linearly moving one part and pressing it against another part that is kept stationary. The resulting friction heats the parts, causing them to forge together. An inbuilt machine has been developed by Prof. Arshad Noor Siddiquee. The LFW machine is shown in Fig. 3. The machine has been successfully utilized to join dissimilar materials.

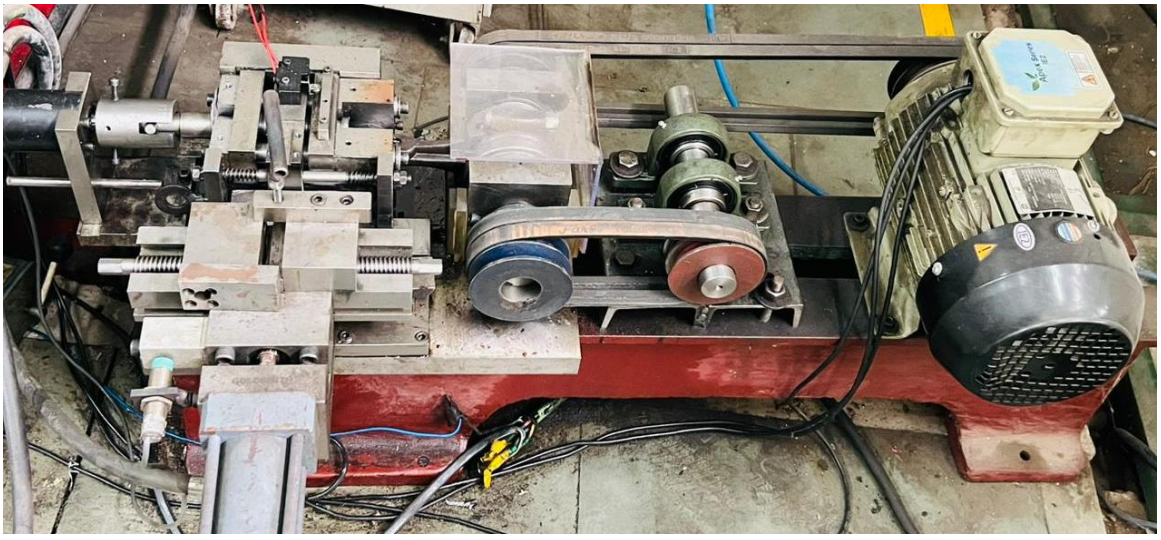

Fig. 3: Linear Friction Welding Setup