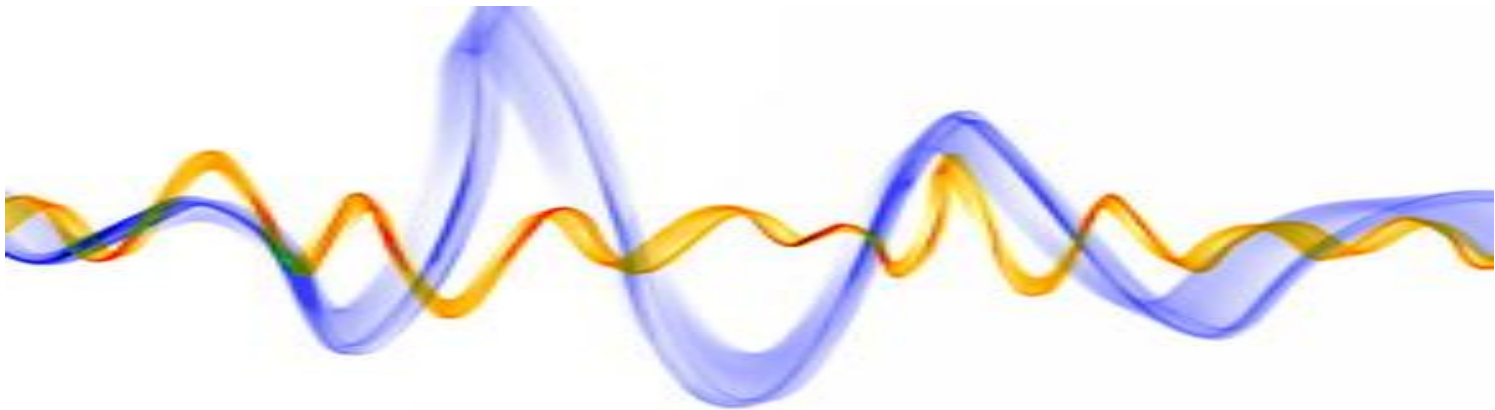


ULTRASONIC WELDING



INTRODUCTION

Ultrasonic welding is an industrial technique whereby high-frequency ultrasonic acoustic vibrations are locally applied to workpieces being held together under pressure to create a solid-state weld.

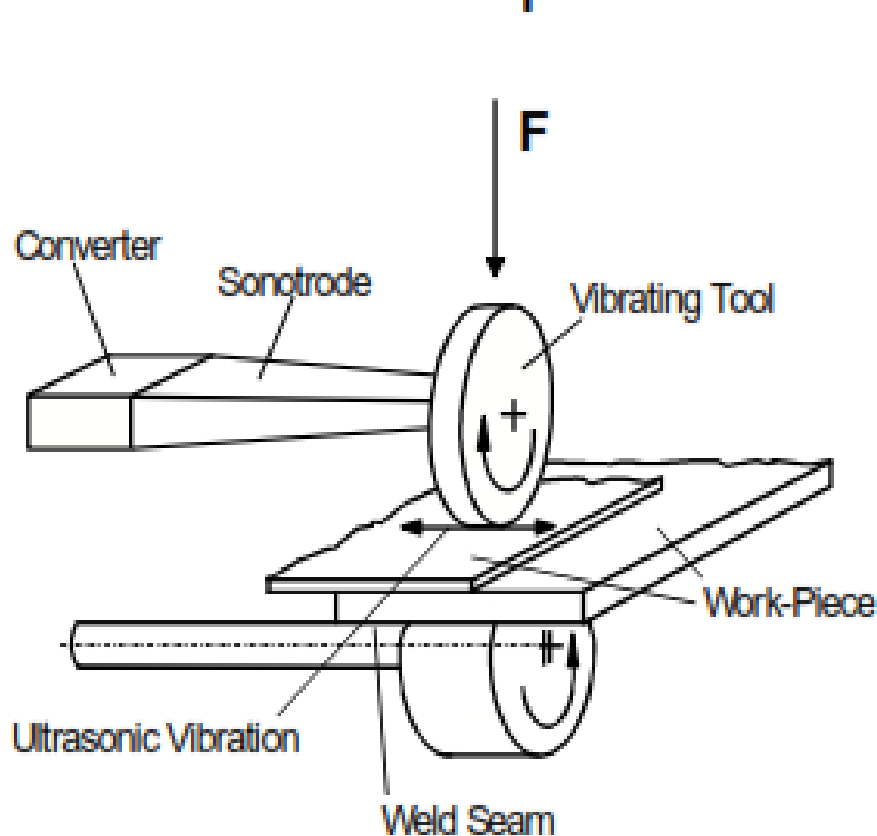
Why to use US welding?

- **First** - Ultrasonic assembly uses ultrasonic vibratory energy which is transmitted through the parts to melt and bond thermoplastic materials And joining thin sheet gauge metals and other lightweight materials
- **Second** - This technique is fast, efficient, non-contaminating and requires no consumables.
- **Third** - In ultrasonic welding, there are no connective bolts, nails, soldering materials, or adhesives necessary to bind the materials together.

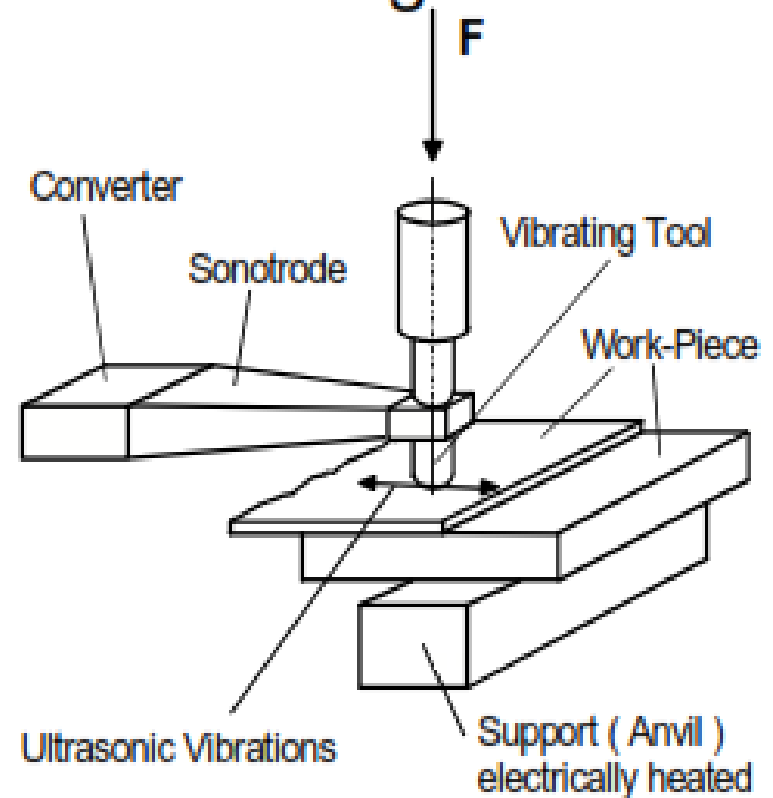
Principle of Ultrasonic Welding

- In ultrasonic welding, frictional heat produced by the ultrasonic waves and force is used for the joining process.
- Ultrasonic waves (15 to 60 kHz) are transferred to the material under pressure with a sonometer.
- Welding times are lower than 3 s. The welding can proceed with or without the application of external heat.

Principle of Ultrasonic Welding



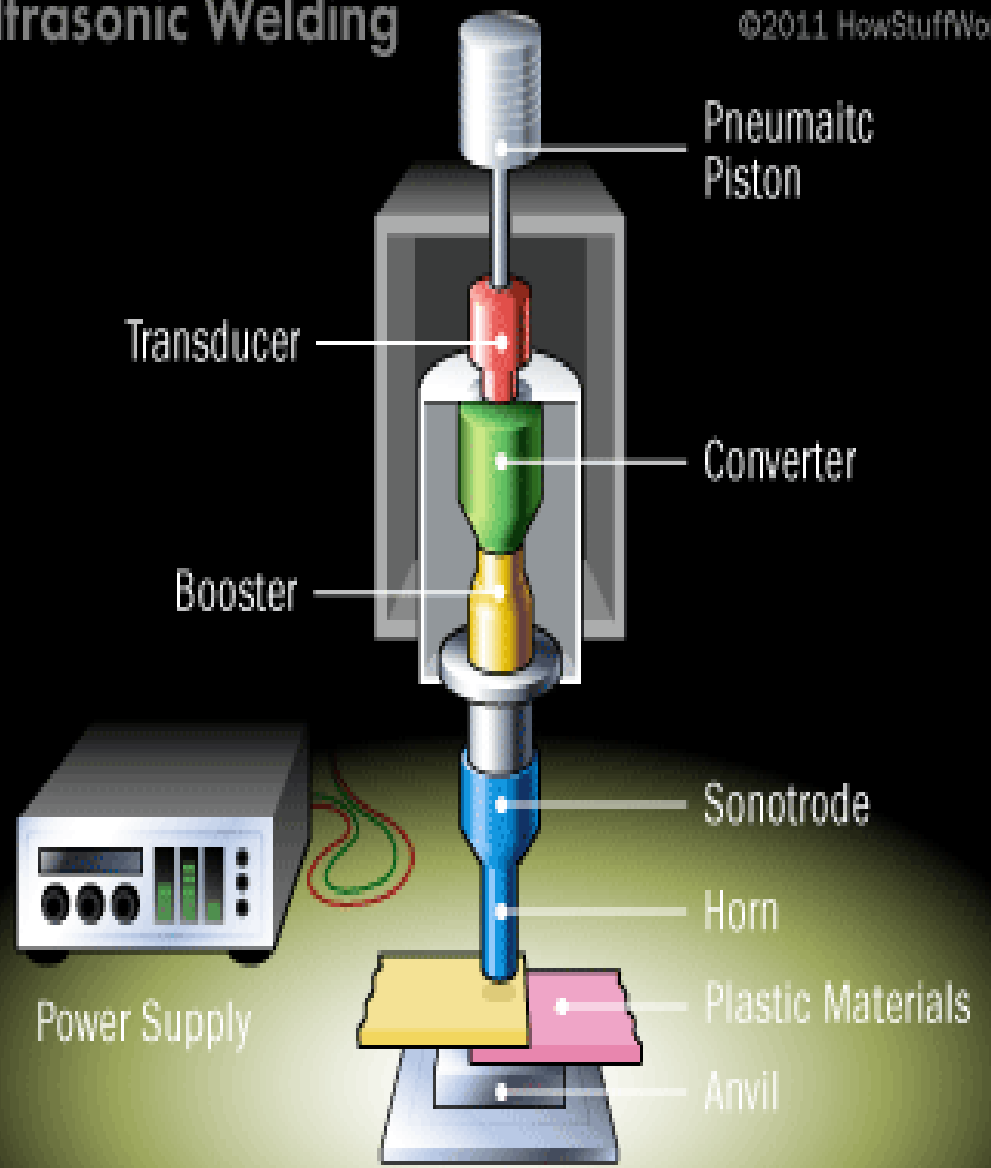
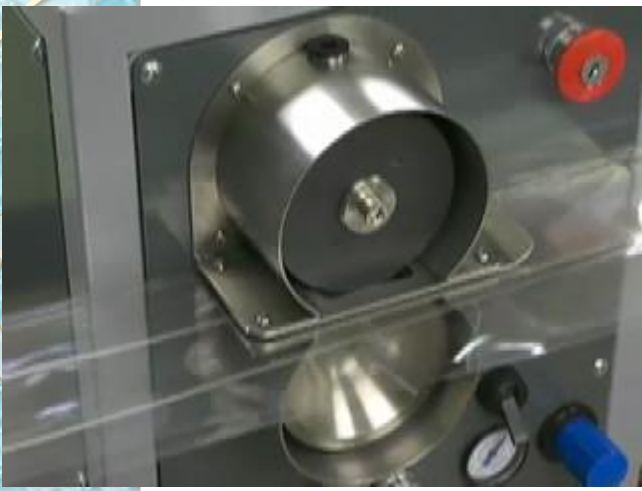
US Roller Welding



US Spot Welding

Ultrasonic Welding

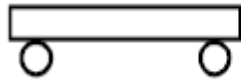
©2011 HowStuffWorks



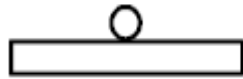
Joint Forms with US Welding



Two Parallel Wires



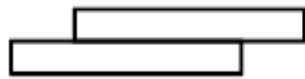
Two Wires with Bridging



Wire on Sheet



Wire Strand on Sheet



Sheet on Sheet



T-Profile on Sheet



T-Profile on Pipe

Spot welding in aircraft wings



Fig. 10: Ultrasonic welding, A380 J-nose skin



Fig. 3: Welded Gulfstream G650 thermoplastic rudder



Fig. 1:Welded fixed wing leading edge on an A380 wing (photo courtesy Airbus)

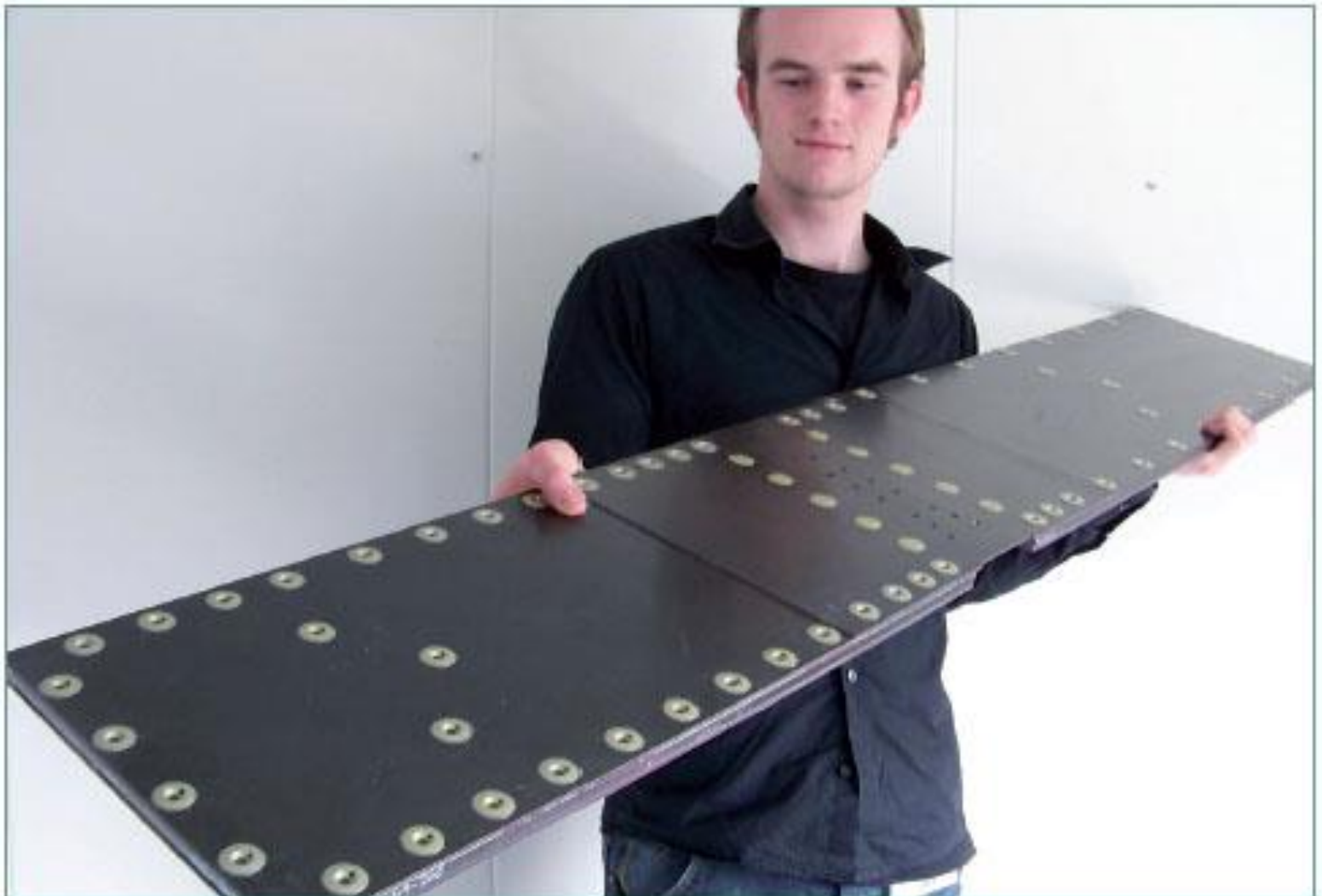


Fig. 2: Gulfstream G550 and G650 pressure bulkhead floor panel

Advantages

- Heat affected zone is minimized
- Very thin materials can be welded
- Surface deformation is minimum
- Welding of glass is also possible
- No defects due to gases, arc and filler metal
- Equipment is simple and moderate skill is enough
- Dissimilar materials can be joined

Disadvantages

- Restricted to join thin materials
- Competitively not economical
- Materials being welded may tend to weld to the tip and anvil



Applications

- Manufacturing of toys
- Joining of electrical and electronic components
- Welding aluminium wire and sheet
- Mobiles, sports shoes , laminations, cars.....
- Packing , medical industries, computers.



Finally

