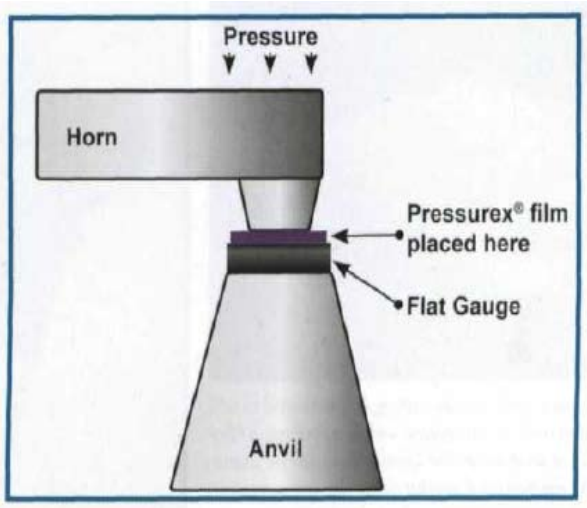
Use of pressure indicating sensor film for economical and precise welding

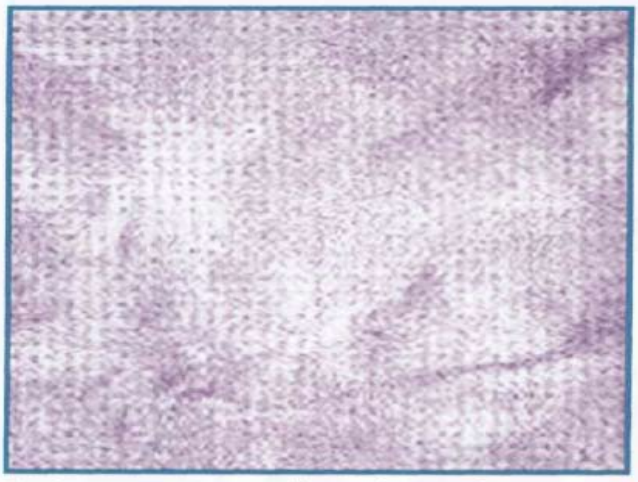
Ultrasonic Welding (USW), the joining technique that uses high-frequency ultrasonic acoustic vibrations to create solid-state welds, is used to join dissimilar materials (such as copper to aluminum) which are thin malleable metals. To optimise the weld and prevent defects, the horn and anvil must be precisely aligned during setup so that the horn exerts uniform pressure across the entire weld area. An economical and precise procedure that will ensure this outcome involves the use of "Pressurex" pressure indicating sensor film, offered by Sensor Products Inc., Madison, NJ/USA.



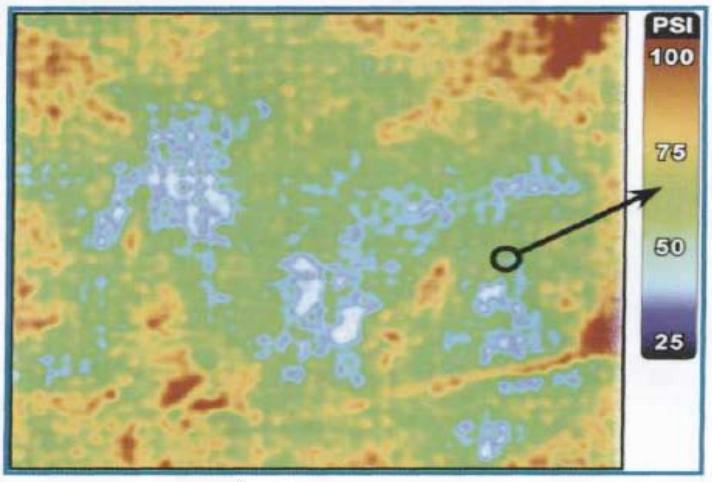
Using "Pressurex" for setup in ultrasonic welding.

Routine use of "Pressurex" during the setup of ultrasonic welders helps ensure proper contact pressure and alignment between the horn and anvil, which results in welds of greater bond strength and aids in reducing rejected product and lowering base factory cost. The film is an easy-to-use tool that reveals the distribution and magnitude of pressure between any two contacting surfaces. When placed between the horn and the anvil of the ultrasonic bonder, the film instantaneously and permanently changes colour directly proportional to the actual pressure applied. The precise pressure magnitude (PSI or kg/cm2) is then easily determined by cornparing color variation results to a colour correlation chart (conceptually similar to interpreting Litmus paper). If desired, the film can be further analysed. The sensor film is extremely thin (4 to 8 mils) and flexible, which enables it to conform to curved surfaces. These pressure maps show that there are pressure variations across the weld zone which can result in less than optimal weld strength.

Such variations are generally caused by lack of alignment between the horn and anvil, or by dirt or residue on the horn. To fix these conditions during setup: First, turn Pressurex® film placed here Fiat Gauge Using "Pressurex" for setup in ultrasonic welding. on the ultrasonic welder and set the supply air pressure. Place a flat gauge on the contact point of the anvil to simulate the thickness of the parts to be welded. Lower the horn onto the flat gauge to calibrate the height setting. Align the horn tip and the anvil. Place "Pressurex" on top of the flat gauge and lower the horn to exert light pressure on the film as shown. Lastly, adjust the horn tip as needed through repeated setups with the sensor film. The setup is correct when the pressure density on the film is uniform in colour. (According to press information from Sensor Products)



Horn's pattern on "Pressurex" film reveals contact flaws.



"Pressurex" pressure profile after image analysis.