

## Ultrasonic Swaging and Forming

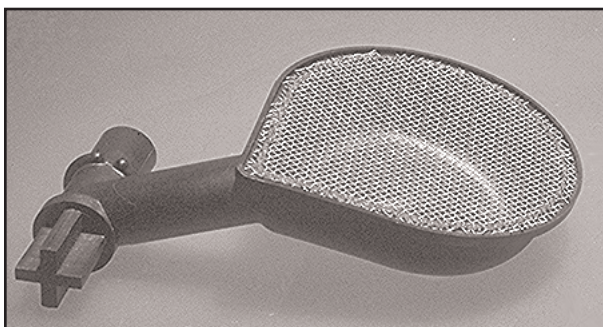
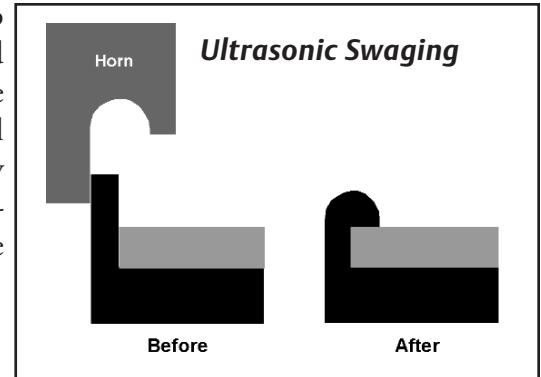
The process of using ultrasonic energy to mechanically capture (no molecular bond) another component of an assembly by melting and reforming a ridge of plastic is referred to as *swaging*. The swage can be either continuous or interrupted. The process is used to roll over a wall section to provide structural retention of a component. Ultrasonic energy is also used to form plastic tubing into a variety of shapes. *Ultrasonic forming* techniques are not limited to circular cross-sections, but can be applied to other profiles.

### Mechanics of Operation

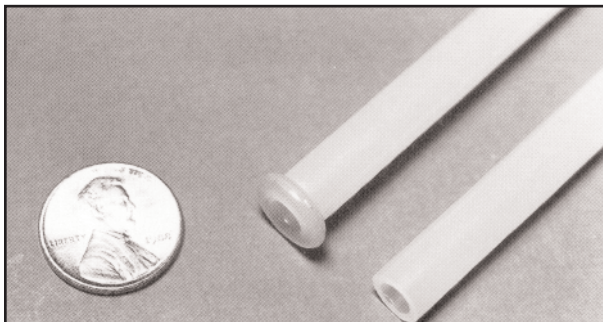
In both swaging and forming, specially designed tooling is required. A cold flow of plastic is initiated by pressure from the ultrasonic horn and, when the ultrasonic energy is applied, the material is brought to its molten state and forced to flow into a cavity in the horn. Upon solidification, the part has been reformed to the required shape.

### Material Requirements

The success of the application is dependent upon the material being formed. In general, the low-to-medium stiffness (low modulus of elasticity), resilient resins can be formed more readily than high stiffness resins. This is due to the elastic nature of these resins; the plastic yields readily allowing the part to be partially cold formed before ultrasonic energy is applied. The materials that can be easily swaged or formed include polypropylene, polyethylene, polymethylpentene, ABS, impact polystyrene, and the cellulose. Rigid materials may be swaged; however, the degree of difficulty is increased.



**Ultrasonic Swaging of Polypropylene to Capture Metal Screen**



**Ultrasonic Tube Forming Applications**

### Process Advantages

The use of ultrasonics for these processes has many advantages:

- Tight assemblies
- Faster than heat staking
- No stress buildup as with cold forming
- Overcomes material memory
- Eliminates the need for consumables (adhesives, staples, tapes, etc.)

**Applied  
Technologies  
Group**

41 Eagle Road  
Danbury, CT  
06813-1961  
(203) 796-0349  
fax (203) 796-9838  
email: info@bransonultrasonics.com

  
**EMERSON**  
Industrial Automation