

## Work Fixtures

One of the most important aspects of ultrasonic cleaning that is often ignored is the proper work fixture for your parts. A work fixture should always be used to hold parts in an ultrasonic tank. Never place parts on the bottom of an ultrasonic tank. This will cause the ultrasonics to operate inefficiently and could damage the bottom of the tank. It will also cause damage to the parts by their rubbing up against each other.

### Selection of Fixture design

Some basic rules to keep in mind when selecting a work fixture are as follows;

1. The fixture should be made of 316 L stainless steel and electro-polished. This material is transparent to ultrasonics and has good particle shedding capability. In those cases where the product may be damaged by hard steel, a coating of nylon or other material can be bonded to the stainless steel.
2. The design should be as minimal as possible. Just enough to hold the part. Keep the mass of the work fixture as light as possible.
3. The part should touch as little of the work fixture as possible and be held in non-critical areas. The holding mechanism can be simple gravity, for dense parts or a spring for light parts.
4. The work fixture should be designed to rest on the lip of the tank suspending it about 2" from the bottom of the ultrasonic tank. [You should always leave 2 " space between the bottom of an ultrasonic tank and the work so that the ultrasonics from the individual transducers are combined. The work should be covered with 2" of cleaning fluid. Leave ½" around



the sides of the tank as well.]

5. The parts should be arranged in one layer, with the spacing between parts from 1/8<sup>th</sup> to ¼". [Part spacing is somewhat dependent on the exact shape of your part and its mass.]
6. If the part is fragile or has edges that are brittle, the work fixture should be coated with a Teflon or Nylobond coating. This will prevent damage to the part.
7. Design your work fixture so that it is easy to stack and also will fit into the next process steps. [Rinsing, drying and inspection]



8. A versatile work fixture is one that has an outer basket to fit the entire tank, inner partial baskets or work holders can be designed for individual parts. This allows the cleaning of several different parts at the same time. This is an especially good design for automation. The outer basket is the carrier for all of the different inner parts baskets and does not have to be replaced or modified if a new part is introduced to your process. If your system has automatic Indexing the outer basket can be designed to be the carrier in the automation process, leaving the inner basket to be the product carrier, reducing cost.



9. Some very small parts are better cleaned in a Pyrex beaker. The beaker should be suspended in the ultrasonic tank using a beaker holder. This positions the beaker for maximum effectiveness in cleaning.

#### **Things to avoid when designing work fixtures:**

1. **Plastic or any type of soft materials;** these will absorb ultrasonic energy and reduce cleaning efficiency.
2. **Crowding of parts;** placing parts close together will reduce the ability of the cleaning fluid to remove particulates from the part.
3. **Multiple parts layers;** multiple layers of parts will shield parts from the full ultrasonics, and cause reflections of energy within the work area that may cause product “burn “ or cavitation erosion.
4. **Weight of Basket and parts;** should not exceed 20 lbs for manual loading and unloading.
5. **Placement of Work fixture in tank;** The fixture should always rest on the top of the tank. Fixtures should never rest on the bottom or on internal hooks within the tank liquid.