Standard Operating Procedure – Branson Ultrasonic Cleaner

About this SOP
This document describes the basic operating procedure for the Branson ultrasonic cleaners (model 2210) in use in Materials Science Central Facilities. This is essentially a condensed version of the operator’s manual. A copy of original operator’s manual is also available in the laboratory and upon request.

Safety Precautions
Electrical
C Make sure the surrounding work space is clean and dry.
C Never immerse the cleaner in water.
C Unplug the cleaner while filling it with solution.
Temperature
C Do not operate dry.
C Maintain proper fluid level.
C Monitor the fluid’s temperature. Never let it exceed 70C.
C Do not use solvents, high vapor pressure or other flammable materials.
Operation
C Keep hands out of the tank while it is operating.
C Do not place objects on tank.
C Use only water-based solutions.
C Do not use mineral acids.
C Change solutions regularly.

Cleaning Principles
An ultrasonic cleaner relies on a process called cavitation to gently and thoroughly clean the surface of your parts. An ultrasonic transducer attached to the cleaning tank transmits high frequency (47 kHz) sounds into the cleaning solution. During the low pressure stage of each sound wave tiny bubbles form and grow. During the high pressure stage these bubbles collapse, removing dirt, rust and other contaminants. This cleaning action can reach any exposed surface, even into deep crevices.

Preparation
C Make sure the work space is clean and dry.
C Make sure the tank and cleaning solution are clean.
C If starting with a new solution select one appropriate for the job. See the table at the end of this procedure for assistance.
C If cleaning will be done using the indirect method, i.e. placing the items in a beaker or solid tray and placing the beaker or tray into the tank, then the cleaner should be added to the tray or beaker. Water can be used to fill the tank.

C Unplug the power cable.
C Fill the cleaning tank to the proper level. Allow for the volume of the parts to be cleaned.
C Plug in the power cable.
C Turn on the power and wait for the start-up self-test to complete.

**Degass**

Degassing the cleaning solution will improve cleaning efficiency by removing dissolved gas from the cleaning solution. Degassing is usually done the first time a new solution is used or if the solution in the cleaner has not been used for a couple of days.

C Select “Set Degass”.
C Set degass time for 5 - 10 minutes.
C Press ON/OFF to start.
C Wait for the degass operation to finish.

**Cleaning**

C Select “SET TEMP” and set the tank temperature. Cleaning is generally faster at higher temperatures.
C Select “SET SONICS” and set the cleaning time.
C Place items into a basket, tray, or in beakers. Do not place the items in direct contact with the tank. This could damage the transducer.
C Cover the tank using the vented cover. This will increase heating rate and will reduce evaporation of the cleaning solution.
C Press ON/OFF to start.
C Monitor the cleaner during operation. Do not let the cleaning solution drop below the correct level. Monitor the temperature. (Select “SOLUTION TEMP”)
C The cleaner will stop automatically after running for the specified time.

**Finishing Up**

C Remove all items from the tank.
C Rinse, dry and/or lubricate items immediately.
C Allow the solution to cool to a temperature where it can be handled safely.
C Unplug the power cable.
C Pour the used solution out, either into the drain if appropriate, or else into a proper waste disposal unit.
C Dry the tank and the area around the cleaner.
Solution Types

Acidic Water-Based Solutions: remove rust, tarnish or scale. They range from mild solutions that remove tarnish to concentrated, inhibited acidic solutions that remove investment plaster, milk stone, zinc oxide and rust from steel and cast iron as well as smut and heat treat scale from hardened steel.

Alkaline Water-Based Solutions: include carbonates, silicates and caustics. These cause emulsifying action on the cleaned surface which keeps soil from redepositing on the cleaned surface, and improves cleaning action in hard water.

Caustic Solutions: used to remove rust from steels, metal alloy corrosion, and a variety of tenacious soils.

Solution Effects on Metals

<table>
<thead>
<tr>
<th>Cleaning Agent</th>
<th>Steel</th>
<th>Brass</th>
<th>Aluminum</th>
<th>Magnesium</th>
<th>Zinc</th>
<th>Stainless Steel, Copper</th>
<th>Tin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical (Alkaline)</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none (2)</td>
<td>none</td>
<td>none (2)</td>
<td>none (2)</td>
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<tr>
<td>Jewelry (Alkaline)</td>
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<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
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<tr>
<td>Buffing Compound (Alkaline)</td>
<td>none</td>
<td>slight stain</td>
<td>none</td>
<td>none</td>
<td>attacks</td>
<td>none</td>
<td>none</td>
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<tr>
<td>Oxide Remover (Acidic)</td>
<td>slight etch</td>
<td>none</td>
<td>slight attack</td>
<td>attacks</td>
<td>attacks</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Electronic Cleaner (Alkaline)</td>
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<td>slight attack</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>General Purpose (Alkaline)</td>
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<td>none</td>
<td>none</td>
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<tr>
<td>Industrial Strength (Alkaline)</td>
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<td>slight attack</td>
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<td>none</td>
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<td>none</td>
<td>none</td>
<td>none</td>
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<tr>
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<td>slight attack</td>
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<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Metal Cleaner 3 (Alkaline)</td>
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<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Rust Stripper (Caustic)</td>
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<td>none</td>
<td>attacks (1)</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>slight attack</td>
</tr>
</tbody>
</table>

(1) Hydrogen gas may be evolved if used with reactive metals.
(2) No effect if solution temperature is less than 60°C.