

## *Application Brief*

## Aqueous Degreasing of Metal Parts

Ultrasonic cleaning is required in the metalworking industry for the removal of oils, greases, metalworking fluids, abrasive polishing compounds, and particulate contamination such as metal fines and shop soils. Cleaning agents based on CFC-113 azeotropes and chlorocarbon solvents, such as 1,1,1 trichloroethane, have been used widely for the removal of these soils. Due to associated ozone-depleting factors, however, these solvents are being phased-out of production and use.

Environmentally acceptable alternatives are available with aqueous solutions and recently-developed semi-aqueous chemistries. Ultrasonics coupled with either process helps achieve the same level of cleanliness metalworkers expected of solvents. Ultrasonics is particularly advantageous for efficiently cleaning parts that have blind holes, crevices, or intricate geometries.

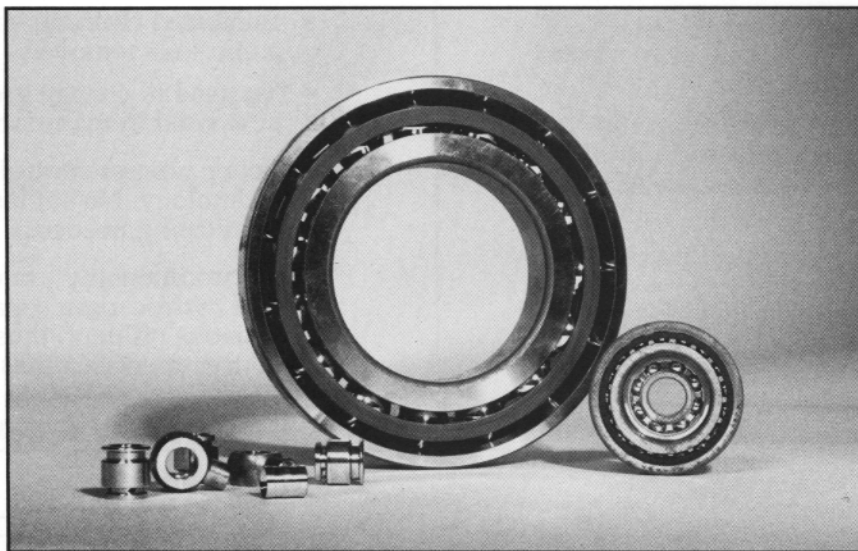
A distinguishing characteristic of the new semi-aqueous chemistries is that they are very application specific. Branson has developed detailed application reports for using the new chemistries to successfully clean metal components.

Branson also has designed equipment specifically for use with semi-aqueous cleaners, which require special considerations particularly in rinsing.

Semi-aqueous chemistries are hydrocarbon-based agents with polar and non-polar components for a balance of selective solvency. Soils are dissolved in the cleaner and washed away in the subsequent water rinse where the organic soil, hydrocarbon portion, separates from the aqueous effluent limiting waste discharge. Because of their chemical properties, however, thorough rinsing in at least two separate steps must be undertaken for complete removal of the solution. As with any process involving water, drying must be included as the final step.

Aqueous cleaners are inorganically-based chemistries that either emulsify, disperse, or solvate soils in liquid. Empowered with ultrasonics, they are effective even with removing organic substances.

These two solvent-alternative ultrasonic cleaning technologies are represented and evaluated in this application brief.



# Cleaning Valve Bodies

## **Challenge:**

Remove light machining and cutting oil from valve bodies.

## **Previous**

### **Cleaning Method:**

Solvent/vapor clean with a FC-113 alcohol azeotrope.

## **Recommended**

### **Process:**

- Immerse valve components into a heated ultrasonic tank (40 kHz) containing an alkaline oil emulsifying solution at 140°F for three minutes. Use 5% concentration by volume.
- Hot water spray rinse at 150°F for 45 seconds.
- Hot water triple cascade rinse with ultrasonics at 150°F for three minutes. Flow rate is 1 GPM.
- Air knife blow-off followed by a hot high purity air evaporative dryer at 280°F.

## **Equipment:**

A Branson Aqueous Ultrasonic Cleaning System with dryer integrated with a TDR-50 automated transport system.

## **Benefits:**

- Eliminates the need to use CFC-based solvents.
- No need to seek alternatives to proven effective machining oils.
- Emulsified oils removed from the cleaning solution by a pump and ultrafiltration package. Extends the life of the cleaning solution.
- Brighter, more eye-appealing product.

# Cleaning Bearings

## **Challenge:**

Remove grease and oil from stainless steel bearings without the use of CFCs and provide a similar level of cleanliness experienced with solvents.

## **Previous**

### **Cleaning Method:**

Solvent/vapor clean with 1,1,1 trichloroethane.

## **Recommended**

### **Process:**

- Immerse bearings horizontally into heated ultrasonic tank (40 kHz) containing semi-aqueous solution at 125°F for five minutes. Use full strength concentration.
- Ultrasonic hot water overflow rinse at 150°F for 90 seconds with a flow rate of 0.3 GPM. Effluent goes to separation tank where soil/hydrocarbon and water separate out.
- Hot water triple cascade rinse for three minutes at 160°F. Flow rate is 1.5 GPM.
- Air knife blow-off followed by forced hot air dryer. Drying temperature is 240°F.

## **Equipment:**

A Branson semi-aqueous batch or continuous process cleaner with dryer.

## **Benefits:**

- Enhanced cleaning – ionic as well as organic soils removed.
- No need to change grease or lubricants now used in manufacturing process.
- Better process control – simple process technology. No sophisticated control monitoring needed.
- Environmentally preferred – organic soil and hydrocarbon separate from the aqueous effluent, thus decreasing load on treatment facilities.

For application assistance, contact your nearest Branson office or the Branson Cleaning Applications Laboratory at (203) 796-0522.



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