

# The Science Behind Branson Precision Ultrasonic Cleaning

**Branson's world class laboratory for developing ultrasonic cleaning solutions.**

As a leader in ultrasonic technologies for over 60 years, Branson has developed world-class capabilities in the scientific research and development of ultrasonic technologies — including the industry's leading comprehensive in-house laboratory for the scientific measurement and analysis of part cleanliness.

## What Is "Target Cleanliness"?

Target cleanliness refers to the optimum level of cleanliness required for a manufactured part so that contamination will not adversely affect any subsequent operations.

**Case 1:** An optical lens needs to be coated with a micro-thin film to reduce glare. That lens must be totally free of contaminants to ensure perfect clarity and uniform film coating. This level of cleanliness requires advanced scientific measurement to evaluate a cleaning process that achieves this objective.

**Case 2:** The plastic cap of an automotive brake fluid reservoir needs to have the injection mold release agent removed. The seal is provided by the molded threads on the cap and reservoir and does not depend on an absolutely smooth, particulate-free surface. It's a much less rigorous level of cleanliness.

Each of the parts described above has its unique "target cleanliness." And each one needs an appropriate cleaning process that achieves its target cleanliness requirement, in turn facilitating subsequent manufacturing operations. Under-cleaning can negatively impact subsequent operations and product quality. Over-cleaning can inflate costs unnecessarily.

Branson science can help you determine your optimal "target cleanliness" and engineer an ultrasonic cleaning process that achieves your cleaning objective.

## An Unmatched Resource

Branson's capabilities are available to determine the exact cleaning solution for your application. Our goal is to meet your optimal target cleanliness and determine the most cost-effective ultrasonic cleaning process to deliver it.

## Comprehensive Capabilities

Backed by experience, Branson's lab can develop a cleaning solution that meets your target cleanliness level...and will achieve it consistently.

**Step 1.** Branson precision cleaning experts consult with you to establish an understanding of the contaminants needing removal and to determine what level of cleanliness is required at that specific point in manufacture — its target cleanliness. Dialogue includes your current cleaning challenges as well as discussion of what your cleaning objective is.

**Step 2.** Provide Branson with typical production parts as they exist prior to cleaning and sent to the next step in your operation.

**Step 3.** Our lab will then test clean your parts and analyze their cleanliness through an appropriate method. Armed with this information, an accurate proposal can be offered that specifies the equipment configuration, cleaning process parameters, and material handling scheme. Branson will work within your budget constraints to provide a solution to meet your cleaning needs.



# BRANSON

## Precise Evidence-Based Evaluation

An important advantage of working with Branson is the depth of capability available in our lab. Branson offers the most comprehensive range of in-house cleanliness measurement techniques to accommodate a wide spectrum of cleaning applications. Analysis may be as simple and direct as a white glove test, or it may involve advanced methodology capable of determining cleanliness at the molecular level.

Our laboratory evaluates cleanliness using 4 levels of increasing precision: Visual, Enhanced Visual, Gravimetric, and Organic Measurement.

**1. VISUAL ANALYSIS.** The most basic form of evaluation can be accomplished at varying levels of detail, depending on your applications needs.

**White glove** tests readily reveal visible residue on a surface. Application and removal of **clear tape** can reveal residue that is loosely attached to a surface. **Microscopic** observation is performed using high-power optics. Enhanced capture and powerful image processing provide a high level of detail.

**2. ENHANCED VISUAL ANALYSIS.** Enhanced visual analysis of cleanliness incorporates manipulation of light to yield yet more detail:

**UV inspection** can reveal residue not readily visible in normal light. **Fluorescent penetrant inspection (FPI)** can reveal micro-cracks in critical substrates when any surface flaw is unacceptable. **Direct and oblique illumination** can reveal contaminants or particulates that may escape detection unless illuminated from the proper angle.

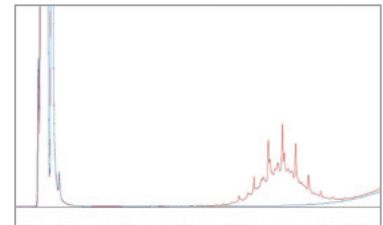
**3. GRAVIMETRIC ANALYSIS.** Using ASTM and ISO standard test methods, Branson extracts contaminants from a part, captures the sample, and then weighs the residue to measure cleanliness based on particulate size and weight.

**4. ORGANIC MEASUREMENT AND ANALYSIS.** Branson can measure cleanliness with an extraordinarily high level of precision and accuracy using either surface energy measurement or organic fingerprinting.

**Contact angle** measurement reveals the level of surface energy and, in turn, indicates the level of cleanliness on a part's surface. The lower the contact angle, the lower the surface energy, and the cleaner the surface.



**Organic fingerprinting** uses gas chromatography to separate an organic contaminant into its individual constituents. Subsequent testing can then be used to reveal if any of the contaminant molecules remain on the surface after cleaning.



### The Branson Advantage

Branson offers our customers a high-value comprehensive solution consisting of equipment, process, and performance, backed by the best support available.

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