

THE ULTRASONIC ADVANTAGE

Cleaning is a problem we are all faced with every day in both our personal lives and our professional lives. In its broadest sense it is the removal of undesirable material from a particular place. In the more technical realm cleaning is usually performed to make a particular material or component acceptable to the next level of processing. This task is becoming increasingly difficult as geometries continue to decrease while production rates escalate.

Cleaning can be accomplished by a variety of means. One of the more common methods is immersion in a liquid. When this is the chosen methodology, it is usually a combination of chemistry and mechanical activity that is employed. Independently each will remove some soil; together the effect is multiplied many times.

Some typical sources of mechanical activity include brushing, spraying, and ultrasonics. Brushing is employed where the parts to be cleaned are geometrically simple, typically having large flat surfaces with no recessed areas or blind holes. For effective use of its mechanical energy, a spray must be aimed such that it impinges directly on the soil to be removed. This makes component orientation critical. Ultrasonics is often chosen because it is not as dependent upon either geometry or orientation for effective soil removal. Ultrasound travels in all directions in the solution and, in fact, will actually pass through the components to reach and clean areas which are otherwise inaccessible. Because ultrasonic energy penetrates into these crevices and cavities, any type of part or assembly can be cleaned.

There are a number of benefits realized from the application of ultrasonics to precision cleaning. These include:

- Enhanced cleaning speed - Ultrasonics is faster than any conventional cleaning method. Entire assemblies can be cleaned without disassembly. Often the labor-saving advantages make ultrasonics the most cost effective choice.
- Unmatched cleaning consistency - The ultrasonic activity is micro in nature and reaches all areas for uniform cleaning. This is true for large or small parts, simple or complex parts handled singly or in batches. Thorough soil removal is not operator dependent.
- Easier compliance with safety and environmental regulations through reduction of dangerous chemical concentrations or substitution of less aggressive cleaning media.
- Reduction of direct worker contact with hazardous cleaning substances.
- Savings in energy costs, labor and floor space.

In addition to the mechanical advantages provided by ultrasonics, there are a number of chemical or process benefits which can also be gained. These include:

- Speeding up the rate at which soil dissolves by intimately mixing the cleaning agent with the contaminants.

- Carrying fresh solution to the soiled surface through a "micro-streaming" effect.
- Attacking the molecular "cement" by which soil attaches itself to a workpiece surface.
- Preventing formation of a neutral film on the workpiece surface that may impede cleaning.
- Raising the temperature of the liquid, thereby increasing the rate of chemical activity.

Ultrasonics can bring substantial value to a precision cleaning application.

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