Ultrasonic Cleaning Parameters

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Abstract

In this paper, ultrasonic cleaning system is introduced. Such as other cleaning industrial processes, many variables are involved in this method. Identification of these parameters and their effects on cleaning effectiveness may be first major stage in optimization of process. These parameters includes: temperature, amount of dissolved gas, surface tension of cleaning solvent and etc. Many researchers examined these parameters variations on performance of action. This paper is a review of their studies.

Keywords: Ultrasonic cleaning, Parameters, Cavitation

1. INTRODUTION

Many Cleaning technologies are used in industry and some changes are applied in their applications. Vapor degreasing using chlorinated and fluorinated solvents that were used for a long time in industry due to environmental rules is being phased out. At the same time, cleaning requirements are continually increasing. Cleanliness has become an important issue in many industries. It seems that each advance in technology demands great attention to cleanliness for its success. As a result, the cleaning industry has been challenged to deliver the needed cleanliness and has done so through rapid innovation over the past several years. Many of these advances have involved the use of ultrasonic technology. Ultrasonic energy is now used extensively in precision cleaning applications due to increasing speed of impurities displacement and enhancement the cleaning effect of the alternative chemistries.

The use of ultrasonic cleaning baths ranging from the small laboratory and jewellers' units of 100–200 W to large industrial cleaning tanks of several kilowatts is well known. Ultrasonic energy can be applied externally as in a cleaning bath or by the insertion of an ultrasonic horn into media.

This paper is intended to familiarize the reader with ultrasonic cleaning process and investigations were done about its parameters, briefly is reviewed.

2. PRINCIPLE OF ULTRASONIC CLEANING

Many conventional cleaning procedures can be speeded up considerably and carried out far more thoroughly when the cleaning solution is subjected to ultrasonic vibration. In some cases it is even unnecessary to dismantle a mechanism to clean it thoroughly by ultrasonic vibrations.

The basic equipment consists of a generator, a transducer(s) and cleaning tank. The generator supplies high-frequency (ultrasonic) power which is converted into mechanical vibrations by the transducer. The transducer radiating surface is vibrated at intensity high enough to produce cavitations in the cleaning solution that poured in tank. Cavitation is a physical phenomenon consisting of the creation in a liquid of very small vacuum bubbles filled to a certain degree with vapor, gas or both of them. This rapid formation and collapse of vapor bubbles within the liquid lead to implosion of them in certain conditions. These implosions release energy that provides an erosive action which is