

Microbubble Bombardment Cleansing for Industrial Applications

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Abstract- Traditionally, cleaning of metals tools, jewelry or engine parts which are complicated to get clean by normal washing, whereas mostly distillation process is used for cleaning. This project is proposed the microbubble bombardment cleaning for industrial applications. In this technique good cleaning takes place in the metal parts, but our traditional methods for cleaning gets hazardous for human or affects the atmospheric condition as chemical process. At the time of the electrolysis process, with cleaning of object dust some particles of the cleaning object also dissolved during process and it is a big loss if object material is precious such as Gold or Silver etc. In this paper, we are discussed the microbubble bombardment method for cleansing a bowl. In this process, we have required very high frequency which generate vibrations and to produce microbubble in the system. The advantage of this process that can clean or wash the pesticides layer on fruit also as there is no chemical process required. Micro bubble bombardment cleaners can be used to clean many different types of objects, including jewellery, lenses and other optical parts, watches, dental and surgical instruments, tools, coins, fountain pens, golf clubs, fishing reels, window blinds, firearms, car fuel injectors, musical instruments, industrial parts and electronic equipment. They can be used in many jewellery workshops, watchmakers establishments, and electronic repair workshops. This project has reduced the problems regarding cleaning of different objects or hacks using water or cleaning solution.

I. INTRODUCTION

In industrial sector cleaning of various metals, engine parts, food processing plant, object hacks are required. There are many traditional process available for cleaning which have many drawbacks such as metal dishevelment, chemical requirements and food processing limitations, etc. These processes are used the costly chemical which affects the industry financial conditions and reduces the life of the equipments [1-5]. So, these problems are removed by using this cleansing method. This process is not big machine or appliance, as it is very easy and simple structured which having only some circuit part which will perform role of conversion process. The main term used to clean this process is microbubble bombardment which is achieved by piezoelectric transducer & frequency multiplier circuit [6-10]. It can be used for any of the small application to big application. Solvent degreasing using chlorinated and fluorinated hydrocarbon solvents, a process used for

cleaning by the finishing industry since its very inception, is on its way out, a victim of increased regulation, the Montreal Protocol and the "Green" movement in general. It is understandable why this method achieved its prominent position in metal finishing it is reasonably effective at cleaning and was for-rarely the most expedient and least expensive cleaning means available. The equipment required is simple and inexpensive, and until recently the chemistry was considered environmentally safe.

II. PROPOSED TECHNIQUE

The drawback of current electrolysis process, is removed by using this technique. In this process object is to be clean with microbubble bombardment. These bombardment is too large that cleans the object without getting it hurted. Now, how to produce this bombardment is our project. In this project incoming supply is converted into high voltage & high frequency. This frequency is near to 17kHz. This conversion is done by using frequency multiplier circuit & transformer. This very high frequency is then feeding to the piezoelectric transducer which converts this high frequency supply into large vibrations. Piezoelectric transducers convert alternating electrical energy directly to mechanical energy through use of the piezoelectric effect in which certain materials change dimension when an electrical charge is applied to them. Electrical energy at the ultrasonic frequency is supplied to the transducer by the ultrasonic generator [11-15]. This electrical energy is applied to piezoelectric elements in the transducer which vibrate. These vibrations are amplified by the resonant masses of the transducer and directed into the liquid through the radiating plate. Thus, this process produces large microbubbles in the liquid. Then this microbubbles are bombarding on the object is to be cleaned.

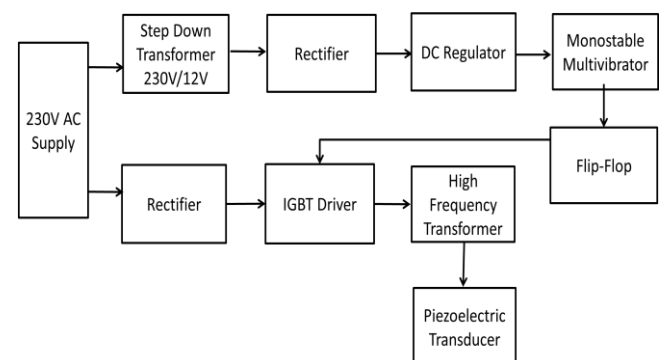


Fig. 1 Block diagram

The block diagram of proposed system is shown in Fig. 1. In this case regular ac supply is coming from mains then this supply we step down the voltage by using step down transformer. When supply voltage is step down 12 v then it's 12 V is converted into DC by using rectifier . Because in the whole procedure we need constant supply so we are converted into DC. This DC voltage is boosted to 300V with the aid of capacitor. After that, this supply is fed to the single phase IGBT inverter which is triggered by frequency multiplier IC & that decides the frequency of output AC supply. This high frequency supply then fed to the piezoelectric transducer blocks. These blocks converts this resonant frequency supply into mechanical vibrations by transducer elements. Finally, these vibrations are fed to the working bowl through radiating plate. This all process produces a huge microbubble bombardment in the liquid in working bowl. Hence, bombardment on the object to be cleaned is cause to clean that object.

III. HARDWARE PROTOTYPE MODEL

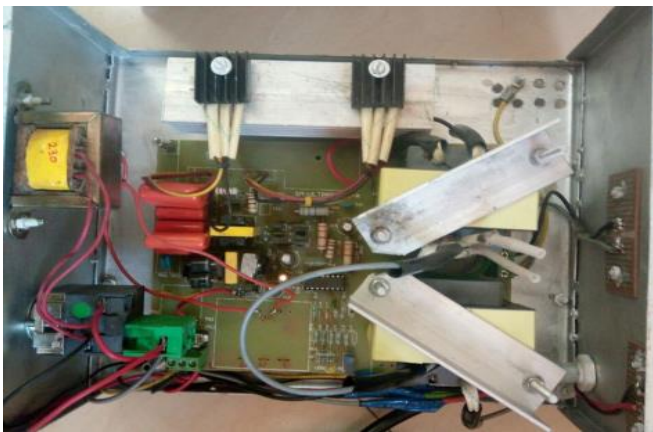


Fig. 2 Internal View of proposed Hardware circuit



Fig. 3 Complete hardware platform



Fig. 4 Hardware view of transducer

In the working model fan is used for the cooling purpose . the transducer produce the vibration in the output kit. This is no dangerous to human being. In this case the any liquid we can used. This process is environment friendly Fig. 2 Shows the internal view of the proposed system. In the cleaning process material loss chances is very less than others. This process is more safe than others. This process application is home appliances to industrial equipments. The complete setup of the hardware cleasing and internal view of the transducer are shown in Fig. 3 and Fig. 4 respectively. Piezoelectric transducers convert alternating electrical energy directly to mechanical energy through use of the piezoelectric effect in which certain materials change dimension when an electrical charge is applied to them [3]. Electrical energy at the ultrasonic frequency is supplied to the transducer by the ultrasonic generator [4]. This electrical energy is applied to piezoelectric elements in the transducer which vibrate. These vibrations are amplified by the resonant masses of the transducer and directed into the liquid through the radiating plate. Early piezoelectric transducers utilized such piezoelectric materials as naturally occurring quartz crystals and barium titanate which were fragile and unstable. Early piezoelectric transducers were, therefore, unreliable. Today's transducers incorporate stronger, more efficient and highly stable ceramic piezoelectric materials which were develops as a result of the efforts of the US Navy and its research to develop advanced sonar transponders in the 1940's. The vast majority of transducers used today for ultrasonic cleaning utilize the piezoelectric effect.

IV. MCROBUBBLE BOMBARDMENT IN CLEANING & RINSING PROCESS RESULTS & DISCUSSION

Cleaning in most instances requires that a contaminant be dissolved (as in the case of a soluble soil), displaced (as in the case of a non-soluble soil) or both dissolved and displaced (as in the case of insoluble particles being held by

a soluble binder such as oil or grease). The mechanical effect of ultrasonic energy can be helpful in both speeding dissolution and displacing particles. Just as it is beneficial in cleaning, ultrasonics is also beneficial in the rinsing process. Residual cleaning chemicals are removed quickly and completely by ultrasonic rinsing. In removing a contaminant by dissolution, it is necessary for the solvent to come into contact with and dissolve the contaminant. The cleaning activity takes place only at the interface between the cleaning chemistry and the contaminant. As the cleaning chemistry dissolves the contaminant, a saturated layer develops at the interface between the fresh cleaning chemistry and the contaminant. Once this has happened, cleaning action stops as the saturated chemistry can no longer attack the contaminant. Fresh chemistry cannot reach the contaminant. Ultrasonic cavitation and implosion effectively displace the saturated layer to allow fresh chemistry to come into contact with the contaminant remaining to be removed. This is especially beneficial when irregular surfaces or internal passageways are to be cleaned.

Some contaminants are comprised of insoluble particles loosely attached and held in place by ionic or cohesive forces. These particles need only be displaced sufficiently to break the attractive forces to be removed.

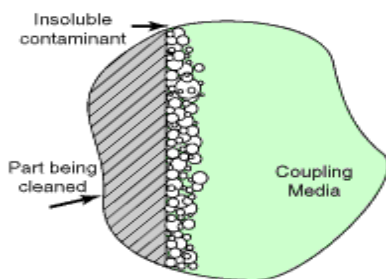


Fig. 5 (a)- Ultrasonic cleaning by dissolution [5]

Cavitation and implosion as a result of ultrasonic activity displace and remove loosely held contaminants such as dust from surfaces. For this to be effective, it is necessary that the coupling medium be capable of wetting the particles to be removed.

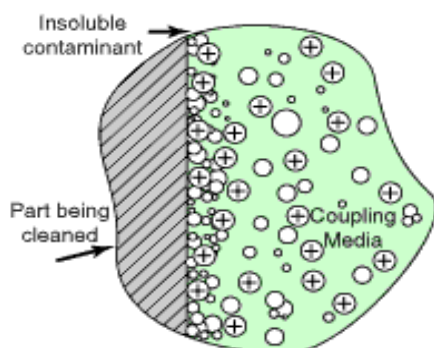


Fig. 5 (b)- Ultrasonic cleaning by dissolution [5]

Object of cleaning when placed in the working bowl & supply gets switched ON, the working gets started. Huge vibrations due to high frequency (resonant frequency) conversion process of transducer start producing huge microbubbles in the liquid in the working bowl which having heavy bombardment tendency. These microbubbles bombards on the object & clean it by removing all the dust & dirt particles. Cleaning is very deep as it cleans each & every hacks on the object deeply. Any type of liquid we can use for cleaning.

V. CONCLUSION

Microbubble bombardment cleansing method is reduced all the problems which are associated with traditional process system for cleaning. This process has not required any additional fuel or chemical which reduce the life of the equipments. For the industrial applications, this Cleaning process is very effective and efficient. This process can clean the impurity stuck to the object. This paper discussed the proposed cleaning technique without chemical process i.e. enhance the life of the equipments and reliability.

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