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A Review on Metal Cleaning

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Abstract: ***The metal cleaning process is the removal of contaminants from the surface of ferrous and non-ferrous materials. The oil, greases and coolant are stick in the metal surface during the deep drawing process, then the oil and greases are affected during the welding process. The oil, greases and coolant are removed in the various processes such as Electrolytic plasma processing (EPP), Laser technology and micro-bubble technology are used to clean the metal surface. In micro bubble technology the micro bubbles flotation combined with the deionized water to clean the contaminants from the metal surface. In this paper we study of all the aspects to relative in improvement for cleaning and improve the metal surface.***

Keywords: metal cleaning, oil cleaning

I. INTRODUCTION

Metal cleaning is referred to as washing or degreasing of metal parts in industrial applications. The general objective of metal cleaning is to remove foreign matter from the solid substrate. Cleaning processes remove soils and contaminants from the surface of ferrous and non ferrous materials with varying levels if efficiency cleaning of metallic parts has a vital role in the production line because contaminated metallic parts can cause glitches to the completion of manufacturing process. These contaminants are mainly machining oil or particles accumulated on the metal stamping process. They are challenging to clean by water due to the hydrophobicity of oil and dirt, which imposes challenges to the cleaning industries.

The microbubble technology which are used to clean metallic part, basically microbubble is a very tiny air bubbles generated in water there diameter is 50 micron meter. Microbubble floatation was vastly applied in wastewater treatment and achieved consistently oil removal efficiency. Microbubble floatation has successfully removed 90% oil and grease from contaminated metallic parts. A fluidized bed system technology works with the help of glass powder which are remove the dirt from surface spherical glass powder size is 100 to 800 microns, there is no need of any solvent. Fluidized bed system helps to remove oil and residuals from surface easily.

II. LITRETURE SURVEY

A. In the paper "Development of an effective cleaning method for metallic part using microbubbles", the author Khang Aik Tan, Yogeswaran Mohan, Kwok Jee Liew, See hin Chong, phaik eong po. The author has stated that microbubbles flotation combined with deionized water was proposed as a novel approach to clean oil contaminated metallic parts. The characteristics of microbubble such as bubble size distribution and filling time describe the cleaning expectation of microbubble in oil removal of metallic parts. Microbubble flotation with aid of deionized water has successfully removed 90% of oil from oil-contaminated metallic parts. It cleaning larger volume of metallic parts with lower power consumption as compared to ultrasonic cleaning. Microbubble flotation combined with deionized water offers an effective, sustainable, green and power-efficient approach in cleaning oil-contaminated metallic parts.

B. In the paper "A review of incorporating Nd : YAG laser cleaning principal in automotive industry", the author Mohammad khairul Azhar Abdul Razab, Mohammad Noor Mohammad Jaafar, Mazlan Mohammad, Noraina Adam, Nor Hakimin Abdullah. The author has stated that Laser cleaning has identified as an ideal technology to replace conventional chemical techniques in the motorcar coating removal process. This Laser technique can remove the coating layers without using chemical products and prevents the metal surfaces from defect. This review paper has elucidated the effectiveness , quality and efficiency of Laser coating removal using pulsed Nd:YAG laser with proper selection of laser parameters.

C. In the paper "A fluidized bed system is a cost effective option for degreasing process", the author " M. Barlleta ,S. Gaurino and V1. Tagliaferri" University of rome 'Tor Verguta' Department of Mechanical Engineering. The author has stated surface cleaning by means of a fluidized bed of hard particles. A spherical shaped glass powder with variable mesh sizes in the range of 100 to 800 microns was fluidized. The impact of fluidized particles on the metal substrate caused accurate cleaning of the surface of the work piece without involving the use of any solvents. The result demonstrate a fluidized bed system can be applied in surface cleaning with excellent performance regarding the removal rate and the residual oil which can be easily reduced below.

D. In the paper "Applications of Laser Cleaning Process in High Value Manufacturing Industry" Sundar Marimuthu*, Husein K € urs € ¸ad Sezer† and Alhaji M. Kamara‡. The Author state that for cleaning process most of the industries cleaning is currently carried out using manual processes employing aggressive chemicals, including hydrofluoric acid. This convention chemical cleaning method is adopted in industries are labour-intensive & are currently carried out using multiple staged manual processes (up to 15 steps). These are error-prone & can expose the operater to hazardous process. Such process has some drawback i.e. residue, uneven removal & environmental concerns. An alternative technology is to use laser systems as replacement for conventional chemical cleaning method. The laser cleaning process offers advantages such as the possibility of remote control, high speed, dry cleaning & importantly more environmental-friendly processing. Which is mainly include dry laser cleaning, wet laser cleaning, & hydrodynamics based laser cleaning. High capital cost, low productivity & some technical issues such as , over or under-cleaning (due to the sensitivity of laser cleaning to the process parameters or contaminant thickness/ composition). Recent development in high power nanosecond & picosecond pulsed lasers are expected to significantly improve the process Lead-time & address the high cost issues with the process. Laser cleaning is expected to become a mainstream process within the manufacturing industries.

E. In this paper "Novel approach for clean utilization of complex low-grade metal resources using silicon as metal getter" The Author Yun Lei , Peng Qiu , Wenhui Ma , Chao Wang . A method to utilize complex low-grade metal resources cleanly is necessary for the sustainable development of resources and the environment. Si is a widely consumed material in the semiconductor and photovoltaic industries; however, its purity must be upgraded for specific uses. In this study, inexpensive low-purity Si (~99.32%) was employed as a metal getter to clean accumulated low-grade metal resources by extracting valuable elements from the low-grade resources and to make the manufacture of high-purity Si (~99.99%) possible.Currently, the worldwide recy-cling activities of spent automotive catalyst mainly focus on the recovery of platinum group metals (PGMs), such as Pt, Pd, and Rh,e.g., by using Fe (Peng et al., 2017; Ding et al., 2019) or Cu (Zhang et al., 2019) as a metal getter or by extracting PGMs via hydro-metallurgical treatments such as oxidative leaching (Nogueira et al.) using an HCl and H2O2 system (Wei et al., 2019) or other methods. This study provides a new approach for the clean utilization of complex low-grade resources. This approach is a candidate for being widely employed in industry, because it makes possible the extraction of valuable elements from low-grade resources as well as the manufacturing of high-purity Si (99.99%). The results of this study indicate that the proposed method is a promising candidate to solve the problem of the high cost of the extraction of valuable elements from low-grade resources, because another important product can be obtained: high-purity Si, which is significantly consumed for the manufacturing of solar-grade Si and electronic devices. The high consumption of high-purity Si indicates that large amounts of complex low-grade metal resources can be treated, making this approach suitable for large-scale application.

F. In the paper "Analysis of risk trade off relationship between organic solvents and aqueous agents" the author Emi Kikuchi, Yasunori kikuchi, Masahiko Hirao has stated that, the analyze the risk trade off relationship between organic solvent and aqueous agent in metal cleaning process. Result shows the contribution of the process using chlorinated solvent to chemical ozone creation and human toxicity. The the cleaning agent and process facilities' are are selected on the basis of comprehensive analysis of risk trade off relationship for feasible and cleaner production.

G. In the paper "Electrolytic plasma processing for cleaning and metal coating of steel surface" the author E. I. Meletis, X. Nie, FL. Wang, JC. Jiang has stated that, the Electrolytic plasma processing (EPP) are concerned with cleaning and deposition of metal coating on steel surface for corrosion protection, the effect of cleaning steel surface and Zn and Zn-Al coating deposition are investigated. The EPP produced clean surface and metal coating at high deposition rates, and has great potential as new plasma surface teqnique. The electrolytic plasma processing method is capable of producing adherent, dens and uniform Zn-Al coating.

III. CONCLUSION

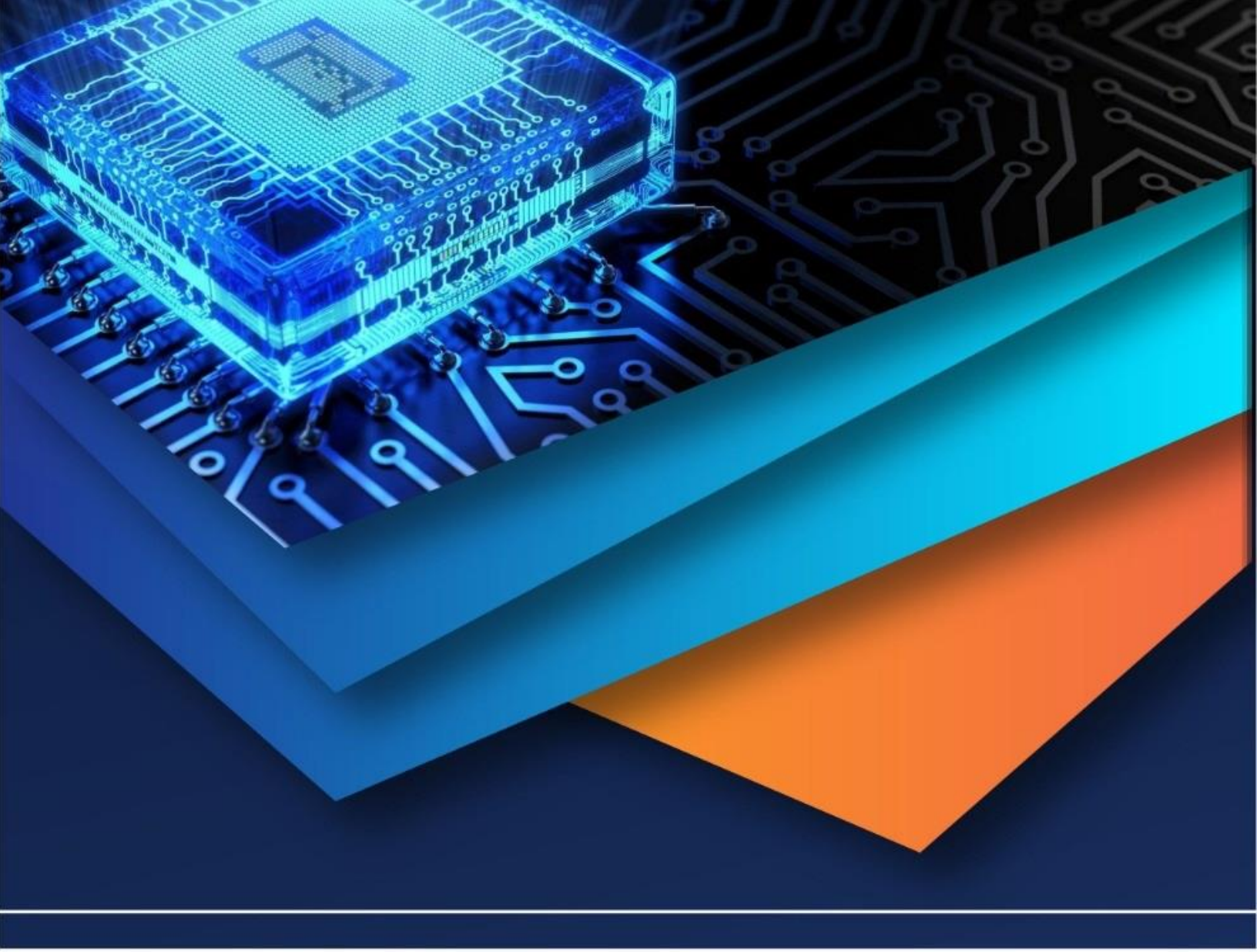
We have studied many different paper and found that in each of the paper they have performed different cleaning process on different material by varying many parameters. Microbubble cleaning, Fluidized bed system, laser cleaning etc. this technology helps to clean metal surface.

REFERENCES

[1] Khang Aik Tan, Yogeswaran Mohan, Kwok Jee Liew, See Hin Chong, Phaik Eong Poh. "Development of an effective cleaning method for metallic parts using microbubbles". Elsevier Ltd. (2020)

[2] Mohammad Khairul Azhar Abdul Razab, Mohamed Noor, Mohamad Jaafar, Mazlab Mihamed, Noraina Adam, Nor Hakimin Abdullah. "A review of incorporating Nd:YAG laser cleaning principal in automotive industry". Elsevier Ltd. (2018)

[3] M. Barletta, S. Guarino, V1. Tagliaferri, University of Rome ‘Tor Vergata' Department of Mechanical Engineering. "A Fluidized bed system is a cost effective option for degreasing processes". Elsevier Ltd. 2004
[4] Sundar Marimuthu, Husein Kursad Sezer, Alhaji M. Kamara. "Application of laser cleaning process in high value manufacturing industry". Elsevier Ltd. (2019)
[5] Yun Lei, Peng Qui, Wenhui Ma, Chao Wang. "Novel approach for clean utilization of complex low grade metal resources using silicon as metal getter". Elsevier Ltd.(2020)
[6] Emi kikuchi, Yasunori kikushi , Masahiko Hirao. "Analysis of risk trade off relationship between organic solvents and aqueous agents". Elsevier Ltd. (2011)
[7] E.I.Meltis, X.Nie, FL.Wang, JC Jiang. "Electrolytic plasma processing for cleaning and metal coating of steel surface". Elsevier Ltd. (2020)



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