

Automated Paint Dosing Machine - A Comprehensive Review

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Abstract - Painting is one of the surface finish operations which is done to a part to obtain a well protected and decorative finish. It has many limitations, when it comes to painting an industrial part which is large requires a huge capacity spray gun that cannot be manually operated and there are other health hazards associated with it. All these limitations can be overcome by automation.

Design and fabrication of such a system includes identifying the challenges faced and draw a solution. The system includes containers made of acrylic tubes seated on aluminium flange, which is connected using pneumatic connectors and tubes whose opening and closing is operated using solenoid valve (CV).

Index terms – Dosing machine, colour mixing, aeroplane, solenoid valve, Additives, Automation, Acrylic tube



1. INTRODUCTION

Colour mixing is an important process which has a wide application in several fields. There are various kinds of colour mixing that can be done. It can either be additive colour mixing or subtractive colour mixing. Additive colour blending of shades includes blending colors of light. In added substance blending of shades there are three essential colors: red, green, and blue. Without shade or, when no colors are indicating, the outcome is dark. In the event that each of the three essential colors are indicating, the outcome is white. At the point when red and green join, the effect is yellow. At the point when red and blue join, the consequence is maroon. At the point when blue and green consolidate, the outcome is cyan. Added substance blending is utilized as a part of TV and workstation screens to generate an extensive variety of shades utilizing just three essential colors. Subtractive colour mixing is carried out by specifically evacuating certain shades, case in point with optical channels. The three essential colors in subtractive blending are yellow, maroon, and cyan. In subtractive blending of color, the unlucky deficiency of shade is white and the vicinity of every one of the three essential colors is dark. In subtractive blending of colors, the auxiliary shades are the same as the essential colors from added substance blending, and the other way around. Subtractive blending is utilized to make a mixture of colors when printing on paper by consolidating a little number of ink shades, and additionally when painting. The blending of colors does not handle immaculate

subtractive color blending on the grounds that some light from the subtracted shade is even now being reflected. This outcomes in a darker and desaturated shade contrasted with the color that might be accomplished with perfect channels. This chapter develops the background for the present work and discusses the need to take up this work. It presents a review of available relevant literature. Objectives of the present work along with methodology adopted to accomplish them are also discussed here.

2. LITERATURE,

Allen Edgar Bryson, et.al [1], has studied the control of quality in the manufacture of paint. He had given the brief introduction about composition of paint and its quality. He further presented the manufacturing process of paints which consist of essential steps like Mixing, Grinding, Thinning, and Tinting. Straining and canning operations takes place after the paint batch has been tested and accepted as meeting the prescribed standard. Further he focused on the Testing of paints, Measurement of quality of paints and controlling factors in manufacturing of paints.

Ronal J. Weetmanet, et.al [2], worked on the mechanical design of mixer with the emphasis on the fluid forces that are imposed on the impellers by the fluid continuum in the mixing vessel. According to them forces are the results of transient

fluid flow asymmetries, acting on the mixing impeller. These loads are dynamic and are transmitted from the impeller blades to the mixer shaft and gear reducer. Fluid forces acting on the mixer that is bending loads on the shafts caused by an effective force and torque can be calculated and same can be analyzed with the help of CFD that is Computational Fluid Dynamics. According to them power transmitted by the prime mover through the reducer and shaft can be calculated. From applied power and mixer speed torque can be calculated. Torque can be equated to a force at an effective radius

Tapas Raj Nit Rourkela et.al [3], In line of colour mixing technology, few works have been done related to the inkjet printer technology. The work related to an inkjet printer, an ink billing system and to control method for an inkjet printer has been approached by researchers (Koike et al [2007]). Research related to the formulation of color ink composition for use in ink jet printing applications was published by Causley and Petersen [1989]. Researches on color sensor for recognizing the hue of articles by sensing rays of light passed through or reflected from the articles was done by Kanazawa et al [1987]. Works related to the types of color sensors i.e. contact types and non-contact types were done by DiCarlo et al [2010].

D.I. Ntunde et.al,[4], Humans have seen the need to leave a mark on the world in the form of painted images since prehistory. If we look at how art evolved over the years, we can know a number of things about the people that created painted images and the societies they lived in. At some point, early man figured out that by mixing color giving particles known as pigments into a medium like water or saliva, paint could be created.

O.S.Galaktionov et.al,[5] Applied the mapping approach to study the distributive mixing in the industrial mixer. They have taken the Kenics Static mixer for study which is widely used in industrial applications. According to them mapping method makes it possible to study and compare thousands of different mixer layouts and perform optimization with respect to macroscopic homogenization efficiency and interface generation. Mapping technique comprises of computational domain, mixing modules and mapping matrices. They studied

the mixing efficiency in terms of blade twist angle.

David W Kammel et.al, [6], has focused on design, selection and use of Total Mixed Rations (TMR) mixers. According to him mixer design is still primarily a trial and error process with due Consideration given to prior experience. The manufacturer selects a specific mixer design that is expected to perform, and field tests determine design changes and their effect on the mix. He highlighted on major aspect like Mixer design and options, Mixer testing, Batch mixing, Mixing time, Safety, Mixer sizing, Mixer costs etc. He further said that since 'Perfect mix' is impossible, there will likely be some difference in the test results. The test results should be looked at to determine the statistical significance of the variability.

3. CONCLUSION

At the end of the design we obtain a fully process controlled and a foil safe automated dispensing unit which is totally reliable and precise. The efficiency of the unit is very important as it totally determines the total economy of the whole printing operation, power consumption, viscosity of the mix, agitator efficiency and flow of the mix totally determines the work and efficiency of the unit.

Fluid dynamics play an important role in most chemical industries. Hence, the viscosity of the paint mix plays an important role when it comes to understanding the physical properties of the mix, especially the pressure, the flow of paint after coating etc.

4. ACKNOWLEDGMENT

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