

Theerachai Wiajckanodom 2014: Design and Development of a Spray Painting Machine for Alkalized Eggs Production Process. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Associate Professor Chawalit Kittichaikarn, Ph.D. 224 pages.

This research aims to design and develop a prototype of spray painting machine for alkalized egg production in order to have constant production rates with standard quality of alkalized eggs. This prototype can solve the shortage of labor problem and reduce pollution caused by exhalation of paint. Computational Fluid Dynamics program was used to analyze the best adhesion of paint on egg shells. The result obtained will be used to design spray painting machine. The computational results were also validated with the experimental results by using the Image Processing program. Moreover, the commercial Finite Element program was used to analyze the strength of the main structures and all important component parts of the machine.

The prototype of spray painting machine was designed to have 3 painting stations, each station consists of painting, turning and drying processes. The eggs are transported by chain conveyor with roller that driven by 90 W Compact AC Geared Motors with Electromagnetic Brake. The machine is 4 meter long with egg tray at the end of the machine. Due to the limited budget, the machine was built with only 1 painting station. From the final test, if this machine is complete, it will have the ability to paint egg at the production rate of 20,000 eggs per day. From the engineering economic analysis, it was found that this machine has approximately payback period of 1 years and 11 months.

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