

Innovative Head Cap Inserting Machine for the Toothbrush industry's Efficient and Sustainable Production

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The plastic manufacturing industry is continuously seeking new technologies due to the potential increase in demand for new products that are to be produced on a single production line while reducing model changeover time and improving product quality. In mass volume production, improvement of the cap inserting machine systems becomes a favorable way to reduce the unit cost of production in an effective and sustainable manner. This may significantly reduce cost, manufacturing lead-time, increase flexibility, and usually be economically modified for use on another product. A cap inserting system consists of standard components that can be used to satisfy different fixing requirements. These fixtures are reusable, and this enhances their flexibility and reduces the time and cost of development. It also offers the benefit of eliminating the need for dedicated tooling facilities and their associated storage and floor space, rapid response to engineering and production changes, system expandability, and considerable reduction in setup time. This research presents a novel cap inserting system for toothbrush manufacturing in the plastic industry. The developed system has been successfully validated using several plastic manufacturing such as hot stamping. The developed system can be further expanded to the fully automated system. A programmable logic controller was used to control the cylinders and other components. The machine was modelled and simulated using SolidWorks software and found to be functionally accurate. As a continued study, a prototype machine is built and tested for functionality and kinematics.

Keywords: Semi-automated system, Toothbrush cap inserting, Mass-volume production, Lead time