



---

## **Design and Fabrication of an Automated Pen Barrel Collecting and Packing Machine**

K.T.K.M. De Silva \*, H.S.N. Ariyawansa, M.I.I. Ahamed

*Department of Mechanical and Manufacturing Engineering, Faculty of Engineering,  
University of Ruhuna*

\*Corresponding author: *muthumalidesilva@gmail.com*

### **ABSTRACT**

Automation is an efficient method to achieve cost effective solutions in manufacturing plants, as well as in the process industry and many other industrial areas. Assembling of parts in manufacturing industry is generally the largest single cost element. Assembly cost is the major cost in overall cost of ball pen manufacturing since pen manufacturing requires too many parts to be assembled together. To reduce the overall cost of the product it is required to observe each and every assembly process, and analyze each process with various parameters like efficiency, productivity, lead time, delivery precision, investment cost, capacity, maintenance, running cost. Based on this kind of analysis, Atlas Axillia (PVT) Ltd which is one of the leading stationery manufacturing industries in Sri Lanka has decided to automate the pen barrel assembling process. The manufacturing of pen barrels at the Atlas plant is done using injection moulding and the pen barrel collecting and packing processes were done by manually. The aim of this research is to design and fabricate an automated pen barrel collecting and packing machine. With this automated system, 6000 pen barrels can be packed in a specific order, within an average time of 75 minutes. In addition, the company can save LKR 300,000 of labour cost annually from one such machine. Compared to the existing manual process, the proposed design mainly assists in improving the productivity, quality, safety, flexibility as well as the accuracy of the particular process. This automated system, carries the pen barrels in sets, using a pneumatic gripper movable in XY bed, and packs them in 12 positions inside the crate. A Human Machine Interface (HMI) was designed and implemented for the machine for easier overall operation, improved communication, and easier controlling of the process.

**Keywords:** *Automated System, Collecting and Packing, Human Machine Interface, Injection Moulding, Pen Barrels.*