

PLC Based 7 Tank Process

Aparna R. Kare¹, Charanjeet Girase², Kaushik Bawkar³, Ravish Kumar⁴, Vaibhav Somvanshi⁵

Professor, Department of Electrical Engineering, Pune, India ¹

Student, Department of Electrical Engineering, Pune, India ²⁻⁵

NBN Sinhgad Technical Institutes Campus, Pune, India

Abstract: Powder coating is a superior finishing process widely used across industries for providing a durable, high- quality, and aesthetically pleasing finish to metal products. One of the most critical stages in this process is the pre- treatment phase, which typically involves dipping the metal job sequentially into seven different chemical tanks for cleaning, degreasing, phosphating, and other surface preparation steps. In conventional systems, this process is performed manually, requiring significant human effort, time, and resources, often resulting in inconsistent quality and increased operational costs.

To address these challenges, this project proposes a PLC-based Fully Automated 7-Tank Pre-Treatment System. The system employs a programmable logic controller (PLC) to automate the sequential dipping of metal objects using a motorized gantry system. The gantry consists of a vertical and horizontal slider mechanism along with a motorized gripper to securely hold and transport the workpiece. Each tank is assigned a specific time duration, which is programmed into the PLC for precise control. The system ensures that the metal object is dipped in each tank sequentially for the required duration without any manual intervention.

Automation of the 7-tank process offers multiple benefits, including improved process accuracy, consistent product quality, reduced labour dependency, enhanced safety, and significant cost and time savings. This project transforms the traditional labour-intensive process into a smart and autonomous solution that aligns with modern industrial automation trends.

The implementation of this system demonstrates how real-time industrial problems can be resolved using automation and PLC technology, making it an ideal model for industries focused on increasing productivity and maintaining high standards in surface treatment operations.

Keywords: PLC Automation, 7-Tank Process, Powder Coating, Gantry System, Pre-Treatment, Industrial Automation, Motorized Gripper, Surface Preparation, Productivity, Cost Reduction.

