1. Introduction

1.1 Overview

Safety is the major issue in the aviation industry and it is directly embedded in all parts of the aviation activities (Design, Maintenance, Operations). From Maintenance and engineering prospective assurance of safety and quality required and recommended by the regularity Authorities local and international by developing the rules and regulation for the above mentioned activities.

Maintenance all activities required to keep the aircraft and equipments airworthy, and after all activities carried out according to the scheduled / un scheduled maintenance planning Document MPD. Still some activates done by the supporting workshop like structure repair workshop, tires workshop, and painting workshop.

The importance of painting workshop activities has the same importance like the other maintenance activates in the MROs. So there are some issues appears in the painting works like :

1- The environmental effects of the painting process.
2- Quality of the painting process.
3- Human Factor for the painting labors.
4- How to minimize the cost of the painting process.
5- How to minimize aircraft downtime for the painting process.
6- The efficiency and effectiveness of the overall painting process.

Industrial Automation is widely used in all aspects of industry even the aviation industry, because the huge demand for the air transport services is now booming according to ICAO.
Chapter one

Introduction

So the quick and high quality will directly affect the airline situation, and the adopt and implement new technique like automation on some activities like handling passengers and their luggage, or more over automate the painting hanger which we will talk about.

1.2 Background

Most commonly, the automated painting process already start in the automobile industry, but actually in the aviation industry established in early eightieth according to Boing and recently followed by the European Airbus. SAFAT establish the painting workshop since 2005 and they are doing well, but they want to bring the modern automation technologies to the painting workshop.

1.3 Problem Statement

Aircraft manufacturers require extreme accuracy and repeatability when painting airplanes. One key aspect of the paint hangar upgrade and automation was the Collision Avoidance System (proximity system). For greatest efficiency, painters must quickly get very close to the aircraft.

Also there is a very curtail problem face the MRO’s from the International Civil Aviation organization and standards and recommended practices that to ensure the safety of the painting hanger and personnel’s, the consequences and implications of associating with paints and aircrafts during paintings to both the environment and people who are work within or nearby.

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Table 1 ICAO Air transport demand
1.4 Proposed Solution

The proposed solution is to design an automated painting system with a PLC control system which has the ability to do the painting activities in the optimum manner to ensure the quality, cost effective, less time more than the human paint labors.

1.5 Objectives

The objective of this research is to provide an optimized solution for the problems of painting hanger in the following aspects:

- Safety problem for the people working with in painting activities.
- Use of automation techniques (PLC) to develop an automated paint hanger.
- High accuracy in the painting process.
- Cost effectiveness resulting of economical use of paint materials and time spent in the painting process.
- The environmental effect of using the automated painting process and how the side effect can be considered in the design of the PLC to operate a suitable fumes exhaust system.

1.6 Methodology

Automation System in divided into two part (Holding arm & spray plates congaing two spray guns)

The produce:

Due to the un symmetrical shape of the air craft, during painting process the proximity sensor send control signal to the holding arm to keep the pre-described distance between the painting plates the aircraft body to ensure the quality of the painting process forward or backward. The spray guns in the spray plate will not be energized unless the object detect there is a part of the aircraft then the spray plates moves up, down, right, and left. Also there a signal sent to the sucking fan to relive the entire hanger from fumes and heat.
1.7 Research plan

This research aim to design to automated painting hanger using the PLC to control the movement of the spray plates and holding arm plus control the spraying function itself.

This research will contain six chapters as follows:

**Chapter one** Introduction which explain the problem statement along with the proposed solution and the objectives of the research

**Chapter two** Literature review highlight the main parts of the system and shows the previous systems Painting process

**Chapter three** industrial automation and principle of the system PLC.

**Chapter four the case study** Mechatronics System Design.

**Chapter Conclusion, recommendation** summarized the work done in the thesis and suggests several recommendation for future work.