Reliability determination of ignition system of rocket platform using reliability block diagram and FMEA analysis

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Abstract. This paper presents reliability determination of ignition system using the reliability block diagram and also, Failure Mode and Effect Analysis of ignition system is performed. This system is based on PLC controller to control the sequence of operation and electrical devices have a function to connect and disconnect the electrical circuit for supplying electric power for igniting the rocket. According to the complexity system, sometimes found that out of function such as misfire and hang fire. In this investigation, reliability block diagram of the ignition system include mechanical and electrical mechanisms is determined. By considering reliability of each component based on history of using, maintenance record, test report, and expert opinion and using ignition system reliability block diagram, reliability of ignition system can is determined. Moreover, since connector is the most important parts of ignition system by the highest RPN number. Hence, these parts must have a high reliability and have to more preventive maintenance and replace the new one after found the defect.

Keywords: Ignition system; Reliability block diagram, FMEA analysis.

1. Introduction

The ignition system is shown as Fig. 1 use for a rocket platform that is installed at Military vehicle laboratory in The Defence Technology Institute (Thailand). The half-scale rocket platform as shown in Fig. 2 consists of the turning mechanism, elevating mechanism, cradle, rocket pod, aiming system, and ignition system. The half-scale rocket platform has developed in laboratory and still improve the ignition system. The method have applied to develop the ignition system using failure mode and effect analysis and reliability block diagram to determine reliability of the ignition system.

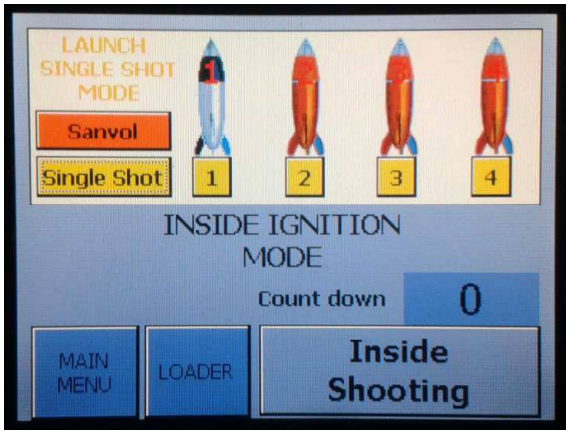

Fig. 1 Ignition system.

Fig. 2 Rocket platform.

Failure Mode and Effect Analysis: FMEA has been applied to use in various processes such as a product design process has been used this technique to design and develop the electric wire [1]. The process of reducing waste used it in producing water piping of the radiator in the car