

## DEVELOPMENT OF LIGHTNING PROTECTION DESIGN USING METHODS QUALITY CONTROL CIRCLE (QCC) IN THE COAL MINING INDUSTRY

SILVESTER EKA JEMALI<sup>1</sup>, ERRY RIMAWAN<sup>2</sup> & ANTONIUS SETYADI<sup>3</sup>

<sup>1,2</sup>Magister Industrial Engineering Program, Mercu Buana University, Jakarta, Indonesia

<sup>3</sup>Magister Management Program, Mercu Buana University, Jakarta, Indonesia

### ABSTRACT

*In the current era, there are still many business ventures in the world whose production and distribution processes are affected by the impact of natural phenomena and climate change. A natural phenomenon that is often found in tropical regions is lightning. Indonesia, which has 17,504 islands separated by the sea, is crossed by the Pacific Ring of Fire and the Alpide Belt with 200 days of thunder so that Indonesia is included in the category of countries that are vulnerable to lightning strikes. Companies engaged in coal mining business services in Indonesia such as PT XYZ from 2013 - February 2018 experienced 10 cases with a total loss due to lightning strikes reaching 6 billion Rupiah and at risk of multiple fatality which caused death to one or several employees. In anticipating the phenomenon of lightning strikes, PT XYZ used lightning protection until there were 3 designs, but there were still several cases of lightning strikes that caused losses. The use of the lightning protection becomes part of the framework of implementing Law No. 1 of 1970 concerning work safety and the Regulation of the Minister of Manpower of the Republic of Indonesia Number: PER / 02.MEN / 1989 concerning supervision of the installation of lightning dealers and the achievement of production and protection of company assets. Related to this, design research is needed using the 8-step Quality Control Circle (QCC) method. After developing the design of the lightning protection, no damage was found due to direct lightning strikes until the end of 2019*

**KEYWORDS:** *Lightning, Lightning Protection, Design and QCC*

**Received:** Jun 09, 2020; **Accepted:** Jun 29, 2020; **Published:** Jun 30, 2020; **Paper Id.:** IJMPERDJUN2020335