ABSTRACT

The monitoring system uses a Bridge Structural Health Monitoring System (SHMS), which is a small device installed in a large-scale network to carry out sensing, computing and communication. The aim of SHMS is to identify the age of bridge structures, as well as monitor the influence of environmental conditions and the impact of heavy vehicles. SHMS can improve public safety and reduce maintenance and operational costs. The manufacture of SHMS only focuses on sensor components, it does not contain a casing to protect the sensor and there is no casing on the market. The purpose of using the casing itself is to protect the sensor from factors that affect sensor performance. This research aims to design a casing design with dimensions and sizes that suit sensor needs, material selection and structural strength analysis. In this study, the analytical method used is Finite Element Analysis (FEA), which is a numerical method used to solve various problems in structural and fluid mechanics. In its application, FEA uses a finite element approach to model physical systems. FEA is divided into four main stages, namely preprocessing, solving, postprocessing, and validation. This research produces a casing design by considering sensor dimensions, materials, and structural strength analysis using Finite Element Analysis (FEA). The results show a safe design with a maximum Von Mises stress of 27.87 MPa which does not exceed the yield strength of the material and a maximum deformation of 0.6234 mm, which is a safe value because it does not damage the sensor parts. The casing safety factor was found to be 2,526 MPa, meeting the minimum limit of 1.25, which is included in the safe category. From the results of the design and structural strength, a prototype is made to verify and ensure that the design aspects have been implemented correctly and are ready for use.

Keywords*: *Wireless Sensor Network* (WSN), *Casing, Finite Element Analysis (FEA)