ABSTRACT

One of the transportation infrastructure that has an important role as a liaison between regions is a bridge. But currently there is still a lot of damage, one of the contributing factors is due to the load of vehicles passed beyond the maximum limit. This supervision can be done by implementing technology in the form of the use of Wireless Sensor Network (WSN), which is a small embedded device installed on a large-scale network to carry out sensing, computing and communication. One of them is SunSPOT (Small Programmable Object), which can detect structural vibrations, and analyze their health condition. The WSN implementation is carried out on road stud casings mounted on the road to protect the sensor from vehicle loads, rain and other environmental conditions. The development of this casing is carried out in terms of casing design and material by maintaining performance on the sensor, not blocking the signal, and being able to withstand loads. So that the condition of the bridge can be known in real time and supervision can be more easily carried out. Material simulations were carried out using Ansys R1 2023 student software. This study uses Finite Element Method (FEM) to determine and calculate design strength based on voltage, deformation, and safety factor. From the simulation results, it was found that the maximum voltage von mises was 196.33 MPa where this result did not exceed the yield strength value of Aluminum 6061-T6 material, which was 276 MPa with a given load limit of 20 tons or 200000 N. The total deformation obtained was 0.1235 mm. By using safety factor theory , the value obtained is 1.3. This value is safe because the safety factor value can be said to be safe if it has a minimum value of 1.25 or more than 1 based on the type of loading and safety number standards.

Keywords — Wireless Sensor Network, WSN Casing, Finite Element Method