Finite Element Analysis on Robotic Arm for Waste Management Application

ZOL BAHRI Razali1,a* and NURUL ATIKAH Datu Derin2,b
[1]Faculty of Eng. Technology, UniMAP UniCITI Campus, 02100 Padang Besar, PERLIS, MALAYSIA
[2]School of Mechatronics Eng. UniMAP Pauh Putra Campus, 02600 Arau PERLIS, MALAYSIA
[a,]*zolbahri@unimap.edu.my, [b]dd_nurulatikah@yahoo.com

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Abstract. Articulated robotic arm is used for handling and separating waste in waste management facility. In the proses of designing the robotic arm, an analysis such as simulation of finite element analysis would very helpful in the early stage of the design. The result of the analysis will show the strength or weakness of the design before the stage of redesign and fabrication. This project focuses on thorough analysis on the design project of robotic arm for waste management application. The CAD software, SolidWorks is used to model the detail design of the robotic arm, and to simulate the motion of the device. The analysis included force analysis on the structure of the robotic arm and motion simulation on the robotic arm. The robotic arm used four servomotors for overall operation; three for its joints, and one for the gripping mechanism. The gripper was designed and fabricated using aluminium sheet due to the high strength-to-density ratio of the material. Based on the results, a better design of robotic arm with different gripping mechanism is proposed. The difference between two designs is clearly brought a large development where the ability of the robotic arm to lift up a larger weight of object is considered as a success. The method and materials of the project is detailed in the paper.