

ABSTRACT

*The agricultural sprayer drone industry has been rapidly growing in response to the increasing demand for modernization and work efficiency. However, the assembly and quality control (QC) processes still face challenges such as long processing times, repetitive movements, and potential operator fatigue. This study aims to design and analyze a turn and lift fixture as an assembly and QC support tool for sprayer drone products. The research method involved developing a 3D design using CAD software and conducting structural analysis through the Finite Element Analysis (FEA) method to evaluate the strength and safety of the design. The analysis results show that the lifting structure at its lowest position experienced the most critical condition, with a maximum Von Mises stress of **76,49 MPa**, a maximum deformation of **0,80016 mm**, and a minimum safety factor of **3,26**. For the rail support component, the maximum Von Mises stress was **32,86 MPa**, the maximum deformation was **0,266 mm**, and the minimum safety factor was **7,60**. These values indicate that the fixture design is safe and meets the required strength standards. Furthermore, the implementation of this fixture contributes to improving positioning efficiency, reducing repetitive movements, and saving time. Therefore, the designed turn and lift fixture is considered feasible for use and has the potential to support productivity improvements in the sprayer drone manufacturing industry.*

Keywords: *Design, Fixture, FEA, Sprayer drone*

INTISARI

Industri *sprayer drone* di sektor pertanian berkembang pesat seiring kebutuhan modernisasi dan efisiensi kerja. Namun, proses *assembly* dan *quality control* (QC) masih menghadapi kendala berupa waktu yang lama, gerakan berulang, serta potensi kelelahan operator. Penelitian ini bertujuan merancang dan menganalisis *turn and lift fixture* sebagai alat bantu *assembly* dan QC produk *sprayer drone*. Metode penelitian meliputi perancangan desain 3D menggunakan perangkat lunak CAD dan analisis struktur dengan metode *Finite Element Analysis* (FEA) untuk mengevaluasi kekuatan serta keamanan desain. Hasil analisis struktur *lifting* pada posisi terendah memperoleh nilai yang paling tinggi dengan nilai tegangan *Von Mises* maksimum sebesar 76,49 MPa, *deformation* maksimum 0,80016 mm, dan nilai *safety factor* minimum 3,26. Sedangkan pada komponen *rail support* diperoleh nilai tegangan *Von Mises* maksimum sebesar 32,86 MPa, *deformation* maksimum 0,266 mm, dan *safety factor* minimum 7,60. Nilai tersebut menunjukkan bahwa rancangan *fixture* berada pada kondisi aman dan memenuhi standar kekuatan yang dipersyaratkan. Selain itu, penggunaan *fixture* ini memberikan kontribusi pada peningkatan efisiensi pemosisian, mengurangi gerakan berulang, serta menghemat waktu. Dengan demikian, *turn and lift fixture* yang dirancang dinilai layak untuk digunakan dan berpotensi mendukung peningkatan produktivitas dalam industri manufaktur *sprayer drone*.

Kata Kunci: Perancangan, *Fixture*, FEA, *Sprayer Drone*.