

## INTISARI

Sepeda diinovasikan agar menjadi alat transportasi ramah lingkungan yang mampu beroperasi di lokasi ekstrem serta dapat menjadi kendaraan militer. Untuk meningkatkan kapabilitas alat, maka sepeda dilengkapi listrik sehingga dapat menjadi kendaraan cepat. Dengan demikian, dilakukan perancangan *frame* yang mampu memenuhi kebutuhan tersebut, dimana *frame* harus tangguh dan dapat memuat komponen listrik.

Jenis sepeda yang diacu adalah sepeda gunung (MTB). Gambar 3D dibuat menggunakan software Autodesk Inventor Professional 2013 dan dianalisis kekuatannya berdasarkan metode elemen hingga. Pembebanan diberlakukan secara statis dengan berat pengendara utuh dikenai pada *seatpost*. Desain *frame* yang dihasilkan juga dipertimbangkan dari segi ergonomi.

Desain dinyatakan aman setelah mencapai faktor keamanan minimal 2,01 dengan beban maksimal seorang pengendara 120 kg, ditambah komponen listrik 10 kg. Bahan yang dipilih, yaitu paduan aluminium 6061-T6 agar tetap ringan namun kuat. *Frame* dibentuk dari potongan jenis ketebalan plat berbeda yang dihasilkan melalui proses *milling*, bubut, dan *bending*, kemudian disatukan menggunakan pengelasan GTAW.

**Kata kunci:** transportasi, sepeda listrik, *mountain bike*, desain, *stress analysis*, las GTAW.

## ABSTRACT

Bicycle is innovated in order to become an eco-friendly vehicle which qualified on extreme area and for military purpose. To improve its capability, bike is equipped with electricity so it can run faster. Design of frame therefore is made to meet that needs, which are frame supposed to be tough and has room for electric component.

Bicycle type is mountain bike (MTB). The 3D drawing was made using Autodesk Inventor Professional 2013 and analyzed based on Finite Element Method (FEM). Static load was applied by putting the whole rider weight on seatpost. Design had already considered from ergonomic value.

The design was claimed safe under condition of minimum safety factor achieved 2,01 when frame had been maximum loaded with a 120 kg rider, plus 10 kg of electric component. Aluminium alloy 6061-T6 was selected as frame material to keep it light but strong. Frame was produced from many pieces of different plate thickness, which were formed by milling, turning, and bending processes, then joined by GTAW.

**Keywords:** transportation, electric bike, mountain bike, design, stress analysis, GTAW.