

ABSTRAK

Dengan semakin tinggi penggunaan baterai litium ion (LIB) maka semakin tinggi pula jumlah limbah baterai, yang merupakan tergolong limbah B3 (Bahan Berbahaya dan Beracun). Daur ulang baterai litium ion perlu dilakukan untuk mengurangi limbah B3. Proses daur ulang baterai dapat dilakukan dengan beberapa tahapan dimulai dengan mengosongkan baterai (*discharging*), pembongkaran baterai (*dismantling*), penghancuran baterai (*crushing*), pengambilan litium (*mining*), dan pemurnian litium (*purification litium*). Tujuan dari penelitian adalah merancang dan membuat mesin pemisah magnetik untuk membantu proses pengambilan litium (*mining*).

Metodologi yang dilakukan dalam merancang mesin pemisah magnetik ini dilakukan dengan beberapa proses. Proses awal perancangan mesin pemisah magnetik beserta perhitungan kekuatan komponennya, dilanjutkan pembuatan desain rancangan 3 dimensi menggunakan *software* CAD. Berikutnya desain mesin pemisah magnetik dianalisa menggunakan *software* FEA untuk dianalisa tegangan *Von Misses Stress*, *Deformation*, dan *Maximum Shear Stress*.

Dari penelitian ini didapatkan rancangan mesin pemisah magnetik hasil pencacahan baterai litium. Analisa kekuatan rangka mesin pemisah magnetik ini diketahui. Pada *frame hollow* terjadi tegangan *von mises* sebesar 0,09 MPa, deformasi $1,58e-8$ m, dan *maimum shear stress* 0,0048 MPa. Pada *frame UNP* terjadi tegangan *von mises* sebesar 0,48 MPa, deformasi $2,77e-6$ m, dan *maximum shear stress* 0,27 MPa.

Kata Kunci : Perancangan, Pemisah, Baterai, Magnetik, dan Baterai Litium Ion.

ABSTRACT

The use of lithium ion battery for different applications such as electric cars and electric motor cycle were increased rapidly in the recent decades. This condition create the waste of lithium ion battery due to the leak or damage during the use also increased. In the other hand, the battery waste were classified as B3 (Hazardous and Toxic Materials). Lithium ion battery recycling needs to be done to reduce B3 waste. The battery recycling process can be carried out in several stages starting with emptying the battery (discharging), dismantling the battery (dismantling), destroying the battery (crushing), taking lithium (mining), and purification of lithium (purification lithium). This research purpose is to design and manufacture a magnetic separator machine is made to assist the process of taking lithium (mining).

The step by step works that used in the present study are described as follow: the initial process of designing a magnetic separator and calculating the strength of its components, continued with the creation of a 3-dimensional design using the CAD software. Next, the design of the magnetic separator was analyzed using the FEA software to analyze the Von Misses Stress, Deformation, and Maximum Shear Stress.

The results from the present study showed that the analysis of the strength of the frame of this magnetic separator machine is known. In the hollow frame, there is a von Mises stress of 0.09 MPa, a deformation of 1.58×10^{-8} m, and a maximum shear stress of 0.0048 MPa. In the UNP frame, the von Mises stress is 0.48 MPa, the deformation is 2.77×10^{-6} m, and the maximum shear stress is 0.27 MPa.

Keywords: Design, Separator, Battery, Magnetic, and Lithium Ion Battery.