ABSTRACT

The main purpose of bamboo splitter machine development is to improve the efficiency and productivity of bamboo lamination industries. Bamboo splitter machine has several part,, one of them is bamboo's pusher mechanism. The main function of bamboo's pusher mechanism is pushing the spesimen to move toward the blade. The pusher development process is using reverse engineering method. This method use existing component as base of the development. Furthermore, the pusher's analysis is doing by take into material consideration based on simplicity of machining process and also the wearing rate. The wearing rate of each material come from the testing with Ogoshi method. Meanwhile, the calculation of mechanical loads count by using moment distribution (Cross method) and also do CAE simulation on Solidwork. The final output is a design that consist of 16 kind component and devided by two classification, custom component and standart part component. The recommendation for custom component material is using ASTM A36. This steel is machinable and also has wearing rate on 206,2 mm^2/working hour. Meanwhile, the recommendation for standart part component especialy slider is using Nachi's bearing that has wearing rate on 143,1 mm^2/working hour. The mechanical load calculation conclude that the maximum value of bending momen diagram is 705 kgmm to the left (CCW) at toehold E, and then the maximum value for the shear force diagram is 16 kg at toehold E positive. The bamboo's pusher load simulation using Solidwork program based on the actual load when the machine is operated conclude that it has maxmimum value of tensile stress on 5.6305 MPa with yield strength equal to 250 MPa. For the strain and displacement each has maximum value on 0.000020 mm and 0,003119 mm and the entire model of bamboo's pusher design has factor of safety value on 44,4. Based on every parameters that already count and being simulated before, it can be concluded that the design of the bamboo's pusher is very safe to produce.

Keywords : bamboo's pusher, reverse engineering, wearing test, Ogoshi, Cross, stress distribution

INTISARI

Pengembangan mesin pembilah bambu ditujukan untuk meningkatkan efisiensi dan produktivitas industri bambu laminasi. Pada mesin pembilah bambu terdapat beberapa bagian, salah satunya adalah mekanisme pendorong bambu. Pendorong bambu berfungsi untuk mendorong spesimen mendekati pisau (*blade*). Proses perancangan pendorong menggunakan metode *reverse engineering.* Metode ini menggunakan komponen *existing* sebagai dasar dalam perancangan. Proses analisa dilakukan dengan mempertimbangkan material berdasarkan kemudahan dalam *machining* dan laju keausan. Laju keausan didapat dari pengujian dengan metode *Ogoshi.* Perhitungan pembebanan mekanik dilakukan menggunakan metode *Cross* dan juga simulasi CAE pada Solidwork. Perancangan pendorong menghasilkan rancangan yang terdiri atas 16 jenis komponen dan terbagi dalam dua jenis yaitu *custom* dan *standart part.* Komponen *custom* direkomendasikan menggunakan baja *ASTM A36* yang mudah dilakukan proses *machining* dan memiliki laju keausan sebesar 206,2 mm^2/*working hour*, sementara itu untuk *standart part* terutama komponen *slider* digunakan merek Nachi yang memiliki laju keausan 143,1 mm^2/*working hour*. Untuk hasil perhitungan struktur mekanik menghasilkan nilai *bending moment diagram* maksimum berada pada tumpuan E sebesar 705 *kgmm* berlawanan dengan arah jarum jam, dan nilai *shear force diagram* sebesar 16 kg pada tumpuan E positif. Hasil dari simulasi pembebanan dengan *software* Solidwork berdasar beban aktual yang terjadi ketika mesin dioperasikan menyimpulkan bahwa pendorong akan mengalami tegangan maksimum sebesar 5.6305 *MPa* dengan *yield strength* sebesar 250 *MPa*, sementara regangan maksimum yang terjadi adalah 0.000020 *mm* dengan defleksi maksimum sebesar 0.003119 *mm*. Total rancangan pendorong memiliki *safety factor* sebesar 44,4. Berdasarkan parameter yang telah dihitung dan disimulasikan maka dapat disimpulkan bahwa rancangan pendorong sangat aman untuk diproduksi.

Kata kunci: pendorong bambu, *reverse engineering, wear test ,Ogoshi*, metode *Cross, stress distribution*