ABSTRAK

REDESAIN *ROTARY SHAFT* MESIN *MULTI SPINDLE WHEEL NUTRUNNER* MENGGUNAKAN METODE *HOUSE OF QUALITY* (HOQ) DAN *FINITE ELEMENT METHOD* (FEM)

Muhammad Baharuddin Wahid T.

H1E017031

Abstrak- PT XYZ merupakan perusahaan *engineering to order* yang membuat mesin *multi spindle wheel nutrunner* sebagai alat pemasang roda mobil di PT ABC. Berdasarkan observasi, mesin tersebut mengalami kerusakan disebabkan karena *rotary shaft* yang berperan menyangga mesin mengalami beban berlebih berupa tegangan tekan dan tegangan puntir ketika beroperasi. Kesalahan perancangan mengakibatkan desain *rotary shaft* tidak mampu menerima gaya-gaya yang bekerja. Dampaknya operasional PT ABC mengalami kerugian dan berbahaya bagi operator karena dapat terjadi kecelakaan kerja. Penelitian ini bertujuan untuk melakukan redesain *rotary shaft* yang memenuhi kualitas berdasarkan kebutuhan pelanggan menggunakan metode *House of Quality* (HOQ) dan *Finite Element Method* (FEM) digunakan untuk mengetahui pengujian hasil redesain *rotary shaft* ketika menerima pembebanan. Penelitian dilakukan menggunakan data kualitatif yang berasal dari wawancara, dokumentasi, dan kuesioner. Kuesioner disebarkan kepada 5 orang responden ahli yang memahami kebutuhan pelanggan dan *rotary shaft*. Perancangan redesain *rotary shaft* dan pengujian hasil redesain dilakukan dengan alat bantu *software Solidworks*. Hasil pengolahan data menggunakan HOQ, didapatkan 2 model redesain *rotary shaft*. Pengujian kedua model redesain dengan FEM menghasilkan nilai *von mises stress* model redesain 1 sebesar 277,5 MPa dan model redesain 2 sebesar 111,8 MPa keduanya masih di bawah batas maksimal tegangan luluh (*yield strength*) material yaitu 470 MPa. Hasil pengujian *safety factor* model redesain 1 bernilai 1,7 dan model redesain 2 bernilai 4,2 sedangkan batas minimal nilai *safety factor* yaitu 2,1. Berdasarkan hasil tersebut maka model redesain 2 terpilih sebagai rancangan redesain untuk *rotary shaft* yang memenuhi kebutuhan pelanggan dan aman untuk dioperasikan.

Kata kunci: Redesain, *House of Quality*, *Finite Element Method*, *Solidworks*

ABSTRACT

***REDESIGN OF ROTARY SHAFT MULTI SPINDLE WHEEL NUTRUNNER MACHINE USING HOUSE OF QUALITY (HOQ) METHOD AND FINITE ELEMENT METHOD* (FEM)**

Muhammad Baharudin Wahid T.

H1E017031

Abstract- *PT XYZ is an engineering to order company that makes multi spindle wheel nutrunner machines as a car wheel fitting tool at PT ABC. Based on observations, the machine was damaged because the rotary shaft which plays a role in supporting the engine experiences excessive loads in the form of compressive stress and torsional stress when operating. Design errors resulted in the design of the rotary shaft not being able to accept the working forces. As a result, PT ABC's operations suffer losses and are dangerous for operators because work accidents can occur. This study aims to redesign rotary shafts that meet quality based on customer needs using House of Quality (HOQ) methods and Finite Element Method (FEM) used to determine the results of redesigning rotary shaft tests when receiving loading. The research was conducted using qualitative data derived from interviews, documentation, and questionnaires. Questionnaires were distributed to 5 expert respondents or experts who understand customers and rotary shaft nutrunner multi-spindle wheel machines. The design of the rotary shaft redesign and testing of the results of the redesign was carried out using the Solidworks software tool. The results of data processing using the HOQ obtained 2 rotary shaft redesign models. Testing the two redesigned models with FEM yielded a von Mises stress value for redesigned model 1 of 277.5 MPa and redesigned model 2 of 111.8 MPa, both of which were still below the maximum material yield strength limit of 470 MPa. The results of the safety factor test for redesign model 1 are 1.7 and redesign model 2 is 4.2 while the minimum safety factor value is 2.1. Based on the test results, the redesigned model 2 was chosen as the redesigned design for the rotary shaft which can meet customer needs and is safe to operate.*

Keywords:*Redesign, House of Quality, Finite Element Method, Solidworks*