

ABSTRAK

Nama Mahasiswa : Rahmat Agung Satria
NPM : 062330200340
Jurusan : Teknik Mesin
Program Studi : Diploma Teknik Mesin
Judul Laporan Akhir : Rancang Bangun Alat Bantu Produksi Perhiasan
(Proses Pengujian)

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Laporan ini membahas rancang bangun alat bantu produksi perhiasan berupa mesin Two High Rolling Mill yang dirancang untuk meningkatkan efektivitas dan efisiensi proses penggilisan perak. Perancangan mesin dilakukan sebagai upaya membantu proses produksi perhiasan agar dapat menghasilkan ukuran material yang lebih seragam, mengurangi ketergantungan terhadap proses manual, serta meningkatkan produktivitas kerja. Metode yang digunakan dalam penelitian ini meliputi studi literatur, perancangan mesin, pemilihan komponen, perhitungan teknik, proses pembuatan, perakitan, serta pengujian kinerja mesin. Mesin yang dirancang menggunakan motor listrik berdaya 1 HP dengan putaran 1440 rpm, gearbox tipe WPA dengan rasio 1:40, sistem transmisi menggunakan rantai dan sproket, roll penggilis berdiameter 56 mm, serta rangka utama yang dibuat menggunakan material baja hollow. Berdasarkan hasil perhitungan, kebutuhan daya mesin sebesar 0,024 kW dengan kebutuhan torsi minimum sebesar 0,178 N.m. Sementara itu, motor listrik mampu menghasilkan torsi sebesar 9,6 N.m sehingga secara teoritis mampu memenuhi kebutuhan pengoperasian mesin. Hasil pengujian menunjukkan bahwa mesin dapat melakukan proses penggilisan perak dengan baik pada variasi reduksi ketebalan 0,2 mm hingga 1,0 mm dalam satu kali lintasan. Pada reduksi 1,2 mm, mesin mengalami penurunan kinerja karena kebutuhan torsi meningkat sehingga motor tidak mampu memutar roll secara optimal. Hasil pengujian juga menunjukkan bahwa semakin besar reduksi ketebalan, semakin besar pertambahan panjang benda kerja akibat deformasi plastis selama proses pengerolan. Berdasarkan hasil penelitian, mesin dinyatakan mampu bekerja secara optimal hingga reduksi 1,0 mm. Reduksi yang direkomendasikan adalah 0,5–0,6 mm per lintasan untuk menjaga kestabilan operasi, keamanan komponen, serta memperoleh hasil penggilisan perak yang baik dan seragam.

Kata Kunci: Two High Rolling Mill, perhiasan, reduksi ketebalan, Pengujian, perancangan

ABSTRACT

Desain of Apar Pin seal production Equipment

(Making Process)

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Rahmamat Agung Satria

NPM. 062330200340

DIPLOMA THERE MECHANICAL ENGINEERING STUDY PROGRAM

MECHANICAL ENGINEERING DEPARTMENT

STATE POLYTECHNIC OF SRIWIJAYA

This report discusses the design and development of a supporting tool for jewelry production in the form of a Two High Rolling Mill machine, which is designed to improve the effectiveness and efficiency of the silver rolling process. The machine was developed to assist jewelry production by producing more uniform material dimensions, reducing dependence on manual processes, and increasing work productivity. The research methods used in this study include literature review, machine design, component selection, engineering calculations, manufacturing, assembly, and machine performance testing. The designed machine uses a 1 HP electric motor with a rotational speed of 1440 rpm, a WPA-type gearbox with a 1:40 reduction ratio, a chain and sprocket transmission system, 56 mm diameter rolling rolls, and a main frame constructed from hollow steel. Based on the calculation results, the required machine power is 0.024 kW, with a minimum torque requirement of 0.178 N.m. Meanwhile, the electric motor is capable of producing 9.6 N.m of torque, indicating that it is theoretically sufficient to meet the machine's operating requirements. The test results show that the machine can perform the silver rolling process effectively at thickness reductions ranging from 0.2 mm to 1.0 mm in a single pass. At a reduction of 1.2 mm, the machine performance decreased because the required torque increased, causing the motor to be unable to rotate the rolls optimally. The test results also indicate that a greater thickness reduction results in a greater increase in workpiece length due to plastic deformation during the rolling process. Based on the research results, the machine is considered capable of operating optimally at a maximum reduction of 1.0 mm. A recommended reduction of 0.5–0.6 mm per pass is suggested to maintain operational stability, component safety, and good and uniform silver rolling results.

Keywords : Two High Rolling Mill, jewelry, thickness reduction, Testing, design