

DESIGN OF JIG USED TO HOLD BALL VALVES FOR SURFACE POLISHING

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ABSTRACT

Tanjung Maintenance Sdn Bhd is one of the native companies that produced maintenance service for heavy industry equipment. Among maintenance services in Tanjung Maintenance Sdn Bhd are ball valve polishing, valve seat lapping process, hydro test and many more. Tanjung maintenance firm they were still using traditional method for polishing process. The old method is risky to the workers and it limited to certain ball, which are not suitable for large and too small ball. The old method using expelled steel to grip the ball and the lathe machines as the medium rotation of the ball. Since from the problem, a recommendation had been made to design a special jig that flexible to grip a different sizes of ball and construct the technique more users friendly to the human resources especially workers. A detail revision and analysis on traditional technique has been done. It is important to develop an assistive jig, which is that have fully criterion to work out the problem. Hopefully the concepts that have been generated can diminish an accident to the workers and can reduce the cost of polishing process..

ABSTRAK

Tanjung Maintenance Sdn Bhd merupakan salah satu syarikat bumiputera yang memberikan perkhidmatan penyelenggaraan alatan industri berat. Antara perkhidmatan selenggaraan yang ada di Tanjung Maintenance ialah proses mengilap bola injap, mengilap injap duduk ,ujian kebocoran dan pelbagai perkhidmatan penyelenggaraan . Kaedah mengkilap bola injap yang dilakukan di Tanjung Maintenance masih menggunakan kaedah yang lama. Ia menggunakan batang besi terbuang untuk memegang bola dan menggunakan mesin pelarik sebagai medium untuk memegang dan memutar bola. Kaedah ini adalah berisiko tinggi kepada pekerja dan ia terhad untuk saiz-saiz bola yang tertentu sahaja. Dalam menyelesaikan masalah ini ,satu cadangan telah diusulkan untuk mereka satu alat yang yang lebih selamat semasa melakukan proses mengkilap bola ini .Alat yang direka bentuk akan menekankan aspek dari segi keanjalan alat ini untuk memegang pelbagai saiz injap dan dari aspek keselamatan. Kajian terperinci dan analisis akan dijalankan dalam usaha membangunkan alat ini demi memastikan konsep yang dipilih adalah tepat. Ini penting dalam memastikan alat yang direka mempunyai ciri-ciri yang dapat mengurangkan risiko kemalangan semasa dan secara tidak langsung dapat mengurangkan kos proses mengkilap injap bola.

TABLE OF CONTENT

CHAPTER	ITEM	PAGE
	CONFESSION	i
	ACKNOWLEDGEMENT	ii
	ABSTRACT	iii
	ABSTRAK	iv
	TABLE OF CONTENT	v
	LIST OF TABLE	ix
	LIST OF FIGURE	x
	LIST OF SYMBOLS	xiv
	LIST OF ABBREVIATIONS	xv
	LIST OF APPENDIXES	xvi
I	INTRODUCTION	1
	1.1 Problem Statement	3
	1.2 Objective of Study	4
	1.3 Scopes	4
II	LITERATURE REVIEW	5
	2.1 Valves Definition	5
	2.2 Valve parts	6
	2.2.1 Ports	7
	2.2.2 Discs and rotor	7
	2.2.3 Seat	8

CHAPTER	ITEM	PAGE
	2.3	Types of the ball valves 8
	2.3.1	RA series 8
	2.3.2	Characteristic of RA series 9
	2.3.3	Series R 9
	2.3.4	The characteristic of R 10
	2.4	Traditional Polishing method 11
	2.5	Computer-aided design (CAD) 13
	2.5.1	Solid work 13
	2.5.2	Solid work Cosmo 14
	2.6	Stress 15
	2.6.1	Bending 16
	2.7	Yield stress 17
	2.8	Tapered roller bearing 19
III	METHODOLOGY	22
	3.1	Design Flow Process 22
	3.2	Formulating Process 23
	3.3	Concept Design 25
	3.3.1	Clarify Function 26
	3.3.2	Generate Alternative concepts 27
	3.3.3	Analyzing alternative concepts 27
	3.3.4	Evaluating alternatives concepts 28
	3.3.5	Best Concept 28
IV	CONCEPTS DESIGN	29
	4.1	Design specifications and requirements 30
	4.1.1	Problem faced during polishing Process 31
	4.1.2	Most customers needs list (Requirement and specifications) 31

CHAPTER	ITEM	PAGE
	4.2	Concepts generations 31
	4.2.1	First Concept 32
	4.2.2	Second Concept 34
	4.2.3	Third Concept 35
	4.3	Concept sketch 34
	4.4	Concepts selections 37
	4.4.1	Weighed rating method 37
	4.4.2	Final concepts selections 38
	4.4.3	Concepts Evaluate 38
V	DESIGN	40
	5.1	Design configuration 41
	5.1.1	Rotation and Sliding Mechanism 41
	5.1.2	Joining mechanism 44
	5.2	Material selections 49
	5.3	Design Specifications 50
	5.3.1	Product Specification 50
	5.3.2	Product Features 51
VI	DETAIL DESIGN	52
	6.1	Part Detail 53
	6.2	Assembly drawing 61
	6.3	Disassembly Drawing 62
	6.4	Bill of material 64
	6.5	Detail Design Process Flow 65

CHAPTER	ITEM	PAGE
VII	STRUCTURAL ANALYSIS	66
	7.1 Structural analysis by using theoretical	67
	7.1.1 Calculations analysis (Horizontal)	68
	7.1.2 Theoretical analysis of jig in Vertical position	70
	7.1.3 Calculations analysis (Vertical)	71
	7.2 Bearing selection using cosmos	72
	7.3 Structural Analysis	73
	7.3.1 Procedure in structural analysis	73
	7.4 Structural analysis	78
	7.4.1 Structures analysis for the Horizontal boom length 395×10^{-3}	78
	7.4.2 Structures analysis of the Horizontal boom	81
	7.5 Result Analysis	85
	7.5.1 Analysis of boom in horizontal Position	85
	7.5.2 Analysis of boom in vertical position	86
	7.6 Design for safety and environments	87
VII	CONCLUSION AND SUGGESTION FOR FUTHER STUDY	88
	8.1 Conclusion	88
	8.2 Suggestion for further study	89
	REFERENCES	90

LIST OF TABLES

TABLE NUM.	TITLE	PAGE
Table 2.3	Table of dimension sizes and weight ball series	10
Table 4.1	Product Descriptions, key business Goal and Target Markets	30
Table 4.2	Weighted Rating Method	37
Table 4.3	Rating value	37
Table 5.1	Material of each component	49
Table 5.2	Product specifications	50
Table 6.1	Standard part in the product design	60
Table 6.2	The numbers of components in jig	64
Table 7.1	Result of analysis	85

LIST OF FIGURES

FIGURE NUM.	TITLE	PAGE
Figure 2.1	Exploded view of RA series ball valves	8
Figure 2.2	Exploded view of R series	9
Figure 2.3	The Traditional polishing process	11
Figure 2.4	Polishing process with small ball valves	11
Figure 2.5	The polishing in vertical position	12
Figure 2.6	Product design by using solid work software	13
Figure 2.7	Tapered roller bearing	19
Figure 2.8	Point of roll	19
Figure 2.9	Cutaway view of a tapered roller bearing	20
Figures 3.1	Block diagram of design process (Rundolph J Egger , 2004)	22
Figure 3.2	Formulating Design Problem	24
Figure 3.3	Concept design decision making activities	25
Figure 3.4	Hierarchy structure functions	26
Figure 4.1	First concept sketches	34
Figure 4.2	Second concept sketches	35
Figure 4.3	Third concept of sketch	36

FIGURE NUM.	TITLE	PAGE
Figure 5.1	Rotating cap movement	41
Figure 5.2	Movement of second body	42
Figure 5.3	The boom that can move forward and backward	43
Figure 5.4	Joining using slot joint	44
Figure 5.5	Weld joints	45
Figure 5.6	Screw joint between horizontal block and main body	45
Figure 5.7	Screw joint (bom and connecting shaft)	46
Figure 5.8	Show joining between horizontal block and second body	47
Figure 5.9	The screw joint of main body	47
Figure 5.10	Slotted screw joint (rotating rod and boom)	48
Figure 6.1	Main body	53
Figure 6.2	Second body	54
Figure 6.3	Vertical boom	55
Figure 6.4	Horizontal boom	55
Figure 6.5	Horizontal block	56
Figure 6.6	Vertical block	56
Figure 6.7	Connection shafts vertical/ horizontal	57
Figure 6.8	Rotating cap	58
Figure 6.9	Set screw	59
Figure 6.10	Bolt	59
Figure 6.11	Bearing	59
Figure 6.12	Nut	59
Figure 6.13	Washer	59

FIGURE NUM.	TITLE	PAGE
Figure 6.14	Assembly drawing of the jig with horizontal boom	61
Figure 6.15	Assembly drawing of the jig with vertical boom	61
Figure 6.16	Dissemble drawing jig of the boom with horizontal position	62
Figure 6.17	Dissemble drawing jig of the boom with vertical position.	63
Figure 6.18	Detail Design Process Flow	65
Figure 7.1	Figure of reaction force	67
Figure 7.2	The reaction force in jig with horizontal boom	70
Figure 7.3	Calculation of the life hours using Cosmos	72
Figure 7.4	Bearing calculator	72
Figure 7.5	Product in cosmos analysis file	73
Figure 7.6	The table of material resources	74
Figure 7.7	The selection of boundary condition	75
Figure 7.8	The meshing is completely applied to the jig	76
Figure 7.9	Result of the analysis	77
Figure 7.10	The value of stress	78
Figure 7.11	The strain analysis $L=395 \times 10^{-3}$ m	79
Figure 7.12	The displacement analysis $L =395 \times 10^{-3}$ m	80
Figure 7.13	The maximum value of the stress	81
Figure 7.14	The first critical point of the jig which is at the bottom of the boom.	82

FIGURE NUM.	TITLE	PAGE
Figure 7.15	The 2nd critical point of the jig	82
Figure 7.16	Show the value of strain	83
Figure 7.17	Show the critical location of strain	84

LIST OF SYMBOLS

SYMBOL	DESCRIPTION
σ	The average stress,
F	Force acting over the area A .
M	The moment at the neutral axis
Y	The perpendicular distance to the neutral axis
I_x	The area moment of inertia about the neutral axis x
B	The width of the section being analyzed
H	The depth of the section being analyzed

LIST OF ABBREVIATION

SUBSCRIPT	DEFINITION
CAD	Computer Aided Design
OSHA	Occupational Safety and Health Act(s)
AT	Assistive Technology
ASTM	American Steel Test Material

LIST OF APPENDIXES

APPENDIX	TITLE	PAGE
A	Project Gantt Chart PSM I	93
B	Project Gantt Chart PSM II	94
C	Detail Drawing	95

CHAPTER I

INTRODUCTIONS

Oil and gas are considered among the world's most important resources. The oil and gas industry plays a critical role in driving the global economy. The processes and systems involved in producing and distributing oil and gas are highly complex, and require state-of-the-art technology.

ISO 9001:2000 certified worldwide manufacturer of severe service valves. A wide range of custom-engineered valves for high & medium pressure applications are available. Valves are designed to handle high pressure, corrosive, high temperature & erosive applications. Types of valves include pressurize safety & relief, turbine bypass, chemical, isolation, high temperature, choke, control, high pressure, safety, oil & steam valves. Applications includes oil & gas, fossil, nuclear, wellhead pressure control, firewater pump discharge, methanol injection, high-pressure letdown, boiler feed water regulators, and oil compressor for LNG fuel.

A large variety of valves is available and has many applications with sizes ranging from tiny to huge. The cost of valves ranges from very cheap simple disposable valves, and the value are very expensive especially for specialized applications. Often not realized by some, small valves are even inside some common household items including mini-pump dispenser spigots, spray devices, and some rubber bulbs for pumping air.

A valve is a device that regulates the flow of substances (gases, fluidized solids, slurries, or liquids) by opening, closing, or partially obstructing various passageways.

Valves are used in of applications including industrial, military, commercial, residential, transportation. Plumbing valves are the most obvious in everyday life. The typical problem of the ball valve is leakage. The leakage occurred because of those scratches on the ball surfaces and the scratches due to the pressure of flow or installations process. When the problems occur, the ball valves should go polishing process.

Tanjung maintenance services are one of the companies that carry out work on oil and gas industry services. At Tanjung Maintenance they have 4 sections of department which is mechanical department, fabrication department, diesel department and valves departments. Valve department is carry out work on valve maintenances witch are includes polishing process of ball valves, lapping process ,hydro test and many oil and gas industry maintenance process.

1.1 Problem Statement

Leakage can be described as an unwanted loss, or leak, of something which escapes from its proper location. The leaking can be gas, liquid, or even a solid such as a powdered or granular solid. The regular problem happens to the ball valves are the leakage inside of the ball. The leakage gave an impact to the performances of system and also gives damage to the valves and increasing maintenance cost of month.

At Tanjung Maintenance, the polishing process was conducted in a traditional way. The polishing process is done by using a special shaft to hold the ball at the lathe machines. The ball then will be tightening at chuck of the lathe machines. Once the ball has been rotated the workers will polish the ball valve by using the sand paper, which is hold by their naked hand. These procedures will continuously execute until all the scratches on the ball surface are fully disappeared.

1.2 Objective of Study

The objective of this project is to design a jig that used to hold a valve that will undergo polishing process. The jig has ability to hold the ball with different size and weight. The characteristics of the jig should have higher level of safety

1.3 Scopes

- Do some literature review and study on the valve application and their functions
- Design a jig that will attach to the turning machine
- Do some structural analysis on the design
- Come out with the design of the jig that uses to hold the ball of the valve when polishing process.
- Conduct with the design structural analysis to the jig by using COSMOS.

CHAPTER II

LITERATURE REVIEW

In order to have better understanding of this project, literature reviews have been made on several topics. The purpose of this chapter is to provide the brief of the literature review on design for safety. The first part of this chapter will be discussed on what are the valves and its definition. More over the literature study contents the characteristic of the successful products development. Structural design analysis using Cosmos .Literature study was done by using three main sources as an input to the project research which is internet, books and journal

2.1 Valves Definition

A valve is a device that regulates the flow of substances (gases, fluidized solids, slurries, or liquids) by opening, closing, or partially obstructing various passageways. Valves are technically pipe fittings, but usually are discussed separately. Valves are used in a variety of applications including industrial, military, commercial, residential, transportation. Plumbing valves are the most obvious in everyday life, but many more are used. Some valves are driven by pressure only which are mainly used for safety purposes in steam engines and domestic heating or cooking appliances. Others are used in a controlled way, like in Otto cycle engines driven by a camshaft, where they play a major role in engine cycle control.

2.2 Valve parts

The majority of the valve consists of the valve body, including most of the exterior. The valve body is the vessel or casing that holds the fluid going through inside the valve. Valve bodies are most commonly made of various metals or plastics, although valve bodies fused with glass laboratory items in one piece are also made of glass.

2.2.1 Ports

The body consists of two or more openings, called ports from which movement occurs from one opening to the next. These ports are controlled by a valve. Valves with two or three ports are the most common, while valves consisting of four or more ports are not as frequently used. Extra ports that are not needed can be closed off by the valve. Manufacturing of valves often occurs with the intent that they will be connected with another specific object. These objects can vary, but generally these include some type of piping, tubing, or pump head.

Combined with a valve, ports have the ability to act as faucets, taps, or spigots, all while one or more of its remaining ports are left unconnected. Most valves are built with some means of connection at the ports. This includes threads, compression fittings, glue or cement application (especially for plastic), flanges, or welding (for metals).