



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**DESIGN AND FABRICATE THE AUTONOMOUS  
STEAM IRON STAND**

This report is submitted in accordance with the requirement of the University Technical Malaysia Melaka (UTeM) for the Bachelor of Mechanical Engineering Technology (Maintenance) with Honours.

by

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## APPROVAL

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## ABSTRAK

Seterika stim autonomus ini berfungsi secara separa automatic. Dimulakan dengan meghidupkan soket elektrik seterika ini. Laraskan pengewapan dengan tekanan tertentu mengikut fabrik. Gantungkan baju pada pengantung seterika ini. Motor penggerak akan bergerak ke atas dan kebawah fabrik sehingga selesai menyeterika sepenuhnya. Idea rekaan seterika ini tercipta apabila pengguna di Malaysia tiada daya kekuatan untuk berdiri lama dan terdapat banyak seterika di Malaysia tetapi tiada yang pengendalian automatik. Seterika stim autonomos direka untuk mudah digunakan dengan menyambungkan semua bahagian keluli tahan karat menggunakan kimpalan gas lengai logam dan menyatakan nilai ergonomic produk menggunakan analisis RULA dan ujian tekanan kepada beberapa jenis fabrik. Keputusan tekanan, suhu, masa diambil untuk kudutan hilang dan kualiti pada lima jenis fabrik berbeza ditunjukkan dalam laporan ini. Berdasarkan dapatan keputusan, untuk seterika stim menghilangkan kudutan sangat sempurna berdasarkan ujian therma dan analisis untuk pergerakan nozel juga hampir sempurna. Motor penggerak juga bergerak dengan baik.

## **ABSTRACT**

This autonomous steam iron stand is semi- automatic function. Only switch on the plug. Adjust the steam for suitable pressure depend on the fabric. Hang the clothes at Autonomous Steam Iron Stand hanger. The motor linear actuator will move the fabric up and down until completely iron. This stand design idea created for people, especially in Malaysia for people that no enough energy to stand for a long time and to iron their clothes and there are many types of iron in Malaysia, but nothing works with autonomous. Autonomous Steam Iron Stand design for easy to use with semi- automatic when iron the clothes with fabricate all stainless steel hollow pipe parts using metal inert gas (MIG) welding and determine the iron stand ergonomic value using RULA Analysis and pressure testing analysis on several types of fabrics. The result of pressure, temperature, time taken to remove the wrinkles, and quality for 5 types of textile was show in this report. Based on all the fitting results, for this steam iron to remove the wrinkles is perfect by doing the thermal test and analysis and for the movement of this iron stand nozzle also perfect. The motor actuator pushes the nozzle with good movement.

## **DEDICATION**

To my beloved parents Mohd Bonawan Bin Siros and  
Khalijah Binti Md Dawi and all my friends



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## LIST OF SYMBOLS

<b>m</b>	-	meter
<b>W</b>	-	watt
<b>g</b>	-	gram
<b>ml</b>	-	millilitre
<b><sup>3</sup></b>	-	cube
<b>A</b>	-	Ampere
<b>kg</b>	-	Kilogram
<b>RM</b>	-	Ringgit Malaysia
<b>V</b>	-	Volume
<b>v</b>	-	Specific volume
<b>m</b>	-	Mass of vapor
<b>T</b>	-	Temperature
<b>P</b>	-	Pressure
<b>x</b>	-	Quality
<b>v<sub>f</sub></b>	-	Specific volume of saturated liquid
<b>v<sub>g</sub></b>	-	Specific volume of saturated vapor
<b>u</b>	-	Average internal energy of the mixture
<b>u<sub>f</sub></b>	-	Internal energy of saturated liquid
<b>u<sub>g</sub></b>	-	Internal energy of saturated vapor
<b>kJ</b>	-	Kilo joule

## **LIST OF ABBREVIATIONS**

<b>TIG</b>	Tungsten inert gas
<b>MIG</b>	Metal inert gas

# CHAPTER 1

## INTRODUCTION

### 1.0 Background

In Malaysia, there are many people with different races and different celebration. For example, Hari Raya Aidilfitri, Deepavali and Chinese New Year. People use with different clothes for their celebration. Other than that, people wear clothes with many types of fabric for hangout, working and going to school and mostly they use to ironed their clothes to prevent it from wrinkles. Clothes are important in our life. clothes are used to symbolize the nation and close the genitals. At some indeterminate time in the Middle Ages it was heavy damp linens, discovered that if the cloth was moistened and then heated under pressure the fabric would be wrinkle-free when dry (Iron, 1949). From time to time, clothing improves the quality of its manufacturing and is increasingly rated by people in fashion. Therefore, people will show their eagerness to wear their clothes. To ensure the following, the clothes to be worn must be ironed. Early method to removed wrinkles or crease by applying the clothes under the heavy weight, stretching and beating, this method needs more energy to users while ironing and it also contributes a long period time to remove the wrinkles or crease on the clothes (B.F. Parr 1949). The main purpose of the iron is to remove creases from clothing. So, there are many various types of iron made to iron for all types of clothing. Until today, the most sophisticated and most recent iron we have seen in the Malaysian market is by using certain technologies such as steam iron. The steam can be adjusted automatically. With this iron, clothes can be ironed more easily and better compare to iron without a steamer.

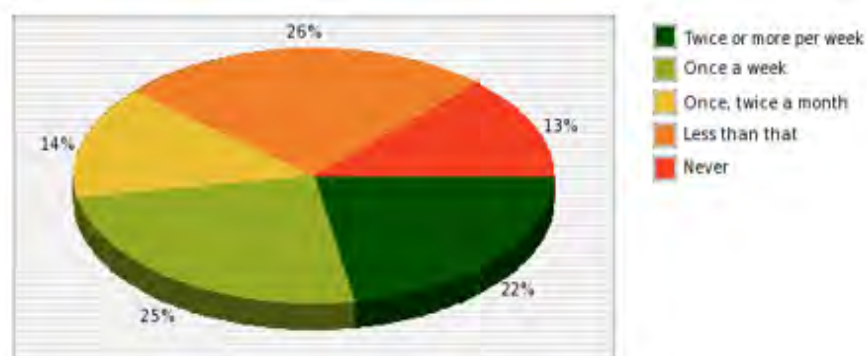
The steam iron process was replaced by more economical natural gas steam renewal. In the process of steam renewal, steam reacts with methane at high temperatures to produce carbon monoxide and hydrogen with the presence of catalysts. At high temperatures and at low temperatures, additional hydrogen can be produced through gas respiratory reactions, occurring in two phases (Sanz, Nieva, & Dufour, 2015).

## 1.1 Problem Statement

The autonomous steam iron stand has a fully automatic mechanism in their concept. This stand design idea created for:

- Find the accurate temperature and the time taken when the water start to vaporize between different volume.
- Find the suitable volume, pressure and time taken to remove wrinkles for several type of fabrics.
- Autonomous steam iron stand's ergonomic factor

Users almost no enough time for ironed clothes. At night, is the time for rest after work or doing a lot of activity in a day time. Therefore, from the statistic in Japan, there have a chart about how often the people iron clothes in a week and month.



**Figure 1.1: Chart about how often the People Iron Clothes in Japan (Cloth Washing and Ironing in Japan.” Whatjapanthinks, 3 May 2018)**

Wherever you are, this autonomous steam iron stand is created for effective and quick. Useful in any place and great travel solution, this autonomous steam iron stand is heated quickly and makes it easy to remove folds without using an ironing board. It's safe for fine outfits, Ideal for last minute touches for travel. This autonomous steam iron stand is semi- automatic function. Just switch on the plug. Then, adjust the steam for the suitable pressure for the fabric. Hang clothes on the hangers at the Autonomous Steam Iron Stand and the motor linear actuator will move the fabric up and down until completely iron. It has very saved time and energy to use. There are Several factors that make the Steaming operation difficult. An appliance that is large may and an appliance that is bulky and heavy may be difficult to manipulate and thus inhibit applying the proper with the present invention; amount of Steam for the time required to remove wrinkles.

## **1.2 Objective Research**

There was several objective research:

1. To determine the accurate temperature and the time taken when the water start to vaporize from thermal testing analysis.
2. To determine the suitable volume, pressure and time taken to remove wrinkles for several type of fabrics from the autonomous steam iron testing to different fabric and volume of water.
3. To determine the autonomous steam iron stand ergonomic value using RULA analysis.

### **1.3 Research Scope**

The aim of this project is to focus on the autonomous steam iron stand in order to function effectively and perfectly. Besides that, there are the idea to be made to existing forms to be customized according the problem that has been encountered is as follows:

1. To determine the accurate temperature and the time taken when the water start to vaporize from thermal testing analysis using several equipment such as Thermocouple type center 309 data logger thermometer and stopwatch.
2. To determine the suitable volume, pressure and time taken to remove wrinkles for several type of fabrics based on data analysis for pressure, temperature and time vs water volume different fabric.
3. To determine ergonomic value from RULA analysis method using CATIA V5R19 software .

## CHAPTER 2

### LITERATURE REVIEW

#### 2.0 Introduction

In this chapter is discussed in the literature review of this study. It consists of definition iron clothes, material and component of the autonomous steam iron stand, user of the autonomous steam iron stand, features of the autonomous steam iron stand, process fabrication and steam pressure testing of autonomous steam iron stand and previous research as shown at Figure 2.1: literature review structure.

