

CHAPTER 1

INTRODUCTION

1.1. Background

PT. Doultton is a tableware industry that produces plates, glasses, vases, photo frames, and others. in different shapes and dimensions. It is located at KM 29.9 Serang Street, Balaraja, Tangerang. The production target of this company is around 12.5 million pieces per year of best finished product. This company has many customers from Indonesia and other countries, such as Japan, United Kingdom, Australia, and United States of America.

One of department in PT. Doultton which has responsibility to develop the product introduction is NPI (New Product Introduction) department. There are 3 kinds of product introductions; new product (create brand new products that have not been in the market), transferred product (create existing products in the market that its production are transferred to PT. Doultton), improved product (create improvement of the existing product). Among three product introductions, problem is often happened in the transferred product. It is happened because transferred products often come without technical drawing data. Therefore CAD engineers have to search the geometry data from existing products.

In this research, the problem is appeared because there are two data sources; technical drawing from customer and sample of existing product. Those two data are different. The difference are existing product dimension is below customers' standard. In the end, technical drawing data is used as reference to create transferred product.

The observe product in this research is Emirate Large Plate (Dia - 25cm). Its total production amount is about 700 pieces per month. It had been produced in a factory in china, then the production processed was transferred to PT. Doultton

The standard dimensions for Emirate Large Plate are 247.5 mm for diameter and 21 mm for height. Unfortunately, the product that has been in the market didn't meet the customer standard after dimension measured by PT. Doultton, meanwhile the purpose of this production in this company is to make products that meet the customer standard and fulfil the market demand.

As already explained before, technical drawing data is used to fix the problem of 3D CAD data making. Technical drawing will be converted into vector and will be

processed in PowerSHAPE 2013 software into prototype 3D. After prototype 3D is finished, machining process will be done to create prototype model. The prototype model becomes basic source to make mould for trial process. Trial process is testing process to every new item that is produced by NPI department. The products from trial process will be measured. Product trial result is matched with the dimension, but doesn't resemble the existing product. This problem will always appeared if the re-trial process is conducted without change the design that resemble the shape of existing product. It increases trial cost. Expensive trial cost will affect the price of the product and also gives bad effects to the company. Company may get big loss for trial cost if customer canceled the tender because of expensive trial cost

In order to solve the design problem, reverse engineering approach is used. Reverse engineering is a process to produce a redesigned product that does not have complete data. There are three stages in reverse engineering: identification of geometry information, point reconstruction and application of the CAD model. Identification of geometry information is data retrieval from the geometry of the object. This process is usually done by using the scanner with noncontact system or contact system. Point reconstruction was done by data processing software from the result of the identification process. Deployment model is the process of making 3D CAD data from the results of point reconstruction.

In this research, reverse engineering is not used to redesign the product that does not have complete data, but to get geometry data from the existing products. Reverse engineering here is conducted just to get the geometric shape of existing product which has complete data. It used as secondary data to combine with primary data (technical drawing). It helps CAD engineer to process the data for approaching the shape of product shape that has been in the market. Reverse engineering can cut the process time. It can help to gather data from an object that does not have a clear specification, as well as ease in analyzing whether a product is in compliance with CAD data. (Raja and Fernandes, 2008). It is suitable with the problem design of Emirate Large Plate (Dia-25cm). Reverse Engineering is expected to able to shorten the company trial process and decrease the trial cost. So that reverse engineering is needed to solve the problem. (Telea, 2012; Bradley, 1998)

From previous research, Ali, Chowdary and Gonzales (2013) and M. Hussain, CH. Rao and Prasad (2008) use reverse engineering to get the design from

existing product which are broken clutch shoe and injection mould. Both are processed without technical drawing data. M. Hussain, CH. Rao and Prasad (2008) using non-contact scanner and calculate the error analysis of both scanning process. Mansor (2002) make an investigation of reverse engineering method which is generated by using free-form surface generation in model making. Contribution this research is shown that reverse engineering can be used for a design that has complete data but needs adjustment from geometric shape of existing product.

1.2. Problem Formulation

Based on research background that is described above, then the problems in this research can be stated as : "Dimension of Emirate Large Plate (Dia-25cm) is below customers' standard which are 247.5 mm for diameter and 21 mm for height; and product trial result can't be resemble the shape of existing product because the technical drawing data is different with existing product data."

1.3. Objectives

The objective of this research is proposing reverse engineering approach to make the design of Emirate Large Plate (Dia-25cm) that can be accepted for both customer and market.

1.4. Scope and Limitation

- a. Research conducted in NPI department especially in design process until trial process. The production process will not be explained because it is not the CAD engineer scope.
- b. Scanning process is using CMM Matron Machine from PT. Doulton, because this machine is suitable for collecting the data, that is geometry data from exists product.
- c. Softwares are using CMM Manager 3.0 and PowerSHAPE 2013, considering that software CMM Manager 3.0 is the original software from CMM machine and software PowerSHAPE 2013 is the latest software from PowerSHAPE 2013 that is used by company
- d. The existing product that been used is come from China factory. There is only one object as example of standard product in the market
- e. The technical drawing is sent by Barlaston which came from the customer

- f. Trial process conducted after 31 January 2014 made by other team members.

