

# Reverse Engineering Concept For Domestic Lpg Gas Stove Knob Production

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**Abstract-** The process of duplicating an existing part, subassembly, or product without the aid of drawings, documentation, or a computer model is known as reverse engineering. In this project we made an attempt to duplicate the LPG gas stove knob by the process of reverse engineering. Normally scanning processes are used for measuring the existing component size. The digitizing process for which CAD drawing converted by graphics standard. First the component dimensions are measured and detail of drawings are prepared. Tool & die for LPG gas knob is preferred

**Index Terms-** Duplicating, Part, Product, LPG gas stove Knob, Reverse Engineering, Die

## INTRODUCTION

This reverse engineering of domestic LPG gas knob plastic injection mold is done due to its advantages in reducing production cost and to shorten the development process. The reverse engineering is a process that used to create 3D CAD (Computer Aided Design) models directly from physical parts with accurate dimension. This is used in order to redesign a product for better manufacturability. Usually, high technology and modern manufacturing method is used so that a component can be quickly and accurately reverse engineered. For a product of LPG gas knob, the most important thing that should be considered is the dimension and tolerance of each part and features because each part is connected to one another and a problem will occur if the dimension is not accurate. A good design of core and cavity is needed to produce a perfect product. This study is focused on the methodology and the application of reverse engineering to produce the knob mould. The application of the reverse engineering is applied according from the first to the last process. First, a sample of the parts or drawing must be provided. Then, the parts or object is digitized. After that, the taken data is refined to create a 3D model. For this study, a type of knob had been chosen from many types of the other product. The criteria of the chosen hand phone design is based on the popularity and trend currently.

As computer-aided design has becoming more popular, reverse engineering has become a viable method to create a 3D virtual model of an existing physical part for

use in 3D CAD, CAM, UNIGRAPHIC and other software. The reverse engineering process involves measuring an object and then produces a 3D model. The physical object can be measured using 3D scanning technologies like CMMs and laser scanners or other handling tool such as vernier caliper. CAM is Computer Aided Manufacturing that involves the use of computers to assist in all phases of manufacturing a product.

### 1.1. The objectives of the research

The objective of the study is to develop and redesign the product with the application of the reverse engineering process. This study requires the student to be creative and apply reverse engineering tools and experience high and research technology that is not experienced in their learning education classes. The main focus in this study is to build a core and cavity for knob with the application of reverse engineering, to analyze the importance of each part in hand phone cover to improve its design and to analyze the injection molding process in producing the product.

### 1.2. Scope of study

a. This study will be involves the literature review of reverse engineering, mould, injection molding, reverse engineering tools and software used.

b. To apply reverse engineering method is to obtain the solid model of knob and detail design of existing product.

c. To study features of existing product and minimize if possible.

### 1.3. Problem statement

The study is done to mold for knob. The design of the mold can reduce the production time of the product in the future beside to reduce the cost of the production. Knob is already existed in market, so a reverse engineering is important to redesign the knob for other usage. A reverse engineering is a way to reduce the development process and reduce the production costs of a product and this will clearly show us the importance of the knob to be reverse engineer to enhance the product.

1.4. Research

1.4.1. 3D Laser Scanner

A Reverse engineering process of a mechanical component requires a precise digital model of the objects to be reproduced. A 3D scanner can be used to digitize freeform or gradually changing shaped components as well as prismatic geometries whereas a co-ordinate measuring machine is usually used only to determine simple dimensions of a highly prismatic model. These data points are then processed to create a usable digital model. The type of 3D scanner includes the laser, Destructive, Mechanical Probe, Time of Flight and X-Ray. Within the broader topic of 3D Laser Scanning, there are two types of device which operate in different ways and produce radically different results:

1. Triangulating 3D Laser Scanners
2. Time of Flight 3D Laser Scanners.

1.4.2. Coordinate Measuring Machine (CMM)

A Coordinate-measuring machine (CMM) is a device for dimensional measuring. It is a mechanical system designed to move a measuring probe to determine the coordinates of points on the surface of a work piece. The CMM is used to measure dimensions which are critical in tolerance and difficult to be determine using conventional method.

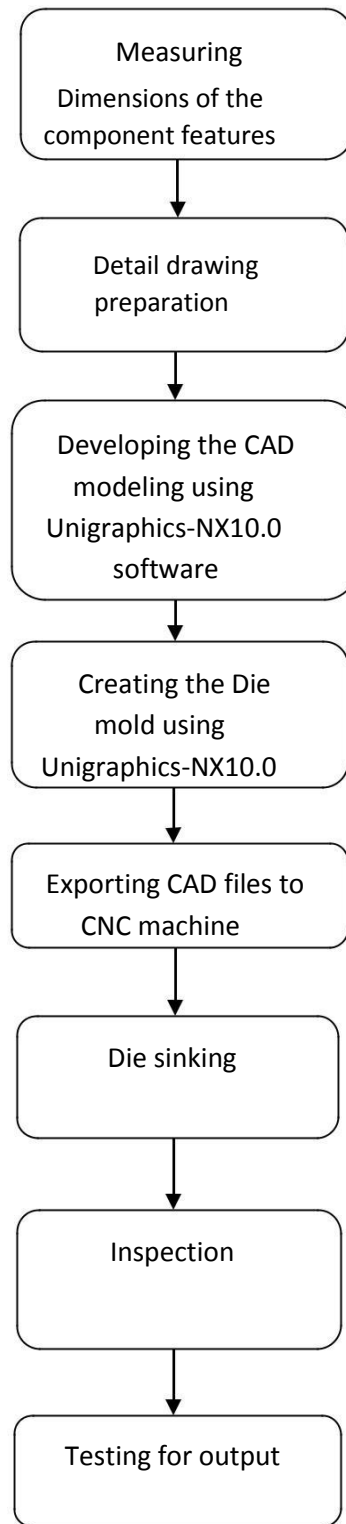
1.2.3 Vernier Caliper

A caliper is a device that used to measure the distance between two symmetrically opposing sides. A caliper can be as simple as a compass with inward or outward-facing points. The tips of the caliper are adjusted to fit across the points to be measured, the caliper is then removed and the distance read by measuring between the tips with a measuring tool, such as a ruler. A vernier caliper is used in the metalworking field of mechanical engineering, and in woodworking and woodturning.

1.4.4. Injection Moulding

The process of injection molding is used to produce large quantities of identical plastic items. Injection molding is the most important plastics manufacturing process. It produces such small products as bottle tops; sink plugs, children's toys, containers, model kits, disposable razors and parts of cameras. It is also used to manufacture larger items such as dustbins, and milk crates. The process can even mould such large items as dingy hulls and kit car body shell parts. Injection molding used to be operated by people on the factory floor but these days it is a form of highly automated form of production. There was not all the polymers is possible to be injection mold. This will be later explained in the next chapter.

II. METHODOLOGY

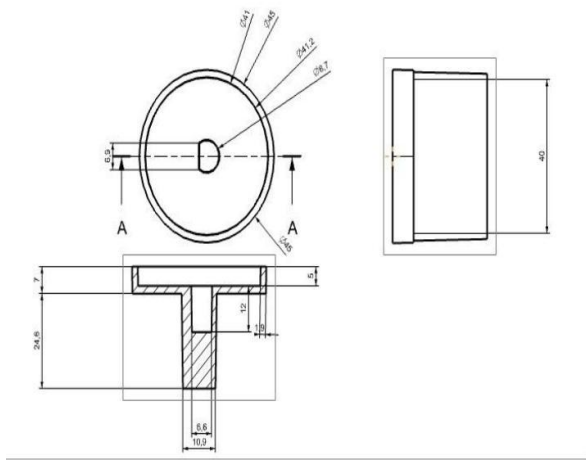


III.PRODUCT DESIGN

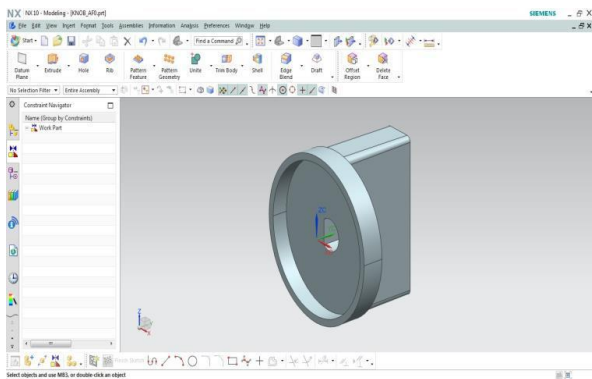
Many product design features are not considered because it is a reverse engineering process we only duplicating an existing product

3.1. DETAIL DRAWING PREPERATION

Detail drawing is prepared by using conventional tools



3.2 PRODUCT DESIGN IN NX



IV. MOLD DESIGN

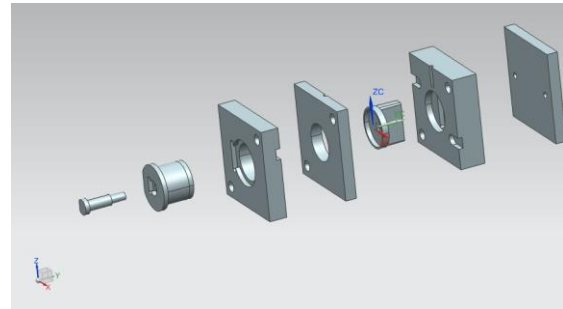
4.1. MOLD BASIS

At the most basic level, molds consist of two main parts: the cavity and core. The core forms the main internal surfaces of the part. The cavity forms the major external surfaces. Typically, the core and cavity separate as the mold opens, so that the part can be removed. This mold separation occurs along the interface known as the parting line. The parting line can lie in one plane corresponding to a major geometric feature such as the part top, bottom or centerline, or it can be stepped or angled to accommodate irregular part features.

4.2. MOLD DESIGN FETRUES

Various mold design features are considered for preparing mold that are Core, Cavity, Partejection, Sprues, Runners, Gates, Mo ld shrinkage, Draft, Wall thickness etc.,

4.3. MOLD DESIGN



4.4.CAD FILE EXPORTING

Mold design datas are exporting to CNC machine in form of IGES then mold shinking(drilling,boring,grinding etc,) process are done by CNC

4.5 MOLD MATERIAL SELECTION

Material selection should consider the mechanical properties,moldability characteristics and cost of the material. Cavity plate,core,stripper plates are made by EN8 material Core holders,bottom plates are made by C45 material

#### 4.6. MANUFACTURED MOLD



#### V. PART PRODUCTION

Finally part production process are done by injection molding machine

#### VI. REFERENCE

- [1] Raja, Vinesh & Fernandes, Kiran J. (2008), "Reverse
- [2] Engineering: an industrial perspective", Springer series in advanced manufacturing.
- [3] Lee, K.H. & Woo, H. (1998), "Use of Reverse Engineering method for rapid product development",
- [4] International Conference on Computers and Industrial Engineering, vol:35, pp. 21-24.
- [5] Cheng, Z.Q., Thackera, J.G., Pilkeya, W.D., Hollowellb, W.T., Reagana, S.W. & Sievekaa, E.M.,
- [6] (2001), "Experiences in Reverse-Engineering of a Finite element Automobile crash model", Finite
- [7] Elements in Analysis and Design, ELSEVIER. Vol: 37,pp. 843-860.