A STUDY OF A PROBLEMATIC INJECTION PRODUCT, LEADING TO THE RE-DESIGN AND IMPROVEMENT OF THE : MOULD DESIGN AND MANUFACTURE

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VERIFICATION OF PROJECT SUPERVISOR

We * hereby declare that the project paper or thesis has been read and we * have the opinion that the project paper is appropriate in terms of scope erage and quality for awarding a Bachelor in Production Technology

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OATH

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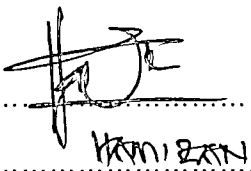
Signature : 

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DEDICATION

Firstly I would like to dedicate this project report to our entire German Malaysian Institute (GMI) lectures who taught us during this two and half. Without their generous giving us the knowledge they have, we are unable to accomplish this project. Especially when we facing some problem on processed this project, they tried their best to help us to solve the problem. Secondly, we would to our institute, GMI that provide us all the facilities that we need to accomplish this final-year project. Next, our parent, they have given our financial and mental support for finish this project. Finally, is to our group members. We shared our ideas while making this project.

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First of all, we would like to thank those people with help and contribute their experience to make our mould successfully to be producing.

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- To all the PRODUCTION TECHNOLOGY TTO without their knowledge we also don't have the capable to handle this project professionally.

ABSTRACT

This is the report of the project assign to us, as a final Year Project end evaluation and this report are prepare to the respective technical training officer (TTO). This report includes all the information and data of our Cable Tie, by referring the design section you will be clearer and understand about the product design, material selection and the product specification. Other relevant document such as process plan, project schedule. In the problem encounter and counter measure section, I'll list out the problem facing during project period, and how to solve it. Finally general review in the conclusion section will help to improve for future Final Year Project.

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CHAPTER 1

INTRODUCTION

Moulding technology has becoming increasingly important for bringing new products in highest quality and in shortest time; it has been a great number of products made of plastic are replacing products which made of steel. Although this technology is widely used today, but people still struggling to search for shortest time to design, develop and fabricate it. Therefore, the main intention of this project is to design a construction, which the product can be feel and test it functionality before making a production tools. Moreover; perhaps customer demand of number of shots is optimum to this workable prototype, producing soft tool is the best choice because of its cost and manufacturing time.

New emerging products especially automobile industry, a try out tool is same as production tool means that only one number of tools is gambling to create a prototype as well as a final product. So, quite lengthy of time is waste at R&D stage at the mean time increase the manufacturing time. With implementation of Moldflow analysis, this problem can be eliminated because a production tool is made after this mould design is approved.

On the same occasion, model of electronic parts are develop very fast which means product life cycle is short. So, using an actual tool to produce prototype is not an idea because of it cost.

The objective of this project is to understand the concept of workable Moldflow analysis and mould design. This is to compare the fabrication cost, lead time, functionality, number of shots, mechanical properties and possible failure. The using is material of pre harden steel as the inserts of the mould then inject it by Nylon 6/6. At the end of the project, the produced parts will be evaluated for their appearance, functionality and mechanical properties in comparing to products produce by a real production tools.

1.1 KEY WORDS

SKD 40, Pre harden Steel, Nylon 6/6, Moldflow, Catia, MDT, MasterCam

1.2 PROBLEM STATEMENT

Manufacturing industry today, especially automobile and electronic industries are developing very fast means that the product life cycle is short. They need cable tie as an agent fastening. So, manufacturer who produce the moulds of these part are always running against time to complete their task. Even though the mould is ready on time but people still have no clues why a lot of time and money had been waste at R&D stage. There are still no appropriate references and backup plan to guide, to make and to reduce lead time at R&D stage. People might think the first tool is always the production tool as their final product of its company.

Techniques used today to manufacturing moulds are using hard material mainly steel as a basic form of the product. In shorts, steel as the material of the inserts. To make a first tool or a try out tool, introduce Moldflow is ideal option because of its can

be analyse everything. High machining time, high percentage breakage of cutting tool and lots of precaution have to take care, these could burden the manufacturer.

1.3 HYPOTHESIS

At the end of this project, we must design the mould, in this case to produce a good design, we must conduct research and analyze the structure of the product, material, type of the gating system, cavity layout and cooling system because the product is very long and must having a suitable material/plastic flow.

In Moldflow analysis we can identify good solution for this problem especially the flow of the material. The analysis results can be used for reference, instruction and planning on how to obtain a good design.

1.4 LIMITATION

The implementation of Moldflow analysis sometime not accurate compare to the actual injection moulding data. This is cause by lack of maintenance of the injection moulding. The designer still used their experience to construct the mould design. Sometime Moldflow needed one day to complete the analysis. It's depends on the merge line, size and profile of the product.

1.5 OBJECTIVE

It has been determined that the following objective is necessary for the successful completion of this project:

- Study of material properties and selection of the best polymer
- Redesign of the plastic product according to Plastic Product Selection Methods
- To be independent while solving the problem and finding the solution
- Designing an assembly drawing of the mould according to the mould flow analysis

1.6 LITERATURE REVIEW

We have agreed to divide the tasks according to our discussion. My tasks focus more on Mould design. The idea is to design and development new product so that the detail design can be thoroughly tested before we prepare to manufacturing. A idea new product calls for a feasibility study, not only about whether or not it is possible to realize a product, but also to identify structural and material problems, liability and safety issues well ahead of time so that all surprises are eliminated. Rather, the identification of problems becomes a part of the product planning.

1.6.1 PRODUCT

Cable ties are used throughout various major industries such as video, computer, entertainment, electronics, automotive, supermarket (for packaging) and music, as well as by home users worldwide. Cable ties are also widely used in the telecom industry. Some common uses are within equipment in the telecom central offices, premise wiring systems and computer data centers.

1.6.2 CABLE TIES HISTORY

The need to collect, contain and control multiple wires into tightly organized bundles appeared with the invention of the first products that contained electrical wiring systems. Electrical wiring had to be bundled and routed within the equipment to prevent or reduce damage to wiring, isolate wires from moving parts and to provide consistent, organized and efficient wiring layouts to facilitate tracing and servicing of internal wiring systems.

1.6.3 EARLY WIRE BUNDLING METHODS

In early products with electrical wiring the methods for securing and routing wiring were simple. Manufacturers utilized twine, lacing cord or friction tape to bundle and route the wiring. Although these materials were effective in prototype and early production units, it became clear that they had serious drawbacks as bundling devices. Hand wrapping of lacing cord required a great deal of time in manufacturing and tying off did not produce a very secure and tight bundle. There was the danger that thin cord would cut into wire insulation, while tapes could dry out and peel off.

These problems triggered efforts to invent a device that would encircle bundle and route wires more efficiently and at uniform tension. Some early prototype devices included separate straps and locking mechanisms, which required two operations to install. All these devices lacked fine adjustment and permanent locking features.

1.6.4 THE FIRST CABLE TIES

The first device that was used to bundle and route wires effectively were similar in appearance and function to today's standard cable tie. It had a steel pawl or barb inserted at an angle inside its head. Although this design provided fine adjustment and self-locking it required two separate, time consuming manufacturing operations moulding the tie and insertion of the steel pawl. In addition, there was the possibility that the steel pawl could work loose or break off, with potentially disastrous results if it fell into printed circuits or closely spaced relay contacts.

The next major development was a two-component, self-locking cable tie completely produced from nylon material. Although it was finely adjustable, it still maintained the time-consuming, two-step manufacturing process. Because of its design, this improved cable tie provided better hand eye coordination and reduced

tallation time. Over time cable tie design improved steadily and eventually led to the velopment of a one-piece, molded, self-locking nylon cable tie.

.5 MODERN CABLE TIES

Since the development of the first one-piece, self-locking cable tie its design s steadily refined to improve the effectiveness of the product as a wire bundling ice. The basic one-piece, self-locking cable tie now comes in many sizes and styles a diverse range of applications. It has also been modified into specialty ties with all qualities of the basic tie, plus added features for different uses. (www.nelco.com)

.6 CABLE TIE CHARACTERISTICS

A cable tie is a band or length of strap manufactured from a class of polymeric erials known as polyamides (Nylon 6/6). The width, length and head area employ heting mechanisms to bundle and then lock items together. Commercially duced in 1938, nylon was the first synthetic semi-crystalline polymer whose sical properties compared favorably to some metals. Nylon possesses an tanding balance of properties, combining strength, moderate stiffness, high service perature and a high level of toughness. Particularly resistant to repeated impact, n has a low coefficient of friction and excellent abrasion resistance. It is resistant to s, lubricants, and most chemicals, but is attacked by phenols, strong acids and izing agents. Nylon is inherently susceptible to environmental conditions; however, cable ties are moisturized to attain optimum performance levels. Nylon products uld be stored in a cool, dry area, out of direct sunlight, and sealed in the original kaging material to extend performance levels indefinitely.

1.7 CABLE TIE TOOLS AND ACCESSORIES

Cable tie accessories are used in conjunction with cable ties to stabilize and secure wiring bundles in a variety of applications, both indoors and outdoors. There are currently many accessories on the market. Adhesive backed mounting pads, mounting cradles screw mounts and push mounts are just a few of the cable tie accessories that are available.

1.7.1 ADHESIVE BACKED MOUNTING PADS

Adhesive backed mounts are low profile mounting pads that stick onto virtually any surface. By simply peeling off the backing paper they stick onto any clean dry smooth non-greasy surface. Standard and light duty ties can be inserted and secured easily for all types of bundling needs. These adhesive backed mounts are not recommended for outdoor use.

1.7.2 PUSH MOUNTS

The Push mounts install by snapping easily onto any standard 6.4 mm hole. Centered ears and locking barb design hold it securely in place. Heavy-duty spring arm compensators accommodate chassis/panel thickness up to 3.2 mm and hold securely. Secures standard and light duty ties.

1.7.3 CABLE TIE TENSIONING TOOLS

Cable tie tools automate the assembly process. They pull cable ties tight, ensure correct tension and snap off excess length with a quick twist avoiding sharp edges on cut ties. The compact nature of these tools also provide for easy storage. In addition, these cable tie tensioning tools automate the assembly process thereby speeding up the cable tie installations process and lowering total installation cost.

There are a wide variety of handheld and pneumatic cable tie tensioning tools on the market ranging from the heavy duty, power assisted automatic versions to the economical, lightweight, hand-held controlled tools for small intricate work that provide uniform tensioning and safe, flush cut-offs.

I.8 APPLICATIONS

I.8.1 OUTDOOR APPLICATION

.8.1.1 NYLON 6/6 – UV STABILIZED

UV Stabilized Nylon 6/6 is used in continuous or extended exposure to outdoor unlight. The nylon cable tie is a weather resistant grade, enduring additional ultraviolet UV) light. This grade is produced by incorporating stabilizers in the nylon resin. UV tabilized Nylon cable ties are available only in black.

I.2 NYLON 6/6 - HEAT STABILIZED

Heat Stabilized Nylon 6/6 is used in continuous or extended exposure to high eratures (up to 250°F). A general-purpose nylon will have a reduction in physical erties and fatigue as a result of high temperatures. Nylon cable ties containing ally formulated heat stabilizers provide additional thermal endurance. Heat ized nylons are engineered for continuous exposure to temperatures above F, which meet UL standards for electrical applications.

CHEMICAL RESISTANT APPLICATIONS

.1 POLYPROPYLENE - GENERAL PURPOSE

Polypropylene is used in environments where chemical effects on nylon are a rn, because it is not affected by inorganic acids (hydrochloric), polyhydric ols (ethylene glycol), neutral salt (sodium chloride), and basic salts (sodium ionate). Polypropylene also resists a number of other chemicals with good results igh it has a lower tensile strength than nylon 6/6. In addition, this material has the to withstand ultraviolet light exposure.

2 Tefzel*

Although weaker than general purpose nylon 6/6 (about 37%), Tefzel is ant to a wide range of chemicals such as concentrated hydrofluoric and sulfuric It is also a low water absorbing material; therefore, moisture has a minimal effect Tefzel is radiation resistant up to 100 megarads and meets IEEE requirement