



MEC 332

FINAL REPORT

“EZ WHEEL’S LUGNUT FASTENER”

DIP. MECHANICAL ENGINEERING

SEMESTER 6

J4EM1106H1

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CHAPTER 2

DESIGN PROBLEM DEFINITION

2.1 MARKET ANALYSIS

2.1.1 GENERAL NEED FOR PRODUCT

Nowadays vehicles become the most important thing that we need in our life until at one state vehicle become a must have product like cell phone. Hence problem will occur in any way. One common problem occur for vehicle user is tire. Usually if someone purchase a vehicle they will get a set of tools such as T nut wrench. Large force needed to open tire's nut when using T nut wrench which can burden a user especially for women and disable people. Older method to open wheels nut is use T nut wrench which is need to use large force older method obviously burden the user especially women and disable people. Besides that, it takes much time to open just a single nut.

Hence a machine has been designed that can open the wheel's nut named EZ wheel's lug nut fastener . The tire nut removal has been designed with type of pitch circle diameter (PCD). This tool can open one nuts in one time and the force utilization has been reduced. This tire nut removal is operating with a gear system usage which have 1:3 gear ratio to reduce the 3 times force needed to remove a nut . This machine has potential in Malaysia automotive market because especially for 1500 cubic centimeter (CC)of engine capacity because mostly it has Pitch Circle Diameter (PCD) of 100.

1.1 BACKGROUND OF THE PROJECT

A lug nuts may be removed using a lug, socket or impact wrench on it. If the wheel is to be removed then an automotive jack to raise the vehicle and some wheel chocks would be used as well. But in order to remove the nut from the tyre portably and more on the efficiency, creating a new type of lug nut opener in innovative ways are really promising.

Lug nuts can be difficult to remove, as they may become frozen to the wheel stud. In such cases a breaker bar or repeated blows from an impact wrench can be used to free them. Alternating between tightening and loosening can free especially stubborn lug nuts.

Lug nuts must be installed in an alternating pattern, commonly in Malaysia, it was referred to as a cross pattern. This ensures a uniform distribution of load across the wheel mounting surface. When installing lug nuts, it is recommended to tighten them with a calibrated torque wrench. While a lug, socket or impact wrench may be used to tighten lug nuts the final tightening should be performed by a torque wrench, ensuring an accurate load is applied.

Many things must be considered in order to build something technical. Additionally, under-tightened lug nuts may come loose with time. Safety measures are considered during this design so that it becomes more ergonomically and user-friendly. Furthermore, it is designed for all types of drivers, especially women drivers in this country.

1.2 PROJECT OBJECTIVES

The main objectives of this project are:

1. To apply knowledge of mechanical designs .The course in mechanical design help students understand the fundamentals of designing the most commonly used parts, elements and units of various machines. Mechanical design can be defined as the process by which resources or energy is converted into useful mechanical forms. Besides that, students can form of the new machine or it can lead to upgrade or improvement of the existing machine.
2. To design, develop, fabricate, and testing prototype to ease the process off removing lug nut. The design process is a methodical series of steps that engineers use in creating functional products and processes. Besides that, design research investigates the complete set of activities involved in the process of bringing new devices, technologies, and services to the marketplace. Students can create a new design and develop a prototype. Furthermore, students can know how to fabricate and testing their prototype.
3. To improvement qualities and skills. There are many qualities and skills an individual needs to become an effective engineering students and to have a successful skills. Good technical skills are of course also essential. Students dynamic so it needs people who can work across disciplines, with others, and continually adapt to new challengers. When students doing their fabrication, students can improve their skills for example welding and casting process.

1.3 FLOWCHART OF THE PROJECT

Engineering Process

There are few design steps which can be followed to create a new product design that meets certain criteria and accomplishes a certain task. Which is

1. Define the problem
2. Explore and gather information
3. Specify requirements
4. Find the solutions
5. Analyse and choose the best solution
6. Implement the design
7. Evaluate performance

- Define the problem

This is the single most important step in the design process. Without fully understanding the problem, engineer can't solve it successfully.

Find an idea for design engineering to solve problem and the needs among the people.

Identify the problems that burden all people to get the idea and listing possible design.

- Explore and gather information

Do a background research on the problem that need to be solve.

- In order to make background research plan, some steps are needed such as :

1. Identify questions to ask about target user or customer