

# EM110 DIPLOMA OF MECHANICAL ENGINEERING FACULTY OF MECHANICAL ENGINEERING UITM CAWANGAN JOHOR, PASIR GUDANG CAMPUS

**MECHANICAL ENGINEERING DESIGN (MEC 332)** 

## **PROJECT:**

## MULTI-PURPOSE PORTABLE PULLEY

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#### **1.0 Introduction**

### 1.1 Overview of the Project

Lifting objects can be very hard as it requires a large amount of energy and stamina. A healthy person might be having problems and limitations when they need to climb up the stairs whilecarrying their objects to their home. Therefore, we design and innovate Multi-Purpose Portable Pulley that helps to solve this problem. faster. The purpose of this product is to lift objects from oneplace or floor to another without using much energy and save time as the loads can be carried easilyat one go and faster. The user's only need to install the pulley at their balcony or any suitable spotsand lift the load by rotating the crank handle. This product is designed to be light, compact, portableand user's friendly to make lifting easier and more efficient. Various methods such as concept designing, calculation analysis, engineering was performed to innovate our product. For each concept design, we have justified and compared the pros and cons of each of the design selection. Besides, 3D simulation, analysis and survey were also executed to find the best criteria and design which meet the safety requirements and practicality. In the analysis, our Multipurpose Portable Pulley operated very well without any failure due to proper choice of design, suitable material, andthe fabrication methods. Hopefully, this design can be helpful to solve the lifting problems by the society.

#### 1.2 Design Objective

With the increasing population around the city area, a lot of people start to livein highrise building. For them it is cheaper to accommodate the high cost of living in the cities [5]. However, by living in high rise building they have to face a challenge of moving their belonging from the ground floor to their desire one. This problem becomes more serious if thebuilding does not have an elevator installed [1]. The objectives of this project are:

- i. Firstly, our objective is to establish a design parameter for portable pulley.
  - When it comes to designing, a lot of thing need to be considered. Our portable pulley needs to be light enough so that it can be easily installed and carry around. It is also requiring a perfect size so that it can be used in a tight space of high-risebuilding. Structural integrity is also major thing, so that there will be no design flaw related. This show that designing a portable pulley required a lot of attention avoid a catastrophic failure to the product.
- ii. . To adjust or recalculate the require parameter.
  - By using this application, it is easier to adjust or recalculate the require parameter. SolidWorks also a mainstream software that many of the industrial sector use. Thisshow that this software is important to be used for our project. It is also making useasier to visualize our final product before we began to fabricate it.
- iii. To conduct analysis and simulation of the established model.
  - By using the SolidWorks, we perform a structural analysis in order find the limit load of our product. It is very crucial for us to find the limit load to determine thesuitable load that the portable pulley can handle. Using this method can also saveour cost during testing of our prototype. The design flaw can also being shown by the software. By conducting the analysis we can reduce the risk of a person being injured during operating the pulley.