

PIPE WRENCH



Introduction to Engineering (010243109)

Mini Project Report

By

Section(A)

Hsu Mon San	6601023620107
Thae Nandar Aung	6601023610128
Myo Htut Kyaw	6601023621090

Department of Production and Robotics Engineering

King Mongkut's University of Technology, North Bangkok

Title: “PIPE WRENCH”

Background

Pipe Wrench has been widely used in many industries over a long time. A Pipe Wrench has one movable jaw while the other one is fixed. The two parallel jaws have serrated teeth on the surface to prevent it from slipping or rotating when force is applied. The two jaws opened and closed when it is placed on a pipe or rotate in one direction.

A Pipe Wrench was first invented in 1869 by Daniel C. Stillson who is a mechanic at the Walworth Company in Cambridge. After that, in 1888, the Swedish inventor Johan Petter Johansson took out his first patent on the adjustable pipe wrench. Back in the old days, the design of nut is quite inconvenience to use. Over the past 150 years, it has been developed into a better one for usage. The most common size for pipe wrench is 150mm wrench but there's also a wrench up to 1200mm.

Motivation

Pipe Wrench is a popular versatile tool which is used in various industries. The demand to produce a more efficient and affordable pipe wrench in the industry is rising overtime. So, we decided to make a pipe wrench with 3D printer.

The project aims to design and manufacture a 120mm long pipe wrench that offer ease of use and adaptability to various types of pipe sizes and adjustability to round objects. The project could reduce the maintenance costs and increase overall efficiency for users. Our team is enthusiastic to create a product that will make a useful pipe wrench for real world industries.

Introduction

A pipe wrench has many types of parts that are designed to perform pipe fittings for tightening or loosening. Those following parts are essential to create an efficient pipe wrench. They are

- Hook Jaw
- Bottom Jaw with Handle wrench
- Knurled Adjusting Nut
- Pin 1
- Pin 2
- Screw
- Spring 1
- Spring 2

Hook Jaw

Form

- 24 grams and 8.07 m of PLA Plus
- 1 hour and 56 minutes for printing
- Jaw with the hook-shaped piece

Fit

- Fit to the bottom jaw

Function

- To hold the object or pipe width

Bottom Jaw with Handle Wrench

From

- 18 grams and 6.08 m of PLA Plus
- 1 hour 33 minutes for printing

Fit

- Fit to the top jaw
- Fit in the cage

Function

- To hold the object or pipe width
- Use handle to pull or push the pipe wrench in the direction you want

Knurled Adjusting Nut

From

- 7 grams and 2.30m of PLA Plus
- 59 minutes for 3D printing
- Rotating part

Fit

- Fit to the self-cleaning Threads

Function

- To slide the top jaw away from the bottom jaw

Pin 1/Pin 2

From

- Two 9.5 mm flat head screws

Fit

- Fit to the springs to the wrench handle

Function

- To make the spring stable on the main based handle

Screw

From

- 32.2mm pan head screw with nut

Fit

- To fix the cage and handle

Function

- To connect handle and cage to become main body of the wrench

Spring 1

From

- 1 gram and 0.42m of PLA Plus
- 6 minutes for 3D printing

Fit

- fit on the handle

Function

- to keep the handle in place by the spring assembly

Spring 2

From

- 1 gram and 0.29m of PLA Plus
- 5 minutes for 3D printing

Fit

- fit on the handle against the cage

Function

- to keep the handle in place by the spring assembly

The conceptual design and idea

To make a useful and efficient product, we surfed a lot in internet. After that, we choose few products and selected which one might be a great idea to produce. So, the idea to manufacture a pipe wrench is influenced by watching YouTube education channels and short clips from learning Websites. We used Solid Works for drawing and set dimensions to each part to ensures its versatility and efficiency. To print out the parts in 3D printer, we used blue-colored plastic as a material. We also trimmed the parts to get the shape accurate to the sketch (drawing) so that the product can functioning well.

Experiment and setup

Before we even begin the process of creating a 3D model of a pipe wrench with the advanced program SolidWorks, we want to be sure that the tool we create will work exceptionally well when gripping and rotating pipes of different diameters. This intricate design process involves giving careful thought to a number of elements, including the wrench's exact measurements, ideal angles, and essential components that will make it useful and adaptable.

Every component, including the ergonomics of the handle and the shape of the jaw, has been painstakingly designed to make sure that this pipe wrench can handle any work it comes across. After the painstaking design stage, we move on to the world of 3D printing. The entire process of 3D printing takes around two days, during which time every single pipe wrench part is created layer by layer.

When the 3D printing process is finished, the next process entails post-processing procedure that includes cleaning, sanding, and smoothing the raw parts to guarantee the highest level of accuracy and quality in the finished product. Then, test the 3D printed pipe wrench to ensure it functions as expected. Verify that it can securely grip and turn pipes of various sizes without breaking or slipping. It turns out that 3D printed wrench needs some adjustments and some parts can't be assembled. Therefore, we repeat the printing process until a functional tool is achieved. This repetitive but necessary process continues until we achieve a truly functional, reliable, and robust tool that meets our initial design aspirations.

Conclusion

In conclusion, the process of developing a 3D-printed pipe wrench has required commitment, creativity, and ongoing improvement. Our team started this project with the goal of designing and producing a flexible tool that could adapt to different pipe sizes and round objects while lowering maintenance costs and improving overall efficiency. This was motivated by the need for a more effective and economical solution in a variety of industries.

Starting with the conceptual design and idea generation phase, where we searched the internet for inspiration, chose the most promising design, and used SolidWorks to create accurate 3D models, the project required painstaking attention to detail. From the hook jaw to the handle wrench, we made sure that every part contributed to the functionality and versatility of the wrench by carefully considering it.

The thorough process we went through to create a functional 3D printed pipe wrench is evidence of the commitment that goes into making tools. This complex process is more than just putting the pieces together; it's a dynamic process that takes great care to detail and produces a pipe wrench that is both genuinely reliable and functional in the end. This is a process that involves many complex steps that warrant in-depth investigation. It begins with the design phase and continues through the 3D printing process, testing, and refinement stages.

Reference: sketchfab.com

https://sketchfab.com/models/76d26bc88ea24404a8fc3932489c714b/embed?autostart=1&internal=1&tracking=0&ui_ar=0&ui_infos=0&ui_snapshots=1&ui_stop=0&ui_theatre=1&ui_watermark=0