“Design And Construction an Automatic Electromechanical Puller System”.

A report submitted to the Department of Mechanical Engineering.

Sonargaon University of Bangladesh in partial fulfilment of the

requirements for award of the degree

Of

Bachelor of Science in Mechanical Engineering

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Abstract

By automating conventional manufacturing and industrial processes, the Fourth Industrial Revolution is changing global supply chains and production systems. This change makes use of extensive machine-to-machine connectivity and contemporary smart technology. Machines are more effective at doing repeated jobs, and advances in machine learning and computer capacity allow them to handle extremely complicated procedures, even though they cannot completely replace deep human expertise. One of the best examples of this technological progress is an automated electromechanical puller mechanism. These systems, which can vary greatly in complexity and application, are made to pull or extract materials or objects automatically. They include electromechanical components. It is these kinds of systems that are essential to improving accuracy and efficiency in smart manufacturing.

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Chapter-01

1.1 Introduction

Any kind of bearing or gear is typically manually removed from a shaft by people. Thus, we will use an electrical motor and gearbox to create an electromechanical pulley system to tackle this issue. The gearbox's output power is operated by a pulley screw, which facilitates effortless movement. Among the many features of the Electro Mechanical Puller System are the DC motor input (ac-220) and output (dc-24). Worm gearbox A puller featuring a 220V AC plug for connecting the power source. Forward and backward control of the power supply governs cricket. Increase or decrease in motor RPM for the cricket regulator. The device is incredibly portable because it has four wheels for easy mobility. It is convenient to utilize close to the workplace. One tool used to remove items like this is a puller.



1.2 Objectives:

- To Design and construction an automatic electromechanical puller system.
- To Annalise the Performance of the Constructed Electromechanical Puller Device.
- To make the technology environment friendly in Industrial sources. The implementation of an automatic electro mechanical puller in this project.

Chapter 2

Instrumentation



Figure: 2.1 Dc Motor



Figure: 2.2 Power Supply Cricket (220V AC To 24VDC)



Figure: 2.3 Worm Gear

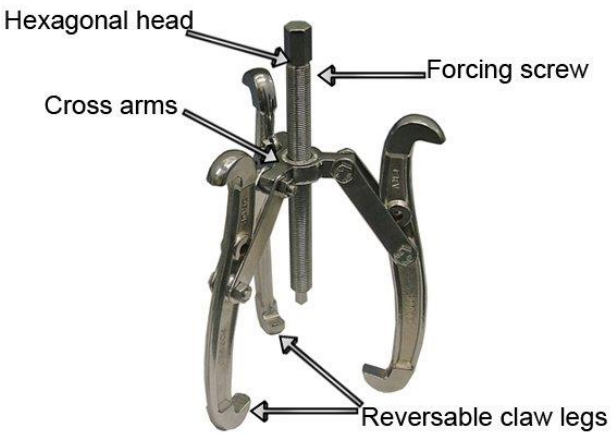


Figure: 2.4 Puller



Figure: 2.5 Worm gear



Figure: 2.6 Screw



Figure:2.7 Flange





2.9 3-Way Switch Forward Reverie

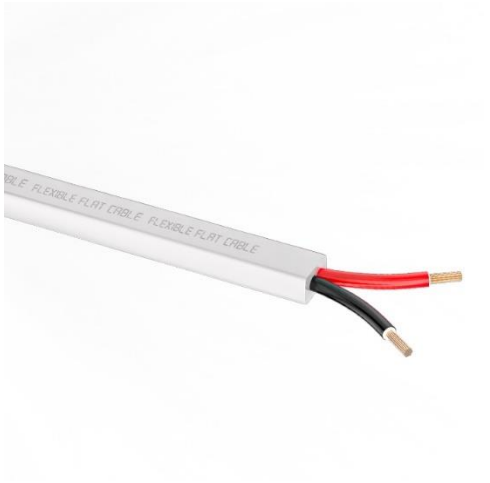


Figure: 2.10 Flexible Cable



Figure: 2.11 Wooden Box

Chapter 3
Methodology

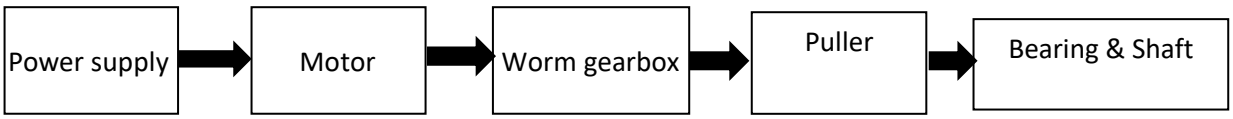
Working Process:

In this model we are utilizing Ac source to Convert DC sources.

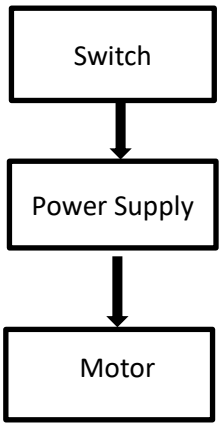
Here DC 24 volte motor is directly connected to the 80:1 ratio worm gearbox. The three-jaw puller is set on the front side. The gearbox is threaded on the inside of which the puller shaft is forwarded and reverse. Only the gear will rotate, the puller shaft will not rotate, because the puller shaft is fixed with the key only forward reverse.

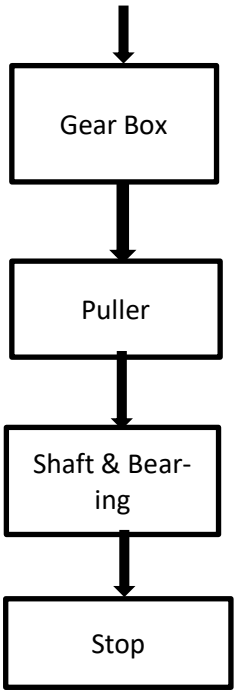
At final Stage AC to DC converter is placed in order to operate different types of DC loads.

Block diagram:



Flow Chart:





Proposed system specifications:

1. Power Supply 220 Volt Ac To 24 Volt Dc
2. Dc motor 24 volts, 3000 rpm, 1 amp, 120 watts
3. Worm Gear 80:1 Ratio
4. Puller 8 inch
5. 3- Way witch
6. Flexible Cable

Power Supply:

An electrical equipment that provides electricity to an electrical load is called a power supply. A power supply's primary function is to transform electric current from a source into the proper voltage, current, and frequency so that the load can be powered. Power supplies are therefore occasionally referred to as electric power converters. While some power supplies are integrated into the load appliances they power, others are stand-alone, independent pieces of machinery. Consumer electronics gadgets and desktop computer power supply are two examples of the latter. Power supply can also be used to cut off the current and limit the amount of current that the load draws to safe levels.



Figure 3.1 Power Supply Cricket (220Volt Ac To 24Volt Dc)

DC MOTOR:

A DC motor is a type of electrical motor that generates mechanical force by means of direct current (DC). The most popular kinds rely on magnetic forces generated by coil currents. Almost all varieties of DC motors contain an internal mechanism—electromechanical or electronic—that allows the motor's portion of the current to be periodically reversed. Since DC motors could be fueled by the direct-current lighting power distribution networks already in place, they were the first type of motors to be employed extensively. A DC motor's speed can be adjusted throughout a broad range by varying the field windings' current strength or the motor's supply voltage. Appliances, toys, and tools all employ small DC motors. The lightweight brushed universal motor is utilized for



Figure: Dc Motor

Worm Gear:

A gear arrangement where a worm meshes with a worm wheel is called a worm drive. The worm screw and worm gear are other names for the two components. When the phrase "worm gear" is used imprecisely to refer to the worm, worm wheel, or worm drive as a unit, it might cause confusion in the thermology. A gearbox with its drive axes at 90° angles to one another and built using worm and worm wheel is significantly smaller than one constructed with simple spur gears. When using a single-start worm, the worm wheel advances by just one tooth for every 360° round of the worm. Consequently, the gear ratio is the "size of the worm wheel - to" worm size, regardless of the worm's size (as long as realistic engineering constraints are respected).



Figure: Worm Gear Box

Puller:

A bearing puller is a tool that is used to extract parts from a shaft or recess, including gears, pulleys, and bearings. Before forcing the component off the shaft, the puller uses specially constructed jaws to firmly hold onto it. In every sector, pullers are utilized to safely and efficiently demount bearings. It is simple and inexpensive to make the bearing puller that follows. As with regular gear pullers, it was utilized to take out and replace bearings.

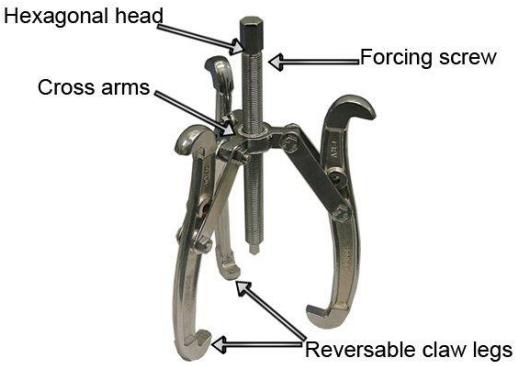


Figure: Puller

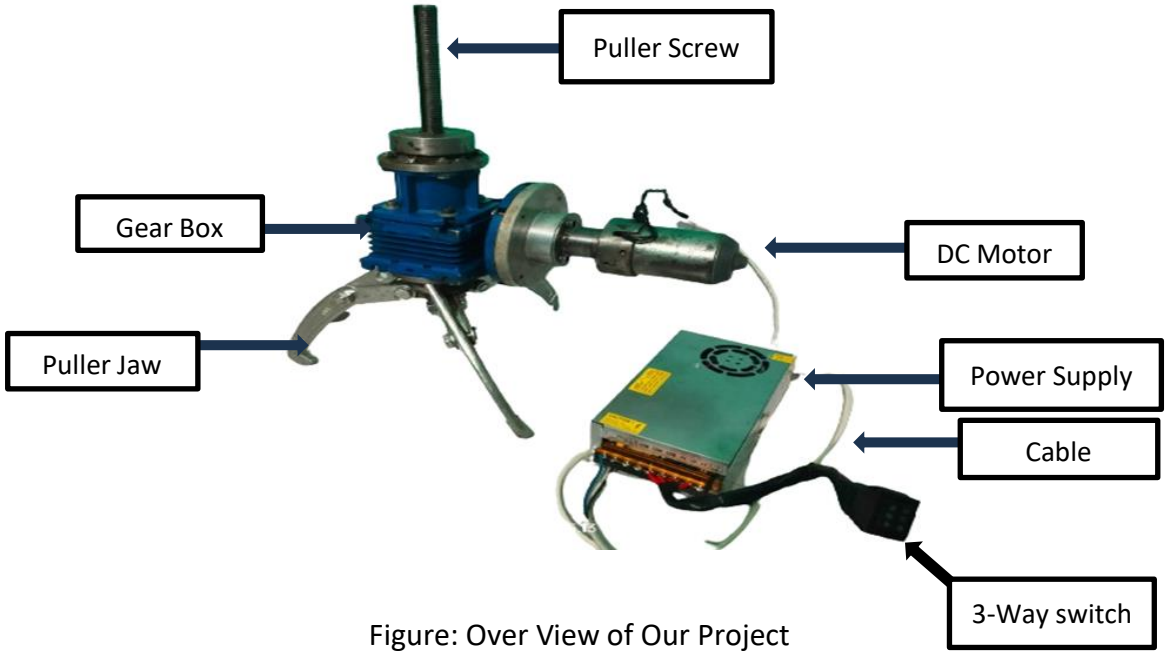


Figure: Over View of Our Project

CHAPTER 4

Experiment:

Sl no	Expriment time	Gear Ratio	Motor rpm	Job count time	Remark
1	3 min	80:1	3000	1.30 min	Automatically
2	3 min	-	-	2.3 mi	Manually

Remarks: - When motor rpm 3000 puller operation is smooth and operation duration 1.30 minutes.

The same conditional bearing manually removes need 2.30 minutes

Test system Compier

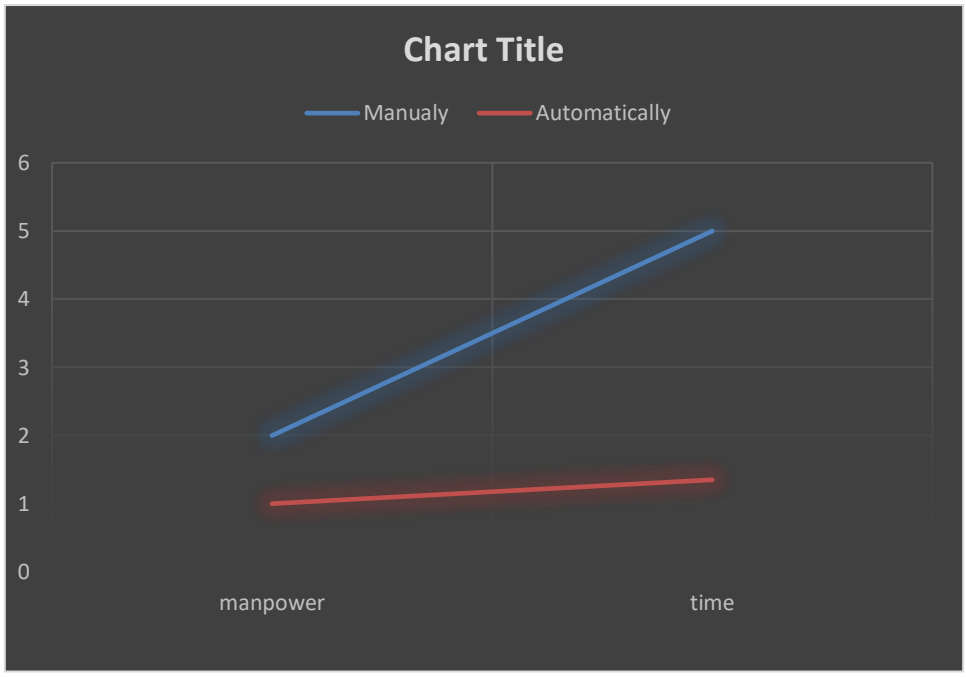


Figure: Compier Grap

Sample Calculation:

Nm= RPM of motor = 3000

Np= RPM of Puller =?

T1= Teeth of gear---------1

T2= Teeth of gear----------2

We Know, The gear Ratio = 1:80

Motor RPM =3000

Find the puller RPM?

Puller RPM = $\frac{Nm}{Np} = \frac{T2}{T1}$

$\frac{3000}{NP} = \frac{80}{1}$

$= \frac{3000}{80}$

∴ Np = 37.5 rpm

∴ RPM of Puller = 37.5

Advantage & Disadvantage an Automatic Electro mechanical puller System.

Advantage	Disadvantage
Time saving	Over load may cause the motor to overheat or burn.
Cost saving	Over load may damage the thread of the screw shaft.
Operate unskilled people	First the cost is high.
Can be worked at any angle	Need Electricity to use it.

Chapter5

Result and Discussion:

In our project justify efficiency two type of testing method apply

1) manually bearing remove:

Here needs minimum two manpower some time two or more manpower needs. And time also required also high.

Also need more tools such as manual puller, ball pin Hamar, support wooden shaft.

2) automatically bearing remove method.

Need One operator who operate machine. Before operate machine, he attests puller leg into the bearing then operation the automatic puller machine and remove bearing easily within short time.

Discussion:

After complete this project we successfully experiment.

We highly Recommended that this equipment is use any light and heavy industry to save cost and time. When we are ready this project we face some limitation.

We can’t test any standard position.

So, need standard test before using.

Chapter 6

Future Recommendation of this project

Limit switch at the end point.

360-degree rotating base.

Digital display.

HMI for pressure, rpm, kW.

It will be required in all factories in future.

An auto machine suitable for opening bearing

Conclusion

Finally, an automatic electro mechanical puller system will take mechanical work forward, saving money, effort & time. We hope its use will multiply in the future, and we will be able to bring new version of it. A puller is a tool used to remove parts such as bearings, pulleys or gears from a shaft. They have legs, typically two or three which circle around the back or inside of a part and they also have a forcing screw which centers up against the end of a shaft We are offering range of impeccable An Automatic Electro Mechanical Puller. Customers can avail from us Mechanical Pullers like Mechanical Jaw Puller and Cage Type Mechanical Puller in numerous specifications. The Mechanical Pullers, offered by us, are stringently tested by the experts on the parameters of functionality, quality and durability before supply That's where a puller can come in handy by applying gentle, steady pressure until the piece just pops apart. You can use these not only to pull gears, but to remove pulleys, separate bearings from shafts, or brake discs from hubs If a part, such as a gear, bearing or ball bearing, is so tight that you cannot loosen it with your own strength, you need a tool to help you do so. In a situation where a stuck part is installed on a machine, for example, leading to a standstill, disassembly must be fast as well as efficient, safe and gentle. Only a puller can give you that. A puller thus stands for added value, productivity and long-term service life for machines. You should also remember that necessary investments in new machines due to incorrect maintenance are always higher than the investment in the right puller. It is also important to mention that a puller is by no means an industry-specific tool, it is used in all areas of technology where downtime must be avoided.

Chapter7

Reference:

1. Google

2. Wikipedia