Archives available at journals.mriindia.com

International Journal on Mechanical Engineering and Robotics

ISSN: 2321-5747
Volume 14 Issue 01, 2025

Design & Fabrication of Motorized Screw Jack Machine

[1]Dhanraj R Raut, [2]Aadarsh A Dabhade, [3]Surajkumar Bind, [4]Sukhendrakumar Dwivedi, [5]Aayush Rahangdale

[1,2,3,4,5]Department of Mechanical Engineering,
Suryodaya College of Engineering & Technology, Nagpur, India
aadarshdabhade@gmail.com[2]

Peer Review Information

Submission: 11 Feb 2025
Revision: 20 Mar 2025
Acceptance: 22 April 2025

Keywords

Jackscrew
Mechanical Jack
Power Screw Mechanism
Jacking System

Abstract

A screw jack is Jackscrew is function by turning a lead screw. The maximum height of the jack Is adjusted by turning the lead screw. It can be done either manually or by Integrating an electric motor with it. This integration is our project. It is difficult part in the project is finding a minimum speed motor that is able to work at 12V. Due to this reason the battery output of an automobile is 12V, and the electricity needed for the operation of the screw jack Is taken from this battery. Another problem will be regarding speed reduction. 12V motors usually operate at higher speeds, likely at 4000 rpm. So reducing this high rpm to the required lower rpm for the operation of screw jack without bulky accessories or power loss can be challenging. .It can be done In any type of jack cylindrical screw jack, bottle type screw jack and scissor type screw jack. In our project we use scissor screw jack which is applicable for operation.

INTRODUCTION

An electrically operated screw-type jack have a support base a lifting ram which is contained in the jack body, a servo motor which is contained in the housing, reduction gears for transmitting the driving power of the servo motor to the lifting ram, a safety device can prevent the motor and the mechanism which transmit power from an abrupt Failure due to overloading, a square head pin for conventional hand operation of the jack when the jack is overloaded. The safety device consists of a clutch disk, a clutch spring and a sleeve. The reduction gears consist of first sun and planet explore the development, applications, and advancements in motorized screw jacks, along with gears, then sun and planet gears and sun gear cylinder.

In case of heavy loaded object the jack can be operated remotely. There is no need to control manually, this project reduces the accident.

LITERATURE REVIEW

A **motorized screw jack** is a mechanical device used to lift or apply a load through the rotation of a screw. Unlike manual screw jacks, which require human effort for operation, motorized screw jacks rely on an electric motor or other power sources to automate the lifting process. This literature review aims to

TRENDS AND DEVELOPMENTS

As automation continues to grow, the future of motorized screw jacks lies in further integration with **Internet of Things (IoT)** and **artificial intelligence (AI)** technologies. **Liu et al. (2022)** predict that motorized screw jacks will increasingly be connected to centralized systems for monitoring and diagnostics. Real-time data from sensors can be used to predict maintenance needs, reducing downtime and improving system efficiency.

Additionally, research into **sustainable materials** and **energy-efficient motor designs** will continue to enhance the environmental performance of motorized screw jacks. The increasing focus on **autonomous systems** also suggests that motorized screw jacks will become more integrated with robotics and automated assembly lines in the future.

WORKING PRINCIPLE

The lead-acid battery is used to drive the d.c motor. The d.c motor shaft is connected to the spur gear. If power is given to the D.c motor, it will run so that the spur gear also runs to slow down the speed of the D.C motor. The jack moves the screw upward, so that the vehicle lifts from ground. The vehicle is lifted by using the lifting platform at the top of the Screw jack. The power is supplied by motor using battery. The lifting and uplifting is worked by changing the battery supply to the motor.

Power screws are used to perform rotary motion into translatory motion. A screw jack is an example of a power screw in which a very small force applied in a ground is used to raise or lower a large load. The effort required to turn the screw can be eliminated by using a 12V DC motor to rotated screw of jack; which facilitate in easily changing the tyre. Advantage of this system is that it draws the energy from the battery of vehicle. For torque multiplication; the torques generated by motor two spur gear are used. on power screw of jack. Also we are looking for to increase the capability of motorized screw jack by varying helix angle by which energy can be drawn by motor can be decrease.

The motorized screw jack has been used to cater to the needs of small and medium automobile garages, which are normally manually operated with minimum skilled labor. In almost of the garages the vehicles are lifted by using screw jack. This require high man power and skillfull labour. In order to avoid all such obstacles the motorized jack has been designed in such a way that it can be used to lift the vehicle very easilys without any impact force. The operation is made simple so that even unskilled labour can use it with less effort.The d.c motor is coupled with the screw jack by gear arrangement. The rotation of screw jack shafts depends upon the rotation of D.C motor. This is a simple type of automation project. The operation remains to be an essential part of the system although with changing demands on physical input, the degree of mechanization is increased.

CONCLUSION

Screw Jacks are the important product to push, pull, lift, lower and position loads of anything from a couple of kilogram to hundreds of ton. It is highly useful that a jack become available that can be operated alternately from inside the vehicle or from a location of safety besides the road on which the vehicle is placed.. Such type of jack should desirably be light in weight enough and be compact enough so that it can be stored in an automobile trunk, can be lifted up and carried by most adults to its desirable position of use, and yet t can be capable of lifting a wheel of a 4,000 -5,000 pound vehicle off the ground. Further, it should be stable and controllable by a switch so that jacking can be done from a position of safety. It should be easily moves either to a position underneath the axle of the vehicle or some other reinforced support surface designed to be joied by a jack.. This type of particular design of the motorized screw jack will be benefiial in rising and lowering of loads.