



# DESIGN AND FABRICATION OF QUICK LIFT JACK FOR AUTOMOBILES

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## ABSTRACT

This paper entitled –Fabrication of Quick Lifting Jack for Automobiles|| has been conceived having studied the difficulty in lifting the any type of light vehicles. Our survey in the regard in several automobile garages, revealed the facts that mostly some difficult methods were adopted in lifting the vehicles for reconditioning. Now the project has mainly concentrated on this difficulty, and hence a suitable device has been designed. Such that the vehicle can be lifted from the floor land without application of any impact force. The fabrication part of it has been considered with almost case for its simplicity and economy, such that this can be accommodated as one of the essential tools on automobile garages.

Keywords: Bevel gear, Frame, Handle, Jack, Quick lifting

## 1. INTRODUCTION

Quick lifting jack with gear arrangement for car garages was created to better serve the demands of small and medium sized car garages, which are often run by people with a very low level of trained labor. The majority of garages use screw jacks to elevate the automobiles. High numbers of skilled workers are required for this. In order to prevent anysuch drawbacks, this motorized hydraulic jack is made to raise a car extremely smoothly and without applying any power. By simply showing how the motorized hydraulic jack functions, the task is made so simple that even a labor without special training may do it.

A gear is a rotating circular machine part having cut teeth or, in the case of a cogwheel or gearwheel, inserted teeth, which mesh with another toothed part to transmit torque. A gear may also be known informally as a cog. Geared devices can change the speed, torque, and direction of a power source. Gears of different sizes produce a change in torque, creating a

mechanical advantage, through their gear ratio, and thus maybe considered a simple machine. The rotational speeds, and the torques, of two meshing gears differ in proportion to their diameters. The teeth on the two meshing gears all have the same shape.

Two or more meshing gears, working in a sequence, are called a gear train or a transmission. The gears in a transmission are analogous to the wheels in a crossed, belt pulley system. An advantage of gears is that the teeth of a gear prevent slippage. In transmissions with multiple gear ratios—such as bicycles, motorcycles, and cars—the term "gear" (e.g., "first gear") refers to a gear ratio rather than an actual physical gear. The term describes similar devices, even when the gear ratio is continuous rather than discrete, or when the device does not actually contain gears, as in a continuously variable transmission.

## 2. LIST OF COMPONENTS:

- 1) Bevel Gears
- 2) Frame
- 3) Handle
- 4) Bearings
- 5) Lifting Rod

## 3. DESIGN AND CALCULATION:

The following calculations have been made with fabrication in mind. These calculated values may not exactly match the actual performance, but it leads to idea of creating the output in a proper manner.

Input data:

$$d_g = 2.5 d_p$$

$$\alpha_p = \tan^{-1} \left( \frac{1}{2.5} \right) = 21.8^\circ$$

$$\alpha_g = 90^\circ - \alpha_p = 90^\circ - 21.8^\circ = 68.2^\circ$$

$$r_{gavg} = r_g - \frac{b}{2} \sin \alpha_g = 12.5 - \sin 68.2^\circ = 11.6 \text{ in} = 30 \text{ cm}$$

$$r_{pavg} = r_p - \frac{b}{2} \sin \alpha_p = 5 - \sin 21.8^\circ = 4.6 \text{ in} = 11.7 \text{ cm}$$

Through the use of the power equation:

$$h_p = \frac{F_t V}{33000}$$

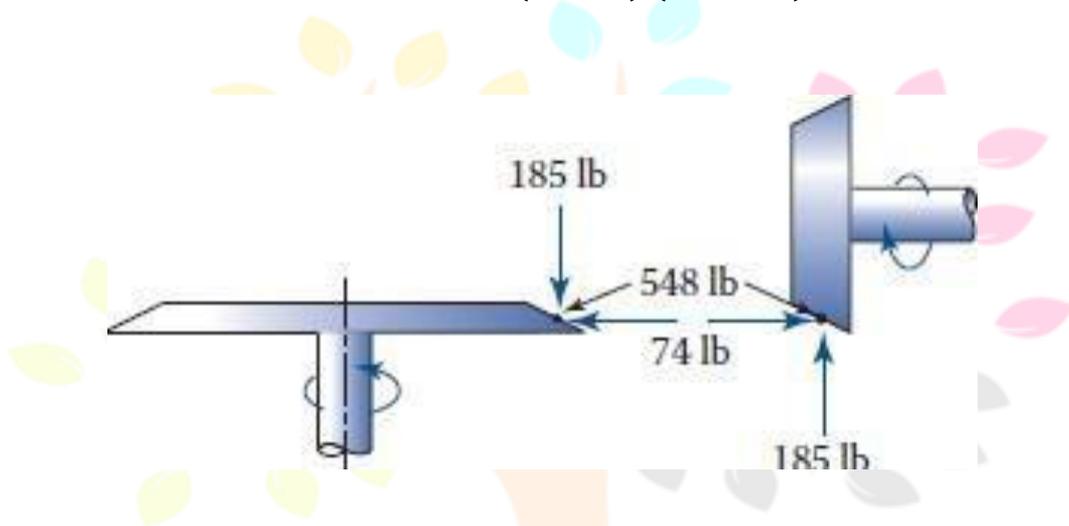
$$F_t = \frac{33000 h_p}{V}$$

$$V = \frac{\pi d_{pavg} n_p}{12} = \frac{\pi(9.2)500}{12} = 1204.2 \text{ rpm}$$

$$F_t = \frac{33000 (20)}{1204.2} = 548 \text{ lb} = 2437 \text{ N}$$

$$F_a = F_t \tan \phi \sin \alpha_p = 548 (\tan 20^\circ) (\sin 21.8^\circ) = 74 \text{ lb} = 330 \text{ N}$$

$$F_r = F_t \tan \phi \cos \alpha_p = 548 (\tan 20^\circ) (\cos 21.8^\circ) = 185 \text{ lb} = 823 \text{ N}$$



International Research Journal  
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#### 4. FABRICATION:

A tool called a rapid lift jack is used to lift heavy objects with significantly less force can be used to explain the rapid lift jack's operating concept. Many additional technological developments, including dental chairs and quick-lift jacks, function. Handle is used to rotate the bevel gear arrangements. Lifting rod will be fixed to bevel gear under the jack arrangement. Jack will move upward and downward when the handle is rotated both clockwise and counter clockwise.

During usage, the screw jack is assembled for operation with extended properly. The jack is then placed perfectly under the vehicle with loading platform serving as a base for support. functions as the effort that aids rotation During the process of lifting rotates in clockwise direction allowing rotate as well (engaging gearing motion) which aids in the upward movement The reverse is the case when it is turned counter clockwise, allowing downward movement of thereby lowering the load. Doing all these like the conventional jack the operator must carefully inspect the operation making sure the load sits perfectly on the loading platform to prevent unsafe conditions i.e. slippage of the vehicle from the jack.



#### 5. BENEFITS:

1. Quick lift of vehicles
2. Low man power
3. Low cost automation
4. Maintenance cost is very low
5. Easy to install
6. Less in weight

#### 6. CONCLUSION:

In this work we have discussed about the various steps which we use to run our design and fabricated. We have a fantastic opportunity to make the most of our limited experience with this project. This project allowed us to gather a lot of useful experience preparing, ordering, putting together, and machining. We are happy that the work was finished in such a short

amount of time. The "Quick Lift Jack for Automobiles" runs without a hitch. We are aware of the challenges associated with maintaining accuracy and, more critically, tolerances. We have put in our best effort and taken advantage of all the opportunities that have come our way. Here are some final thoughts on our dream. The "Quick Lift Jack for Automobiles" was created as a result. Additional techniques can be used to edit and improve them.

## 7. FUTURE SCOPE:

- A bevel gear drive's sophistication and superior performance offer the engineer many opportunities
- A bevel gear can also significantly reduce backlash when correctly calibrated. In most instances, this is achieved with a shim or retaining ring.
- A bevel gear drives are precisely fitted to minimize the distance between meshed gears.

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