

# Multi-Socket Extension For Wheelgun

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**Abstract-** This project is about developing a multi-socket extension for a wheel gun. A wheel gun is a mechanical device used for tightening or loosening wheel nuts. It isn't a piece of cake for a single person to screw or unscrew all wheel nuts in case of emergency. Usually, we need to remove a single wheel nut at a time, and it is much time-consuming if we need instant help with it. Observing this, we researched related to multi-socket extensions. They were available but had some limitations that made them useful only for specific dimensions. They had some disadvantages –

- Variable spacing for different configurations of wheel nuts was not available
- These cannot be used for wheel nuts of different diameters
- They had defined number of slots

So, we came up with some ideas to overcome these problems and limitations. We aimed to develop a mechanism that will help us overcome these limitations and problems. Also, we aimed to develop a mechanism that can be used as a variable wheel socket extension for wheel.

**Keywords-** Multi-socket, Extension, Wheel gun, nuts, screw, unscrew, variable, diameter, Mechanism

## I. INTRODUCTION

A wheel gun is a mechanical tool that is used to loosen or tighten the wheel nuts, that helps in attaching or removing tires. Wheel nuts are unscrewed when tires need to be removed. When tires are attached again the wheel nuts need to be screwed back.

At present, usually single bolt wheel guns are used. Multi slot wheel guns are available, but they are limited to defined dimensions. So they can be used only for a specific type of tires or wheel nut assembly. So we saw the need of making a variable dimension multi slot extension for the wheel gun. It would help the user to screw or unscrew wheel nuts with much more ease and within comparatively lesser time.

## II. PROJECT OVERVIEW

There are various kinds of nut removal devices present but the problem is, they remove one nut at a time. In

our project we are making an extension for removing multiple nuts of tyres at a time whose diameter will vary (2 diameter sizes) according to the nut placement and will have in total 6 nut slots for removing and tightening of nuts.

## III. PROJECT OBJECTIVES


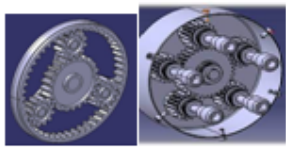
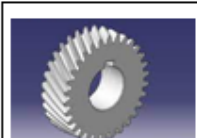

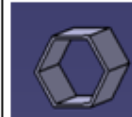
- 1) To build an extension for wheel gun which will have multiple slots.
- 2) To reduce time consumption for tightening and loosening nuts.
- 3) To save manpower required.
- 4) To overcome nut related problems in tyres.
- 5) To save energy required for tightening and loosening nuts individually.
- 6) To make a mechanism that can be used for commercial vehicles\*.
- 7) To reduce the errors caused by manual tightening of nuts.

## IV. CONSTRUCTION

The multiple wheel removal extension being developed has “varying spacing” between slots which has multiple advantages for a commercial vehicle\* user, such as being versatile for different tyre profiles, increasing wheel gun efficiency and reducing human effort and time put into changing a set of tyres.(\* commercial vehicle being referred specifically to LMV category)

The major elements employed in this project are: -

- Circular Frame
- Nut Slots
- Spur Gear
- Helical Gear
- Planetary Gear Arrangement
- Ball Bearing

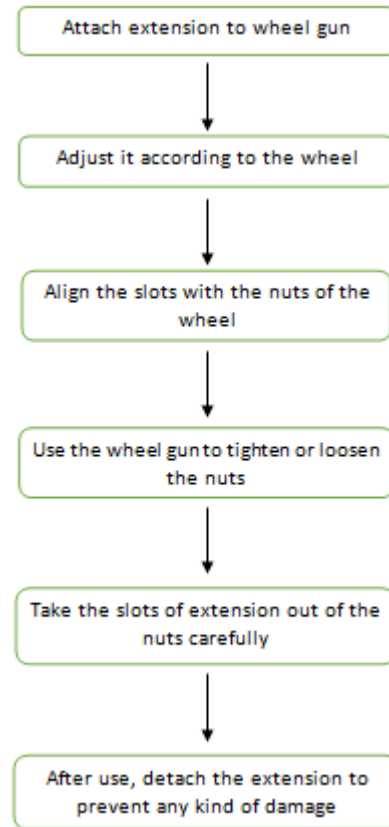
	<p><b>Circular Frame:</b> - The frame will be home to all the gears and will also play a part in the gear system, when the distance between the slots is altered.</p>
	<p><b>Planetary Gear Arrangement:</b> - This is the basic gear arrangement to be used, where the planetary gears in engagement with sun gears will define first size whereas, planetary gears in engagement with ring gear will define second size.</p>
	<p><b>Helical Gears:</b> - Helical gears will be used as both Sun gear and Planetary gears for less operation sounds and smooth and efficient working.</p>
	<p><b>Ball Bearings:</b> - Ball bearings will be used between wheel gun shaft and the frame for smooth operation and wear reduction.</p>
	<p><b>Nut Slots:</b> - Nut slots will be connected to shafts, connected to Planetary gears, which will engage with nuts for tightening/ loosening.</p>

- The radius of Pitch Circle for Planetary gear will vary according to tyre size (for 13-inch tyres roughly 1.3 inches ( $\approx 33.02\text{mm} \pm 10$ ))
- The radius of Sun gear will also vary with tyre size (for 13-inch tyres roughly 2 inches ( $\approx 50.8\text{mm} \pm 5$ ))

**V. WORKING**

- Torque will be supplied from the wheel gun to the shaft.
- First Case: - (Smaller Profile)
  - Torque will be further supplied through the sun gear to the planetary gears engaged with it.
- Second Case:-(Larger Profile)
  - For larger profiles, engagement of planetary gears will shift from Sun gear to Ring gear.
  - Torque will be further supplied through Ring gear to planetary gears engaged with it.
- Slots will be aligned with the wheel's nuts.
- The slots will rotate with the respective rotation of planetary gears.
- Rotation of slots will result in tightening/loosening of nuts.

**VI. WORKING PROCESS**



**VII. CONCLUSION**

- 1) It is a portable extension.
- 2) It reduces the human efforts.
- 3) It will save the time as well as the energy consumed.
- 4) It will be a variable diameter wheel gun, suitable for tyre nuts.

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