Design for wheel to hub Alignment Tool in aid of puncture Muhammad Safdar Khan TUS

Aim of the Project

The project aims to revamp the group project design of the Wheel-to-Hub Alignment Tool, integrating an automatic system for aiding puncture situations, replacing manual control. This system will secure the tire for alignment with the hub, facilitating the process.

Background

There are various systems that appear straightforward and practical for use. After examining different systems based on their. prices, weight, height, and length, significant differences were observed. Consequently, from the research conducted, the ultimate idea emerged: Just as cargo shipments in certain countries ride on air, your car can do the same. Air suspension systems have been prevalent in the trucking industry for quite some time. However, over the past decade, they have also gained traction in the commercial sector. From motorcycles to allterrain vehicles, custom cars, performance vehicles, and even everyday commuter cars, suspension systems are being these employed. Hence, the final choice was a pneumatic system equipped with air suspension.

Conceptual Design

The idea was to develop a design that is neither too tall to obstruct the view of the tire nor excessively heavy, surpassing the weight of the tire itself. Hence, devising an original idea isn't straightforward. Research reveals that such a product is not currently available in the market.

But from the group project there was some idea to work on.



The crucial aspect was selecting the appropriate material capable of withstanding the necessary force. This necessitated careful consideration of materials, as the selection varied depending on specific location and required specifications.

Figure 1: group project Design

While there were numerous ideas considered, the primary focus was on refining the main concept and detailing its functionality



This cylinder, which will house the air suspension, requires a material that is both sturdy and somewhat Strong, but heavy..



Design

From the conceptual design, it's evident that individuals may struggle to grasp what it actually is and how it will function. Therefore, creating 3D designs for each conceptual idea was crucial for visualizing and understanding its operational mechanism.



Photo of: 3d Design



Apart from that, the body parts will be constructed from aluminium, except for the section where the tire will be positioned. In that area, aluminium will still be utilized, but a layer of plastic will be added on top. This plastic layer enables smooth rotation of the tire, and it offers a good balance between weight and cost.

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Materials Selection



Photo of: a Cylinder



Photo of: graph for stainless steel





Photo of: plastic

Photo of: plastic graph

The graph is about plastic Density V/S Price

Air Suspension

The suspension system that will be housed within the cylinder is an air suspension, which operates through air control to adjust its height. This type of suspension is common in cars, alongside the traditional spring suspension.



Photo of: Air suspension System

To inflate the air suspension, a 12-volt electric air pump will be employed



Castor wheel

The castor wheels will be attached to the four legs of the final project for enhanced stability and mobility.





Photo of: Castor wheel