

Design and Development of Hubless Wheel

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Abstract— The current innovation connects with a cycle or a motor driven vehicle which continues on direction surface and all the more especially on a street. In the case of a motorcycle, the front guiding wheel is fitted with a first crown-molded roller bearing being involved an external annular component which upholds the edge and an inside annular component which is to an arm. The arm carries at its front end a second crown-shaped roller bearing of which the internal element is made integral by way of a lug of the interior annular element of the roller bearing and of which the interior annular element of bearing is made integral with the arm. The device allows transmitting the steering forces at a point located as close as possible to the contact area between the tire and the road. In addition to that, the vehicle becomes more compact, Because of center mass, it is troublesome in guiding contrast with without center point, which can be effectively directed in manual. The power is sent with the guide of stuff drive system which is more proficient than the chain drive mechanism.

Keywords: Rim, Roller, Rim Support Plate, Tubeless Tyre

I. INTRODUCTION

In today's era, there are many problems of using normal wheel are their heavy weight, comparable more cost, complex assembly which all makes for more force to accelerate the wheel or vehicles themselves. Across that I came to know that hubless wheels are helpful alternative of regular wheel. So, I searched and analysis whole system and I came across with new idea that is "Hubless wheel" means design of hubless wheel. The Hubless Wheel is the modified form of wheels for Light Motive Vehicles in which there is elimination of Hub from the traditional wheels. The eliminated hub gives it an excellent appearance with a lot many advantages over Hub-wheels. It reduces the overall weight of the wheels in the vehicle along with an advanced innovative design. It proves itself to be one of the great innovations in the field of automobiles. Further-on it also reduces the material consumption thus resulting in overall cost reduction. Inexact wheel require higher performance components its stressful.the outer bearing of the wheel will rotate more slowly in the orbit of the wheel for any speed.he brought with him making it more suitable for slow motion devices. the function that can be useful in the wheel drive because smart wheel foe some electric cars ,also reported to help in steering and braking as the hulls can stand on the wheel, against the force of what the car wants I want to after a corner, so the wheel turns point of contact, so you wheel want them high precision drive system

II. LITERATURE REVIEW

In 2015 Andrew. J. Horst, West Lawn [1] In this paper experimenter, The Hubless wheel of the current development uses a mix of the outside sliding construction, the inward sliding design and the connecting component to supplant the

ordinary Mecca segment, in order to successfully drop the material weight, number of hall, and the item cost, and further to increment primary strength of the stitch by the sliding design. As indicated by the substitute exemplification, the hubless wheel pivots to drive the bearing gathering to rotate along the hole between the sliding design, and that implies the shaft of the bearing gathering can spin and make the sliding designs move. Contrasting with the past workmanship, the hubless wheel of the current development doesn't utilize the focal Mecca segment, and the sliding construction and the spanning factors are applied to rotatable introduce the hubless wheel on the casing of the carriage. The sliding design that houses the shaped breakers are arranged around the inward substance of the trim to for the mounting intersection between the hubless wheel outline. Benefit of material thriftiness for minimal expense and low weight, compact mounting intersection for ground simultaneousness and new power age, programmed drive light. The hubless wheel of guarantee wherein the outer sliding design and the inward sliding construction are annular design molded to fit the fix.

In 2014 Sheldon S.N. Pinto, Joshua M Amarnath, Jishnu S. Nair, Rajkumar [2] In this investigation paper in the hubless specific vehicle in life pattern of item is totally significant particularly for a market able product. As per our plan; the harm opportunity is around 5. This is a base quantum considering the way that the chassis of the scale-cycle will observer both bowing second as well as well as shear powers. The plant of wellbeing according to our calculation is 42.8. Since this worth of FOS is inside achievability range as far as assembling capacity, the plan proposed is adept. As for life of the item, our plan has a delayed existence of over to cycles during its activity. This worth shows that the proposed plan isn't simply reasonable to deal with the exhaustion stress position, yet additionally appropriate to give an ostensible life season of the item. The material to name will safeguard light-weight qualities as well as the property to help scattering freight to provide for an ideal life.

In 1993 Franco Sbarro [3] Franco Sbarro professes to have built a machine driven vehicle with hub-less wheel. Chain drive is being utilized to communicate the power from the machine to the ruin wheel. Sbarro claims that hub-less wheel is more productive than the customary wheel. Sbarro further cases that the crown safe bearing whose outer help the stitch and whose innards is joined and hindering power. Front wheel is fitted with a first crown molded comber bearing being made out of annular component which is associated with an arm. The gadget likewise permits as sending powers at a point much close to the contact region among tire and street. The vehicle as indicated by guarantee wherein the controlling pivot of said substitute bearing goes through the rotational hub of the wheel. A vehicle as per the wherein the arm include no less than one tension arm and inside component of said substitute bearing is associated by the no less than one anticipation to help construction of the vehicle.

In 2001 Bennet Ross, Dunamon, Dr. Barlett [4] The Spokeless bicycle the cases to have created a hub-less wheel which has no chain drive dissimilar to Franco s chain driven hub-less wheel. The front facing fix and the obstruct fix incorporate score which will concede the different compartments. The broadly useful of the current development, which will be portrayed hitherto in lesser detail is give another hubless bicycle framework that has insect of the upsides of the bicycle predisposition referenced hereto frontward and various new highlights that effect in another hubless bicycle framework. The spokeless bicycle arrangement of guarantee wherein said front facing support structure further incorporates a front facing cross part between expressed support of front facing side part. This arrangement of guarantee wherein said frustrate support structure further incorporate an obstruct cross part expressed support of upset side part

In 2005 Willium J. Donakowski [5] The hubless caster gathering where the wheel isn't cut formed however is somewhat annular. Additionally, the internal outskirts is given with toroidal sections for the comber bearing. Donakowski in his work makes reference to that the caster hub-less gathering would have progressed firmness than a regular wheel. Dissimilar to hub-favor plan by different experimenters which utilizes either stuff or affix to communicate the power source in his proposed plan. The caster gathering of guarantee wherein expressed support of transport each turn separately regarding other. The hubless caster in wheel incorporated a neck segment adjusted to be placed in said annular face of said pivotal opening, said first bearing race shaped in an outside annular face of said neck segment. The caster gathering of guarantee wherein every one of expressed support of wheel each turn separately concerning other. The cater gathering of guarantee wherein shared with the wheel incorporate neck segment adjusted to be placed in said annular face of said hub opening, said first bearing race framed in outside annular face of said neck segment. A neck segment adjusted to be placed in said internal annular face said hub opening first bearing race shaped outer annular face.

III. OBJECTIVE

- 1) Reduce the weight of hubless wheel
- 2) Increase the safety of Hubless wheel
- 3) Low cost to manufacture hubless wheel
- 4) Less friction.

IV. PRINCIPLE

A hubless wheel (otherwise called an edge rider or center less wheel) is a kind of wheel with no middle center. To be exact, notwithstanding, the center point is quite basically as large as the actual wheel. The pivot is empty, following the wheel at extremely close resilientances. The hubless wheel was concocted by Franco Sbarro (who has constructed an assortment of working hubless wheel vehicles, including no less than two cruisers and a vehicle, the 1989 Sbarro Osmos), and protected by Globe holding of Geneva. The wheel still can't seem to arrive at its full specialized potential. Resiliances, move of energy, and materials are components of the plan which are yet to be completely taken advantage of Albeit hubless wheels are striking for all intents and purposes,

their various functional hindrances have blocked their boundless use as an option in contrast to ordinary wheels. They are troublesome and costly to make, requiring a lot of accuracy machining, and the plan leaves the direction and other mechanical parts generally presented to the components. The drive framework is particularly dangerous since a traditional hub and CV joint can't be utilized; choices incorporate utilizing chain or belt drive. Another arrangement, created by Sbarro, is to house the whole drive framework inside the actual wheel

V. SOLID MODELING

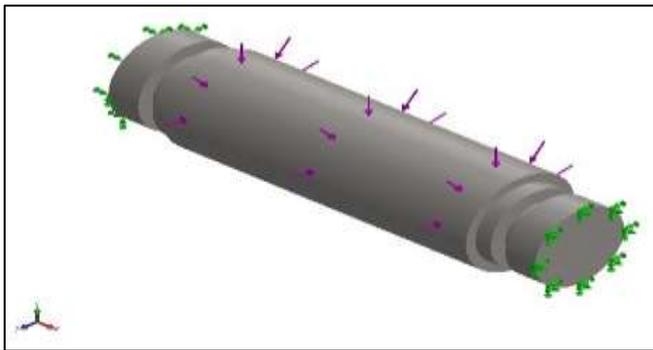
Modeling of Hubless wheel we decided to use Solid works Software. Solid Works is a solid modeling computer-aided design (CAD) and computer-aided engineering (CAE) computer program that runs on Microsoft Windows. Solid Works is published by Dassault Systems. Which gives us better designing way to make Hubless wheel and also gives wide range of functions to make our work easy. the modeling of tyre.the tyre is rubber converging typically inflated inner tube placed round a wheel to a form a soft contact with the road.the second modeling of Rim, the rim is the outer edge of a wheel, holding the tire.it makes up the outer circular design of the wheel on which the inside edge of the tire is mounted on vehicle such as automobiles. The modeling of the roller, the roller is work as a bearing in hubless wheel. Which gives a strength and moving support to the rim and tyre easily move.the last modeling of roller support clip Roller support clip main function is to stop horizontal motion of roller in hubless wheel. Basically, it works on circle principle and its also famous as a E- clip in industrial. After completing proper part design, I complete thr hubless wheel assembly in solid work in software



Fig. 5.1: Final Modeling of Hubless Wheel

VI. ANALYSIS

This is the first and most important part of designing in Mechanical field. CAD modeling and better analysis is important in this field; so, we start simulation of our hubless wheel components for know the value of stress and strain maximum and minimum value. Analysis is small regions or small geometries in your model, this could cause you to have proportionally small elements in that area and cause higher stresses than what is actual. So, if something in your model is small and not necessary to the question you are asking, get rid of it for the analysis help it. First of analysis of ruller



Mass : 0.0287435 kg
Volume: 3.63841 m³
Density: 7900 kg/m³
Weight: 0.281686 N
Element size: 1.53869 mm
Tolerance : 0.0769347 mm

Fig. 6.1: Applied force on roller

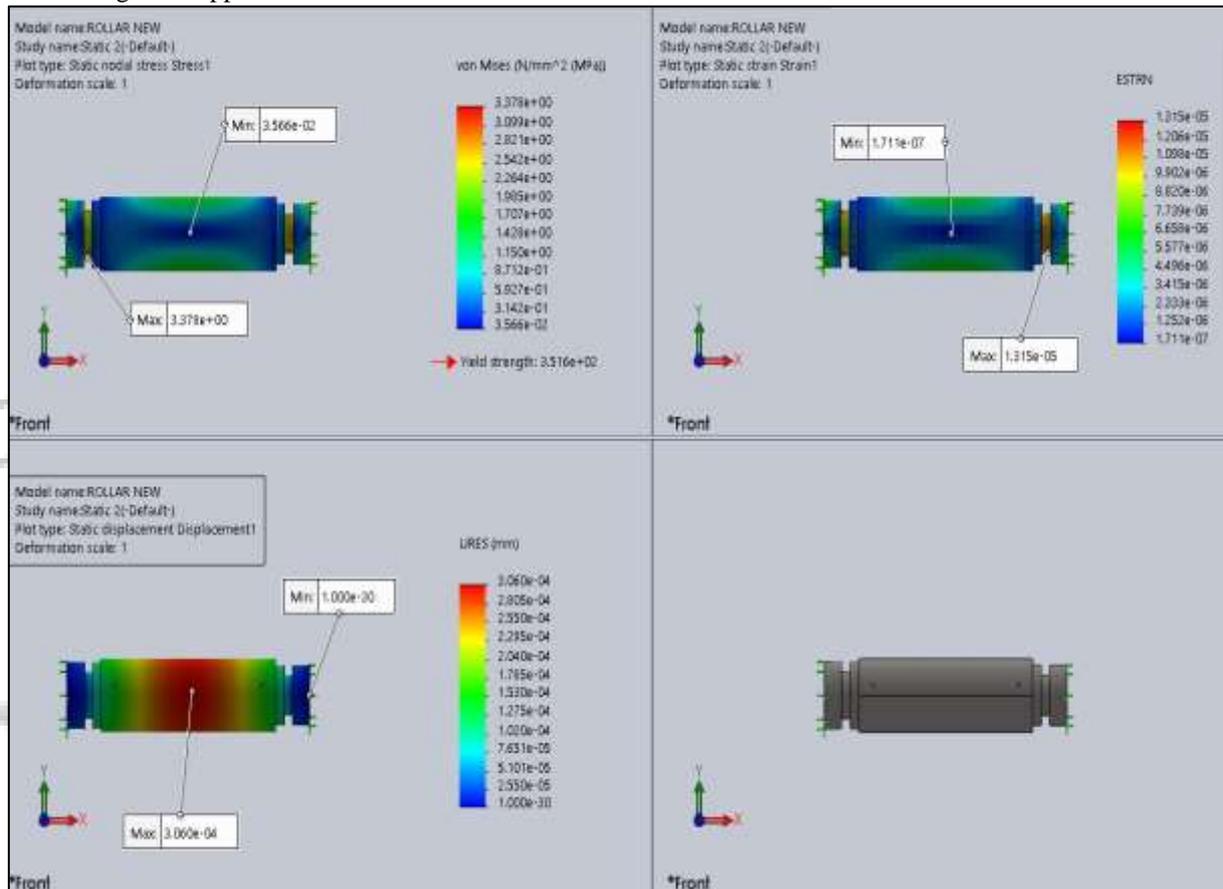
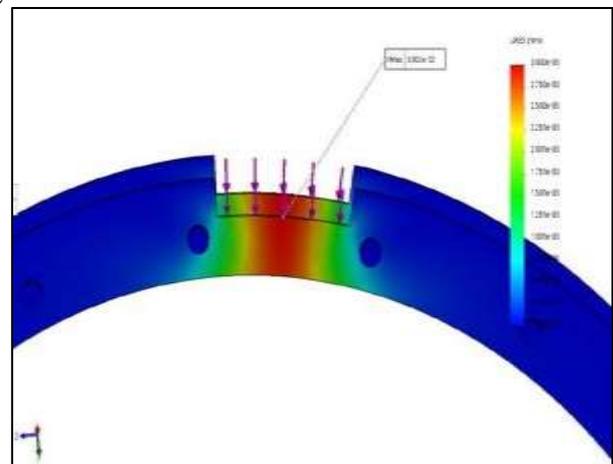


Fig. 6.2: Final analysis of roller

Analysis of Rim support plate. The rim support plate on applied of forces in the fixture details in entities 2 faces fixed geometry. the load detail in 2 faces in normal load apply, the value of 600N. the final analysis of two main part of hubless wheel and it is showing the design is good on two times two more load on compare to actual load and it is good for hubless wheel for all types of load, strength, stress, strain and displacement of loading bodies or part.



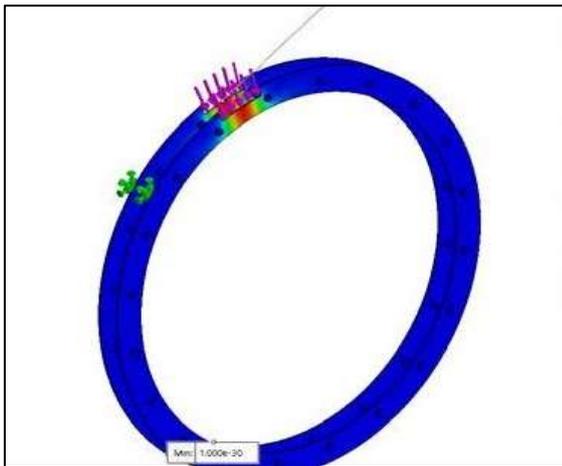


Fig. 6.3: Final analysis of rim support plate

VII. MANUFACTURING

The manufacturing process in the buy of standard rim of cycle in Indian market. the laser cut manufacturing for understanding with laser company owner gives design dwg. File.

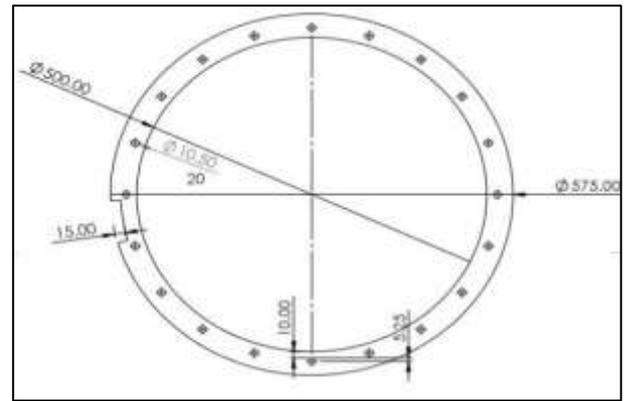


Fig. 7.1: Rim support plate

The manufacturing process in the Roller manufacture the job work in lathe machine I gives file industries in lathe machine operator the better job work.

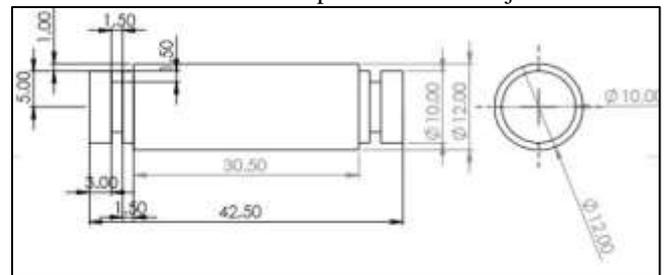


Fig. 7.2: Roller manufacture

VIII. FINAL MODEL OF HUBLESS WHEEL

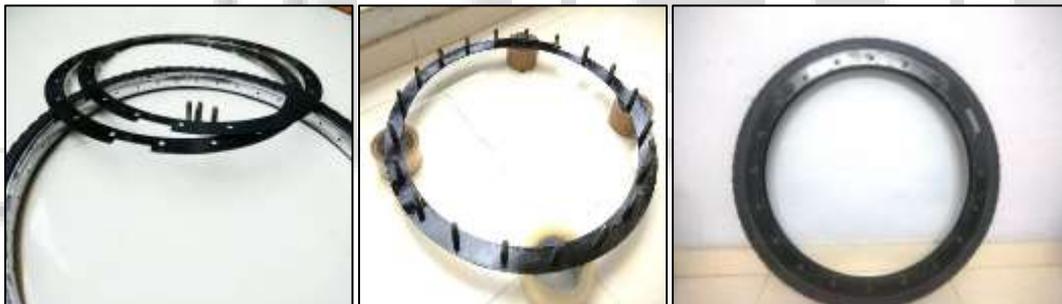


Fig. 8.1: Final Manufacturing of hubless wheel

IX. CONCLUSION

The hubless wheel is incredible concern and has made an honest effort to execute as many as highlights to make it practical and usable. This wheel is strong and simple to use for individuals. It is with the most recent idea that satisfies the expected requirements of Hubless wheel for individuals. With some further change it can finish with the development wheel. As indicated by achievability investigation, it is plausible to all way to the clients

Hub-less wheel is a next generation wheel which eliminates the short comings of any conventional hub less wheel vehicle. In the ongoing situation, where security, quality, and availability are prime concern, it gives answer for every one of them. The ongoing wheel configuration shows its uniqueness as far as mode by which the power is getting communicated. The disposal of center and spokes presents security in the gadget and ride experience improves as the utilization of center less wheel gives better vehicle solidness. The presence of non-complex components in the design

makes it more serviceable and accessible. Further advancement in this wheel produces enormous extension for upgrades in the current plan, like diminishing the frictional misfortunes among bearing and edge through plan adjustments and change in material. Better nature of battery can really improve the evaluated speed of vehicle.

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