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DESIGN AND MANUFACTURING OF ELECTRICAL GEAR SHIFTER FOR GO – KART

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Abstract-- **Motorcycles are widely used around the world particularly in INDIA. The gear shifting system of the motor-cycle is conventionally manual. This report covers development of an indigenous gear shifting changing system for the standard motorcycle. By this system the manual mechanical gear shifting will remain unchanged because an additional switch control system will be provided on the handles. So, the system has both the option manual as well as automatic. The system uses low-cost microcontrollers to make the accurate decision for shifting the gear up and down by observing the speed, and it controls the clutch transmission where necessary. The ELECTRO MECHANICAL GEAR SHIFTER mode will require input from the user to shift between gears using switches or buttons. The switches will be operated to instruct the motor to shift the gear. This will enable the user to shift gears using hands and can also always use the manual transmission if desired. The AUTOMATIC GEAR SHIFTER mode will consist of a microcontroller to make decision of changing the gears based on the reply of the wheel. It will use sensors and same actuation mechanism used for electromechanical system.**

KEYWORDS: Electrical gear shifting, Catia, Creo, Ansys Workbench, Thermal analysis, static analysis, etc.

I. INTRODUCTION

Transportation decisions impact many aspects of urban life. Young and old alike are affected by the viability and relative of travelling to destinations on foot, by bike, transit, or reliance on private vehicles. Transportation investments are arguably the single largest shaper of urban spaces and of development patterns. The safety, speed, and comfort for a particular mode of travel are a function of the investments that have been made in specific types of travel options. Regions, and parts of regions, vary considerably in terms of their supportiveness of travelling in ways that are health promoting (active) and environmentally sustainable. Transmission system transmits mechanical power from the engine to give kinetic energy to the wheels. It is an interconnected system of gears, shafts, and other electrical gadgets that form a bridge to transfer) power and energy from the engine to the wheels. The complete set up of the system helps to maintain the cruising speed of the vehicle without any disturbance to the performance.

The oldest variant of the transmission system in India is the manual transmission that has undergone various modifications and alterations to form the present-day automatic transmission. A transmission or gearbox provides speed and torque conversions from a rotating power source to another device using different gear ratios. transmission reduces the higher engine speed to the slower wheel speed, increasing torque in the process. A transmission will have multiple gear ratios with the ability to switch between them as speed varies. This switching may be done manually or automatically. Directional control may also be provided, such as forward and reverse gears. In motor vehicle applications, the transmission will generally be connected to the crankshaft of the engine. The output of the transmission is transmitted through chain drive, which in turn gives motion the rear wheel. Most modern gearboxes are used to increase torque while reducing the speed of a prime mover output shaft. This means that the output shaft of a gearbox will rotate at slower rate than the input shaft, and this reduction in speed will produce a mechanical advantage, causing an increase in torque.

II. Methodology

The primary parameters required for the design to be carried out are: -
1. Torque required to shift the gear.
2. Motor selection criteria.
3. Weight consideration
4. Motor mounting
5. Type of linkage required.
6. Torque amplification using linkage
7. CAE of components

III. LITERATURE REVIEW

[1] Farid Tolba Adham Mohamed Abdelkader, A patent [2] an actuator with a tachometer for the fore- aft movement of the gears is used. The gear shifting mechanism also includes a solenoid and pivotal mounting to provide movement of the actuator assembly in second direction. In this patent the invention of automated driver system for a manual transmission vehicle includes a gear shifting mechanism under control of a microprocessor. The gear shifting mechanism includes a gear shift actuator, DC Motor, Tachometer with a lead screw assembly and also a linear displacement transducer is used.

[2] Pawan R. Gurav, Rajesh M.Mhatre, Deepak B. Pal , Geeta J. karmarka, The patent [4] To automate the manual transmission in two wheelers hydraulic and pneumatic drives are used. But these equipment results higher weight of vehicle. Also, the response of this system gives sluggish response and leakages issue. To avoid this AMT is used.

[3] A. A. Jagatap, S. D. Lokhande, The journal [8] gives us a brief introduction to shift schedule of gears to save energy and improve fuel economy. Since there is no perfect automatic shift technology for engineering vehicles, this theory is implemented to improve the ordinary vehicle transmission. The author predicts that automatic gear transmission vehicle chooses the best shift rule based upon driver's information of manipulation the author also claims that the rule of shift decision changes the traditional shift mechanism to intelligent shift decision.

[4] Rajesh M.Mhatre, Deepak B. Pal , Sahil R.Satvilkar, Patent [5] has mentioned that the transmission gears and clutch shifting apparatus for automatic operation of manual shift mechanism in a automotive vehicle include gear and clutch actuation mechanisms mounted on bar of vehicle and coupled by the cables to the control actuation mechanisms mounted off the vehicle board. The on-board gear shift actuator includes two intersecting movable slots for causing movement of the shift lever. In this invention electrical control and actuation mechanism are mounted outside the vehicle. A relatively small gear and clutches is mounted on the vehicle, cables are used to connect these actuators with each other.

[5] Ying Yang Qing Zhang Zhen Wang Zeyu Chen Xue Cai College of mechanical engineering and automation, It is describe the patent [1] On semi-automatic gear shifting apparatus for use in shifting gears in gearboxes of motorcycles and the like gearboxes wherein gears are shifted by rotating spindles which are connected to the ratchet type gear shifting means. Here the shifting apparatus consists of a lever arm, one end of which is connected to the spindle and the other end is connected to the toe pedal. Also, an actuating rod is connected to the toe pedal, the rod is reciprocated to move the lever and in turn the spindle. This spindle is actuated by a pair of push button switches mounted on the handle bar.

IV. DESIGN CONSIDERATION

Engine - Discover 125 cc Length of link

attached -5m

Considering that the first gear requires the max. Torque to be shifted, an arrangement wasmade such that a coupling

was attached to the gear shaft.

This coupling was loaded with weights at the end of it using a string loader. Gradually loadwas increased from 2 kg to 12

kg

Therefore,

By using the equation for torque,T-F"

perpendicular distance T=120(n) 0.05(m)

T-6nm

The torque required to shift the first gear is 6nm.

Fig. 4.1. Gear Shifter Design.

V. CAD MODEL & ANSYS ANALYSIS

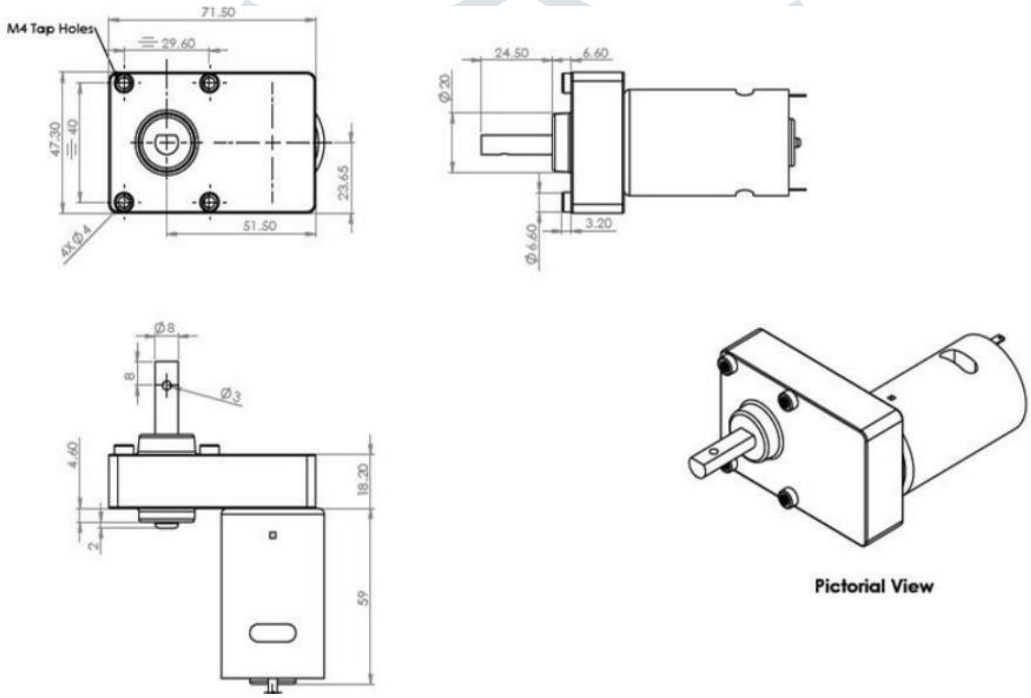

Fig. 5.1. 2-D CAD MODEL OF SQUARE GEARED DC MOTOR.

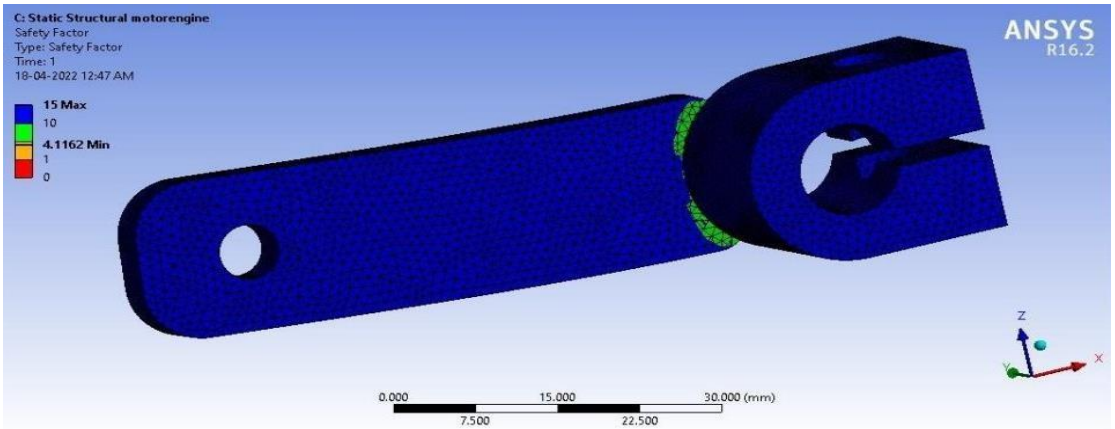

Fig. 5.2. GEAR SHAFT COUPLING.

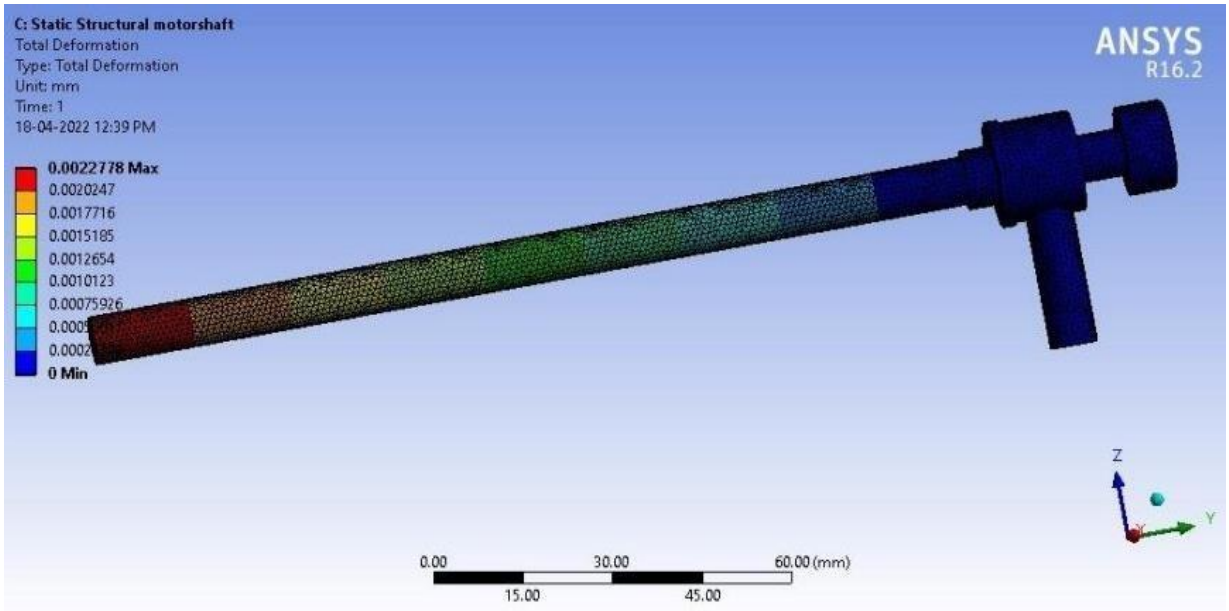

Fig. No. 5.3 PUSH-PULL ROD.

VI. CONCLUSION

This work adventured by us can be used as a safety precaution. we have done this project with simple in construction by lower expenses this is one of the advantageous projects. The combination of electronic and mechatronics thereby reducing the chance of death in an accident. This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of knowledge regarding planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between institution and industries. We are proud that we have completed the work with the limited time successfully. The "DESIGN AND MANUFACTURING OF ELECTRICAL GEAR SHIFTER FOR GO-KART" is working with satisfactory condition.

ACKNOWLEDGMENT

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[5] Pawan R. Gurav, Rajesh M.Mhatre, Deepak B. Pal , Sahil R.Satvilkar, Geeta J. karmarkar,"Button operated gear shifter in two wheeler using stepper motor" International Journal of Scientific & Engineering Research, Volume 8, Issue 3, March-2017