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DESIGN AND FABRICATION OF QUAD VEHICLE

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Abstract : An all-terrain vehicle (ATV), also known as a light utility vehicle, a quad bike, or simply a quad, as defined by the American National Standards Institute (ANSI), is a vehicle that travels on low-pressure tires, has a seat that is straddled by the operator, and has handlebars. Quad is an all terrain vehicle (a four-wheeler bike), which was initially developed as a farm-to-town vehicle in isolated and mountainous areas .The challenge to manufacture a vehicle with best performance in rugged terrains. An aspect of this project is to design and document a report that creates an overview of the vehicle's construction element. The team focused on improving every single system on the bike to enhance performance and drivability.

IndexTerms **– Quad Vehicle,Terrine Vehicle,Design,Fabrication,Performance.**

I. INTRODUCTION

The design and fabrication of Quad Bike. ATV means an All-Terrain vehicle, classified as quad, quad bike, 3 wheelers, 4 wheelers, or quad-tricycle is defined by the American National Standards Institute (ANSI) as a vehicle that travels on low pressure tires, with a seat that is straddled by the operator, along with the handle bar for a steering control. As the name implies, it is a design to handle a wider variety of terrain than most other vehicles. The ATV is specially designed for an off road driving. ATV is designed for very rough terrain, jumps, maneuverability and endurance. The design process of this single person vehicle is iterative and based on several engineering and reverse engineering processes.

The designing work is initiated to achieve the best standardized as well as optimized design possible. Besides performance, consumer needs of serviceability and affordability were also kept in concern which we got to know through the internet research and reviews for all terrain vehicles. The primary objective of the frame is to provide a 3-dimensional protected space around the various sub-systems that will keep the driver safe. Its secondary objectives are to provide reliable mounting locations for components, appealing, low in cost, and low in weight. The main objective was to create an ATV i.e. Quad Bike prototype to ride easily in rough terrains such as deserts and overcome muddy ditches. Quad bikes are primarily designed to ride in deserts and off road terrain areas like us conventional bikes and vehicles can't be used in this terrain.

1.1.SCOPE OF QUAD BIKE:

The quad was first named a Quad tricycle and was initially designed, built and sold by Royal Enfield in 1983. It was designed to replace horses in pulling carriages. In 1967 Honda needed something that would sell well when Motorbike sales dipped during the winter months. They developed a three wheeled all-terrain vehicle which begun the popularity of the quad bike. In 1982, Suzuki released their first range of ATVs, this time with a four wheeled variant. The popularity of the four wheeled variant soon over shadowed the Three wheeled one and other companies quickly followed suit. American companies saw the success of the four wheeled bike and developed their own. In 1985 the Polaris Industries created tTe first American Quad Bike. Due to increased safety concerns the three wheeled bike became less popular and eventually production of the vehicles stopped altogether when governing bodies declared them too unsafe to be sold.

Even with four wheels the Quad bike is seen as a dangerous vehicle if incorrectly used and new legislation is often discussed in relation to the use of Quad bikes. So we are sure thatour project will have a high demand in the industry and also we are hoping to get orders from racing guns.

Fig: 1.1 Quad Vehicle

1.2.About Quad Bike :

A quad, quad bike, three-wheeler, or four- wheeler, is defined by the American National Standards Institute (ANSI) as a vehicle that travels on low-pressure tires, with a seat that is straddled by the operator, along with handlebars for steering control. As the name implies, it is designed to handle a wider variety of terrain than most other vehicles. Although it is a street- legal vehicle in some countries, it is not street- legal within most states and provinces of Australia, the United States or Canada.By the current ANSI definition, Quad bikes are intended for use by a single operator, although some companies have developed Quad bike intended for use by the operator and one passenger. These Quad bikes are referred to as tandem Quad bikes.The rider sits on and operates these vehicles like a motorcycle, but the extra wheels give more stability at slower speeds. Although equipped with three or four wheels, six-wheel models exist for specialized applications. Engine sizes of Quad Bikes currently for sale in the United States, (as of 2008 products), range from 49 to 1,000 cc (3 to61 cu in).

1.3.Quad Bike In India:

On 10th March 2014, A Bangalore High Court ruling has made it possible for RTO in Karnataka to register ATVs. Until recently these All Terrain Vehicles or Quad Bikes were restricted to off- road use only; one wasn't allowed to ride/drive them on public roads and they could only be used in private farms or property. Adventurers and Quad Bike owners can rejoice as the situation is set to change and from the report in daily Bangalore Mirror, at least Quad Bike owners in Karnataka can have a sigh of relief as they can now head to their nearest RTO and register their quad bikes and drive them on the road. Quad Bikes are also finding application in agricultural and mining sectors. After several steps taken by government ,the craze of Quad Bike has increased. Companies like Polaris and Yamaha have started selling their products in India.

1.4.Quad Bike in Foreign Countries:

Amongst foreign countries United States is the most valuable market in Quad Bike .There are lots of enthusiasts who own Quad Bike for recreational purposes. Lots of societies and groups have been formed who hold regular competition ,though some strict rules have been made regarding Quad Bike .In United Kingdom , Quad Bikes are recognised as vehicles having 550kg and 4 wheels .Riding Quad Bike on public road is not allowed and requires a special licence .In Australia ,some years ago Quad Bikes were legal but now after lots of accident cases registered, they have been prohibited on public road.

1.5. Definitions and Nomenclature:

Clear definition and differentiation is required with respect to several important terms used in this review:„Quad bike "This review will examine the use of four wheeled, motorized bikes, having a straddle seat and handlebars. Such bikes are commonly referred to as either Quad bikes, or All-Terrain Vehicles (ATVs). For clarity and simplicity, this review will henceforth refer to these vehicles exclusively as Quad bikes. In instances where a vehicle has been described as an ATV by the original authors, the term Quad bike will be used in its place. Three wheeled motorbikes (which were phased out of the market in the late 1980s) and larger „side-by-side" vehicles (also known as Utility Task Vehicles) are not considered Quad bikes, and as such do not fall within the scope of this work.

This review will largely focus on the use of crush protection devices (CPDs) on Quad bikes, particularly the Australian-designed Quad Bar. Some testing and simulation of Roll Over Protective Structures (ROPS) devices will also be provided. In the past, various authors have used the umbrella term „Roll Over Protective Structure", or even „Roll Over Protection System" to describe devices which are more correctly categorized as CPDs. For the purposes of this review, CPDs will be distinguished from ROPS, and PROP on the following basis:

A Roll Over Protective Structure or System (ROPS), is a external frame or structure which forms a compartment to protect the rider from injuries caused by vehicle overturns and to a lesser extent, collisions. Such structures may also incorporate crushable components designed to absorb energy during a crash and reduce the magnitude of vehicle and rider accelerations during these events. A ROPS „system" generally incorporates additional operator restraints, such as seatbelts, to ensure that the rider remains within the protective structure during the roll or crash event. ROPS are commonly used on heavy vehicles such as earth-moving equipment and tractors, high performance on-road vehicles such as race cars, and high speed off-road vehicle such as buggies. ROPS designs for Quad bikes proposed by Dahle, Johnson, and MUARC will be examined in this review.

The term Passive Roll Over Protective Structure has also been employed at times to denote smaller and less intrusive ROPS structures which do not employ rider restraints. In the context of this review, such devices will be classified and referred to as Crush Protection Devices (CPDs).

A Crush Protection Device is a structure designed to form a protective space between the bike and the ground in the event of roll over. Such devices aim to prevent or reduce rider injuries incurred due to crushing or asphyxiation. In general, CPDs are not designed to be used with occupant restraints, thereby allowing the use of active riding techniques and rider separation from the vehicle during loss of control events. CPD designs including the UK HSE U-Bar, the NZ T-Bar and the Robertson V-Bar (later

renamed the Quad Bar) will be examined. For clarity and simplicity, where these devices have been termed as ROPS (or even PROPS) by the original authors, such designations have been changed to CPD.

1.6. BIKE DIMENSIONS:

Fork Length	- 750 mm
Ground clearance	- 250 mm
Wheel to Distance	- 860 mm
Vehicle Length	- 1800 mm
Vehicle Height	- 1000 mm
Wheel Distance	- 1000 mm
Front Wheel Distance	- 1070 mm
Vehicle Carriage	- 530 mm
Spring Angle	- 55 deg
Wishbone Dimensions	-190 mm
Tyre Profile	- R 12 145/70
Swing Arm Length	- 590 mm
Steering Rack	- 600 mm

II DESIGN OF QUAD VEHICLE

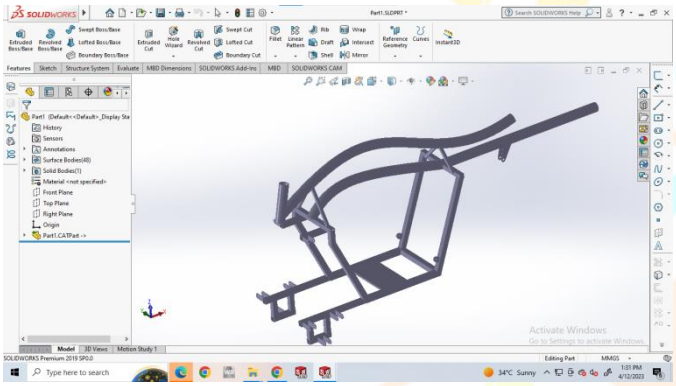


Fig: 2.1 Design Of Chassis

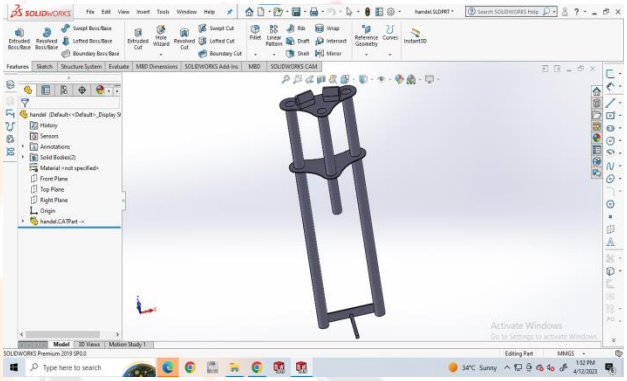


Fig:2.2 Design Of Handle Bar

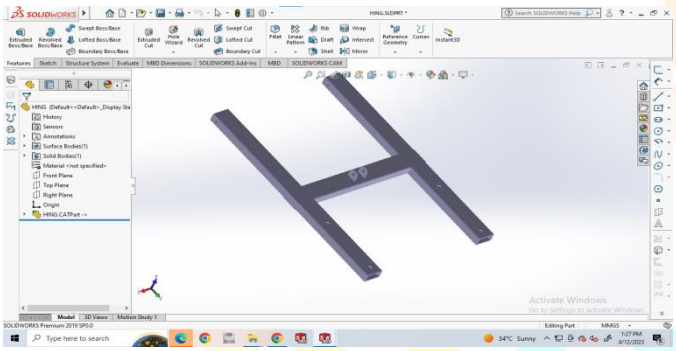


Fig: 2.3 Design Of Swing Arm

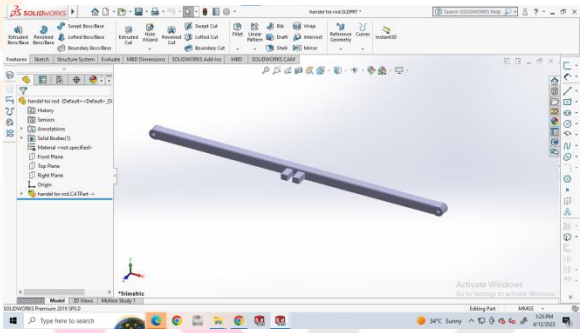
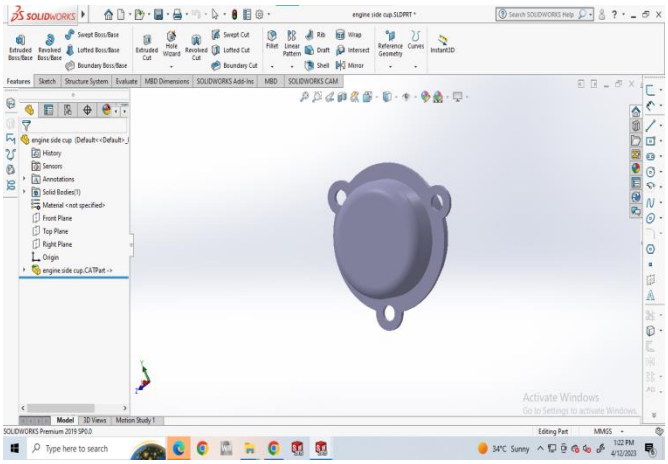
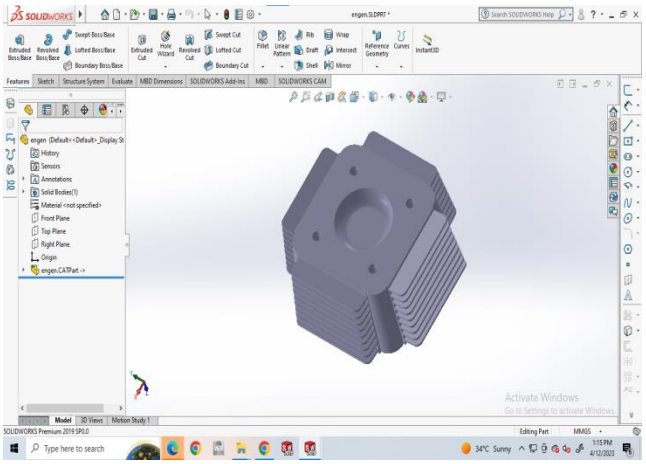
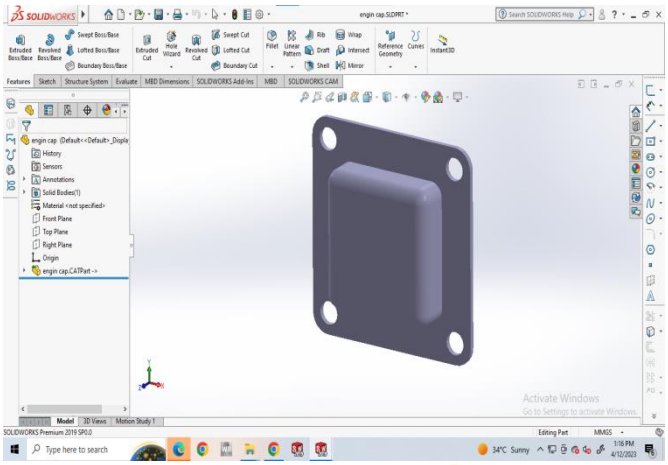


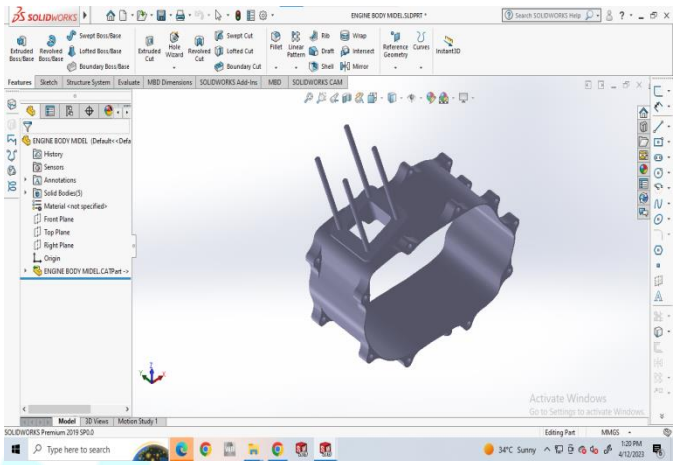
Fig:2.4 Design Of Handle Tie Rod

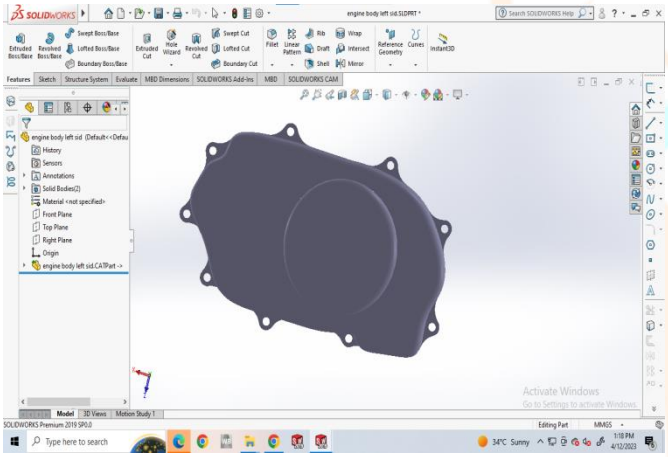
III DESIGN OF PARTS DESIGN

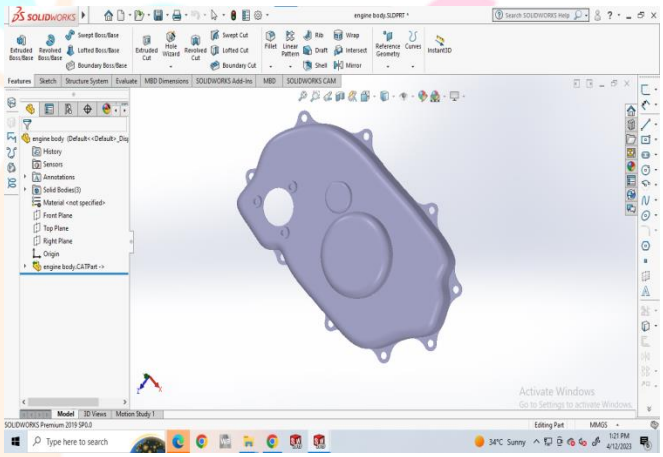


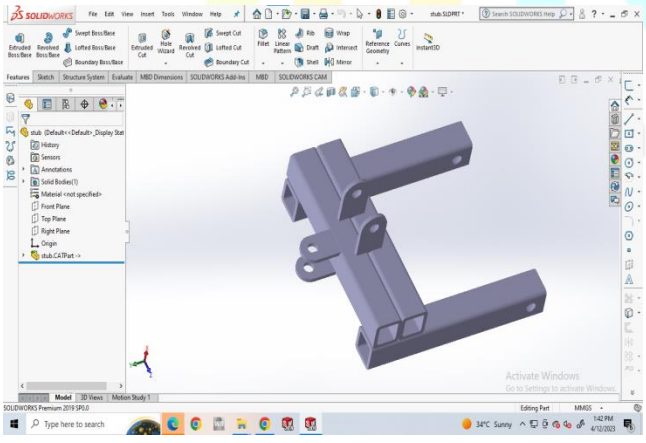


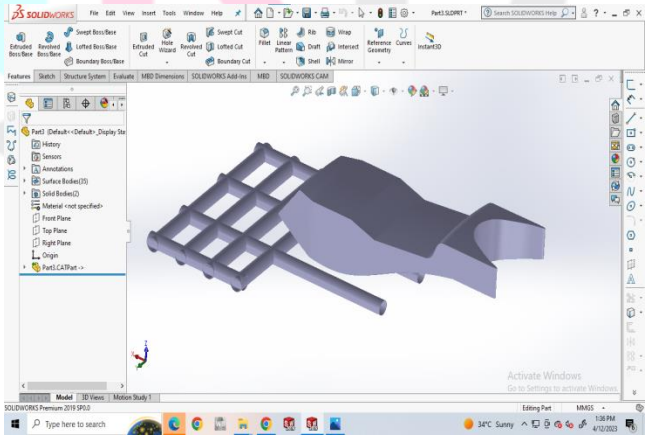


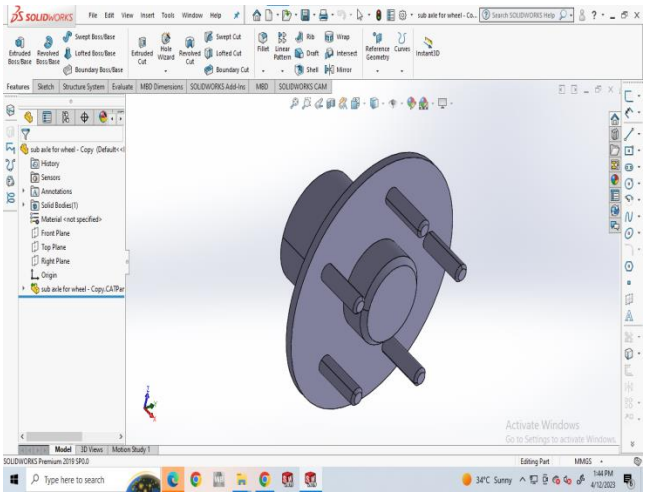


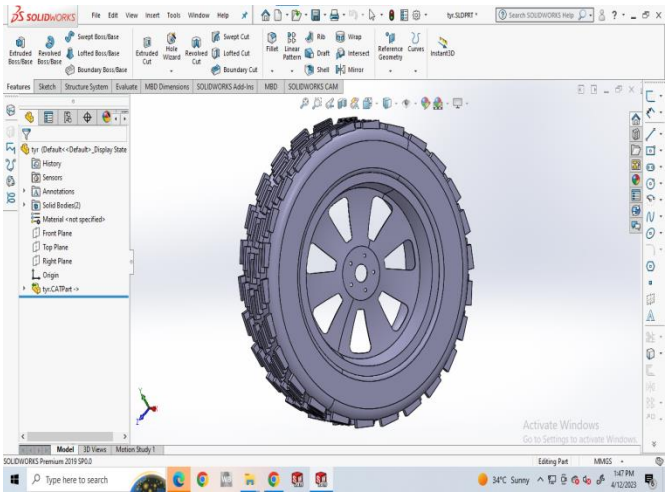


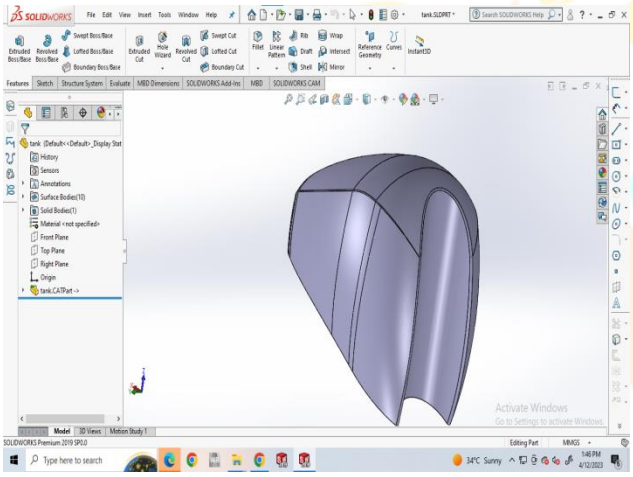


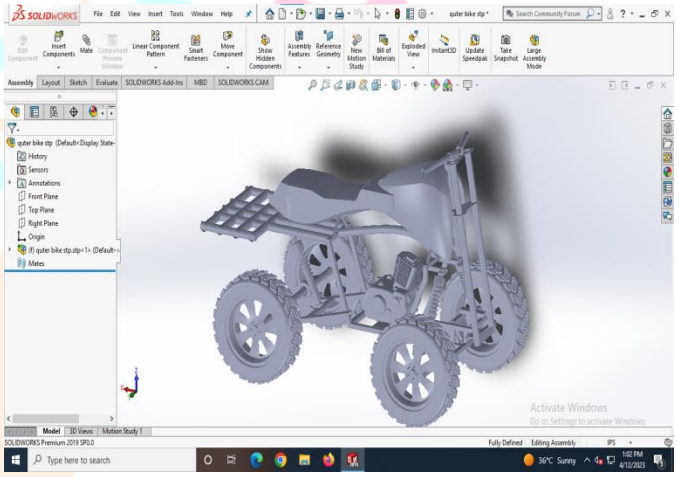












IV. CONCLUSION

In Olden Days Quad vehicles have become increasingly popular due to their versatility, speed, and off-road capabilities. They are used for a variety of purposes including recreational activities.

But, In this design and fabrication of this vehicle using Agricultural purpose, Carrying loads, constructions fields, commercial purposes and transportation in remote, village and city areas.

V. ACKNOWLEDGMENT

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