

“Economic Construction and Assembling of All-Terrain Vehicle (ATV) Incorporated with Single Cylinder 4-stroke Engine”

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Abstract - This paper aims at developing a technically sound and conceptually designed ATV referred to as quad bike. During this paper, it describes intimately the procedure followed, methodology used and therefore the issues created within the entire style analysis of quad bike. So as accomplish this task, there's a special planning and analysis will be meted out to boost the protection of various sub-components of the quad bike like chassis, suspension, steering mechanism, braking etc. It additionally describe intimately, there's a spread of methodology thought within the entire style method. These efforts are validate the look by theoretical calculations, simulations also are meted out.

Key Words: Quad bike, All Terrain Vehicle, off roader.

1. INTRODUCTION

The primary objective of this all terrain vehicles (ATV) is working effectively on roads as well as no roads conditions. This ATV is mainly fabricated for proper transportation on rough roads in shorter distances. For simplicity and keeping into thought the need and style constrains, We've assumed that the planning method of this quad bike can incorporate an engine of hero Honda splendor concerning 100cc that is typically employed in little ATV s and thought vehicle like quad bike. The choice of engine has been influenced by the parameters just like the practicality and performance with relevancy force, acceleration, traction, mobility and endurance of the vehicle.



Fig-1 : Overview of ATV

2. DESIGN APPROACH

The task of ATV design began with conducting in depth analysis for ATVs and quad bike and knowing its numerous technical specifications wherever regarding. Information from our analysis the initial planning and look will be designed on a CAD platform & further designing will be drawn at CATIA V5R20 which is the CAD package used for simulation of engine and further analysis.

2.1 FRAME

Designing and fabrication of the frame is first priority of the design procedure. The considerations should be taken out while designing ATV frame are: 1)Reliability 2)Aerodynamics 3)Safety and Ergonomics 4)Economic construction to ensure driver's safety, give reliable mounting locations for the engine and different vehicle parts, be esthetically appealing, low in price, and low in weight, numerous issues taken into thought to replicate identical. The generated style though the CAD computer code is as follows.



Fig-2 : Design of ATV

2.2 BRAKING SYSTEM

The braking system for the vehicle is able for stopping the vehicle in any respect times and is integral for the driver's and vehicle's safety. The vehicle should be equipped with a braking system that acts on rear wheels and single plate hydraulic disc & having its own fluid reservoir.



Fig-3 : Breaking system

2.3 suspension system

In the all terrain vehicle suspension system is having very much importance. Basically ATV is an off roader so it requires large travel suspension system. In this quad bike the team has finalized front suspension as a coil spring inside a spring suspension & at the rear end a mono cross single coil spring suspension for a better support.



Fig-4 : mono cross rear suspension



Fig-5 : SNS front suspension

2.4 Steering system

The mechanisms is able for the direct accordance to basic automobile rules governing the drive of a 2 wheeler or a vehicle being driven with a steering , it should be of mechanical links and should not be spherical or H The steering are of handle sort with a column. The steering column or stem are created out of identical material because there main of the chassis. The tie rods for the steering can have knuckle joints to atone for the suspension jounce.



Fig-6 : Steering system

3. LITERATURE REVIEW

Haik Himam Saheb, Ravi Sandeep Kumar at all 2016, the report explains objectives, assumptions and calculations created in planning and fabricating a QUAD BIKE for QUAD 2016. Quad Bike is associate degree All tract vehicle (4-Wheeler bike), that was at first developed as a farm to city vehicle in Isolated and mountainous areas. The team's primary objective is to style a secure and purposeful vehicle primarily based on rigid and torsion free frame considering the technical tips provided in the rule book on with that operating on every parameter that would enhance the performance and potency of our vehicle. [1]

Annamalai, Bevin babu at all 2012, All-terrain vehicle(ATV) Square measure achieving wider response and significance in the gift world. With their characteristic skills of getting through any piece of ground together with their straight forward and compact structure, they rule the off-roading world. A new field of engineering analysis has been developed owing to the increasing range of ATV accidents. [2]

Amol Santosh Junnarkar at all 2018, Designing purpose of this Quad bike is to manufacture Associate in Nursing off road vehicle that would facilitate in transportation in mountainous areas, farming field and as a reliable expertise for a weekend enthusiast. So as to accomplish this task, different style aspects of a Quad Bike Vehicles were analyzed, and sure components of the bike were chosen for specific focus. There square measure several sides to Associate in Nursing cross-country vehicle, like the chassis, suspension, steering, drive-train and braking, all of that need though style concentration. The foremost time and energy went into coming up with and implementing these components of the vehicle as a results of it had been felt that they most dramatically have an effect on the cross-country driving expertise. [3]

Deep Shrivastava 2014, planning purpose of this Quad Bike is to manufacture an off road vehicle that might facilitate in transportation in craggy areas farming field and as a reliable expertise for a weekend enthusiast so as to accomplish this task, totally different style aspects of a Quad Bike vehicle were analyzed, and sure elements of the bike were chosen for specific focus. There are many sides to associate cross-country vehicle, like the chassis, suspension; steering, drive-train, and breaking all of that require though style concentration. The points of the automotive I decide to specifically specialize in were the chassis, drive-train, and suspension the foremost time and energy went into planning and implementing these elements of the vehicle as a result of it absolutely was felt that they most dramatically result the cross-country driving experience throughout the complete style method, client interest through innovative, cheap, and effective ways was always the first goal. [4]

Jawagar Shrehari at all 2016, this style report aims to get conceptually sound and optimized style analysis of quad bike.

In order to accomplish this takes, there's a unique planning and analysis is applied to reinforce the protection of different sub-components of the quad bike like chassis, suspension, steering mechanisms, braking etc. It can jointly describe in detail, there's a range of methodology thought within the entire style method. These effort are validate the design by theoretical calculations, simulations also are applied. [5]

Srijan Manish, Jitendra Kumar Rajak at all 2014, First the planning approach is mentioned then the resulting style procedure analysis has been explained. Due efforts are place to validate the planning by theoretical calculations, simulations and proverbial facts. The aim behind this paper is to explain a reliable nevertheless cheaper methodology for industrial quad bike planning and simulation that will be used as a reference several for several of the coming industries also as many research and development comes. [6]

Ahamd Madni, Singh Yagyanath at all 2015, many alternative management strategies for ABS Systems are developed. These strategies disagree in their theoretical basis and performance below the changes of road conditions. In our projects we tend to employ a Mechanical ABS System or additional like "ANTI BRAKE LOCK SYSTEM" Which permit mobility to the vehicle in laborious braking condition while not lockup the wheel utterly. However, this method is most safety issues in ATV bikes and can try and overcome this issue by victimization ABS System and by ever-changing & fabricating the chassis of a discarded Quad bike. We are going to conjointly create some structural modification so as to boost stability and performance of the bike below tested conditions. [7]

Andrew Mclnotsh, Around twelve to fourteen folk's area unit killed and 1400 separated annually in Australia ensuring from Quad bike (All parcel vehicle ATV) and aspect by aspect vehicle (SSV) incidents. The Australia parcel vehicle Assessment Program (ATV AP) shopper safety star classification system has been developed on the idea of tests assessing a vehicle's static stability, dynamic handling and change crashworthiness and is being planned as a way to cut back these serious and fatal injuries chiefly resulting from Quad bike rollovers. The ATV AP objective is to introduce a strong check primarily based classification system, so as to supply shopper primarily based incentives for informed, safer and applicable vehicle purchase, light 'Fit For Purpose' criteria, with corresponding incentives and competition amongst the Quad bike and SSV business for improved styles and models. This Paper presents an outline of the testing basis on that the planned classification system was developed. [8]

Mangalath, Jayakrisnan 2018, our analysis show that a lot of similar vehicles bring home the bacon tilting by victimization active hydraulic actuation that limits the naturalness of the leaning action and puts extra parasitic losses on the engine. Instead we will style the vehicle to lean passively. [9]

M.S.M Aras, M.K.M Zambri 2015, the main downside of the ATV involves the steering management (yaw control) that cannot rotate simply and wishes high forces to regulate the movement of ATV. Yaw movement is incredibly restricted once driven manually, size it needs high forces to move the steering. This project with a mathematical and empirical modeling to capture the dynamics of a fresh changed ATV during this project, the modeling of ATV by using system identification technique is conducted. The model can then be compared to its derived mathematical model. Then, the planning of a wireless system is needed to solve the matter, which ends up in a simple rotation of 45 degree to the left and right with precise, correct and light-weight yaw movement and verification mistreatment MATLAB Simulink. As a conclusion the yaw estimation shows that the ATV movement achieved its stability at angle 45 degree. [10]

4. OVERALL VEHICLE SPECIFICATIONS

Table no.1

DESCRIPTION	SPECIFICATION
Wheel Base	49.2 in
Ground Clearance	11.3 in
Engine Max Torque	8.05nm
R.P.M	@5000rpm
Max speed	60km/hr
Gear Ratio	10:1
Tire Size	90/100-10
Engine Specification	97.2cc single cylinder 4-stroke SI engine

5. CONCLUSION

Here, we have a tendency to reach generating a definite however price effective style methodology for a quad bike to be designed at industrial level. Concern ranging from vehicle conception, the approach it's designed, keeping under consideration the necessities and target specification and performance delineate. The analysis of the look via the Finite component Analysis methodology and its validation outlined during this paper intimately. Also, an in depth description of the phase suspension style and also the methodology of selecting and coming up with the required suspension assembly, the braking system and also the choice of desired rotor and drive safety, steering mechanism and also the management over the vehicle and alternative building factors as taken under consideration intimately. The

conception of centre of gravity and its importance in an exceedingly vehicle style is additionally intimately. Thus within the conclusion, we've got generated a productive and however reliable methodology for generating a quad bike incorporating varied automotive and mechanical ideas and tools.



Fig-7 : Final assembly

REFERENCES

- [1] Design Report Quad Bike Design Challenge – 2016 Haik Himam Saheb, Ravi Sandeep Kumar, Abhilash Reddy G and Neela sai kiran Department of Mechanical Engineering, GNIT, Hyderabad.
- [2] Analysis Of All Terrain Vehicle (ATVV) for impact loading and roll over considering the safety of Occupants Naiju. C.D, Annamalai, Bevin babu, Nikhil Prakash, SMBS VIT University, vellore 632014, india November 2012.
- [3] Design and Fabrication of All-Terrain Quad Bike 1.Nikhil Pramod Kulkarni, 2.Anmol Santosh Junnarkar, 3.Mit Paresh Mehta Department of Mechanical Engineering, 1.k.k.Wagh Collage of Engineering Nashik, Maharashtra, India, 2 Jawahar Insitiute Of Technology, Nashik, Maharashtra, India UEDR 2018 Volume 6, Issue 3, ISSN: 2321- 9939.
- [4] Designing of All Terrain Vehicle (ATV) Deep Shrivastva Mechanical Department of Oriental Institute of Science and Technology Bhopal International Journal of Scientific and Research Publication, Volume 4, Issue 12, December 2014.
- [5] Design Analysis and Fabrication of All-Terrain Vehicle (Quad-Bike) Raagul Srinivasn K A , Jawagar Shrehari J B.E. Student, Department of Mechanical Engineering, Dr. N.G.P. Institue of Technology , Coimbatore, India, International Journal of innovative Research in Science, Engineering and Technology (An Iso 3297:2007 Certified organization) Vol.5, Issue 11 , November 2016.
- [6] Quad Bike Design And Simualtion: A Pre-Manufacturing Methodology 1.Srijan Manish,2. jitendra Kumar Rajak, 3.Vishnu Kant Tiwari, 4.Rakes Volume 5, Issue 6, June (2014),pp. 68-76.
- [7] 2015 Month : November Volume : 1 Issue : 4Page 338-345 Design And Fabrication Of Quad Bike 1.Ahmad Madni, 2.Singh Yagyanath, 3.Saurabh Kumar,4.Gagandaep Singh,5.Mohit Saraf,6.Abhishek Kumar
- [8] Transport And Road Safety (TARS) Research, University of New South Wales, Sydney, Australia Andrew McIntosh Consultancy & Research Pty Ltd, Australia
- [9] Design And Fabrication Of Leaning Quad Bike 1.Georgekutty S Mangalath,2.Jayakrisnan K V, 3.Khamarudheen K,4.Rino Raj P,5.Vaisakh Rajasekharan 1Assistant Professor, Department of Mechanical Engineering, Mar Athanasius Collage of Engineering, Kothamangalan, Kerala, India. Volume: 05 issue: 04 Apr – 2018
- [10] System identification modeling based on modification of all terrain vehicle (ATV) using wireless control system M.S.M. Aras, M.K.M. Zambri, F.A. Azis M.Z.A. Rashid, M.N. Kamarudin 1 UTeRG, CERIA, Faculty of Eletrical Engineering, University Teknikal Melaka (UteM), Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia; Volume 9 , pp. 1640-1654, December 2015