International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

IJIEMR Transactions, online available on 23rd June 2017. Link :http://www.ijiemr.org/downloads.php?vol=Volume-6&issue=ISSUE-4

Title: **THERMAL SIMULATION OF HYBRID DRIVE SYSTEM**

Volume 06, Issue 4, Pages: 1292–1302.

Paper Authors

VEERABABU PERABATHULA, MR. RAMBABU
Pydah College of Engineering

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

THERMAL SIMULATION OF HYBRID DRIVE SYSTEM

[1]VEERABABU PERABATHULA, [2]MR. RAMBABU
[1]Dept of Thermal Emgineering,Pydah College of Engineering
[2]Assistant Professor,Dept of Thermal Emgineering,Pydah College of Engineering

ABSTRACT:
The project was realized as a study preceding the implementation of an innovative hybrid combustion/ electric drive system (racing car) for an unmanned land platform with thermal velocity. The target parameters of the drive were specified and its components were sized and selected. A vehicle operating mode was developed and components were reselected with a view to attain the lowest possible thermal velocity. A conceptual structural form of an unmanned land vehicle platform was developed. Developing green propulsion concepts for aviation requires some changes in standard procedures for the preliminary drive system design. Standard design procedures are not readily applicable to system that uses multiple energy sources; innovative concepts like hybrid propulsion systems require new approaches in velocity and performance prediction.
Keywords: hybrid drive, drive system, wheeled vehicle, drive dynamics.

CHAPTER-1.INTRODUCTION

HYBRID CAR:

Hybrid cars are becoming more popular and more common. Basically, a hybrid car is one that uses two or more engines i.e. an electric motor and a conventional engine (either petrol or diesel). The electric engine powers the car at lower speeds and gas engine powers it at higher speeds. A hybrid car like Toyota Prius and Civic Hybrid not only conserves fuel but also produce less CO2 emissions. Though hybrid vehicles are now growing in popularity but still few people are actually using it mainly due to lack of knowledge of how hybrid vehicles work and whether they're as good as other gasoline powered vehicles.While the technology has existed since the early 1900's, it has only been in the past decade or so that the price of manufacturing them has brought them into the range of possibility for the average driver. There are also more government incentive programs that use credits and special discounts to support the purchase and use of hybrid vehicles. Many cities are switching their public transportation and service vehicles over to hybrid cars and buses as a part of the program to become more environmentally

1 GENERAL INTRODUCTION:

Increasing air traffic, increasing urbanizationand regulatory attention are the mostresponsible for last few years' need to controlthe air quality. Since air passengers areprojected to grow at a rate of 5 percent per yearthrough aviation is believed to

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

strongly in fluence the environmental impact because ofaircraft emissions effects on the Earth'satmosphere and climate.Engine emissions have adverse effects on globalwarming and local air quality: this is a goodreason why unconventional aircraft propulsionsystems are investigated, aiming at reducing Aircraft emissions and noise, Alternative energy is appealing forenvironmental, economic and politicalaspects; the cost of renewable energy has beensignificantly reduced because of technologicaladvances, while the oil price has an increasingtrend.The most investigated alternative energysources for aircraft applications up to now arehydrogen solar energy systems electric systems; atomic energy (alternative butdangerous for the environment) is stillinvestigated for space travels With the energy crisis still looming, initiativessuch as More Electric Engine (MEE) and MoreElectric Aircraft (MEA) are promoted: in thiscontext hybrid-electric power, helping inreducing fuel usage, is considered because of itspotential advantages.

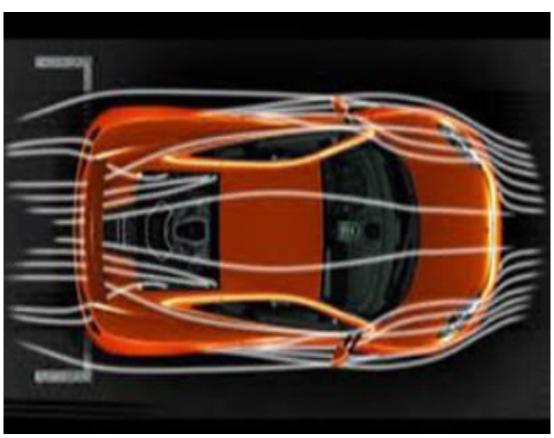


Fig: 1.1 Aerodynamic Analysis of the vehicle along with the car

Overview:

Drive System The performance hybrid vehicle is something of a nascent idea, and to the best of our knowledge, no one has built yet built a hybrid vehicle on a Formula SAE chassis. However, traditionally there are two different methods of implementing a hybrid drive system: series and parallel. These are shown in the diagrams

The difference lies in whether the gas engine provides power to the wheels directly, with assistance from an electric motor during acceleration (parallel); or if all wheel power comes from the electric motor and the gas engine merely serves to drive a generator (series).

CHAPTER-2

LITARATURE REVIEW

[1] Karen et al (1999) presented a simulation and modeling package developed at Texas A&M University, V-Elph 2.01. V-Elph was written in the Matlab/Simulink graphical simulation language and is portable to most computer platforms. They also discussed the methodology for designing vehicle drivetrains using the V-Elph package. An EV, a series HEV, a parallel HEV and a conventional internal combustion engine driven drivetrain have been designed using the simulation package. Simulation results such as fuel consumption, vehicle emissions, and complexity are compared and discussed for each vehicle.created a model in MATLAB and ADAMS to demonstrate its fuel economy over the conventional vehicle. He used the Honda IMA (Integrated Motor Assistant) architecture, where the electric motor acts as a supplement to the engine torque. He

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

showed that the motor unit acts as generator during the regenerative braking. He used a simple power management algorithm in the power management controller he designed for the vehicle.

[2] Cuddy and Keith (2007) performed a parallel and series configured hybrid vehicles likely feasible in next decade are defined and evaluated using a flexible Advanced Vehicle Simulator (ADVISOR). Fuel economies of two diesel powered hybrid vehicles are compared to a comparable technology diesel powered internal combustion engine vehicle. The fuel economy of the parallel hybrid defined is 24% better than the internal combustion engine vehicle and 4% better than the series hybrid. discussed the importance of vehicle simulations in designing the hybrid electric vehicles. A series hybrid electric vehicle simulation with the simulation language Modelica was developed. They explained the simulation approach. They concluded with some of the simulation results emphasizing the simulation importance.

[3] Zhou and Chang (2008) established powertrain dynamic simulation model of an integrated starter/generator (ISG) hybrid electric vehicle (HEV) using Simulink. The parallel electric assist control strategy (PEACS) was 22 researched and designed. The analysis of dynamics performance and fuel economy of the model was carried out under the FTP drive cycle, which can provide a design reference for the setup of the powertrain test bench. The results show that the fuel consumption can be effectively reduced by using the designed PEACS with the state-of-charge of the battery maintaining in a certain scope. Kuen-Bao (2008) described the mathematical modelling, analysis and simulation of a novel hybrid powertrain used in a scooter. The primary feature of the proposed hybrid powertrain is the use of a split power-system that consists of a one-degree-of-freedom (dof) planetary gear-train (PGT) and a two-dof PGT to combine the power of two sources, a gasoline engine and an electric motor. Detailed component level models for the hybrid electric scooter are established using the Matlab/Simulink environment. The performance of the proposed hybrid powertrain is studied using the developed model under four driving cycles. The simulation results verify the operational capabilities of the proposed hybrid system.

[4] David and Sheng-Chung (2004) proposed new parallel-type hybrid-electric-power system comprises an engine's energy distribution and a torque-integrated mechanism (specifically including an engine, a motor/alternator, a CVT device, and PCM as well as a 3-helical gear set). To let the engine achieve maximum thermo-efficiency with minimum emissions, the servomotors adjust the diameter size of the pulley to control the engine output for the final power-output axle and the alternator. The system is applied with a stable engine-load to maximize operating performance. The vehicle is driven by the motor alone in the light-duty mode. Meanwhile, in the medium-duty mode, power comes from the engine, with extra energy being used for battery charging. Finally, in the heavy duty mode, both the engine and motor together power the vehicle. The engine output is

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

fixed, but the motor output power can be controlled.

[5] Yimin and Mehrdad (2006)

Introduced a speed and torque coupling hybrid drivetrain. In this drivetrain, a planetary gear unit and a generator/motor decouple the engine speed from the vehicle wheel speed. Also, another shaft-fixed gear unit and traction motor decouple the engine torque from the vehicle wheel torque. Thus, the engine can operate within its optimal speed and torque region, and at the same time, can directly deliver its torque to the driven wheels. They also discussed the fundamentals architecture, design, control, and simulation of the drivetrain. Simulations show that the fuel economy in urban and highway driving cycles can be greatly improved.

[6] Kuen-Bao and-Tsung-Hua (2006) incorporated a mechanical type rubber V-belt, continuously-variable transmission (CVT) and chain drives to combine power of the two power sources, a gasoline engine and an electric motor in hybrid power system. The system uses four different modes in order to maximize the performance and reduce emissions: electric-motor mode; engine mode; engine/charging mode; and power mode. The main advantages of this new transmission include the use of only one electric motor/generator and the shift of the operating mode accomplished by the mechanical-type clutches for easy control and low cost. Kinematic analyses and design are achieved to obtain the size of each component of this system. A design example is fabricated and tested. discussed the battery power and energy requirements for grid-charged parallel hybrid electric vehicles with different operating strategies. First, they considered the traditional all-electric range based operating concept and shown that this strategy can require a larger, more expensive battery due to the simultaneous requirement for high energy and power

CHAPTER-3
METHODOLOGY

The adopted approach is based on thecomparison in terms of performances,consumptions and weights between twoconfigurations of the same aircraft equippedwith two different propulsion systems: atraditional diesel engine versus a parallel hybriddiesel-electric propulsion system. The parallelhybrid diesel-electric propulsion systems consistin a diesel internal combustion engine, anelectric motor, a rechargeable battery pack and apropeller.

3.1 FORMULATION OF DESIGN REQUIREMENTS

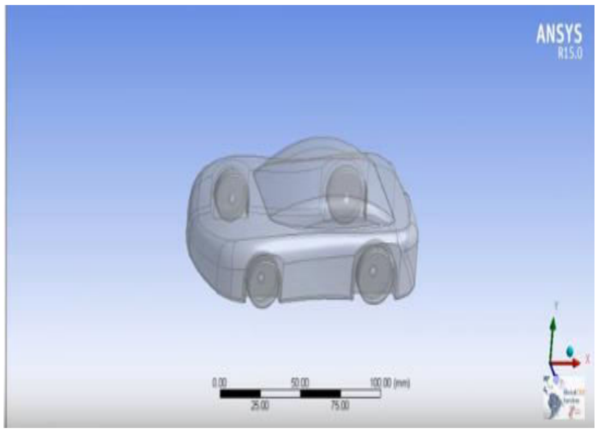
Based on the analysis of the need to put into military service logistic and engineering platforms, initial requirements for the platform were formulated. The requirements and objectives with regard to the drive system for the medium-sized unmanned land platform under design are as follows:

- total weight of vehicle – 800 kg,
- travelling speed - 20 km/h,
- instantaneous travelling speed - 30 km/h,
- travel at 5 km/h for 8 h,
- silent mode travel possible in any terrain type,
- negotiating narrow passages - 1.2 to 1.5 m,

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

- turning radius - 4 m,

Capability of turning in place,
Negotiating rubble heaps, high curbs, stairs, marsh and desert areas,



THE FIG 3.1 MODEL VIEW OF RACING CAR SYSTEM

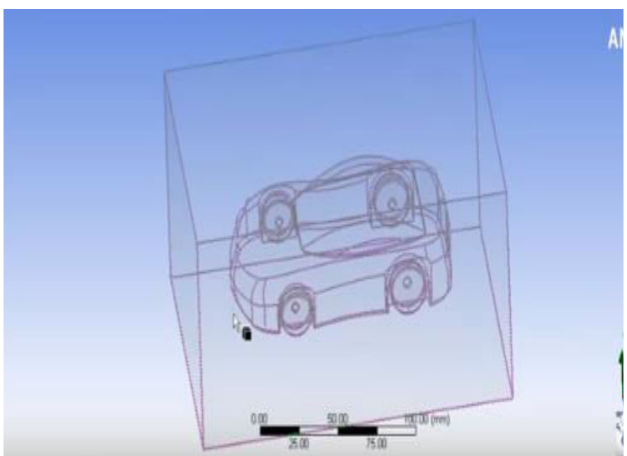


Fig 3.2 Geometric part of the modeling view

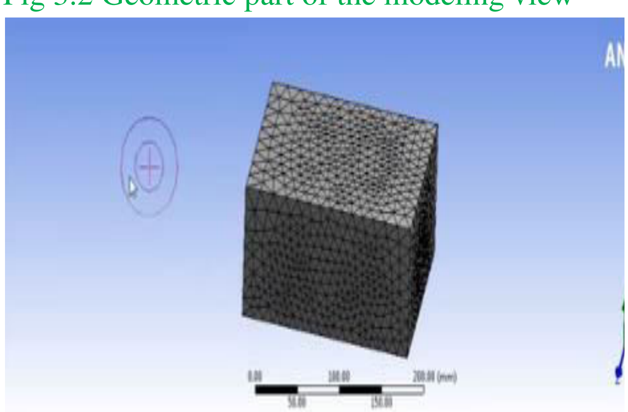


Figure 3.4 Meshing model of designing view

Fig3.5 Hybrid drive system racing car

The reference of meshing values:

Area-1
Density = 1.225
Entholpy =0
Length -1
Pressure =0
Temprature =289.06
Velocity =1 m/s
Ratio and specific heat = 1.4
Viscosity = 1.7994e-0.99 log m-s

CHAPTER-4

RESULTS

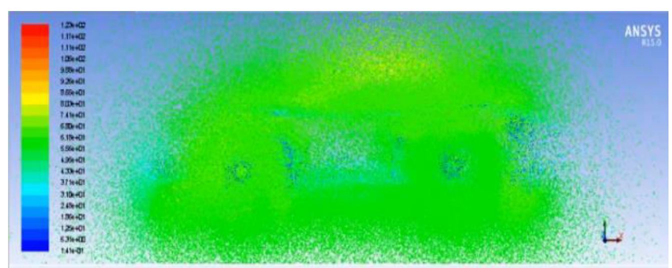
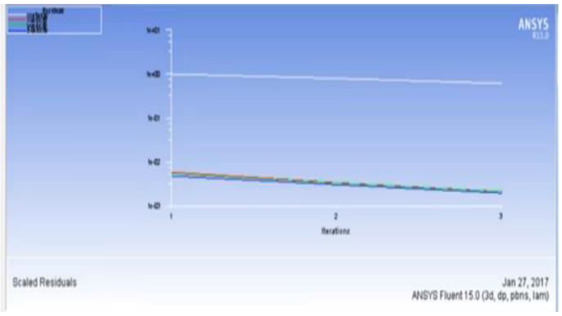


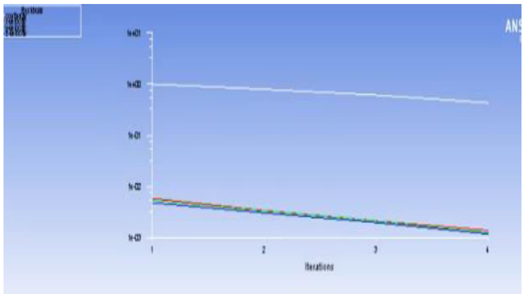
FIGURE 4.1 3D OF THE HYBRIDE DRIVE RACING CAR

FIGURE 4.2 VELOCITY VECTORS BY VELOCITY MAGNITUDE

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org



GRAPH 4.1 MINIMUM VELOCITY DRIVING SYSTEM



GRAPH 4.2 MAXIMUM VELOCITY OF DRIVING SYSTEM

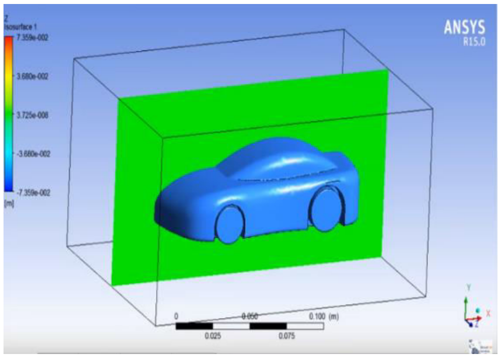


FIGURE 4.3 MINIMUM VELOCITY GRADIENTS

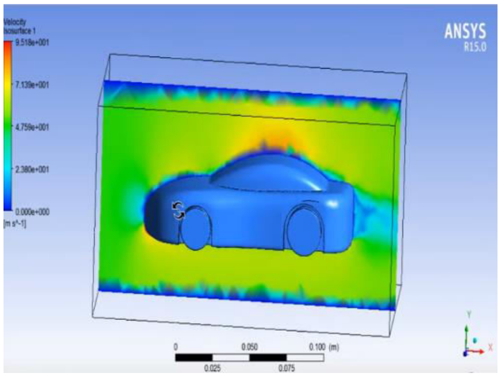


FIGURE 4.4 MAXIMUM VELOCITY GRADIENTS

DISCUSSIONS:

The research aim was to bring change in designing rotor¸ in the system (to create a rectangular channel under the vehicle and placing the rotor under the vehicle and placing the rotor at the bottom of channel) to modify other related works with designing this system in solid work environment¸ networking the system in the Gambit environment in a mode with the least pressure on the rotor in the inlet speed 30 M/S for the inlet air entered the channel and with obtaining the pressure and doing the calculation by the aim of the governed relation on system this project encountered with fault¸ because :

1. Adding rotor under the vehicle increase the fuel assumption about %27¸ while the aim saving in the gasoline consumption as a resource is irreversible.
2. According to the increase in the system designing cost against the common vehicles¸ about 38 N/m torque was applied in flywheel rotation¸ in which this few rotation can´t meet the required propulsion for movement of vehicle

CHAPTER-5

CONCLUSIONS

In the case of hybrid drives, proper selection of components of the drive system is largely dependent on the mode of vehicle operation. Operating mode takes into account the conditions and parameters of the vehicle and terrain configuration. The advantage of hybrid drives is the possibility of storing energy that is used in emergency and rare situations. The main engine (combustion engine) takes advantage of that situation and runs within its optimum operating range.

The target range of the vehicle in silent mode should be about 10 km when driving on an asphalt road and 5 km on grassy surface. Reaction forces that occur when driving are derived from rolling resistance and air resistance of the vehicle. Air resistance strongly depends on speed; for the adopted continuous speed of 20 km/h air resistance is 470 kN. Rolling resistance is independent of vehicle motion parameters and is equal to 110 N when driving on an asphalt road and to 630 N when driving on grassy ground (tall grass). We have tested the kart for its fuel economyunder three conditions running fully on ICengine, running fully on electric motor, &running on combination of both electric andic-engine (hybrid). In our project we have usedan old DC starter motor of a car which hasvery high current consumption of the rate of25 amperes at start-up because of high torquerequirements during start up, but it graduallydecreases to 10-12 amperes as it gains speed.So the battery drains out quickly reducing theoverall efficiency. Instead of this to improvethe performance high efficiency DC brushlessmotor can be used which have low currentconsumption. The IC-engine used is also anold 75CC, 3.5 h.p. having very less efficiency reducing the overall efficiency.

FUTURE SCOPE

Hybrid drive racing car using a good battery and powerful motor we can make a typical hybrid car which drives with motor in city and on highway it uses internal combustion engine. in cities cars have speed around 40-45 k.m./ hour. and powerful motor is capable to drive car at this speed and due to this exhaust gases emissions can be reduced in cities and this is helpful for health and also for global warming. currently, hybrid vehicles utilize NYmph battery technology, which needs replacements after some period, but instead of these lithium-ion batteries which are very reliable can be used. however the initial cost increases as this is a new technology. nowadays new bio fuels are also made to reduce the exhaust emissions and cut down the fuel prices. also use of cvts in hybrids has proven that they are having better transmission efficiency than normal ones. combiningcvts with the smart computer integrated circuits and smart sensors, the efficiency can be greatly improv

REFERENCES

[1] Penman bmv,.xturbines,com/wind-electric-hybrids, html, german [2012].

[2] Toyota New Cars, Trucks, SUVs & Hybrids, Toyota Official Site,japan [2012]

[3] physicsforums.com/threads/why-are-gas-turbine-engines-not-used-in-automobiles. 2012.

[4] Deepak DivashkarPrasad a,1, M.Rafiuddin Ahmed a,n, Young-HoLee, [2013] . Flow analysis around a cylindrical rotor by changing the air flow in the inlet and outlet channels, 1Dongsam-dongYoungdo-ku,Busan,606 791,SouthKorea, Received 21 September 2013 Accepted 19 February 2014 Available online 7 March 2014

[5] Emmanuel Guilmineau,Laboratoire de Me´canique des Fluides, [2007]The effects of air turbulence in front of the vehicle by the front slope, CNRS UMR 6598, EcoleCentrale de Nantes, 44321 Nantes

Cedex 3, and France Available online 6 August 2007.
[6] AljureaDE, Lehmkuhlab O, I Rodrيguez a, A. Oliva a. [2010]
Analysis of air turbulence in front of the car, UniversitatPolitècnica de Catalunya-Barcelona Tech (UPC), ETSEIAT, Colom 11, 08222 Terrassa, Barcelona, Spain b Termo Fluids, S.L. Av. Jaquard, 97 1-E, 08222 Terrassa, Barcelona, Spain.
[7] Mingde Su, Jiun-Der Yu, [2011] Air turbine blades aerodynamic analysis software Kmbyt, USA, Received 5 August 2010, Received in revised form 27 April 2011, Accepted 27 October 2011, Available online 15 November 2011.