

# The Benefit Of Altering Cars

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ENGL 21007 Writing for engineers

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March 8th 2023

## Lab Report Analysis

Society is always changing, humans are evolving and that means improvement and innovations in our technology. With the improvement of technology cars are no different adding new parts making cars eco friendly while also making them more powerful. The Labs will be analyzed by their ability to explain the innovations in today's world. The first lab is "Simulation of diesel hybrid electric vehicle containing hydrogen enriched CI engines" summary. The second lab "Aspects of an experimental study of hydrogen use at automotive diesel engine". The third lab "Large-eddy simulations of a stratified-charge direct-injection spark-ignition engine: Comparison with experiment and analysis of cycle-to-cycle variations". The labs all focus on how car emission can be reduced based on a piece of technology added to the car model.

Lab report one is about testing cars based on their fuel source by mixing between a diesel engine, a hydrogen and diesel, and adding an electric motor and seeing which one is efficient compared to the other models. V1 has an engine with a diesel fuel source. V2 has a hydrogen tank along with a diesel tank. V3 has an electric motor with the diesel tank. And V4 has the diesel tank, hydrogen tank and electric motor. Lab 1 includes all the parameters for the experiment. Each car model is different using an additional piece of tech, such as adding a h2 tank or electric motor. Lab one states Hydrogen is the one of the most important renewable energy sources. Hydrogen is increasing in its availability compared to the lesser eco friendly energy sources. Adding hydrogen to a car's engine will also reduce the carbon emissions. The way this lab attempts to see the difference between carbon emissions is by making 4 different model cars V1 is a basic model of diesel car V2 has a hydrogen fuel tank and diesel tank V3 has an electric motor and diesel tank V4 has an electric motor diesel tank and hydrogen tank. The results of the test were recorded showing that V4 was the most

efficient car model compared to the other three using 250 kilowatts (power consumed) on 5000 rpms (revolutions per minute) torque being at 300 nm (newton meters) while at 3000 Rpm and carbon emissions being at 115g/km which is drastically lower compared to V1s 200g/km. V3 came in a close second being slightly less than V4 results. The addition of a hydrogen tank and electric motor makes the car the most efficient out of the other 4 models

Lab report two explains how to change certain aspects of a vehicle such as brakes pressure, fuel and adding hydrogen to make it efficient and reduce carbon emissions. The abstract explains how the engine will be set up with a ECU (electronic control unit) that will control the amount of hydrogen and diesel will be injected to maintain optimal engine performance, reduce carbon emissions and also keep the heating valves in check. Hydrogen is already a renewable energy source that is being sought out. The fact that scientists are seeking it makes it an in demand product which will create a more eco friendly fuel source making other fuel sources obsolete. There will be an injector that inserts a certain amount of hydrogen and diesel keeping the results controlled. The amount applied will range from 18% to 34% .

For applying the substitute ratio to 34% of hydrogen to the fuel source the consumption of fuel decreases from .85kg to .55kg. The reason the carbon emission is decreased is because there is less oxygen in the diesel fuel being burned. The conclusion wraps up and summarizes the results of the lab

Lab 3 explains how the car's spark ignition can affect the amount of carbon emission that is released into the atmosphere and how this can be reduced by the fuel injection and the engine type. The abstract goes into detail how turning on a car makes the start ignition may make the engine release an excessive amount of carbon. But by switching the point of ignition along with the engine it can be reduced. The introduction states the engine that can possibly change the carbon emission is a DISI (direct injection spark ignition). The amount of

flames as well can also affect the amount the carbon may be released. The specifications that will be used during the testing phase is the car will have an engine with a four valve four stroke cycle with single cylinder and an optically visible spark ignition with direct in cylinder fuel injection. The spark plug will have a mounted spray plume and the engine will be tested on 350 consecutive cycles. The results of the experiment show the cylinder experienced 24kPa (kilopascal) and the apparent heat release rates peaked at 12, both slightly higher than the simulations. The IMEP (indicated mean effective pressure) was at a too low of a number to be calculated correctly because of the simulation misfires. With all of these factors put together the conclusions that were brought up explains how the carbon emissions were reduced because of the subtle early fuel burn it created a stratified combustion.

Lab report 1 “Simulation of diesel hybrid electric vehicle containing hydrogen enriched CI engine” abstract is well structured and explains the parameters of the lab. The abstract explains how lab 1 will make different modeled vehicles that will allow them to test their theory on how adjusting fuel sources can create an efficient car. The introduction elaborates on the idea concept of how hydrogen is an amazing resource as it comes in an abundance green and will go extinct. The vehicle and design and modeling and simulation section is the methods part that talks about the process of the tests the lab will do and the specifications of each model car. This section is well organized and extremely understandable because of graphs. Trying to understand car terms is difficult but the graphs make the process of the lab easy to understand. The discussions and results section also have a similar effect. The graphs are clear and concise. The results show the reader which model is better in terms of efficiency, eco-friendly and what has the most power. The Conclusions summarizes Lab 1 very well by listing all improvements in each section the car was tested on.

Lab report 2's (title) abstract is also similar to Lab 1 where it prepares you for exactly what you will be reading on. It doesn't feel like a bombardment of information but necessary information. The Introduction brings up the adjustments that will be made to the car along with why they will be adjusting the cars. The methods Has the equations and how to replicate the experiment. It's short and direct. The discussion section explains how the car is affected by these aspects of increasing the hydrogen from 18% to 34% and it is explained by elaborating how the hydrogen at a certain percentage affects the cars performance. The conclusions simplifies what was in the previous section listing the numbers that were stated before. The effect of each number is also mentioned acknowledging the best outcome.

Lab 3 abstract similar to the previous to give the reader a small amount of information that will be elaborated on later in the lab. The intro gives us information on how the car acts pre experiment. The intro explains what the car does and how that will affect carbon emission and how they will be using simulations through the experiment. Engine specifications and the physical model sections are the methods segment of the lab report. This section is very analytical and doesn't miss any details that might be crucial towards the final outcome of the experiment. The result and discussions section is harder to understand. It is a large chunk of information so it feels overwhelming. The conclusion feels like a restatement of the intro and adding the final details of the result section allowing us to understand it better.

All together the labs are very successful in their goals. Their information is received and as readers it is understandable. The labs go in perfect depth with the right amount of graphs and displayed information. Each alteration to the car or engine model is explained for readers to understand. Hopefully if the chance were to occur these labs be replicated by other readers and a possible chance to a cleaner environment can come sooner.

## References

[Lab Reports 1](#)-Simulation of diesel hybrid electric vehicle containing hydrogen enriched CI engine

[Lab report 2 replacement](#)-Aspects of an experimental study of hydrogen use at automotive diesel engine

[Lab report 3](#)-Large-eddy simulations of a stratified-charge direct-injection spark-ignition engine: Comparison with experiment and analysis of cycle-to-cycle variations