JAN 2020
EDITION 1

SAE-TECHBUZZ

SAENITK

KEEPING UP WITH THE FUTURE

PREFACE

It is an endearing moment for the SAE-NITK club which has been exploring the very bright side of the technologies of the future and exhibits them to the institute throughout these years. This step of launching a magazine for the very first time is going to be a first for this club and NITK Surathkal. The Institute appreciates the work of SAE-NITK and all its members and coordinators who have been working their best to embellish the club.

I congratulate Dr. Poornesh Kumar Koorata for mentoring the club and achieving these milestones and will be continuing his incredible work for this club. I wish the club every success, in all its undertakings.

Prof. Umamaheshwar Rao
Director
NITK Surathkal

PREFACE

I am very much pleased to state that the SAE-NITK club is one of the most active clubs and has been doing an incredible work all these years. For the first time the club is bringing out a magazine which aims at showcasing the developments that have been taking place in the field of Automotive sector and I am sure it will help lots of people to get to know about the activities of SAE and also about the technological advances in the field.

The Members, Coordinators and Faculty Advisors of SAE-NITK have been doing a great job. The current Faculty Advisor Dr. Poornesh Kumar Koorata is mentoring the club very effectively and I firmly believe that under his mentorship the SAE-NITK club will reach several milestones in the years to come. I wish them all the success.

Prof. Jagannatha Nayak
Dean Students' Welfare
NITK Surathkal

PREFACE

SAE-NITK has been doing a great work throughout these years and achieving many great things. Our institution is very proud of it. This step of introducing a magazine for a very first time is a great idea by which they can spread the knowledge on upcoming advancements in technologies to the readers. All the members and coordinators deserve a huge acknowledgement for all the hard work they have been doing all these years to make this club one of the most active clubs in NITK Surathkal.

Dr. Poornesh Kumar Koorata deserves a huge praise for all his instructions and mentoring which is very important for this club. SAE-NITK should continue its great work and I wish them a huge success.

Dr. Shrikantha S Rao
Head of the Department
Mechanical Engineering
NITK Surathkal

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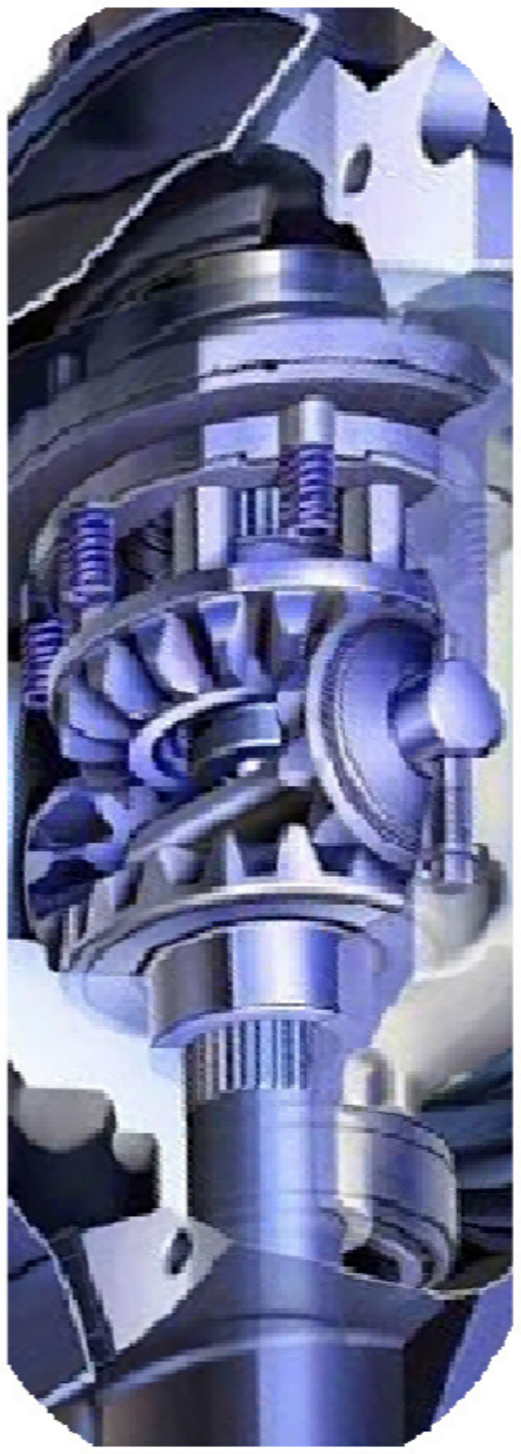
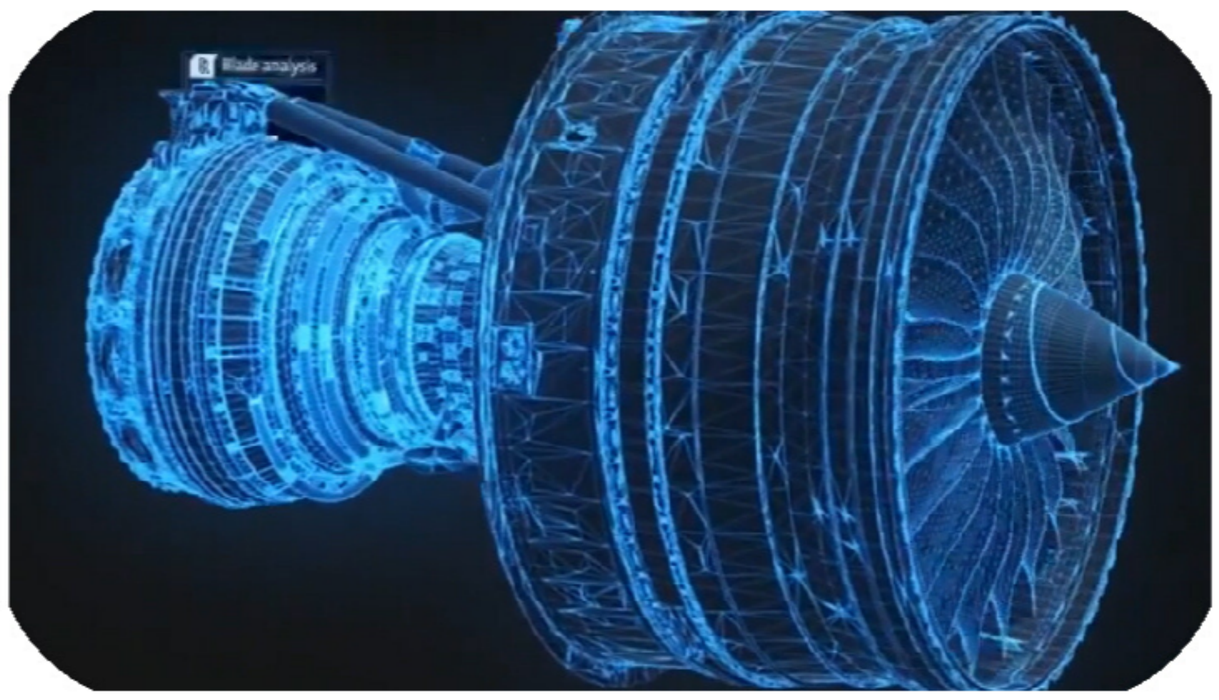
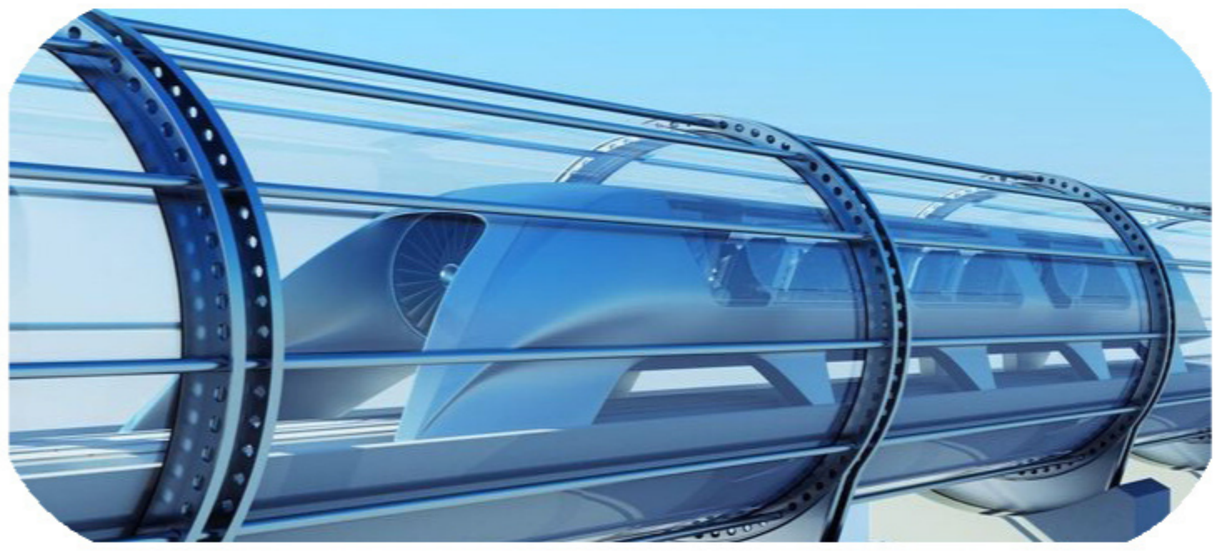






Elcometer 456 on Cars

Hidden rework, impact damage, resprays and filled body panels can all significantly affect a vehicle's resale value

In addition to numerous other inspection points, body shops, dealerships and professional car buyers need to assess the quality of the paint finish and verify that the condition of the vehicle matches its reported history. Bodywork damage can be found by measuring a vehicle's paint thickness, with extremely high or low thickness readings indicating where previous repairs have occurred - giving a valuable insight into the vehicle's true condition, determining if it has been in an accident or experienced other types of paint damage and therefore giving the true resale value of the vehicle. Ideal for instantly measuring paint thickness and providing an indication of the overall condition of paint work on vehicles, the Elcometer 456 Dry Film Thickness Gauge is one of the fastest dry film thickness gauges on the market.

The Elcometer 456 Dry Film Thickness Gauge

Meeting the requirements of today's automotive refinishing market, the Elcometer 456 is able to identify the amount of hidden damage on a vehicle which is usually not found in public or commercial condition reports.

As many high line and luxury cars use both steel and aluminium body panels, the Elcometer 456 dual FNF gauge uses instant material recognition to automatically switch materials, allowing uninterrupted examination. And with a reading rate of 70+ readings per minute, the Elcometer 456 is one of the fastest gauges on the market – which means that cars can be inspected far quicker – allowing more cars to be inspected each day.

How to find hidden rework on a vehicle with the Elcometer 456 Dry Film Thickness Gauge

To find hidden rework on a vehicle, using either mils or microns, gently press the gauge on to the bodywork and move around the car, taking a number of readings from each panel. Make sure body panels next to each other are checked - as they often show significant differences after a respray. If the readings are consistent, this indicates the paintwork is original. If there is a big difference in the paint thicknesses, this suggests there has been rework of some kind – it could be anything from a scratch to a filled body panel. If the paint thickness is a lot thinner in a particular place, it suggests this is a replacement panel, that's not been painted properly.

The Elcometer Index Value

Unlike other gauges the Elcometer 456 displays the key statistical values used to assess the overall condition of the paint work – such as the number of readings, average coating thickness and the lowest paint thickness. It also has the unique Elcometer Index Value. The Elcometer Index Value provides the inspector with a single number which illustrates the car's overall paint condition and establishes if any previous paint work has been undertaken. This quantifiable number determines the extent of rework and the overall quality of the vehicle being appraised. The higher the Elcometer Index Value, the stronger the indication of previous rework.

Easy to Use, Robust and Accurate

The large, easy to read color display not only rotates automatically when being used to measure on side panels, but features adjustable screen brightness allowing a clear display to be visible, even in bright sunlight. Designed to last, the robust, water resistant design and built in temperature compensation, ensures the gauge is accurate in all weather conditions - from the North Pole to the Sahara, from the rainforest to a forecourt. Each gauge is supplied with all that is needed to take measurements straight from the box, and comes with a protective carry case which easily clips onto a belt.

Instant Live Readings Direct to your PC, Tablet or Smart Phone

As well as reducing inspection times, the Elcometer 456 can also speed up inspection reporting. When out in the field or on site, users can instantly review their data using Elcometer's free data management software, ElcoMaster®.

Each live reading can be transferred via Bluetooth® to a PC, smart phone or tablet and at the click of a button users are able to generate professional reports. The reports can then be emailed to clients, just seconds after the inspection has been carried out, or uploaded via cloud technology, making it accessible anywhere in the world.

Polymer Electrolyte Membrane (PEM) Fuel Cell

The hazardous effects of pollutants from conventional fuel vehicles have led the scientific world to move towards environmentally friendly energy sources. In recent decades, the United States and several other countries have been putting emphasis on the environmental impact of the transportation sector and reducing petroleum dependence. Due to the negative environmental impacts of fossil fuel power sources, fuel cell technology has received considerable attention in the last two decades owing to its high efficiency and low pollution. Though we have various renewable energy sources, the perfect one to use an energy source for vehicles is hydrogen. Like electricity, hydrogen is an energy carrier that hasthe ability to deliver incredible amounts of energy. Fuel Cells, as the energy conversion device for direct and effective conversion of the chemical energy of a fuel and an oxidant into electrical energy, are now on the verge of becoming competitive for clean power generation.

Why do we need fuel cells?

Traditional power generation depends upon fossil fuels which produce a significant amount of pollutants and are also in limited supply. Many alternative energy methods have been proposed like hydroelectric power, batteries, solar, biofuel, wind, geothermal and bioenergy. All these sources can produce energy but each of them has advantages and disadvantages. Fuel cells are most significant to use because their applications are currently energy limited.

Fuel cells finds applications in various sectors like:

1. Portable Sector:

Portable devices like laptops, cell phones, video recorders and others will need greater amounts of power for longer periods of time. Fuel cells are very scalable and have easy recharging capabilities compared to batteries.

2. Transportation Sector:

Fuel cell vehicles also have the ability to be more fuel efficient than vehicles powered by other fuels. This powerful technology allows a new range of power use in small two-wheeled and four-wheeled vehicles, boats, scooters, unmanned vehicles, and other utility vehicles.

3. Stationary Sector:

Stationary fuel cells can produce enough electricity and heat to power an entire house or business, which can result in significant savings. These fuel cells may even make enough power to sell some of it back to the grid. Fuel cells can also power residences and businesses where no electricity is available.

The Primary fuel cell of different types are:

1. Proton Exchange Membrane Fuel Cells (PEMFC)
2. Solid Oxide Fuel Cells (SOFC)
3. Alkaline Fuel Cells (AFC)
4. Molten Carbonate Fuel Cells (MCFC)
5. Phosphoric Acid Fuel Cells (PAFC)

The Polymer Electrolyte Membrane (PEM) fuel cell is one of the most promising power sources for energy demands due to their low operating temperature and high-power density. It has garnered a great deal of attention and is regarded as an upcoming power for transportation, stationary and portable applications owing to their high conversion efficiency, quick startup, simple design, and environmental benignity.

The idea of powering a car with Polymer electrolyte membrane fuel cell has been around for decades. In principle, these cars which run on electricity generated onboard by electrochemically combining hydrogen with oxygen from the air, could reduce global dependence on petroleum while emitting just water from the tailpipes. But despite extensive fleet testing, fuel cell passenger cars have always seemed to be another five years away. No longer, motorists can now buy or lease their very own fuel cell cars. The numbers today are low, and the cars are available only in a few geographic regions equipped with public hydrogen filling stations. But the industry is gearing up to manufacture more of these cars and expand refueling infrastructure and researches continue to look for ways to reduce fuel cell costs and improve durability.

Working of a PEM fuel cell

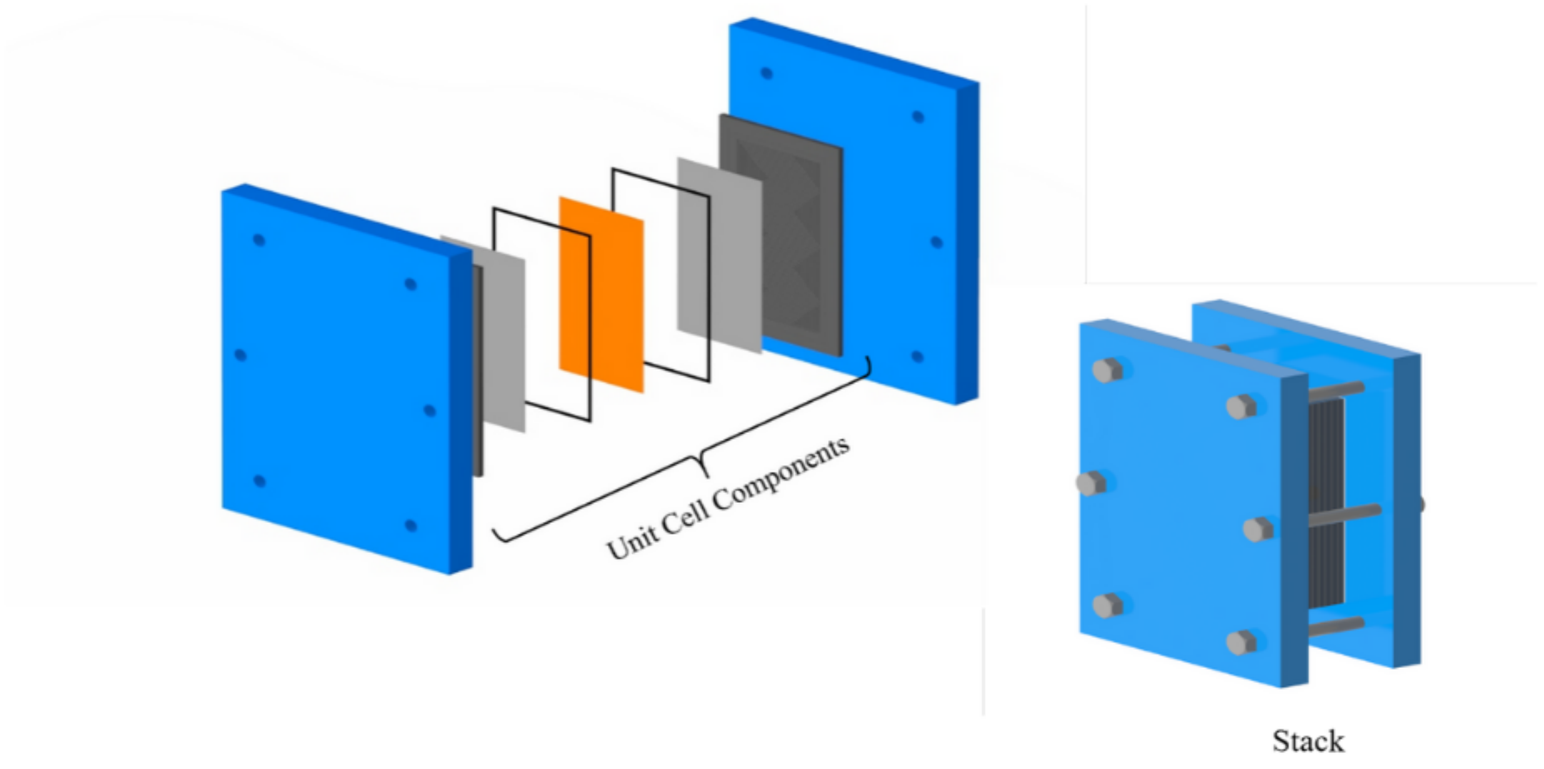


Fig 1. Schematic of a PEMFC Stack

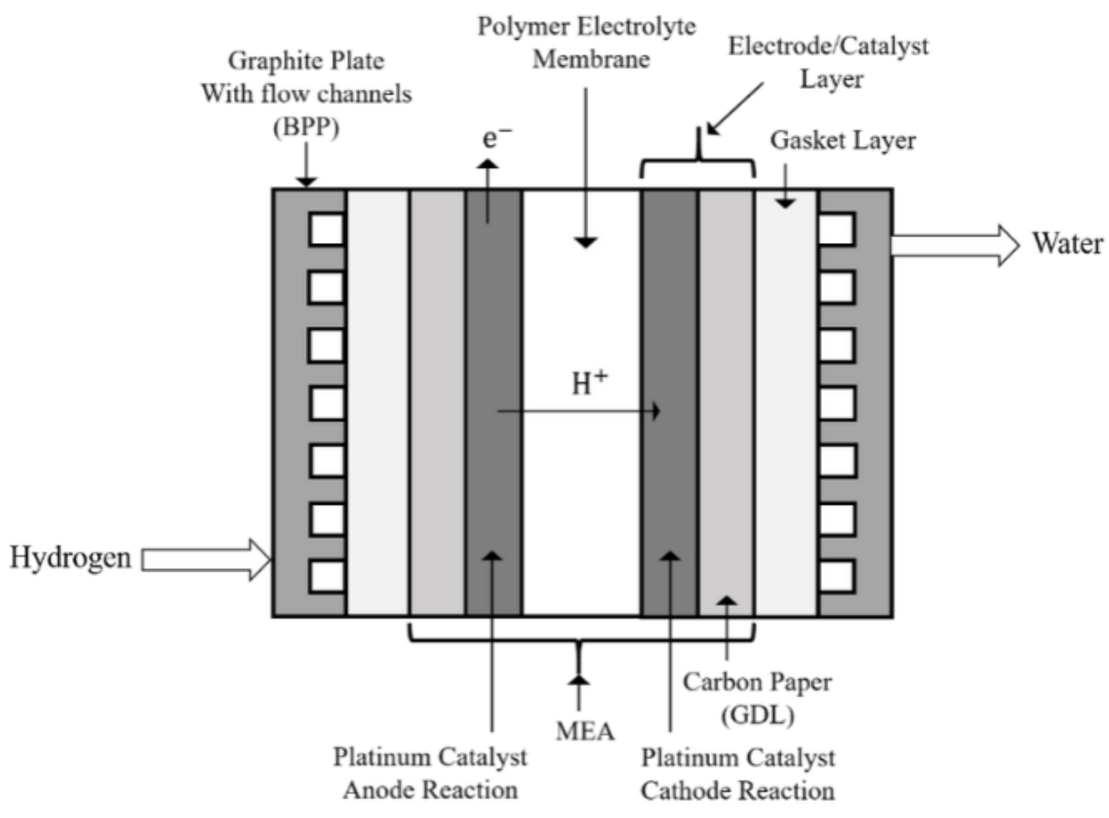


Fig.2 Schematic of a Single unit PEM Fuel Cell

Polymer electrolyte membrane fuel cells (PEMFCs) generally convert hydrogen energy into electricity using hydrogen and oxygen through an electrochemical reaction. The advantage of this fuel cell is that it has a high energy efficiency of about 60%, light weight, high power density and quick startup. The main components of PEM fuel consist of as shown in the above Fig 2. Are Bipolar plates (BPP), the membrane electrode assembly (MEA) and gasket. MEA, is the main component consisting of Polymer electrolyte membrane (PEM), Gas Diffusion Layer (GDL) and catalyst layer (CL). Hydrogen is mainly used as the fuel and it is supplied from a flow channel on the anode side. The Platinum based catalyst breaks hydrogen into positive hydrogen ions and negatively charged electrons. The electrolyte membrane only allows the positively charged ions to pass through which forces the electrons to travel along an external circuit to the cathode as a result an electrical current is created. On the cathode side, oxygen from air is supplied from the flow channel as the oxidant. Oxygen diffuses through the gas diffusion layer and reaches cathode's catalyst layer. Oxygen molecules react with the electrons and proton H+, which have been transferred from the anode to form water at the catalyst membrane interface.

Performance of a PEM fuel cell

The current supplied by a fuel cell is directly proportional to the amount of fuel consumed. In other words, as the fuel cell voltage decreases the electric power produced also decreases. Thus fuel cell voltage can be considered as fuel cell efficiency. There are three major types of fuel cell losses usually considered as a region that gave a fuel cell i-V curve its characteristic shape as shown in Fig 3.

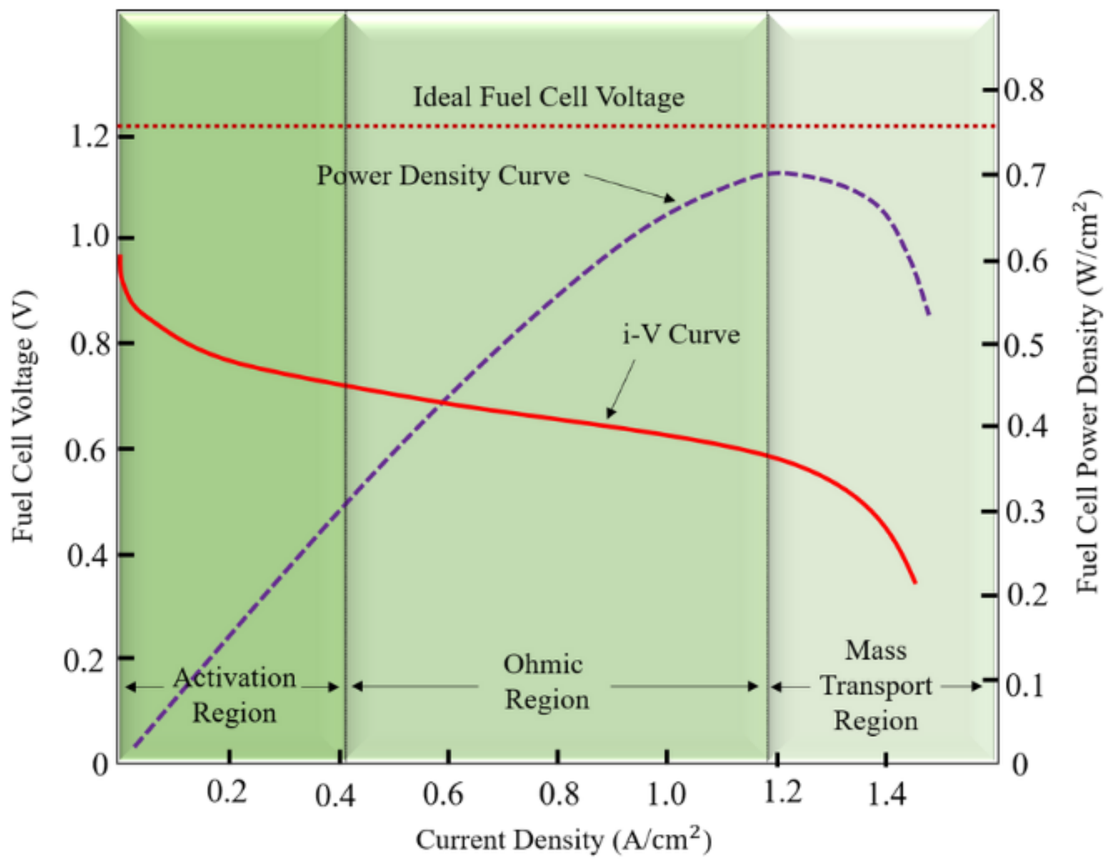
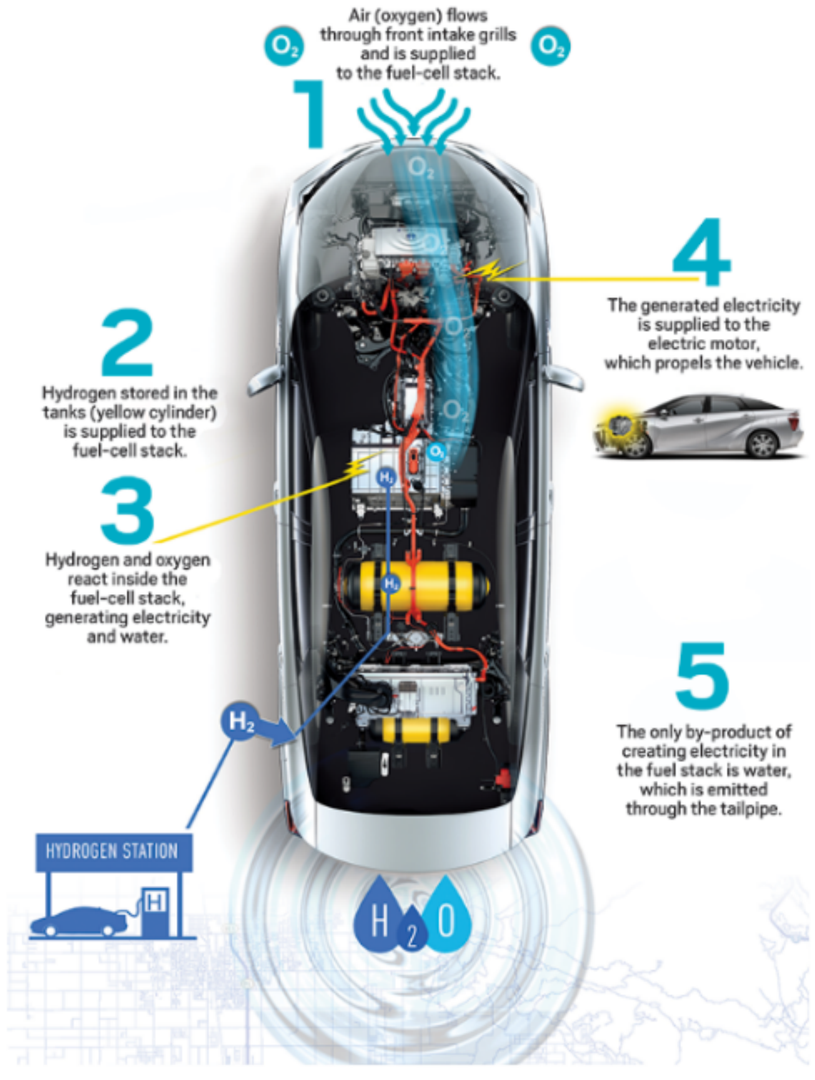


Fig 3. Performance of a typical PEM fuel cell.

1. Activation Region: An activation barrier impedes the conversion of reactants to products and vice versa, thus a portion of fuel cell voltage is sacrificed to lower the activation barrier.
2. Ohmic Region: Losses that are due to the resistance given by various components like electrodes, electrolytes, interconnects and so on. Thus voltage is expended to drive conductive charge transport represents a loss to fuel cell performance.
3. Mass Transport Region: Due to reactant depletion or product clogging effects the poor mass transport leads to a loss in fuel cell performance.



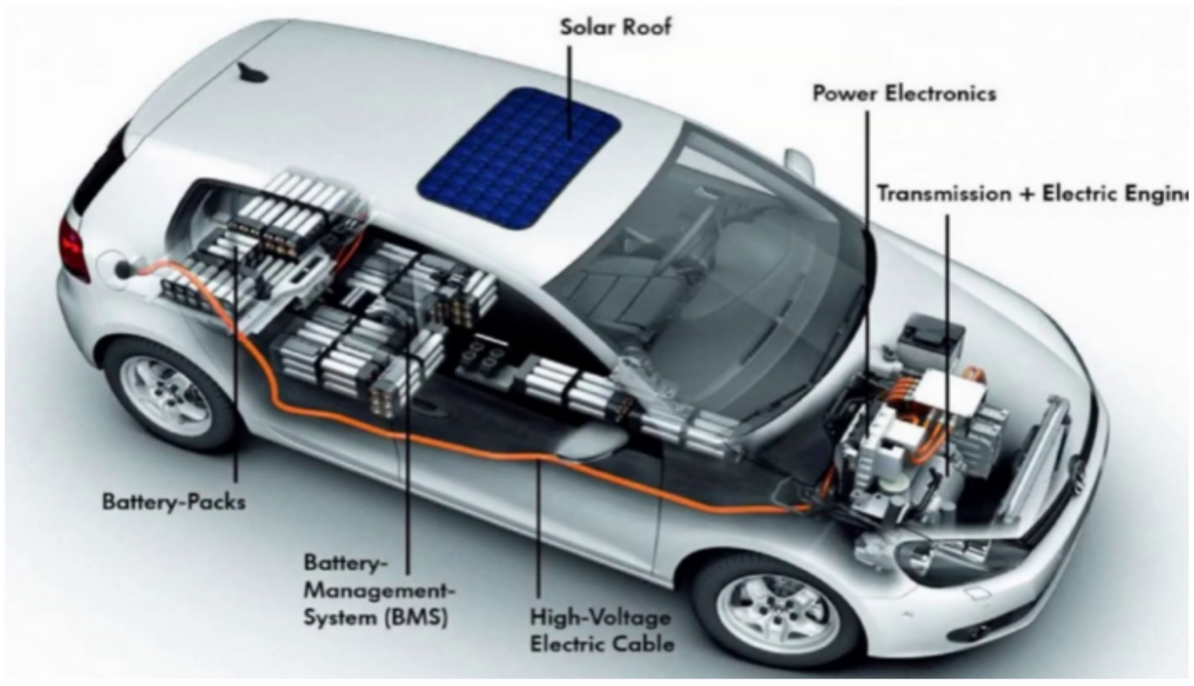
Can EVs meet India's Green Goals?

The Indian government wants only EVs to be sold in India after 2030, which seems to be a good move as India vows to keep its Paris summit promises. According to researches, by adopting electric vehicles, India can reduce carbon emissions in 2030 by 38% and also save about 4 lakh crore rupees in 2030 alone. But just like every coin has 2 sides, aren't we sidelining the limitations of EVs?

There's no doubt that climate change must be mitigated and EVs might be the answer. An electric vehicle has 90% less moving parts than a typical IC engine car, making it more efficient and also eco-friendly. But there are certain flaws in the current EV technology, which might hamper their faster adoption. Present EVs work on Li ion batteries. They also require precious metals like Cobalt and Magnesium. These metal ores are in short supply on Earth, with major deposits in countries like Chile, China, Argentina. China has already invested in these countries and use these reserves for their companies. What oil reserves mean to us today, in future it might be these mineral reserves. Mining of these mineral reserves poses a great threat to the environment and human life. It pollutes the groundwater, while radiation and air pollution could take many lives. Also, it is believed that child labor is involved in their mining. It is proven in studies that working around Cobalt (which helps cathodes concentrate a lot of power in a confined space)has adverse effects on health. It can cause vision and heart problems. While India imports most of these minerals and electric parts, it also doesn't have many manufacturing units. The cost of these batteries is thus very high, which followed by issues of slow charging, battery recycling, charging infrastructure, vehicle speed etc. abates their popularity. Problems related to electrolyte spillage, accidental fire, high maintenance cost also need to be addressed. Despite India witnessing a 10% annual increase in EV adoption which mostly consist of 2 and 3 wheelers, their total share is a mere 1%.

With companies like Renault and Maruti already readying their plans to scrap the diesel engine, EV revolution might also cause a big blow to automobile biggies and India might face another crisis –JOBS. EV technology would require reskilling of technicians, changes in curriculum and technology, and a complete overhaul in the automobile industry, causing a disruption in local labor. That could also lead to some automobile giants lobbying in the govt. to save themselves. Companies like Tesla will conquer the industry.

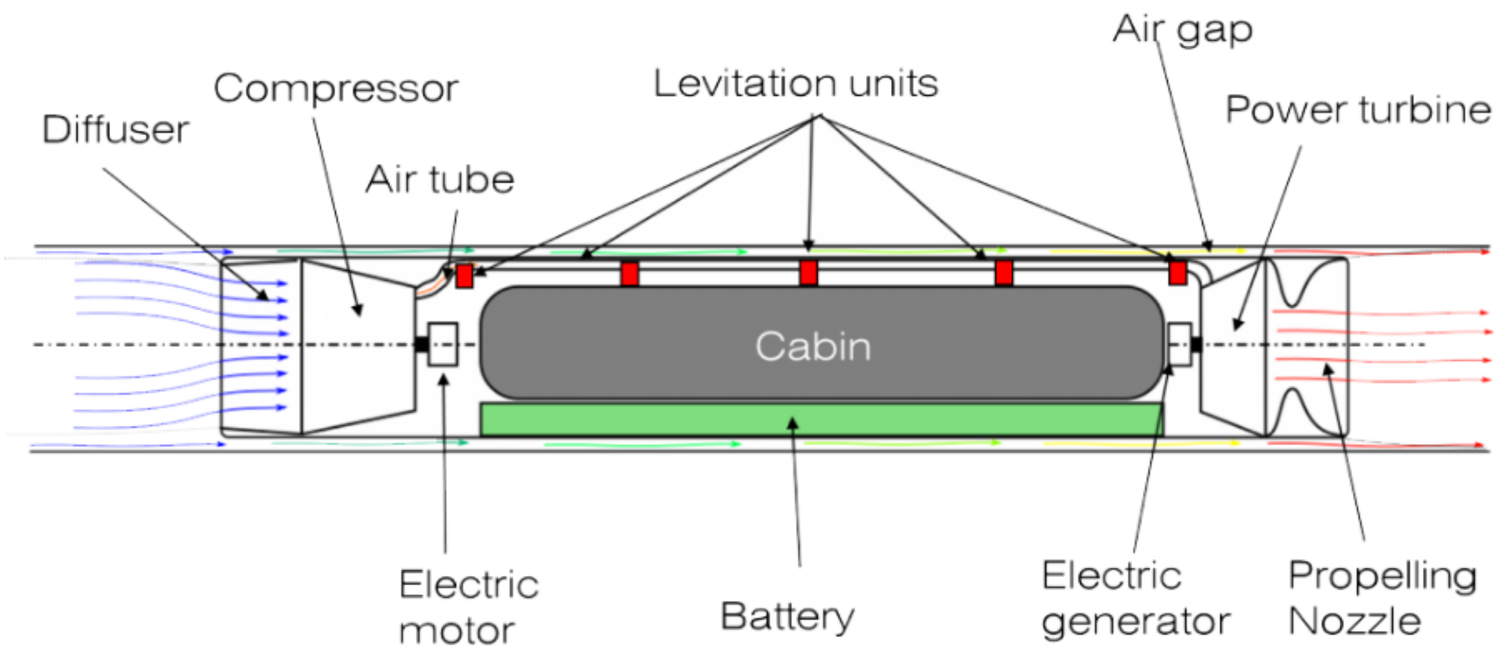
With the electric vehicle technology still under progress, what India needs is a shrewd policy. Who would ever want to miss the fun of a long drive with friends and family, as EVs don't promise long duration power supply. Developments in this field are undergoing at a rapid pace, and we have now developed supercapacitors, sodium ion batteries (sodium may be the new lithium) and a lot more needs to be done. Instead of mass adoption of EVs, we should set up technological centers for research and development in the battery technology to make batteries more viable and long lasting. E-highways where trucks and buses could run using overhead electric wires, shared mobility, use of fuel cells, biogas should be practiced. India has a huge potential to be the world leader if we tap this opportunity. India still imports 90% EV parts from countries like China. Moving away from oil might free us from unnecessary US influence, but we also should not become dependent to China. Thus by investing in the development of the EV technology, India could become the center of influence, a positon presently countries like USA, Saudi and China enjoy.



RAJAT
SHUKLA

Hyperloop Technology

The world of technology is changing at a pace faster than what we can fathom. Few years back, we only knew about four modes of transportation. Then suddenly in 2012 Elon Musk came up with an idea to change the conventional-boring-routine stuff. He created a project for reinventing the mode of passenger movement and freight transportation. Hence, the fifth mode of transportation - Hyperloop came into existence and the company was named Hyperloop-One.In Musk's words, a hyperloop is a system to "build a tube over or under the ground that contains a special environment." Cars would basically be propelled in this tube. One method could be a huge pneumatic tube where high-speed fans would compress and push the air — although the friction implications make Musk skeptical that it would work. Another option is having a vacuum in the tube and using electromagnetic suspension instead. Musk acknowledges it is hard to maintain a vacuum (one small leak in hundreds of miles of tubing, and the system shuts down), but there are pumping solutions to overcome this. Hence he favours the second solution.



How does it work?

Hyperloop has four key features.

1) The passenger capsules aren't propelled by air pressure like in vaccum tubes, but by two electromagnetic motors. It is aimed to travel at a top speed of 760 miles per hour.

2) The tube tracks have low pressure air inside of them which results in a partial vacuum.
Usually objects moving through air tubes will compress the air and this cushion of air will slow down the object. But the Hyperloop features a compressor fan in front of the capsule. The compressor fan redirects air to the back of the capsule, from where it will be sent to the air bearings.

3) Air bearings are like ski paddles that levitate the capsules above the surface of the tube in order to reduce friction between the tube and the capsule.

4) The tube track is designed to be immune to weather and earthquakes. They are also designed to be self-powering and unobstructive. The pillars that support the tube above the ground have a small foot-print that can sway in the case of an earthquake. Each of the tube sections can move around flexibly because there isn't a constant track that capsules rely on

Solar panels on the top of the track supply power to the periodic motors. With these innovations and completely automated departure system, Elon Musk dreams of the Hyperloop being the fastest, safest and the most convenient form of travel in the world.

PAVAN
PAWAR

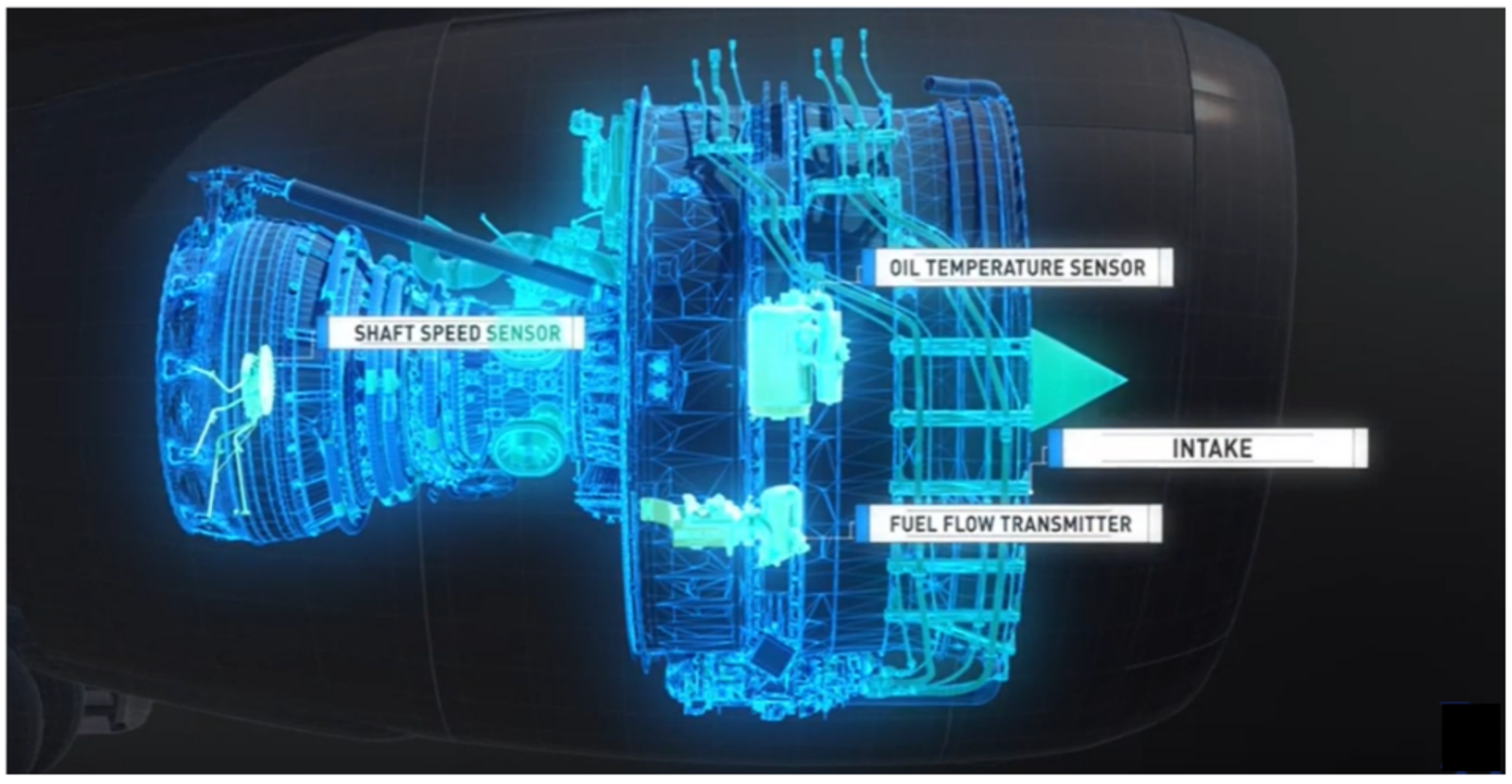
IF
EVERYTHING
SEEMS UNDER
CONTROL,
YOU ARE NOT
GOING FAST
ENOUGH

The Airbus E-Fan X Project

A JOINT INITIATIVE BY AIRBUS, ROLLS-ROYCE AND SIEMENS

For over a hundred years - and certainly many to follow - the aircraft industry, for the most part, has relied upon combustion based engines ranging from the long-forgotten piston-prop through the state of the art Turbofan. Yet, no matter what the degree of advancement is in the field of such engines, what's guaranteed is an ever-increasing toll of CO2 and other greenhouse gases. The intuitive solution for sustainable development, as in nearly all domains of power generation, especially in transportation, is electricity. Presently, every industry in the field of transportation employs at least a certain level of technological know-how of the utilisation of electrical energy to power any system that would otherwise derive energy through the combustion of fossil fuels.However, no such concrete technology in the aircraft domain is in existence yet, due primarily to the commendable figures of power output and efficiencies of the contemporary combustion engines.

But then, electric engines were never invented with the aim of outperforming the existing engines (though with the current trends of R&D, such a thought could be realised), but to rather mimic them without using non-renewable resources and reducing greenhouse emissions in parallel.The E-Fan X Programme of Airbus is one such initiative that aims to accelerate developments towards environment-friendly aviation. The E-Fan was initially designed specifically to utilise electric power. As a second step, E-Fan was transformed into an updated 'Plus' version with a hybrid configuration for longer flight endurance. E-Fan Plus – which debuted during the summer of 2016 – incorporates an internal combustion engine as a range extender in addition to the aircraft's on-board lithium-ion batteries. These two propulsion system configurations, conjointly with ongoing innovation, highlight the aircraft's role as a technology demonstrator that allows the company to make important advances on its electric aircraft roadmap.Airbus has also produced the all-electric E-Fan 1.0 and hybrid E-Fan 1.2, which combined a 60 kW motor with a combustion engine. While these represented major achievements, the steps between each project were incremental.



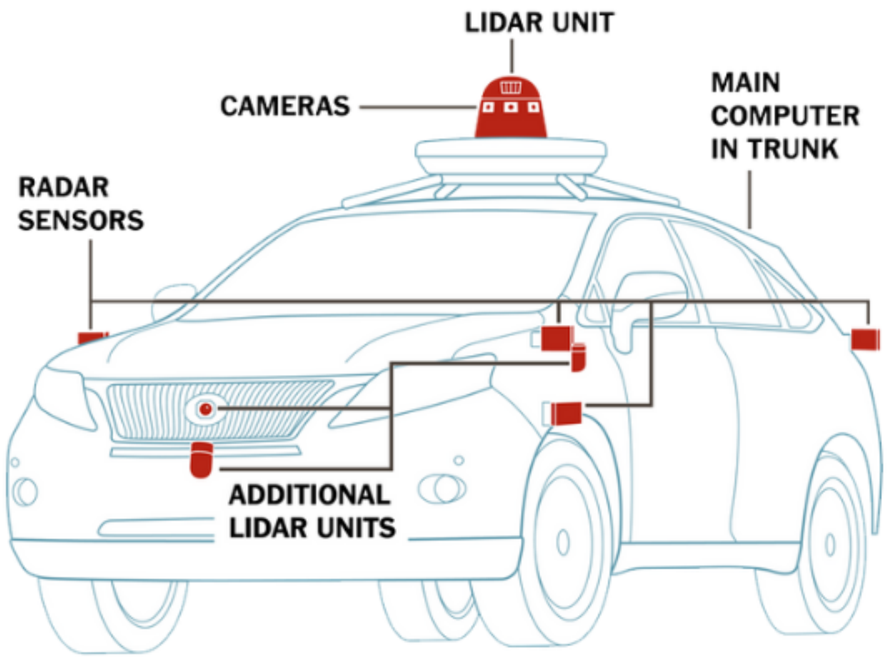
SACHIT KRISHNAN

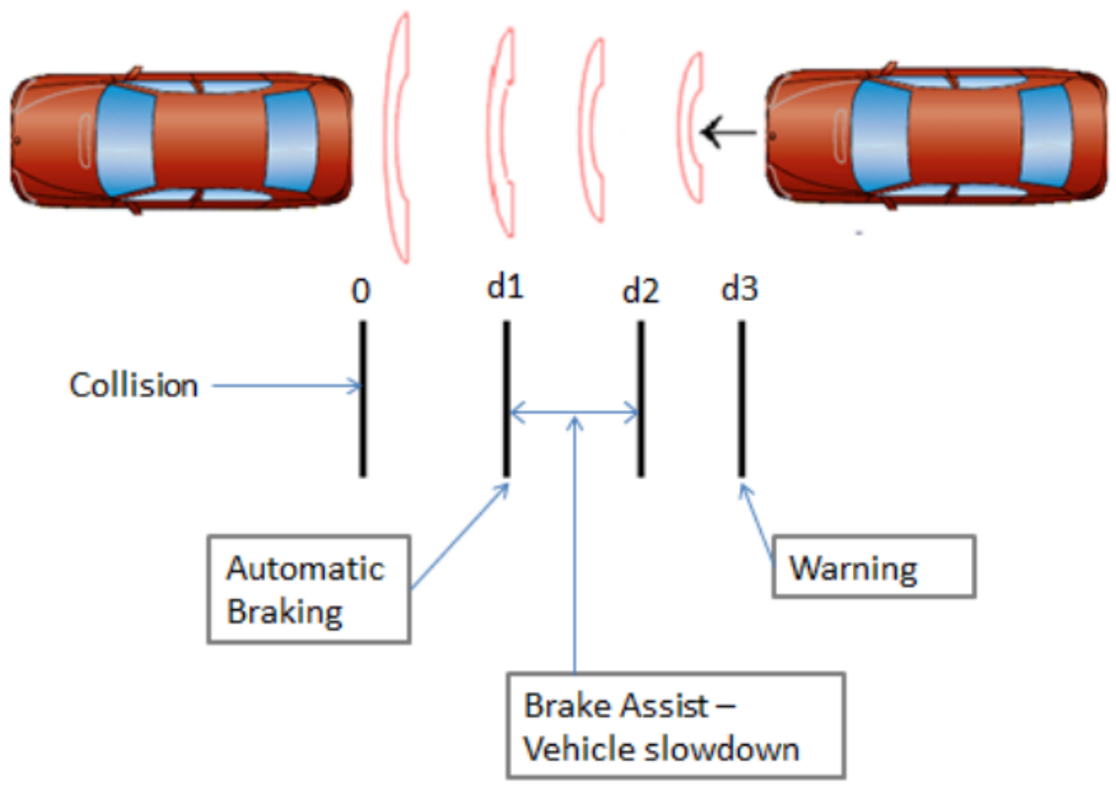
Advancing innovations in the Automotive Industry

Everyone knows that how much automobile industry has been developed in recent years, so I would like to give you brief idea about it.
Artificial Intelligence (AI) and Machine Learning (ML) are very important parts in our automobile industry. Nowadays, more automobile companies are implementing new technologies using AI and ML that makes driving vehicles more easy and safe.
In advanced vehicles, you can match the speed of the car in front of you by using sensors built in system like adaptive cruise control. With the help of this system, we can control the speed of our car, bring it to complete stop and also resume it automatically which makes it more comfortable for driver to drive in traffic areas.

Automatic Emergency Breaking (AEB) is a system which automatically applies the brakes to avoid accident if a forward collision is about to happen and the driver is not paying attention towards it.
Few years ago, people used to turn their head back or see in mirrors while parking the car. But nowadays, we have parking sensors and rear-view cameras in our vehicles with which we get a broader view of backside and parking becomes easy and safe.

Sometimes parents are afraid to give vehicles to their children as they might get distracted while driving vehicle by playing the audio system at an excessive volume or they might drive at very high speed also. For that parents can use parental control system to limit speed and volume. It limits the speed and audio volume to a certain maximum limit. It can also sound a continuous alarm if seat belts are left unfastened.
Depending on driving mode we are using, modern vehicles can stiffen their suspensions, adjust their steering ratios, and even embolden their engine notes. Cars can have driving modes like normal, eco, comfort, sport, sport plus, individual, and track with each offering a different flavor of luxury.
Lane keep assist is one of the many safety technologies now available in modern cars, which solves one of the simplest problems. Keeping a car centered in a lane is not very difficult, but drivers of vehicle, still needs a little help particularly on long trips. This system use the brakes or steering to keep a car in a lane and prevents it from crossing the line





SACHIN KUCHEKAR

Autonomous Vehicles

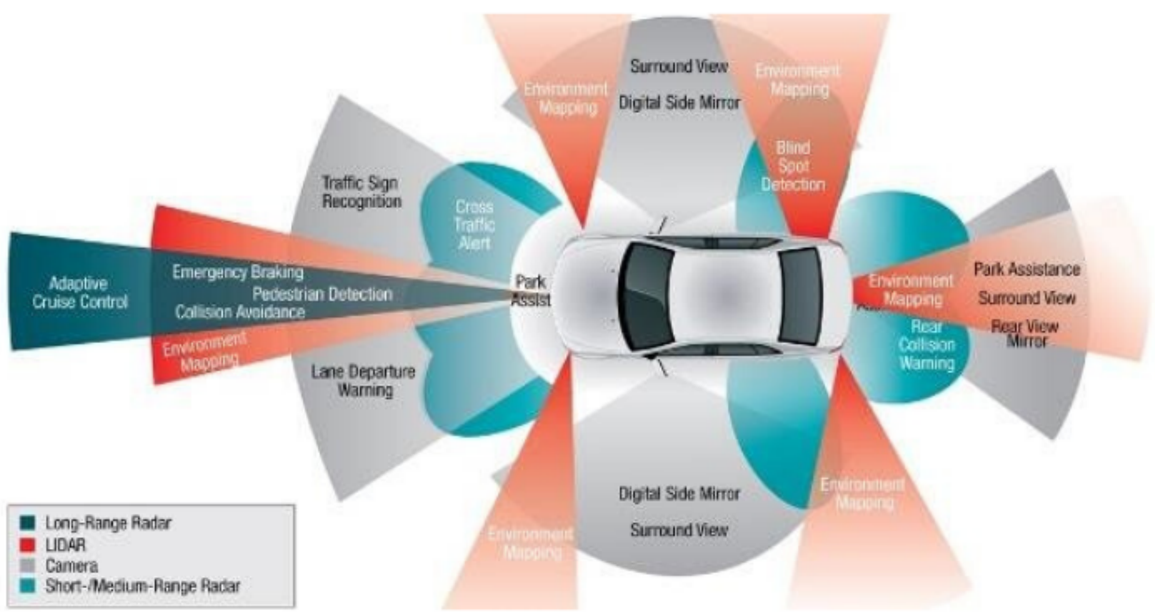
Introduction

Driver-less cars used to be the sort of thing you'd see in some sci-fi films - but they're soon going to be a reality. Autonomous cars are being developed by some companies like Lexus, BMW and Mercedes. Fully-driverless tech is still at an advanced testing stage, but partially automated technology has been around for the last few years.

Research done till now

Most important thing in autonomous vehicles is identifying all the moving objects. The AI systems powering driverless cars, for example, are trained extensively in virtual simulations to prepare the vehicle for nearly every event on the road. But sometimes the car makes an unexpected error in the real world because an event occurs that should, but doesn't, alter the car's behaviour. As with traditional approaches, the researchers put an AI system through simulation training. But then, a human closely monitors the system's actions as it acts in the real world, providing feedback when the system made, or was about to make, any mistakes. The researchers then combine the training data with the human feedback data, and use machine-learning techniques to produce a model that pinpoints situations where the system most likely needs more information about how to act correctly.The researchers validated their method using video games, with a simulated human correcting the learned path of an on-screen character. But the next step is to incorporate the model with traditional training and testing approaches for autonomous cars and robots with human feedback.

Autonomous vehicles use combinations of technologies and sensors to sense the roadway, other vehicles, and objects on and along the roadway. And they process the information using Machine Learning algorithm and take the decision. Machine Learning has wide use in Autonomous Vehicles.



Autonomous Vehicles are made with various levels. With each higher level the responsibility will shift more from person driving to the vehicle.

Level 1 - Consists of emergency stop, active cruise control, warnings against collisions.

Level 2 - Assist the driver for turn the steering wheel.

Level 3 - Allows the driver to completely turn their attention from the driving, but driver will have to again step in some time

Level 4 – Driver doesn't need to drive but need to be present during some critical situations.

Level 5 – Driver will not be needed at all, the cars will drive autonomously.

Future of transportation

Currently, autonomous vehicles have many drawbacks but they will be the future of transportation. Travel behaviour is continuously changing. In some respects we are creatures of habit, settled into routines. However, as people move through life their circumstances change and the need to reconsider their mobility behaviour arises. As a result, there is an important underlying dynamic to behaviour which sets the stage for how use of autonomous vehicles might influence it. These landscape solutions will take decades to fully roll out globally. When all cars are driverless, they can be guided like a robot army. But at some point, a 60-40 mix of human and driverless cars will be on the same freeway and local roads.

NIKHIL
KADAM

HORSEPOWER IS HOW HARD YOU HIT THE WALL

TORQUE IS HOW FAR YOU TAKE THE WALL WITH YOU

Differential Gear System

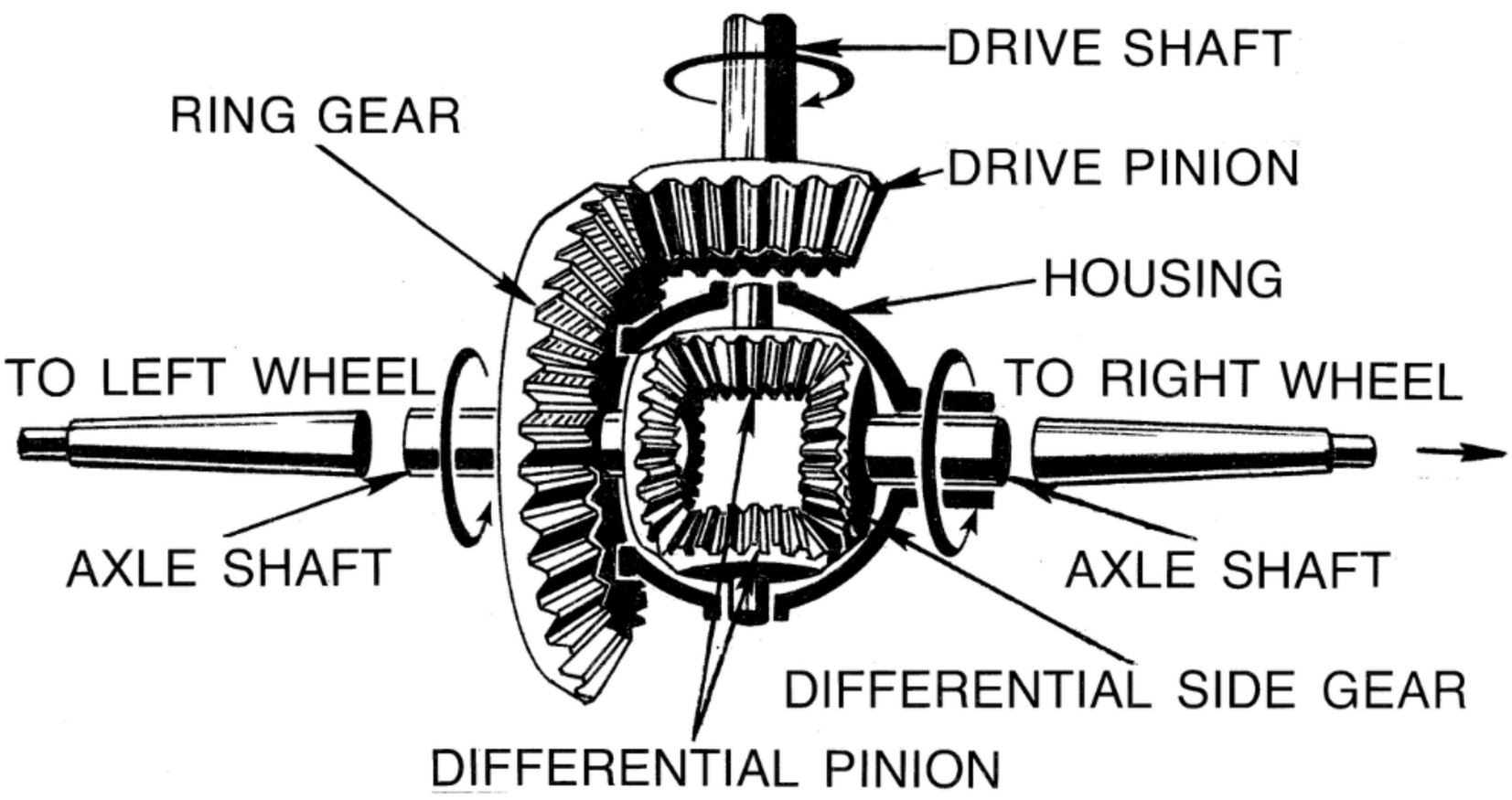
Function of a differential:
The main function of differential gear is to allow the rear wheels of vehicle to rotate at different speeds.

Necessity of a differential gear:
When a car is moving on a road, if it has to take a curve as shown in figure, the inner wheel must move at lower speeds and the outer wheel must move at greater speeds. To satisfy the above necessity we use differential gear in the rear wheel of the car.

Working of old cars without a differential gear:
Car wheel struck in mud
In the olden cars only one of the rear wheel is driven by the engine, so that it allows the two back wheels to rotate at different speeds. But the olden cars had drawbacks like more power requirement, discomfort due to the force acting only on the one side of wheel etc. When the driven wheel get struck in the mud, then there will be no chance for car to get out of it. So the development of differential gear gave a solution to all the problems.

Working of differential gear:
The power from the transmission shaft is transmitted to ring gear through a bevel and pinion gear.There will be a spider gear attached on the ring gear.This spring gear has two types of motions allowed for it.One is along the rotation of spider gear and other is rotating above its own axis. Spider gear is attached to side gear which is attached to the wheel shaft. Spider gear is designed such that it pushes side gear and makes the wheel to rotate at same speed. When the leftside wheel must be slowed and right side wheel should be turned fast, The spider gear rotates in anti clockwise direction and vice versa.

Disadvantage of differential gear and how to correct it:
When one of the rear tyre is on the slippery part, the power will be supplied to the slippery wheel, such that it doesn't allow car to move. This problem arises due to differential gear. The problem can be fixed by using the preloaded spring between the side gears and using clutch plates in the casing.



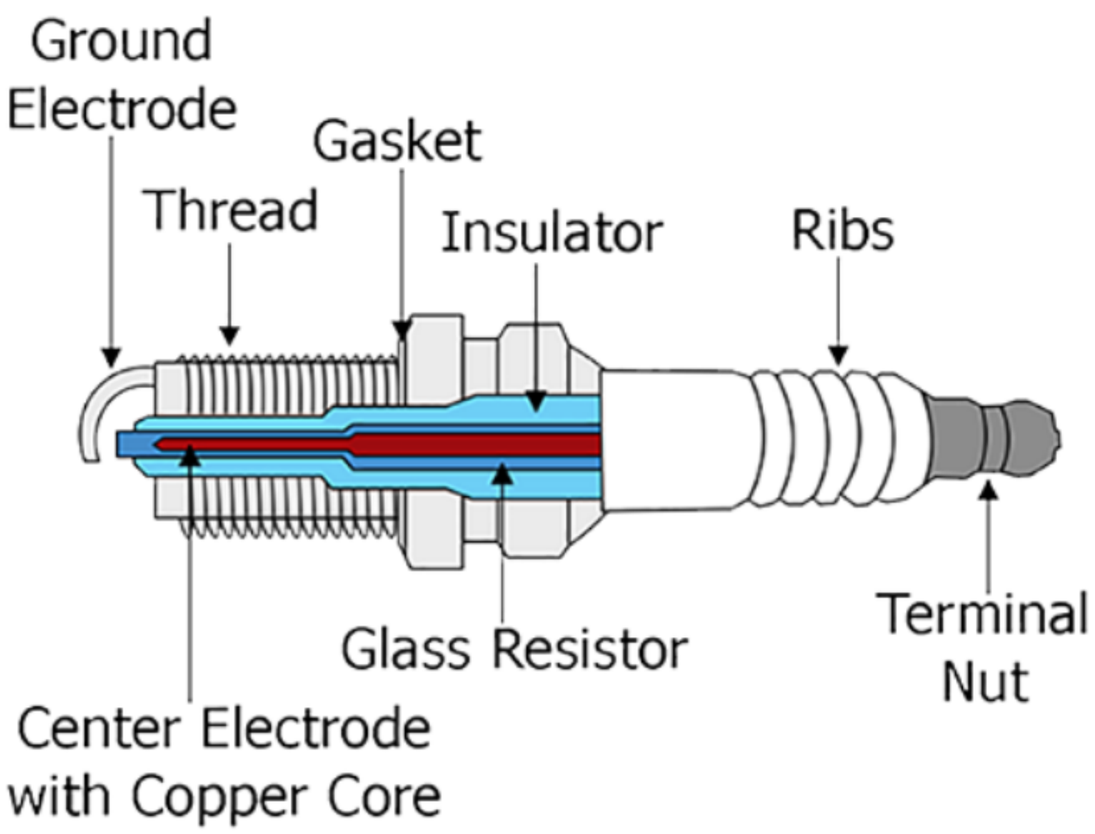
KIRAN
KUMAR

Difference Between Glow Plugs and Spark Plugs

WHAT IS A GLOW PLUG?

Fuel ignition in a diesel engine is only due to the high compression ratio which raises the injected diesel fuel temperature to ignition temperature. But in cold weather, it can be difficult because Liquid fuel needs to be in vapour form to burn. In a cold engine, even compression temperatures are not enough to vaporize the fuel enough to ignite. This is due to the low temperature of the engine cooling the heat of compression. After a few ignition cycles, the engine gets warm enough to continue running normally, although at some reduction in power. For this problem in a diesel engine, a glow plug is used.

A glow plug is a heating device used to make starting of a diesel engine simpler. This heating element works on the principle of heat emission due to electrical resistance. This heating element, when electrified, heats due to its electrical resistance and begins to emit light in the visible spectrum, hence the term Glow Plug. The fuel injector spray pattern then impinges directly upon the hot tip of the glow plug during the injection of fuel at top dead center This ignites the fuel even when the engine is insufficiently hot for normal operation, which reduces the cranking time to start the engine.

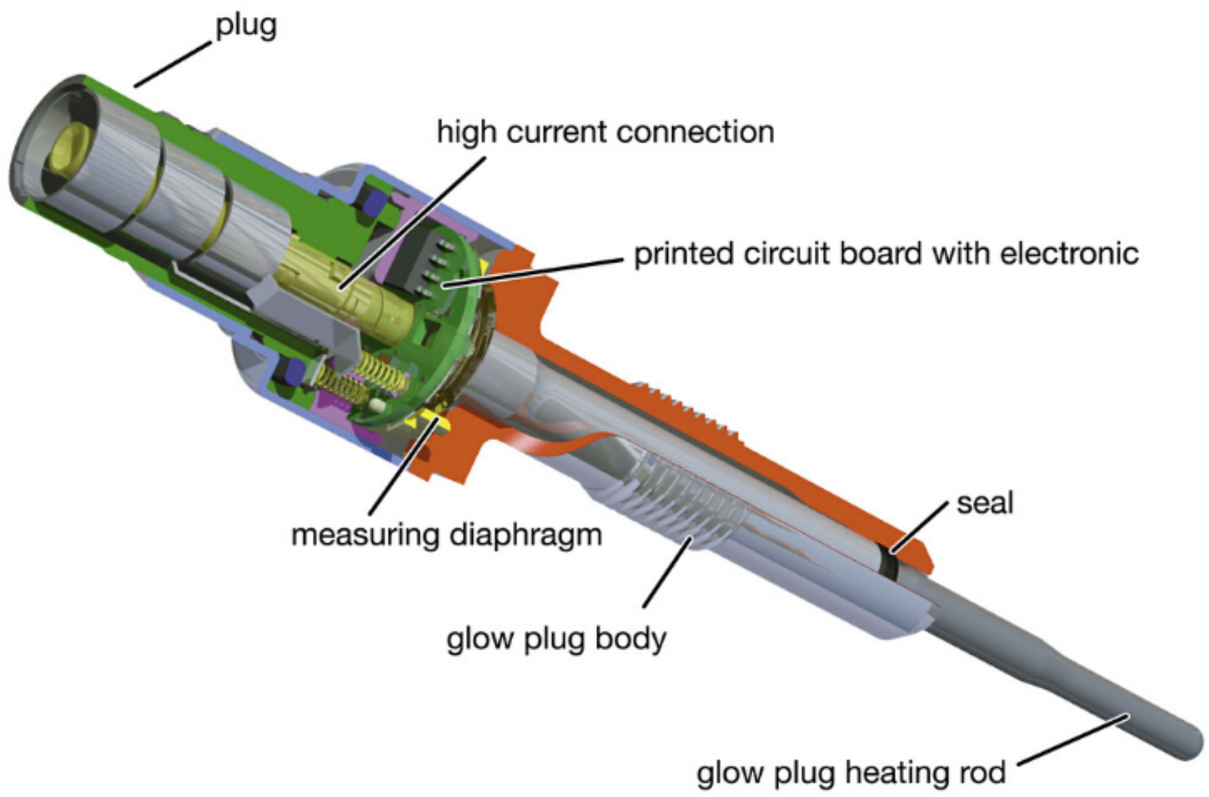


Internal Sturcture of Spark Plug

WHAT IS A SPARK PLUG?

As the auto-ignition temperature of the gasoline (petrol) is high (270–280°C). It needs to be ignited unlike diesel in a diesel engine which is ignited by compression, for this purpose a spark plug is used in a gasoline engine to ignite gasoline in each cycle.

A spark plug is a device for delivering electric current from an ignition system to the combustion chamber of an SI engine to ignite the compressed fuel and air mixture while containing combustion pressure within the engine.A spark plug has a metal threaded shell, electrically isolated from a central electrode by a porcelain insulator. The central electrode, which may contain a resistor, is connected by a heavily insulated wire to the output terminal of an ignition coil or magneto. The spark plug's metal shell is screwed into the engine's cylinder head and thus electrically grounded. The central electrode goes through the porcelain insulator into the combustion chamber, forming one or more spark gap between the inner end of the central electrode.



Internal Structure of Glow Plug

DEVENDRA GHARAT

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