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COLLEGE OF ENGINEERING
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SPECIAL POINTS OF INTEREST:

- Rolls Royce's famous hood ornament is called the "**Spirit of Ecstasy".**
- The most expensive car ever made is the **Bugatti Royal Kellner ,**costing 6.45$ more than the Bugatti Veyron.
- **14** Is the number of cars Ferrari produces in a day.

INSIDE THIS ISSUE:

AUTOMOBILE DEPARTMENT

THE HISTORY OF AUTOMOBILE.

In the early days people used bullock carriage or other animals such as camel, horse etc. to transport good and human from one place to another. In use of these animals one big problem encounter is that they could not travel for long distance and for long time. So the necessary of a machine is arrive which can satisfied these function. After a great effort of scientist an automobile come into existence in 1769, when a French engineer Captain Nicholas Cugnot design the first road vehicle propelled by its own power. It is a steam engine automobile but his design proved to be impractical. First steam carriage built by Richard Trevithick in 1801 in England.

J.J.E. Lenoir. He used coal gas as fuel. There is no compression stroke In the year 1860, first internal combustion engine is developed by before burring of fuel.

In the year 1867, Nikolaus Otto and Eugen Langer used compression stroke in that engine so the power of engine will increase.

In the year 1876, Nikolaus Otto developed first four stroke spark ignition engine.

After this several engineers (Dugald Clerk, James Robson and Karl Benz) developed two stroke engine.

In the year 1880, Karl Benz in Germany developed a tricycle propelled by an internal combustion engine.

In the year 1892, Rudolf Diesel developed first four stroke compression ignition engine.

In the year 1920 a stratified charge engine developed which can run on both petrol and diesel. Ricardo developed a jet ignited stratified charged engine.

In the year 1957 Wankel developed a rotary type internal combustion engine.

-Likith Sai(1NH13AU035)

STORY OF THE WHEEL

THE WHEEL

The invention of the wheel falls into the late Neolithic and maybe seen in conjunction with other technological advances that gave rise to the early Bronze Age. Note that this implies the passage of several wheel-less millennia even after the invention of agriculture and of pottery during the Aceramic Neolithic (9500-6500BC).

- 4500-3300BC: CHALCOLITHIC, invention of the potter's wheel; earliest wooden wheels (discs with a hole for the axle); earliest wheeled vehicles, domestication of the horse.
- 3300-2200BC: Early Bronze Age.
- 2200-1550 BC: Middle Bronze Age, invention of the spoked wheel and the chariot

- Aldwin Rajan(1NH14AUOO2)

THE WHEEL

THE RISE OF GOODYEAR TYRE AND RUBBER COMPANY -

"I couldn't find the sports car of my dreams, so I built one myself"
-Ferdinand Porsche

Introduction: The Goodyear Tire & Rubber Company is an American multinational tire manufacturing company founded in 1898 by Frank Seiberling and based in Akron, Ohio. Goodyear manufactures tires for automobiles, commercial trucks, light trucks, motorcycles, SUVs, race cars, airplanes, farm equipment and heavy earth-mover machinery. The company was named after American Charles Goodyear, inventor of vulcanized rubber. The first Goodyear tires became popular because they were easily detachable and required little maintenance.

Goodyear presented a vision of a future tire that looks very different from tires today, that is a sphere. Goodyear unveiled its latest concept tire, Eagle-360 at the Geneva International Motor Show 2016 and the Eagle-360 Urban in 2017.

Concept: "By steadily reducing the driver interaction and intervention in self-driving vehicles, tires will play an even more important role as the primary link to the road," said Joseph Zekoski.

Spherical shape for ultimate maneuverability and safety:

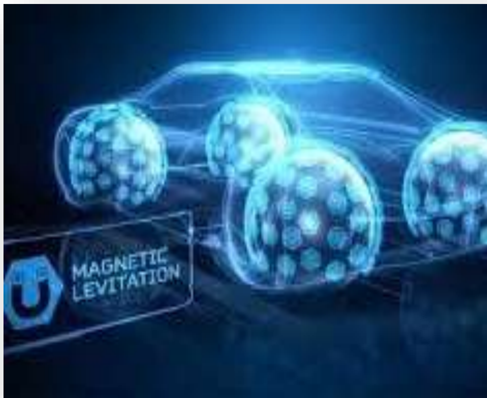
The unique shape of the Goodyear Eagle-360 could contribute to safety and maneuverability to match the demands of autonomous mobility. The spherical shape of the tire is key to delivering ultimate maneuverability.

The multi-orientation tires move in all directions, contributing to passenger safety.

In addition, the spherical shape of the Goodyear Eagle-360 helps the car to overtake an obstacle without changing its driving direction and because 360 degree turns are possible with this tire, it could tackle anticipated parking constrictions of the future, as less space will be needed for cars fitted with spherical tires to pull into parking spots. Assuming public parking areas play the same role, this could significantly increase the capacity of public parking areas without increasing their size.

Sensors ensure connectivity with the car .

THE GOODYEAR TIRE AND RUBBER COMPANY



MAGNETIC LEVITATION

Sensors:

Sensors inside the Eagle-360 concept tire register the road conditions, including weather and road surface conditions, and communicate this information to the car as well as to other vehicles to enhance sensitivity monitoring technology, sensors in the Eagle-360 register and regulate the wear of the tire to extend mileage. And now customizing the tire tread based on the region where the driver lives is a new possibility.

Connected to the car via magnetic levitation:

To connect with the body of the car, the Goodyear Eagle-360 concept tire relies on magnetic levitation. The tire is suspended from the car by magnetic fields which increases the passenger comfort and reduces noise.

-John Christopher

(1NH12AU028)

Bloodhound SSC-1000Mph

The BLOODHOUND Project is a Global Engineering Adventure, using a 1000mph World Land Speed Record attempt to inspire the next generation to enjoy, explore and get involved in (STEM) Science, Technology, Engineering and Mathematics.

The BLOODHOUND projects makes all Specifications, Calculations, CAED models, Test Data, Working of the Sub-assemblies of the car available to Globe via Internet and makes this a Global Engineering Adventure.

Objectives

Inspire the next generation about science, technology, engineering and mathematics.

Share an iconic research and development programme with a global audience.

Set a new World Land Speed Record of 1,000mph.

THE CAR

The BLOODHOUND Project centers on BLOODHOUND SSC, a supersonic car that is designed to go faster than 1,000mph (1,600km/h). It will cover a mile in just 3.6 seconds.

BLOODHOUND SSC is approximately 13.4m long and weighs 7.5 tones. The design is a mix of car and aircraft technology, with the front section being a carbon fiber monologue (like a racing car) and the back portion being a metallic framework and panels (like an aircraft). The two front wheels sit within the body and two rear wheels are mounted externally within wheel fairings.

The Car will be powered by both a jet engine and a rocket, which together will produce more than 135,000 horsepower.

Design

BLOODHOUND SSC is one of the most complicated car ever built. It will comprise of over 3,500 parts (and 22,500 rivets), of which many have been designed and manufactured uniquely for this car.

Main body

"Failure is simply an opportunity to begin again, this time more intelligently."
-Henry Ford.

BLOODHOUND SSC is a hybrid construction. The front section of the Car (which consists broadly of the nose and the cockpit) is primarily made of carbon fiber composite while the rear section is made from metal.

THE BLOODHOUND

Engines

BLOODHOUND SSC will be powered by three engines. The Euro jet EJ200 jet engine and the Nammo rocket/rocket cluster – will provide the thrust, while the third – a Jaguar Supercharged V8 engine – will act as an auxiliary power unit to drive the rocket oxidizer pump.

The temperature in the rocket system reaches 3000˚C.

At full power the jet will be providing 90kN of thrust and the rocket 120kN. Together that's 135,000 thrust horsepower. The altitude bloodhound will reach if it is vertically fired is 25000ft.

Fuel

The Car will need around 400 litres of jet fuel and 800 litres of rocket oxidizer (high test peroxide, or HTP) for each 1,000mph run.

"The builder of the best racing car is not necessarily its best driver." -Hans Salye.

Brakes

BLOODHOUND SSC has three primary braking systems: Airbrakes, Parachutes and Wheel brakes. These will be used one-by-one to slow the car down from its top speed of over 1000mph.

1000mph : Throttle is closed

800mph : Airbrakes are deployed

650mph : First Parachute is deployed

400mph : Second Parachute is deployed if required

200mph : Wheel brakes are applied.

Aerodynamics

Computational Fluid Dynamics was used to study the effect of Shock Waves on the Supersonic car. The car has been designed to have zero lift. The drag force on the car at 1000mph is 20 tonnes.

The Desert Plan

The perfect track was searched with the help of a programme written by Dr. Adrian Luckman, Swansea University. These were then looked into individually with help of Google Maps and Hakskeen Pan in South Africa was found to be the ideal track for Bloodhound.

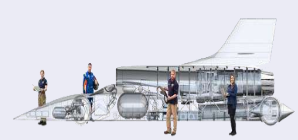
Driver

Andy Green - Fighter Pilot in the Royal Air Force

He is the fastest Man on Earth. He has driven Thrust SSC which is the current world land speed record holder at 763mph. He has also driven JCB DieselMax which the fastest diesel car in the world at 350mph.

-Suraj K

(1NH12AU02)



INSIDE OF THE BLOODHOUND

THE DODGE TOMAHAWK

THE DODGE TOMAHAWK

The Dodge Tomahawk was a non–street legal concept vehicle introduced by Dodge at the 2003 North American International Auto Show.

large-capacity 10-cylinder automobile engine, and its four close-coupled wheels, which gave a motorcycle-like appearance The Retro-Art Deco design's central visual element is the 500-horse power (370 kW), 8.3-litre (510 cu in) V10 SRT10 engine from the Dodge Viper .The vehicle has two front wheels and two rear wheels, which are sprung independently and theoretically allow it to lean into corners and counter steer like a motorcycle.

Dodge's claims of a hypothetical top speed of 300 to 420 miles per hour (480 to 680 km/h), probably based on horsepower and gearing calculations, were debunked by the motorcycling and automotive media. No road tests of the Tomahawk have ever been published. As they were not street legal, Dodge called the Tomahawk a "rolling sculpture", which was not intended to be ridden.

Design

The design was the work of Chrysler staff designer Mark Walters, who built the vehicle around the Dodge Viper 8.3-litre (510 cu in) V-10 engine but a running, workable concept vehicle, the design and fabrication process took six months for engineering, as well as the fabrication RM designed a new, patented front- and rear-swing arm suspension that allows both parallel wheels to lean together, keeping all four in contact with the ground and allowing counter steering. The Tomahawk was intended, unlike many concept vehicles, to be a "functional runner" that "had to work" as well as have a finished appearance, since the mechanical parts would be exposed to view.

Suspension

The Tomahawk has an independent suspension on all four wheels designed to allow the rider to counter steer and lean into turns like a tilting three-wheeler. There is a hub-center steering style swing arm connected to the outboard side of each of the two front wheels, with a steering link connected to the handlebar shaft. There is very little lock-to-lock steering range, only about 20° on either side of center, so the turning radius of the Tomahawk is large A low center of gravity, accomplished by situating the engine as low to ground as possible, is intended to provide greater control at low speeds The two rear wheels also each have an independent swing arm, but on the inboard side, along with an inboard chain drive for each wheel. The rider can engage a rear suspension lock, which hydraulically holds the two wheels' relative positions, letting the vehicle stand on its own, without using a side stand.

The suspension would allow a lean of up to 45° with all four wheels maintaining contact with the ground before one of the swing arms contacted the ground, although attempting to actually corner at such extreme angles is not safe given the Tomahawk's 1,500 lb weight

"You can do anything if you have enthusiasm."
-Henry Ford.

Fabrication

RM custom-milled the Tomahawk components from blocks of aluminum. Under the seat are two alloy pieces that began as 750 lb (340 kg) billets that are machined down to 25 lb. (11 kg) each, and polished

polished to a mirror finish. Details like hand levers and the twist grip use needle and ball bearings.

Detroit Auto Show debut

The Tomahawk was remembered in 2014 by Automotive News as one of the "10 Most Memorable World Debuts". In the years after the Tomahawk made its high-profile entrance, the Detroit Auto Show became more modest in scale, and the automakers' battle to outdo each other with boundary-breaking dream cars faded in the years leading up to the 2008 auto industry crisis

THE DODGE TOMAHAWK

Performance

As introduced in 2003, the one-of-a-kind Tomahawk was operational and road-ready, but not fully road-tested, and acceleration and top speed were not confirmed; Dodge described the vehicle both as "automotive sculpture," intended for display only, and as "ride able". A request from one publication to test the Tomahawk's performance was refused, and Dodge declined the same publication's request to interview the company's test riders, or to relay their riding impressions.

Top speed

The January 6, 2003 press release from Dodge announcing the Tomahawk and listing the specifications said it had "a potential top speed of nearly 400 miles per hour" and also said "PERFORMANCE: 0-60 mph: 2.5 seconds (est.) Top Speed: 300+ mph (est.)".

-Sagar Suri(1NH14AU042)

FUN FACTS

- British inventor **Edward Butler** is credited with coining the term 'motorcycle' when inventing a 3-wheeled petrol vehicle in 1884.
- The very first **Harley Davidson motorcycle** used a tomato can for a carburetor.
- **Triumph** makes golf balls in addition to motorcycles.
- **'Vespa'** means 'Wasp' in Italian.

RISE OF JAPANESE AUTOMAKERS IN THE WEST

Until 1960 American made cars were delivered to retail buyers with an average of 24 defects a unit. Many aspects included very important things like safety of passengers and safety of environment. Those American cars made in Detroit were made on 'gas guzzling engines'. Until 1960, there was no concern about neither passenger nor our own mother nature

Government imposing rules:

At last the government woke up, as a result the federal standards of automotive safety were imposed in 1966.and emission pollutants in 1970, energy consumption 1975.

A slow victory:

According to Peter Chenny, he observed the victory of Japanese cars when his father bought a Honda instead of a Volkswagen, but first Japanese victory came when they introduced the new and most reliable models of all time which was the Toyota corolla. Introduced in 1966, it gained popularity overnight.

TOYOTA CONCEPT I

Corolla: Engine capacity-1.1 liter

Transmission-4 speed manual, 2 speed Auto

Wheel base-2286mm (90 inch)

Height-1379mm (54.3 inch)

This was a tremendous commercial hit bagging mind blowing shares in the market. The corollas new and updated models are still on the streets and I personally encounter them in Bangalore city.

Export Expansion:

In 1970's export of passenger cars increased at a considerably high rate, i.e. nearly a 200 fold from previous decade. 17% of the produced cars were exported worldwide.

After the 1973's Arab oil embargo, the vehicle exporting accelerated again and the auto production in japan increased rapidly in 1970's

As the 'Star makers' Mitsubishi and Honda emerged and started the sales of their 'Dodge vehicles' in the U.S. even more brands like these came to America and settled down there, thus ruling the western automobile industry.

Claiming Victory

Japanese vehicles like Toyota Corolla, Mazda Cosmo, Nissan Datsun, Mazda RX5, RX7, Subaru and Wagon-R are few of the many Japanese cars the world surrendered to. In 2000, Japanese cars were the most competitive brands of all time and in the same year Japan also became the largest car manufacturer in the world.

Brand Expansion

Honda expanded its brand in various fields, one of them being in the car industry and thus helping Japan become the most dominating car building nation. Honda then developed a four stroke petrol engine and also accelerated in the field of robotics, building a super intelligent robot by the name "Asimo" .Toyota holds a large amount of shares in the world market thus making it one of the richest car producing company the world.

Japanese car brands proved that they can change or shift to a new weapon to win the war.

-Thushar(1NH15AU057)

"As long as we stick to our old weapons ,no new war can be won."

- Silver Shadow.

TESLA'S AUTOPILOT SYSTEM

The newest Tesla autonomous car doesn't just let people drive hands-free. It's intelligent, and capable of learning behaviors of both the operator and environment in order to make better driving decisions. While many high-end automakers are creating technology that allows cars to drive themselves, Tesla's technology is bound to leave them in the dust. Tesla's plan is to lower overall vehicle maintenance cost and lower collisions in conclusion lowering collision repair cost making it more affordable for the average American to own an electric vehicle.

THE BLOODHOUND

The Tesla Cars Use Machine Learning

Tesla is utilizing a variety of high-tech systems, like mapping data, connectivity, and machine learning, to make their autopilot system cutting-edge. In a way, the technology that Tesla uses is an awful lot like what Google does. It's called machine learning, and it involves using an algorithm to analyze data, and then making accurate predictions based on the information. Google learns from user behavior, and generates more accurate results over time. For instance, a person who enjoys refinishing furniture, and routinely runs searches for woodworking materials and how-to articles, will likely get information on how to build or refinish furniture if he looks up "wood furniture." Another person might see listings for stores that sell wood furniture. Facebook does the same thing when it chooses what to put in your feed based on who you interact most with and which posts you like or comment. This is what the Tesla tech does, but on a much grander scale.

It's the Ultimate Artificially Intelligent Car

Machine learning is a form of artificial intelligence, and many companies are harnessing the technology. However, Tesla's cars don't just learn from the experiences of one vehicle. They're all connected, and they will become smarter as more vehicles take to the streets. The autonomous Google car, which has been spoken about quite a lot, has been programmed to pause for a moment before leaving a red light. By doing so, it avoids collisions with those who try to slip into the intersection as the light is changing. While the Tesla car has a similar algorithm that detects common driving situations like this, it could learn other nuances of driving, like whether another driver is taking a curve too fast and is likely to drift.

-Jai Kumar Sundar(1NH14AU021).

FUN FACTS

- Only **9 parts** on the Tesla Model S require regular replacement.
- **The Roadster** was Tesla's first model.
- **2.5 sec** is the time taken by the model S TO GO FROM 0-60mph in 'Ludicrous' mode.
- **$1** is Elon Musk's annual salary from Tesla.

ADVANCED TRANSMISSSION CONTROL UNIT

TRANSMISSION UNIT

Modern day cars are offered with both Automatic and Manual Transmission as per the customer choice. In comparison to manual transmission, automatic transmissions enhance the driving comfort and also fuel efficient as it independently determines the point where engines run most efficiently. There are various aspects to discuss about the Advancement of Technology in Transmission Control Units.

Going High-tech: Modern Transmission Control Units are designed to meet high precision digital intelligence in order to find out engine's ideal operating point, the control unit posses high-tech computer enabling complex operation of various kinds of automatic transmission systems. The processing speed of a modern transmission unit is incredibly faster than the computers used in the lunar mission.

Conventional Automatic: A conventional automatic transmission uses various programs stored in the control unit to shift the gears. Most of cars are equipped with a switch strategically placed on the steering helping the drivers to shift gears avoiding errors and adds precision transmission power. Most common conventional transmission is designed with 6 gears though some ultra-efficient versions are designed with 9 gears.

Automated Manual Transmission: An Automated Manual Transmission, abbreviated as AMT, is a combination of manual and automatic transmission. It offers the best of comfort and convenience of an automatic with an individual control of manual transmission. The clutch opens during the idling condition and utilizes the energy generated when it's closed. This transmission drastically reduces carbon emissions and saves fuel in the process.

Dual Clutch Automated Transmission: This type of transmission comprises two separate transmissions. One is used for even gear shift and other one for odd gear shift. Both clutches shift back and forth between the transmissions within a fraction of second, allowing precision gear shift. The complex coordination in a dual clutch transmission is possible due to sophisticated transmission control system by a powerful processing.

Continuously Variable Transmission: Abbreviated as CVT, used without any shifting points that completely eliminates shifting response delays. As result, allowing the driver to accelerate accurately without any interruptions as the driving force is available all the times. The vehicle does not even shift back and forth between fixed shifting points, a feature most essential during steep inclines. CVT is widespread in Asia and North American markets.

e-Clutch: An e-Clutch provides the comfort of any automated to a manual transmission in a cost effective way. Drivers can shift into gear one by just stepping into gas pedal, the e-Clutch automates the clutch but not the transmission. The clutch pedal produces an electrical signal and sends it to the actuator, which decouples the clutch.

Coasting: The e-Clutch manual transmission can also benefit fuel efficient coasting functions, which is only possible with automatic transmissions. Coasting expands on the well-known start-stop function and enables additional fuel savings of up to ten percent.

"You don't expect to be at the top of the mountain the day you start climbing" -Enzo Ferrari.

-Jai Kumar Sundar(1NH14AU021).

F1 CAR DESIGN AND TECHNOLOGY

The physics of Formula One

There is a reason F1 cars look as if they're glued to the road – they virtually are. A Grand Prix racer generates so much down force at 160kmh that it could drive on the roof of a tunnel.

The down force, which is considerably more than the car's weight, makes the car stick to the road so well that through corners the driver can be subjected to forces of 5 Gs' – five times the pull of gravity – where their 70-kilogram body suddenly weighs 350kg. Five Gs' can stop a driver breathing, and make his head weigh 25kg.

Aerodynamics is, in general, the key to success in this sport. The 10 F1 teams spend hundreds of millions of dollars each year in a bid to create maximum down force and minimal drag. Wings are tailored for each race, and "barge boards" fitted to the sides of cars help shape the airflow and reduce turbulence.

F1 CAR DESIGN

Tight circuits such as that at Monaco, which is considered "slow", demand a very aggressive wing profile. Cars can run up to two separate "blades" on the rear wings. On high-speed circuits such as Monza, however, the cars are stripped of as much wing as possible to minimize drag and raise speeds for the long straights.

At full blast, the fuel pump delivers fuel faster than the water flows from your kitchen tap. The drivers pilot these vehicles at more than 300kmh while semi-reclining in a tub made of exotic carbon fiber, just centimeters off the road. Acceleration from 0-160kmh is achieved in about 3.5 seconds; the car can be quicker in the 100kmh to 200kmh sprint, because the down force created at speed aids grip, so reducing wheel spin.

That means in the time it takes a high-powered sports car to hit 60kmh, an F1 car will be doing 150kmh.

The drivers have to be supremely focused, and maintain this concentration for the two hours it takes to cover the 300-odd kilometers of a race.

A top driver can feel a variation as tiny as 0.5 percent in front-to-rear aerodynamic balance and sense a change in the car's behavior if front ride height is raised by just a millimeter.

F1 drivers are serious about fitness; they have to be. Their steeds can brake from 185kmh to a halt within 80 meters. Jacques Villeneuve once described the braking force as "like having someone drop a brick around your neck".

The thinner and lighter the driver, the better the fit in the tiny cockpit. All the top drivers train like elite athletes to endure the rigorous – and the high temperatures – of a race. Muscle strength is critical, especially in the neck (even with the compulsory use since last year of the Head and Neck

FUN FACTS

- F1 cars can accelerate from 0-100mph and decelerate back to 0 all in just **four seconds**.
- The best F1 pit crews can refuel and change tires in just **3 seconds.**
- At full pelt the fuel pump delivers fuel at a greater rate than your **domestic tap does water.**
- The gear box in an F1 car can change gears **50**

F1 CAR

Support system, or HANS, which reduces the force applied to the neck by up to 86 percent).

Between races, practice and the demands of corporate promotion, drivers undergo vigorous short-session training and psycho-physical therapy programs devised by the teams. Toyota, for example, asks its F1 drivers to take food intolerance tests and complete personality questionnaires in a bid to find each man's ultimate "round-the-clock" training regime.

The driver's blood pressure can rise by up to 50 percent during racing and he (there hasn't been a woman in an F1 championship race since 1976) loses up to three litres of fluid in a race. His heart rate can reach 190 beats per minute on the starting grid and exceed 200 during the race. The pulse rate of a healthy young person is typically about 60.

Each team starts the season in Melbourne this weekend with two cars and at least one spare. Teams in contention for the championship will ensure each driver has a spare car.

The maximum displacement of a 10-cylinder F1 engine is 3.0-litres and it cannot be supercharged or turbocharged. Each engine weighs about 100kg, but its precise specifications are determined by the demands of the circuit at which it will perform. The car must weigh at least 600kg and have four wheels, two of which are steerable, the other pair driven.

The engines produce an astonishing 650kW-plus at about 18,000rpm. The average large sedan generates about 150kW at 6000rpm. Previously, peak revs were about 12,000 – then Renault invented pneumatically driven valves, enabling engine speed to jump to 18,000rpm.

At Monza last year, the BMW engine in driver Juan Pablo Montoya's Williams car peaked at more than 19,000rpm. At those engine revs, the accelerative force on the pistons is nearly 9000 times gravity.

Achieving phenomenal power comes at a cost. Automotive engineering genius Ferdinand Porsche once said that "the perfect race car crosses the finish line in first place and then falls to pieces".

New technical regulations this year, stipulating teams can use only one engine per car per race weekend, have team engineers talking of doubling an engine's life expectancy – to just 800km.

Teams are constantly judging how far the car can go on 1kg of fuel, as that dictates the amount carried on board, hence pit-stop strategies. Race fuel "economy" is about 80 litres/100km. Places can be made or lost in a pit stop, when some 60 litres of fuel can be pumped into the tank in five seconds.

Teams could once use components of rocket fuel (in the height of the turbo era), but the fuel used now is more like premium unleaded, with octane levels of 95 to 102 but without cleansing elements or additives to aid drivability.

Fuel regulations are tough and, over a racing weekend, motor sport's governing body, the FIA, can take random samples to ensure the specified fuel is being used. It analyses the samples with a gas-chromatograph to identify different-sized hydrocarbon molecules – the fuel must match molecule to molecule exactly – in a process similar to fingerprint testing.

Each F1 racer has about 1.5km of wire, carrying data from some 120 sensors transmitting such information as the angle of the rear wing and brake, oil and tyre pressures.

"What's behind you doesn't matter."
-Enzo Ferrari.

Each F1 racer has about 1.5km of wire, carrying data from some 120 sensors transmitting such information as the angle of the rear wing and brake, oil and tyre pressures.

In the pit garages are some 500 meters of cabling for data processing. But only the people perched on the "bar stools" in the pits (race engineers, team principal, technical director and operations man) will be engaged in measuring a car's every function in a race.

A team has 70 to 100 people at each GP. To keep costs down, teams may send fewer staff on the "long haul" from Europe to Melbourne's race.

In each team, about a quarter of the staff work on the engine; most of the rest work on the chassis and assembly. Design of the chassis is an ongoing process - as soon as one season starts, the chassis team is already looking ahead to the next.

Each car comprises about 9000 different components, half of which are in the engine. The body and chassis are made from carbon fiber, which is four times stiffer and five times stronger than steel. The software to integrate the data from the sensors and engine and gearbox management programs comprises some 500,000 lines of code, which takes some 20 man-years to write.

The gearbox can have up to seven speeds. If the timing of the gear changes is off by even a few thousandths of a second, the gearbox will self-destruct.

Using digital replicas of various tracks, teams can test the engine before each race. The milling machines used to make car components can shape the surface of an area of one square meter to an accuracy of 4 microns (0.004mm), which is about 25 times thinner than a human hair.

It takes a lot of money and brainpower to generate this sort of vehicle. The outrageous costs have drawn industry criticism, with F1 boss Bernie Ecclestone arguing that the major players must cut costs or risk extinction.

-Arjun B C(1NH14AU005)

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