

Vehicle Tech 2 – Vehicle Structure & Aero

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Generative Design

Generative design what are the pros and cons of this revolutionary design approach engineers are now able to create thousands of iterations to their designs in which generative design will calculate many ways to make the product stronger and at the same time lighter using only what material is needed saving money and time for a company to create and experiment with designs.

This is a great tool for making strong chassis for our cars and revolutionising the way we manufacture our cars and components generative design is AI it can think for itself it can look at the chassis of a car and make it better.

more efficient stronger and lighter and quicker than a design from an engineer it really is the future maybe not for the exterior of our cars but as far as components and chassis are concerned it is a giant leap for technology and Design.

Taking inspiration from nature and evolution its designs are very organic it learns and evolves designs making them more effective learning from mistakes and calculating a more efficient solution to a products issues and solving them.

This process allows engineers and designers to talk to the computer inputting information like height weight and material of the design this is then put through the AI brain of generative design and an outcome is gained with many ways of achieving the goals you have set in a calculated and precise manner.

Also another pro to this tool is that you can input a choice of material and the limitations of that material and what design your trying to achieve like a chassis and feed that information into generative design it will then create many designs with that material and after its been created it will be attached with sensors that calculate weak points stress points and so on while the product is moving.

This information is put back into the system and generative design will find ways of improving that design and solving those issues again with many iterations so the product will become more and more efficient it improves itself like evolution.

it will make chassis and safety areas of a car better and better preventing life threatening accidents from ever resulting in catastrophe improving manufacturing time saving money saving resources by using less material than needed while still maintaining a high standard of safety and quality improving our economy and changing the automotive sector for ever our lives and maybe even design.



Steel Monocoque

The pros

low cost

Steel is very low in cost this allows manufacturers to make more cars at a cheaper price earning good profit on each car which is why companies like to use this material to create steel monocoques producing them quickly but at the same time creating a strong monocoque for the road.

Easy to produce

Another benefit to using steel is that it is easy to produce and can be welded in many ways it's a very adaptable material this means that a cars monocoque can be made in larger volumes at a reasonable price.

Saving the manufacturer money, the customer as well as making a decent profit it's a win win situation steel is mainly used in the lower end of the car market But because of its high production capabilities high strength and design capabilities you can see why it is used a lot in the exterior and monocoque of many cars on the road today.

It is a tried and tested metal that can take the rough and tumble vibrations that a road or another car can chuck at it and provides safety better handling because of the weight of it and is easily replaced.

Even companies like Mercedes Benz are still using steel monocoques for most of their cars so there are some premium brands still using this material today which proves that steel isn't going anywhere for a while as it offers more pros than it does cons and in a uncertain post Brexit market for metals steel may be used more often as it is cheap to buy strong and easy to manufacture in large quantities.

Recyclable

Steel is just one of the materials that can be recycled without degrading in quality it can be used again and again it is quickly recycled as it has magnetic quality's it is easily picked up and moved and put back into the automotive industry ready to be used and re used so there are many benefits if you're a small company.

Steel helps to cut down the overall cost of buying new materials and is also helping to save our planet as being able to reuse our resources especially metals will have a big impact in the future of the automobile industry

So, steel will be an obvious choice for most companies as keeping the cost of producing there vehicles down is priority in order to make a decent profit while producing well designed strong quality products for the automotive market.

Strong

One of the biggest benefits of using steel to build monocoques is because of its strength it can hold a lot of weight without being damaged and because of its stiffness and weight it allows the driver to gain more control over the cars handling as it is more planted to the ground Also because of its strength it makes the car safer as it can consume a lot of force which is another benefit to this material.

As the image of a company is very important and the safety of its consumer is always the main focus of any company using a metal like steel which has been used for way over 4000 years this metal allows for amazing design because of its flexibility the possibilities are as endless as your imagination

and because of its recyclability advantages over other competitor materials are massive giving companies the freedom to experiment and innovate Without having to spend ridiculous amounts of money steel allows a company to find their feet and gain momentum in such a competitive market which is why steel is known as the "universal building product" and will continue to be used for many years to come.

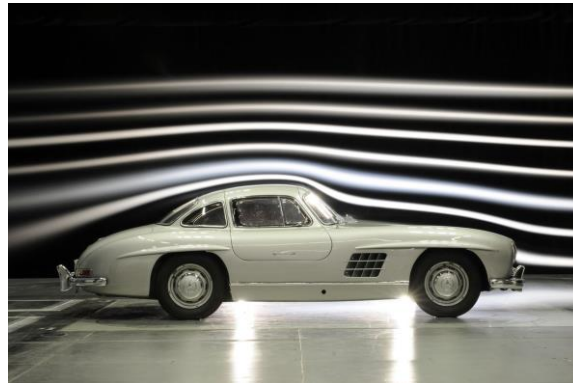
The cons

Heavy

Steel is heavy so going quickly is something that steel is not made for and is the reason why its only used in the lower segment of the automotive industry effecting the miles per gallon of your car.

Corrosion

When exposed to the elements steel if not painted with corrosion resistant paint it can start to rust which in turn causes it to lose its strength and reliability on the road there are many benefits to steel but this is just one of the cons of using it this is why steel is used inside of a car rather than its exterior as it has better protection from the elements.



Aerodynamics

Aerodynamics are important to a cars performance in the early days of f1 aerodynamics was ranked less important than an engines power output but is now known that aerodynamics effects the hole cars performance handling power and economy millage but cars face another problem air and the drag that the air can cause on the performance of the car.

drag is measured using the cars cd area also known as the drag coefficient this calculation will tell you the amount of drag that the air is causing on the frontal area of the cars surfaces the calculation of drag on the car is done by first calculating the air density the velocity and frontal area of the vehicle this will in turn give you the drag of the car IE its CD.

there are different types of drag that act on the cars aerodynamic flow one is high pressure drag this is where the air meets a surface like the window or the bonnet and the back of the car these are areas of high pressure which stop the car from achieving its full potential To overcome this resistance of drag you need more power to cut through it.

Which brings us to newtons third law of gravity every action has an equal and opposite reaction so making the vehicle sleeker and smoother like nature and organic shapes that flow into each other create better airflow as it slips over the car.

leaving a cleaner wake of air can stop imbalance in the rear as turbulent air can be created if it is not directed to the rear in a more precise manner therefore it is better to have a smaller frontal area than a large one like a truck.

as there is more resistance to cut through which can leave a chaotic wake of air exiting which spins like a tornado gaining more and more energy which can affect the cars overall handling and balance this was shown on plane wings as the air ran over the end of the wing.

it had nowhere to exit but they realised if you gave the end of the wing a curved fin it allowed the air to be directed more sensibly which stopped the turbulent air from shaking the structure of the plane.

The other type of drag is known as viscous drag this affects the flatter areas of a cars surfaces like the roof bonnet and floor of the car So in terms of the aerodynamics you would want to keep the surfaces as low and streamlined as possible a teardrop is the most aerodynamic shape in nature and is used in the design of the McLaren Speed Tail.

the teardrop shape has the lowest coefficient of drag this is because it is a smooth and sleek shape the air slips over it because it has no opposition This aerodynamic shape gave birth to the experimentation of aerodynamics.

And its benefits for racing and cars becoming a more reliable and affordable as cars could get more mileage per gallon than they could in the past as a result of this leap in aerodynamics.

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Quotes

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