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Technical Report Writing

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1 Introduction

This report will look at the history of carbon fibre, the use of carbon fibre in the automotive industry, the future of carbon fibre in the automotive industry and the pros and cons of carbon fibre and if it benefits the automotive industry and if it will be sustainable enough to replace existing materials used in the automotive industry. The information will then be used to see if carbon fibre is a sustainable material and is a positive factor in the automotive industry.

1.1 What is carbon fibre?

Carbon Fibre is a polymer and is sometimes known as graphite fibre. Carbon fibre is quite a lightweight material yet extremely strong. Carbon fibre is five-instances more potent than metallic and two times as stiff. It is also stronger than steel but somehow it is also lighter than steel, making it favourable within the engineering and automotive designing industries when creating many automotive parts. It is made with strong and thin crystalline filaments of carbon. The crystalline filaments are the base of why carbon fibre is strong. It is so thin that it can be compared to being thinner than a single strand of hair. Carbon fibre can be described as rope as it gains strength when it is twisted together. When it is twisted together, it forms a cloth, and a coat of resin can be used to make a permanent shape from the cloth like material made from twisting the carbon fibre together.

1.2 How is carbon fibre made?

The process of making carbon fibre is partially chemical and partially mechanical. It is when long stands of fibre are heated using high temperature while avoiding the contact of oxygen. The prevention of oxygen contact prevents it from burning the strands of fibres. The atoms inside the fibres start to vibrate in a process called carbonization. This causes the tightly interlocking of chains made of carbon atoms with the remainder of a few non carbon atoms remaining.

2 Literature

2.1 History of carbon fibre

Thomas Edison (in 1879) baked cotton threads or bamboo silvers at high temperatures. This carbonised them into a fibre filament that is mad of all carbon. High grade carbon fibres were invented in 1958. The fibres were said to be very inefficient, but they contained close to 20% of carbon and had a very low strength profile. A new manufacturing process was invented in the 1960s which realized that carbon fibre has a great strength potential than what was previously found in earlier times.

2.2 Uses of carbon fibre in the automotive industry

We have seen carbon fibre take over the automotive industry in the past years as it has grown in popularity as it has been providing positive results when tested to see if it is a good enough material for the automotive industry. It started by taking over the formula one industry as it was light weight and strong enough to be used. An example is the Halo bar used to protect the formula one driver from any serious harm as carbon fibre is strong enough to protect the driver as shown below in figure 1:



as shown from the image above the Halo can withstand a lot of force and pressure. This just proves of how strong carbon fibre is and how lightweight it is as it does not greatly impact the weight of the formula one car.

We have also seen carbon fibre being used to make the whole body of some supercars as it is lightweight and allows them to go faster as it does not weigh as much as steel. It is also used due to its strength but can be questionable depending on the type of impact a crash can cause to the supercar. Below is an image of the 2020 model Ford GT made using a full carbon fibre body:



As shown in the above image carbon fibre can be used to make an entire car body as it will help with the performance of the car and the strength to an extent. This proves the potential that carbon fibre has in the automotive world and the impact it has made in the automotive industry, it is truly leading technology.

2.3 Pros of carbon fibre

There are many pros of carbon fibre which make it such a key factor in the automotive industry such as:

1. High in stiffness meaning it is not easily flexible and does not warp easily.
2. Is high in tensile strength.
3. Has a low weight to strength ratio.
4. Is high in chemical resistance.
5. Is temperature tolerant to heat.
6. Has low thermal expansion.

This is why carbon fibre is very popular in many industries such as aerospace, automotive, military, and recreational applications. These pros are why carbon fibre is slowly replacing some materials used to manufacture cars in the automotive industry.

2.4 Cons of Carbon Fibre

Carbon fibre still has its disadvantages although it seems as if it is a product with no disadvantages. The following are the cons of carbon fibre:

1. Carbon fibre products are expensive compared to other structural building materials used for the same jobs.
2. It conducts heat and electricity, so it may not be the best choice for your project if you're building or structure works with either of these elements.

2.5 Future of carbon fibre

The future of carbon fibre is exciting and is continually evolving. It is undeniable that carbon fibre is a remarkable material that can be widely used and can even live a very long life if it is kept in the right conditions. However, although it looks like carbon fibre has a very bright future there are some current issues with carbon fibre that look to be altered in the future for our betterment. One of the biggest issues is that befalls carbon fibre is its cost for manufacturing this means that it is not easy to make carbon fibre especially without the right equipment. This equipment is also very difficult to acquire as it will need a large amount of capital. It is one of the most expensive high-quality materials to create. Although we have this big issue there is hope for carbon fibre in the future in this regard, as the price for it has drastically decreased in the last five years alone as carbon fibre in all its forms has increased in popularity. The next few decades in particular look to provide us with carbon fibre that is easily accessible, more cost-effective, and still extremely reliable, strong, and lightweight. (News, 2022)

3 Discussion

Some people may say that carbon fibre is not good due to the previously stated cons of carbon fibre. Although this is the case, we can see that the majority of people and industries are supportive about carbon fibre being the best material the automotive world has ever seen.

4 Conclusions

In conclusion we see that carbon fibre will be the best material to ever touch the surface of the earth as it is useful in many ways in the automotive industry. we hope to see that carbon fibre will be adapted more into normal cars and not just supercars and the development of carbon fibre into different automotive industries as it is efficient and strong and light.

5 Reference

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