

Gepp and Sons Solicitors sponsors Sam Titchner, an aspiring engineer to design, build and race an electric car in the Greenpower Challenge 2012....

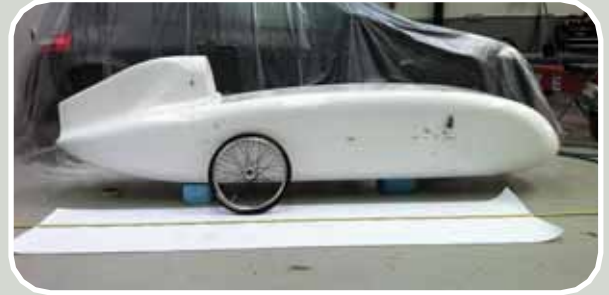


2nd Edition



Following on from the previous newsletter Sam's aim was to try and get his race car ready for the Goodwood Final 2011, even though Sam spent most of his free time working to get the car finished unfortunately this wasn't enough to get the car to the race which was a big shame. However, Sam sees this as more of an advantage as this means he can spend more time refining parts of the car, ready for the 2012 season.

So how has Sam been getting on with the designing and building of the car? Construction of the new car actually commenced over a year ago now, but due to Sam working solely on every part of the car on his own it has taken some time.



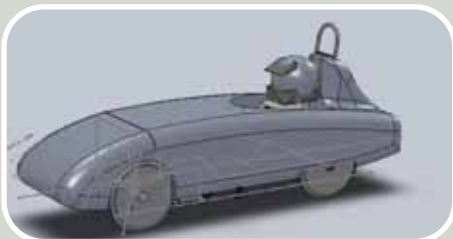
CAR CONSTRUCTION

So how has the car gone from a design on paper to a nearly finished race car....



Design Stage

Sam took inspiration from his old race car, current high performing race cars and aerodynamic naturally formed shapes, sketching up many different styles of designs and choosing the best looking and potentially most aerodynamic. He then took these sketches and turned them into 3D Models using CAD. This allowed him to virtually check the sizes, the final looks, and potential weight, but best of all this allowed him to test these full scale models within a virtual wind tunnel.



The wind tunnel shows how aerodynamic the car is in terms of

drag. This figure will be used to determine the gear ratio and the overall speed. From this we know the best shape and will go on to refine this. All in all this process took over 6 months and like anything is constantly being changed as new ideas are developed. From the previous race car many important lessons were learnt, one of them being to get the bodywork right. So it was decided to make a start on the bodywork first, as this will be the most time consuming and the design will no doubtably change over time.

Build stage

Once the shape was finalised, work commenced on constructing the bodywork, Sam took the hard decision to build the bodywork by hand as this seemed the most realistic option, in terms of money and experience.



This option involves 3 stages, first of which is to create a full scale solid model. This was created by using blue foam boards, 7 in fact, each board had a paper template of the car placed over it. This template was then drawn onto the board, then cut out using a band saw, giving the rough shape of the car. Each board was stuck together using a resin based glue called epoxy as normal glue would cause the boards to melt.

Once the glue dried work could start on manually shaping the foam to give the nice curves. So far everything was going fine but not for long the

first mistake made was to start coating the foam in body filler, which shamefully started melting the foam! This meant the car now had to be coated in epoxy. After this was completed, the body filler could be



applied, to do this a lot of body filler was needed, much to Sams delight his cousin who owns a body shop offered to help, saving a large sum of money, and time. To get the final shape over 20 litres of body filler was required. Finally after 4 months of sanding the car was ready to be spray painted. This was to give the car the best possible surface finish.

Once polished to a mirror finish, the next stage of construction could start but to get the final 'shell' a 'female' mold needs to be created out of fibreglass, which is basically lots of fibres of glass woven together to create a kind of 'mat' which is draped over the polished mold, then has a similar type of resin to epoxy applied



this is called polyester, which binds the glass together taking the shape of the car. Once finished the resin is applied to the glass (which is very messy), this resin is then left to set over a couple of days. After which Sam returned and removed the fibreglass part, which he was extremely chuffed about.

The car required 3 different moulds, the top, bottom and back and the nose cone. These moulds were then assembled without the original mold to check they fitted together correctly. These were then strapped to the roof of a car and transported to a composites company not too far from the body shop. This is where the final part of the bodywork takes shape. The three moulds are sanded and prepped ready to receive carbon fibre.



Why use carbon fibre?

You may have or may not have heard of this material, its most famous use is within formula 1 racing, where weight saving and high strength are needed, it is also used in the aerospace industry.

What makes it so strong and light?

Basically carbon fibre is made from acrylic which has had all the acrylic removed to just leave carbon, which is arranged in a strong fibre. When this

fibre is woven into a cloth and mixed with resin it becomes as strong as steel. But without the weight.

So why use it? Sam is using this exotic and expensive material for the body work as it means he only requires a small amount to make the shell compared to fibreglass, not only this but he will also end up with a strong shell to protect the driver in the event of a crash.

After a month of hard work and 'Laying up*' Sam has a complete carbon shell. Sam is now in the process of fitting the body work to the chassis.



Look out for the next installment into Sam's progress!

Here is to a prosperous new year and hopefully a successful 2012 for 'ElectroMotive Racing'.



*Laying up - this term is used in the composites industry as a quick reference to the process of laying down the matting or cloth then applying the resin

Questions/ Queries

If you have any questions about the car, the team or in fact anything, please do not hesitate to contact me via my email:

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Or follow me on twitter:

<http://twitter.com/#!/EMFRacing>

