GROEP T
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Plan of approach

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Introduction

After a short introduction we got the message from the EE4 coaches that next project will be a small particle vehicle that the project participants have to build on their own. The vehicle is a small car which will work solely on solar energy. This project can be seen as a preparation for the two year master project: the Solar Challenge. The coaches gave only the basic materials: a solar panel and a DC-motor, the rest has to be created and designed by the project participants.
This plan of approach was set up on account of a question of the coaches of the EE4 project. With this POA it's possible to explain what the different steps in the project are and how they will be dealt with.

Goals

The main goals of the small car are building up speed and resist an impact. The car has ten meters to accelerate to a certain speed, after this distance the car has to push against a ball. After the collision the ball has to roll on a slope as high as possible. This is a seriously complicated challenge, the car has to be light to build up some speed but not too light because it can break upon impact. These are the main goals because the car that pushes the ball to the highest point wins the trophy.
The jury will not look only at the highest point of the ball but they will also consider two criteria: innovation and which car is the most beautiful. It is necessary to do the utter best to focus on all of the aspects.
Besides focusing on the goals, it is also important to have a good cooperation and improve the skills as an engineer.

How

The project can be divided into three parts. To complete the project the way it should be done it's necessary to focus on each of the three parts because they form the basis to a good result. The three parts are SSV I, Simulink and SSV II. For each different part it is possible to subdivide in smaller tasks. For each subdivision the coaches will give an important explanation. With this explanation it is possible to understand what has to be done for each subdivision and how.

The first part is SSV I, this can be subdivided in: DC-motor, solar panel, transmission ratio, race strategy and FabLab. These subdivisions form the basis for the car. For the DC-motor and solar panel it is important to understand how it works and what it will do. Therefore some calculations must be done because not every solar panel and motor will give the exact same voltage and current output. The explanation about the transmission ratio will help us to choose the right ratio so the SSV will convert the power of the engine efficiently in speed. Also a good race strategy is useful to try and win the contest.

After building and constructing the first parts of the SSV and after finishing SSV I, it is time to simulate the behavior of the small car. This simulation will be done on the computer and is an important part in the project because this will predict the performance of the SSV in the final test. This part is called Simulink, some

important subdivisions are: simulate solar panel and resistor, simulate car with DC-motor and without solar panel and then simulate with solar panel (simulate race). So different stages in the process will be simulated to see of the work is paying off.

After getting good results from the simulation it'll be possible to start the final part: SSV II, which will consist of: the testing track, 2D drawing, and a comprehensive analysis. Here the SSV will be tested on a real track and no longer on a computer. This is a very important part because here it will be possible to see if the car survives the impact on the ball. Also a comprehensive analysis and the 2D drawings will be made.

Decision making

The starting material is for every team the same: a DC-motor and a small solar panel. Only the sheer basics were given, so weekly meetings are absolutely necessary. During these meetings some very important decisions will have to be made. The first is of what material the SSV will be made of, this is perhaps the most important decision because the car has to be fast and it must be capable to resist an impact. The second decision is also very important: deciding how the solar panel will be attached on the SSV. This might not seem as an important to some people but this decision has a serious impact on the efficiency by which the car converts solar light into energy. While making all these decisions it's important to keep in mind that the judges will look at the innovative aspect. And last but not least, the looks of the car must phenomenal. After the decision making process, the students can begin with the fabrication. As mentioned before, most parts of the SSV need to be produced in FabLab, where the costs for students are very acceptable. But not everything can be produced in the fabrication lab so there are some parts that have to be bought.

The coaches and other teams can keep track of the progress via the wikipage where the team will post everything they do.

Limitations

With every project there are some limitations, this is not different for the EE4 project. The car has to powered by solar energy and nothing else, it's not allowed for instance to implement an engine from a motorcycle. After all is this project also a contest so there are some contest rules which can't be ignore. These rules are for every team the same but they won't be discussed here but can be found as attachment.

Assumption

The project has just started so it's quite impossible to make some assumptions already.

Project participants

The project participants have all agreed with this POA and their names (signature), e-mail and function are mentioned below.

Thomas Colebrants - **thomas.colebrants@student.kuleuven.be** - Designer
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