

# Team Rocket: Plan of approach

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## Introduction

The Umicore Solar team of Group T is trying to increase their budget by building a miniature version of their Umicar and put it on the market. To do this, they have asked Team Rocket, our engineering office, to build a demo model of their Umicar. The most important thing that the Umicore Solar team wants to know is if it is even possible to build a working miniature car? Therefore they have asked us to predict and simulate how the Small Solar Vehicle (SSV) will behave. Finally, we have to build our SSV and enter a race. This race is held between the SSV's of the other offices.

To keep in touch with our customer (the Umicore Solar team) we will inform their contact person, Tan Ye, several times. By doing this, we are sure that we can produce what they expect.

## Motive

This POA is set up to guide our SSV project in the following weeks. According to POA, every team member has a basic understanding of the project and follows the plan step by step. Besides, it is more convenient for other related people to consult our project with this POA.

## Approval and adjustment

The POA has to be handed to the coach at the end of week 1. The coach will give feedback in week 2. If the POA is not sufficient, a correction will be made in the following week and handed out at the end of the week 3. The approval and adjustment will be improved and corrected by Mr. Tan Ye who is the coach for the project.

## Explanation of the structure of the plan

Our project contains four main assignments which are engineering, enterprising, educating and documentation. The engineering assignment is the most important one and it concludes the designing, building, simulating and testing of our SSV. The enterprising part consists of marketing and budget control. The educating part contains research, seminars and the reports. The documentation contains the work breakdown structure, Gantt chart, plan of approach and cooperation contract.

## Project description

The central theme of our own EE4-EM project is 'Umicore Solar Team'. It is about solar powered vehicles and their technology. We are asked to build a Small Solar Vehicle (SSV) and optimize it for a race. We should put some knowledge into practice, such as solar power,

how it can be used to drive motors, inner mechanical structures of the vehicle and some suitable materials.

## Client

Tan Ye, the coach of our team, is also the client of our project.

## Customer

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## Goals

Our assignment is more or less similar to the Umicore Solar Team of Group T in the aspect of technology. It is all about how to use a clean and renewable energy source, solar energy, to drive vehicles. Because of the lack of knowledge and expense support, we may not achieve the level that Umicore Solar Team does. But we are ready to do our best to get some new research, findings or experiment results. Though the study of the existing solutions and self-research, we would like to build up a solar vehicle with the highest power and efficiency with the lowest cost. And our product should be put into practice in the future and does not have to be just an experimental thing.

## Problems

This paragraph lists the problems that we expect to face during the project.

As mentioned in the text above, we will have to make a small solar vehicle and participate in a race. The major problem that jumps to mind is the positioning of the solar panel on the car. We will have to find the perfect angle in which the solar panel catches enough sunlight to produce the right amount of power but does not affect the aerodynamics in a severe way. This will have to be done by calculations. It is critical to get this ratio right. If the angle is too steep the drag of the wind will undo the extra power delivered by the solar panel, but if the angle is too small the solar panel might not catch the right amount of sunlight. The calculations will show which the right angle is.

Problems we may encounter in the team are most likely based on the cultural gap (different nationalities) and the communication problem (different languages). By creating an open-minded environment and by working with mixed subgroups we hope to overcome this problem.

Probably there will also be some difficulties with the materials used for our prototype. We have to find materials which are light, strong and low cost.

Because of all the different lesson programs we could also have some difficulty to meet in group. A good communication is necessary to prevent this problem.

## The expected result

We will design a beautiful and innovative Small Solar Vehicle (SSV) with a high speed. The SSV will be optimized by both Sankey diagrams and simulink software. We assume that the SSV can drive 14m with the 6m straight and 8m up to a ramp with a slope of  $3^\circ$ . We also have to analyze the existing Umicar. This analysis will be based on criteria like: material knowledge, dynamics, aerodynamics, mathematics, energy and strength of materials. Furthermore, in term of enterprising, it is easy to calculate the cost of the materials which have to be bought. The low cost of the product can be achieved by the team's effort, so it can attract to the companies who are interested in SSV. Besides that, we will also have to devise a strategic marketing plan for the miniature model of the Umicar.

At last there is the educating part. The description report which motivates the coach to accept the tasks will be achieved at the end of the project. The team also gets the calculation knowledge from these tasks. Team members can build much better communication between each other during these 14 weeks.

## Deadlines

The customer expects that we inform Tan Ye from time to time. We have set several deadlines to show the progress of our project. The contact person can suggest what we have to change so that our work matches with the expectations of the customer. The deadlines are:

- Week 1: we have to hand in our Work Breakdown Structure, Gantt chart, cooperation contract and plan of approach.
- Week 6: case SSV part 1 and case Simulink have to be ready. The draft version of our process report has also to be finished.
- Week 11: in this week we have to hand in case SSV part 2 and the final version of our process report.

## Limitations

The team has to make a good time management for the tasks. The work should be completed before week 10 in order to take a race in time.

The amount of money also has limitations. The materials have to be bought with a minimum amount of money, so we don't overspend the maximum budget of 200 euros. Group T provides a solar panel and a DC-motor. The energy of which is used in the SSV is solar energy, other forms of energy are prohibited.