Project Astrid Update

Go ahead Astrid! The first six months are over and thanks to your generous support and donations we have been able to make enormous progress. We would also like to take this opportunity to thank our new sponsors. Without you, we would not have gotten as far as we have! For the second half of the year, we have more exciting milestones to look forward to, from the first Hotfire campaign to our Critical Design Review.

Avionics Update

Since the start of the project we have worked on system design. We have decided to use two identical flight computers, which use different add-ons. In addition we have worked on our battery management system, our communication and antenna design and our groundstation. We have designed the first batch of the PCBs and had review-meetings.

Currently we are working on minor fixes since the review and on ordering all parts and the PCBs itself, before producing and testing them.

From a software perspective, we have decided on the distribution of which tasks run on which of the main flight computers: The tasks that are important for the control logic during the flight, run on the upper flight computer, while the recovery and engine control run on the lower flight computer. As they are identical, the lower flight computer can act as a redundancy for the upper flight computer in case something fails.

We have nearly finished developing the programs for the upper flight computer. Only the content specific to our rocket is missing, like which sensors will contribute to the Kalman-filter or what data is sent via our CAN bus. Furthermore, we are currently improving our hardware-in-the-loop testing to be able to test the systems as soon as they have been produced.

In addition we recently demonstrated our airbrake control at our open day. This was a successful hardware in the loop test where a simulation drove our control algorithm which drove a physical airbrake assembly.

Structures Update

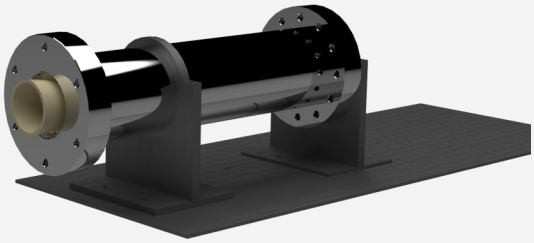
Over the past few months, Astrid's structural engineering team has been working hard on designing the rocket body. Based on STAHR and new requirements, this is Astrid's progress thus far:

The nosecone design with an integrated payload tower has been finalized. Our payload design, a mass-tuned damper, is almost complete. The bulkheads are being standardized to make them lighter and easier to fit. There are live cameras with 360-degree and downward-facing views. The design and simulation of the Type V composite pressure vessel and the recovery tube are progressing steadily. The next phase, manufacturing and testing, can now begin.

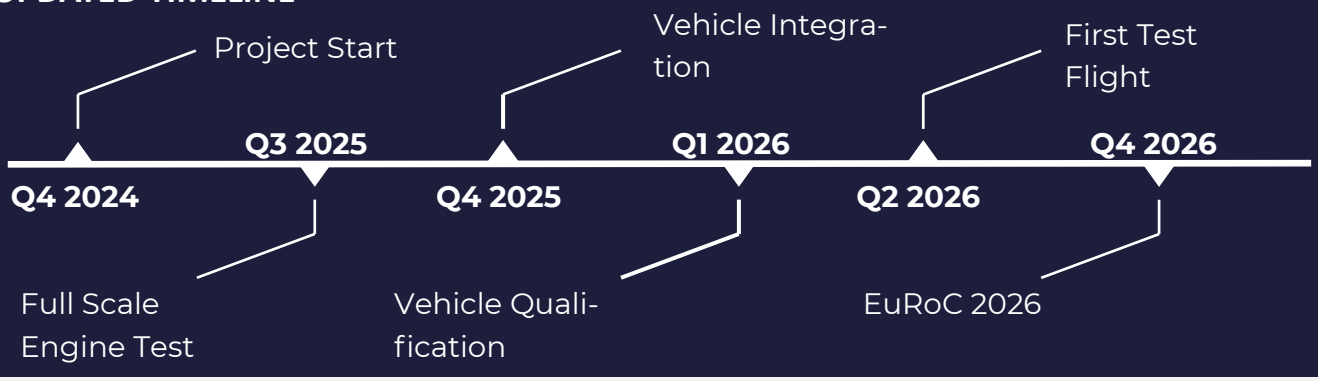
Having gained new insights and inspiration from our valued and experienced alumni during the PDR, we are now striving to make the final adjustments and have a complete model ready for manufacture after the CDR.

Propulsion Update

Exciting times lie ahead for Astrid's Propulsion Team. We're in the midst of preparations for our upcoming test campaign, and manufacturing of our first engine is set to begin in the coming weeks. Thanks to our sponsors, we're on track to see months of hard work finally light up. Part of our team is working to refurbish the engine testbench at the chair of high pressure gas dynamics, and make it ready to test Toothless. In addition, our fluid systems engineers are developing an efficient and safe solution for storing our propellants and delivering them to the engine. As our calculations regarding tank size and pressure are almost finished, time has come to select the specific valves, pressure regulators, and piping that will make up our fluid system. After completing this phase and manufacturing the first bulkheads, we'll move on to assembly and integration testing.



UPDATED TIMELINE

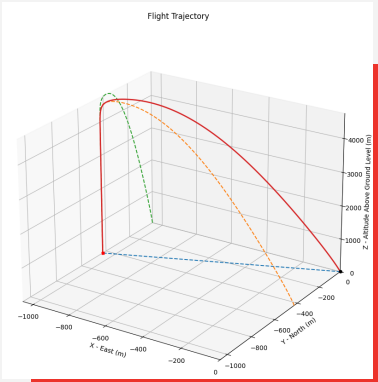


Recovery Update

The design of the drogue and main parachute has been moving steadily. With parachute systems, research and testing is key. To be able to test and manufacture, researching parachute design has been our number one priority. Having now nearly finished our research, we can now design and manufacture scaled parachutes, which we will test using a sled towed by a glider winch across a runway. Based on the gathered data, we will be able to reliably design our final parachutes. Another crucial component of the recovery system, are the ejection mechanisms for the main and drogue parachute. Again, a lot of research was required, especially since we are using a drogue mortar to deploy the drogue. The first step therefore was to expand our knowledge base, since we have not yet incorporated such a system in our rockets. Now we have entered the CAD design phase and hopefully will soon enter the design and manufacturing phase.

Simulation Update

Astrid's Simulations subteam is currently developing the airbrakes and fins of the rocket, which are instrumental to achieving the mission's goal – reaching exactly 3km in a stable flight. Both the airbrakes and fins are simulated using CFD with StarCCM+ to estimate drag and lift coefficients at different speeds, angle of attacks and altitudes. These will be used as inputs for the trajectory simulation with RocketPy and calculation of the different loads acting on the rocket during its flight. Additionally we are planning a validation campaign in a wind tunnel, where we can experimentally correlate and compare the simulations' results.



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