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# DESIGN, BUILDING AND LAUNCHING THE STRATOS VEHICLE, A SUMMARY OF A POSSIBLE RECORD BREAKING AMATEUR SOUNDING ROCKET PROJECT

**Abstract**

The amateur rocket altitude record is currently set at 10.7 Km. The Stratos rocket from Delft Aerospace Rocket Engineering, or DARE for short, is designed to break this record. The design is based on the completely new rocket design-strategy and is part of a master thesis. The project shows that with a small but highly motivated team and a sponsoring contract from a space company, big leaps in technology can be achieved.

The Stratos rocket is the first two stage rocket launched by DARE. It will is a good example of flight envelope expansion. The rocket will fly faster and higher than previous DARE rockets. The maximum velocity will be in the range of Mach 2.9 with a apogee altitude of about 15 Km.

The whole flight profile is optimized to reach the maximum apogee altitude. Between the separation of the booster stage and the ignition of the second stage of the Stratos rocket will be a small delay time, also known as a drift-time. The motor of the second stage is constructed in such way that the motor produces smoke to lower the pressure drag during coasting. This smoke grain, together with the drift-time increased the apogee altitude by over 2300 meters!

The rocket is equipped with several pressure sensors, accelerometers, a MEMS Inertial Measurement Unit and GPS receiver. The propellant of that DARE uses for this rocket is Kalinidex; a mixture of potassium nitrate and sorbitol. This propellant is also used for the Cansat rocket competition of the Netherlands. The motor casings are constructed from carbon fiber and glass fiber. Due to the design the motor casing is also the fuselage of the vehicle, saving precious mass in the whole vehicle.

The rocket is completely designed and produced from scratch, and no big commercial components are used. The flight of this rocket will be a giant leap in the history of DARE, paving the way for bigger rockets with a higher apogee altitudes.

The Stratos rocket will be launched at ESRANGE Space Centre together with the REXUS campaign from ESA and DLR in the beginning of March 2009. The flight data and results of this flight will be presented in the paper, together with the design, conclusions and possible recommendations.