

DLR/Bayern-Chemie Project Red Kite

Development, manufacturing and provision of a solid rocket motor "made in Germany" for sounding rockets

Brief description

Red Kite is the name of a joint development between Bayern-Chemie GmbH and Mobile Rocket Base (MORABA) of a rocket motor for unguided sounding rockets to carry scientific payloads of several hundreds of kg net mass. To be used in single stage configuration or as booster for commercial or military surplus derived upper stages.

Aims

The new motor will first be adopted by MORABA to extend the launch envelope of its sounding rocket scientific platform. The development focused on usability at ranges around the globe and a cost-efficient manufacturing. Therefore, well known and robust designs are employed, and materials and components subject to severe import restrictions, or of non-European origin were avoided.

Applications

- Scientific disciplines supported:
- Hypersonic research
 - Space flight technologies (reentry, GNC, communication)
 - Atmospheric physics
 - Microgravity research in the fields of material sciences
 - gravitational biology
 - quantum physics
 - Student education

Outlook

- Enabling high-quality university, industrial and military research and education
- Promoting industry through innovative developments



Parties involved

DLR Space Operations and Astronaut Training; Mobile Rocket Base (RB-MRB); Bayern-Chemie GmbH

Facts and figures

- Qualification firings: mid-2023
- Test flight: autumn 2023
- Technical data Red Kite:
 - Size:** 0.55 m \varnothing \times 3.5 m length
 - Weight:** ~ 900 kg composite propellant
 - Burn time:** ~ 13 sec
 - Maximum thrust (vacuum):** ~ 230 kN
 - Scientific payloads, depending on configuration:**
 - > 250 kg
 - > 250 km
 - > Mach 7



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With its department Mobile Rocket Base (MORABA), DLR supports rocket-based research in many fields of science and technology. The increasing demand of the scientific community for powerful rocket vehicles has led to the definition of the Red Kite. A dual thrust profile initially enables high acceleration values around tenfold the acceleration due to gravity, which drop in the further course, thereby minimising aerodynamic losses. This makes the Red Kite motor particularly suitable as a booster stage for many other motors from the MORABA portfolio. These originate partly from old military stocks and partly from the civilian market. With the advent of the new rocket motor, a wide range of possible missions and trajectories can be provided. For research in microgravity, steep trajectories are suitable, which maximise the time outside the atmosphere and guarantee the experiments up to seven minutes of microgravity (maximum residual acceleration of $10^{-5} g$), and thus the absence of gravitational effects. Research in re-entry technology and hypersonic technologies benefits from flat trajectories that exposes payloads to minutes in the stratosphere at speeds up to Mach 8. Major components of the Red Kite engine are currently undergoing intensive testing. A complete system test is scheduled for mid-2023. In the same year, the qualification flight will take place.

Rendering of a launch vehicle with Red Kite as booster stage

