

HyImpulse Launches First German Commercial Rocket

For the first time a German company has achieved the successful "lift-off" of a commercially viable launch vehicle.



SR75 on the launch-pad



SR 75 lift-off at Australian launch site in Koonibba

At the Australian launch site in Koonibba, HyImpulse, a German manufacturer and system provider of commercial launch vehicles for satellite transport, successfully test-launched the 12-meter-long and 2.5-ton single-stage rocket "SR 75".

At 2:40 PM ACST or 7:10 AM CET, the launch vehicle lifted off successfully, and the hybrid rocket propulsion system operated as planned. After the successful lift-off, the SR75 will be retrieved for further examination and analysis of the data. [1]

The Company

The startup's future vehicle is based on technologies Dr. Mario Kobald, Dr. Christian Schmierer and two of HyImpulse's other co-founders developed as students at the University of Stuttgart in Germany where they launched a sounding rocket called Heros 3 to a height of 32.3 kilometers, setting an altitude world record in 2016 for *hybrid* student rockets.

"We saw with interest all these developments in the small launch industry, but we saw that no one was using *hybrid* rockets," Schmierer said. "We thought we could make a change."

The team went on to further develop hybrid propulsion and turbopump technology at the DLR Institute of Space Propulsion before leaving the agency in 2018 to form HyImpulse. [2]

HyImpulse is bankrolled by Rudolf Schwarz, chairman of German technology company IABG. [1]

HyImpulse's private space launch enterprise is headquartered in Neuenstadt am Kocher (Baden-Württemberg) and is developing a small launch vehicle designed around the concept of hybrid-propellant rockets.

The HyImpulse small satellite launcher is powered by an innovative hybrid engine running on a paraffin-based fuel (commonly also known as *candle wax*).

Paraffin fuels are safer to operate, are more efficient, and have lower environmental impact compared to kerosene propellants. [3]

Hybrid rocket engines inherently combine the features of a liquid propulsion system (throttling, shut-down, restart) while deriving the cost and operational benefits of a solid propulsion system.

LOX / Paraffin fuel achieves as high *Specific Impulse (Isp)* as LOX / RP-1 fuel, which is the most common combination of high performance rocket fuels. HyImpulse propellants offer more than 40 sec higher specific impulses compared to hydrogen peroxide or nitrous oxide, hybrids, or AP / AL / HTPB solids.

The Product

HyImpulse's goal is to develop a low-cost commercial three-stage hybrid rocket named SL 1, designed to transport satellites of up to 500 kg to LEO, based on innovative and safe hybrid propulsion technologies. [3]

As proof of concept the company was developing the suborbital SR 75 launch vehicle. This smaller suborbital SR 75 rocket will serve both as the company's first commercial service and as a technology demonstrator for SL 1, the final three-stage hybrid LOX / Paraffin commercial rocket.

The inaugural lift-off of the SL 1 multi-stage launch vehicle is scheduled by the end of 2025. [4]

Thus the somewhat flippant expression to "light the candle" for igniting a rocket for lift off as used by the Apollo astronauts will take on a whole new meaning in 2025 when SL 1 makes its maiden flight.

The Partners

HyImpulse Technologies GmbH is a spin-off of the German Aerospace research center (DLR) without DLR holding any equity shares or any other participation in HyImpulse Technologies GmbH's company assets.

Current international and governmental consortium of partners as of May 2024 are: SSC (Swedish Space Corporation), IABG, Astos Solutions, ADAMANT Composites, the European Union (EU), SaxaVord (UK spaceport), SOUTHERN LAUNCH (Australia), HELLENIC REPUBLIC (University of Athens), University of PATRAS and Ansys (headquartered in the USA). [3]

References

[1] Hyimpulse on LinkeIn, May3, 2024

[2] <https://spacenews.com/dlr-spinoff-hyimpulse-plans-small-launcher-debut-in-2022/>

[3] <https://www.hyimpulse.de/en/>

[4] Wikipedia: <https://en.wikipedia.org/wiki/HyImpulse>

Further reading on hybrid rocket fuels: ARC paper: <https://arc.aiaa.org/doi/full/10.2514/1.A34035>