

TUM spin-off "Isar-Aerospace" begins production of launch vehicles Quick and clean satellite launches



*The founders of Isar Aerospace (from left): Josef Fleischmann, Markus Brandl and Daniel Metzler.
Image: Isar Aerospace Technologies GmbH*

In the coming years, tens of thousands of small satellites will be fired into outer space worldwide. Isar Aerospace, a start-up formed at the Technical University of Munich (TUM), has developed a small, low-cost launch vehicle specifically designed to carry small satellites into orbit. Manufacturing is now set to begin in Ottobrunn, just outside Munich and a short distance away from TUM's Department of Aerospace and Geodesy. The production halls were officially opened today with the Bavarian Minister President Dr. Markus Söder and TUM President Prof. Dr. Thomas F. Hofmann in attendance.

In contrast to traditional satellites, which weigh several tons, modern small satellites top out at 500 kilograms or less. This is possible thanks to efficient electric drive motors and the miniaturization of electronic components. The production costs are lower, too, making it feasible to send entire swarms of satellites into orbit, for example to improve internet connectivity or generate earth observation data.

These small satellites are placed in low orbits at around 500 kilometers above the Earth's surface. This permits the rapid transmission of data to the ground. But how can tens of thousands of small satellites be launched into orbit as efficiently, cost-effectively and cleanly as possible? "Most launch vehicles are poorly suited to this task," says Daniel Metzler, one of the co-founders of the Isar Aerospace start-up.

Rockets tailored to the transport of small satellites

The idea of building a rocket capable of carrying a maximum load of 1000 kilograms to an altitude of 500 kilometers with maximum efficiency was born in 2017 at TUM in the workshops of the student group WARR (Scientific Workgroup for Rocketry and Space Flight). Metzler and his team developed a small engine for a research rocket. An online video the students created about their project sparked numerous enquiries from industry.

"That's when we realized that we had stumbled on a market opportunity. We then decided to build our own rocket – tailored to the transport of small satellites," recalls the engineer. "The idea was to improve our propulsion technology: Launch vehicles in Europe have always used different engines for the first and second stages. Our concept was to use clusters of identical engines instead. This can bring substantial savings in development and production costs."

Production halls opened in Ottobrunn

Josef Fleischmann, Markus Brandl and Daniel Metzler – who all studied aerospace engineering at TUM – launched their Isar Aerospace startup in early 2018 with the support of TUM. The founders took part in the XPRENEURS program operated by UnternehmerTUM, the Center for Innovation and Business Creation at TUM. The first engine component prototypes were made in the MakerSpace high-tech workshop in Garching. Seed capital was invested by UnternehmerTUM Venture Capital Partners and private investors. The new company also received support from the ESA Business Incubation Center in Oberpfaffenhofen.

After two years of development work, they have reached a key milestone: Their first rocket is now going into production. On Monday of this week, with Bavarian Minister President Dr. Markus Soeder and TUM President Prof. Dr. Thomas F. Hofmann in attendance, the young entrepreneurs opened their 4500 square meter production halls in Ottobrunn. The facility is located just a few kilometers away from the Ludwig Boelkow Campus, where the TUM Department of Aerospace and Geodesy has its main headquarters.

Clean propulsion

According to Metzler, the company already has "interest worth several hundred million euros," for the planned rocket, which is 27 meters long and 2 meters in diameter. Most enquiries are from Europe. The company's workforce has now grown to 100 employees.

The first transport rocket, loaded with small satellites, is due to be launched into orbit in 2021. It will be propelled by a cluster of small engines. Cost-effective and fully automated production will be achieved through 3D printing technology. The engines will be powered by innovative light fuels that will burn cleanly and efficiently under high pressure in the combustion chambers. "In this way we achieve a high level of energy conversion," says Metzler.

If all goes according to plan, series production will then begin immediately: Isar Aerospace then plans to build 20 rockets per year.

More information:

- Every year TUM spawns more than 70 technology-focused spinouts. TUM and UnternehmerTUM support start-ups with programs tailored to the various phases of building a business – from creating the business model to management training, and from market entry to a possible IPO. Up to 30 teams can use offices in the TUM Incubator at a given time to plan the launch of their companies – with the most promising candidates travelling to Silicon Valley for two weeks with the support of TUM. UnternehmerTUM invests through its own venture capital fund, UVC, in tech companies displaying strong potential and with MakerSpace and the Bio.Kitchen, provides a 1500 square

meter high-tech prototype workshop and biotechnology lab. According to "Startup Radar", a survey conducted by Stifterverband für die Deutsche Wissenschaft, no German university provides better support for student start-ups.

- The Department of Aerospace and Geodesy (LRG) was established as the 15th academic department at TUM in the spring of 2018. From new transport systems to communications and satellite technology and the observation and measurement of the planet: In cooperation with geodetic disciplines, the fields of aeronautics and aerospace are thus transformed into "Mission Planet Earth". The department's main headquarters are located in Taufkirchen/Ottobrunn.

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