

Success Story

Reaching for the moon dust: TIWARI Scientific Instruments develops 3D printing with moon dust and more

When, at some point in the next few years, an astronaut lands on the moon, gets out, takes a small step for man and a giant leap for mankind, and then needs a house and soon new gloves because the spacesuit has holes in it: How do they go about it? Bringing all the building and sewing materials from Earth is far too expensive. It currently costs a million euros to transport a kilo from the Earth to the Moon.



It is better to work on the moon with what is abundantly available there: Moon dust. This is the sand of the moon, a layer up to 15 metres thick. Moon dust does not only have favourable properties for humans, because it is very sharp-edged and solid. But if Siddharth Tiwari, who founded TIWARI Scientific Instruments (TSI) in 2019, has his way, the dust will be used to produce infrastructures and textile elements using fused filament fabrication (FFF) technology. All the astronaut has to bring back from Earth is the thermoplastic, which serves as a material together with the lunar dust, and a 3D printer - preferably from TSI.

Berlin is intensively committed to young companies

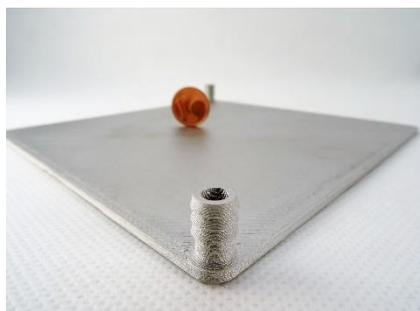
Siddharth Tiwari is proud to have "matured" with the start-up for two years in the incubator of the European Space Agency "ESA BIC" in Darmstadt. The multilingual founder, who grew up in India, completed his bachelor's degree in mechanical engineering in Mumbai and then a master's degree in aerospace engineering in Milan. In 2013, he came to Berlin and worked in aerospace engineering companies. The opportunity to participate in the ESA BIC (Business Incubation Center) meant realising a dream for him and ensured the trip to Darmstadt. The entrepreneur is currently relocating the headquarters back to Berlin. "We have the very best conditions here. We benefit from industry networks such as the 'Innovation Network for Advanced Materials' and the strong work of Berlin Partner and EEN with their numerous offers. We find skilled workers thanks to Berlin's universities. And our location in the Adlershof Technology Park fits perfectly with our orientation," Tiwari convincingly praises the local structures.



Tangible help from the EEN Berlin-Brandenburg



Of course, this also includes the commitment of the young entrepreneur himself, who went to networking events and made the appropriate contacts with the business development institutions there. "This has paid off for us in a very concrete way. Our contact at the Enterprise Europe Network, Jens Woelki, pointed me to the EU funding programme 'Galactica', which is about networking European aerospace with



the textile industry. Inspired by this, we developed a project idea with two partners we already knew, the French company Spartan Space and Aalen University in Baden-Württemberg. EEN then helped again with the application to make sure we met the criteria for the tender. EEN had previously supported the start-up in the AMable project. Within this framework, TIWARI Scientific Instrument, together with Berlin-based Nano-Join, outlined an additive manufacturing process for printing complex 3-dimensional interconnects from silver onto foils for sintering for electrical, electronic, and electromechanical components, stampings and wire bonding.

The Galatica project, which bears the futuristic name TXTHAB-3D, was launched in September 2021. It is also intended to help the young company develop further towards becoming a product provider and manufacturer of 3D printers.

Cost-effective printing of short runs

Currently, three features distinguish TIWARI Scientific Instrument: a deep know-how for the complex process of 3D printing for metal and ceramics (and also lunar dust), the focus being on the printer itself. They have already developed their own models, and an ESA test series for the printing results, thanks to which the start-up can concretely show which material properties are achieved, and which are not yet commonplace.

The market for the modern printing processes TSI is involved with is much bigger beyond the moon. "For me, filament printing is not a disruptive technology, but an advancement. At TIWARI Scientific Instruments, we mix plastic with high-performance materials such as metal or ceramics when printing. Then the plastic is removed from the object in a heat treatment, which creates holes, and then the material is compressed so that the holes are closed again. That's how you get an object made of metal or ceramic! The heat treatment is old, but what we no longer need is the mould that had to be made for each design in the traditional injection moulding process. This means that smaller runs can be produced affordably, and the technology also becomes attractive for SMEs."



Future industrial clients for the company will certainly initially be at home on Earth. But when the first SME opens on the moon, it could use a printer from Adlershof.

