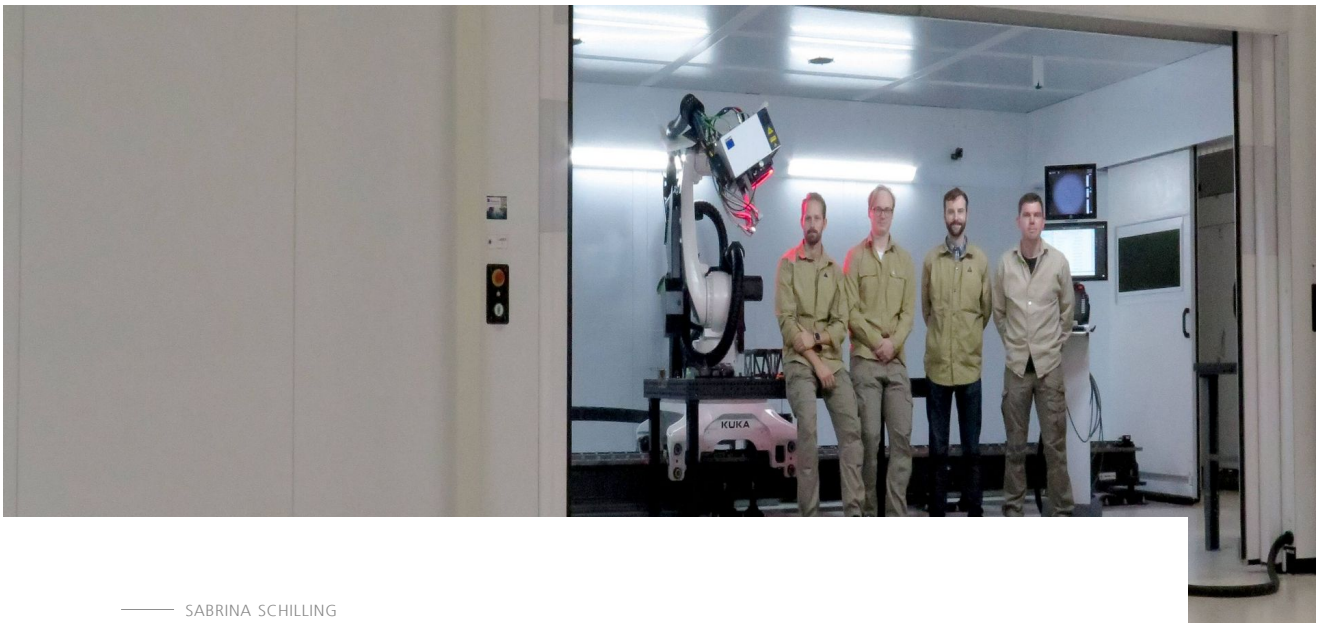


SABRINA SCHILLING

Lasers against leaks: Safety for hydrogen tanks

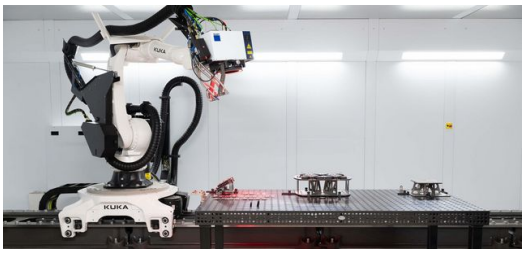
A shimmering tank, constructed from a structure of tiny triangles, could solve one of the biggest problems of the energy transition: The safe, space-saving storage of hydrogen. The Swedish company NITIU is relying on high-tech applications from TRUMPF for this purpose – and is opening its own laser laboratory.

Hydrogen is considered the energy source of the future – lightweight, clean and available in almost unlimited quantities. But this inconspicuous element has its drawbacks: it only remains liquid at minus 253 degrees Celsius, and in gaseous form it requires enormous storage space. When it comes to use in vehicles or industrial plants, this promising technology quickly becomes a technical challenge. The young technology company NITIU wants to change exactly that. It has developed an isotropic lightweight structure (ILS®) – a patented metal lattice made up of countless tetrahedrons that is both extremely lightweight and exceptionally stable. Isotropic means that the structure reacts the same in all directions, i.e., it can absorb forces equally well from every side. It is precisely this property that makes it the ideal basis for a new type of hydrogen tank that can withstand stresses from all directions and stores the energy source particularly efficiently. NITIU relies on lasers to manufacture its innovative concept.

A laboratory for precision

"When I started at NITIU four years ago, laser processing didn't play a major role," explains Joseph Hainsworth, the company's technical director. "But I quickly realized that the laser is the key to precisely joining our structure and fully utilizing its stability." In order to use the tool in a targeted manner, Hainsworth and his team wanted their own laser laboratory, tailored for testing and further development of the ILS® structure. "Our goal was to work independently, improve quality and drastically shorten development cycles," explains Hainsworth. In search of suitable technologies, he traveled through Europe for a year.

NITIU relies on TRUMPF's high-precision laser technology for the development of its ILS® structure for hydrogen storage – a key element in the company's innovation process.



Thanks to precisely controllable mirrors, the laser can move in three-dimensional space - with exceptional accuracy and speed.

High-tech meets flexibility

He found what he was looking for at TRUMPF. "About six months before we ordered the machines, we began having intensive discussions with the laser experts at TRUMPF," recalls Hainsworth. "It was important to us that the systems were flexible and complemented each other – and they understood exactly that." At the heart of the new laser laboratory is a TruLaser Cell 3000 and a TruLaser Weld 5000 with PFO 3D optics (programmable focusing optics) for precise welding in two and three dimensions. TRUMPF specifically adapted this combination for NITIU: the optics feature precisely controllable mirrors that allow the laser to move in 3D space. "It does this with incredible accuracy – and at incredible speed," says Hainsworth. "This optic is the most flexible component we have ever used."

Speed, quality, enthusiasm

Since the opening of the laser laboratory, work at NITIU has changed noticeably. "In the past, it took weeks before we could test changes to the concept. Today we go to the lab in the morning, try something out, and can implement it the next day," says Hainsworth happily. "The quality is higher, the processes are more stable – and we are constantly learning." TRUMPF tailored the systems precisely to NITIU's processes and combined all components into a turnkey solution. "We could have commissioned different providers," explains Hainsworth. "But TRUMPF's concept of everything from a single source was crucial. This allowed us to focus on our own technology – on what we do best."

A step into the future

With the new laser center, NITIU has taken a giant step forward – toward more efficient, lighter and safer hydrogen tanks. What began as a vision is now taking shape – lightweight, stable and laser-processed. "Sometimes I have to pinch myself," says Hainsworth and laughs. "It's simply the coolest thing ever."

About NITIU

The Swedish company NITIU AB, based in Gävle, was founded in 2016 and specializes in the development and production of innovative lightweight metal structures. With its patented ILS® technology, NITIU contributes to the more efficient use of materials and energy – an important building block for sustainable mobility on land, at sea and in the air.

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TRUMPF GROUP COMMUNICATIONS

https://www.trumpf.com/en_CA/newsroom/stories/lasers-against-leaks-safety-for-hydrogen-tanks/