Concrete tube for Europe’s first passenger-size hyperloop demonstrator nears completion

Ottobrunn, 21.12.2022

At the TUM Hyperloop test site south of Munich construction wraps up on the first full-scale concrete tube that may well define the future of passenger transport in Europe and the world.

The TUM Hyperloop Demonstrator

This 24-meter-long, 4.2-meter-wide concrete cylinder is the central component of the hyperloop demonstrator being developed by the TUM Hyperloop program at the Technical University of Munich (TUM) with the support of the Bavarian government. “Our mission is to develop the technology for ultra-fast, emission-free, and effortless connections between mobility hubs.”, says Gabriele Semino, the Project Lead of the program. Having come a long way since the program was initiated in 2020, TUM Hyperloop has made significant headway in the development of their hyperloop concept, all leading up to the current project phase.

Ultra-fast and Sustainable Connections Between Mobility Hubs

As commonly defined, a hyperloop is a network of tubes, connecting mobility hubs around the world. What truly sets hyperloop apart from traditional rail transport is that the hyperloop vehicles, commonly called pods, travel in a partial vacuum with no physical contact to the track. These pods move at high speeds inside the depressurized tubes, while levitating and being propelled by powerful electric motors. The aim is to greatly reduce all major sources of friction. In practice, this revolutionary mode of transportation will allow to travel between mobility hubs with exceptionally low energy consumption, while maintaining speeds near the sound barrier.

Culmination of Years of Development

The hyperloop demonstrator is the first test segment of an extensive testing strategy, intended for developing the core systems and technologies. An appropriate passenger-size pod is also currently being built. The demonstrator will be the first of its kind in Europe, the first capable of operation with passengers, allowing a glimpse into what hyperloop technology will look like.

“Looking at the progress we’ve made so far, we know from the results of several test stands that our design works in principle”, says Domenik Radeck, the Technical Lead of TUM Hyperloop. “But having the actual passenger-sized pod which integrates all technical systems in the concrete tube will enable holistic testing, which we are looking forward to a
lot.” With this tube segment, TUM Hyperloop puts three years of design concepts into practice, moving towards proving the feasibility of the system.

A Concrete Start

What started with small spades at TUM Hyperloop’s groundbreaking event in September, was continued with heavy-duty equipment. Casted with reinforced concrete, a large foundation was first built to support all 250 tons of the demonstrator’s tube. In parallel the six elements that form the high-performance concrete tube were fabricated 150 kilometers north of the construction site. Upon completion the four-meter-long elements were loaded on specialized trucks and transported over three nights across Bavaria to the construction site.

Finally, a crane lifted each tube segment onto sliding support rails, which allowed the team to adjust their position to achieve the required precision and then pretension the whole structure. Once completed, the temporary supports were removed, and the fully assembled tube stood firmly on its foundations. To cap it off, a steel sliding gate and endcap were fixed onto the front and back ends of the tube, sealing it completely.

This entire operation was planned and coordinated by Raphaela Schiburr, TUM Hyperloop’s Head of Tube Construction. “The finished tube will need to maintain a partial vacuum of 1 millbar, equivalent to one-thousandth of normal atmospheric pressure, while also providing the guideway for the pod to travel on. The necessary precision and the sheer size of the tube required considerable development efforts and detailed construction planning”, Schiburr says.

Fast Track to the Future

With the concrete tube now completed, the team can now continue with the installation of the electrical and vacuum systems as well as with the construction of the passenger-size hyperloop pod. Once completed, the thorough testing phase will begin. TUM Hyperloop plans to unveil the completed demonstrator in 2023.