Information Sheet: TUM Hyperloop

Status: 30.09.2022

It is supposed to be almost as fast as sound: the Hyperloop. The TUM Hyperloop Program at the Technical University of Munich (TUM) is developing the technology at the Aerospace Campus in Ottobrunn/Taufkirchen to make this vision a reality. TUM students had already proven in international competitions that they can build unbeatably fast prototypes of the passenger capsules. The student initiative, founded back in 2015, had won all four SpaceX Hyperloop Pod competitions by 2019. Now, to further test the Hyperloop technology, Europe's first passenger-sized Hyperloop demonstrator will be built by 2023, a 24-meter test tube with a matching full-scale capsule. Construction has already begun on the Ludwig Bölkow Campus site in Ottobrunn/Taufkirchen.

Hyperloop: ultra-fast connections between mobility hubs

Hyperloop is a high-speed transportation system for passengers and cargo, proposed as a concept in 2013 by Elon Musk, founder of Tesla and SpaceX. In principle, the system can be broken down into two elementary components: a network of tubes that connect mobility centers, and transport capsules (also called pods) that move inside them at very high speeds. Air is extracted from the tubes with the help of powerful vacuum pumps, which helps the pod to move with very little air resistance. The aim is to achieve very high speeds using as little energy as possible, which in turn means short travel times for passengers. In addition to reducing air resistance, the Hyperloop concept also focuses on eliminating rolling resistance. Contactless magnetic levitation and propulsion systems ensure an energy-efficient and comfortable travel experience.

From breaking speed records to building Europe's first passenger-size Hyperloop demonstrator

In 2015, a student initiative was founded at TUM to design and build prototypes for the SpaceX Hyperloop Pod Competitions. The goal of the international competition was to design and build the fastest Hyperloop pod prototype. Between 2015 and 2019, the team won all four competitions, most recently with a record speed of 482 km/h. Based on the students' success, the TUM Hyperloop Program was founded in 2020, an interdisciplinary research and development project involving a variety of TUM chairs, subject matter experts and students. As part of the program, the team is currently building Europe's first passenger-sized demonstrator. The 24-meter-long test segment with a matching passenger capsule is intended to evaluate and prove the functionality of all key
technologies at full scale, which are necessary to bring the system to market maturity. The team is also analyzing the impact of Hyperloop technology, identifying suitable route corridors to connect Europe’s mobility hubs, and improving the feasibility of the Hyperloop system.

**Timeline of events and upcoming development goals**

- **2013**: Elon Musk publishes a white paper describing the Hyperloop concept for the first time
- **2015**: A student initiative is founded at TUM to develop prototypes for the SpaceX Hyperloop competitions. Between 2015 and 2019, the initiative won all four competitions against international teams.
- **2020**: The TUM Hyperloop Research Program is founded at the Department for Aerospace and Geodesy at TUM. Since then, the program’s goals have been to develop Hyperloop technology and study its application and feasibility using a network in continental Europe as an example.
- **2022**: Groundbreaking ceremony for the TUM Hyperloop Demonstrator. Bavaria’s Minister President Dr. Markus Söder and Bavarian Science Minister Markus Blume give the starting signal for the construction of the passenger-sized test segment.
- **2023**: Planned commissioning and presentation of the TUM Hyperloop Demonstrator to the public.

**FAQs**

**What are the advantages of the Hyperloop?**

Thanks to the extremely high speeds of the Hyperloop system, travel time from door to door over medium distances can be significantly reduced compared to today’s connections. In addition, the system aims for climate neutrality with all-electric operation.

**What distances can be covered?**

The high speeds make Hyperloop ideal for medium to long distances between major mobility centers. The routes currently being considered are typically between 200 and 1500 km.

**Can the Hyperloop also connect to current modes of transportation?**

The key to reducing door-to-door travel time is to embed Hyperloop into the current mobility landscape and thus place stations in existing mobility centers. This will, for example, eliminate long trips to airports and allow for quick and direct transportation.

**Is the Hyperloop for passengers or for freight?**

Both. Hyperloop pods can be designed to carry both cargo and passengers.

**Will the Hyperloop operate above ground or underground?**

The Hyperloop route is adapted to the area of operation, i.e., it can run above or below ground.