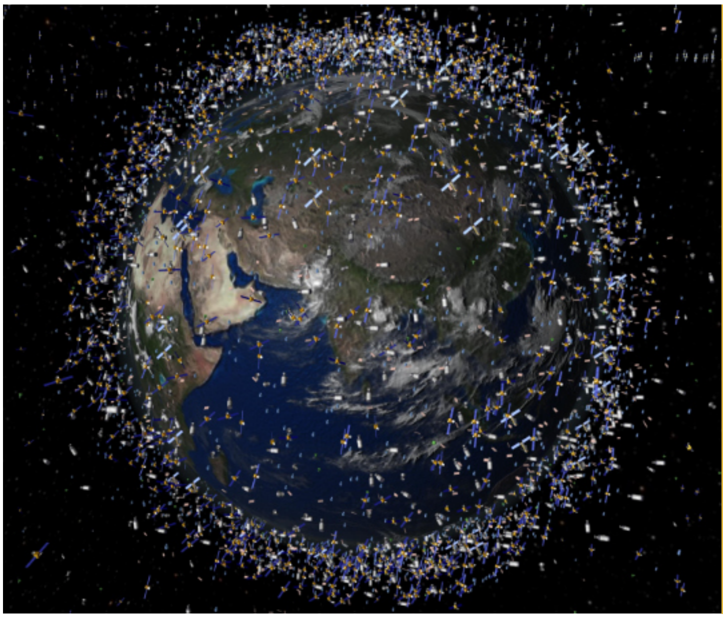
venturetec ROTATING SYSTEMS

HIGH-PRECISION LASER DETECTION IN SPACE

Detection and monitoring of small space debris objects tested

In addition to disused satellites, parts of rockets and a growing number of small pieces of scrap metal can also be found in orbit. The increasing littering of orbits is endangering current and future space missions.



„WTW recognized the growing demand for telemetry and autotracking solutions in the aerospace industry at an early stage.

Our engineers have many years of experience in the development and construction of customized antenna systems on towers, trailers and transporters.

With Venturetec Rotating Systems at our side, we master the requirements of our international customers - precisely, on time and at the highest level.“

Thomas Siebolds, Managing Director and CEO
WTW Anlagenbau GmbH

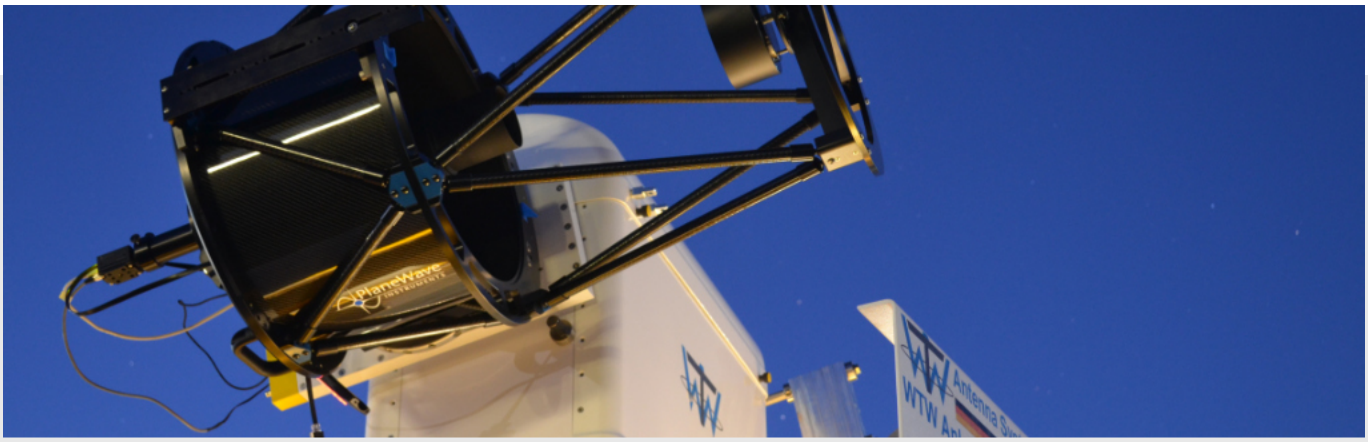
For some time now, the ratio of active satellites to junk objects has developed very unfavorably. At orbital altitudes of 800 or 1500 km, the density of objects is now particularly high. The constant danger of collisions not only threatens existing and new space projects, but can also lead to a cascading number of ever smaller pieces of debris. As a result, the continued use of these orbits would become uneconomical.

To avoid collisions, satellite operators already have to fly evasive maneuvers at ever shorter intervals. This requires precise observations in order to be able to make reliable orbit predictions for space debris, taking into account a variety of influencing factors.

Today, various institutions around the world operate fully automated sensor systems that monitor near-Earth space around the clock, as well as database systems that provide up-to-date collision warnings.

The methods currently in use are based on radar systems for objects from about 1 cm in low earth orbit and on optical telescopes for objects in geostationary orbit with an orbital height of over 30,000 km.

New technology could help to independently issue collision warnings in Europe and create a database with the trajectories of observed objects. DLR is using a container solution from WTW to research new possibilities for detecting the smallest objects.

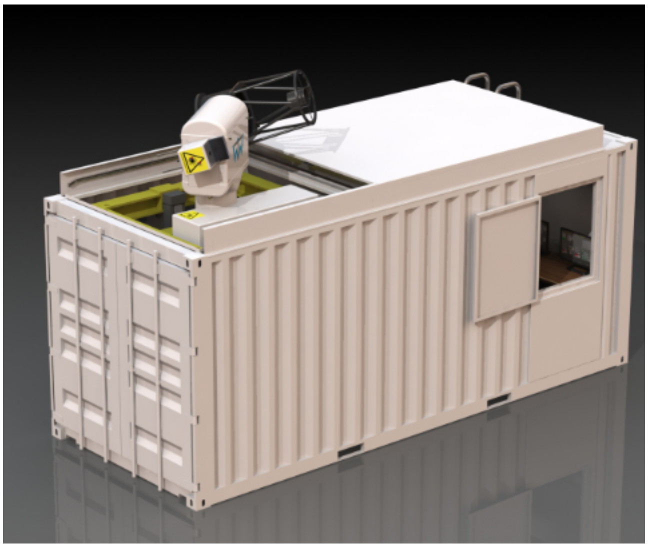


Precise laser position measurement

Modern laser ranging systems are much cheaper to set up and operate. They allow distances to be measured with an accuracy of less than one centimeter. Laser ranging is therefore the most accurate ground-based measurement method for determining a satellite's orbit.

Unlike satellites with their special reflectors, space debris with its fluctuating scattering cross-section returns many orders of magnitude fewer photons as a signal.

Only with the development of powerful lasers (e.g. Nd:YAG) and adapted, highly sensitive detectors (e.g. InGaAs) does this technology promise reliable detection of even the smallest parts. DLR is conducting research into this with the adjacent equipment in the container.



Project planning and realization

For this project, Venturetec worked with WTW in several iterations to develop and implement an optimum technical solution that ensures reliable signal and power transmission during full rotation, even in different climatic environments. The customized slip ring was adapted to the planned installation space and has a sufficiently free inner diameter. This made it possible to integrate the HF rotary joint, the cable feedthroughs and a powerful laser beam on the Coudé path through the telescope mount.

Further measures on site led to additional size, weight and centre of gravity optimizations.

„Our customers expect customized solutions of the highest quality.

Excellent project management and reliable partners and suppliers are essential for the implementation of these complex systems.

With Venturetec, we have a partner at our side that we can fully rely on in every phase of the project“

Helena Kiel, Purchasing Manager
WTW Anlagenbau GmbH

„Thanks to the partnership-based cooperation with WTW, we as a medium-sized company can contribute our technical expertise in a targeted manner.

Our engineers combine in-depth specialist knowledge with a high degree of flexibility and implementation strength - this provides our partners with real added value in the competition for their customers..“

Dominik Pless, Technical Director
Venturetec Rotating Systems GmbH

Venturetec Rotating Systems GmbH specialises in the development and manufacture of slip rings and hybrid rotary transmitter. As a recognised partner of leading high-tech companies in the fields of medical technology, defense, industrial automation, surveillance and propulsion systems, Venturetec is based in Germany and has commercial agencies in China, France, Israel, Italy, Sweden, Spain and USA. Since 2014, Venturetec has been part of the successful Berndorf AG, a company based in Austria.

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UC SLR - 202508 EN - V1.3