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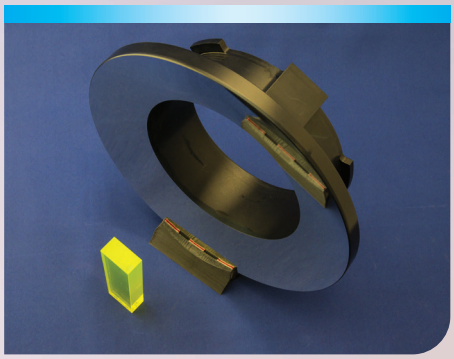
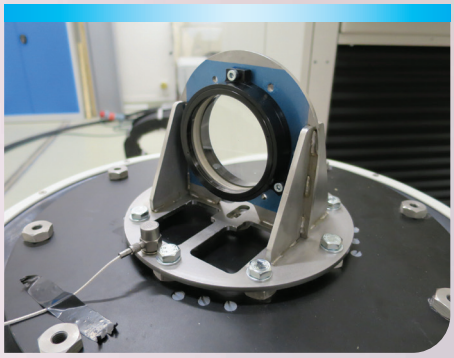
SPACE PROJECTS FOR esa

Light-weighted aspheric mirrors for the METIS telescope



- The mission (Solar Orbiter, launched in 2020) aims to study the solar corona through multi-wavelength imaging and spectroscopy at 30.4 nm (He-II), 121.6 nm (H-I), and 590–650 nm (visible polarized light).
- TOPTEC was in charge of designing and producing ultra-lightweight aspheric annuloid mirrors with extremely low micro-roughness of 0.3 nm to ensure high optical performance.
- The main challenge was achieving the required optical precision and minimal micro-roughness while meeting strict weight constraints for space deployment.

Optical system of the coronograph ASPIICS (Proba-3 mission)



- A formation-flying lens-based coronagraph enabling observation of the white-light solar corona as close as 1.08 solar radii, with polarimetric imaging in the 540–570 nm range and narrow-band imaging at 587.6 nm (He-I-D3) and 530.3 nm (Fe-XIV).
- TOPTEC completed the full telescope design, optical tolerancing, production of optical and mechanical elements, and final optomechanical assembly.
- The key task was to achieve optical precision and micro-roughness below 0.5 nm, ensuring alignment stability and high performance under demanding space conditions.

Optical system of FLEX-FLORIS

- The mission focuses on measuring vegetation fluorescence to monitor plant health and photosynthetic activity globally, using a high-resolution imaging spectrometer operating in the 500–780 nm range.
- TOPTEC delivered the complete telescope design for the spectrograph's light path, including optical tolerancing, production of optical and mechanical components, and final assembly.
- The main difficulty was attaining high optical performance of the telescope, excelling in its extremely low signal - scattering' performance and wavefront-error performance necessary to handle the subtle fluorescence signal.

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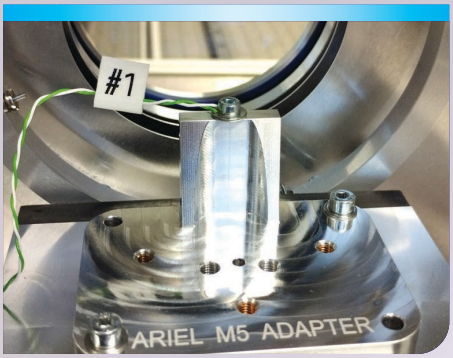
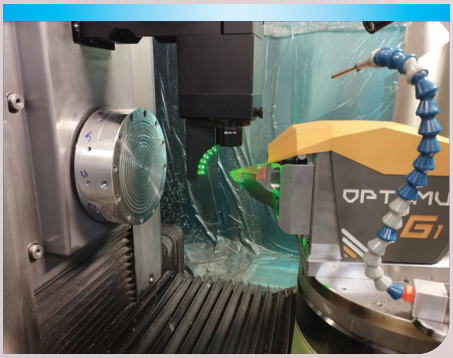


Optical mirrors and cryo chamber for the ARIEL mission

- A space telescope designed to study the atmospheres of over 1,000 exoplanets as part of ESA's Cosmic Vision program, with a planned launch in 2029, focuses on characterizing exoplanetary atmospheres using a single optical and infrared spectrometer operating in the 1.95–7.8 μm range.
- TOPTEC contributes to the design and optical tolerancing, ensuring high spectral precision.
- The critical task is achieving ultra-stable measurements while minimizing interference from stellar activity and instrumental noise.

NEOSTEL "Fly-Eye" telescope

- A space debris and NEO surveillance and tracking optical telescope with a system of telescopes distributed around the equator.
- The modular design of the telescopes offers performance equivalent to a 1 m - diameter telescope and provides an extremely large field of view 6.7° x 6.7° in comparison to standard telescopes.
- TOPTEC produced the aspheric lenses of the telescope, develop 600 mm class autocollimator used for the alignment of the main telescope, and developed alignment aid bench for the secondary optics and instruments.



New polishing techniques for aspherical and free form lenses

- The project aims to develop technologies for fabricating complex lenses with surface accuracy and roughness suitable for high-end optical systems in the visible and UV ranges.
- TOPTEC is advancing laser-assisted SPDT removal techniques and post-polishing processes for non-trivial geometries in glass-like materials.
- The major breakthrough lies in reducing production time while expanding the limits of precision in freeform optics manufacturing.