

Cedrat Technologies (CTEC) designed, manufactured, tested and delivered to L3-Harris the first Engineering Model of the PAM30 to be integrated in the JPL DOSC Module of the [NASA Psyche Mission](#).

The PAM30 aims at accurately pointing the optical downlink signal (communication laser beam) towards Earth position from the Psyche Asteroid beyond Mars Planet.

The PAM30 consists in a SiC mirror mounted on a 2-rotation axis ("Tip Tilt"), small range and pointing mechanism with Strain Gages positioning sensors, mounted on a bracket including a thermal sensor (Fig 2).

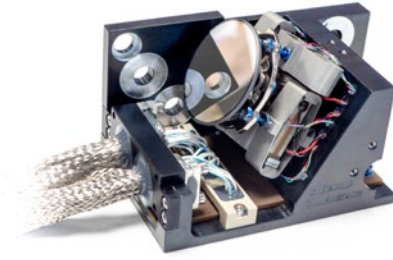


Fig. 1: View of PAM30

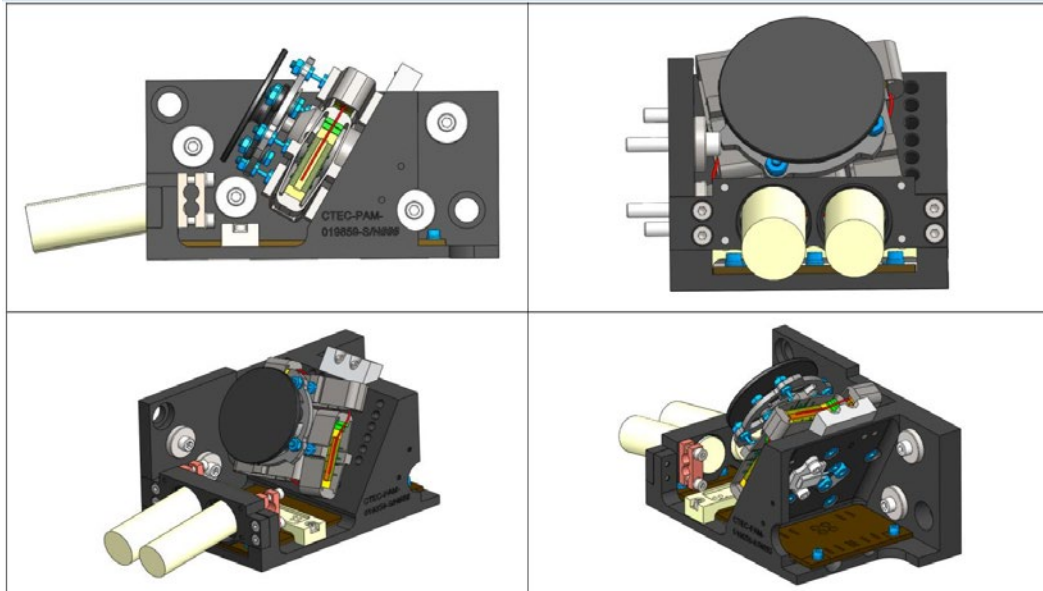


Fig. 2: PAM overview including amplified piezo actuators APA® and SiC mirror

The PAM30 is based on a two stiff push pull pairs of APA120SM piezo actuators. It produces more than +/-3 mrad for both axis rotations for the full -40/+65 °C operational temperature spectrum with loaded mechanical resonant frequencies above 1 000 Hz.

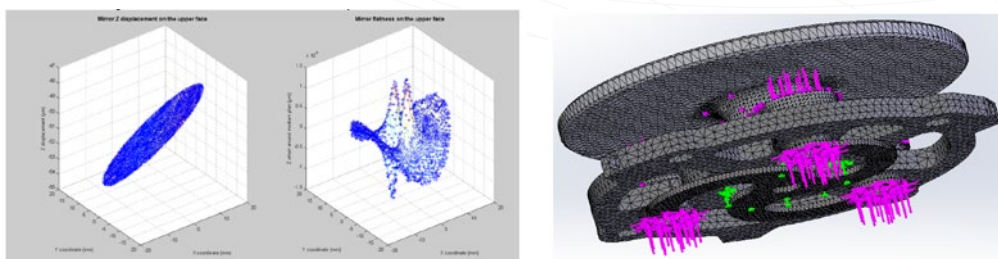


Fig. 3: Mirror surface deformation simulation and analysis

The SiC mirror has been manufactured and polished by Mersen OptoSiC. In order to be compliant with the 63 nm flatness requirement, the mirror shape and interfaces have been co designed by Mersen OptoSiC & CTEC. CTEC developed specific simulation tools to compute any impact on the mirror flatness coming from environmental, operating and boundary conditions (Fig 3) as well as dedicated tools and step by step process to integrate the SiC mirror and check its flatness after each assembly step (Fig 4).

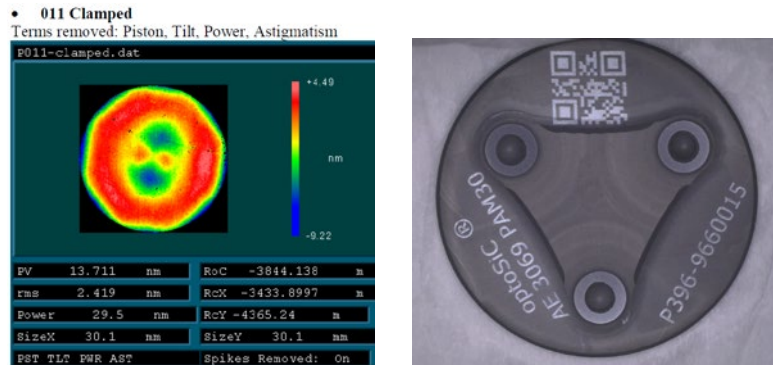


Fig. 4: OptoSiC® Mirror interface (left) and surface verification with interferometer (right)

The next steps in the project is to complete the Engineering Qualification Model (EQM) as well as the 2 Flight Models to be delivered before March 2020. The EQM is currently submitted to a comprehensive qualification campaign, including thermal and vibrations tests. Both FM will be subjected to a series of acceptance tests also including thermal and vibrations tests.

A paper will be presented during [AMS 2020 conference](#) in order to review some specific design aspects and the final performances of the PAM30.