XCAM SCIENTIFIC

PFO MONITORS

Space PFO



Particulate contamination monitor for space launch applications

XCAM Scientific has been spearheading a technology development programme, funded by the **European Space Agency (ESA)**, to create a unique instrument for measuring particulate contamination inside a launch vehicle fairing during liftoff.

Launch vehicles, and their enclosed satellite payloads, experience significant degrees of mechanical and acoustic shock and vibration during their journey into space. Nothing is currently known about the sources and types of particulate contamination inside a rocket fairing during launch; however, it is certain that **contamination can seriously affect the performance**, accuracy and reliability of the multi-million dollar instruments which are routinely sent into space to study our planet and explore the universe.

Concept of Operations

Central to the concept of operations, is the **elimination of the need for tele-commanding between the launch vehicle (LV) and the instrument**. When power is supplied to the unit, it automatically enters a pre-programmed power-up sequence before moving to a pre-flight data acquisition and transmission mode.

Using a combination of environmental sensors, the unit can autonomously detect when launch commences and move to the flight data acquisition and transmission mode, operating for a fixed duration between launch and fairing ejection. The unit then enters a post-flight transmission mode, transferring the remaining data to the launch vehicle for telemetry to the ground.

XCAM Scientific's proprietary algorithms allow instant analysis of launch campaign data, detecting and classifying particles at any time.

Features & Benefits

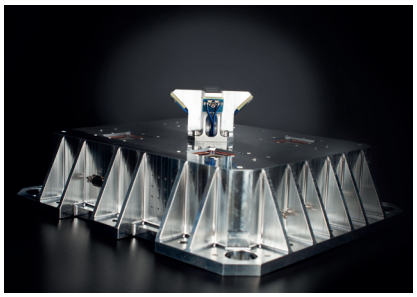
- **Ruggedised Design**
  withstands the varying vibration, shock, acoustic, pressure, temperature, and humidity environments experienced during space launch.
- **Standardised Mounting Points for Shock Absorbers**
  enables deployment across a wide range of launch vehicles.
- **Surface Particle Monitoring from 5 µm**
  detecting and classifying particles and fibres every 10 s.
- **Performance Verification**
  using a special chrome-on-glass test mask to confirm optimal operation.
- **Space Qualified**
  the Space PFO is being considered for ESA's Ariane-6 and Vega-C launch vehicles from 2027 launches onwards.
- **Custom Development Available**
  to meet the demands of your mission.

esa

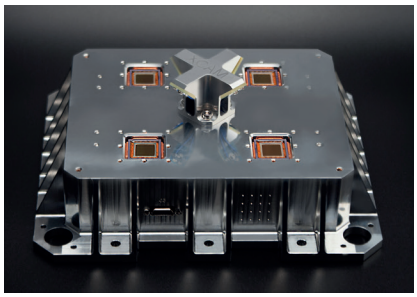
XCAM Scientific was contracted under a programme of and funded by the European Space Agency. The view expressed herein can in no way be taken to reflect the official opinion of the European Space Agency.

www.xcamscientific.com

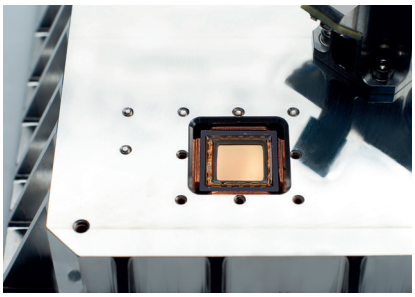
Space PFO Gallery



Space PFO engineering model



Space PFO flight ready unit



High performance sensors

Key Specifications

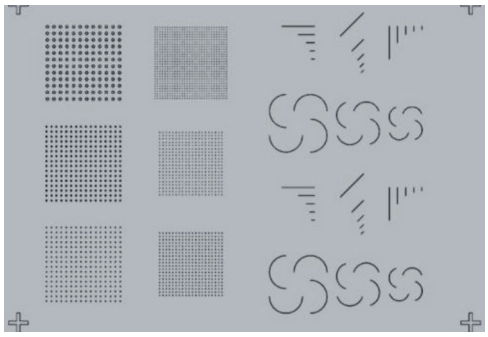
Parameter	Specification
Total Detection Area	4 cm^2
Sample Rate	At least every 10 s
Particle Readout	Size, shape, distribution Particle/fibre classification
Minimum Particle Size	100% of 5 µm
Operation Lifetime	Data acquisition: at least 254 s Data transfer: at least 5 hours
Operational Temperature	-20°C to +80°C
Operational Humidity Range	0% to 95%
Instrument Volume / Mass	~2.4 litres / 2.5 kg

System In Use

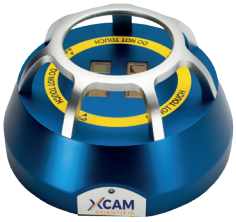
- **Integration**
  The powered-off Space PFO is integrated into the LV fairing in a cleanroom environment alongside the satellite(s).
- **Pre-Launch**
  Space PFO is in pre-flight data acquisition and transmission mode as encapsulated fairing moved and assembled atop LV.
- **Launch**
  Space PFO operates in flight-mode data acquisition until fairing ejection; followed by data transmission to ground control, with automatic shut down when complete.

Performance Verification

Detection and classification performance verification is achieved using a special chrome-on-glass test mask containing 3.5, 10, 20, 40, 75 and 150 µm particles, and simulating 5 and 10 µm straight and curly fibres. XCAM Scientific detection and classification algorithms can detect 100% of particles ≥5 µm and 80% >3 µm.



Related Products



PFO 1040
Ground-based, real-time surface particulate monitor for clean environments.

MKPU-XCAM-DS-00063-vC

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