

## Ariane 5 Fairing Preparations for James Webb Space Telescope (JWST) Launch

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The Ariane 5 fairing for the James Webb Space Telescope (JWST) was inspected, cleaned, and maintained to specified cleanliness requirements to ensure launch distribution of contamination was minimal. NASA, ESA, and RUAG representatives collaborated to inspect and clean the fairing at RUAG facilities and at the launch site. These efforts allowed JWST to meet contamination mission cleanliness requirements and enhance mission observation performance.

The James Webb Space Telescope (JWST) is a large, infrared space telescope operating at Lagrange point 2. JWST is a joint effort between NASA, ESA, and CSA and was launched from the Centre Spatial Guyanais (CSG) on an Ariane 5 rocket in December 2021. The Ariane 5 payload fairing (PLF), as shown in Figure 1, interior and Vehicle Equipment Bay membranes received multiple cleanings, detailed inspections, and verification sampling to achieve necessary cleanliness levels.

Investigation of PLF cleanliness began early in the JWST program to test the Fairing Acoustic Protection (FAP) panels. Initial PLF cleaning was performed at RUAG in Switzerland prior to shipment to the launch site in collaboration with NASA and ESA. The cleaning procedure used at RUAG premises was based on heritage of the PLF cleaning procedure for ESA/Herschel-Planck and NASA/Mars2020 missions on an Atlas V launcher. The Ariane 5 fairing was packaged in a clean manner and inspected and cleaned upon arrival to CSG. Silicon wafers and particle fall out (PFO) plates were used to monitor the internal fairing cleanliness prior to encapsulation. Just after encapsulation, PFO plates and calcium fluoride (CaF<sub>2</sub>) crystals were placed inside the fairing on a specific tool door for monitoring the cleanliness inside the fairing during the ventilation phase. The fairing itself was specially sealed to protect the inner environment with just a small, doored porthole accessible via diving board for final closeout of the purge interface [1]. Fairing cleanliness was achieved and mitigated contamination distribution upon launch.



Fig. 1: Ariane 5 fairing (left) and fairing encapsulation (right) within air shower curtain (ASHC).

### References

[1] Abeel, A.; Wooldridge, E., *SPIE Optics and Photonics*. "Overview of Contamination Control for JWST launch campaign".