Coating Plasma Innovation (CPI) partners with Thales Alenia Space for surface treatment.

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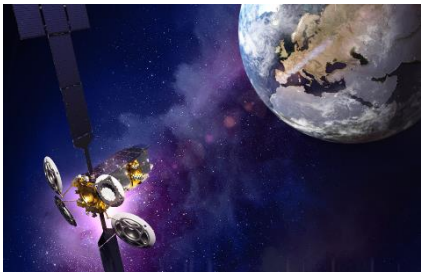
Fuveau, France — Coating Plasma Innovation (CPI) partners with Thales Alenia Space for surface treatment. Thales Alenia Space is at the forefront of space innovation, engineering the future space with cutting-edge projects that demand precision, safety, and reliability. "In the aerospace industry, details matter, and the quality of our components can't be compromised. To maintain our commitment to our excellence, we collaborate with top-tier suppliers who share the same dedication to quality and expertise." Pierre Jouanne, Material and Process expert at the Thales Alenia Space premises in Cannes in the South of France, explains why they work with CPI.

Pierre Jouanne, an expert in functionalization, adhesion, coating and surface treatment for Thales Alenia Space products, focuses on telecom and scientific applications. He explains: "Here in Cannes, we are deeply involved in the development, integration, and qualification of satellites. Surface treatment plays a pivotal role in our projects, as it ensures that our components meet our stringent standards for performance and durability. It is imperative for us to collaborate with reliable suppliers capable of providing efficient surface treatment solutions, such as plasma surface treatments for polymeric film."

Surface treatment for satellite insulation

"One typical application where we employ plasma surface treatment is in the insulation of satellites. Insulation is crucial in safeguarding the electronics of a satellite, thereby ensuring



the overall performance of the system. If the metallization of the MLI ** does not adhere perfectly to the film, it could potentially affect radiative reflection*. This, in turn, would render the satellite's electronics non-functional, potentially leading to the loss of a significant investment."

* Radiative reflection is important for the temperature regulation of satellites.

Satellites operate in the extreme conditions of space, where temperatures can vary significantly between sunlight and shadow. Radiative reflection helps in regulating the temperature of satellite components. By emitting excess heat through radiative cooling, satellites can prevent overheating of sensitive electronics and thermal damage.

Many scientific instruments and sensors onboard satellites require stable and controlled temperatures to function accurately. Radiative reflection helps maintain the temperature stability of these instruments, ensuring the reliability of the data they collect.

Effective thermal management through radiative reflection can extend the lifespan of satellites. It helps prevent the degradation of materials and components ultimately increasing the satellite's operational longevity.

First collaboration with CPI

"We have previously partnered with CPI for the metallization of PEEK film, which serves as thermal insulation to protect the satellite."

PEEK stands for Polyether Ether Ketone. This high-performance thermoplastic polymer belongs to the family of polyaryletherketones. PEEK has exceptional mechanical, thermal, chemical resistance and electrical insulation properties. Despite its strength, PEEK is relatively lightweight.

Thales Alenia Space introduced PEEK into their processes a decade ago. “Prior to that, we predominantly worked with polyimide sourced from American companies. When we encountered insulation panel issues that time, CPI played a crucial role in pinpointing the root causes of the problem.”

“When dealing with products sourced from the United States for delivery in European markets, extra regulations are necessary. The product requires approval from both the US Ministry of Defense and the Department of Commerce, leading to additional costs. Consequently, we began searching for a European alternative. One of the solutions for insulation was the PEEK film. For plasma treatment after lamination of the polymeric film,

CPI was recommended to us. They had prior experience in various industries, enhancing the adhesion of the metallization layer."

"The first time we collaborated with CPI, we were able to **significantly improve the adhesion of the metallization to the film**. CPI demonstrated extensive knowledge in proposing plasma solutions for the film.

CPI also had the capacity for **large-scale surface treatment**. Often, the rolls we work with exceed 400 meters in length and 2 meters in width. Finding a facility that matches these dimensions is not always easy. The added advantage of CPI's proximity to the Thales Alenia Space premises made them an ideal choice."

Today, Thales Alenia Space qualifies PEEK film for space applications without the need for extra regulation. Nevertheless, when working with organizations like NASA, they still adhere to their requirements to use US-sourced materials.

Advantages of an exceptionally smooth partnership

"Our initial discussions with the CPI team were highly productive. **The team understood the satellite's needs and the film's requirements for the application**. Following CPI's plasma treatment, a substantial improvement in the product was obtained. Thales intends to maintain this collaboration.

The CPI team also consistently generates **innovative solutions**. We also utilize CPI's expertise to identify non-conformities in films treated by other suppliers, such as identifying the root causes of adhesion issues.

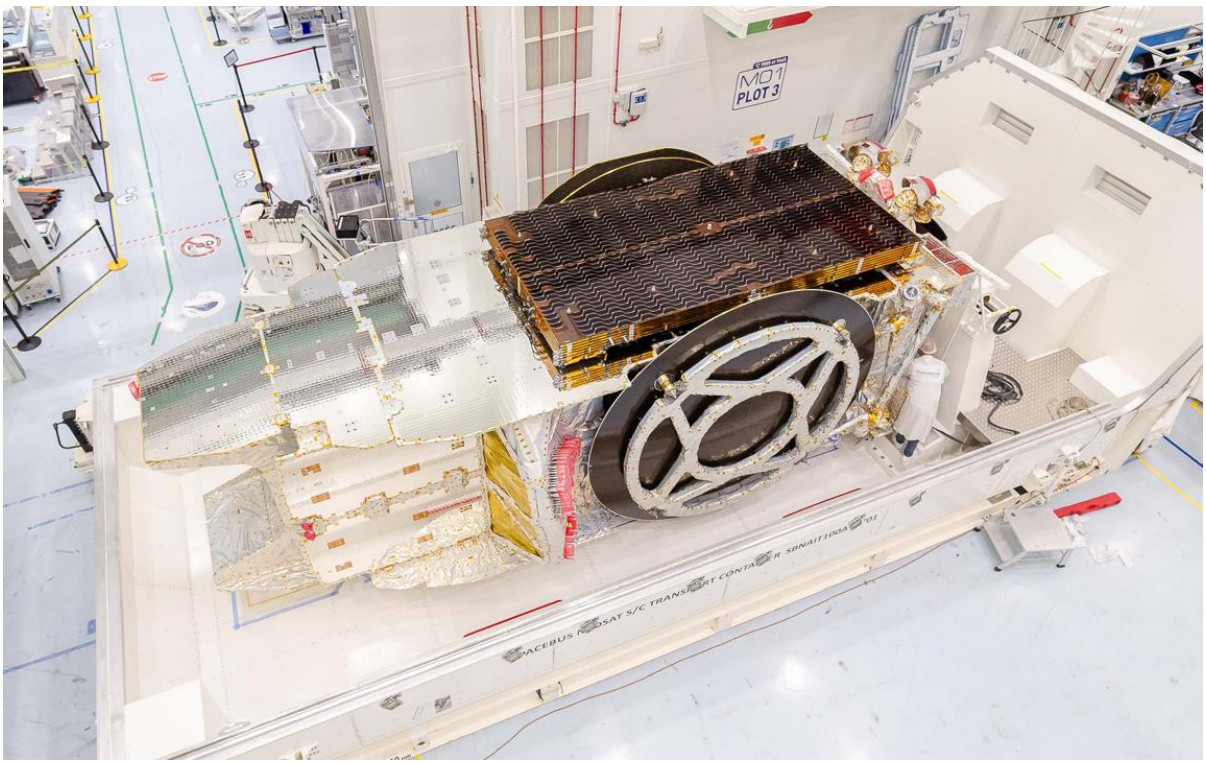
An additional advantage of working with CPI is their willingness to evaluate potential **solutions promptly**. They can provide samples rapidly, creating a dynamic relationship that aligns perfectly with our requirements. Considering that a satellite can represent a $200 million investment, and that lead times are often short, the ability to swiftly resolve issues is of paramount importance to us, enabling us to deliver as promptly as possible. Since collaborating with CPI, we have encountered fewer film-related issues than in the past. That is also why CPI is an integral part of our future projects."

Notably, the most significant European geostationary satellite has undergone CPI's plasma treatment for insulation protection. This treatment has facilitated internet network coverage across the entirety of Europe.

Neutral expert advice

“CPI has been instrumental in enhancing the quality of metallization on thermal insulation film. When we encounter issues with adhesive properties or film coatings on a new surface to be treated, we turn to our CPI contact person to perform the analysis in one of their laboratories. They propose **objective solutions** that are not always plasma-based, providing objective expert advice to ensure the best possible outcome.”

“Partners like CPI Plasma Solutions are not just suppliers: they are experts in their domain. The meticulous care they bring to surface treatment aligns seamlessly with our mission for excellence.”



Eutelsat CPI-Satellite KVHTS/SES17 with MLI PEEK

Multi-layer Insulation explained

Multilayer insulation (MLI) is a crucial component of satellite design, as it plays a vital role in regulating the temperature of the satellite in the extreme conditions of space.

Importance of Multilayer Insulation (MLI):

Thermal Regulation: Space presents a harsh thermal environment, with extreme temperature variations between direct sunlight (+200 °C close to the sun) and shadow (-200 °C).

MLI helps maintain a stable temperature within the satellite, preventing critical components from overheating or freezing.

Component Protection: Satellites carry sensitive electronics, instruments, and power systems. MLI shields these components from the extreme temperatures, ensuring they operate within their specified temperature ranges.

Energy Efficiency: Efficient temperature control reduces the energy required for thermal management systems, optimizing the satellite's power budget and extending its operational lifespan.

Process of Multilayer Insulation:

Layered Design: MLI consists of multiple layers of thin, reflective materials. These materials have low thermal conductivity and high reflectivity.

Radiation Shielding: The outermost layer of MLI reflects a significant portion of incoming solar radiation, preventing the satellite from overheating when exposed to direct sunlight.

Thermal Isolation: Beneath the radiation shield, there are multiple insulating layers. These layers minimize heat transfer between the satellite's interior and the cold vacuum of space.

Reflective Layers: The insulating layers are interlaced with highly reflective metalized surfaces. These surfaces bounce radiative heat back into the satellite, maintaining a stable temperature.

Spacers: Spacers or "pillows" create gaps between the insulating layers. These gaps further reduce heat transfer through conduction.

Securing Layers: The entire MLI assembly is securely wrapped around the satellite, ensuring there are no gaps or exposed areas. It is critical for the MLI to be airtight to prevent heat loss through convection.

Testing: MLI is extensively tested on Earth to simulate space conditions and validate its thermal performance. This testing helps ensure that the satellite will function correctly in orbit.

Maintenance: Over time, the MLI may degrade due to exposure to radiation and micrometeoroid impacts. Satellites in orbit may have mechanisms to periodically adjust or repair the MLI to maintain its effectiveness.

Our website at www.plasmalex.com gives more information on Plasmalex

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About Plasmalex:

June 2023 two leading companies in plasma surface treatment; Europlasma and CPI, specialized in vacuum and atmospheric plasma solutions, merged to form the new company Plasmalex.

As a fully integrated research, development and engineering group, Plasmalex provides complete solutions for nanoscale surface treatment, functional modification and conversion of web processed materials and objects with the lowest possible environmental impact.

Plasmalex has a very extensive machine park that can be used for laboratory tests and industrial scale trials.

Its vision is to help creating a sustainable world by providing breakthrough industrial solutions.

About Europlasma:

Belgium based Europlasma is a pioneer and world leader in low pressure plasma technology.

For 30 years Europlasma offers turnkey low pressure plasma solutions, delivering both chemistry and equipment for a wide range of applications such as electronics, medical, technical textiles and filtration.

Europlasma specializes in vacuum or low pressure plasma surface treatment via Plasma Enhanced Chemical Vapor Deposition (PECVD). The PECVD process is executed in a controlled atmosphere. It assures a deep and very consistent treatment with no variation in coating quality. PECVD is the best solution for fine coating of 3D complex shapes and porous material.

Europlasma has an extensive active patent family protecting machine design, processes, methods for plasma deposition and offers different surface treatment solutions and a wide coating portfolio.

Compared to traditional wet chemical methods, depending on the application, one can realize with Europlasma coating technology:

- 80% reduction in use of coating chemicals,
- 100% reduction in water waste,
- 50% reduction in energy consumption and emission of CO_2.

Since 1993 Europlasma's vision is to help its customers achieve the highest performance and protection for their products, with the lowest environmental footprint. Europlasma achieves this by supplying innovative surface treatment solutions based on in-house low pressure plasma technology delivering both chemistries and equipment for medical, filtration, technical textiles and electronics applications.

About CPI:

Created in 2001, CPI is a pioneering company in cold plasma surface treatment. CPI is located in the south of France.

CPI uses cold plasma web (roll-to-roll) in a controlled atmosphere, at atmospheric pressure or under vacuum, to solve surface treatment problems on flexible substrates.

Applications include bonding, digital printing, flexible packaging, lamination, etc.