

SPACE

We know how

STAND BASE SSM

TRANSPORT CONTAINER

MGSE



The ESEA Group operates as a leading company in the field of industrial automation and design and custom machinery construction.

In a continuous innovative process, the Group has created thousands of solutions in different sectors, while maintaining the objectives of rapid growth and a continuous improvement.

Since its foundation in 1980, ESEA has installed more than 700 custom machines for the production and quality control.

To date, ESEA provides products on a global scale, counting installations in France, Germany, United Kingdom, Sweden, Russia, Japan, United States, China, India, Argentina, Korea and many others other countries.

ESEA's activities range from international R&D projects, carried out in collaboration with universities, to industrial projects, such as testing equipment for satellite and payload.

In the ground segment, the ESEA Group develops and manufactures Ground Mechanical Support Equipment (MGSE).

The ESEA Group is able to meet the most diverse needs of its customers; assemble, calibrate lift, tilt, position, measure, test or transport its satellite or launcher: ESEA processes a tailor-made solution or prepare ready-to-use equipment.

The ESEA Group is a member of the "ICT AEROSPAZIO ABRUZZO" and the "CTNA Cluster Tecnologico Nazionale aerospace", with the aim of creating synergies to positively influence the development of national/regional strategies in the aerospace sector and identify technological solutions that best meet the industry's complex challenges.

The headquarters of the ESEA Group is located in Cepagatti (Pescara), where a structure of 15,000 square meters houses mechanical, electrical and software technical offices, as well as the department of production, R&D, testing, assembly and assistance. In addition, ESEA has a service department that can offer support to customers during commissioning in on-site service and remote assistance, including through augmented reality innovation. The presence of 150 highly skilled employees, combined with manufacturing skills and engineering leadership, has played a significant role in driving the ESEA Group to success and this trend will remain for future milestones.

-We Know how-





Mechanical Ground Support Equipment (MGSE)



Test Benches



Transport (STC)



Augmented Reality

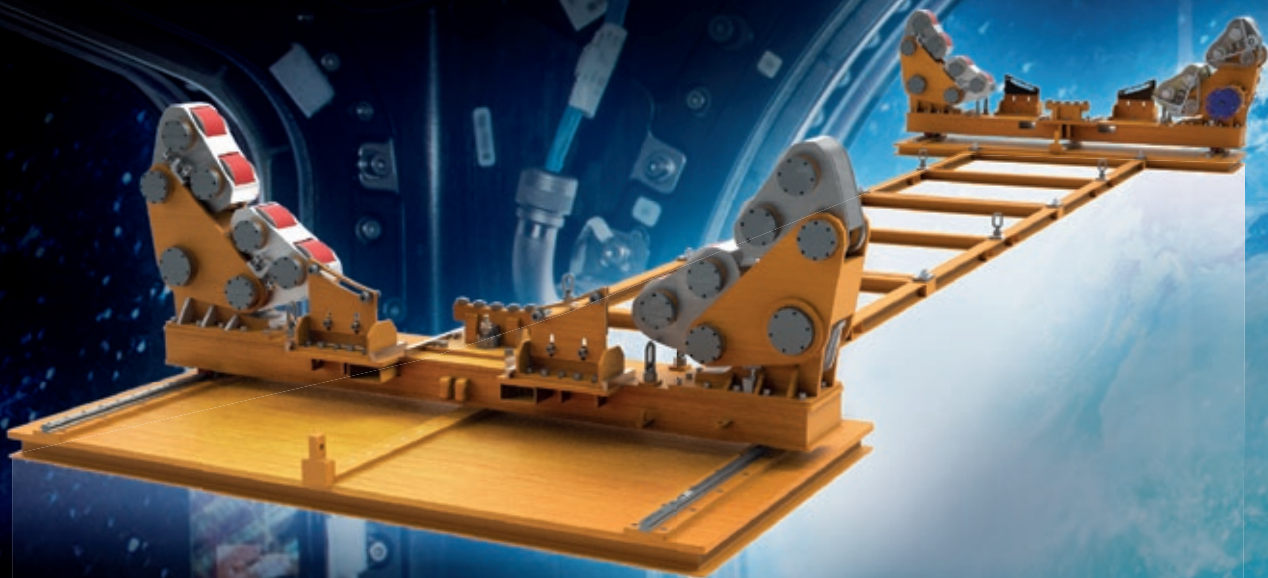


Automation

Our services

CASE HISTORY

Station with rotating support



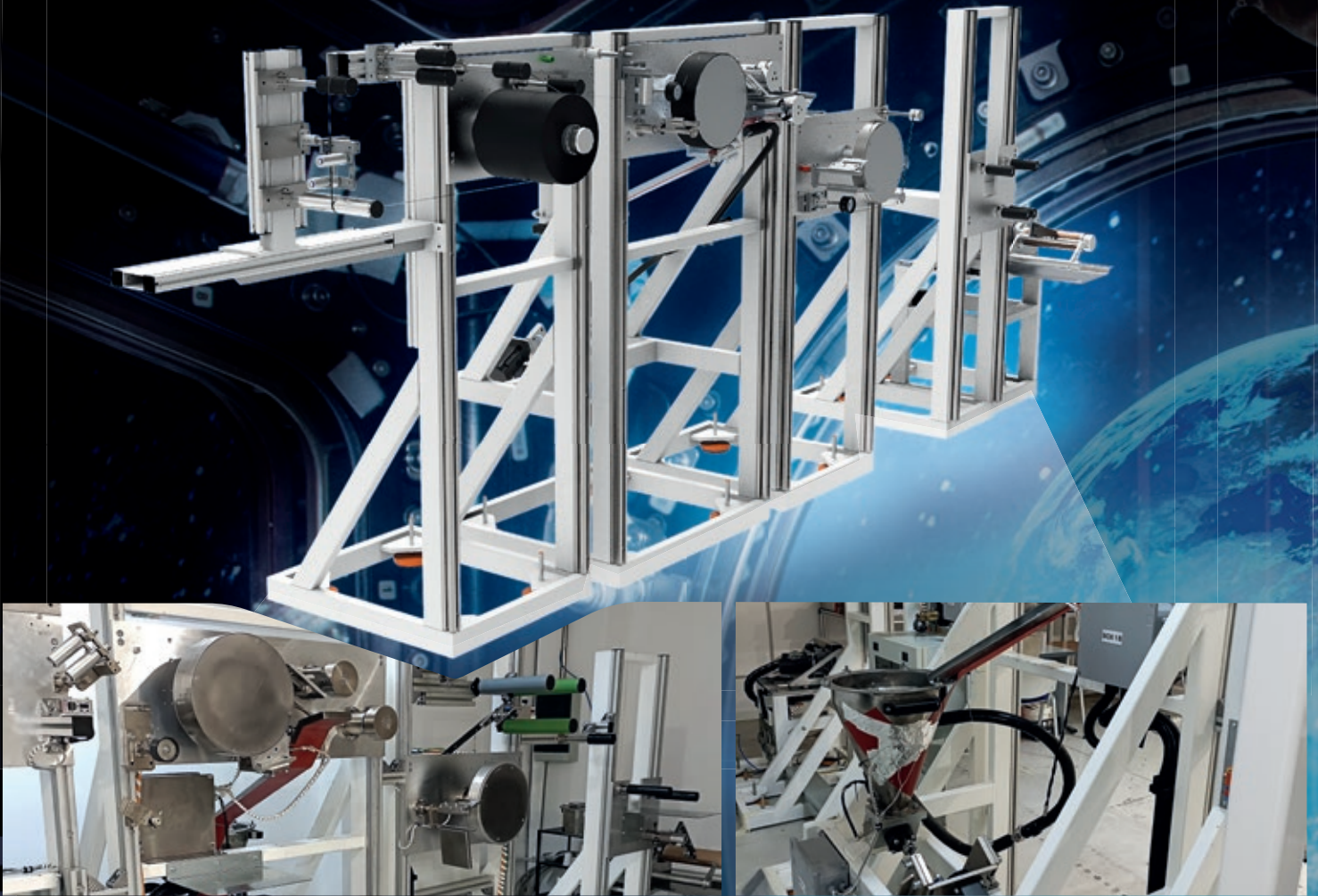
The "Station with rotating support" machine is designed to simplify the process of handling and rotating engine casings. The saddles, one motorized and one free, are made with high-quality materials to ensure the necessary robustness and safety for handling loads up to 20 tonnes.

Our cradles are designed to adapt to any type of handling ring requested by the customer. We have included a tilting roller support system, coated in "Vulkollan" elastomer, to protect their surface during handling.

To ensure maximum safety, we have implemented a wheel locking system that prevents undesired movement of the casing along its axis during rotation, preventing falls or overturns. Furthermore, the connection structure between the two cradles has been designed to allow perfect alignment of the axes, crucial for optimal operation.



Tow Preg

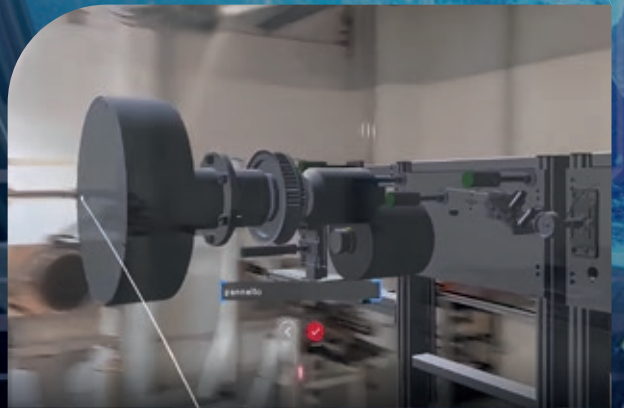


Towpreg augmented reality

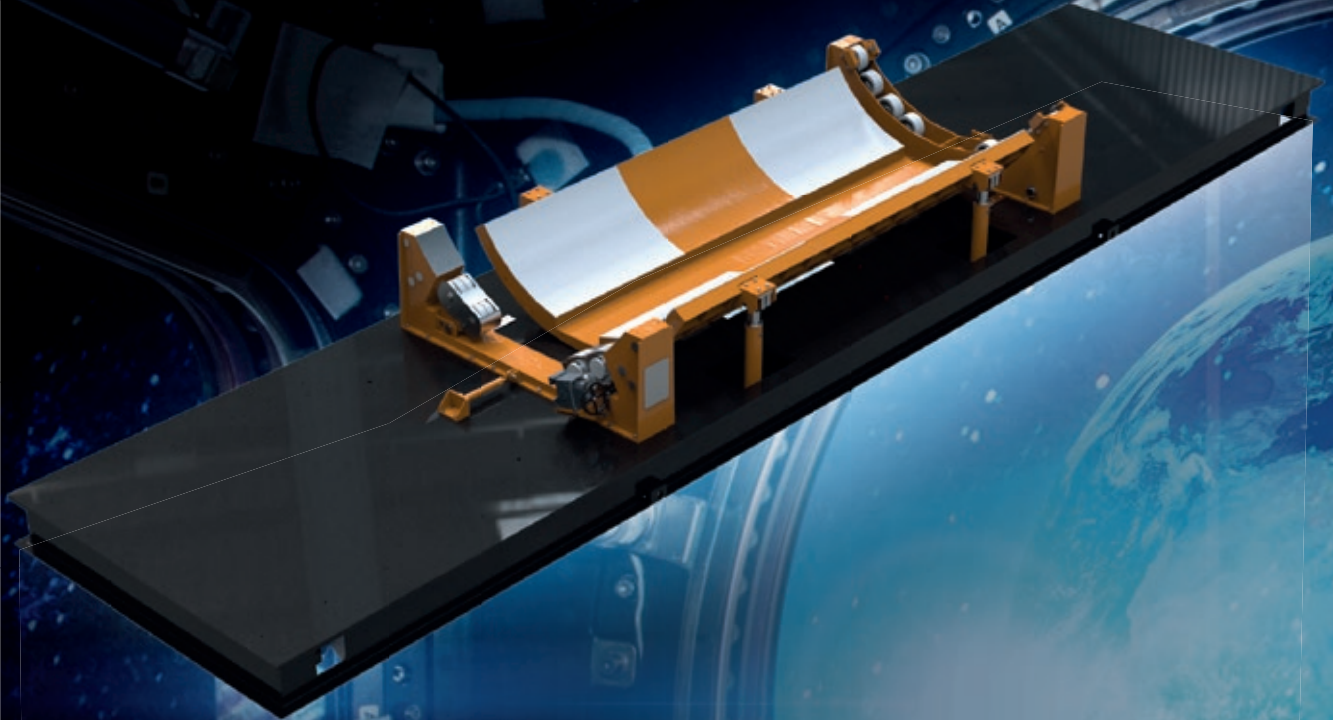
The TOW-PREG has been designed for impregnating dry tow coils with resin, equipped with a unit for unwinding dry tow fiber coils, an impregnation unit with two interchangeable modules for working with thermosetting and thermoplastic resins, and a rewinding unit with temperature and humidity control.

The improvements achievable with this solution compared to technologies currently available on the market are:

1. **Cost Reduction:** Up to 50% reduction in production costs compared to the use of slit-tape, thanks to the absence of slitting, the possibility of implementing "just-in-time" management to avoid the costs of long periods of storage in refrigerated warehouses, and the high maximum process speed, estimated at around 200 m/min.
2. **Quality Control:** High reliability, repeatability, and quality control of the material in terms of fiber/matrix ratio and therefore uniform and controlled properties in the final tank, thanks to the automatic feedback system based on in-line grammage control sensor and the neural network integrated into the machine software.
3. **Versatility:** Capability to work with highly viscous resins thanks to the progressive heating system. **Augmented Reality Implementation:** Integration of an AR system to provide remote support to operators through wearable optical devices, optimizing operations and improving efficiency in production and maintenance.



Integration Bench



The integration bench is designed to support the positioning and assembly of the Stage engine, weighing up to a maximum of 45 tonnes, ensuring stability and safety.

The support cradles, covered in rubber, are equipped with a hydraulic system that allows for vertical translation. The hydraulic system is controlled by a control unit equipped with solenoid valves, an oil reservoir, feeding pumps, and an ATEX electric motor suitable for C022 area.

The rotating saddles of the integration bench are precisely designed to allow optimal positioning and controlled rotation of the Stage/Engine during integration phases. Each saddle is sized to support the handling rings of the Stage/Engine, ensuring a safe and stable interface.

All components have a high safety factor to operate in extreme conditions (-10°C to $+50^{\circ}\text{C}$, 70% humidity).

The bench can be lifted via overhead crane for transport.



Pressurant loading equipment (PLE)



The Pressurant Loading Equipment (PLE) is a pressurization unit mounted on a trolley, made of stainless steel and equipped with handles and four swivel wheels with brakes.

The front panel features pressure gauges, pressure regulators and manual control valves, as well as a silk-screened functional diagram.

Inside the trolley, there is a compressor with all necessary piping, including filters and safety valves.

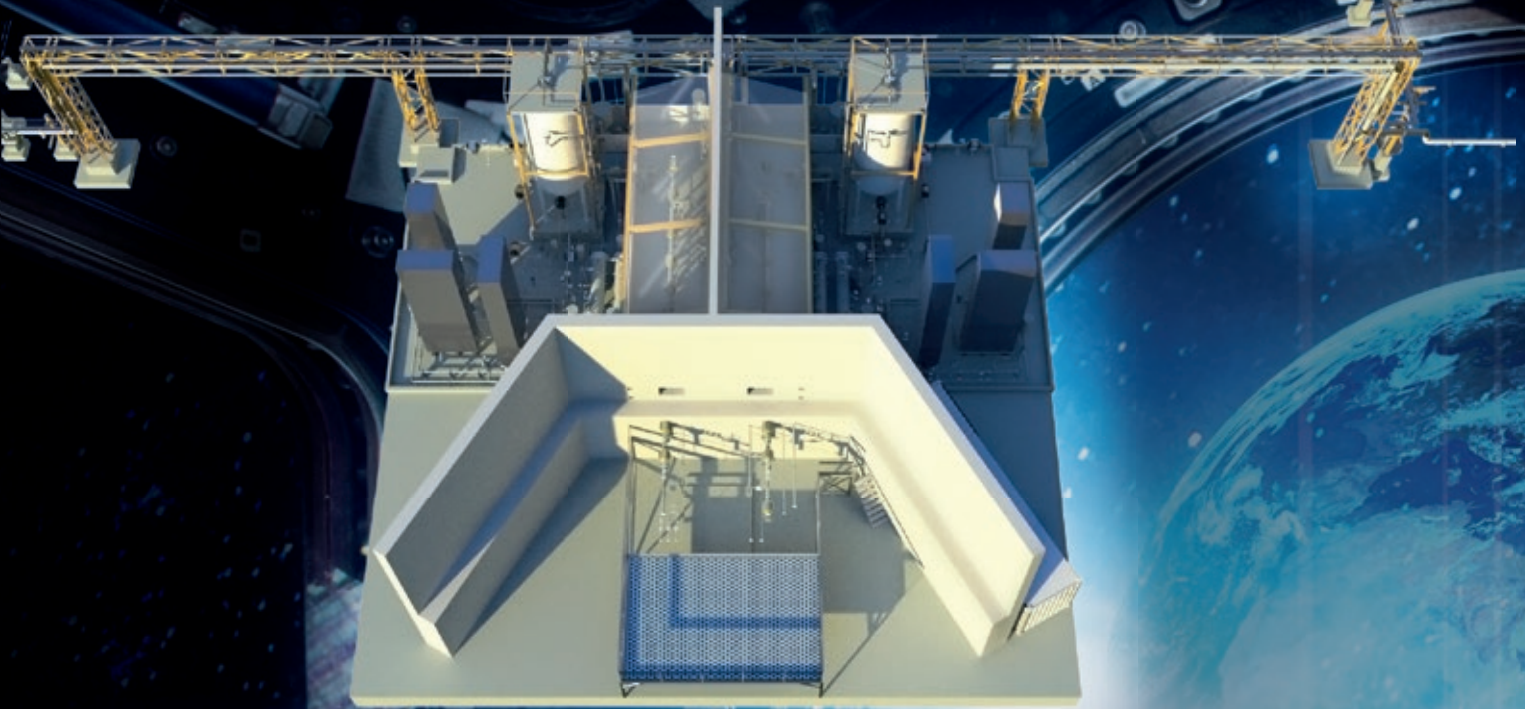
The PLE is designed to pressurize helium tanks to their initial mission pressure of 293 bar.

Furthermore, the equipment can pressurize gas and propellant tanks during development and testing across various pressure ranges, up to a test pressure of 439 bar. Tanks can be depressurized either by venting gas into the environment or by recovering helium. The helium compressor is powered by a compressed air/ GN_2 supply system, up to 10 bar.



PRESSURANT LOADING EQUIPMENT (PLE)

SPTF Test Bench



The SPTF is a testing and development center for space propulsion located in Perdasdefogu, Sardinia, Italy.

The Esea Group has contributed to the realization of this important project. The facility plays a fundamental role in the study and validation of propulsion technologies for rockets, liquid propellant engines and thrust systems used in space exploration.

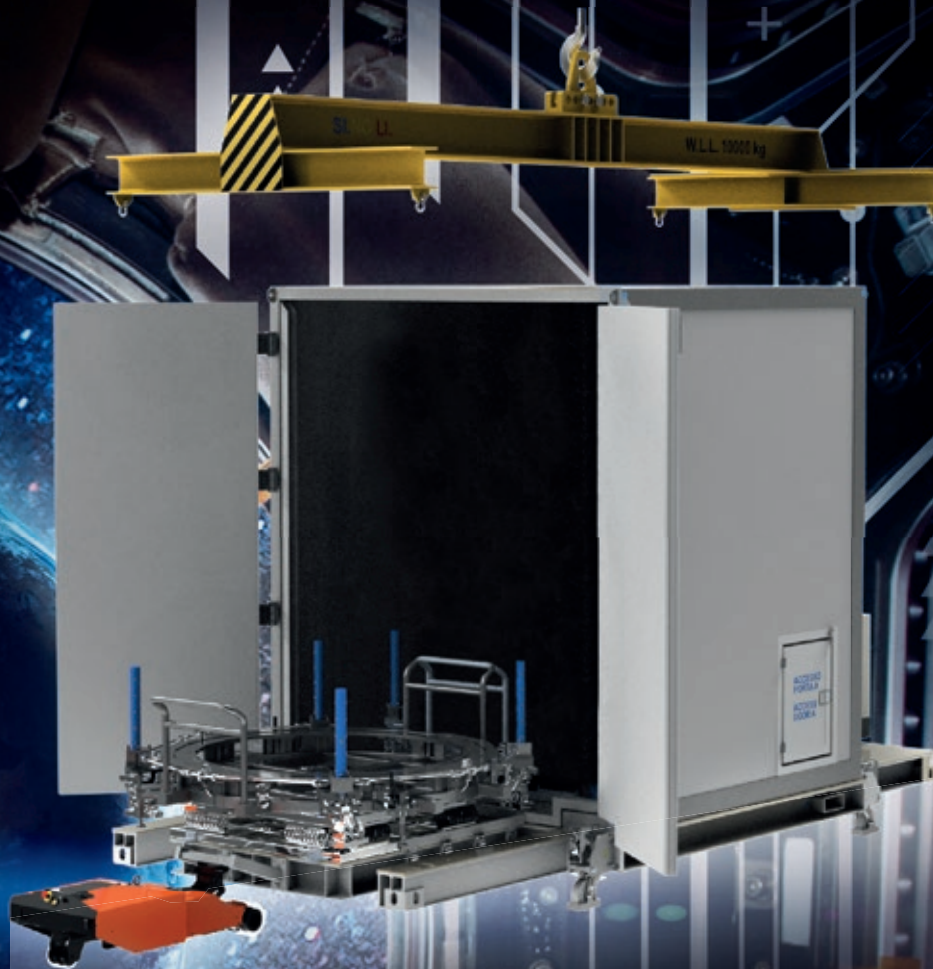
The SPTF is designed to conduct a series of crucial tests for the evaluation and validation of space engines.

These tests may include:

1. Engine ignition tests: Verify the reliability and performance of the engine under simulated flight conditions.
2. Endurance tests: Assess the engine's long-term durability and its ability to operate in extreme conditions.
3. Environmental compatibility tests: Examine how the engine responds to various environmental factors such as temperature, pressure and vibrations.
4. Flight simulation tests: Reproduce the operating conditions of an engine during launch and operation in space.



Transport STC



Container: The transport container is designed to provide a clean and controlled environment for space equipment. Constructed with antistatic materials and equipped with HEPA filters, it maintains a cleanliness class 100,000 (ISO 8), minimizing the buildup of electrostatic charges.

The inert gas environmental control system ensures optimal pressure, temperature, and humidity conditions. With optimized accessibility through a side door and a reliable locking system, the container ensures maximum safety and protection during the transportation and storage of space payloads.

Trolley: The trolley has been precision-engineered for the safe and reliable handling of delicate space payloads. Constructed from high-strength stainless steel, it features swivel wheels with non-slip brakes for optimal maneuverability on any surface.

Ergonomic and removable handles allow for easy transport, while integrated stabilizers ensure exceptional stability during critical operations. With advanced electrical insulation and the use of antistatic materials, the trolley ensures the safety and protection of sensitive payloads in the space environment.



Sliding Cover



The Sliding Cover was designed and built to protect aerospace engines from contamination from the external environment, during the transport phase from the plant to the launch station.

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It's equipped with an automatic lifting and movement system with driven wheels, both controlled with a radio control. The Sliding Cover is able to resist harsh climatic conditions in terms of temperature and humidity.



Stand Base SSM

The SSM base stand is a support equipment designed to ensure integrity and safety during critical satellite integration phases. Constructed with high-quality materials, including high-strength stainless

steel, this device provides a solid and reliable base for satellite and adapter positioning and support.

The height adjustment facility allows you to level the equipment on uneven surfaces, while the braking wheels ensure smooth and safe handling.

The optimized design ensures complete accessibility, allowing a single person to easily perform all the operations such as assembling and disassembling tools.

The structure's anti-corrosion and anti-static properties safeguard component integrity, preventing contamination of the flight system, subsystem, and associated components during handling, transportation, and integration activities.



Spindle Pallet



Our spindle pallet is designed for safe transport of a spindle and its casing weighing up to 120 tonnes.

The saddles allow horizontal translation for both short and long shaft configurations, with controlled vertical lifting to position the load precisely.

The mechanical reducers used for saddle translation are sized to handle a maximum torque of 40 Nm, ensuring smooth and accurate movement.

In addition to the integrated wheel braking system, quick-lock systems for the saddles are also included to ensure stability during transport and operation. The pallet components are made from high-strength materials to withstand extreme working conditions, including heavy loads and temperatures up to 200°C.

The pallet is designed to be ergonomic, with control positions accessible to operators and clear indicators to facilitate translation and lifting operations.



AFP



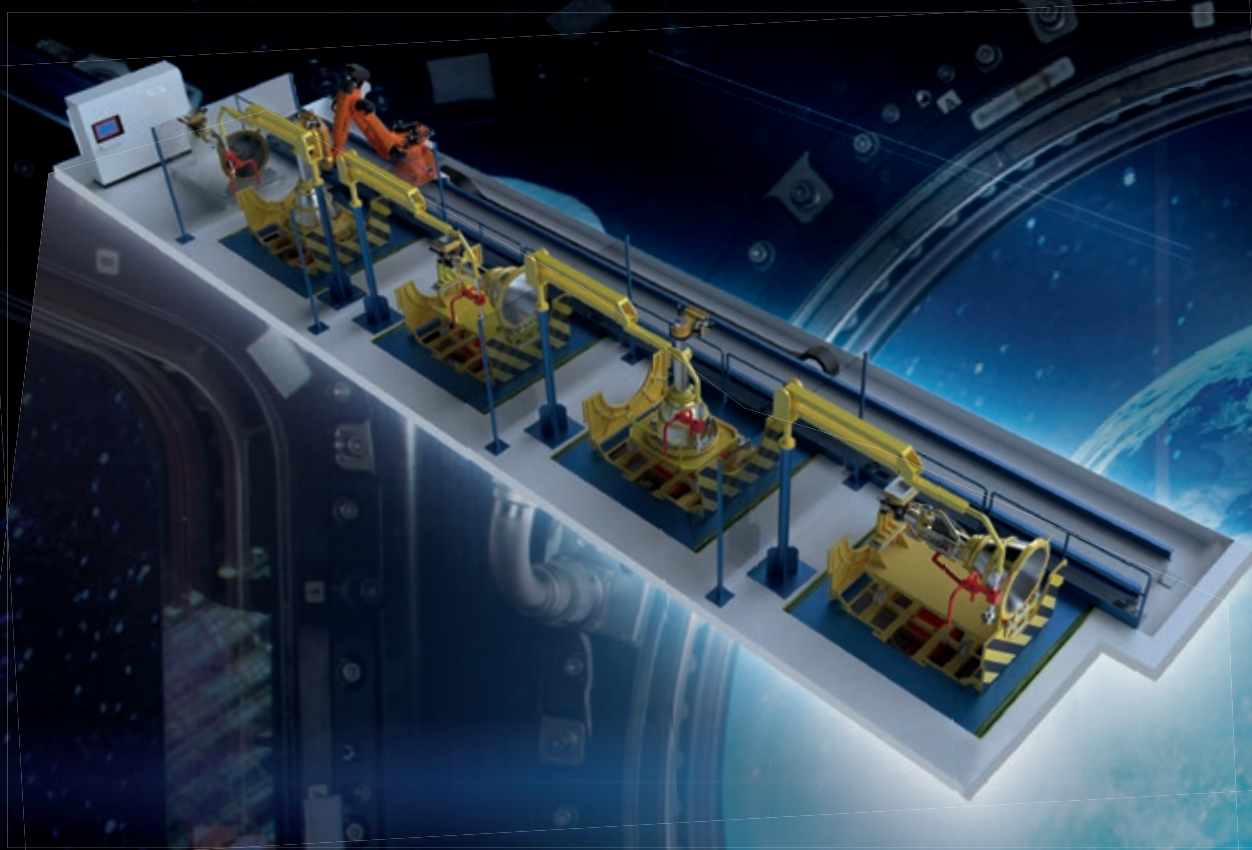
ESEA modular AFP head has demonstrated high rate and high quality in commercial aerospace production.

The development of an innovative modular AFP head increases the capability of the machine to produce complex, convex and concave parts, based on tailored trajectories thanks to the user friendly programming software.

ESEA head offers advantages such as multiplicity of slit tape widths, very short slit tape path, capability to produce complex parts, high accuracy of laying and rapid head change to decreased downtime of the machine and higher throughput of manufactured parts.



Cryogenic Engine Assembly line



The cryogenic engine assembly line is a sophisticated system that manages all stages of the process, from the arrival of the engine to packaging. Engines are transported on pallet jacks and positioned on the interface via AGV. This interface allows secure locking of the engine for subsequent operations. Once positioned, the engine is lowered into the working pit, where automatic assembly stages take place using weight compensators and automatic screwdrivers. During this process, the engine can be manually rotated along the vertical axis to facilitate access to components. To complete the assembly, the engine will be horizontally flipped by the anthropomorphic arm and then repositioned vertically at the end of the process. Once the engine is completed, it is transferred for packaging where the engine is released and transferred to the crate loading station, ready for packaging and transportation. All movement operations/orientation changes of the engine (vertical/horizontal) are managed via AGV or robots to ensure precision and safety in the process. This automated approach optimizes engine assembly and packaging, minimizing errors and increasing overall line productivity.





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