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# DATA SHEET

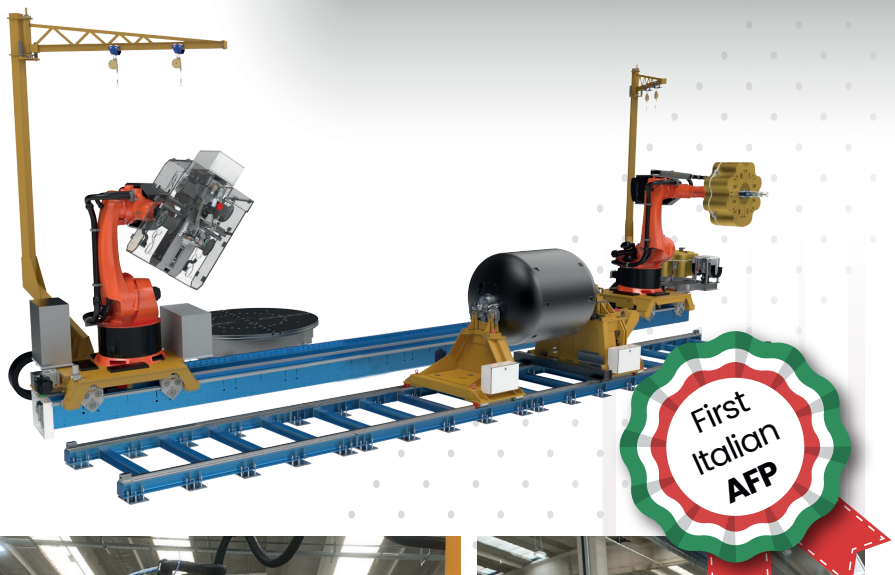
**Model: ARES**

## AFP-FW-MILLING Machine

## Product INFO

Innovative integrated AFP – FW – MILLING MACHINE for the production of cryogenic vessel in composite for aerospace application (type IV and type V).

The development aerospace application of a modular AFP head increase the capability of the machine to produce complex, convex and concave parts, using innovative trajectories.




**ESEA robotic filament winding** is suitable for:

1. the production of ANISOGRID COMPOSITE LATTICE STRUCTURES FOR SPACECRAFT made of regular lattice of intersecting hoop and helical ribs by the filament winding thecnology.
2. Placement of Towpreg and dry fibres along the load direction.


# AUTOMATIC FIBER PLACEMENT-TECHNICAL DATA

| AFP PROCESS SPECIFICATIONS | |
|---|---|
| Head configuration | Modular approach. The head can be assembled in different configuration. The basic configuration is equipped with 4 spools (small design). It is possible to add a second set of 4 spools to increase the productivity of the machine. It is possible in alternative to remove the spool delivery device by each side of the head. |
| High accuracy robot laying | 0,1 mm |
| Fiber configuration | 1/4'' and 1/2'' |
| Cut and feed repeatability | ± 2 mm at 700 mm/s |
| Compaction force control | 3 N to 30 N (automatic, changeable along trajectory) |
| Temperature and Humidity head control | 6' to 20° |
| Maximum lay-up speed | Up to 1,2 m/s |
| Tolerance between laid tapes | 0/+0,2 mm |
| Minimum fiber length | 100 mm |
| Tape tension | 3 N to 20 N |
| Spool (on board) | 4+4 |
| Film release rewinder | 4+4 |
| HMI for advanced production management | Visual process control with intuitive windows for operation and maintenance |
| Bar-code reader for material traceability | |
| Offline simulation software | VERICUT VCS Composites solution 9.4.2 |
| Offline postprocessing software | VERICUT VCP Composites programming 9.4.2 |
| IP Camera | Visual control cam during operation |
| Quality assurance | Laser profilometer, recording and storage of the main process parameters |

| CELL CONFIGURATIONS | |
|---|---|
| Tool AFP | |
| Humidity and temperature head air control | |
| IR Heating | 500 W |
| IR Camera control | |

| MATERIALS | |
|---|---|
| Termoset tape | Compatible |
| Thermoplastic towpreg | Compatibile |

# FILAMENT WINDING – TECHNICAL DATA

| FW PROCESS SPECIFICATIONS | |
|---|---|
| Head configuration | Spools on head to avoid tow's stress during laying |
| High Accuracy robot laying | 0,1 mm |
| Fiber yield | 6K, 12K, 24K |
| Maximum lay-up speed | up to 1,2 m/s |
| Fiber tension per tow | 3 N to 100 N |
| Spool (on board) | 8 |
| Release Film rewinder | 8 |
| HMI for advanced production management | Visual process control with intuitive windows for operation and maintenance |
| Bar-code reader for material traceability | |
| Offline simulation software | CADWIND |
| Offline postprocessing software | CADWIND |
| IP Camera | Visual control cam during operation |
| Quality assurance | Recording and storage of the main process parameters |

| CELL CONFIGURATIONS | |
|---|---|
| Heater | IR lamps 500 W, hot air torch |
| IR Camera control | |

| MATERIALS | |
|---|---|
| Termoset tape | Compatible |
| Thermoplastic towpreg | Compatible |
| Dry fiber | Compatible |

# MILLING – TECHNICAL DATA

| MILLING PROCESS SPECIFICATIONS | |
|---|---|
| Electric spindle | 20kW<br>24000 RPM |
| High accuracy robot | Less of 0,1 mm |
| Maximum speed | up to 1,2 m/s |
| Offline simulation software | POWER MILL |
| Offline programming software | POWER MILL |

# GENERAL – TECHNICAL DATA

| CELL CONFIGURATIONS | |
|---|---|
| Robot Kuka | KR600 |
| Robot on a linear axis | Up to 80 m in length |
| Electrical Cabinet | Insulation code IP56 and air condition system |
| Horizontal positioner | |
| • Payload | 40.000 kg |
| • Maximum mandrel diameter | Ø 2,500 mm |
| • Maximum mandrel lenght | 10,000 mm |
| • Angular accuracy of spindle | 0,005° |

| COMPONENTS | |
|---|---|
| Robot | Kuka |
| Controller | Siemens CNC |
| Linear axis | Güdel |
| Positioner | ESEA Composites |

| OPTIONS | |
|---|---|
| Laser heater | For thermoplastic process with optical zoom to adapt the laser spot to the bandwidth and trajectory specifics. |
| Humidity and temperature head air control for filament winding head | |
| Vertical axis positioner | |
| • Payload | 5.000 kg |
| • Table Diameter | 2700 mm |
| • Angular accuracy | 0.005° |
| Smart maintenance service with augmented reality functions | |