

Metal-Asia

Commercial Proposal for Supply

AFP Automated Fiber Placement Systems for Composite Component Manufacturing

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Executive Summary

AFP (Automated Fiber Placement) is an advanced robotic manufacturing technology for precise deposition of multiple prepreg tow lanes onto complex contoured surfaces with high repeatability and accuracy. AFP systems are deployed across aerospace wing and fuselage panels, wind turbine blades, UAV airframes, high-pressure pipelines, and premium sporting goods. Metal-Asia.pw supplies fully configured AFP systems with integrated robotic platforms, laser or IR heating sources, control systems, and **turnkey commissioning services worldwide** as part of our **Global Procurement Solutions** with full **Supply Chain Transparency**.



Automated Fiber Placement system with multi-tow head and laser-assisted heating for composite manufacturing

Process Capabilities and Technical Scope

AFP systems enable simultaneous placement of up to 32 independently controlled tows ranging from 3.175 mm (1/8") to 25.4 mm (1") in width. Each tow can be individually fed, cut, and restarted, enabling the production of complex geometries with variable laminate thickness without post-processing. The technology supports both thermoset and thermoplastic prepreg processing, as well as dry fiber placement.

Key Technical Specifications — AFP Systems

Parameter	Value / Range
Number of simultaneously placed tows	4, 8, 16, 24, 32 (configurable)
Individual tow width	3.175 mm (1/8"), 6.35 mm (1/4"), 12.7 mm (1/2"), 25.4 mm (1")
Tow thickness	0.13 – 0.36 mm
Minimum tow cut length	25 – 40 mm
Layup accuracy (positioning)	+/- 0.1 mm
Fiber orientation angle accuracy	+/- 0.5 degrees
Maximum layup speed	0.5 – 1.5 m/s (material and geometry dependent)
Trajectory curvature radius (steering)	from 500 mm (tow-width dependent)
Heating type	Laser NIR (2-6 kW), IR lamps, hot gas
Supported prepreg matrices	Epoxy (thermoset), PEEK, PEI, PPS, PA (thermoplastic)
Supported fiber types	Carbon (CF), Glass (GF), Aramid (AF)
Robotic platform	6-axis robot, 90-500 kg payload
Control system	PLC + HMI + offline CAD/CAM

Complete Equipment Scope of Supply – AFP System

Primary Equipment

Item	Description	Technical Specifications	Qty	Unit
1	6-axis industrial robot	Payload 90-500 kg, reach 2500-4000 mm, repeatability +/- 0.05 mm, IP65	1	pcs.
2	Linear travel axis for robot (optional)	Travel 3000-15000 mm, speed 2 m/s, positioning +/- 0.05 mm	1	set
3	Pedestal / foundation frame	Steel construction, anchor mounting, vibration isolation	1	set
4	Multi-tow placement head (AFP head)	8-32 tows, individual tow drive, add/cut system, width up to 25.4 mm	1	pcs.
5	Tow feeding and tensioning system	Servo drives, tension sensors (0.1-50 N), compensators, roller guides	1	set
6	Tow cutting and restart system	CNC pneumatic knives, individual tow control, cycle time < 50 ms	1	set
7	Heating system	Laser NIR 2-6 kW or IR lamps 5-15 kW, adjustable power, closed-loop	1	set

Item	Description	Technical Specifications	Qty	Unit
8	Thermal monitoring system	IR pyrometer, thermal imager, response < 5 ms, accuracy +/- 3 degC	1	set
9	Compaction assembly	Compaction roller, pneumatic drive, force 100-2000 N, width 50-150 mm	1	pcs.
10	Creel system	Capacity 8-32 spools, adjustable braking, quick-change flanges	1	set
11	Prepreg spools (initial batch)	UD tape CF/PEEK or CF/Epoxy, width 6.35/12.7 mm, length 500-1000 m	20-40	pcs.

Control System and Software

Item	Description	Technical Specifications	Qty	Unit
12	Control cabinet with PLC	Industrial PLC, analog I/O modules, communication modules	1	set
13	Operator HMI panel	Touch display 15-21", process control interface, visualization	1	pcs.
14	Offline programming suite	CAD/CAM (CATIA/Siemens NX integration), simulation, robot postprocessor	1	lic.
15	Process monitoring and traceability system	Process parameter database, reporting, MES/ERP integration	1	lic.
16	Portable programming pendant	Teach pendant, 10" display, IP65, emergency stop	1	pcs.

Safety and Auxiliary Systems

Item	Description	Technical Specifications	Qty	Unit
17	Robotic cell safety fencing	Perforated panels, safety light curtains, gate interlock	1	set
18	Laser safety enclosure (for laser heating)	Shading panels per DIN EN 60825, status indicators, emergency stops	1	set
19	Fire safety system	Smoke/heat detectors, powder/gas extinguishing module	1	set
20	Exhaust ventilation system	Flow rate 2000-5000 m3/h, filtration, vapor concentration monitoring	1	set
21	Laser cooling chiller	8-15 kW cooling capacity, temperature 18-22 degC, recirculating	1	pcs.
22	Compressed air station	10-15 bar, 500 L receiver, dryer, filters	1	set

Item	Description	Technical Specifications	Qty	Unit
23	Uninterruptible power supply (UPS)	10–20 kVA, 15–30 min autonomy	1	pcs.

Optional Equipment

Item	Description	Technical Specifications	Qty	Unit
24	Workpiece positioner (1-2 axes)	Payload up to 5000 kg, adjustable rotation speed	1	pcs.
25	Machine vision system	2D/3D camera, layup defect detection, tow width measurement	1	set
26	Portable UT system	Hand-held flaw detector, thickness gauge, A-scan/B-scan, 1–10 MHz	1	set
27	Thermography system	IR thermal imager, heating uniformity analysis, delamination detection	1	pcs.
28	Porosity control system	Ultrasonic or X-ray, image analysis software	1	set

Customs Classification and HS Codes

HS Code	Product Description
8479.71.00	Machines for mechanical working of plastics materials
8477.10.00	Industrial robot manipulators
8515.11.00	Laser equipment for thermal processing
8479.89.97	Other machines with individual functions
8479.60.00	Equipment for heat treatment of materials
8466.20.00	Parts and accessories for robots
9031.49.00	Automatic control and regulation instruments
8419.39.80	Equipment for thermal processing
9027.80.00	Instruments for physical analysis
8479.82.00	Mixing or blending machines

Engineering Audit and Project Design

Prior to AFP system delivery, Metal-Asia.pw engineers perform a comprehensive [engineering audit](#) of your production facility. The audit covers part geometry analysis, optimal system configuration selection (tow count, heating type, working envelope), infrastructure requirements assessment, and robotic cell layout development.

Technical Documentation Package

- Technical specification for AFP system based on your part portfolio
- Technical datasheets for all system components
- Process layup card with recommended parameters
- Robotic cell layout with equipment placement
- Operation and maintenance manuals in English

Factory and Site Acceptance Testing

- FAT at manufacturer's facility: mechanical, electrical, and software verification
- Test layup of flat and curved specimens
- Laminate geometry control (thickness, fiber orientation)
- Thermographic verification of temperature profile
- SAT at your facility after installation and calibration

Installation Supervision and Commissioning

Metal-Asia.pw executes the full scope of [AFP system installation supervision](#) at your facility, including robot mounting, placement head integration, auxiliary systems connection, electrical and pneumatic hookup, software-hardware integration, and comprehensive testing.

Commissioning Sequence

1. Installation and geometric alignment of robotic platform
2. Placement head mounting and optical alignment
3. Heating system connection and calibration (laser/IR)
4. Thermal monitoring system calibration
5. Tow feeding, tensioning, and cutting mechanism adjustment
6. Robot postprocessor loading and verification
7. Standard layup trajectory programming
8. Operator and process engineer training (40-80 hours)
9. Trial production run and final acceptance

Integrated Service Portfolio

Metal-Asia.pw provides a comprehensive range of [procurement services from China](#), including customs clearance, quality control, and logistics management worldwide.

- [Engineering audit of production facilities](#) — requirements verification, technical specification preparation
- [Comprehensive equipment sourcing](#) — optimal configuration selection
- [Customs and international logistics](#) — global delivery and customs clearance
- [B2B manufacturer audit in China](#) — pre-order reliability verification
- [Integrated engineering systems](#) — auxiliary equipment design
- [Installation supervision and commissioning](#) — full project handover
- NDT quality control (UT, RT) and chemical composition verification to ASTM/ISO/DIN

- Technical documentation for customs clearance
- Post-warranty service support and spare parts inventory

Why Metal-Asia.pw: Transparency, Compliance, Direct Access

Comparison Criteria	Direct Procurement from China	Metal-Asia.pw Turnkey Delivery
Supplier verification	No on-site verification capability	In-person factory audit, capacity assessment
Quality assurance	Difficult to organize FAT without representation	Full FAT at factory, video reporting
Technical documentation	Chinese/English only	Complete English documentation package
Customs clearance	HS code classification risks	Accurate HS classification, full brokerage
Installation and commissioning	Separate contract or not available	Included, personnel training provided
Warranty service	Long lead times for spare parts	Regional spare parts hub, 72-hour response
Supply chain visibility	Limited milestone tracking	Full milestone-based project reporting
Compliance certification	No support	CE/UL certification support, ASTM/ISO compliance
Training	Not provided	40-80 hours on-site training
Logistics	Transit risks	Cargo insurance, stage-gate tracking

Frequently Asked Questions (FAQ)

Q1: What is the difference between AFP and ATL technology?

AFP (Automated Fiber Placement) uses narrow tows (3–25 mm) that are individually controlled, cut, and restarted, enabling complex geometries with variable thickness. ATL (Automated Tape Laying) processes wide tapes (75–300 mm) and is used for large flat or mildly contoured panels. AFP offers greater geometric flexibility; ATL delivers higher deposition rates on simple geometries.

Q2: What types of defects can occur during AFP and how are they controlled?

Primary defects include: gaps and overlaps between tows, wrinkles, bridging, missing tows, and foreign object inclusion. Control methods include machine vision (real-time), process parameter logging, post-process UT inspection, and thermography.

Q3: Can a single AFP system handle multiple material types?

Yes, provided the placement head is modular with interchangeable guide rollers and adjustable feeding, tensioning, and heating parameters. Transition from thermoset to thermoplastic prepregs requires heating system modification (from IR to laser) and temperature profile reconfiguration.

Q4: What is the typical energy consumption of an AFP system?

Average power consumption for an AFP system with laser heating ranges from 15-35 kW depending on configuration (laser power, tow count, auxiliary systems). At typical operating speeds (0.3-0.5 m/s), energy consumption per unit layup area is comparable to or lower than manual methods.

Q5: What facility requirements are needed for AFP system installation?

Requirements: minimum floor area 80-150 m² (depending on work envelope), ceiling height 4.5 m minimum, ambient temperature 18-25 degC, relative humidity 40-70%, compressed air supply (6-8 bar), electrical power 380V/50Hz (min. 50 kVA), exhaust ventilation, 500 lux illumination at working surface.

Q6: How long does AFP system operator training take?

The standard operator training course lasts 40 hours (5 working days) covering composite technology theory, robot programming, process parameter setup, and hands-on exercises. The process technician course is 80 hours with advanced diagnostics, process optimization, and quality control.

Q7: What is the typical return on investment for an AFP system?

ROI depends on part mix and production volume. For medium-volume production (500-5000 parts per year), typical payback is 2-4 years through labor cost reduction (3-5x vs. manual layup), scrap and waste reduction, and elimination of post-processing operations.

Q8: What warranty coverage is provided for AFP systems?

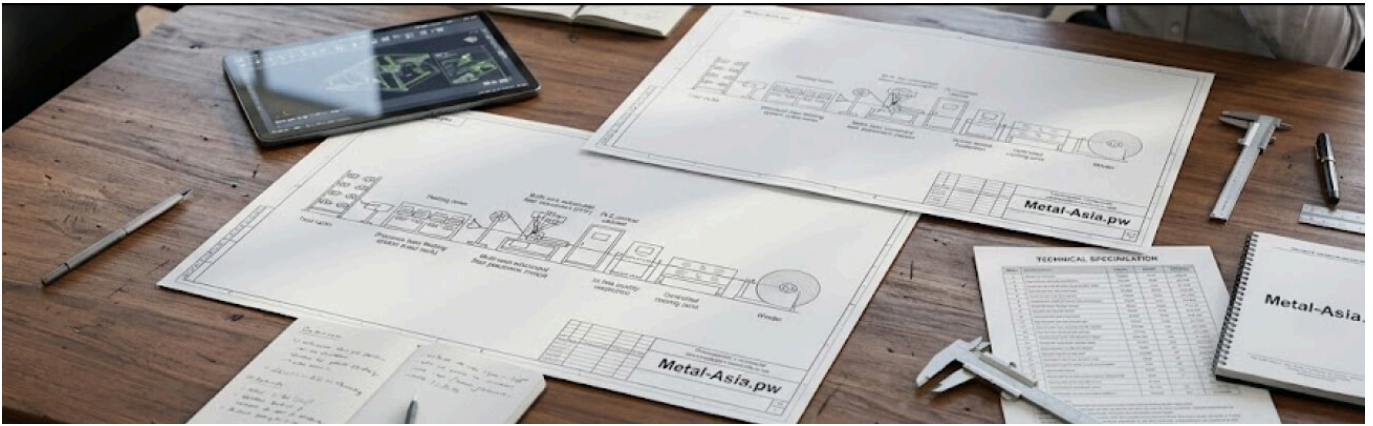
Warranty period is 12 months from commissioning or 18 months from shipment. Coverage includes: replacement of defective components, on-site engineer dispatch, remote diagnostics via VPN, and software updates. Extended warranty and post-warranty service agreements are available.

Contact Information

For AFP system supply inquiries, technical consultation, and project support, contact Metal-Asia.pw:

- **Official Website:** www.metal-asia.pw
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For our full service portfolio, visit Metal-Asia.pw.



Turnkey AFP system supply from China with installation supervision and operator training — worldwide delivery