Metal-Asia

Technical Requirements for LATP Line Procurement

AFP1 — Industrial-Scale Automated Fiber Placement System

Industrial AFP lines for serial production of thermoplastic composite components

Introduction

This document defines the comprehensive technical, commercial, and organizational data that the Buyer must provide to Metal-Asia.pw for the preparation of a complete quotation covering supply, installation, and commissioning of an industrial-scale AFP system based on Laser-Assisted Thermoplastic Automated Fiber Placement (LATP) technology. Without complete and accurate completion of all sections herein, calculation of final cost, delivery timelines, and scope of work is not possible.

Metal-Asia.pw delivers comprehensive sourcing and procurement of industrial composite manufacturing lines from China with full project lifecycle support.

Pain Points in Direct Procurement from China

Key risks include: misalignment between stated and actual production performance, absence of regional service infrastructure, complexities in customs clearance for industrial equipment, risk of shipment without FAT acceptance, and lack of English-language documentation and training. Metal-Asia.pw eliminates these risks through engineering audit and turnkey installation.

Section 1. Buyer Credentials and Contracting Parties

The Buyer shall provide complete corporate credentials of the legal entity — the Payer: full and abbreviated company name, legal form, registration number, tax ID, legal and actual addresses, contact details of responsible personnel. Specify the Importer counterparty if the Payer and Consignee differ. Provide bank account details for settlements, contract currency, payment terms, and customs clearance requirements.

Section 2. Equipment Purpose and Application Scope

The Buyer shall clearly articulate the technological purpose of the system: serial production, low-volume manufacturing, R&D development, laboratory testing, or educational objectives. Specify target industries: aerospace, automotive, energy, marine, medical, robotics, or general-purpose applications. Describe the

types of components to be manufactured. This determines the working envelope configuration, laser power requirements, and accuracy specifications.

AFP1 Application Areas

Application Area	Description
Aerospace industry	Panels, reinforced structures, skin assemblies
Automotive industry	Structural components, lightweight frames
UAV and eVTOL	Primary and secondary structures
Energy and pressure systems	Pipes, cylinders, pressure vessels
Marine and offshore	Bearings, pipes, wear-resistant structures
R&D and education	Thermoplastic composite process development

Section 3. Tape Feed System Technical Specifications

The Buyer shall specify the format and type of tape to be used: single-row UD tape width 1/4 inch (6.35 mm), 1/2 inch (12.7 mm), or other custom dimensions. Thermoplastic matrix: PEEK, PEKK, PPS, PA, PP, or alternative polymer. Tape thickness, allowable tension range during feeding, reel requirements and capacity. Feed method: continuous, step-cut, or programmable step. Minimum course length, minimum cut step, feed accuracy, and cut repeatability.

Section 4. Laser Heating System

The Buyer shall specify laser type: continuous-wave fiber laser with wavelength in the NIR range (1080 nm) or alternative spectrum. Laser power: 3 kW for industrial systems. Laser spot dimensions, required substrate and tape heating temperature range, temperature control accuracy (less than ±15°C), thermal control system response time. Water cooling requirements for the laser, optics, and compaction roller.

Section 5. Robotic Positioning System and Working Envelope

The Buyer shall define the industrial robot type: KUKA KR70 R2100 or equivalent with KR C5 controller. Standard working envelope dimensions: 2×1 m, or custom configuration up to 15×2 m. Requirements for linear tracks, 1–2 axis positioners, additional robots for synchronized operation. Axis positioning accuracy, course-to-course placement accuracy (±0.1 mm), layup speed up to 500 mm/s.

Section 6. Compaction System and Layup Quality Control

Specify compaction force range: 100–700 N for industrial systems. Compaction drive type: pneumatic control. Compaction roller requirements: material, diameter, coating, replaceability. Monitoring systems: IR pyrometer with response time ≤5 ms, IR thermal imager, optical camera for visual defect detection. High-precision tape tension sensors (5–50 N, ±0.5%). Data collection and process analytics system: real-time logging of temperature, speed, force, tension.

Section 7. Control System and Software

Controller requirements: open architecture with user-configurable settings, PID temperature regulator. Operator interface: localization language (English, Chinese, or other), panel type (touchscreen, industrial PC). Software for offline layup trajectory programming, process simulation, CAD model import (STEP, IGES, CATIA, NX). MES/ERP system integration capability, data exchange protocols (OPC UA, Ethernet/IP). Requirements for program backup, software updates, technical support.

Section 8. Electrical and Utility Requirements

Power supply: 380 V, 3-phase, 50/60 Hz for industrial systems. Maximum power consumption of the complete system. Grounding requirements, surge protection, UPS availability for critical nodes. Water cooling system: flow rate, pressure, coolant temperature, water preparation requirements (distilled, deionized). Pneumatic system: compressed air pressure, flow rate, air quality requirements (drying, filtration).

Section 9. Safety and Certification Requirements

The Buyer shall specify required certifications: CE, ISO 9001, ISO 14001, UL, EAC (for Customs Union), ITAR (for aerospace applications). Safety systems: laser zone protective enclosure (laser safety Class 4), emergency stop buttons, operator presence sensors, door interlock. Fire suppression system for high-temperature thermoplastic processing. Electromagnetic interference protection, compliance with IEC 60204-1 electrical safety standards.

Section 10. Delivery Terms, Shipping, and Customs Clearance

Specify Incoterms 2020 delivery basis: EXW, FCA, FOB, CIF, DAP, DDP. Port of departure in China and destination point. Packaging requirements: wooden crates, moisture barrier, fragile cargo labeling, shock and tilt indicators. Equipment manufacturing lead time. Customs clearance requirements: HS code, certificate of conformity necessity, Customs Union Technical Regulation compliance declaration. Cargo insurance terms during transit.

Section 11. Installation, Commissioning, and Training

The Buyer shall define installation requirements: supplier specialist dispatch to the Buyer's facility, installation and commissioning timelines. Foundation preparation, utility routing, ventilation system completion prior to installation crew arrival. Personnel training: number of trainees, training program (operators, setup technicians, programmers), training language, certificate issuance. Number of working shifts for process parameter optimization on the Buyer's actual component.

Section 12. Warranty Obligations and Service Support

Warranty period: standard 12 months from commissioning date, extendable to 24–36 months. List of warranty cases, claim submission procedure, supplier response time. Post-warranty service: annual service contract cost, scheduled maintenance frequency, remote diagnostics, spare parts warehouse availability in the delivery region. Critical spare parts: laser source, optics, robot, controller, sensors — delivery lead times and pricing.

Section 13. Documentation and Technical Documentation

List of documents to be delivered with the equipment: technical passport, operation manual, electrical and pneumatic schematics, component certificates, laser radiation safety passport, compliance declaration. Documentation language: English, Chinese, or bilingual. Format: printed and electronic (PDF). Process documentation requirements: tape selection recommendations, layup parameters for standard materials, material database.

Section 14. Options, Configuration, and Future Upgrade Path

The Buyer shall list required options: IR thermal imager, machine vision optical system, data collection and analytics system, additional positioners, extended working envelope, automatic reel change system. Scalability requirements: laser power upgrade capability, working envelope expansion, integration with other technological cells. Request for consumables supply for trial operation: tapes, laser protective windows, filters.

Section 15. Composite Component-Specific Requirements

Specify required properties of finished components: layup density (void content <1%), interlaminar shear strength (ILSS), tensile and flexural strength, thermal resistance, chemical resistance. Post-processing requirements: vacuum bagging necessity, thermoforming, machining, quality control (ultrasonic testing, X-ray, tomography). Productivity: target first-pass yield, cycle time per component, planned annual production volume.

Section 16. Acceptance Conditions and Final Criteria

The Buyer shall define acceptance testing procedure: Factory Acceptance Test (FAT) at the manufacturer's facility in China, Site Acceptance Test (SAT) at the Buyer's facility. Acceptance criteria: geometric accuracy of test component layup, process repeatability on a series of N components, compliance with stated technical specifications, absence of layup defects. Penalty clauses for non-compliance with technical requirements, Buyer's right to reject acceptance. Property transfer conditions, risk of accidental loss during transit.

AFP1 Technical Specifications

Parameter	Value	Notes
Tape format	Single-row, 1/4" and 1/2" UD tape	Dual-format in one system
Laser type	Continuous-wave fiber laser	NIR range
Laser power	3 kW	Nominal power
Laser spot size	15 × 40 mm	Rectangular spot
Heating temperature range	200–500°C	Wide range
Maximum layup speed	500 mm/s	Industrial productivity
Compaction force	100–700 N	Wide adjustable range
Temperature control accuracy	< ±15°C	High stability

Parameter	Value	Notes
Layup accuracy (course-to-course)	±0.1 mm	Industrial precision
Cut repeatability	±2 mm	Automatic system
Minimum course length	135 mm	Minimum fragment
Standard working envelope	2 × 1 m	Robot KR70 R2100
Maximum configurable envelope	up to 15 × 2 m	With linear track
Scalability	Linear track, 1–2 axis positioners	Modular architecture
IR pyrometer	Response time ≤ 5 ms	Non-contact monitoring
Temperature control	PID, open architecture	User-configurable
Water cooling	Laser, optics, compaction roller	Closed-loop system
Pneumatic force control	Yes	Adjustable range
Tape tension sensors (optional)	5–50 N, ±0.5%	High precision
IR thermal imager (optional)	Yes	Optional
Optical camera (optional)	Yes	Defect detection
Data collection and analytics (optional)	Yes	Process logging
Visual defect tracking (optional)	Yes	Machine vision

Laser System Requirements

Parameter	Requirement
Laser type	Continuous-wave fiber laser
Wavelength	1080 nm (NIR range)
Power	3 kW nominal, adjustable
Safety class	Class 4, protective enclosure mandatory
Cooling system	Water-cooled, closed-loop
Coolant temperature	18–22°C, flow rate ≥ 15 L/min
Water quality	Deionized or distilled
Power adjustment range	10–100% of nominal

Robotic System Requirements

Parameter	Requirement
Robot model	KUKA KR70 R2100 with KR C5 controller
Number of axes	6 axes + additional positioner axes
Payload capacity	≥ 70 kg
Standard working envelope	2 × 1 m
Maximum working envelope	15 × 2 m (with linear track)
Positioning accuracy	±0.05 mm
Course-to-course layup accuracy	±0.1 mm
Maximum layup speed	500 mm/s
Positioners	1–2 axes, synchronization with robot
Linear track	Modular, extendable

Control System Requirements

Parameter	Requirement
Architecture	Open, user-configurable
Temperature control	PID regulator with manual tuning
Interface	Industrial touchscreen display
Interface language	English / Chinese / Other
Data logging	Collection of all process parameters
Data export	CSV, XML, OPC UA
MES/ERP integration	OPC UA, Ethernet/IP, PROFINET
Offline programming	CAD model import (STEP, IGES, CATIA, NX)
Process simulation	Virtual trajectory verification

Electrical and Utility Requirements

Parameter	Requirement
Power supply	380 V, 3-phase, 50/60 Hz
Maximum power consumption	15 kVA
Grounding	Mandatory, resistance ≤ 4 Ohm
Surge protection	Class III
Water cooling	Flow rate ≥ 15 L/min, pressure 3–5 bar

Parameter	Requirement
Pneumatic system	Pressure 6 bar, flow rate 400 L/min
Air quality	Drying, 5-micron filtration
Compressed air	ISO 8573-1 quality class: 1.4.1

Safety and Certification Requirements

Requirement	Details
CE Certificate	Mandatory for export to Europe
EAC Declaration	Mandatory for Customs Union
ISO 9001	Quality management system certificate
ISO 14001	Environmental management system
Laser safety	IEC 60825-1, Class 4 protective enclosure
Electrical safety	IEC 60204-1
EMI protection	Compliance with EN 61000-6-2/4
Fire suppression	Automatic system for laser zone
Emergency stop	Buttons around working envelope perimeter
Presence sensors	Infrared barriers

Delivery Terms and Shipping

Parameter	Requirement
Delivery basis	CIP / DAP Incoterms 2020
Port of departure	Shanghai, Ningbo, or Shenzhen
Destination point	Specified by Buyer
Packaging	Wooden crates, moisture barrier, labeling
Indicators	Shock, tilt, temperature
Manufacturing lead time	16–20 weeks made-to-order
HS customs code	8477 59 000 0
Additional code	8479 89 970 9

Installation, Commissioning, and Training

Stage	Requirement
Turnkey installation	Metal-Asia.pw specialist dispatch to facility

Stage	Requirement
Site preparation	Foundation, utilities, ventilation
Commissioning	Full parameter tuning on Buyer's materials
Personnel training	Up to 8 persons: operators, programmers, setup technicians, technicians
Training language	English with technical translation
Process optimization	5 working shifts on actual component
Certificates	Issued upon training completion

Warranty Obligations

Parameter	Terms
Warranty period	12 months from commissioning date
Extended warranty	Up to 24 months
Post-warranty service	Annual service contract
Response time	24 hours critical, 48 hours standard
Spare parts	Regional warehouse, delivery ≤ 14 days
Critical components	Laser, optics, robot — delivery ≤ 7 days
Remote diagnostics	VPN access, online monitoring

Documentation

Document	Format	Language
Technical passport	Printed + PDF	English / Chinese
Operation manual	Printed + PDF	English / Chinese
Programming manual	Printed + PDF	English / Chinese
Electrical schematics	PDF + CAD	Universal
Pneumatic schematics	PDF + CAD	Universal
Laser safety passport	PDF	English / Chinese
Material recommendations	PDF	English / Chinese
Layup parameter database	Electronic	English / Chinese
FAT protocol	PDF	English / Chinese

Supply Scope — AFP1

No.	Item	Quantity	Notes
1	Industrial AFP system AFP1, complete	1 set	Including KR70 R2100 robot
2	Laser source 3 kW, 1080 nm	1 pc.	Fiber, NIR
3	Focusing optics system	1 set	Spot 15×40 mm
4	Dual-format tape feed system	1 set	1/4" and 1/2"
5	Pneumatic compaction system	1 set	Range 100–700 N
6	Non-contact IR pyrometer	1 pc.	Response time ≤ 5 ms
7	Water cooling system	1 set	Closed-loop
8	KUKA KR C5 controller	1 pc.	Open architecture
9	Touchscreen operator panel	1 pc.	Industrial grade
10	Laser zone protective enclosure	1 set	Class 4, full perimeter
11	Air filtration system	1 set	5-micron, drying
12	Emergency stop system	1 set	Buttons + barriers
13	Spare parts kit	1 set	1-year operation
14	Consumables kit	1 set	Trial tape reels
15	Technical documentation	1 set	Complete package
16	Option: IR thermal imager	1 pc.	Upon request
17	Option: Optical camera	1 pc.	Machine vision
18	Option: Tension sensors	1 set	5–50 N, ±0.5%
19	Option: Analytics system	1 set	Data collection and analysis
20	Option: Linear track	1 set	Up to 15 m
21	Option: 1–2 axis positioners	1–2 pcs.	Synchronization with robot

Customs Clearance and HS Codes

HS Code	Description	Notes
8477 59 000 0	Plastics processing machines	Primary code
8479 89 970 9	Other machinery and mechanical appliances	Secondary
8515 80 000 0	Laser welding apparatus	Laser source
8479 50 000 0	Industrial robots	KUKA manipulator
9031 80 000 0	Regulating and controlling instruments	Measurement system
8477 90 000 0	Parts of plastics processing machines	Spare parts

Metal-Asia.pw Procurement Support Services

Metal-Asia.pw delivers comprehensive procurement from China, including tender bid support for public procurement frameworks, defense procurement compliance, and government contracting. Services encompass quality control (NDT, ultrasonic testing), chemical composition verification against international standards, and turnkey customs clearance.

Why Metal-Asia.pw vs. Direct Chinese Suppliers

Criterion	Direct Chinese Supplier	Metal-Asia.pw
Technical audit	Absent	Free engineering audit
Quality control	At factory discretion	Independent control
FAT acceptance	Not conducted	Mandatory FAT
Customs clearance	Buyer handles independently	Full customs support
Turnkey installation	Not provided	Turnkey with training
Regional service	Absent	Regional service network
Documentation	English only	Localized translation
Warranty	12 months standard	Up to 24 months with service contract
Communication	Language barrier	English-speaking project managers

FAQ — Frequently Asked Questions

Q1: What is the system productivity per shift? A: Productivity depends on component geometry and layup complexity. For typical aerospace skin panels, productivity is 2–4 m² of laid tape per hour at 500 mm/s speed.

Q2: Can the working envelope be expanded after purchase? A: Yes, the modular AFP1 architecture allows working envelope expansion from 2×1 m to 15×2 m through installation of linear tracks and additional positioners without replacing the primary robot.

Q3: Which thermoplastics does the system support? A: AFP1 operates with UD tapes based on PEEK, PEKK, PPS, PA, PP, and other high-performance thermoplastics. The 200–500°C temperature range covers most industrial matrices.

Q4: Are specialized facility requirements necessary? A: Yes, a production facility with temperature 18–25°C, relative humidity ≤ 70%, ventilation and exhaust system is required. Foundation for the robot and positioners is mandatory.

Q5: How is optional equipment delivery organized? A: All options (thermal imager, camera, tension sensors, analytics system) can be installed during initial delivery or as part of modernization. Option delivery lead time is 8–12 weeks.

Q6: What are the personnel qualification requirements for AFP1 operation? A: Operators should have technical education (engineering or technological). The Metal-Asia.pw training program spans 5 days and

includes theory, programming practice, and parameter tuning.

Q7: Is integration with existing production lines possible? A: Yes, the open controller architecture and support for industrial protocols (OPC UA, Ethernet/IP, PROFINET) enable integration with MES/ERP systems and other equipment.

Q8: What is the investment payback period for AFP1? A: Payback period depends on production volume and component type. For serial production of aerospace components, typical payback is 18–24 months through reduced material costs and labor intensity compared to manual layup.

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Request turnkey AFP system installation with personnel training