

Appendix 2 – Program of Requirements – technical specifications

Introduction

Cato has recently integrated the former W8SVR® business and is committed to continuing the production and supply of woven tape thermoplastic composites, in roll (fabric) or plate (laminate) format.

In order to expand its manufacturing footprint in this area, Cato will acquire a tape weaving machine as specified in the present document.

Purpose

The weaving machine will produce fabrics from pancake-wound warp spools mounted on a creel and pancake-wound weft spools provided by a weft feeder. The "rigid" tapes consist of unidirectional fibers (glass, carbon, flax etc.) impregnated with a thermoplastic matrix (like PP, PA, PEEK). Only occasionally will dry or bindered tapes be used as the raw material. The tapes have a width of 5-25 mm and a thickness of 0.10-0.35 mm. The fabric to be produced will be between approx. 1200 and 2100 mm wide in various weave styles (plain 1-1 and twill 2-2 being the most common and therefore to be foreseen from the start). The possibility of in-line edge trimming and cutting via ultrasonic knives is desirable.

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1. General

Requirement	Content
1.1.	The Contracting Authority seeks a Contractor responsible for supplying or optionally retrofitting a weaving machine for the production of thermoplastic tape fabrics. The solution must be fully operational, industrial-grade and scalable.
1.2.	The weaving machine shall be suitable for continuous industrial operation (24/7), subject to normal preventive maintenance.
1.3.	The machine shall be designed for an expected technical service life of at least 10 years under normal industrial operating conditions.
1.4.	Contractor shall ensure availability of spare parts and technical support for a minimum period of 10 years after delivery.
1.5.	The machine-output consist of woven UD fabrics wound on a 6" (or 3") carton core, see details in Chapter 2. Equipment specification.
1.6.	The machines runs standalone and stops automatically by an error. During typical operation, only operator interference during material changes and small maintenance.

2. Equipment specification

Requirement	Content
2.1.	<p>Weft feeder:</p> <ul style="list-style-type: none"> • Two colors for use in pic-à-pic or continuous production with automatic weft roll change; programmable splicing position (at fabric edge) • Foreseen for weft roll outer diameter up to 480 mm • Pre-tensioning of weft tapes on the presentation head • Holding and tensioning during insertion via accumulator • Non-slip gripper suitable for rigid tapes with smooth surface • No-twist weft feeding • 0/1 sensor for detection of effective tape hand-over • Programmable cutting system and gripper pathway for flexible fabric width
2.2.	<p>Weaving loom:</p> <ul style="list-style-type: none"> • Net fabric width should at minimum span the range 1200 - 2100 mm (excl. selvages) <ul style="list-style-type: none"> ○ Optional: wider range welcome if this corresponds to standard machine widths offered by the vendor • Servo-driven roller for warp tape presentation and warp tape tension control system • Pneumatic airshaft • Speed min. 80 picks per minute • Selvedge fixation or (thermal/ultrasonic) fabric fixation not required <ul style="list-style-type: none"> ○ Optional: selvedge fixation via thermal bonding

	<ul style="list-style-type: none"> ○ Optional: in-line cutting and/or edge trimming with ultrasonic cutters • Complete set of heald frames and healds for 12.50 mm and 25.00 mm tapes and corresponding reed • Additional reed for 12.50 and 25.00 mm to guide the tapes into the loom • In-line error detection (warp/weft tape rupture) • External batch winder on 6" cores <ul style="list-style-type: none"> ○ Optional: winder on 3" cores with adapter to also allow 6" • Ejector or other system to unload the batch without it touching the floor • Winder must allow a roll diameter up to 1000 mm
2.3.	<p>HMI, sensors & data acquisition:</p> <ul style="list-style-type: none"> • HMI shall provide a programmable interface via which each run can be programmed and run data stored. • At minimum the machine shall log key process parameters for each run (incl. tape and fabric width, weave style, speed, running meters produced, any machine errors occurred)
2.4.	<p>The equipment complies to the European machine directive and is CE labelled.</p> <p>Safety features:</p> <ul style="list-style-type: none"> • Emergency Stops: complies with European and national legislation • Guarding: the machine must be equipped with adequate systems for safe operation • Carbon dust: Electrical cabinet protected against carbon fiber dust • Safety certifications & compliance: The equipment shall comply with all applicable European and national safety legislation and be delivered at minimum with full CE conformity (CE marking) supported by complete technical documentation, including (where applicable): EU Declaration of Conformity, relevant EN/ISO standards applied, risk assessment (per ISO 12100), operating & maintenance manuals (in the required language), and verification that all safety functions/guards/interlocks meet the required performance level.
2.5.	All connections are labelled.
2.6.	<p>Equipment is supplied with technical documentation (including electric schematics), service manual and operational manual.</p> <p>Documentation:</p> <ul style="list-style-type: none"> • Vendor certificates (e.g. ISO)Any relevant quality management certifications (if applicable). • Detailed machine drawings • Use manual in English languageCE conformity document
2.7.	HMI is positioned at an ergonomically sound position. Ergonomics have been taken into account.
<p>Creel (Optional Component) The creel is defined as an optional component and does not form part of the mandatory scope of supply. If offered, the creel shall meet the following functional requirements:</p>	
2.8.	Creel (optional): ▪ 120 positions minimum

	<ul style="list-style-type: none"> • Suitable for pancake spools on 3" cardboard core or on plastic spools such as, for example, those provided by Häfner • Stable tension control on each spool for the entire range of spool widths from 5–25 mm, with tension adjusted as a function of spool weight. • Spool weight max. 6 kg • Spool outer diameter up to 500 mm (running length ~700 m for 0.25 mm thick tape) <p>Optional: tape guide preventing tapes from falling off the side of the reel in the event of a loss of tension, reloading of creel spools or a sharp angle of entry into the weaving loom.</p>
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3. Environmental & utility requirements

Requirement	Content
3.1.	Electrical supply (will be foreseen as needed by contracting authority): <ul style="list-style-type: none"> • Voltage 230V or 400V • Frequency: 50 Hz
3.2.	Pneumatic supply: <ul style="list-style-type: none"> • Air pressure to be defined by vendor and will be foreseen by contracting authority
3.3.	Operating environment: <ul style="list-style-type: none"> • Temperature range: 15-35°C • Humidity: 20-80% RH
3.4.	Space available: <ul style="list-style-type: none"> • Maximum height, length, width: TBD • The Contractor shall specify the required installation footprint (length, width and height) in the tender submission.

4. Maintenance and Service

Requirement	Content
4.1.	Spare parts & service: <ul style="list-style-type: none"> • Recommended spare parts list to be provided by vendor • Maintenance plan and standard vendor conditions for service to be detailed
4.2.	Training: <ul style="list-style-type: none"> • Vendor shall detail the required/proposed training for machine operators • Format of training documentation in English language will be detailed.

5. Performance and Operational Requirements

Requirement	Content
5.1.	<ul style="list-style-type: none"> • The machine shall be capable of producing thermoplastic tape fabrics in accordance with the dimensional and material requirements defined in this Program of Requirements.

	<ul style="list-style-type: none"> • The machine shall demonstrate stable and repeatable operation at the specified production speed. • The machine shall be capable of continuous production under industrial conditions. • The machine shall ensure consistent fabric quality without unacceptable variation in width, weave pattern, tape straightness and tension, fabric openness or tape positioning.
5.2.	<p>Ergonomics & Operator Usability (Specification)</p> <p>The machine shall be designed to support safe, comfortable and efficient operation for a wide range of users (target: 5th–95th percentile). The supplier shall demonstrate ergonomic considerations in the machine layout and provide relevant values/assumptions.</p>
5.3.	<p>Operator working positions</p> <ul style="list-style-type: none"> • The machine shall provide defined operator position(s) for normal operation, loading/unloading, inspection and cleaning. • Routine operator tasks shall be possible with neutral posture (no sustained bending, twisting, over-shoulder reaching).
5.4.	<p>Adjustability</p> <ul style="list-style-type: none"> • Operator interfaces and supports that affect posture (e.g., HMI angle/height where applicable, work supports, guides) shall be adjustable. • Adjustments shall be tool-less or require only common tools, and shall be clearly marked with scales/position indicators.
5.5.	<p>Access & clearances</p> <ul style="list-style-type: none"> • Access to all routine service points (daily/weekly) shall be possible without awkward postures and without removing major guarding. • Adequate clearances shall be provided for feet/knees/hips at operating locations and for safe movement around the machine.
5.6.	<p>Manual handling & forces</p> <ul style="list-style-type: none"> • The machine shall minimize manual lifting, carrying, pushing/pulling and repetitive force. • Maximum single-person lift for any routinely handled part (incl. change parts, covers, bins) shall be ≤ 10kg. Above this, mechanical aids shall be provided (lift assist, rails, carts, hoists).
5.7.	<p>Repetition & changeover</p> <ul style="list-style-type: none"> • High-frequency actions shall require low force and short travel; repetitive clamping shall be assisted or automated where feasible. • Changeover operations shall be designed for fast, safe execution with minimal awkward posture; change parts shall include handling features (grips, lifting points) and clear identification.

<p>5.8.</p>	<p>Controls, HMI and emergency stops</p> <ul style="list-style-type: none"> • Controls shall be located at natural hand height and within comfortable reach from the normal operator position(s). • The HMI shall be readable at typical viewing distance; glare shall be avoided; alarms and messages shall be clear and consistent. • Emergency stop(s) shall be highly visible and reachable from all normal operating positions and access points where intervention is expected.
<p>5.9.</p>	<p>Visibility & lighting</p> <ul style="list-style-type: none"> • The operator shall have clear line-of-sight to critical process areas without leaning or twisting; where not feasible, viewing windows/cameras shall be provided. • Integrated task lighting shall be provided for loading/unloading and inspection areas; lighting shall avoid shadows and be serviceable without major disassembly.
<p>5.10.</p>	<p>Noise, vibration & comfort</p> <ul style="list-style-type: none"> • Noise level at operator position during normal operation shall be ≤ 80 dB(A) (supplier to measure/declare). • Vibration transmitted to operator touch points shall be minimized; isolation measures shall be applied where relevant. • Hot/cold surfaces accessible to operators shall be guarded or insulated; sharp edges and uncomfortable contact surfaces shall be avoided.
<p>5.11.</p>	<p>Cleaning & housekeeping ergonomics</p> <ul style="list-style-type: none"> • Cleaning points, filters and routine maintenance items shall be accessible and removable without awkward posture. • Waste collection/bins shall be positioned for safe handling; full bins shall not exceed 15 kg or shall include handling aids. • Surfaces shall be designed for easy wipe-down; drainage/collection shall prevent heavy manual handling of liquids/contaminants.
<p>5.12.</p>	<p>Labeling, guidance and error prevention</p> <ul style="list-style-type: none"> • Clear labeling and pictograms shall be provided at point of use (controls, adjustment points, service points). • Poka-yoke features (keyed parts, guided loading, interlocks where appropriate) shall be implemented to reduce operator error. • The design shall be usable for both left- and right-handed operators where practical.
<p>5.13.</p>	<p>Deliverables</p> <p>Supplier shall provide an ergonomic layout/justification (operator positions, working heights, reach distances, manual handling assumptions) and declare key ergonomic values (noise, manual handling limits, access strategy) as part of the machine documentation package.</p>

6. SAT and acceptance

Requirement	Content
6.1.	<p>SAT and acceptance:</p> <ul style="list-style-type: none"> ○ Installation and commissioning of the machine shall be conducted by vendor, with specialized technicians provided by vendor. ○ Vendor shall define a SAT procedure that includes a validation of the electrical and mechanical function of the machine (“dry run”), as well as an actual weaving trial with tape material provided by the Contracting Authority. ○ SAT shall target demonstration of the machine’s suitability with regard to all key criteria as defined in the specification / Program of Requirements. ○ Acceptance of the machine shall take place upon successful completion of the SAT in accordance with the agreed SAT protocol. The machine shall be deemed accepted only after written confirmation by the Contracting Authority.

For approval:

Applicant	
Name	
Job Title	
Place and Date	
Signature	