**Order description**

1. **Device name**: Filament Winding Machine
2. **Brief description of the device**: The ordered machine is intended to produce composite elements using the filament winding method. The machine must be equipped with at least 4 axes, a device for processing pre-impregnated fibers (towpreg), fiber creel with an electronic tension control system, an impregnating unit with heating, an electronic CNC control system, software for winding design and G-code generation for the device, and a quality control system.
3. **Additional information**: The ordered machine must be adapted for wet winding of carbon and glass fibers and winding of pre-impregnated fibers (towpreg). All axes must be equipped with a drive system with a servomotor and an internal resolver/encoder. The machine must ensure interpolated operation of all axes. Servomotors and drives must be protected by over-current, over-voltage, thermal, and short circuit protection. The machine must ensure the protection of cables used to connect individual elements and must have ground connection, and all parts of the device must be protected against static electricity.

The Ordering Party expects that the contractor selected in the tender procedure will, within 45 days of concluding the contract, present the machine design for acceptance to the Ordering Party, in the form of technical documentation in electronic form, including at least: 3D technical drawings of the device, list of components and materials, control system design, source code of the device software, taking into account the features and parameters of the machine contained in point VII. Acceptance by the Ordering Party of the design referred to in the preceding sentence will be the basis to commence work on building or completing / configuring the machine, which is the subject of this order.

In addition, the Ordering Party expects that before the final acceptance of the machine, it will carry out its preliminary acceptance at the contractor's location, which will consist of a visual inspection of the device, in accordance with the scope of delivery and technical and functional specifications, and checking the device's functions (pre-acceptance tests will be carried out in accordance with the contractor's standard testing procedures).

The detailed procedure for accepting the machine design, preliminary acceptance and final acceptance of the subject of the order has been described in the draft contract, which is an integral element of the tender documentation in this procedure.

1. **CPV Code: 42994200-2**
2. **Delivery location**: Building B2, Wrocław University of Science and Technology,   
   M. Smoluchowskiego 25, 50-372 Wrocław
3. **Special conditions regarding delivery**: Delivery to the specified address.
4. **Description of the device by parameters / technical specification:**

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| --- | --- | --- |
| Name of the Object of the Contract:  **Filament Winding Machine** | | |
| Technical and functional parameters of the device | | |
| Item. No | Requirements of the Buyer | Offered parameter |
| To be filled be the Seller |
| 1 | **Winder**  Number of spindles: 1  Number of axes: at least 4  Spindle axis speed range: 0 – min. 90 RPM  Horizontal carriage speed range: 0 – min. 60 m/min  Cross-feed carriage speed range: 0 – min. 30 m/min  Feed eye rotation stroke: min. +/- 180˚  Feed eye rotation speed range: 0 – min. 120 RPM  Interpolation operation of all axes  Minimum winding diameter: max. 100 mm  Maximum winding diameter: min. 700 mm  Minimum winding length: max. 300 mm  Maximum winding length: min. 2000 mm  Maximum distance between holders (mandrel with shafts): 3000 mm  Maximum spindle weight (mandrel + composite): 200 kg  Type of drive holder (headstock): 3-jaw chuck  Type of tailstock holder: live-tail center  Maximum noise level: 80 dB  Protection level for electrical parts and cabinets: at least IP54 or IP55  Protection for servomotors and drives: over-current, over-voltage, thermal, short circuit protection  Grounding  Protection against static electricity  E-Stop Safety pushbuttons  **Device for processing pre-impregnated fibers (towpreg)**  Rollers for transport and guiding system for min 2 prepreg tows (towpreg fibers)  Prepreg Winding eye  **Electronic Fiber Creel and Tension System**  Type of fiber unwinding: fiber spools with outer unwinding  Number of tensioners: min. 2  Tension range: max. 10 N – min. 80 N per tow  Motor drive system on every spool  Auto compensation of rapid and inertia speed changes  Bi-directional function  Central tension set point for all spools  Quick-fix arrangement for fast replacement and fixing of the spool  E-Stop Safety button  Broken fiber detection function  **Mechanical Fiber Creel for glass fibers**  Type of fiber unwinding: fiber spools with inner unwinding  Broken fiber detection function  **Impregnating unit**  Type: roller/drum  Number of tows: 4  Bath heating temperature control; temperature range: from ambient temperature to min. 60˚C  Temperature recording  Resin film thickness adjustment  Resin level measurement in the bath with an alarm  **Electronic control system (CNC)**  Workstation (PC and laptop) with control system compatible with the machine software  Operating modes: automatic and manual  Absolute and relative coordinate systems  Unlimited pattern length  Unlimited program length  Unlimited number of patterns  Unlimited CNC programs storage capability  Includes a subset of Standard G-code CNC machine language  Feed-rate and rapid traverse  Continuous START/STOP function  Smooth movement function  Linear interpolation between all axes  Axes position monitoring  Axes speed monitoring  Spindle monitoring  Actual position values display  Pattern information display  Program information display  Error message display  Machine status information display  Servo Drive enable/disable function  Limit switches safety functions  Home referencing function  Emergency stop (E-stop) function  Safety integrated functions in all modes of operation  **Software for winding design and G-code generation**  Remote pattern programming  Min. two free lifetime licenses  Free updates for 5 years to newer versions (if available)  Interface language: English  Data export to FEA analysis packages  Mandrel generation  CAD mandrel data import feature  Winding pattern development  Geodesic and non-geodesic winding path  Winding angle: 0-90˚  Winding angle selection assistance  Dynamic 3D winding simulation  Winding path simulation / Winding pattern simulation  Progressive acceleration profile  Motion smoothing option  Collision detection  Burst pressure calculator for pressure vessels according to the layers and materials  Volume calculator according to the mandrel dimensions  Material composition specification for fibers and resin  Material consumption and export of the analysis to excel file  Thickness report analysis and export of the analysis to excel file. Possibility to calculate weight and thickness of each layer  Editing and inserting programmed stops (interrupts)  Post-processing  Control data generation  **Quality Control System**  Interface language: English  Recorded parameters:  Operator data;  Raw material data;  Date and time;  Environmental data: temperature and humidity;  Program information;  Processing time;  Fiber tension (set tension);  Resin temperature in the impregnating bath;  Break and stop time information.  **Safety Zone**  Protection of the working area with mechanical or light barriers | Confirm that the requirements are met:  **………………………………………..**  Name:  Model:  Manufacturer:  Confirm that the requirements are met:  **………………………………………..**  Name:  Model:  Manufacturer:  Confirm that the requirements are met:  **………………………………………..**  Name:  Model:  Manufacturer:  Confirm that the requirements are met:  **………………………………………..**  Name:  Model:  Manufacturer:  Confirm that the requirements are met:  **………………………………………..**  Name:  Model:  Manufacturer:  Confirm that the requirements are met:  **………………………………………..**  Name:  Model:  Manufacturer:  Confirm that the requirements are met:  **………………………………………..**  Name:  Model:  Manufacturer:  Confirm that the requirements are met:  **………………………………………..**  Name:  Model:  Manufacturer:  Confirm that the requirements are met:  **………………………………………..**  Name:  Model:  Manufacturer: |
| 2 | Number of Filament Winding Machines: 1 pc. |  |
| 3 | Warranty for the Filament Winding Machine: minimum 6 months | Provide the warranty duration:  ……………………………………………….. |
| 4 | Transport | Confirm that the requirements are met:  **………………………………………..** |
| 5 | Installation of devices | Confirm that the requirements are met:  **………………………………………..** |
| 6 | Protection during transport (Packaging) | Confirm that the requirements are met:  **………………………………………..** |
| 7 | Remote diagnostics and service | Confirm that the requirements are met:  **………………………………………..** |
| 8 | After sales support | Confirm that the requirements are met:  **………………………………………..** |
| 9 | Training on machine operation | Confirm that the requirements are met:  **………………………………………..** |
| 10 | All devices are brand new | Confirm that the requirements are met:  **………………………………………..** |
| 11 | Documentation in English:  minimum 2 paper copies and minimum 2 electronic copies | Confirm that the requirements are met:  **………………………………………..** |
| 12 | Delivery date: maximum 12 months | Provide the number of months after signing the contract:  **………………………………………..** |
| 13 | Servis response time: maximum 12 man-hours | Provide the number of man-hours of intervention from the moment of reporting the failure:  **………………………………………..** |

**The offer should be drawn up in Polish, in electronic form and signed with a qualified electronic signature or in electronic form with a trusted signature or a personal (electronic) signature**.