**Fac simile di**

**Relazione Tecnica**

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 **Spett. le Politecnico di Torino**

 **Area AQUI**

 **Ufficio Appalti**

 **Corso Duca degli Abruzzi n° 24**

 **10129 – Torino**

**GARA EUROPEA A PROCEDURA APERTA AI SENSI DELL’ART. 60 D.LGS. 50/2016 PER LA FORNITURA DI UNA STAZIONE DI FRICTION STIR WELDING PER LA SALDATURA ALLO STATO SEMI-SOLIDO DI MATERIALI E COMPONENTI DI INTERESSE INDUSTRIALE, UNITAMENTE ALLA SENSORISTICA NECESSARIA PER IL CONTROLLO ED IL MONITORAGGIO DEL PROCESSO DI GIUNZIONE, DA ASSEMBLARE IN FASE DI CONSEGNA**

***CIG 7871826450 - CID 321 - 41 – CUP E15D18000320007– CUI F00518460019201900087***

Il sottoscritto

nato a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Pr) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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con sede operativa in

n. telefono \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ n. fax \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cell. \_\_\_\_\_\_\_\_\_\_\_ e-mail \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

sito web

Codice Fiscale

partita IVA n.

*Al fine di concorrere all’aggiudicazione del contratto per l’affidamento della fornitura indicata in oggetto, formula la seguente offerta tecnica.*

*Con riferimento ai requisiti minimi previsti a pena di esclusione, indicare nella tabella sottostante il riferimento alla pagina della scheda tecnica da cui poter evincere la presenza dell’elemento tecnico minimo richiesto.*

*Tabella 1*

|  |  |
| --- | --- |
| ELEMENTI TECNICI MINIMI A PENA ESCLUSIONE  | A CURA DEL FORNITORE |
| ID | Descrizione |  | Note(eventuali) | N. pagina della scheda tecnica dalla quale si evinca la presenza dell’elemento minimo  |
| 1. **General Requirements**
 |
| 1 | The friction stir welding machine must be CE-marked, thereby proving its conformity to current EU standards |  |  |  |
| 1. **Size of the FSW machine**
 |
| 1 | The FSW machine (safety fence included) must have a **maximum size of 4500 mm x 4000 mm x 2700 mm** (X-axis x Y-axis x Z-axis , respectively) |  |  |  |
| 2 | Taken into account the conditions of the premises, each part of the supply must not exceed the following **maximum dimensions: 1600 mm x 2300 mm** to be deliverable through an available hatch from ground level to basement level; a bridge crane is available on site. |  |  |  |
| 1. **Type of samples to be welded by the friction stir welding machine**
 |
| 1 | Type of materials: most common steels, aluminum-based alloys, copper-based alloys, magnesium-based alloys, titanium-based alloys with thicknesses coherent to the forces (along X-, Y-, Z-axis) and spindle torque developed by the friction stir welding machine.  |  |  |  |
| 2 | Sample size: **at least 300 mm x 300 mm x 300 mm** (X-axis x Y-axis x Z-axis |  |  |  |
| 3 | Max sample mass: **100 kg**  |  |  |  |
| 1. **Safety requirements**
 |
| 1 | Safety fence |  |  |  |
| 2 | Emergency system emergency switch-off button |  |  |  |
| 3 | Interlock mechanical stops and/or limit switches on all the X-, Y-, and Z-axis. |  |  |  |
| 1. **Friction stir welding machine**
 |
| 1 | Max force on Z-axis (down force): 60 kN |  |  |  |
| 2 | Max side force on welding direction: 35 kN |  |  |  |
| 3 | Max spindle torque 200 Nm |  |  |  |
| 4 | Max spindle rotational speed: 1500 rpm |  |  |  |
| 5 | Cooling system: Internal liquid cooling system for cooling spindle in order to weld at high temperature titanium alloys and other high strength metals |  |  |  |
| 6 | Max welding speed: 1000 mm/min along X-axis welding direction |  |  |  |
| 7 | Z-axis control: 1) position control mode during friction stir welding (i.e the FSW machine must guarantee to keep constant the pin tool position along Z-axis during the entire welding);2) force control during friction stir welding (i.e the FSW machine must guarantee to keep constant the tool force along Z-axis during the entire welding).Both welding options 1) and 2) must be available |  |  |  |
| 8 | Working range:X-axis stroke 500 mmY-axis stroke optionalZ-axis stroke 300 mm |  |  |  |
| 9 | Positional accuracy X-axis stroke ± 0.10 mmZ-axis stroke ± 0.05 mm |  |  |  |
| 10 | Repeatability accuracy:X-axis stroke ± 0.05 mmZ-axis stroke ± 0.05 mm |  |  |  |
| 11 | rpm spindle accuracy: better than 2 % at least up to 1000 rpm |  |  |  |
| 12 | Force accuracy:on Z-axis (down force) - better than 5 % at least up to 50 kN  |  |  |  |
| 13 | Max spindle run out: ± 0.10 mm |  |  |  |
| 14 | Headstoke tilting: at least from -3° to 0° (limit values included) |  |  |  |
| 15 | Welding speed accuracy: better than 2 % at the maximum welding speed |  |  |  |
| 16 | Worktable Length (along X-axis) 700 mmWidth (along Y-axis) 500 mmTable plate -table plate with threaded holes for mounting fixtures or other units |  |  |  |
| 17 | Electrical service: 380-430 V, 50 Hz, 3 phase |  |  |  |
| 18 | User manual: printed and electronic version in English language  |  |  |  |
| 1. **Control and monitoring systems**
 |
| 1 | Setting of parameters: position/force control, tool force along Z-axis, spindle torque, spindle rpm, plunge speed, welding speed, dwell time (between tool plunge and beginning of linear welding) |  |  |  |
| 2 | Data monitoring and data storage: Monitoring and data storage of the following process parameters: force along X-axis (Fx), force along Y-axis (Fy), force along Z-axis (Fz), tool position along Z-axis, spindle torque, spindle rpm, welding speed, plunge speed. Storage file as .txt or .csv or similar files to be directly opened with Excel. Serial, USB or Ethernet port to download monitored data. |  |  |  |
| 3 | Sampling rate: Monitoring of process parameters with a sampling rate of at least 10 Hz when welding both in position and force control. |  |  |  |
| 4 | Display of actual welding parameter values during welding on PC monitor or HMI interface |  |  |  |
| 5 | Control interface: PC or touch screen interface to set up welding parameters, welding path, detect alarms and system status. |  |  |  |
| 6 | Software: Appropriate software to control and monitor the friction stir welding machine along with relevant lifelong licenses and user manuals. |  |  |  |
| 7 | License: Lifelong software licenses included |  |  |  |

|  |
| --- |
| 1. **Others**
 |
| 1 | Pin tool: set of at least 5 tool pins for welding aluminum alloys |  |  |  |
| 2 | Installation: set-up of all hardware and software components, complete set-up and testing of the equipment |  |  |  |
| 3 | Training course: at least 16 hours of training course on site (introduction to operations, realization of friction stir welds to instruct users) |  |  |  |
| 4 | Legal Warranty Servicing 12 months working time (CET) phone assistance or email support in English within 24 hours from the call. |  |  |  |
| 5 | On-site minimum assistance: Technical intervention on site within 10 working days after request |  |  |  |

**Nella Tabella sottostante *apporre una “X” in corrispondenza dell’elemento tecnico premiale offerto.***

*Tabella 2*

Ove offerto indicare il n. di pagina della scheda tecnica dalla quale si evinca la presenza dell'elemento oggetto di valutazione

|  |  |  |
| --- | --- | --- |
| **EV – Elementi per la Valutazione tecnica****Elements for technical eValuation** | **Barrare se offerto** | **Pagina scheda tecnica** |
| **EV1 –** Max force on Z-axis | 60 < Fz < 80 kN80 ≤ Fz < 100 kNFz ≥ 100 kN: |  |
| **EV2–** Max spindle torque (ST)  | 200 < ST < 300 Nm:300 ≤ ST < 400 Nm:400 ≤ ST < 500 Nm:500 ≤ ST < 600 Nm:ST ≥ 600 Nm: |  |
| **EV3**- Positional accuracy | better than the following valuesX-axis stroke ± 0.03 mmandZ-axis stroke ± 0.03 mm |  |
| **EV4**- Repeatability accuracy | better than the following valuesX-axis stroke ± 0.03 mmandZ-axis stroke ± 0.03 mm |  |
| **EV5 –** Stationary shoulder (i.e. tool pin only rotates). This option allows to use not only a rotating shoulder and pin configuration, but also fixed shoulder with a rotating tool pin. |  |  |
| **EV6 –** On-line overriding of force Fz, welding speed, and plunge stage during the joining process  |  |  |
| **EV7 -** WarrantyWarranty extension **free of charge** after first year | additional 1 yearadditional 2 years  |  |
|  **EV8** - Delivery |  1 reduction week 2 reduction weeks 3 reduction weeks> 3 reduction weeks |  |

**Rappresentante Legale/Titolare dell’Impresa**

(firma leggibile) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Luogo e data di nascita) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Legali Rappresentanti (nel caso di costituenda R.T.I./ Consorzio)**

(firme leggibili) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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(Luoghi e date di nascita) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Note utili alla compilazione**:

Nel caso di concorrenti con idoneità plurisoggettiva, non ancora costituiti, la relazione deve essere sottoscritta da tutti gli operatori economici che partecipano alla procedura in forma congiunta.