

## General Scope

The scope is to supply, erect, commission and training of COBOT welding system as per the following specification

**(Evaluation criterion for L1 will be on the basis of total cost of Basic machine, installation, Commissioning & Training, Standard accessories, Essential accessories/ features, Non comprehensive AMC & Breakdown AMC)**

## Basic Machine specifications

*(Compliance matrix showing each & every tender specification (1 to 19) and details of offer as per format given under. Specific values shall be provided wherever applicable, **simply replying with** "complied" or "confirmed" to such clauses will not be accepted.)*

Sl. No	Details	Specification	Compliance/ Values/ Remarks
<b>1.0.</b>	<b>TIG Welding Power Source</b>		
1.1.	Make and model of the power source	To be specified	<b>Please Specify</b>
1.2.	TIG Welding Power Source	300 A AC/DC or higher	<b>Please Specify value</b>
1.3.	Nominal Welding range	3 - 300 A or higher	<b>Please Specify value</b>
1.4.	Welding process	1. TIG DC & DC Pulse 2. TIG AC & AC Pulse	
1.5.	Input Power Supply	400 V $\pm$ 15%, 3 ph, 50 - 60 Hz	<b>Please Specify value</b>
1.6.	100% duty cycle at (A)	300 A or better	<b>Please Specify value</b>
1.7.	AC Frequency	30 -200 Hz or higher	<b>Please Specify value</b>
1.8.	AC Balance	5% - 95%	<b>Please Specify value</b>
1.9.	Nominal Pulse frequency DC, Hz	0.2 to 20,000 Hz	<b>Please Specify value</b>
1.10.	Nominal Spot-welding time	0.01 to 10 Sec	<b>Please Specify value</b>
1.11.	Nominal Spot welding off time	0.1 - 10 Sec	<b>Please Specify value</b>
1.12.	Welding Mode Settings	Auto and Manual Mode	<b>Complied/ Not Complied</b>
1.13.	Liquid Cooling system: Cooling system shall be adequate for the current range and duty cycle specified.	To be specified	<b>Please Specify</b>
1.14.	Carriage/Trolley with wheels	Required	<b>Complied/ Not Complied</b>
1.15.	Automatic Voltage Control (AVC)	Required	<b>Complied/ Not Complied</b>

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1.16.	Weight of the power source	To be specified	<i>Please Specify</i>
1.17.	Seam Tracking: The offered system shall be compatible for future integration of Laser seam tracking. Vendor shall confirm the same.	To be confirmed	<i>Please Confirm</i>
<b>2.0.</b>	<b>Cobot-TIG Torch</b>		
2.1.	Duty Cycle	350 A at 100%, DC, 300 A for AC	<i>Please Specify value</i>
2.2.	<b>Protection for Cobot from HF Ignition:</b> The Cobot welding TIG torch should have built-in system to protect the Cobot and the torch arm from HF ignition	Required	<i>Complied/ Not Complied</i>
2.3.	<b>Multifunction Flange:</b> The TIG Cobot torch should be equipped with multifunctional flange to enable easy Free-drive programming at the 6th Rotation. In addition, there should be multifunction buttons on the flange to support tacking and wire inching	Required	<i>Complied/ Not Complied</i>
2.4.	<b>Torch cooling:</b> The welding torch should be specially developed for TIG Cobot welding, slim and robust design and should be equipped with Cobot-optimized mounting. To enable collaborative work, it should come with hybrid cooling concept with heat pipe technology	Required	<i>Complied/ Not Complied</i>
2.5.	Torch change process: Torch should be equipped with safety and design features to enables fast and precise torch changes without leaking cooling water	Required	<i>Complied/ Not Complied</i>
2.6.	Weight	To be specified	<i>Please Specify</i>
<b>3.0.</b>	<b>Cobot</b>		
3.1.	Make and model of the cobot	To be specified	<i>Please Specify</i>
3.2.	Payload	12 kg or better	<i>Please Specify value</i>
3.3.	Reach	1300 mm or better	<i>Please Specify value</i>
3.4.	Repeatability	±0.1 mm or better	<i>Please Specify value</i>
3.5.	Degrees of freedom	6 rotating joints	<i>Complied/ Not Complied</i>

<b>Sl. No</b>	<b>Details</b>	<b>Specification</b>	<b>Compliance/ Values/ Remarks</b>
3.6.	Base Rotation	$\pm 360^\circ$	<i>Please Specify value</i>
3.7.	Base Rotation Speed	$\pm 120^\circ/\text{Sec}$	<i>Please Specify value</i>
3.8.	Shoulder Rotation	$\pm 360^\circ$	<i>Please Specify value</i>
3.9.	Shoulder Rotation Speed	$\pm 120^\circ/\text{Sec}$	<i>Please Specify value</i>
3.10.	Elbow Rotation	$\pm 360^\circ$	<i>Please Specify value</i>
3.11.	Elbow Rotation Speed	$\pm 180^\circ/\text{Sec}$	<i>Please Specify value</i>
3.12.	Wrist 1 Rotation	$\pm 360^\circ$	<i>Please Specify value</i>
3.13.	Wrist 1 Rotation Speed	$\pm 180^\circ/\text{Sec}$	<i>Please Specify value</i>
3.14.	Wrist 2 Rotation	$\pm 360^\circ$	<i>Please Specify value</i>
3.15.	Wrist 2 Rotation Speed	$\pm 180^\circ/\text{Sec}$	<i>Please Specify value</i>
3.16.	Wrist 3 Rotation	$\pm 360^\circ$	<i>Please Specify value</i>
3.17.	Wrist 3 Rotation Speed	$\pm 180^\circ/\text{Sec}$	<i>Please Specify value</i>
3.18.	Typical tool	1 m/Sec	<i>Please Specify value</i>
3.19.	Operating temperature range	0-50° C	<i>Please Specify value</i>
3.20.	Noise	Max 72 dB (A)	<i>Please Specify value</i>
3.21.	IP Classification	IP54 or better	<b>Complied/ Not Complied</b>
3.22.	Type of drive for all 6 axes	AC Servo Motor	<b>Complied/ Not Complied</b>
3.23.	Nominal Base Footprint	To be specified	<i>Please Specify value</i>
3.24.	Mounting Position	Any orientation	<b>Complied/ Not Complied</b>
3.25.	Communication Ports	To be specified	<i>Please Specify</i>
<b>4.0.</b>	<b>Teach pendant</b>		
4.1.	Cable Length	4 m or above	<i>Please Specify value</i>
4.2.	Materials	To be specified	<i>Please Specify</i>

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4.3.	Teach pendent display	12 " or larger touch screen	<i>Please Specify</i>
4.4.	IP Classification	IP54 or better	<i>Please Specify</i>
<b>5.0.</b>	<b>Software</b>		
5.1.	<b>Cobot programming software:</b> Cobot OEM's off-line programming software license. Capable of motion simulation for Cobot. Should be able to do reach and cycle time studies.	Required	<b>Complied/ Not Complied</b>
5.2.	<b>Welding technology software:</b> OEM's welding technology package for multi pass, continuous welding (TIG) to generate arc welding programs by defining process parameters such as Torch Angle, work angle, seam and weave data, wire feed, velocity, speed, current, voltage etc.,	Required	<b>Complied/ Not Complied</b>
<b>6.0.</b>	<b>Integration of Welding Power source with the Cobot</b>		
6.1.	<b>Control unit:</b> The system should be equipped with special Cobot interface and external control panel for operation of the TIG-Cobot system.	Required	<b>Complied/ Not Complied</b>
6.2.	<b>Mode of operation:</b> Synchronized operations of power source, wire feeder, cobot and rotary table and to achieve the target values	Required	<b>Complied/ Not Complied</b>
6.3.	Data Acquisition system	Required	<b>Complied/ Not Complied</b>
6.4.	Inbuilt template for multiple spot weld programming.	Required	<b>Complied/ Not Complied</b>
6.5.	<b>User Interface:</b> The welding parameters must be accessible directly at the Cobot pendant. The welding parameter control should be embedded at the Cobot pendant / user interface.	Required	<b>Complied/ Not Complied</b>
6.6.	<b>Weaving function:</b> There should be provision for linear and radial weaving in the Cobot, based on the welding requirement. The pre-defined weaving parameters should be stored in the Cobot controller and should be visible in the Cobot pendant user interface.	Required	<b>Complied/ Not Complied</b>
<b>7.0.</b>	<b>Wire feed system</b>		
7.1.	Wire size	0.8 mm to 1.6 mm	<i>Please Specify value</i>

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7.2.	Materials	Stainless steel, Nickel & aluminium alloys	<b>Complied/ Not Complied</b>
7.3.	Nominal Wire feed rate	500 mm to 3000 mm/min	<b>Please Specify value</b>
7.4.	Nominal Crater fill time	0 - 5.0 s	<b>Please Specify value</b>
7.5.	Nominal Start delay time	0 - 10.0 s	<b>Please Specify value</b>
7.6.	<b>Wire feed Synchronization:</b> Wire feed shall be fully synchronized with the welding modes such as spot, Interval Spot welding and continuous welding	Required	<b>Complied/ Not Complied</b>
7.7.	Wire feed tube/Nozzle with necessary accessories to feed the filler wire into the weld pool and should be attachable to the Torch.	Required	<b>Complied/ Not Complied</b>
7.8.	Hose pack length	Minimum 4 meters	<b>Please Specify value</b>
7.9.	Wire supporting hook	Required	<b>Complied / Not Complied</b>
<b>8.0.</b>	<b>Positioner</b>		
8.1.	Type	Swiveling rotary table	<b>Complied / Not Complied</b>
8.2.	Rotary Axes	2 axes	<b>Please Specify value</b>
8.3.	Payload	100 Kg	<b>Please Specify value</b>
8.4.	Table Diameter	500 mm	<b>Please Specify value</b>
8.5.	Angle of tilt	0° to 90° (Nominal)	<b>Please Specify value</b>
8.6.	Speed of tilt	10°/s (Nominal)	<b>Please Specify value</b>
8.7.	Speed of rotation	90°/s (Nominal)	<b>Please Specify value</b>
8.8.	<b>Function access:</b> The controlling of the positioner should be fully embedded in the COBOT's operating software. The access should be visible in the Cobot teach pendant.	Required	<b>Complied / Not Complied</b>
8.9.	The integrated positioner should be having homing function and jog mode	Required	<b>Complied / Not Complied</b>
8.10.	Speeds of the positioner should be configurable from the Cobot pendant	Required	<b>Complied / Not Complied</b>
8.11.	The positioner should be synchronous in motion with the Cobot	Required	<b>Complied / Not Complied</b>

Sl. No	Details	Specification	Compliance/ Values/ Remarks
8.12.	<b>Welding speed calculation:</b> The positioner will have built-in calculation of the rotational speed based on the welding speed	Required	<b>Complied / Not Complied</b>
<b>9.0.</b>	<b>Standard accessories</b>		
9.1.	Collet	Required	<b>Complied / Not Complied</b>
9.2.	Ceramic Cup	Required	<b>Complied/ Not Complied</b>
9.3.	Welding Table	1.5 x 1.5 m or higher	<b>Please Specify value</b>
9.4.	Welding Accessories	Required	<b>Please Specify</b>
9.5.	Work Station with 3 years comprehensive Warranty	<ul style="list-style-type: none"> <li>• Microsoft Windows 10 or higher OS shall be installed in an SSD (128GB Minimum)</li> <li>• High-end, Multi-core, 64-bit processor (Intel i5 or better)</li> <li>• Ram: 16 GB DDR4 or better</li> <li>• Microsoft Office 2016 or newer for report generation</li> <li>• 24" size Monitor with resolution 1920 x 1080 or better</li> <li>• Standard keyboard and mouse</li> </ul>	<b>Please Specify value</b>
<b>10.0.</b>	<b>Optional Accessories</b>		
10.1.	The vendor shall indicate the optional accessories which may be essential to improve the performance of the machine. List of such optional accessories along with the description of their function shall be provided and quoted.		<b>Quoted / Not Quoted</b>
<b>11.0.</b>	<b>Recommended Spares</b>		
11.1.	The vendors should provide a list of essential mechanical, electrical & electronics spares required for operation of machine on two-shift basis for a period of 2 years with quantity and cost break-up.		<b>Quoted / Not Quoted</b>
<b>12.0.</b>	<b>Technical Documentation to be submitted along with offer</b>		
12.1.	Type of the machine, model no and its specifications		<b>Submitted / Not submitted</b>
12.2.	Machine layout drawing indicating shop floor space and machine weight.		<b>Submitted / Not submitted</b>
12.3.	Company profile and website address.		<b>Submitted / Not submitted</b>

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12.4.	List of defense/government R&D /any private sector references with details to whom similar machines have been supplied.		<b>Submitted / Not submitted</b>
12.5.	Clause by clause compliance statement against each point indicated in this specification		<b>Submitted / Not submitted</b>
12.6.	List of optional accessories and recommended spares		<b>Submitted / Not submitted</b>
<b>13.0.</b>	<b>Technical Documentation to be supplied with the machine:</b> One set hard copy and soft copy of the following technical documentation in 'English' shall have to be supplied along with the machine:		
13.1.	Instruction/ Operational manual		<b>Complied / Not Complied</b>
13.2.	Spare parts manual		<b>Complied / Not Complied</b>
13.3.	Maintenance manual for mechanical, electrical and electronic systems.		<b>Complied / Not Complied</b>
13.4.	Circuit diagram for electrical & electronics		<b>Complied / Not Complied</b>
13.5.	Machine Lay out		<b>Complied / Not Complied</b>
13.6.	Preventive maintenance check list, troubleshooting charts and guidelines		<b>Complied / Not Complied</b>
<b>14.0.</b>	<b>Pre delivery inspection (PDI) &amp; Shipment Clearance</b>		
14.1.	PDI shall be carried out by LPSC at manufacturer's site before despatch for its conformance to specification and function as per standard protocol.		<b>Complied / Not Complied</b>
14.2.	During PDI the accuracy tests on the machine shall also be performed as per manufacturers test plan.		<b>Complied / Not Complied</b>
14.3.	Wire feeder system and positioner shall be flawlessly synchronized with the TIG welding unit for trouble free operation and shall be demonstrated during PDI & the same shall be repeated after installation		<b>Complied / Not Complied</b>
14.4.	Demonstration of welding of Aluminium & Nickel alloys shall be a part of PDI. Vendor shall procure material for demonstration.		<b>Complied / Not Complied</b>
14.5.	Theoretical and practical training regarding machine operation shall be provided for 2 engineers of LPSC.		<b>Complied / Not Complied</b>
14.6.	The equipment shall be despatched only after a despatch clearance given by LPSC.		<b>Complied / Not Complied</b>
14.7.	The vendor shall specify the number of days required for PDI including training and shall quote separately. The cost of travel and accommodation of LPSC engineers shall be borne by LPSC for PDI.		<b>Complied / Not Complied</b>
<b>15.0.</b>	<b>Erection, Installation, training and Commissioning</b>		
15.1.	The machine shall be erected, installed and commissioned at LPSC, Valiamala, Thiruvananthapuram, Kerala, India. Party shall arrange all the necessary logistics for unloading the machine and placing the same at LPSC site. All necessary tools, instruments and equipments for erection, installation and commissioning of the machine shall be brought by supplier.		<b>Complied / Not Complied</b>

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15.2.	Vendor shall train 2 of LPSC's engineers on operation, programming and machine maintenance for two weeks after commissioning of machine at installation site free of cost.		<i>Complied / Not Complied</i>
15.3.	All capabilities of machine as agreed in the offer shall be demonstrated during performance demonstration. Demonstration of welding of Aluminium & Nickel alloys. LPSC will supply material for demonstration.		<i>Complied / Not Complied</i>
15.4.	Final acceptance of the machine shall be based on satisfactory completion of the activities mentioned in <b>Cl. No. 15.1 to 15.3</b>		<i>Complied / Not Complied</i>
15.5.	Installation and commissioning and training at site shall be completed within 1 month from the date of communication from the LPSC on receipt of machine at site.		<i>Complied / Not Complied</i>
15.6.	Vendor shall also quote the cost of erection, Installation, training and Commissioning.		<i>Quoted / not quoted</i>
<b>16.0.</b>	<b>Warranty</b>		
16.1.	The supplied machine shall be warranted for a period of <b>minimum 2 years</b> from the date of machine acceptance at LPSC site. The vendor shall quote the cost of extended warranty period.		<i>Complied / Not Complied</i>
<b>17.0.</b>	<b>Other Terms and conditions</b>		
17.1.	The packing of each item should be adequately sturdy to avoid any damage while handling and during transit. The packing should also prevent any prolonged exposure to hostile environment.		<i>Complied / Not Complied</i>
17.2.	Vendor shall also quote packing, forwarding & freight charges.		<i>Quoted / not quoted</i>
17.3.	After sales service shall be provided by the vendor for a minimum period of 10 years from date of machine acceptance.		<i>Complied / Not Complied</i>
17.4.	If the machine or any part of it is lost or damaged in transit, the replacement of such machine or part shall be affected free of cost.		<i>Complied / Not Complied</i>
17.5.	Party shall indicate the delivery period from the date of receipt of technical and commercial clear purchase order.		<i>Complied / Not Complied</i>
<b>18.0.</b>	<b>AMC:</b> The vendor shall also quote for AMC charges for three years beyond the accepted warranty period as per Annexure-2		<i>Complied / Not Complied</i>
<b>19.0.</b>	<b>Checklist for the quotation: Please confirm Quoted or Not</b>		
19.1.	Basic Machine including standard features/accessories at <b>Cl. No. 1.0. to 9.5.</b>		<i>Quoted/ Not Quoted</i>
19.2.	Optional accessories at <b>Cl. No. 10</b>		<i>Quoted/ Not Quoted</i>
19.3.	Recommended spares at <b>Cl. No. 11</b>		<i>Quoted/ Not Quoted</i>
19.4.	Erection, Installation, Commissioning and Training charges		<i>Quoted/ Not Quoted</i>
19.5.	Packing, forwarding & freight charges.		<i>Quoted/ Not Quoted</i>
19.6.	Extended Warranty after the expiry of standard warranty for 1 year		<i>Quoted/ Not Quoted</i>



Sl. No	Details	Specification	Compliance/ Values/ Remarks
19.7.	Non comprehensive AMC charges for 2 Preventive maintenance visits for first year (will be ordered only after warranty/ extended warranty period). Terms and conditions as per Annexure-2		Quoted/ Not Quoted
19.8.	Non comprehensive AMC charges for 2 Preventive maintenance visits for second year (will be ordered only after warranty/ extended warranty period). Terms and conditions as per Annexure-2		Quoted/ Not Quoted
19.9.	Non comprehensive AMC charges for 2 Preventive maintenance visits for third year (will be ordered only after warranty/ extended warranty period). Terms and conditions as per Annexure-2		Quoted/ Not Quoted
19.10.	Call basis Breakdown visit charges for 1st day, price shall be valid for 3 years after the warranty period. (will be ordered only after warranty/ extended warranty period). Terms and conditions as per Annexure-2		Quoted/ Not Quoted
19.11.	Call basis Breakdown visit charges for subsequent days, price shall be valid for 3 years after the warranty period. (will be ordered only after warranty/ extended warranty period). Terms and conditions as per Annexure-2		Quoted/ Not Quoted
19.12.	Probable spares list for AMC, Price shall be valid for entire period of AMC (This cost will not be a criterion for evaluation L1 )		Quoted/ Not Quoted

20.0.	Qualification Criteria	
20.1.	Proof of establishment of company/business for a period of more than 5 years.	<p>The bidder must be a reputed original equipment manufacturer or authorized representative of OEM in the business of supply, installation and servicing of COBOT/Robotic welding system for a period of not less than 5 years (i.e. must be in this business from April 2019 or earlier).</p> <p>The certificate of incorporation or authorization certificate from OEM or any other relevant certificate to this effect is required to be enclosed.</p> <p>If necessary, the representative of LPSC may visit the Bidder/OEM Ex-Works for evaluation.</p>
20.2.	No custom-made machines are allowed,	Party shall only offer standard machines with model prevailing in the market and should not be a prototype or developmental system.
20.3.	Previous experience & copy of performance certificates along with Purchase Orders.	The respondent shall have a minimum of 3 installations similar COBOT/Robotic welding systems or higher capacity in ISRO centres or Public sector or Government organizations or private firm in India over last 5 years (April 2019 onwards). Copy of installation & commissioning report shall be furnished for a minimum of 3 installations.
20.4.	Declaration that the bidder had not been blacklisted or debarred anywhere in India or abroad by any organization.	A certificate/undertaking on the letter head of the Company to the effect that the bidder had not been blacklisted or debarred anywhere in India or abroad by any organization.
20.5.	AMC details.	Offer without AMC for three years with price breakup for spares shall not be considered.
20.6.	Local content	Minimum 20% Local content is required for the acceptance of the offer

