

Indian Institute of Technology Palakkad

भारतीय प्रौद्योगिकी संस्थान पालक्काड

STORES & PURCHASE SECTION

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21-10-2022

CORRIGENDUM-II

Sub.: SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF FULLY INTEGRATED 4-AXIS CNC TABLE FOR HYBRID ADDITIVE AND SUBTRACTIVE PROCESS

Ref.: Tender No. TENDER/2022-23/115 Date of Publication: 30-09-2022

Existing Clause			Amended As			
S. No.	Items	Specification	S. No.	Items	Specification	
A	Technical specifications		A	Technical specifi	ications	
	3-axis CNC welding	table with an integrated metal		3-axis CNC weld	ing table with an integrated	
	additive and subtract	tive heads along with other		metal additive and	d subtractive heads along	
	· ·	y features that are listed in the			onal mandatory features that	
	sections and sub-sec	tions of A to C			ections and sub-sections of A	
A.1	CNC Controller			to C		
	-	programmable path motion with G	A.1	CNC Controller		
		for metal printing, cladding and			or programmable path motion	
	machining				M Codes for metal printing,	
A.2	Software			cladding and mac	hining	
	•	eadily print the metal upon the input	A.2	Software		
		ssary CAD/CAM and AM based pre		*	d readily print the metal upon	
		softwares for both metal printing			ile. The necessary CAD/CAM	
	and machining shou	ld be pre-installed		and AM based pre and post processing		
	3 Axis mounting				both metal printing and	
A.3	stage for metal			machining should	-	
	printing and milling			3 Axis mounting stage for metal		
	IIIIIIIII	≥ 600 mm in both X and Y	A.3	printing and		
				milling		
	XY stroke	directions. The welding		g	≥ 600 mm in both X and Y	
		torch & machining head			directions. The welding	
		should move in the speed		XY stroke	torch & machining head	
		range between 60 mm/min			should move in the speed	
A.3.1		to 600/min and the speed			range between 60 mm/min	
		should be consistent	A.3.1		to 2000/min and the speed	
		from the absolute			should be consistent from	
		beginning to ending.			the absolute beginning to	
		Acceleration/declaratio			end.	
		n should be avoided.			Acceleration/declaration	
		Ball screw drive with stepper or			should be avoided at both	
A.3.2	XY drive	step-servo motor.			beginning and end	

A.3.3 Resolution A.3.4 Accuracy in XY Stroke A.3.5 Z-stroke A.3.6 Z drive A.3.6 Accuracy in XY Stroke A.3.7 Resolution A.3.8 Accuracy in XY Stroke A.3.8 Accuracy in XY Stroke A.3.9 Accuracy in XY Stroke A.3.0 Z-stroke A.3.0 Z-stroke A.3.1 Accuracy in XY Stroke A.3.2 Z-stroke A.3.3 Resolution A.3.4 Accuracy in XY Stroke A.3.5 Z-stroke A.3.6 Z drive A.3.7 Resolution A.3.8 Resolution A.3.8 Resolution A.3.9 Accuracy in XY Accuracy in XY Stroke A.3.9 Accuracy in X Accuracy in XY Accuracy in XY Stroke A.3.0 D in microns A.3.1 Resolution A.3.2 Stroke Accuracy in XY Accur						Ball screw drive with
A.3.4 Stroke Lable center (Need to be demonstrated at time of installation) A.3.5 Z-stroke ≥ 200 mm A.3.6 Z drive Acme screw with stepper or stepservo drive. A.3.6 Z drive Acme screw with stepper or stepservo drive. A.3.6 Z drive Acme screw with stepper or stepservo drive. A.3.6 Z drive Acme screw with stepper or stepservo drive. A.3.7 Resolution ≤ 10 microns A.3.8 X-stroke ≥ 200 mm Accuracy in Z Acme screw with stepper or stepservo drive. A.3.7 Resolution ≤ 10 microns Accuracy in Z Acme screw with stepper or stepservo drive. A.3.8 Stroke Accuracy in Z Accuracy in	A.3.3	Resolution	≤ 20 µm	A.3.2	XY drive	stepper or step-servo motor.
A.3.5 Z-stroke ≥ 200 mm A.3.6 Z drive Acme screw with stepper or stepservo drive. A.3.7 Resolution ≥ 10 microns ≥ 0.1 mm / 200 mm (Need to be demonstrated at time of installation) A.3.8 Stroke ≥ 200 mm A.3.6 Z drive Accuracy in Z Accu			± 0.1 mm / ± 300 mm from the			
A.3.5 Z-stroke A.3.6 Z drive A.3.7 Resolution A.3.8 Z-stroke A.3.8 Z-stroke A.3.8 Z-stroke A.3.9 Accuracy in XY A.3.9 Resolution A.3.10 Z drive A.3.10 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.8 Z-stroke A.3.8 Z-stroke A.3.9 Accuracy in Z A.3.8 Resolution A.3.9 Imm / 200 mm (Need to be demonstrated at ime of installation) A.3.8 Stroke B. 2 drive A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.8 Stroke B. 2 drive A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.9 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.10 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.10 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.10 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.10 Imm / 200 mm (Need to be demonstrated at time of installation) A.3.10 Imm / 20	A.3.4	•	,	A.3.3	Resolution	≤ 20 µm
A.3.6 Z drive Acme screw with stepper or stepservo drive. A.3.7 Resolution ≤ 10 microns ±0.1 mm / 200 mm (Need to be demonstrated at time of installation) Execuracy in Z A.3.8 Stroke Accuracy in Z A.3.9 Medding torch and Machining head feed rate in all X, Y A.3.9 and Z directions A.4 Rotating stage (Vertical) A separate round table of 300 mm diameter should be there, and it should rotate in the range of 0 to 500 rpm (user defined) under the load of 100 kg for printing of solid/hollow axisymmetric shapes. A ≥ 10 mm thick nitride plate should be there for fixing the jobs on the round table. A.4.1 Welding head should be able to reach the center of the rotating table for material deposition. A.5 Motor connected three jaw chuck along with tail stock An additional three jaw check should be provided for fixing rods/hollow cylinders in horizontal position to perform the weld-cladding operation. A.6 Mounting clamp for MIG/TIG/PAW welding torches with automatic on/off control (relay unit). The clamp should allow the user to vary the angle between (-40° to 40°) with reference to the Z axis (vertical). A.7.1 Automatic torch heeight controller A.3.6 Z drive Accuracy in Z A.3.7 Resolution 5 10 microns 4.3.8 Resolution 5 10 microns 4.3.10 Welding torch and Machining head feed rate in all X, Y and Z directions It should support STL file format. It should support STL file format. It should be user to load of 100 kg for the printing of partitioning. It is also preferred; if the interface can allow user defined coding to control the CNC table A.4.2 Welding head should be able to reach the center of the rotating table of 300 mm diameter should be there, and it should rotate in the range of 0 to 200 rpm (user-defined) under the load of 100 kg for the printing of solid-hollow axisymmetric shapes. A ≥ 10 mm thick nitride plates should be there for fixing the jobs on the round table. A.4.1 Rotating stage (Vertical) A.4.2 Welding head should be able to reach the center of the rotating table for material de				A.3.4	•	the table center (Need to be demonstrated at time of
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A.3.7 Resolution A.3.7 Resolution S 10 microns	A.3.6	Z drive		A.3.6	Z drive	
A.3.8 Stroke A.3.8 Stroke A.3.8 Stroke A.3.8 Stroke demonstrated at time of installation	A.3.7	Resolution	≤ 10 microns	A.3.7	Resolution	≤ 10 microns
Welding torch and Machining head feed rate in all X, Y and Z directions	A.3.8		demonstrated at time of	A.3.8	Stroke	be demonstrated at time of
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A separate round table of 300 mm diameter should be there, and it should rotate in the range of 0 to 500 rpm (user defined) under the load of 100 kg for printing of solid/hollow axisymmetric shapes. A ≥ 10 mm thick nitride plate should be there for fixing the jobs on the round table. A.4.2 Welding head should be able to reach the center of the rotating table for material deposition. A.5 Motor connected three jaw chuck along with tail stock A n additional three jaw check should be provided for fixing rods/hollow cylinders in horizontal position to perform the weld-cladding operation. A.6 Mounting clamp Mounting clamp for MIG/TIG/PAW welding torches with automatic on/off control (relay unit). The clamp should allow the user to vary the angle between (-40° to 40°) with reference to the Z axis (vertical). A.7 Automatic torch height control using are voltage. A.7.1 Are voltage based out a baight control using are voltage. A.6.1 It should be capable of doing slicing or partitioning. It is also preferred, if the interface can allow user defined coding to control the CNC table A.3.10 A.3.10 CAD/CAM software It should be capable of doing slicing or partitioning. It is also preferred, if the interface can allow user defined coding to control the CNC table A.4.4 Rotating stage (Vertical) A separate round table of 300 mm diameter should be there, and it should rotate in the range of 0 to 200 rpm (user-defined) under the load of 100 kg for the printing of solid/hollow axisymmetric shapes. A ≥ 10 mm thick nitride plate should be there for fixing the jobs on the round table. 40°CrMoV13-9 Nitride steel plates or any cost efficient equivalent grade. A.4.1 Motor connected three jaw chuck along with tail stock (cladding setup) A.5.5 Motor connected three jaw chuck along with tail stock (cladding setup) A.6.6 A.7.1 Are voltage based out to baicht control using are voltage.	A.4	Rotating stage (Ver	rtical)			
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A.7.1 Are voltage based auto height control using are voltage A.7.1 Are voltage based auto height control using are voltage				A.5		
A_{\bullet}/A_{\bullet} Are voltage based auto height control using are voltage	A.7	Automatic torch he	Automatic torch height controller		+	
	A.7.1	Arc voltage based au	nto height control using arc voltage			-

	feedback.			the horizontal po	osition to perform the weld-
A.7.2	Gap between sheet and nozzle should be user programmable.			_	on and it should rotate in the
				_	0 rpm (user-defined) under a
A.8	Pen pointer attachment			load of 100 kg.	
	Required for part program verification		A.6	Mounting clam	p
A.9	Milling Head			Mounting clamp	o for MIG/TIG/PAW welding
A.9.1	Collets			torches with automatic on/off control (rela	
A.9.2	Cutting tools and ac	cessories		unit). The clamp should allow the user to v the angle between (-40° to 40°) with refere	
	8				
1 10 1	Operating airflow	≥ 3000 m^3/h	A.7	to the Z axis (ve	·
A.10.1		2 3000 III 3/II			h height controller
A.10.2	Operating negative pressure	1500 Pascal	A.7.1	voltage feedback	ed auto height control using arc
A.10.3	Voltage	400 V	A.7.2		eet and nozzle should be user
A.10.3 A.10.4		supplied with 2 numbers	11.7.2	programmable.	cet and nozzie should be user
A.10.4		ed extraction arm of	A.8	Pen pointer attachment	
		mm and 2 m in length		-	rt program verification
	gramerer 51%2	A.9		should be mounted on a	
A.11	Cooling system wit	h automatic on/off	A.)		head without interfering with
				•	ating head). The end user
A.11.1	-	ald be submerged in a liquid coolant		~ ~	o use both the heads
		height from the top surface for		simultaneously	for both molten metal
		e cooling camber of size 400 mm * made of SS304 should be there			cutting. The table should not
A.11.2	400 11111 - 200 11111 1	made of 55304 should be there			achining the weld bead since
A.11.2	An additional coolar	nt storage tank with electric motor			rations affect the metal
	-	oumping the liquid to cooling	4.0.1	deposition.	NC 10000 PDV
		npletion of every layer of printing.	A.9.1	Spindle Speed	Min 18000 RPM
	-	id cooling chamber should have a	A.9.2	Main Spindle	3.5 kW or more (Should be
A.11.3		e to control the flow rate.		Power	able to cut mild steel
A.11.4	the printing progress	ement for auto stop of liquid inlet as	A.9.3	Spindle taper	specimens. ISO/BT/SK 40/50
A.12	Interface	ses iii Z direction.			ISO/D1/SK 40/30
A.12.1	USB		A.9.4	Collets	
	USB		A.9.5	Standard	Standard accessories must include all items and
A.12.2	An Android app, usi	ing which users can jog the		accessories	accessories which are
		m zero and start/pause/re-start the			essential to the Four axis
	G-code to continue	machining.			CNC milling machine,
A.13	High temperature	pyrometer			whether those are
	Operating				mentioned in this
A.13.1	wavelength	≤ 1.6 µm			specification or not. A list
A.13.2	Focal length	≥ 200 mm			of such items/ accessories
A.13.3	Vision zone	≤ 0.7 mm diameter			is to be provided with the
A.13.4	Accuracy	± 0.3% of reading + 2°C			offer and price for the same should be shown
	Temperature		A.9.6	Cutting Tools	The bidder should supply
A.13.5	measuring range	385°C - 1680°C	11.7.0	Cutting 100is	essential mill cutting tools:
		CTLM-2HCF3–C3H model with			10 mm diameter end mill,
	calibration certificat				roughing end mill, slab mill,
A.14	Geometrical laser s	scanner			and radius mill cutters. A list
					of cutting tools with

A.14.1	Measuring range Z-				specifications and quantity is
	axis	≥ 300 mm			to be submitted with the
A.14.2	Measuring range X-				offer
	axis	≥ 300 mm	A.9.7	Standard Tools	One (01) set of standard
A.14.3	Resolution X-axis	≥ 640 points/profile			tools for maintenance of the
A.15	Fume extractor				machine is to be provided
		1 111 1 .			indicating the item-wise
		s should be extracted out agh the enclosure. The enclosure			price. The nomenclature,
		g to facilitate the fume extractor			quantity, and specification
	inlet pipe.				of the tools are to be
A.16	Desktop				mentioned in detail in the
					quotation (the price should be included in the total
A.16.1	CPU	AMD D 7.2700V (24. CDU			price)
		AMD Ryzen 7 3700X (with CPU		Operating	≥ 3000 m^3/h
		cooler) or higher	A.10.1	airflow	2 3000 III 3/II
		AMD B550 chipset, supports AM4 socket 3rd GEN AMD	A.10.1	Operating	
		RyzenTM processors and future		negative	
A.16.2	Motherboard	AMD RyzenTM with BIOS	A.10.2	pressure	1500 Pascal
		update.	A.10.3	Voltage	400 V
		apatie.	A.10.3	Ŭ.	be supplied with two fume
		3.5" 1 TB HDD, 64 MB Cache,	A.10.4		From two different locations of
		7200 RPM class, Interface: SATA			ting space. The reference
		6 Gb/s		setup is shown be	
A.16.3	SSD Storage	0 00,0		setup is shown of	
A.16.4	Graphics card	8 GB or higher			
	- 1	Support E ATX motherboard,			
		Support Graphics card, CPU			
		cooler, 3.5" HDD/2.5" SDD: 3/1			
A.16.5	Case	Preferable: 2x200 mm ARGB		100	
		Fans in front, 1x120 mm fan in		100	
		the rear		4	Land Section 1
A.16.6	Power supply	750 Watts			-
		27", IPS Panel, LED-Backlight,		90	
		Full HD (Max resolution:		17.1	
		1920x1080), Aspect ratio: 19x9,	A.11		
		Display colors: 16.7 million,	A.11	Cooling system	with automatic on/off
		HDMI and display ports Optional:	A.11.1	The metal print s	should be submerged in a
A.16.7	Monitor	Built - in speaker, Headphone		-	to a certain preset height from
		jack, Audio line-in			or which the detachable
				cooling camber of	of size 400 mm * 400 mm *
				200 mm made of	SS304 should be there
			A.11.2		olant storage tank with
					ould be there for pumping the
		Mechanical Keyboard Preferable:			camber after the completion
A.16.8	Keyboard	RGB Mechanical Keyboard with		of every layer of	
7.10.0	Reyboard	Kalih LH Blue Switches			iquid cooling chamber should
					er and valve to control the
L	<u> </u>		A.11.3	flow rate.	

			A.11.4	- C	ngement for auto stop of printing progresses in Z
				direction.	
		Wined Ontical Manimum DDL	A.12	Interface	
		Wired, Optical, Maximum DPI: 4000	A.12.1	USB	
A.16.9	Mouse	Windows 11 and pre-installed	A.12.2	machine, set prog	using which users can jog the gram zero and start/pause/re-o continue machining.
A.16.10	OS and supporting softwares	CAD, CAM and additive	A.13	High temperatur	
	Softwares	manufacturing (AM) softwares		Operating	
			A.13.1	wavelength	≤ 1.6 µm
В	Required features	1	A.13.2	Focal length	≥ 200 mm
	_	made up of Nitride steel plate of >	A.13.3	Vision zone	≤ 0.7 mm diameter
		te should be 600 x 600 mm**2 with			
B.1	internally threaded b	blind holes. The blind holes on the	A.13.4	Accuracy Temperature	$\pm 0.3\%$ of reading + 2°C
		he end user to fix the workpiece	A.13.5	measuring range	385°C - 1680°C
	anywhere on the nit	ride steel plate	71.13.3		n CTLM-2HCF3–C3H model
	The table should be			with calibration c	
B.2	able to move in all		A.14	Geometrical lase	er scanner (It should be
D.2	three X, Y, and Z			attached with CN	`
	directions.			Eg: Micro-Epsilo	n scanCONTROL 250-
		nould be fixed inside of the		100/BL	
		r the temperature at any given point	A.14.1	Measuring range	
B.3	of the metal print. The provision should manually adjust the focus of the IR spot as the printing progresses			Z-axis	≥ 300 mm
	in Z-direction.	he IR spot as the printing progresses	A.14.2	Measuring range	. 700
	in Z-direction.			X-axis	≥ 300 mm
			A.14.3	Resolution X-	> 640 pointa/profile
C	Required documen		A.15	axis Fume extractor	≥ 640 points/profile
C.1	_	ete machine/s parts and	A.15		
	specifications				mes should be extracted out
C.2	Manual/s for machin	ne operation		simultaneously through the enclosure. The enclosure can have one opening to facilitate	
C.3	Manual/s for safety	instructions and specifications		the fume extracto	
C.4	Accuracy report		A.16	Desktop	
F		from the date of installation) ace for three continuous years	A.16.1	CPU	AMD Ryzen 7 3700X (with
	should be quoted seguranty. The user h	parately on top of one year standard nave full rights to apt or not to apt the one year standard warranty	A.16.2	Motherboard	CPU cooler) or higher AMD B550 chipset, supports AM4 socket 3rd GEN AMD RyzenTM processors and future AMD RyzenTM with BIOS update.
			A.16.3	SSD Storage	3.5" 1 TB HDD, 64 MB Cache, 7200 RPM class, Interface: SATA 6 Gb/s

A.16.4	Graphics card	8 GB or higher
A.16.5	Case	Support E ATX motherboard, Support Graphics card, CPU cooler, 3.5" HDD/2.5" SDD: 3/1 Preferable: 2x200 mm ARGB Fans in front, 1x120 mm fan in the rear
A.16.6	Power supply	750 Watts
.16.7	Monitor	27", IPS Panel, LED-Backlight, Full HD (Max resolution: 1920x1080), Aspect ratio: 19x9, Display colors: 16.7 million, HDMI and display ports Optional: Built – in speaker, Headphone jack, Audio line-in
A.16.8	Keyboard	Mechanical Keyboard Preferable: RGB Mechanical Keyboard with Kalih LH Blue Switches
.16.9	Mouse	Wired, Optical, Maximum DPI: 4000
A .16.1	OS and supporting softwares	Windows 11 and pre- installed CAD, CAM and additive manufacturing (AM) softwares
В	Required feat	tures
B.1	40CrMoV13-9 efficient equiv	9 Nitride steel plates or any cost- valent grade
B.2	The table shou be able to mov in all three X, and Z direction	ve Y,
3		he figure, the pyrometer should standalone manual Z-table ne CNC bed.

B.4	The provision to set a pyrometer and laser pen pointer should be provided by defualt. Itemwise price of consumables cutting tools and tool holders, fume extractor, and sensors (laser pointer and pyrometer) should be shown separately as part of the total price of the setup. However, the indenter has a choice to proceed with purchase without any or few of the items mentioned in B.4.
C	Required documents
C.1	Manual/s for complete machine/s parts and specifications
C.2	Manual/s for machine operation
C.3	Manual/s for safety instructions and specifications
C.4	Accuracy report
F	Warranty (1 years from the date of installation)
	Annually maintenance for three continuous years should be quoted separately on top of one year standard warranty. The user have full rights to apt or not to apt for the AMC within the one year