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	Additive Manufacturing	Project: Development of Laser-based Directed energy Deposition Additive Manufacturing Machine DPP2202201-1
	Annexure-1:- Technical Specifications of Ball Screw Linear Actuators	

Annexure-1

Sl. No.	Item description	Specifications	Vendor compliance Yes/No	Vendor Remarks
Workable Stroke Required				
1.	X axis	1440 to 1525 mm	Essential	
	Y axis (Y1 & Y2)	1040 mm	Essential	
	Z axis	1040 mm	Essential	
Total Actuator Length (excluding body end covers on both sides) required				
2.	X axis	1900 mm	Essential	
	Y axis	1464 to 1490 mm	Essential & Specify	
	Z axis	1250 mm	Essential	
Quantity				
3.	X axis	1 No.	Essential	
	Y axis	2 Nos.	Essential	
	Z axis	1 No.	Essential	
Positional Accuracy				
4.	X axis	±23 µm or better ISO P5 class	Essential	
	Y axis	±23 µm or better ISO P5 class	Essential	
	Z axis	±23 µm or better ISO P5 class	Essential	
Driving mechanism				
5.	X axis	Ball screw	Essential	
	Y axis	Ball screw	Essential	
	Z axis	Ball screw	Essential	
Ball screw type				
6.	X axis	Ground / Rolled	Essential	
	Y axis	Ground / Rolled	Essential	
	Z axis	Ground / Rolled	Essential	
Ball screw diameter				
7.	X axis	25 or 32 mm	Essential	
	Y axis	32 mm	Essential	
	Z axis	25 mm	Essential	

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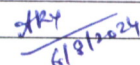
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Ball screw resolution					
8.	X axis	5 to 10 μ m or better	Essential & Specify		
	Y axis	5 to 10 μ m or better	Essential & Specify		
	Z axis	5 to 10 μ m or better	Essential & Specify		
Lead					
9.	X axis	10 mm	Essential		
	Y axis	10 mm	Essential		
	Z axis	10 mm	Essential		
Repeatability					
10.	X axis	5 to 10 μ m or better	Essential & Specify		
	Y axis	5 to 10 μ m or better	Essential & Specify		
	Z axis	5 to 10 μ m or better	Essential & Specify		
Carriage Length					
11.	X axis	Specify	Essential		
	Y axis	Specify	Essential		
	Z axis	Specify	Essential		
Equivalent mass in movement					
12.	X axis	85 - 95 kg	Essential		
13.	Y axis	164 - 198 kg	Essential		
14.	Z axis	70 - 78 kg (self-weight + payload of 35 kg)	Essential		
15.	Deflection of X Axis	Based on our gantry structure, Total deflection of X axis in worst condition (self-weight and Z axis weight to be considered) should be < 40 μ m. Vendor should provide deflection value during the assembly for X-axis. Supporting calculations to be provided.	Essential		

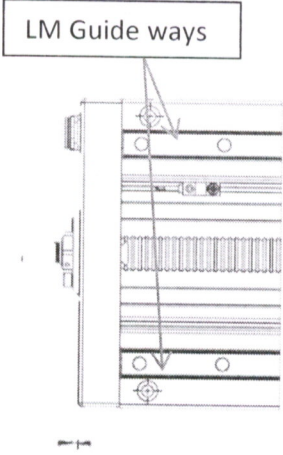
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
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
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		 <p>NOTE: X axis linear stages should have minimum width of about 200/225 mm and it should be incorporated with two LM guide ways for extra rigidity</p>				
Construction						
16.	X axis	Aluminum Extrusion	Essential			
	Y axis	Aluminum Extrusion	Essential			
	Z axis	Aluminum Extrusion	Essential			
Sealing /Protection systems						
17.	X axis	Linear stages should be equipped with sealing cover strips/bellows in order to protect mechanical components inside the linear unit against contamination of particles and dust. The sealing cover material should be heat resistant and flame retardant.	Essential & Specify			
	Y axis					
	Z axis					
RPM at application speed						
18.	X axis	1500 rpm	Essential			
	Y axis	1500 rpm	Essential			
	Z axis	1500 rpm	Essential			
Speed						
19.	X axis	0.25 m/s	Essential			
	Y axis	0.25 m/s	Essential			
	Z axis	0.25 m/s	Essential			

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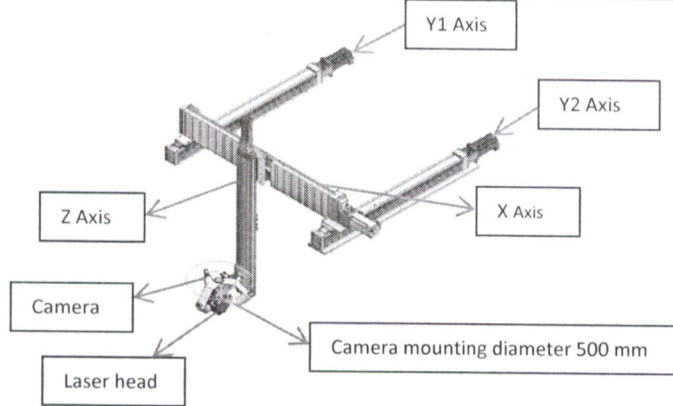
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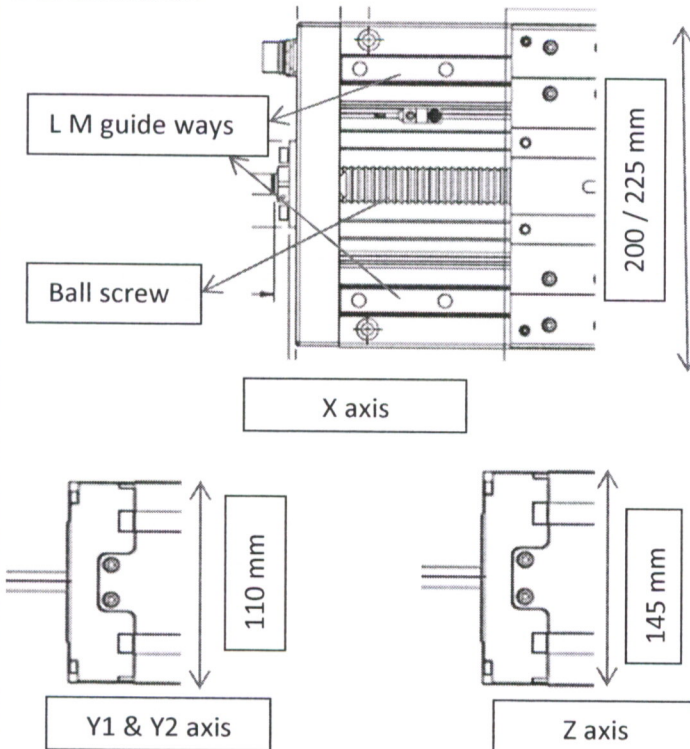
Schematic Representation (only for Reference)

20.



Note: The actuator's workable stroke should be 1040 mm, excluding the non-workable stroke length. The laser head, including the camera mounting diameter, measures approximately 500 mm. It must achieve a 1040 mm stroke length.

Body make: X axis linear stages should be incorporated with two LM guide ways and minimum width of 200/225 mm need to be maintained.



Essential

Acceleration

21.	X axis	1 m/s ²	Essential	
	Y axis	1 m/s ²	Essential	
	Z axis	1 m/s ²	Essential	

Acceleration time

22.	X axis	0.25 s	Essential	
	Y axis	0.25 s	Essential	
	Z axis	0.25 s	Essential	

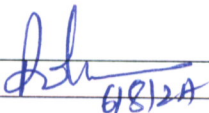
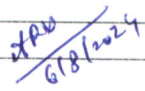
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Dimensions					
23.	X axis	L x W x H	Specify		
24.	Y axis	L x W x H	Specify		
25.	Z axis	L x W x H	Specify		
26.	Backlash	Zero	Essential		
27.	Preloading	Actuator should be preloaded to achieve zero backlash.	Essential. Specify the preload values		
28.	Life span of ball screw	12+ Years	Essential		
29.	Periodical maintenance (Lubrication)	One time	Essential		
30.	Provision for integration of linear scales	Actuators should have provision for integration of linear scales in future (preferably Heidenhain /Renishaw make)	Essential		
31.	In view of high accuracy requirement, Supplier will have to demonstrate the accuracy and specifications of the Linear actuator to CMTI at their manufacturing plant before despatching the actuators and after installation in CMTI.		Essential		
Moment of Inertia of masses					
32.	X Axis	in kgcm ²	Specify		
	Y Axis	in kgcm ²	Specify		
	Z Axis	in kgcm ²	Specify		
Moment Load capacities M					
33.	Mx	in Nm	Specify		
	My	in Nm	Specify		
	Mz	in Nm	Specify		
Motor Compatibility (Servo Motors)					
NOTE: Should be compatible with following Beckhoff Servomotors					
34.	X axis	AM8552-0FH0-0000	Essential		
	Y axis	AM8552-0FH0-0000	Essential		
	Z axis	AM8033-0EH1-0000 / AM8044-0FH1-0000	Essential		
Acceptance Tests					
35.	Accuracy Test with Certificate		Essential		
	Max Payload Test with Certificate		Essential		
	Multi axis movement Test with Certificate		Essential		
Documentation (Two sets)					
36.	a) Linear actuator Catalogue/Manuals.		Essential		
	b) Linear actuator drawings				

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	c) Test records d) Assembly procedures with accuracy values e) Maintenance / repair charts f) Preventive maintenance instructions. g) Lubrication chart & Instruction manual h) All Test Certificates with standard			
Service support-Turnaround time				
37.	Please indicate the shortest turnaround time for making the linear actuators operational from the time of reporting the breakdown.	Essential		
Warranty				
38.	Minimum 12 months or more. Warranty should include free service and free material replacement.	Essential		
Pre-dispatch inspection				
39.	CMTI will visit vendor's premise before dispatch of linear actuators. All Operations of linear actuators to be demonstrated by supplier. Accuracy certificate to be provided for the actuators after pre-dispatch inspection.	Essential		
Additional Requirement specification				
40.	Bidders should have prior experience in supplying linear actuators especially to additive manufacturing applications and are requested to give a list of their customers for similar actuators (Along with contact details) in India where their Linear actuators are installed. At least two such Linear actuators should be located in Government / PSU/ Research Laboratories/ Reputed private sector unit in India.	Essential		
41.	The bidder must have repair, maintenance and up-gradation facility in India with Office at Bangalore.	Essential		
42.	If any Additional spares required need to be mentioned.	Specify		
Limit Switches				
43.	X Axis	Specify	Optional (Quote separately)	
	Y (Y1 & Y2) Axis	Specify		
	Z Axis	Specify		

Additional Options for protection of mechanical components inside the linear actuator against contamination of particles and dust				
44.	X Axis	Specify	Optional (Quote separately)	
	Y (Y1 & Y2) Axis	Specify		
	Z Axis	Specify		
Couplings				
45.	X Axis	Specify	Optional (Quote separately)	
	Y (Y1 & Y2) Axis	Specify		
	Z Axis	Specify		

Prepared By	 G812A	Checked By	 G18/2024
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