

Tender Document
on
***Procurement/Supply of various equipment/
machines/software for Mechanical Engineering Department***

Last date of submitting Tender Document: 04/03/2019 by 3.30 p.m.



Pathfinder for Excellence in Technical Education

Mechanical Engineering Department
NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING AND
RESEARCH, KOLKATA

Block-FC, Sector-III, Salt Lake City,
Kolkata- 7000 106



**NATIONAL INSTITUTE OF TECHNICAL
TEACHENARS' TRAINING AND RESEARCH,
KOLKATA**

(Under Ministry of HRD, Government of India)

Block –FC, Sector – III, Salt Lake City, Kolkata – 700 106

Tel: +91-33-23370479 /4125 Fax: +91-33-23376331

Website: <http://www.nitttrkol.ac.in>

NOTICE INVITING TENDER

Sealed tenders are invited from manufacturers or their authorized-business partners/marketing agents/service agents or dealers for **Procurement/supply of various equipment/ machines/software for Mechanical Engineering Department.**

Tender Paper (TP) will be available in the Institute website and CPP Portal, Govt. of India from 11/02/2019 to 04/03/2019. Bidders may submit their quotation latest by 3.30 p.m. on 04/03/2019 Sealed tender should contain quotations, EMD & tender fee (Demand Draft of Rs. 500/- i/f/o **“Director, NITTTR, Kolkata”** payable **at Kolkata**) in three separate envelopes. Tenders will be opened at 5:00 p.m. on the same date.

Advt. No. 14/2018- 19

Director



**NATIONAL INSTITUTE OF TECHNICAL
TEACHERS' TRAINING AND RESEARCH
(Under Ministry of HRD, Govt. of India) BLOCK
FC, SECTOR III, SALT LAKE CITY,
KOLKATA- 700 106**

TENDER NOTICE

ON

**SUPPLY OF VARIOUS EQUIPMENT/MACHINES/SOFTWARE FOR
MECHANICAL ENGINEERING DEPARTMENT**

Sealed tenders are invited in from the Manufacturers/ Bonafide Suppliers / Authorized Dealers for **SUPPLY OF VARIOUS EQUIPMENT/MACHINES/SOFTWARE FOR MECHANICAL ENGINEERING DEPARTMENT.**

For the details please visit NITTTR website www.nitttrkol.ac.in and CPP Portal, Govt. of India . The tender documents can be downloaded from the website. The tender document is also obtainable from the office. The cost of Tender paper is Rs.500/- by way of Demand Draft drawn in favour of 'The Director, NITTTR, Kolkata' payable at Kolkata. The tender should be accompanied by DD/ Bank Guarantee of 4 % of estimated price as Earnest Money Deposit (EMD).

The Tender Documents with detailed requirements and other terms & conditions can be submitted as per the dates mentioned below:-

Sale of Tender Document	Last Date & Time of submission of Tenders	Tender opening at NITTTR, Kolkata
11 / 02/ 2019 to 04/ 03 /2019 (11:00 AM to 5:00 PM)	04/ 03 / 2019 Up to (3:30 PM)	04 / 03 / 2019 5.00 PM onwards

Advertisement No: 14/2018-19

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TRAINING AND RESEARCH, KOLKATA
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BLOCK FC, SECTOR III, SALT LAKE CITY, KOLKATA-700 106**

**TENDER NOTICE
ON**

**SUPPLY OF VARIOUS EQUIPMENT/MACHINES/SOFTWARE FOR MECHANICAL
ENGINEERING DEPARTMENT**

Sealed tenders are invited in TWO BID FORMAT from the Manufacturers/Bonafide Suppliers/Authorized Dealers for SUPPLY OF VARIOUS EQUIPMENT/MACHINES/SOFTWARE FOR MECHANICAL ENGINEERING DEPARTMENT. The two BID FORMAT are as follows (1) Part One- TECHNICAL BID giving detailed terms and conditions with documents mentioned in the tender document and (2) Part Two- FINANCIAL BID

Both Part One- TECHNICAL BID(Envelop-I) and Part Two- FINANCIAL BID(Envelop-II) in separate sealed covers which shall be contained within another main envelope mentioned "Advertisement No" and should mention SUPPLY OF VARIOUS EQUIPMENT/MACHINES/SOFTWARE FOR MECHANICAL ENGINEERING DEPARTMENT. Item wise bidding in the TWO BID SYSTEM will be accepted.

For the details please visit NITTTR website www.nitttrkol.ac.in and CPP Portal Govt of India. The tender documents can be downloaded from the website. The tender document is also obtainable from the office. The cost of Tender Document is Rs 500/- by way of Demand Draft drawn in favour of 'The Director, NITTTR, Kolkata' payable at Kolkata. The tender should be accompanied by DD/Bank Guarantee of 4% of estimated price as Earnest Money Deposit (EMD).

The Tender Documents with detailed requirement and other terms & conditions can be submitted as per the dates mentioned below:

Sale of Tender Document	Last date & Time of submission of Tenders	Tender opening (only Technical Bid) at NITTTR, Kolkata
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DETAILED SPECIFICATION FOR VARIOUS EQUIPMENT/MACHINES/SOFTWARE

1. 3D PRINTER WITH SCANNER & SOFTWARE (Estimated Rs. 20 Lakh) Qty:01

Specification	
Maximum Printable Area:	(X) 305 mm x (Y) 205 mm (Z) 575 mm - (12"x 8" x 23") or more
Filament Diameter:	1.75 mm to 3 mm (depending on the extruder)
Extruder Diameter:	0.4 mm to 0.6 mm Extruder Temperature: 50 °C to at least 250 °C
Number Of Extruders:	Single
Material Supports:	PLA, Soft PLA, Flexible, WOOD, PVA, ABS XY
Axis Resolution:	200 microns (0.200 mm)
Z Axis resolution:	100 microns (0.100 mm)
Print Head Speed:	50 to 200 mm / second (depending on quality/polymer)
Layer Thickness:	0.07 to 0.15 mm (with one nozzle)
LCD Support:	Yes
SD Card Support:	Yes
SD Card Memory:	8 GB or more
Power Supply Unit Outside:	110-240V, 50/60Hz, 2-2.2A (input), and takes standard IEC cable
Run Time Change Setting Option:	Nozzle Temperature, Fan Speed, Print Speed, Feed Rate etc.
Slicing Software:	
Complimentary software Software should support 3D digital files into buildable model files Should run on 32 and 64 bit operating Systems Windows XP, 7, 8, Vista Clear, familiar and easy-to-use interface Scaling, rotating and movement of parts on a simulated print bed Ability to create custom profiles as needed Imperial/metric conversion available	

2. SPECIFICATIONS FOR MICRO ECM (Estimated Rs. 20 Lakh) Qty : 01

Tool Area	300 square mm
Cross Head Stroke	75 mm
Supply Input:	Hexa Phase 440 Volt AC
Machining Load:	0-25 V, 0-300 Amps variable
Pulsating Facility Lcd	On time 100 microseconds to 1 second variable off time 100 microseconds to 1 second variable plus amplitude 1V-25V variable
Chemical Flow Control:	Variable with flow meter and pressure gauge
Machining Current Setting:	Variable
Machining Voltage Setting:	Variable
Machining Time:	0 to 4999 seconds variable
Digital Led Display:	For voltage, output current, Machining electrolyte temp., forward & reverse, feed rate settings, feed rate
Protection:	For Current overload, short circuit
Usb Port:	For computerized data logging,
All Setting Parameters:	By LCD touch screen panel
Machining Cell:	Pump Motor – 1/4 HP AC
Process Table	300 mm X 40 mm X 150 mm (approx..)
Ecm Tools:	half -round, square & Hexagonal tool
Tool Feed Motor:	Servo Motor with control on forward & reverse, feed rate settings, feed rate display. Through touch screen
Electrolyte Capacity:	40 liter
Micromachining Facility:	Low voltage/current
Accessories:	40 Kg NaNO ₃ , Tools, connecting cables, Anodic clamps 4 nos. clamping bolts 10 nos.
*Additional optional accessories should be indicated separately along with their Price.	
The above specifications are desirable and the actual numbers achievable for your system should be indicated.	

3. VICKERS MICRO HARDNESS TESTER WITH AUTOMATIC MEASUREMENT SYSTEM (Estimated Rs. 20 Lakh) : Qty 01

1. Description of the ITEM: Vicker's Microhardness Tester

2. Detailed Specifications and Quantity: 1 No

Supply, installation and commissioning of an automatic PC interfaced micro hardness tester with image grabber hardware and software with accessories conforming to the following specifications.

I. Micro Hardness Tester:

- | | |
|--|---|
| 1. Test Load | 1gf to 2000 gf (1, 5, 10, 25, 50, 100, 200, 300, 500, 1000, 2000gf).
Automatic switching of load types and load duration. |
| 2. Loading type | Automatic loading with indenter velocity Settable – 5 µm/sec to 60 µm / sec, step size 1 µm /sec |
| 3. Selection of indenter | Motorized turret |
| 4. Dwell time | 5 – 99 Seconds, step size 1second |
| 5. Load selection | Motorized X, Y and Z axis movement with manual override. |
| 6. Standard objectives | A. For scanning 10 x, Objectives from manufacturer of repute in this area.
10X – NA 0.25 mm, free working distance 17.6 mm
B. For measurement 50 x, Fluorite Objectives from manufacturer of repute in this area (Leica, Zeiss or similar).
50X – NA 0.80 mm, free working distance 1.1 mm |
| 7. Measurement | Digital Filler micro meter eyepiece (10 X) with 0.01 µm least Count or better.
Accuracy minimum, measurement up to 360 µm at 500X or Better. |
| 8. Resolution | Measuring device shall be capable of reporting the diagonal lengths within 0.5µm or 0.5 % whichever is larger. The measuring device should be able to report the diagonal lengths in 0.1µm increments. |
| 9. Specimen Stage & Focus | A. X/Y / travel: ceramic coated Motorized 150 mm x 150 mm
B. X/Y positioning increment: 1µm
C. Focusing: Autofocusing (motorized)
D. Automatic measurements at predefined locations |
| 10. Maximum specimen dimensions | Height 90 mm, depth 85 mm. Hardness measurements of thin films and surface treated layers are desirable. |
| 11. Illumination | Computer controlled 6 V, 20 W halogen or equivalent LED with Lambda
Plate of 530 angstrom wavelength. Adjustable illumination intensity & diaphragm for optimum contrast and resolution. |
| 12. Operational panel | LCD touch screen panel with the provision for display & |

Control of the following parameters: dwell time, countdown, loading, Unloading, intensity variation, load selection, turreting of objective and Indenter, X-Y Movement of test table, Z-movement of test Table for focusing

- 13. Hardness** Automatic reading of hardness & hardness graph plotting with motorized X- Y & Z motion control with auto focusing facility with continues 100 reading
- 14. Camera** 1/2" CCD Camera with adaptor and cable CCD Colour camera, Camera Pickup Element (size) - 1/2" Interline transfer CCD Image sensor. Resolution-No of pixels > 800 X 500 Automatic white balance correction shall be provided.
- 15. Camera port** With optical diversion knob
- 16. Manual over riding** For load selection, turret, X- Y movement, Z movement
- 17. Power supply** Input Voltage: Single Phase 220V-240V AC \pm 5% Supply frequency: 50 Hz + 1.5 Hz
- 18. Interface** USB
- 19. Vibrational control** Anti-vibration leg pads

II. Computerized Attachment

The attachment consisting of

1. 1/2" CCD Camera with adaptor
2. Image grabber card

III. Data acquisition and control system

User friendly software should perform all automated operation and analyses of the data. The software should perform the following:

1. Software for Vickers Hardness estimation by automatic and cursor clicking on the diagonal ends of an indentation image, on computer screen.
2. Software offering dwell time countdown, loading, unloading, intensity variation, turreting of objective and Indenter, X-Y Movement of test table, Z movement of test table (three speeds - slow /med/ fast) (Operations can be performed either through computer or LCD panel).
3. Grain size measurement.
4. Linear measurement, angular measurement, area measurement.
5. Percentage phase analysis module.
6. Image database maintenance software.
7. Report generation in MS Excel format.
8. Micron marker.
9. Statistical calculation- average, standard deviation, coefficient of variation, minimum value, maximum value (graphical display with error bands).
10. The software shall be installed in the data acquisition and control system with the following specifications

Processor : Intel (R) Core i5 (4th Gen), 1.6 GHz clock speed with turbo boost up to 2.6 GHz, 3 MB cache or better configuration
 Chipset : Intel Mobile HM86 Express or better
 Main memory : 4 GB DDR3, 1600 MHz expandable up to 16 GB or better
 Hard disk : 500 GB SATA Hard disk drive or better
 Monitor : 21 inch HD LED screen display
 Operating system : Windows 7 with update provisions
 Others : 3 USB ports, Ethernet, wireless and Bluetooth
 11. One set of the software should also be supplied separately in a CD/DVD.

IV. Standard Accessories

- 1. Fixture for odd shaped components 1No.
- 2. Holder for holding thin sheet 1No.
- 3. Flat edge holder 1 No .
- 4. Level indicator 1 No .
- 5. Spare fuses 2 No .
- 6. Hardness test blocks 2 Nos with international certificate
 - (i) High hardness - 700 ± 30 HV at 1000 gm
 - (ii) Low hardness - 200 ± 30 HV at 200 gm
- 7. Indenters 1 No. Vickers, 1 No Knoop with manufacturer certificate

V. Acceptance criteria: Automatic measurement of hardness values with measurement of Hardness with an accuracy of ± 5 HV shall be demonstrated and one performance certificate should be attached for same from any government organisation

VI. Others:

- 1. The micro hardness tester shall meet ASTM E 384, ISO, and IS standards with respect to accuracy of loading system, Vickers Indentor, Knoop Indentor, calibration of microscope, calibration of standard blocks etc. The machine should be traceable to NABL.
- 2. Test certificates for the calibration blocks, detailed technical catalogues and two sets of operation/Instructions manual in English shall be supplied for the instrument.

4. ULTRASONIC ASSISTANCE SETUP FOR WELDING AND ULTRASONIC WELDING MACHINE (Estimated Rs. 20 Lakh) : Qty 01

I. Ultrasonic Welding Machine

ELECTRICAL SPECIFICATIONS:		
Power requirements	1100 Watts or higher	
Line voltage	200- 240V AC, 50/60 Hz, Single phase	
Output power	1100 watts or higher	
Frequency:	20 kHz or better	
Parameter ranges:	Range	Increment/step
Weld & hold time range:	50-1000 millisecond (1 sec)	1 milliseconds
	1-10 seconds	10 milliseconds
After burst delay and duration	“Off” or 50-1000 millisecond (1 sec)	1 milliseconds
	1-10 seconds	10 milliseconds
Signals at Ambient temperature:		
Ready Signal	5 -50 °C Both 24V DC and dry (clean) contact closure available	
General Alarm	24V DC, negative Logic	
Weld on	25 mA max	
External Reset	+24V DC, 25 mA max	
MECHANICAL SPECIFICATIONS:		
Maximum Force on Part	1.96 kN at 690 kPa or better	
Dynamic triggering Range	67-890 N max	
Dynamic Follow through Range	67-890 N max	
Stroke length	102 mm (preferable)	
Cycle rate	90 CPM at 1” stroke length, 345 kPa, 50 ms weld , 50 ms hold	

Basic Width and depth	16.25" and 27.5"
Material to be welded	Thermoplastic e.g. ABS, PC, PP, PE etc.

II. Ultrasonic Assistance for Welding.

The same would be used for ultrasonic assistance of other welding processes like friction stir welding using milling machine. The assistance set up should be comprised of the following:

1. Ultrasonic power supply 1.25V 20 KHz
2. 20 KHz converter
3. Booster 20 KHz.
4. Titanium Horn.

5. THERMAL IMAGING CAMERA (Estimated Rs. 16 Lakh) Qty 01

1. Temperature range: -20°C to 2000°C
2. IR resolution - 320 × 240 pixels
3. Thermal sensitivity/NETD - <40 mK @ +30°C (+86°F)
4. Field of view (FOV) - 31° × 24° or better
5. Minimum focus distance - 0.4 m (1.31 ft.)
6. Spatial resolution (IFOV) - 1.36 mrad
7. Image frequency – 30Hz or more
8. Focus – Automatic (one shot) or manual
9. Digital zoom – 2× and 4× or more
10. Spectral range – 7.5–13 μm
11. Display – Touch screen, minimum 3.5 in. LCD, 320 × 240 pixels
12. Auto orientation - Automatic landscape or portrait
13. Image adjustment - Auto or manual
14. Super resolution mode for IR image with enhanced detail presentation
15. Picture in Picture - Resizable and movable IR area on visual image
16. Accuracy - ±2°C (±3.6°F) or ±2% of reading

6. PRECISION WEIGHING BALANCE (Rs. 3 Lakh) Qty 01

1. Weighing capacity: 75 g or more
2. Readability: 0.1mg or less
3. Reproducibility: 0.05mg or less
4. Stabilization Time: 10 sec or less
5. Calibration: Fully Automatic time and temperature control internal calibrations (FACT)
6. Power Supply: 230 ±10V / 50Hz AC
7. Weighing Pan: 70 mm to 100 mm
8. Display: LCD Colour Display

7. HYDRAULIC COMPRESSION MOLDING PRESS WITH HEATING & COOLING FOR PLASTICS (Estimated Rs. 6 Lakh) Qty 01

1. Operation through Hydraulic Power pack system with Pressure regulating system with mechanical needle gauge range up to 250 kg/cm²
2. Capacity: 0-10 Tons
3. Working platen size: 200mm X 200mm or more
4. Specimen thickness tolerance: 0.05mm to 0.1mm.
5. Stroke : Day Light opening about 200 mm
6. Temperature controller: For temperature and cooling control for both platens
7. Temperature controller: Working range ambient to 300°C or more
8. Digital pressure indication on screen display: Digital temperature reading
9. Cooling system: Required

10. Anti-vibration system: Preferred.
11. Operating power supply: Standard.
12. Safety feature to avoid burn injury.

8. EXTRUDER/INJECTION MOLDING MACHINE (Estimated Rs. 20 Lakh) : Qty 01

1. Screw diameter (mm): 20 (approx.) x 2
2. Diameter ratio (Do/Di): around 1.5
3. Flight depth (mm): around 2.0
4. Barrel to screw clearance: about 0.15 mm
5. Screw to screw clearance: about 0.25 mm
6. Maximum drive power: about 2 kW
7. Maximum Screw Speed: 1000 rpm or more
8. Specific Nominal Torque /shaft (Nm): about 8.0
9. Specific torque (Nm/cm³): about 7.0
10. Maximum Process Temperature: 300 °C or more
11. Throughput range (kg/h): 0.2-1.0
12. Operating Power Supply: Standard.

9. SOLID WORKS SOFTWARE (Estimated Rs. 5 Lakh) : Qty 01

Solid works Software:-

Solid works Educational Suit, Latest Edition

User: Minimum 10 user, 64bit.

Publisher: Dassault System

Type of License: - Perpetual

SOLIDWORKS® Education Edition includes:

- SOLIDWORKS Premium (3D CAD software)
- SOLIDWORKS Simulation Premium (FEA tools)
- SOLIDWORKS Flow Simulation (CFD tools)
- SOLIDWORKS Motion (kinematics analysis)
- SOLIDWORKS Plastics (part and mold filling analysis)
- SOLIDWORKS Sustainability (environmental impact tools)
- SOLIDWORKS Electrical Professional (electrical systems design tools)
- SOLIDWORKS Model Base Definition (define, organize, and publish 3D PMI)
- My SolidWorks Standard (your connection to everything SOLIDWORKS)
- SOLIDWORKS CAM

10. MASTER CAM SOFTWARE (Estimated Rs. 3 Lakh) : Qty 01

Master CAM Software:-

Mastercam Educational Suite, Latest Edition

User: - Minimum 10 user, 64 bit

1. Includes Design, Solids, Mill, Lathe, Router, and Wire EDM programming
2. Add-ons- multiaxis and Art.
3. Type of License: - Perpetual

11. DYNAMOMETER FOR CNC LATHE MACHINE (Estimated Rs. 6 Lakh) :Qty 01

Dynamometer for CNC lathe machine

Technical Specification:-

1. Measurement: X, Y & Z direction force measurement simultaneously.
2. Capacity :- 0 to 5KN
3. Sensitivity :- 0.1N
4. Compatibility with CNC lathe machine: - Equipment supplied with specially designed turret for compatibility with CNC lathe machine, and necessary accessories.
5. Software: - Lathe tool software exclusively designed and developed for measuring the force X, Y & Z direction during turning operation.
6. Software Features: digital display of force, Graphical display of force, component no. type, date, time, data recording, printing, transfer to MS
7. Computer: - Latest compatible computer system with original Intel processor, USB port.
8. Accuracy:- 0.5%
9. Power requirement: - 220 V, 1 Phase, 50 Hz (300 V A max.)

12. DYNAMOMETER FOR CONVENTIONAL LATHE MACHINE (Estimated Rs. 5 Lakh)

Qty 01

Technical Specification:-

1. Force: - XYZ direction.
2. Capacity: - 0 to 500 kg.
3. Accuracy: - 1% of full scale.
4. Bridge resistance: 350 Ohms
5. Tool post diameter:- 20mm/25mm
6. Display: - 3 independent for X, Y & Z force.3 1/2 digit LED display.
7. Compatibility with lathe machine and necessary accessories.
8. Power requirement: - 220 V, 1 Phase, 50 Hz.

13. DYNAMOMETER FOR MILLING MACHINE (Estimated Rs. 6 Lakh) :Qty 01

Technical Specification:-

1. Force: - XYZ direction.
2. Capacity: - 0 to 500 kg min.
3. Accuracy: - 1% of full scale.
4. Bridge resistance: 350 Ohms
5. Tool post diameter:- 20mm/25mm min.
6. Display: - 3 independent for X, Y & Z force: 3 1/2 digit LED display.
7. Compatibility with lathe machine and necessary accessories.
8. Self-centring vice 4” size to hold the specimen.
9. Power requirement: - 220 V, 1 Phase
10. Compatible with CNC milling machine with CNC compatible software.

14. HOLE DRILLING MACHINE FOR RESIDUAL STRESS MEASUREMENT (Estimated Rs. 20 Lakh) : Qty 01

The equipment should be semi-automatic or automatic drilling and acquisition process ensuring high repeatability, high speed drilling, automatic stepping motor control of drilling depth, automatic zero-depth detection, measurement of residual stress variation with the testing depth, choice of stress profile calculation methods, choice of residual stress calculation methods, compliant to the ASTM E837-08 standard, high measuring accuracy.

Technical specifications of strain gage	
Digital strain gage amplifiers:	Same or Equivalent to HBM Spider 8, HBM Spider 8.30, HBM MGCplus, HBM QuantumX, etc.
Technical specifications of alignment-drilling tool	
Dimensions (height, width and length) without dial gages	270 x160x175 (mm) preferable
Maximum turbine speed	400,000 RPM
Acoustic emission (at 1 meter)	76 dBA
Max turbine feed pressure	5 bar approx.
Drilling resolution	5 µm or better
Drilling speed range	0.03 to 1 mm/min
Vertical lift (fast/manual)	60 mm
Vertical lift (slow with motor)	6 mm approx
Horizontal movement (x;y)	7 -10 mm or better
Height adjustment of feet	60 mm or higher
Technical specifications of electronic control system	
Dimensions (height, width and length)	140 x 245 x 220 mm approx.
Grid power supply	90 - 264 (50 - 60Hz)

Compressed air max. input pressure	6 bar approx.
Standard for hole drilling measurements	ASTM E 837-08
Small drilling hole range	(1.8 – 2.0 mm)
Vertical movements	Manual and Automatic controlled
Automatic controlled vertical movement	A resolution of 1µm and feed rate from 0.03 - 1 mm/min Automatic zero-depth detection
Laptop with compatible software	Intel Core i5, 8 GB RAM, USB ports 3, Windows operating system Latest Version, Drilling control and data acquisition software

15. Wire EDM (Estimated Rs. 22 Lakh) : Qty 01

Sl.No	Item with specifications	Quantity
1.	<p>CNC Wire-EDM Machine (with max. 45° Taper Cutting Facility)</p> <p>(a) Wire spools and holder (b) Compatible software for data acquisition of results (c) PC and printer</p> <p><u>Detailed Specification:</u></p> <p>[1] Special Features:</p> <ul style="list-style-type: none"> • Closed loop DC servo system X, Y, U, V axes for higher repeatability. • Fully enclosed U/V table LM guides and ball screws away from working area. • Motorised Quill movement using LM guides. • Robust structure for better accuracy. • Semi-Automatic Wire Threading. • ‘ELCAM’ part programming software (Windows based) • ‘e’ pulse technology • 16 Step programmable flushing (Optional) • Multilanguage display (Optional) • Hand held machine control panel • Mineral Filtration System (Optional) • Wire chopping assembly (Optional) <p>[2] Details of the MACHINE TOOL:</p> <p>1. Max. Workpiece dimensions (W x D x H): 400 x 500 x 200 mm</p> <p>2. Max. Workpiece Weight : 300 kg</p> <p>3. Main table travel : 300 x 400 mm</p> <p>4. Main table positioning accuracy : 0.005 mm</p> <p>5. Main table max. Jog speed : 900 mm/min</p>	1 no.

	6. Aux. table travel : 80 x 80 mm	
	7. Taper angle : at least +/-30°	
	8. Resolution : 0.0005 mm	
	9. Job admit : 200 mm	
	10. Wire spool capacity : at least 6 kg	
	11. Wire electrode diameter : 0.25mm (STANDARD) 0.15, 0.2 (OPTIONAL)	
	12. Wire guide type : DIAMOND CLOSED TYPE	
	13. Wire feed rate : 0 - 15 m/min	
	14. Wire tension : 2.5 kgf	
[3] CNC Pulse GENERATOR Based on E-Pulse Technology		
	Pulse Generator	MOSFET, Storage less
	Pulse Peak Voltage	1 Step
	Max. Machining Current	20 A
	Pulse Peak Current	24 Steps
	Pulse ON Time	32 Steps
	Pulse OFF Time	64 Steps
	Trim-cut mode (Multi-pass cutting)	Standard
	Abnormal Discharge Control	2 stage
	Cabinet Cooler	Built-in
	Line Filter	Built-in
	Input Power Supply	3-Phase AC 415V, 50 Hz
		(Alternate voltage ratings available on request)
	Connected load	10 KVA
	Average load	6 ~ 7 KVA
[4] Technology:		
1. Built-in EDM Technology: Standard & User definable		
2. Automatic selection of machining parameters with manual over-ride		
3. Proportional/Trim-Cut mode		
4. Storageless (capacitor-free) constant energy discharge		
5. Corner control		
6. Cutting Speed: At least 170mm ² sq/min (φ 0.25 mm Special wire and 50 mm HCHC Workpiece)		
7. Detailed Technology charts for Steel, Copper and Carbide.		
8. Technology guidelines for Aluminium, Graphite and Exotic materials like Titanium, Inconel etc.		
9. Best surface finish: at least 0.8 μm Ra value.		
[5] Geometry, Position Measuring System:		
	Controlled Axes	X,Y,U,V simultaneous/Independent
	Main Table Servo System	Closed Loop DC Servo
	Auxiliary Table Servo System	Closed Loop DC Servo
	Positioning measuring system - X,Y,U,V	Incremental Encoder

	Interpolation	Linear, Circular	
	Least Input Increment	0.001 mm	
	Least Command Increment	0.0005 mm	
	Max. Programmable Dimension :	+/- 99999.999 mm	
	Position Command :	Incremental & Absolute	
	Machine reference point (X,Y,U,V)	Available	
	<p>[6] Type of CNC Control: An advanced high speed, high precision CNC continuous path control with integrated Program Logic Control (PLC) based on dual processor architecture incorporating state of the art 56 Bit Digital Signal Processor (DSP) for multi-axes precise motion control at sub-micron level and 32 Bit computer for human-machine interface. The program code should be based on RS-274 standard and it should provide manual as well as built-in graphical APT programming.</p> <p>[7] Data Input and Output:</p> <ol style="list-style-type: none"> 1. Keyboard: Standard ASCII Keyboard 2. Isolated RS 232C serial interface 3. 1.44 MB, 3.5" Floppy Disk <p>[8] Display:</p> <ol style="list-style-type: none"> 1. Display Type: At least 15'' LCD/LED Colour Display. 2. Text in English 3. Other Information should be displayed on screen: <ul style="list-style-type: none"> • Large character Actual Value display for X,Y,U,V • Previous, Current and Next block • Cutting Rate, Cutting/Machine Time, Total Path Length, Path Length to Go • Active EDM parameters • Bar graph display for Machining Gap Voltage • 2D/3D graphic simulation of wire path with zoom facility • Status display for active G,M codes, flags, coordinate systems • Display of part programs with comments • Machine Parameter & EDM Technology • Input/output status • Error messages <p>[9] Program</p> <ol style="list-style-type: none"> 1. Program memory: 128KB with battery back-up for Work 		

	<p>Program</p> <ol style="list-style-type: none"> 2. Part Program EDIT: <ul style="list-style-type: none"> • Preparatory and miscellaneous functions: M0 / M1 • Auxiliary functions: H(0-99) program variables, • D (0-999) Wire Diameter Compensation Variables, A Taper Angle • Inch/Metric, absolute/incremental data input • Program selection of machining parameters • Variable block format • Decimal point programming • Subroutine nesting upto 4 levels • Syntax Driven Editor • Graphic Simulation 3. OFF-LINE Automatic Part Programming System 'ELCAM': <ul style="list-style-type: none"> • Windows based Graphic programming CAD tool • Powerful Editing • Transformations (Copy, Move, Rotate, Scale, Mirror, R-Mirror etc.) • Tool path reversal • DXF Compatible • On profile offset & taper change facility. 4. Background Programming. 5. Diagnostic 6. HV 1.7 Software for Helical Gear programming (Optional) <p>[10] Operating Aids:</p> <ol style="list-style-type: none"> 1. Menu for operating mode selection 2. Software keys for parameter and operation selection 3. Machine Coordinate System Reference 4. 6 Work Coordinate systems 5. Edit (Part program) 6. Program / File management 7. MDI 8. Continuous Cycle 9. Dry Run 10. Single step 11. Mirror Image : On X, Y, XY axes 12. Pattern Rotation : 0 to 359.999° 13. Axes Exchange : X & Y 14. Graphic simulation of part program. 15. Wire path graphic display during machining 16. Edge Finding 17. Center Finding 18. Dry spark mode for Wire Verticality Alignment 19. Feed Hold 20. Override : Feed rate, EDM parameters 21. Optional Stop 	
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22. Block skip
23. Stored stroke limits
24. External machine control panel :
25. Rotary selectors: Mode (Home, Jog Feed rate, Incremental Jog)
 - Selection keys: Cycle START, DRY run, feed HOLD, HALT, WF/WT, FLUSH, Flushing Pressure, CS, Jog Axes
 - LED Indicators: Start, Dry Run, Feed Hold, WF/WT, Flush
 - NO MAN function
26. Pre-Spark function
27. Sixteen Step Programmable Flushing (**Optional**)

[11] Compensation:

1. Wire diameter / Spark Gap compensation on contour
2. Backlash compensation
3. Pitch error compensation

[12] Safety and Protections:

Safety and protection routines continuously active for CPU, Measuring circuit, Servo overload, over traverse limits, Mains voltage.

[13] Diagnostics:

1. Display of error message with/without interruption of the operation in progress for alarms, programming errors, operational errors, memory input/output errors.
2. Diagnostic messages for machine tool interface.
3. Display of machine tool interface input/output signal status.

[14] Pump and Filter:

- | | |
|------------------------------|-------------------|
| 1. Dielectric Fluid | : Deionised water |
| 2. Dielectric tank capacity | : 250 Ltrs |
| 3. DE-ION Resin capacity | : 7.5 Ltrs |
| 4. Paper Filter | : 0.01 mm |
| 5. Dielectric cooling system | : 1700 K Cal |

[15] Technical documentation (two sets of hard copy & one set in CD)

1. Operators manual
2. Programming manual
3. Spare parts manual
4. Maintenance manual for mechanical, hydraulic, pneumatic and electronics
5. Foundation drawings
6. Electrical wiring diagrams & PLC diagrams
7. Preventive maintenance checklist, troubleshooting charts & guidelines
8. Machine test charts

	<p>9. Tool box 10. Conversion List of process parameters from machine unit to actual unit</p>	
	<p>Spare and Consumables: Wire (0.25 mm diameter) 35 kg (10 spools) Upper wire guide for 0.25 mm diameter wire 5 Nos. Lower wire guide for 0.25 mm diameter wire 5 Nos. Carbide power feed contact 10 Nos. Lower flushing nozzle of 6 mm diameter 20 Nos. Upper flushing nozzle of 6 mm diameter 5 Nos. Deionizing resin 30 liters Grease for lubrication of all the axes 5 kg (in the pack of 1kg)</p>	
	<p>NOTE: 1. Unloading and Installation at Site with Proper Training to staff and Students. 2. The machine shall be inspected for positional and geometrical accuracies. 3. Training for our staff and students at our premises on programming, operation and basic troubleshooting. 4. Training on selection of parameters for complex profile cutting.</p>	

16. PLASMA WELDING MACHINE (Estimated Rs. 15 Lakh) : Qty 01

Supply must consists of the followings:

- i. Power Source – 01 Nos.
- ii. Plasma Module – 01 Nos.
- iii. 4 m long Micro Plasma Torch – 01 Nos.
- iv. 4 m long Soft/ Medium Plasma Torch – 01 Nos.
- v. Cooling Unit – 01 Nos
- vi. 3 m long Earth Cable – 01 Nos.
- vii. Argon Gas Regulator – 01 Nos.
- viii. CO₂ Gas Cylinder-01 Nos.
- ix. Gas mixer with adjustable mixing valve and flow control-01 Nos. (Optional)
- x. Argon Gas Cylinder-01 Nos.
- xi. Consumable set
 - a. Gas Nozzle – 01 Nos
 - b. Ceramic tube – 02 Nos
 - c. Plasma nozzle – 06 Nos
 - d. Clamping sleeve – 01 Nos
 - e. Tungsten Electrode - 03 Nos

N.B.: Complete set of Micro Plasma Welding machine to weld MS and SS of 0.1mm to 0.8mm of Welding. There should be NO WELD BEAD appearance after welding. It should be fusion welding.

Additional 4 m Torch for Soft/ medium plasma welding should also be given.

1. SPECIFICATIONS

The power source should be Digitally controlled inverter Based with latest inverter techniques incorporating power factor control device to achieve 0.99 COSØ. Machine should have separate module for Plasma Module & Plasma/TIG Power source. The machine should be Single Phase 230V AC operable at minimum starting welding current of 0.5 Amps.

2. Technical data for Plasma Module:

1. Mains voltage -	230 V
2. Mains voltage tolerance -	-20% / +15%
3. Mains fuse protection (slow-blow) -	16 A
4. Primary contin. power (100% d.c.) -	0.9 kVA
5. Cos phi -	0.99
6. Pilot current range -	3.0 - 30.0 A
7. Pilot current at 10 min / 40°C (104°F) -	100% d.c. 30 A
8. Plasma Gas flow rate	0.2 – 10 Ltr/min
9. Open-circuit voltage -	88 V
10. Standardised working voltage -	10.1 - 11.2 V
11. Striking voltage (Up) -	9.5 kV
12. Protection -	IP 23
13. Marks of conformity -	S, CE

3. Technical data for Plasma/ TIG power source:

1. Power source Type	Digital Microprocessor Controlled inverter Based DC Power Source incorporating Power Factor Control device.
2. Input Supply	230V AC (-20 /+15%), 50Hz, Single Phase
3. Max Input KVA Rating	2.1 KVA
4. Output Current Range TIG MMA	0.5A – 80A 10A – 80A
5. Welding Current(for both TIG At 60% Duty Cycle At 100% Duty Cycle	80A (at 40°C ambient and 10min. duty cycle.) 70A (at 40°C ambient and 10min. duty cycle.)
6. COSØ	0.99
7. Open Circuit Voltage	85V DC
8. Pulse Frequency	0.2 Hz – 2 KHz.
9. Pulse Ratio	10 – 90% of base current
10. Background current level	1- 100% of pulse/main current
11. Starting Current	0% - 200% of welding current
12. End current	0% - 100% of welding current (for better crater filling)
13. Dimension L X B X W mm	485X180X344mm (approx.)
14. Weight	14.2 Kgs.
15. Degree of Protection	IP 23
16. EMC emission class (in accordance with EN/IEC 60974-1)	A

17. Ignition voltage (Up)	9.0KV
18. Standardized operating voltage : TIG	10.1 – 13.2 VDC

4. Additional Technical Feature:

1.The machine should have the following in built feature:
2.H F Ignition Facility
3.Pulse welding functions, slope up, slop down etc.
4.Automatic gas Pre flow & post flow facility
5. Gas test function
6.2Track/4 Track operation
7.Over temperature protection
8.Hot start/soft start
9.Crater Fill current function
10.Arc Force control
11.Continuously adjustable welding current
12. Step less control of current settings.
13.In-built safety measures against open circuit, short circuit or phase fault etc.
14. The machine should have facility to store minimum 100 no welding parameters/job once established and activate these stored data during repetitive type welding.
15.The machine should have function selection for following processes: 16.a. DC Micro Plasma; b. DC TIG; c. DC Pulsed TIG, d. TIG Tacking
17. The machine is fully protected against overloading/prevent damage due to operations at higher current range than specified, through built in tripping device.
18. The welding current and welding voltage is displayed in the front panel to know actual value of welding current and welding voltage.

5. THE FRONT PANEL SHOULD HAVE LED DISPLAY OF FOLLOWING FUNCTIONS:

1.Welding voltage & current
2.Operating mode
3.Welding parameter values like Gas pre-flow and post flow time, down slope and up-slope time, Pulse time, ignition current, main current etc.
4. Set Values & Real Values of Welding parameters.
5. Main voltage- Over voltage & Under Voltage indications.
6.Over temperature indication.
7.Error display

The equipment must comply with essential harmonized standards for health, safety, and environment and consumer protection. Machine should have with 'S' & 'CE' mark

6. PLASMA TORCH:

- I. Micro Plasma Torch: 4 mtr long, Max 50A at 60% Duty Cycle,
- II. Soft / Medium Plasma Torch : 4 mtr long, Min 150A at 100% Duty Cycle

7. Cooling Unit for the above power source. Must have IP23 or better protection class. Output 3.5 lit/ min

17. MULTI-SPECIMEN GRINDER/ POLISHER (Estimated Rs. 5 Lakh) : Qty 01

TECHNICAL DATA:

- | | |
|-------------------------------------|---|
| 1. Principal Motor. | -1 HP, DC Motor, Operated on 220 V./A.C.Single Phase. |
| 2. Grinding Wheel Dia. | -200.Dynamically balanced, easy over mountable. |
| 3. Rotational Speed | - 50-800 RPM, Continuously Variable. |
| 4. Specimen Holder rotational speed | -60 RPM. |
| 5. Specimen Holder movement | - +/- 30 mm in X direction for optimization of paper. |
| 6. Specimen Holder mount | -Two columns, structure for optimization of flatness. |
| 7. Specimen Holder motor | -1/ 4 H.P. for grinding from 80 grit paper |
| 8. Dispensing unit | - 10 bottles with Magnetic needle with timer |
| 9. Magnetic Fixation System | - Set Magnetic Disc 8 inch Bi-metallic Plates- 30 Nos.) |

CONTROL PANEL

- 1. Presetting cycle for time - 0 to 99 Minutes
- 2. Pressure setting knob.
- 3. Digital LED readout for speed of Grinding/Lapping disc.
- 4. Emergency stop button.
- 5. Start button with key for safety.
- 6. Buzzer facility for cycle completion.
- 7. Speed setting knob for Grinding disc motor.
- 8. Water faucet with Automatic flow control valve.
- 9. Automatic Dispensing unit- Time based cycle for dispensing (On time & Off time - pre-setteble) for water & slurry for grinding operations. Adjustable flexible hose with nozzles.

Standard Accessories

Grinding discs along, Paper clamping ring .
Specimen holder discs for holding six moulded specimens of 1" dia. Specimen Indexing press.

Magnetic Fixation System – 8 inch Dia. Set (Includes - Magnetic Disc 8" dia. - 2 No., Bi-metallic Plates for Silicon Carbide Paper 8" - 30 Nos.)

Silicon Carbide Abrasive Paper Disc – 8 inch (self-adhesive water treated paper)
 Grit 220, 320, 400, 800, 1000, 1200,1500,2000,2500 55 Nos. Each Grit
 (Sigma aidritech or similar)

18. AUTOMATIC LINER PRECISION DIAMOND SAW (Estimated Rs. 5 Lakh) : Qty 01

SPECIFICATIONS:

Motor Capacity	180 - Watts, High torque motor.
Speed variation digital speed Indication	50 to 500 rpm continuously variable with
Power Supply	230 V single phase
Wheel Shaft Dia	1/2"
Power Supply	230 V Single Phase AC
Weights for loading	Upto 250 Gms. (Selectable)
Balancing Weight	200 grams.
Buzzer Facility	For completion of Auto cut-off cycle
Vertical Sample Position	Adjustable cut-off provision to stop cutting at any stage
Precise sample positioning	with the help of micrometer head. Transparent mould Facility to Locate Sample at Desired Position
Coolant tank	SS coolant tank and easy replacement of coolant without Removing diamond wheel (for wheel safety as wheels are very expensive)

-Machine stops automatically after the cutting is completed (Auto Cut off cycle)
 -Adjustable cut-off provision to stop cutting at any stage
 -Diamond cutting blade runs through the coolant to avoid heating of the sample. The coolant tank can be taken out easily for coolant change.
-Precise sample positioning with the help of micrometer head.
 -Loading of the specimen will be affected by pLakhing the weights on the specimen holder arm.
 -Provision exists for holding samples with Allen screws and chuck.
 - Will be supplied with Standard Specimen holder for 32 mm dia. moulded sample & Coolant tank, **with one No. (4" x 0.012" x 1/2" 0.2" D.I) diamond Wafering blade** (Please refer prices for diamond wafering blades under optional accessories).
 Transparent Mould 5 kg. Powder and 5 liter liquid with pressure kit

19. ELECTRO POLISHER (Estimated Rs. 4 Lakh) : Qty 01

Sl no	Descriptions	Specifications
1.	Scope of work	To carry out electropolishing/etching of Ni-base superalloys (alloy 617M, etc.), specialty steels , Aluminum
2.	Capabilities of system to be supplied	Both electropolishing and electroetching capabilities on the equipment being quoted are mandatory. However, different cells may be used using a same control system. The equipment being quoted must be precise and user friendly.
3.	Table-top model	The equipment being quoted must be a table-top model only
4.	Power supply	220-240V; 50-60Hz; Single (1) phase; Necessary adapters (if any) have to be provided along with the equipment.
5.	Electronics	Electronics must be microprocessorControlled
6.	Current density curve generation	Display of current density curve automatically by scanning the sample in a defined voltage range. More details have to be provided regarding this function, i.e., methodology of working, etc..
7.	Control functions	<ul style="list-style-type: none"> • Control and monitor the polishing and/or etching processes using the control unit itself • Backlit digital-display/LED/ LCD types display pre-set as well as in-situ parameters: voltage, current, electrolyte temperature, polishing and/or etching duration, electrolyteflow parameter(s) (pump load/speed,etc.). • Maximum duration required for polishing and/ or etching should be 59 minutes (duration greater than 59 minutes is preferable but optional). Actual duration can be indicated in compliance statement. • An option should be available for instantly shutting down the system as a safety measure and in case of current overload. This can be in the form of emergency stop button/ power shut down button. This has to be mentioned clearly. • Capability for storing procedure(s) or parameters is required and this has to be indicated. • Polishing and/ or etching has to be carried out at both room temperature and low temperature (for low temperature application, separate clause is mentioned). If separate cells are required, they have to be listed and quoted separately. • List of recipes or methods (with parameters required for usage and electrolyte requirements for steels and Ni-base superalloys) must be furnished in a CD/ DVD/ Datadisk/ Hardcopy for reference. • A custom developing electrolyte for polishing and/or etching at room temperature and/or lower temperatures. All accessories required for this purpose have to be mentioned and listed separately.
8.	Output voltage/ current load specifications	<ul style="list-style-type: none"> • Polishing: Voltage upto 100 V range is required (beyond 100 V is preferable but optional); Current upto 6 A is required (beyond 6 A is preferable but optional)

		<ul style="list-style-type: none"> Etching: Voltage upto 15 V is required (beyond 15 V is preferable but optional); Current upto 1.5 A is required (beyond 1.5 A is preferable but optional)
9.	Electrolyte temperature monitor	Electrolyte temperature display in-situ is a must. An indication must be present to indicate over-shoot of the preset electrolyte temperature. The machine must automatically shut down once the electrolyte temperature reaches beyond preset temperature to avoid dangerous explosion or situations.
10.	Connectivity for datalogging OR Data Transfer capability	(a) Connectivity of the equipment to a computer for data-logging OR (b) Data storing in a data card and transfer it to a computer using USB type connectivity. Either case is acceptable. In case of provision of (a), connectivity port type has to be indicated, parts/ interfaces which are required should be quoted along with detailed justification. Also, the procedure for data transfer has to be mentioned in case of (a) or (b).
11.	Cooling (cell) requirement	<ul style="list-style-type: none"> Carryout electropolishing and/or electroetching at temperatures ranging from room temperature upto 253.15 K (below 253.15 K is optional but preferable). Actual lowest temperature of electropolishing or electroetching has to be mentioned specifically. Coolant (liquid N2 or dry ice only) or a comprehensive chiller for lowering the temperature of the electrolyte. For this, mechanism of heat exchange from coolant to electrolyte In case coolant (liquid N2 or dry ice) has to be distributed using a recirculatory mechanism, all the accessories including connectors, heat insulators, pump, etc. If separate accessories are required for low temperature electro polishing or electro etching, they have to be specified, indicated with part numbers and justified clearly.
12.	Cleaning accessories	Two sets of cleaning accessories (if any) have to be provided along with the equipment. These are to be listed and mentioned in detail.
13.	Spares	Recommended or suggested spares for first 2 years of normal, trouble-free working of the electro polisher/etcher by the OEM have to be quoted and listed with proper justification and Details. The list of spares has to be provided from OEM only and a certificate in proof of this has to be submitted by OEM along with the Offer. Spares may include, for example, tool kits, fuses, pump motor, etc. required for operation and also Service of the equipment as necessary at site. Other optional spares have to be quoted as optional spare items and they have to be listed clearly with Justification.
14.	Accessories required	<p>The following compatible accessories are required along with the equipment for room temperature and low temperature operation:</p> <ul style="list-style-type: none"> (a) Polishing and etching cell(s) (b) specimen/ anode clamp – 1 No.s (c) specimen mounting stand – 1 No.s (d) cathode(s) – 1 No.s

		<p>(e) extension arm for preparation of specimens of upto 85mm (+/-20%) height (if applicable)</p> <p>(f) electrolyte containers – 2 No.s</p> <p>(g) polymer masks set containing the following apertures (i) Plain (No aperture) (ii) 0.45 to 0.65 sq.cm (iii) 1 to 1.30 sq.cm (iv) 2 to 2.60 sq.cm (v) 3.75 to 5.00 sq.cm have to be provided. Details of diameter and/ or sides in case of rectangular aperture must be mentioned.</p> <p>NOTE: Accessories mentioned in (b), (c) can also be quoted together as anode assembly. This has to be indicated in detail if quoted together.</p>
15.	Consumables required	Electrolytes for electropolishing of (a) 18Cr stainless steels (austeniticsteels) (b) 9Cr steels (martensitic) (c) Ni-base superalloy - Alloy 617 Ni- Cr-Mo-Co alloy have to be indicated clearly and supplied. Quantity of 2.25 litres (+/- 20%) per electrolyte type is required. These have to be indicated with part numbers and volume.

20. LASER BEAM WELDING (NDYAG) (Estimated Rs. 12 Lakh) :Qty 01

ND-YAG Laser Spot Welding Machine

<p>The Laser Welding Machine 200watt would consist of subsystems namely –</p> <ol style="list-style-type: none"> 1. Pulsed Nd: YAG Pulsed Laser Head 2. Power Supply 3. Chiller. 4. Microscope for micro welding 5. 10 Safety Goggles
--

Specifications of Laser Welding Machine with Accessories

A. Pulsed Nd: YAG Laser Head

Laser type	Pulsed Nd: YAG
Wavelength	1064 μm
Maximum average output power	200 watts or higher
Pulse Energy	90 J or higher
Pulse repetition rate	1~300 hz
Maximum power per pulse	7 Kw or higher
Pulse width	500 μsec to 20 msec
Beam divergence	20 mrad
Beam quality	16 mm mrad
Beam expander	Yes, 2x to 8x with input aperture of maximum 20mm.
Pulse shaping	Yes, increasing and decreasing steps for cutting, heat treatment, welding, etc.
Aiming laser	Red laser diode.

B. Power Supply

- Input: 440 V Three phase, $\pm 10\%$
- Current : 32 Amps max
- Input Power consumption : 18 kWatt maximum

C. Fixed Beam Delivery and focusing unit:

- Beam delivery unit consist of 45-degree Beam Bender with Beam Expander and Collimator. Beam focusing assembly consists of gas flow system with pressure attachment. Beam focus spot up to 100 microns. Dummy beam for evaluation, before processing the actual component.

Accessories and Consumable:

A. Chiller

Laser cooling: Chilled water temp 18~25 degrees Celsius.

We cool the external optical parts the Laser source and the integrated electrical cabinet. Chiller specs are as follows -

- Cooling Capacity: 8 kW
- Water to Water Heat exchanger,
- Includes water tank with on loop chiller.
- Pump for the input.
- Treated water with circulating pump on the laser side.
- Water inlet 20° C ~ 5 bar
- Supply 25 lt/min
- Computer

B. Stabilizer: 12 kVA (Optional)

C. Consumable: Di Water for Chiller (Deionized water)

Safety Features:

Protective cover for laser head, table and optical assembly.

The safety provisions will be provided which are full proof and fail-safe type for the safety of the personnel and the machine. The safety provisions will be complying with all the relevant international norms/guidelines for safety of the personnel and such laser equipment. Specifically, the norms followed in design and manufacture of the machine/equipment will be commented upon the offer. The safety feature shall include but will not be limited to the following:

- a) Laser beam path is completely covered and shielded between the laser unit and the work piece surface.
- b) Protection against over travel of moving machine subassemblies and subsystems.
- c) Provision of an emergency stop.
- d) Machine will not start automatically on resumption of power supply without ensuring safety stapes.
- e) Minimum accidental protection

21. MOULD MAKING SYSTEM (Estimated Rs. 2 Lakh) : Qty 01

Specifications

OPERATION	Pneumatically, Button press
MOULD DIAMETER	26 mm. or 1" dia. Mould Cylinder.approx
BAND HEATER	1000 Watts, Input Supply 230V A. C.
MOULD COOLING	By water jacket integrated with heater assembly interfaced with electronic.
THERMOCOUPLE	PT-100
CONTROL PANEL	Microprocessor based control unit Auto cycle for heating, cooling with buzzer indication.
	Max. Air Pressure – up to 6 bar

Standard Accessories

1. Thermocouple (In-built)	- 1 No.
2. Spatula	- 2 Nos.
3. Bakelite Powder	- (5 packs)
4. Spanner	- 1 No.

22. HIGH SPEED CAMERA (Estimated Rs. 3 Lakh) : Qty 01

Detailed technical specifications of High Speed Camera

Item description	The High Speed Camera should be able to take quality images at high frame rates for Flames, Fluid Dynamics, Machine Vision and Material Testing applications
Technical specifications	
Full Frame Performanc	2,000 FPS at 1280X1024 (Full) resolution and up-to 1,00,000 FPS at lower resolutions
Sensor	1.3 Mpixel CMOS image sensor
Dynamic Range	12-bit Monochrome
Light sensitivity	ISO 10,000 mono
Lenses	AF Zoom-Nikkor 24-85mm 02.8-41) IF
Recording memory	16 GB (Minimum)
Software	The camera should have a dedicated software that can be used for camera control and fast image download through high speed Gigabit Ethernet interface. Software having extra features for image processing and analysis would be preferred.
Other support	The camera should support MATLAB for advanced image analysis.
OS	Corn satible with Windows 7or higher (64 bit)
Mechanical & Environmental Specifications	
Weight	Maximum up-to 2 Kg
Operating Temperatur	0 - 40 degree C
Humidity	85% or less (non-condensing)
Power	AC, 230V (with supplied adapter)

Other Requirements	
Supplier profile	The supplier should be well know and reliable with minimum 2 prior supplies in India of the same or similar product. The supplier should have a service centre in India.
Optional Items	
Tripod	Professional medium weight Tripod
Lamp / Mirror	High power LED lamp and Mirror for Shadowgraph application
PC	Laptop for software with HD large screen for better visualization of

23. 3-D PROFILOMETER (Estimated Rs. 10 Lakh) : Qty 01

3D Non-Contact Surface Profilometer for measurement of roughness profile.

S.No.	Parameter	Requirement
1.	Type	3D Non-Contact
2.	Light Source	White
3.	Turret	Motorized
4.	Vertical Measurement	
	a . Range	0.1 nm to 500 μ m
	b. Resolution	<0.1 nm
	C. RMS Repeatability	:50.3 nm
5.	Measurement Array	640 x 480 pixels
6.	Reflectivity	1% up to 100%
7.	Maximum Measurement Area (X,Y)	\geq 50mm
8.	Humidity Range	Up to 70%
9.	Temperature Range	Up to 35°C
10.	Automated/Motorized X-Y Stage and Z	Required
11.	Sample Stage Dimensions	
	a . X-Y Stage	150mmx150mm
	b. Z Translation	100mm
12.	Imaging Hardware	Required
13.	Imaging Software	Required
14.	Analysis Software	Required

**24. MACHINE CONDITION MONITORING SYSTEM (Estimated Rs. 17 Lakh):
Qty 01**

Technical Compliance Sheet for Dynamics Response Monitoring System & Accessories

Item No	DESCRIPTION
1	<p>Dynamics Response Monitoring System</p> <p><u>Basic requirements of the system:</u></p> <ul style="list-style-type: none"> • 6 channels on-line/stand-alone PC-free, real-time (gap-free analysis), • portable, • FFT spectrum analyzer cum vibration acquisition system with minimum of 40KHz bandwidth with an option of increasing the channel count in future through addition of modules. • Exchangeable and flexible software options. • The system must be configured such that different channels can be viewed in different windows with data storage facilities on the analyzer. • These windows must be large and distinct. • Real time multi-analysis capabilities using Digital Signal Processors (DSPs) for maximum computation power. • Real time analysis/measurement as well as parallel/simultaneous recording with reference signal (speed signal). • 1GB/s Ethernet for communication to a controller for data recording, analysis and report generation purpose. There must be facility for data sharing. • Standalone digital data recording measurement. • Software CD and additional post processing/report license <p><u>Front end/Hardware:</u></p> <ol style="list-style-type: none"> 1. Portable, rugged and modular with bright LCD and large accessible buttons for easy setup of the analyzer without using a PC. 2. Interface different transducers facility like ICP accelerometer, force sensor, microphones, pressure sensors (2 or 4mA), proximity probes/eddy probes, key phasors etc. 3. Connectors: BNC 4. Input channels: <ul style="list-style-type: none"> • No. of channels: 4 universal channels, with status LED for each channel. • Sampling rate: 100KHz minimum on each channel • Input Range: ± 100 mV to ± 40 V range (full scale). • Input Protection: ± 60 V • Input Coupling: AC/DC/ICP coupling (grounded and floating) • Resolution: 24 bits ADCs for each input

- Input accuracy: Phase match: minimum $\pm 0.02^\circ$ (A must need feature for modal analysis),
- Amplitude match: minimum $\pm 0.02\text{dB}$, $>140\text{ dB}$ dynamic range
- Filtering: High/Low Pass - Stop/Pass band – Integrator (single/double) – Differentiator – A/C/Z filters

5. Output/Generator channels:

- No. of channels: **2 nos.** with status LED for each channel
- Output range: $\pm 40\text{V}$
- Output resolution: 24 bits DACs
- Output frequency: DC to 40 kHz.

- THD $< 0.002\%$ at 1kHz (Must need feature for testing's using modal shaker)
- Two Pure tones, two step/swept sine with phase offset and frequency tracking, two Multi-sine
- Two uncorrelated random noises (white and pink) with burst, two Chirps, with option of File playback, Input playback.

6. Tachometer channels:

- No of channels: Minimum 2nos.
- Range: $\pm 10\text{ V}$
- Time resolution $> 160\text{ ns}$ (0.06° at 1 kHz)
- Sampling rate: minimum 6.4MHz to ensure accurate rotating speed and phase measurement

7. Internal removable memory/hard disk: minimum 60 GB shock proof SSD or more with connection to PC through USB 3.0 to allow fast and easy post-processing or back-up and USB powered

8. External Power supply: External 220-240V AC power supply to power up the unit and recharge the built-in batteries.

9. Internal Battery: It must last at least 1 hour on full charge for 6 channels

SOFTWARE COMPATIBLE TO DYNAMIC RESPONSE MONITORING SYSTEM:

1. Recorder module:

- Time-domain data during acquisition and analysis process for capture raw.
- Data record facility for post-processing /exporting to other software like Mat lab, Labview etc.,
- Record all channels at 40kHz + 2 ext. sync + DC recorder / player, select two bandwidths on the same record,
- Record option from start to stop, start to time and time to stop, multi-record file, file split: tracks and time

2. Waterfall module:

- Collect and synchronize the spectra, levels, orders and trigger blocks providing flexible 3D waterfall and profiles. Color-spectrogram, Bode plots, order tracking trend plots, Vs time, RPM, Power or Torque.
- No. of slices : 2 to 10000minimum
- Profiles and 3D real-time displays

- One shot or continuous scrolling acquisition
- DC, RPM and Time reference for profiles and 3D displays
- Synchronized cursors between displays.

3. Monitoring Module:

- Minimum 2 additional analysis channels (time and spectral domain) (401 lines, Hanning) analyzer,
- Hot plug on any input (do not stop running analysis or recording)

4. Narrow band FFT module:

- Bandwidth: 40 kHz, No. of lines: 100 to 6400, minimum and 25000 lines maximum
- Time or spectral domain averaging linear, exponential, peak hold & ref peak hold averaging, full matrix cross spectra, FRFs H1 & H2, Coherence
- 2 to 128 time FFT zoom simultaneous with wide band FFT, Frequency Domain Synchronous, Averaging, Independent filters (HP, LP, PB, SB, dt, dt2) on each channel

Data Import/Export Feature:

Export: UFF, TXT, SDF, Matlab, Wav audio (with frequency selection)

IMPORT: TXT, AE2, Wav, Excel

Displays:

- Time: Triggered blocks, weighted blocks, Filtered blocks, compressed view of large files, X/Y view of triggered blocks.
- Narrow Band: Magnitude, Phase, Bode, Imaginary & real part, Polar, Magnitude + phase overlay.
- Profiles: RPM, DC, max, min, RMS, kurtosis, order and overall Vs time or RPM.
- Waterfall: 3D Narrow band, 3D octave, Color Spectrogram, X/Y, Y/ref, order and frequency extraction views, RPM vs Frequency vs Vibration Amplitude must be possible to display.
- Digital Display: of RPM, DC, max, min and Order (magnitude and phase) Alarm levels.
- On all displays: Trace overlay with saved result or real-time measurement, Y scale Lin, Log or dB, EU, EU2, Eu2 / Hz, EU/Hz, Zooms& translations on X, Y, Z axis, Dual cursor, Multi-graph, multi-trace Markers (peak, max, sideband, power band, harmonics, free), Operators, compare, average Filled traces, Magnitude grouping.

TURBO-MACHINERY VIBRATION SOFTWARE MODULE COMPATIBLE TO DYNAMIC RESPONSE MONITORING SYSTEM (OPTIONAL):

- Tabular list: Gap voltage, Overall, orders amplitude and phase (0.5X, 1X, nX), Sub1X, SMax
- Orbits (Overall and nX filtered)
- Full Shaft Motion: Shaft centreline + clearance circle + orbits

	<ul style="list-style-type: none"> • Bode, polar and trend plots • Full and Half Spectrum, cascade and waterfall • Gap voltage reference • Slow roll vector reference for run-out correction • Real-time acquisition, post analysis (based on raw signal recording) and data navigation
2	Accelerometers compatible to dynamic response monitoring system <ul style="list-style-type: none"> • Type: IEPE • Sensitivity: 100mV/g • Freq. 0.5Hz to 10kHz • Range: ±50g • Amplitude linearity: <1% • Noise Floor: <60μgrms • Shock limit:2000g • Freq. response: 1Hz to 10kHz • Temp range: -55°C - 125°C • Hermetic seal: YES
3	Microphone compatible to dynamic response monitoring system <ul style="list-style-type: none"> • Sensitivity: 50mV/Pa • Frequency: 10Hz to 20kHz • Dynamic range: 32dBA to 135dB • SMB to BNC cable

25. ROUGHNESS TESTING MACHINE (Estimated Rs. 16 Lakh) : Qty 01

ROUGHNESS TESTER

Measuring range in x	50mm (2inch)
Measuring range of Stylus	800μm with standard length stylus
Resolution	0.01μm (800μm range)
Measuring principle	Differential Inductance
Stylus tip	60°/2μm (80μinch)
Stylus type	Skid less
Standards	JIS1982 / JIS1994 / JIS2001 / ISO1997 / ANSI / VDA
Parameters	Ra, Rq, Rz, , Rsk, Rku, Rc, RPc, RSm, Rmax*1, Rz1max*2, Rk and others parameter related to surface texture (Possible Customization)
Column and Stand	Vertical adjustment range: 250mm
Measurement	Color graphic LCD touch screen display with backlight
Software for Data transfer	Software along with laptop /pc & operating system to be provided for data transfer
Measured profiles	Primary, Roughness, DF, Filtered waviness curve, R-Motif, W-Motif
Power supply	Both can be power and battery operated
Stylus	One additional stylus to be quoted

Total Estimated Price of Tender is Rs. 274, 00,000/- (Rupees 2 crores seventy four Lakhs)

Other conditions

Bidder should provide training of the system for minimum 3 days free of cost.
Bidder must have supplied similar equipment to academic institutes.

Standard Warranty (at least 3 year)

Installation, demonstration, training and operating manual (2 sets hard copy and one set CD), supported power adopter and software CD (if any).

TERMS & CONDITIONS

1. **The quotation is divided into the two following parts:**

A) TECHNICAL BID:

This part should include

- Specification, Make & Model, Brochure
- Validity period of quote
- Payment terms (not value)
- Supporting papers: GST registration & Income Tax Certificates, Trade Licensed etc.
(Details are given in the section C.7)

B) FINANCIAL BID:

To be considered only when Technical Quotation is accepted by NITTTR, Kolkata

This part should include :

- Specification, Make & Model
- Price (inclusive all taxes) – with back up of basic price (GST)
- Terms & Conditions (Comprehensive)

C) Other terms and conditions :

2. The bidder(s) should preferably be either manufacturer of base machine / equipment / tool or an authorized business partner / marketing agent / service agent (second preference) of the OEM. In case of authorized business partner / marketing agent / service agent, authorization certificate should be attached along with the tender. The brands / models / specifications mentioned are indicative. Equivalent higher configuration products may also be quoted.
3. The rate quoted must be F.O.B. NITTTR, KOLKATA inclusive of packing, forwarding etc GST insurance, if any must be indicated separately. Educational discount, if any should be indicated clearly. For imported items, Custom duty shall be indicated separately.
 - 3.1 All legal disputes shall be under the jurisdiction of the Kolkata Courts in the state of West Bengal.
 - 3.2 Director, NITTTR, Kolkata reserves the right to accept or reject any or all the tenders without assigning any reason whatsoever and decision of the Director, NITTTR, Kolkata in the matter shall be final and binding.

NB: Only relevant information (s) need to be submitted/complied with along with quotation(s)

3. Earnest Money Deposit (EMD):

- 3.1 “EMD at the rate of 4% of the estimated price” in the form of Crossed Account payee demand draft or fixed deposit receipt from commercial bank or Bank guarantee from a commercial bank drawn in favor of Director, NATIONAL INSTITUTE OF TECHNICAL TEACHERS’ TRAINING AND RESEARCH, KOLKATA on any scheduled bank at Kolkata shall be submitted along with the tender.
 - 3.2 Tender without earnest money deposit shall be OUTRIGHT REJECTED. A model format of bank guarantee for furnishing EMD is enclosed in Annexure- A.
 - 3.3 Forfeiture of EMD: EMD of a tenderer will be forfeited if the tenderer withdraws or amends its tender or impairs or derogates from the tender in any respect within the period of validity of its tender. Further, if the successful tenderer fails to furnish the required performance security within the specified period, its EMD will be forfeited.
 - 3.4 Refund of EMD: EMD furnished by all unsuccessful tenderers shall be returned to them without any interest whatsoever, at the earliest after expiry of the final tender validity period but not later than 30 days after conclusion of the contract. EMD of the successful tenderer shall be returned, without any interest whatsoever, after receipt of performance security from it as called for in the contract.
 - 3.5 No EMD is required from bidders who are registered with (i) Central Purchase Organization (ii) NSIC, (iii) the concerned Ministry or Department, and (iv) similar other Organization as applicable.
 - 3.6 EMD in the form of DD should be in a separate envelop superscripting “EMD”.
4. **Each bidder shall submit only one tender.**
 5. **Validity of Tender:** Tender shall remain valid for a period not less than 3 months after the deadline date specified for submission.
 6. **Delivery Period:** Delivery period shall be 45 days from the date of issuing purchase order.
 7. **Submission of Documents:** The Bid should contain the following:
 - Printed copy of the brochure/leaflet containing, Make, Model No. and Specifications.
 - Copy of Two Years Income Tax acknowledgment (F. Y 2015-16 and F.Y 2016-17) and copy of PAN Card.
 - Copy of Valid Trade license.
 - Copy of GST Registration Certificate.
 - Copy of up-to-date custom duty clearance certificate, if applicable
 - Copy of valid registration certificate from State/Central Government.
 - Copy of valid registration certificate of SSI Unit, if any.
 - The Tenderer (s) may furnish a list of clients serviced during the last three (3) years along with satisfactory completion certificates
 - Copy of latest audited statement of accounts
 - In case of foreign manufacturer Authorization Certificate.
 8. **Bid Price:** While furnishing the quoted price in the Financial Bid, the bidder (s) may note the following:

- 8.1 The contract shall be for each item of equipment / instrument / software as mentioned in the schedule of goods/services. Corrections, if any in quoted price, shall be made by crossing out, initialing, dating and rewriting.
- 8.2 All duties, taxes and other levies payable by the vendor under the contract.
- 8.3 All duties, taxes and other levies payable by the vendor under the contract shall be included in the total price and Taxes should be quoted separately.
- 8.4 The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account, except revision of taxes and duties.
- 8.5 The rate quoted must be both in words and figures.
- 8.6 The quantity against each item mentioned in the tender may vary according to the actual requirement at the time of placing Purchase Order.

The rates quoted by the bidder should be in Indian Rupees.

Late Bids: In the case of advertised tender enquiry, late bids (i.e. bids received after the specified date and time for receipt of bids) should not be considered.

9. **Award of Contract:** The NITTTR, KOLKATA will award the contract to the bidder whose tender has been determined to be substantially responsive in terms of technical specifications, terms & conditions and price quoted.
 - 9.1 Notwithstanding the above, NITTTR, KOLKATA reserves the right to accept or reject any bidder(s) and to cancel the bidding process and reject all bids at any time prior to the award of contract.
 - 9.2 The bidder whose bid is accepted will be notified of the award of contract by the NITTTR, KOLKATA prior to expiration of the tenderer(s) validity period. The accepted terms of the offer shall be incorporated in the purchase order.

10. Performance Security:

- 10.1 Performance security at the rate of 6% of the contract value in the form of account payee demand draft, fixed deposit receipt from commercial bank or Bank guarantee from a commercial bank in favour of Director, NITTTR, Kolkata shall be submitted within 21 days after the notification of the award of contract. Performance security should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the vendor, including warranty obligations. A model format of Bank guarantee for providing performance security is enclosed at Annexure –B
- 10.2 Forfeiture of Performance Security: Performance security is to be forfeited and credited to the Institute Account in the event of a breach of contract by the vendor, in terms of the relevant contract.
- 10.3 Refund of Performance security: Performance security should be refunded to the vendor without any interest, whatsoever, after it duly performs and completes the contract in all respect and beyond 60 days of completion of all such obligations under the contract.

11. Liquidated Damages Clause for late Delivery and Late Installation:

- a) If the supplier fails to deliver any or all the goods or to perform services like installation, erection, testing, commissioning, or other allied works on or before specified time period mentioned in the purchase order or extended date of completion time granted by institute if any, he shall without prejudice to any other right or remedy available under the law to the institute on account of such breach, the vendor will pay as agreed compensation the amount calculated at the rate stipulated below:
- b) LD Clause for delay of delivery, installation, testing, commissioning, or other allied works will be as follows:-

0.5% of delivered price of delayed goods (or services) for each week or part thereof subject to maximum 10% of contract value.

12. **Payment:** Payment will be made immediately after delivery & satisfactory commissioning of the goods / services and training of personnel. Payment in settlement of the bills will be subject to the deductions of income tax/ GST at applicable rates under TDS.
13. **Normal Commercial Warranty/ Guarantee:** Normal commercial warranty/ guarantee of three years shall be applicable to the supplied goods/ services and this should be specified clearly by the bidder.
14. **Live Demonstration:** Live demonstration of the item(s) should be arranged by the vendors at their cost, if asked by the Institute.
15. Points which are not explicitly covered under “**terms and conditions**” above shall be covered by General Financial Rule 2017, Government of India, Ministry of Finance, Department of Expenditure. A copy of the same is available in the office of the Department of Mechanical Engineering for perusal of the tenderers. Tenderers are advised to go through the manual before submission of their tenders. A soft copy of the manual can also be downloaded from <http://finmin.nic.in>
16. The non-transferable tender document excluding standard agreement form can be obtained from the Office of the Accountant as per above users on payment of **500/- (Rupees Five Hundred only)** in cash or Demand Draft in favour of the Director, NITTTR, Kolkata. **The users of downloaded tender document shall have to pay the cost of tender document i.e. 500/- by way of Demand Draft in favour of the Director, NITTTR, Kolkata payable at Kolkata while submitting their tender. Otherwise the Tender will not be accepted.**
17. The Competent Authority may cancel the whole tender process without assigning any reason.

You are requested to provide your offer as per schedule provided in Notice Inviting Tender in the sealed envelope super-scribing “**Tender Advt. No. 14 /2018-19**”

To

The Director,
National Institute of Technical Teachers’ Training and Research,
Block – FC, Sector – III,
Salt Lake City, Kolkata – 700 106
PIN: 700 106 Tel. No. +91(033) 2337-0497/4125