

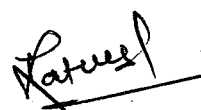
No.:F3(5)/1/ITI/JR/ Advance Mechanical Lab/2026-27/320

Dated: 27/7/26

OFFICE ORDER

In continuation of Office Order No. F3(5)/1/ITI/JR/Advance Mech. Lab/2026-27/273 dated 09.07.2026, and pursuant to the work carried out by the Demand Assessment Team for the establishment of the Advanced Mechanical Laboratory at ITI Jail Road, the following directions are hereby issued:

1. The **System Analyst, Government ITI Jail Road**, shall upload the detailed list of tools, equipment, machinery, and their technical specifications, as submitted by the Demand Assessment Team for the establishment of the Advanced Mechanical Laboratory, on the official website of Government ITI Jail Road to invite **tentative cost estimates** from manufacturers, authorized dealers, suppliers, and other interested stakeholders.
2. Simultaneously, the Demand Assessment Team shall conduct a comprehensive market survey to ascertain the prevailing market rates of the identified tools, equipment and machinery for establishment of advanced mechanical lab at ITI Jail Road from manufacturers, authorised dealers and suppliers and seeks the **tentative cost estimates**.
3. The entire exercise, including uploading of the detailed list of tools, equipment, machinery, and their technical specifications, conduct of market survey and submission of the consolidated report with tentative cost estimates, shall be completed within 10 (Ten) days from the date of uploading on the official website of ITI Jail Road.
4. Tentative cost estimates for the establishment of Advance mechanical lab at ITI Jail Road should be marked to The Principal, ITI Jail Road.


(RATNESH KUMAR MISHRA)
(VICE PRINCIPAL/H.O.O.)

No.:F3(5)/1/ITI/JR/ Advance Mechanical Lab/2026-27/320

Dated: 27/7/26

Copy to:

1. All concerned Officers/ officials
2. GI, ITI Jail Road
3. Store Keeper
4. Guard file

5. Mr. Rajesh (to upload the specifications and list on website)


(RATNESH KUMAR MISHRA)
(VICE PRINCIPAL/H.O.O.)

Date: 23.07.2026

To
The Principal/HOO
ITI Jail Road, New Delhi-110064

Sub: Submission of proposal for setting up of Advance Mechanical Lab at ITI Jail road.

Sir,

With reference to your direction issued by vide order no F3(5)/1/ITI/JR/Advance Mech. Lab/2026-27/273 dated 09.07.2026 for the subject in line, the demand assessment team has identified suitable space (canteen room, area measuring app 900 sq.ft.), assess the infrastructure requirement and tool, equipment & machinery with their technical specification for the setting up of advance mechanical laboratory at ITI Jail Road.

In compliance of the above please find enclosed the list of tool, equipment & machinery required for setting up of lab along with technical specification as per annexure A (Enclosed) as under:

Sr. No.	Name of the Item	Qty	Unit
1	Mini Factory Lab Automation Training System	1	Nos
2	Factory Simulation	4	Users
3	Advanced Integrated Robotic Welding Cell	1	Nos
4	Augmented Reality Weld Simulation	2	Nos
5	Articulated Robot Training Cell	1	Nos
6	Workstation for Pneumatic Training System	1	Nos
7	Workstation for Hydraulic Training System	1	Nos
8	Composite Three-D Machine	1	Nos
9	Resin Based Three-D Machine	1	Nos
10	Three-D Scanning Machine	1	Nos
11	Virtual Reality Workstation	1	Nos
12	Lathe Modular Trainer Kit	1	Nos
13	Milling Modular Trainer Kit	1	Nos
14	Four-Axis Milling Modular Trainer Kit	1	Nos

The demand assessment team hereby submits the proposal to setup the Advance Mechanical Lab. for further necessary action at your end please.

Naresh
23.7.2024
Naresh Kumar Saroha
CI, Fitter-Member

Mahesh
Mahesh Yadav
CI, MMV-Member

Amrit
23/7/26
Amrit Pal Singh
CI, Machinist-Member

Ashok
23.07.26
Ashok Kumar Balyan
CI, Electronics-Member

Sanjeev
23/7/26
Sanjeev Behgal
CI, Diesel Mechanic-Member

Sunder
23/07/2026
Sunder Lal
CCI, Welder-Member

Sanjay
23/07/2026
Sanjay Kumar Pandey
CI, DMC- Chairperson

Advance Mechanical Lab at ITI Jail Road

Sr. No.	Name of the Item	Qty	Unit
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13	Milling Modular Trainer Kit	1	Nos
14	Four-Axis Milling Modular Trainer Kit	1	Nos

TECHNICAL SPECIFICATIONS

Sr. No.	Item Specifications	Qty
	Mini Factory Lab Automation Training System The Mini Factory Lab should provide a perfect platform for analysing, understanding and mastering the interaction of mechanics, pneumatics, electrical engineering and control technology. Feeder station with conveyor: The Feeder station must be designed to separate jobs out of a gravity magazine and to feed the work-pieces by the means of a conveyor to the following station. The Feeder station should consists of: • One Aluminium profile plate, dimensions min. 330 x 650 mm, distance of grooves 45/50 mm • One main terminal block with LED indicators and socket for input and output as per IEEE 488 standard or equivalent • Connection cable with connectors for terminal block as per IEEE 488 standard or equivalent • One gravity feed magazine for jobs with 35- or 40-mm diameter • A Plastic injection-moulded cylinder body and ejector • One double acting cylinder for job separation and cylinder position scanned electrically by sensors • One conveyor with minimum 300 mm to 350 mm, 24 V DC operated gear motor, The conveyor should transport the job to the right or left (forward or reverse) • One Motor controller with following features should be provided: error and ready indicator, speed and current adjustment options, button for manual actuation of a DC motor forward/reverse • An optical diffuse sensor for light barrier • Two small terminal blocks with 15 pin socket to connect with Main terminal block • Pneumatic solenoid valves with cables as required • A Pneumatic maintenance unit with filter, on/off valve and pressure regulator • The station should be assembled on a mobile trolley • The system should have dedicated control panel with pushbuttons for start, stop and reset with an auto/manual key. LED indicators for start and reset. Additional 2 indicators to know status. • All cables should be neatly tied using well grow cable ties • Must be equipped with its own PLC with below specs: • Min. 16 DI & 16 DO • Power supply unit, AC 230 V/DC 24 V • Necessary programming software • Necessary programming cable • The same PLC should be compatible to work with above Electro pneumatic/Electro hydraulic kit. • The kit must come with a complete set of technical documentation as well as a handling description in the structure of Installation & Commissioning, technical data and maintenance • The station should be available as virtual model in virtual learning software • The station must be designed to work alone or in any combination with the other stations. Sorting station with conveyor:	1 Nos

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	The station must be designed for sensors materials detection using a combination of different sensor types and the resulting subsequent process for the workpiece. The station should consists of: • One Aluminium profile plate, dimensions min. 330 x 650 mm, distance of grooves 45/50 mm • One main terminal block with LED indicators and socket for input and output as per IEEE 488 standard or equivalent • Connection cable with connectors for terminal block as per IEEE 488 standard or equivalent • • • One conveyor with minimum 300 mm to 350 mm, 24 V DC operated gear motor, The conveyor should transport the job to the right or left (forward or reverse) • One Motor controller with following features should be provided: error and ready indicator, speed and current adjustment options, button for manual actuation of a DC motor forward/reverse • One Stopper with 3/2-way valve • Two electric deflector • Three Aluminium slides • one detection unit to sort jobs • Two small terminal blocks with 15 pin socket to connect with Main terminal block • A Pneumatic maintenance unit with filter, on/off valve and pressure regulator • The station should be assembled on a mobile trolley • The system should have dedicated control panel with pushbuttons for start, stop and reset with an auto/manual key. LED indicators for start and reset. Additional 2 indicators to know status. • All cables should be neatly tied using well grow cable ties • Must be equipped with its own PLC with below specs: • Min. 16 DI & 16 DO • Power supply unit, AC 230 V/DC 24 V • Necessary programming software • Necessary programming cable • The same PLC should be compatible to work with above Electro pneumatic kit/Electro hydraulic kit. • The kit must come with a complete set of technical documentation as well as a handling description in the structure of Installation & Commissioning, technical data and maintenance • The station should be available as virtual model in virtual learning software • The station must be designed to work alone or in any combination with the other stations.	
2	Factory Simulation The software should be industrially tested, extremely powerful platform for 3D simulation models for automation technology. The software should must have mini factory modules of sr. No.3 mentioned for virtual training . The software must have different mechatronics modules, Mobile robot, Robotic module virtually. The software should control and simulate more than 100 type of simple to complex models like mechatronics, robotics, process etc., (virtually).	4 Users

The software should cover main areas in:

- Robot programming
- PLC programming
- Troubleshooting
- Production planning and production control

It should combine the following functions in one common interface.

- 3D real-time simulation
- System and production line design based on model libraries
- The program offers an integrated training program and a variety of different robot models.
- All the required basics for automation with robots should be possible by in built applications.
- Numerous graphics and animations to explain technical terms and facts, videos on a large number of industrial applications involving robots.
- Sample programs for every model, technical documentation including instructions on processing.
- Communication via OPC client/server
- Simulation of the mobile robot platform
- OpenGL 4 based, including special optimisations for low performance GPU.
- Open the models with python script execution.
- Can able to perform IIOT application.
- The complex model library contains 3D models of selected mechatronic stations, various belt and warehouse systems.
- The virtual models can be controlled by the integrated virtual PLC via the interface unit or by an external hardware PLC.
- The software should have virtual models of the offered under flexible production systems.

In manual mode, individual step movements should be made.

3

Advanced Integrated Robotic Welding Cell

1 Nos

A.	ROBOTIC ARM	
1.	Manipulator Configuration	Articulated Manipulator
2.	Payload	At least 13 kg
3.	Reach	At least 1480mm
4.	Degrees of Freedom	At least 6 (excluding DoF for end-effector)
5.	Pose Repeatability	± 0.04mm or better (lesser value)
6.	Maximum speed for Tool Center Point (TCP)	At least 1.0m/s
7.	Motion range (Maximum Speed)	J1 axis rotation [°] - ±165° or better (260 Degrees/Sec or better) J2 axis rotation [°] - +150° - 90° or better (250 Degrees/Sec or better) J3 axis rotation [°] - +90° - 180° or better (260 Degrees/Sec or better) J4 axis rotation [°] - ±200° or better (470 Degrees/Sec or better) J5 axis rotation [°] - ±135° or better (470 Degrees/Sec or better) J6 axis rotation [°] - ±360° or better (720 Degrees/Sec or better)

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8.	Allowable load moment at the wrist	J4 axis (Nm) – 26 or better J5 axis (Nm) – 26 or better J6 axis (Nm) – 10 or better
9.	Allowable load inertia at the wrist	J4 axis (Kgm2) – 0.90 or better J5 axis (Kgm2) – 0.90 or better J6 axis (Kgm2) – 0.30 or better
10.	Operating Temperature Range IP Rating	Ambient: At least 0 - 45°C Vibration acceleration: 4.9m/s ² (0.5G) or less IP 67 or Better
11.	Mounting position	Floor and Table
12.	Noise Level	80dB or less
B.	CONTROLLER BOX	
1.	Programming Environment	• OEM Standard Programming Language • Provision for programming via a graphical user interface
2.	Command / Function Library Support	Detailed documentation for OEM-developed standard commands, functions and applications for performing stand-alone subtasks, accessing sensor data, and user programming & reference generation
3.	Input / Output Ports	• Digital input: Minimum 16 nos. - Digital output: Minimum 16 nos.
4.	Connection with Robotic Arm	Suitable connectors at both ends with a cable length of a minimum of 7 meters.
5.	Interface Required	Ethernet : 2 Nos USB 2.0 : 3 Nos USB 2.0(TP) : 1 Nos RS 232 : 2 Nos
6.	Protection Class	At least IP20
7.	Power Supply Source	• Three-phase AC source • Nominal voltage: 430VAC Nominal frequency: 50Hz
8.	Software feature	Operation mode : Teaching, reproduction, remote (Teach / Repeat) Moving function : Point-to-point, straight line, circle. Command system : Motion, logic, process, operation Coordinate system : Joint coordinates, rectangular coordinates, user coordinates, tool coordinates, and base coordinates Abnormal detection function : Abnormal stop, abnormal servo, abnormal user coordinates, abnormal tool coordinates, safety maintenance, abnormal arc, etc. Robot safety : External emergency stop, anti-collision and safety bolt interface; MC safety circuit, servo off, etc. Reserved specific interface: Arc welding interface, workstation interface

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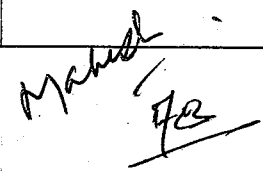
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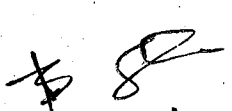
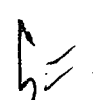
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C.	USER INTERFACE	
1.	Teach Pendant	• Joystick or Touch screen panel or equivalent for jogging of the robot • Event Logging Facility. • 6"full graphic color display. • Mode selection switch, safety switch, emergency stop button • Cable Length: 8 meter • IEC Protection Class: REINFORCED PLASTICS, IP54 Sufficient length of cables from robot controller to teach pendant.
2.	Computation Platform	• Required specifications: • Operating System: Windows 11 pro or latest • Processor: 13th Generation Intel® Core™ i7 processor • Graphics: NVIDIA RTX™ A1000 6GB • Display: 27 inch • Memory: At least 32GB DDR5 • Storage: At least 1TB SSD • Ports: Type-C, LAN (RJ-45), USB (At least 3 no.), Audio in/out combo, HDMI • Communication Interfaces: Intel Wi-Fi and Bluetooth • Security: TPM • Power: 1000W
3.	Robot Programming & Simulation Software (1 License)	Platform Compatibility: Should operate on standard Windows 10 or later operating systems (64-bit). Programming Environment: Must support text-based programming using dedicated robot control languages. Should provide graphical programming features for simplified logic creation and motion sequence setup. Editing and Debugging Tools: Multi-window program editing with syntax highlighting, breakpoints, and line-by-line execution. Real-time monitoring of I/O states, position data, variable values, and system status. Simulation Capability: Must include a built-in 3D simulation environment for offline program verification. Capable of cycle time estimation, collision detection, and workspace interference analysis.

		Should support simulation of multiple robot units within a shared layout. Integration Support: Should allow import of CAD layouts or models for path validation and layout design. Optional interface with third-party design platforms (e.g., 3D CAD software) is desirable. Preventive Maintenance Support: Should offer diagnostic tools for monitoring robot servo status, motor health, and battery/grease life. Must include features for position recovery guidance in case of interruptions. User Interface: Software should have a modern GUI with dockable panes, toolbars, and context-sensitive help. Support for both basic and advanced user modes is recommended. Automation Workflow Compatibility: Should enable offline development, virtual testing, and commissioning within standard automation workflows.	
D	Welding Power Source		
1.	Welding Source Feature	Suitable for normal low-carbon steel and stainless steel (thickness > 1 mm). • Digital control system with 32-bit efficient processor • High-precision waveform management • Consistent pulse MIG welding results with unified and stable droplet formation • Strong penetration, consistent arcing and crater formation, Synergic, regulation with accurate current preset, optional customised database • 20 jobs or more parameters setting memory slots • Comprehensive digital control panel with interchangeable metric/imperial system display • Operable within $\pm 20\%$ of work voltage • Should be equipped with an on-demand fan system and a separate air passage	
2.	Functions	• DC MIG/Pulse MIG/ MMA welding/Lift-TIG • Arc-force • O.C. & O.H. protection • 2T/4T	

Manual

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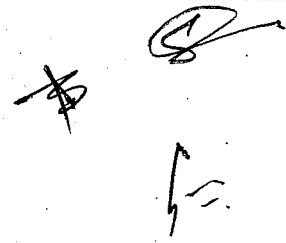
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		• Wire & gas selection area • Inching • Slow wire feeding	
3.	Input Power	Rated Input(kVA): 26.7 Power Factor: 0.9 Input Power: 3P AC400V, 50Hz	
4.	Output Power	Rated OCV (V): 86 or Above MMA, TIG rated VRD (V): 15 or Above MIG rated max output (A/V): 500A/39V or Above MMA rated max output (A/V): 500A/40V or Above TIG rated max output (A/V): 500A/30V or Above Welding Voltage: 10~50 or Above Welding Current: 30~500 or Above Wire Feeder: 4 Roller Wire Feeder Speed (m/min): 1.5 ~ 23 or Above Regulator Heater Voltage: AC36 or Above	
5.	Other Parameters	Efficiency: 91% or Above Insulation Grade: F or Above Weight: Less than 60 Kgs or Above Water-proof, dust-proof and corrosion-proof	
E	Welding Cell Accessories		
1.	Standard Welding Cell With Safety Fence, Fixture	• Safety Fencing - Wire mesh - Material -MS - Powder coated 4m*4m Fencing around Robot 2m Height - Should provide Entry gate - Should provide Safety Light - Curtains - Sensor feature with all safety systems • Fixture - Welding table 1mx 1m - Manual Fixtures with Job Holding - Toggle Clamps • Tool Center Point • Auto Nozzle Cleaner Air Cooled Torch	
2.	Add-ons and Accessories	• Earthling Cable 6mm Sq.1core - Copper cable • Welding wire – 1 roll of 10 kg (Diameter – 1 mm) • Gas hose Piping/Hose pipe up to wire feeder • Gas regulator	

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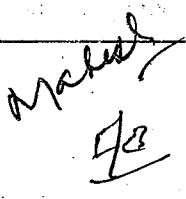
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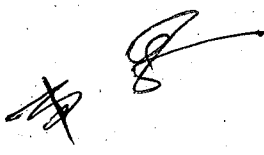


		• Suitable Welding table • Gas Cylinder Co2 – 1 Nos • Gas Cylinder Argon – 1 Nos Suitable Robot Power Wiring required for installation	
F.	PLC and HMI Interface	• PLC Digital inputs: 16 nos. Digital outputs: 12 nos. Analog inputs: 2 nos. Analog output : 2 nos. Communication: Ethernet, RS485 Programming Cable: Ethernet Sample programs for independent working • Human Machine Interface (HMI) Display Size: 10" (800 * 480) 65,536 Colors TFT CPU: Cortex-A8 800MHz RAM: 512 MB ROM: 256 MB Interface: Ethernet, 2 sets of COM ports / 1 extension COM port Sample programs for independent working	
G.	Robotic Weld Process Simulator		
	Introduction	The simulator integrated with robot must utilize augmented reality technology to provide an immersive and realistic welding training experience. The simulator must provide a realistic learning experience in terms of Skill guidance, Hearing skills, Parameter learning, Joints and positions, User experience, Feedback analysis and International Standardisation.	
1	VISION TECHNOLOGY	AUGMENTED REALITY	
2	WELDING PROCESSES SUPPORTED	GMAW (MIG/MAG) & FCAW G/S	
3	WELDING POSITIONS	PA, PB, PC, PD, PF/PG, PE, PH/PJ, HL045/JL045 - 1F, 2F, 3F, 4F, 5F, 6F, 1G, 2G, 3G, 4G, 5G, 6G	
4	WELDING JOINTS	Following set of training Welding Joints: Overlapped plate, V-Butt plate T-Angled plate to plate, V-Butt pipe, T-Angled pipe to plate with magnet feature	
5	PIECE SHOULD BE MANIPULATED SEPARATELY	We should be able to manipulate piece at any time during the exercise to perform a visual inspection of the welding bead. The workpiece is not attached in any way to the work stand	

6	REAL WELDING TORCHES	All kinds of real welding torches to be provided with the systems												
7	WELDING SOUNDS	Simulation should real welding sounds for the weld process												
8	VOLTAGE SELECTION	Provision to modify during the exercise to be provided												
9	INTENSITY (AMPERAGE) SELECTION	Provision to modify during the exercise to be provided												
10	SHIELDING GAS SELECTION	Provision to modify during the exercise to be provided												
11	WIRE SPEED SELECTION	Provision to modify the wire speed in GMAW (MIG/MAG) and FCAW during the exercise												
12	COUPON MATERIAL SELECTION	Carbon Steel, Stainless Steel, Aluminium												
13	GAS COMPOSITION	<table border="1"> <thead> <tr> <th>Material</th><th>GMAW</th><th>FCAW</th></tr> </thead> <tbody> <tr> <td>Carbon Steel</td><td>Argon-Co², CO²</td><td>Argon-Co², CO²</td></tr> <tr> <td>Aluminium</td><td>Argon</td><td>-</td></tr> <tr> <td>Stainless Steel</td><td>Argon-O²</td><td>-</td></tr> </tbody> </table>	Material	GMAW	FCAW	Carbon Steel	Argon-Co ² , CO ²	Argon-Co ² , CO ²	Aluminium	Argon	-	Stainless Steel	Argon-O ²	-
Material	GMAW	FCAW												
Carbon Steel	Argon-Co ² , CO ²	Argon-Co ² , CO ²												
Aluminium	Argon	-												
Stainless Steel	Argon-O ²	-												
14	COUPON THICKNESS SELECTION	3mm, 6mm, 10mm												
15	WELDING PATTERN/WEAVE Welding Direction	Straight, Triangle, Convex, Circle, Zigzag Left to Right/ Right to Left												
16	TRANSFER MODES	Short circuit, globular, spray												
17	UNDO WELDING	It should be possible to undo a pass or weldment repeating only a certain part of the exercise												
18	REPORT FEATURES	CTWD, Travel Speed, Work Angle, Travel Angle, Trajectory, Voltage, Wirefeed Speed, Technical Parameters, Equipment Settings, and Bend Test												
19	AUGMENTED TRAINING CONTENT	Augmented Training Welding Course; Augmented Training Methodology												
20	INTERNATIONAL PUBLISHERS CONTENT	AWS, CESOL, DVS, Ludo Breemans to be available												
21	LMS APPLICATION	E-Learning for Teachers and Students (Available in following language: Hindi/English/Tamil/Telegu)												
22	LMS APPLICATION: TEACHER ACCESS	Easy web access and also desktop application												
23	LMS APPLICATION: STUDENTS ACCESS	Web access. Visualize contents, progress, take tests, live chat												
24	STUDENT PERSONALIZED PROFILE	Practices report and progression												
25	REPORTS	Exercises, courses, students and diploma												

	Lap, Fillet, Pipe Butt and Pipe to Plate joints in CS, SS and Alu
Base material	Carbon Steel, Stainless Steel and Aluminum
Welding practice options for positions	Down hand, Horizontal, Vertical Up, Vertical down, Overhead and Inclined positions. (1G to 6G)
PARAMETER LEARNING - The simulator must have wide range of options to select for each parameter and process.	
Process options	SMAW, GMAW, FCAW and GTAW Process.
Parameter options	SMAW - 50A - 240A.
	GMAW - 10V - 32V & 25A - 270A.
	GTAW - 25A - 270A.
Consumables options	2.5, 3.15 & 4MM for SMAW electrode.
	0.8, 1.0, & 1.2 DIA for GMAW wires.
	2.0 & 2.4MM for GTAW filler rod.
USER EXPERIENCE - The simulator must have the best technology and features which will replicate the realistic workshop experience to the user.	
Simulation Technology	Augmented Reality
Simulation Methodology	Green learning with No real arc or Real fumes.
Weld bead simulation	Simulation software must replicate the weld bead, molten metal and spatter.
Fixture skill training	Provision to place the workpiece on a fixed stand to enable student learn to weld using fixtures.
Fabrication skill training	Provision to place the workpiece on a work table to enable student learn to weld as in fabrication.
Object simulation	Virtual images to be superimposed on real objects. The virtual image must follow the real object when the user lifts the workpiece and inspects.
Environment reality	Only real environment seen through AR reality welding helmet.
Hardware objects	AR SMAW holder, AR electrode, AR GMAW Torch, AR GTAW torch, AR filler rod and all the AR workpieces.
SMAW welding practice	In SMAW welding practice, the physical electrode must retract during welding practice simulating the consumption of electrode.
Industrial Torches for ergonomics	Simulator must be designed to use Industrial Euro connector torches for real feel of weight and ergonomics. (Any reputed brand like Tbi, Binzel, Esab etc).




		reports. Also CSV format available for end-user custom reports
26	REGULATIONS	CE and FCC
27	CERTIFICATIONS	ISO 9001 Quality Management System ISO 14001 Environmental Management System
28	DIMENSIONS (WITHOUT ACCESSORIES)	442.5x239.5x457.5mm (minimum)
29	WEIGHT (WITHOUT HELMET)	10 Kilograms or less
30	WEIGHT (WITH HELMET)	10.5 Kilograms or less
31	ACCESSORIES	MANUAL STANDARD: filler rod, welding gloves, Wi-Fi
32	POWER SUPPLY	100V-240V
33	PROCESSOR	Intel® Core™ i5 10th gen
34	CHIPSET	Intel® Q470E
35	RAM	16 GB (2 x 8GB Dual-Channel) DDR4 2400Mhz
36	GRAPHIC CARD	NVIDIA Quadro T1000
37	HARD DISK	M.2 SSD 128GB
38	AUDIO	Realtek High Definition Audio
39	DISPLAY SIZE	9.7"
40	DISPLAY RESOLUTION	HD LCD 1024 x 768 XGA
41	BACK PANEL PORTS	Screen: HDMI/Display Ports USB: 4 x USB 3.2 Gen 1 Connection: 2x LAN 2x Antennas Intel® WiFi6 Dual Band Audio: microphone & speakers ports
42	FRONT PANEL PORTS	1 X USB type A, 1 X USB type B
43	AR VISION MODULE RESOLUTION	MIPI LCD 4,7" HDMI Display input up to 1280x720 Ultra-low video distortion
44	CAMERAS RESOLUTION (X2)	640x480 / 800x600 Autofocus

4

Augmented Reality Weld Simulation**2 Nos****PURPOSE OF THE AR WELDING SIMULATOR**

The purpose of the AR welding simulator is to impart and enhance the welding skills. The simulator must provide a realistic learning experience in terms of Skill guidance, Hearing skills, Parameter learning, Joints and positions, User experience, Feedback analysis and International Standardization.

FIVE WELDING PARAMETERS - The simulator must have inbuilt software for following parameter combinations

Welding parameter selection combinations (Plate size, Process, Positions Joints and Base material)	1mm to 25mm in SMAW, GMAW, GTAW and FCAW Process from 1G to 6G, 1F to 6F positions in Butt,
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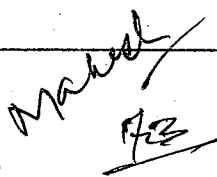
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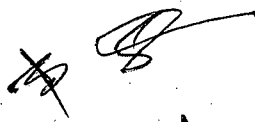
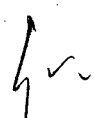
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Base material	Carbon Steel, Stainless Steel and Aluminum
Welding practice options for positions	Down hand, Horizontal, Vertical Up, Vertical down, Overhead and Inclined positions. (1G to 6G)
PARAMETER LEARNING - The simulator must have wide range of options to select for each parameter and process.	
Process options	SMAW, GMAW, FCAW and GTAW Process.
Parameter options	SMAW - 50A - 240A.
	GMAW - 10V - 32V & 25A - 270A.
	GTAW - 25A - 270A.
Consumables options	2.5, 3.15 & 4MM for SMAW electrode.
	0.8, 1.0, & 1.2 DIA for GMAW wires.
	2.0 & 2.4MM for GTAW filler rod.
USER EXPERIENCE - The simulator must have the best technology and features which will replicate the realistic workshop experience to the user.	
Simulation Technology	Augmented Reality
Simulation Methodology	Green learning with No real arc or Real fumes.
Weld bead simulation	Simulation software must replicate the weld bead, molten metal and spatter.
Fixture skill training	Provision to place the workpiece on a fixed stand to enable student learn to weld using fixtures.
Fabrication skill training	Provision to place the workpiece on a work table to enable student learn to weld as in fabrication.
Object simulation	Virtual images to be superimposed on real objects. The virtual image must follow the real object when the user lifts the workpiece and inspects.
Environment reality	Only real environment seen through AR reality welding helmet.
Hardware objects	AR SMAW holder, AR electrode, AR GMAW Torch, AR GTAW torch, AR filler rod and all the AR workpieces.
SMAW welding practice	In SMAW welding practice, the physical electrode must retract during welding practice simulating the consumption of electrode.
Industrial Torches for ergonomics	Simulator must be designed to use Industrial Euro connector torches for real feel of weight and ergonomics. (Any reputed brand like Tbi, Binzel, Esab etc).

Welder feel	During the simulation practice, the student must be able to Touch, rotate and adjust the position of the workpiece to experience maximum comfort.
Reality welding helmet	Users with spectacles (Power glasses) must be able to use the AR Reality welding helmet without any visual disturbances. Googles and headsets are not acceptable.
Portability and Longevity	Simulator must be portable and made of metal body. Should weigh 12-15 Kgs. Input supply - Single phase 230V, 50Hz, 5A.
SKILL GUIDANCE - The simulator must guide the student to perfect the hand steadiness and hand eye coordination.	
Hand steadiness guidance	Guidance through didactic signals for learning Arc length, Stick out, Welding Path, Welding speed, Torch work angle, Torch travel angle, TIG Filler work angle and TIG Filler travel angle.
Hand eye coordination guidance	The simulator must continuously provide didactic guidance for the Ideal head position so that the operator is always able to see the molten weld pool.
HEARING SKILLS - Welding sound is the key hearing skill which welders and engineers inculcate in identifying the correctness of parameters.	
Quality Certificate	ISO 9001 and ISO 14001 certificate from the OEM to be enclosed.
Safety conformity	Certificate of compliance to be enclosed for CE safety regulations.
Authorization letter from OEM	Tender specific authorisation letter from OEM to be enclosed
E Learning Management Systems (ELMS)	
<i>Simulator to have features that help in effective learning</i>	
Windows and Mac OS	The ELMS software hardware application must be available and compatible with Windows and MacOS hardwares.
Server compatible	The ELMS software must be able to connect multiple simulators via a physical or a cloud server.
Data Import and Export	The dual access software must be able to export and import student profiles. The exported file must be a CSV extension and the format must be easily editable.
WPS Creation	The instructor/trainer must be able to create exercises according to their own WPS where they can change the values of equipment settings (Voltage, Amperage/Wire

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		feed speed and Gas) and technique parameters (Work angle, Travel angle, CTWD, Travel speed and Aim).	
	Change Equipment setting values	The instructor/trainer must be able to change the values of equipment settings (Voltage, Amperage/Wire feed speed, Gas). The range must automatically adjust according to the entered value and selected difficulty level.	
	Change Technique parameters	The instructor/trainer must be able to change the values of technique parameters (Work angle, Travel angle, CTWD, Travel speed, Aim). The range must automatically adjust according to the entered value and selected difficulty level.	
	Normal / Restrictive evaluation	The instructor/trainer must be able to select whether the exercise evaluation should be normal or restrictive (Enabling restrictive evaluation will ensure the welding practice will pass only if all the technical parameters are under the acceptable ranges).	
	Enable Disable - Equipment settings	The instructor/trainer must be able to enable or disable the following equipment settings for the evaluation or scoring of an exercise: Gas, Wire Feed Speed/Amperage (depending on selected process), Voltage and Arc Control (SMAW).	
	Enable Disable - Technique parameters	The instructor/trainer must be able to enable or disable the following technique parameters for the evaluation or scoring of an exercise: Work Angle, Travel Angle, CTWD (for GMAW and GTAW torch), Arc Length (for SMAW and GTAW filler rod), Travel speed, Aim, Filler Rod Work Angle (for GTAW) and Filler Rod Travel Angle (for GTAW).	
	Enable Disable - Realtime guide parameters	The instructor/trainer must be able to enable or disable the following Real-time Guide Parameters in an exercise: Work Angle, Travel Angle, Travel Speed, Weave pattern, Gas Flow, Travel Direction, Arc Control, Amperage, Wire Feed Speed, Weave Guide (Real-Time), Helmet Positioning, CTWD, Arc length,	

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		Voltage, Filler Rod Work Angle, Filler Rod Travel Angle.	
	Percentage Pass score setting	The instructor/trainer must be able to set a passing score. This score is the percentage out of 100.	
	SCOPE OF SUPPLY		
	AR Welding simulator	1 No	
	AR Reality HD welding helmet	1 No	
	LED Monitor	1 No	
	AR SMAW simulation Torch	1 No	
	AR SMAW retractable simulation electrode	1 No	
	AR GMAW simulation Torch set	1 No	
	AR GTAW simulation Torch set	1 No	
	AR GTAW simulation Filler	1 No	
	AR workpieces for Lap, Butt, Fillet, Pipe to Pipe and Pipe to Plate	1 Set	
	Work Stand for upto Inclined position	1 No	
	E-learning simulation	1 No	
	Wifi Sticks	1 Pair	
5	Articulated Robot Training Cell		1 Nos
	“The Robotic System will be comprised of the following subsystems”		
	A. Robotic Arm B. Controller Box C. Gripper System D. Additional Requirement E. Inspection and Tests Required F. Manuals G. Installation and Commissioning H. Delivery Period I. Allied Details Required		
	A.	ROBOTIC ARM	
	1.	Manipulator Configuration	• Articulated Manipulator
	2.	Payload	At least 8 kg
	3.	Reach	At least 900mm
	4.	Degrees of Freedom	At least 6 (excluding DoF for end-effector)
	5.	Pose Repeatability	± 0.02mm or better (lesser value)
	6.	Maximum speed for Tool Center Point (TCP)	At least 1.0m/s
	7.	Motion range (Maximum Speed)	J1 axis rotation [°] - 340° or better (285 Degrees/Sec or better) J2 axis rotation [°] - 220° or better (320 Degrees/Sec or better)

C.	USER INTERFACE	
1.	Graphical User Interface	• Default method of programming, operation and data analysis for the robotic arm • Screen Size: At least 5 inches • Protection class: At least IP54 • Provision of emergency stop button • Provision of wheel button • Provision of Power and Error Lamp • Provision of Stop button • Provision of Servo button • Provision of USB Port • Provision of Key Switch • Cable length from controller box: At least 7.0m
2.	Robot Programming & Simulation Software (1License)	Platform Compatibility: Should operate on standard Windows 10 or later operating systems (64-bit). Programming Environment: Must support text-based programming using dedicated robot control languages. Should provide graphical programming features for simplified logic creation and motion sequence setup. Editing and Debugging Tools: Multi-window program editing with syntax highlighting, breakpoints, and line-by-line execution. Real-time monitoring of I/O states, position data, variable values, and system status. Simulation Capability: Must include a built-in 3D simulation environment for offline program verification. Capable of cycle time estimation, collision detection, and workspace interference analysis. Should support simulation of multiple robot units within a shared layout. Integration Support: Should allow import of CAD layouts or models for path validation and layout design. Optional interface with third-party design platforms (e.g., 3D CAD software) is desirable. Preventive Maintenance Support: Should offer diagnostic tools for monitoring robot servo status, motor health, and battery/grease life.

		J3 axis rotation [°] - 165° or better (360 Degrees/Sec or better) J4 axis rotation [°] - 400° or better (330 Degrees/Sec or better) J5 axis rotation [°] - 240° or better (450 Degrees/Sec or better) J6 axis rotation [°] - 720° or better (720 Degrees/Sec or better)
8.	Allowable load moment at the wrist	J4 axis (Nm) – 16 or better J5 axis (Nm) – 16 or better J6 axis (Nm) – 6.5 or better
9.	Allowable load inertia at the wrist	J4 axis (Kgm2) – 0.45 or better J5 axis (Kgm2) – 0.45 or better J6 axis (Kgm2) – 0.10 or better
10.	Protection Class	At least IP65
11.	Operating Temperature Range	Ambient: At least 0 - 40°C
12.	Mounting position	Floor and Table
13.	Noise Level	70dB or less
14.	Robot Weight	Less than 42Kgs
B.	CONTROLLER BOX	
1.	Programming Environment	- Programming Positions: 38000 minimum Programming Steps: 78000 minimum Max No of Programs: 512 Minimum - Provision for programming via a graphical user interface
2.	Command / Function Library Support	Detailed documentation for OEM-developed standard commands, functions and applications for performing stand-alone subtasks, accessing sensor data, and user programming & reference generation
3.	Input / Output Ports	- Digital input: Minimum 16 nos. - Digital output: Minimum 16 nos.
4.	Connection with Robotic Arm	Suitable connectors at both ends with a cable length of a minimum of 5 meters.
5.	Interface Required	Ethernet USB 3.0 Force Sensor SD Card RS 422
6.	Protection Class	At least IP20
7.	Power Supply Source	- Single Phase AC source - Nominal voltage: 230VAC - Nominal frequency: 50Hz
8.	Safety Extension Unit	Yes

C.	USER INTERFACE	
1.	Graphical User Interface	• Default method of programming, operation and data analysis for the robotic arm • Screen Size: At least 5 inches • Protection class: At least IP54 • Provision of emergency stop button • Provision of wheel button • Provision of Power and Error Lamp • Provision of Stop button • Provision of Servo button • Provision of USB Port • Provision of Key Switch • Cable length from controller box: At least 7.0m
2.	Robot Programming & Simulation Software (1License)	Platform Compatibility: Should operate on standard Windows 10 or later operating systems (64-bit). Programming Environment: Must support text-based programming using dedicated robot control languages. Should provide graphical programming features for simplified logic creation and motion sequence setup. Editing and Debugging Tools: Multi-window program editing with syntax highlighting, breakpoints, and line-by-line execution. Real-time monitoring of I/O states, position data, variable values, and system status. Simulation Capability: Must include a built-in 3D simulation environment for offline program verification. Capable of cycle time estimation, collision detection, and workspace interference analysis. Should support simulation of multiple robot units within a shared layout. Integration Support: Should allow import of CAD layouts or models for path validation and layout design. Optional interface with third-party design platforms (e.g., 3D CAD software) is desirable. Preventive Maintenance Support: Should offer diagnostic tools for monitoring robot servo status, motor health, and battery/grease life.

		Must include features for position recovery guidance in case of interruptions. User Interface: Software should have a modern GUI with dockable panes, toolbars, and context-sensitive help. Support for both basic and advanced user modes is recommended. Automation Workflow Compatibility: Should enable offline development, virtual testing, and commissioning within standard automation workflows.
C	Grippers	
1.	Mechanical Gripper	2 Jaw or 3 Jaw Gripper or Better Maximum Payload = 5Kgs or Better With All Accessories for Robot and Gripper From Reputed Brand
2.	Vacuum Gripper	Maximum Payload = 5Kgs or Better The Vacuum Grippers are a general-purpose, all-in-one vacuum system that covers most applications. The Vacuum Gripper has eliminated the need to purchase separate fittings, connection hoses, filters, and suction cups as they come as a one-piece standard – Max Vacuum Level: -92 kPa or better – Open Vacuum Flow: 42.2 NI/min or better – Air Consumption: 32 NI/min @ 4 bar or better – Mini 2-stage vacuum cartridge installed or better – Top Bellows: 40 mm, 60 mm or better – Available Type: A, B, C, D or better With All Accessories for Robot and Gripper From Reputed Brand
3.	Magnetic Gripper	Maximum Payload = 5Kgs With All Accessories for Robot and Gripper From a Reputed Brand
D.	Additional Requirement	A. All required Sensors and additional devices should be included with the order. B. All types of consumables for Installation, commissioning and training under the bidder scope. C. Minimum 20 Nos of Material handling Sample programs

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			should be provided by the bidder during the installation and commissioning. D. D. Detailed training of 2 Days to buyer faculty or designated staff and 2 Days at OEM Location should be provided by the bidder.	
	F.	Inspection and Tests Required	Pre-dispatch factory inspection and testing for full system functionalities will be conducted. Bidder will bear the travel and hospitality expenditure of Buyer personnel.	
	G.	Manual (Soft and Hard Copy)	1. Operational 2. Mechanical Maintenance 3. Electrical Maintenance	
6	Workstation for Pneumatic Training System			1 Nos
Mobile workstation: should be consisting of • Modular and to be assembled and commissioned in the site. • Suitable attachment frame with all necessary mounting kits • Reinforced grid or Grooved plate as single piece made of Aluminium profile with both sides grooves, size: min. 1000 * 700 mm • Connection termination via quick disconnects couplings. • Single row racks to hold electrical/electronics units, MS powder coated • One Suitable drawer unit with 4 draws for storing the components • Dimension of workstation: Minimum L 1500mm, W 750mm, H 1700mm Special Condition: • Each pneumatic component should have quick fix arrangement for easy, quick & safe mounting. • All the components should be included as simulation models in the component library of Pneumatic simulation software. • All exercises given in the work books should be readily available as simulation condition in Pneumatic simulation software. • The components should be fixed manually on the profile plate without tools. • Each pneumatic component should have pneumatic connectors with size of 1/8"/5mm port size for 4 mm tubing • Each hydraulic component should have connectors with size of G¼ "thread & NRV. The kit should be modular and upgradable so that future investments to higher levels of training are reduced. Safety The system shall be design with all possible safety interlocks Valves 1) All the valves shall be conforming to IS 15407 or other relevant codes The individual connections and its fitting for each workbench, its installation and commissioning shall be in the scope of supplier. Pneumatic Trainer Kit Should have following items:				

	Double acting cylinder – 2 Nos. • Piston dia: 20 mm • Stroke length: Maximum 100 mm • Operating pressure: Maximum 1000 kPa (10 bar) • Pneumatic connection for plastic tubing 4 mm Single acting cylinder – 1 No. • Piston dia: 20 mm • Stroke length: Maximum 50 mm • Operating pressure; Maximum 1000 kPa (10 bar) • Pneumatic connection for plastic tubing 4 mm 3/2-way valve with push button with spring return – 3 Nos. • Type: NC • Actuation: Pushbutton • Pressure range: 0 - 8 bar • Flow rate: 60 l/min • Pneumatic connection for plastic tubing 4 mm 3/2-way valve with push button with spring return – 1 No. • Type: NO • Actuation: Pushbutton • Pressure range: 4 - 8 bar • Flow rate: 100 l/min • Pneumatic connection for plastic tubing 4 mm 3/2-way roller lever valve – 3 Nos. • Type: NC • Actuation: Roller lever • Pressure range: 0 - 8 bar • Flow rate: 80 l/min • Pneumatic connection for plastic tubing 4 mm 3/2-way roller lever valve – 1 No. • Type: NC • Actuation: idle return roller lever • Pressure range: 0 - 8 bar • Flow rate: 80 l/min • Pneumatic connection for plastic tubing 4 mm 5/2-way valve with selector switch – 1 No. • Actuation: Selector switch • Pressure range: 0 - 8 bar • Flow rate: 90 l/min • Pneumatic connection for plastic tubing 4 mm 5/2 pneumatically actuated DCV with return spring – 1 No. • Actuation: Pneumatically • Pressure range: 0 - 10 bar • Flow rate: 500 l/min • Pneumatic connection for plastic tubing 4 mm 5/2 pneumatically actuated DCV double sided – 3 Nos. • Actuation: Pneumatically • Pressure range: 0 - 10 bar • Flow rate: 600 l/min • Pneumatic connection for plastic tubing 4 mm OR logic valve: - 1 No. • Type: OR gate • Pressure range: 1 - 10 bar • Flow rate: 500 l/min • Pneumatic connection for plastic tubing 4 mm	
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AND logic valve: - 1 No.

- Type: AND gate
- Pressure range: 1 - 10 bar
- Flow rate: 550 l/min
- Pneumatic connection for plastic tubing 4 mm

Pressure sequence valve: - 1 No.

- Pressure range: 2 - 8 bar
- Flow rate: 100 l/min
- Pneumatic connection for plastic tubing 4 mm

Pneumatic timer: - 1 No.

- Range: Max 5s
- Pressure range: 3 - 8 bar
- Flow rate: 90 l/min
- Pneumatic connection for plastic tubing 4 mm

Quick exhaust valve: - 1 No.

- Pressure range: 1 - 10 bar
- Flow rate: 1000 l/min
- Pneumatic connection for plastic tubing 4 mm

Flow control valve with check valve: - 2 Nos.

- Pressure range: 1 - 10 bar
- Flow rate: 200 l/min
- Pneumatic connection for plastic tubing 4 mm

Manometer: - 2 Nos.

- Display and pressure range: 0 - 10 bar
- Pneumatic connection for plastic tubing 4 mm

Air filter with pressure controller and manometer: - 1 No.

- Pressure range: 1 - 12 bar
- Flow rate: 750 l/min
- Filter grade: 40 μ m
- With on/off valve with silencer

Pressure controller and manometer: - 1 No.

- Pressure range: 1 - 12 bar
- Flow rate: 800 l/min
- Pneumatic connection for plastic tubing 4 mm

Distributor with 6 outputs: - 1 No.

- Pressure range: 1 - 16 bar
- 6 Outputs via non return valve
- Pneumatic connection for plastic tubing 4 mm

Polyurethane plastic tube, 4 mm: 15 M

- Pressure range: 1 - 10 bar
- Size: 4 mm
- Colour: Blue

Tee connector for 4 mm tube: 10 Nos.

- Pressure range: 1 - 14 bar
- Size: 4 mm

Power supply unit- 1 No.

Input voltage: 230 $\pm$ 10% V AC (50 Hz)

Output voltage: 24 V DC, short-circuit proof

Electrical assembly mounting single /double row rack to hold electronics modules

Relay unit with three relays, 4 changeover switches- 1 No.

Contact load: max. 5 A

Cut-off load: max. 90 W

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 3. A signature starting with 'P'.
 4. A signature starting with 'M' and 'A' (possibly 'Mahesh').
 5. A signature starting with 'S'.

Pick-up time: 10 ms Drop-off time: 8 ms NEMA variant: Symbols as per NEMA standard
Signaling unit with an illuminated pressure switch, three illuminated push button, each with a mini bulb.- 1 No. Contact set: 1 makes, 1 breaks Contact load: Maximum 2 A Power consumption (Miniature bulb): 0.48 W NEMA variant: Symbols as per NEMA standard
Limit switch, electrical, actuation via trip cams (from the left)- 1 No. contact load: maximum 5 A
Limit switch, electrical, actuation via trip cams (from the right)- 1 No. contact load: maximum 5 A
3/2-Way Solenoid Valve: - 1 No. • Pressure range: 0 - 10 bar • Flow rate: 500 l/min • Pneumatic connection for plastic tubing 4 mm • Electrical connection via integrated 4 mm safety sockets • 24 V DC power supply • Pneumatic connection for plastic tubing 4 mm
5/2-Way single Solenoid Valve: - 1 No. • Pressure range: 0 - 10 bar • Flow rate: 500 l/min • Pneumatic connection for plastic tubing 4 mm • Electrical connection via integrated 4 mm safety sockets • 24 V DC power supply • Pneumatic connection for plastic tubing 4 mm
5/2-Way double Solenoid Valve: - 1 No. • Pressure range: 0 - 10 bar • Flow rate: 600 l/min • Pneumatic connection for plastic tubing 4 mm • Electrical connection via integrated 4 mm safety sockets • 24 V DC power supply • Pneumatic connection for plastic tubing 4 mm
Proximity reed switch: 2 Nos. • Connection via 4 mm safety sockets • Switching output N/O contact (PNP) with switching status indication • Overload and short-circuit proof, with reverse polarity protection • Operating voltage 5 - 30 V DC • Output current: max. 100 mA • With cylinder mounting
Pressure sensor with display: - 1 No. • Power supply 12 - 30 V DC • Switching output PNP • Pneumatic connection for plastic tubing 4 mm • Pressure measuring range -1 - 8 bar • Quick fix secure click-on system for mounting on the existing profile plate
Inductive sensor: - 1 No. Sensing distance of 0 - 4 mm • Power supply 10 - 30 V DC • N/O contact (PNP) starting function • 360° rotatable, detenting every 15° without changing of Quick fix Position

	• Connection via the 4 mm safety connectors integrated in the quick fix quick connector system protection against polarity reversal, overload and short circuit. Capacitive sensor: - 1 No. • Sensing distance of 0 – 4 mm • Power supply 10 – 30 V DC • N/O contact (PNP) starting function • 360° rotatable, detenting every 15° without changing of quick fix Position • Connection via the 4 mm safety connectors integrated in the quick fix quick connector system protection against polarity reversal, overload and short circuit. Optical sensor: - 1 No. • Sensing distance of 70 – 300 mm • Power supply 10 – 30 V DC • N/O contact (PNP) starting function • 360° rotatable, detenting every 15° without changing of quick fix Position • Connection via the 4 mm safety connectors integrated in the quick fix quick connector system • protection against polarity reversal, overload and short circuit. Silent compressors: 1 no. • Noise level: 45 dB (A)/1 m • Duty cycle: max. 50 % • Design: 230 V/50 Hz • Pressure: 800 kPa (8 bar) P_{max} • Performance: 50 l/min • Reservoir capacity: 22 l • Duty cycle: 50%	
7	Workstation for Hydraulic Training System Mobile workstation: should be consisting of • Modular and to be assembled and commissioned in the site. • Suitable attachment frame with all necessary mounting kits • Reinforced grid or Grooved plate as single piece made of Aluminium profile with both sides grooves, size: min. 1000 * 700 mm • Connection termination via quick disconnects couplings. • Single row racks to hold electrical/electronics units, MS powder coated • One Suitable drawer unit with 4 draws for storing the components • Dimension of workstation: Minimum L 1500mm, W 750mm, H 1700mm Double acting cylinder: - 1 No. • Operating pressure: 60 bar • Maximum permissible pressure: 120 bar • Piston Ø: Max. 16 • Piston rod Ø: 10 mm Stroke: 200 mm 4/2-way hand lever valve: - 1 No. • Spring return • Actuation: Manual • Operating pressure: 60 bar Maximum permissible pressure: 120 bar 4/3-way hand lever valve: - 1 No.	1 Nos

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- Type: by pass mid position
- Actuation: Manual
- Operating pressure: 60 bar

Maximum permissible pressure: 120 bar

One way flow control valve: - 1 No.

- Actuation: manual
- Operating pressure: 60 bar

Maximum permissible pressure: 120 bar

Two way flow control valve: - 1 No.

- Actuation: manual
- Operating pressure: 60 bar

Maximum permissible pressure: 120 bar

Pressure relief valve: - 2 No.

- Actuation: manual
- Operating pressure: 60 bar

Maximum permissible pressure: 120 bar

Non return valve: - 2 No.

- Actuation: hydraulic
- Tube length 1000 mm
- 0.05 mm range – 1 no.
- 0.6 bar range – 1 no.
- Operating pressure: 60 bar

Maximum permissible pressure: 120 bar

Non return valve (pilot operated): - 1 No.

- Actuation: manual
- Operating pressure: 60 bar

Maximum permissible pressure: 120 bar

Shut off valve: - 1 No.

- Actuation: manual
- Operating pressure: 60 bar

Maximum permissible pressure: 120 bar

T connector: - 5 No.

- Ports: 2x coupling nipples and 1x quick coupling socket

Maximum permissible pressure: 120 bar

Distributor with manometer: - 1 No.

- display range and maximum permissible pressure 100 bar
- Cushioning: glycerine

4 Outputs

Manometer: - 2 Nos.

- display range and maximum permissible pressure 100 bar

Cushioning: glycerine

Hoses with quick release couplings: - 1 set

- Operating pressure: 60 bar
- Maximum permissible pressure: 120 bar
- Hose length, 600 mm: 8 Nos.
- Hose length, 1000 mm: 4 Nos.

Hose length, 1500 mm: 2 Nos.

Hydraulic Power pack: -1 No.

- Tank req.: 5 L,
- Pump with external gear motor with pressure relief valve adjustable from 0 – 60 bar.

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- 230 V Motor with overload protection, start capacitor and ON/OFF switch
- Rated output: 650 W

Delivery rate req.: 2 l/min

Hydraulic oil: -1 No.

Suitable oil for above power pack – 10 L

load simulator: - 1 No.

Min. 8 kg load

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Composite Three-D Machine

1 Nos

S.NO.	Parameters	Technical Specifications
1	Application	The 3D Machine should be versatile and capable of producing high strength parts for end-use and functional parts for users including shop floor applications of tooling etc. with high reliability.
2	Printing Technology	Continuous Fiber Fabrication.
3	End component properties	Component strength as per Minimum: ASTM:
		Tensile strength (ASTM D 3039) 590 Mpa or more
		Tensile modulus (ASTM D 3039) 21 Gpa or more
		IZOD Impact (ASTM D 256 -10) 2600 J/m or more
		Flexural strength (D 790) 200 Mpa or more
		Compressive strength (D6641) 140 Mpa or more
		Heat Deflection Temperature or more (D648 B) 100 °C
4	Build volume	300 x 130 x 150 mm or more
5	Z layer resolution	100 microns or better
6	Fiber material	Fiber Glass
7	Printer connectivity	WiFi, Ethernet, USB Flash Drive
8	Print head setup	Machine must have TWO nozzles with one dedicated to a base material and one dedicated to reinforcement material

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			A fiber cutting blade must be integrated inside the printhead and controlled automatically by Simulation.										
	9	Simulation features	1. The 3D printing Simulation must be able to import 3D models from any major CAD Simulation in STL format.										
			2. The Simulation must be able to calculate printing time and consumables usage during pre-processing of each print job.										
			3. The Fiber laying must be Isotropic & layers be fully programmable for lay-up angle and while laying concentric fiber, user should have choice on walls to reinforce as: All walls / Outer shell only / Inner holes only.										
			4. The Simulation must be cloud based & versatile to support OS like: Mac OS 10.7 Lion +, Win 7+, Linux2 and should operate under Chrome 3.0+ Browser.										
	10	Machine hardware & feature	1. The print should have Pause & Resume on demand.										
			2. Print bed must use kinematic coupling to provide precision and certainty of location when decoupled and recoupled.										
			3. 3D Machine must feature a unibody aluminum chassis and precision-machined components to deliver lights-out reliability over thousands of print hours.										
	11	Facility Requirement	1. The operational mass must not be more than 16 kg.										
			2. The power supply must be 100-240 VAC, drawing 3Amp.										
			3. The printer must be able to be relocated easily by one person.										
9	Resin Based Three-D Machine			1 Nos									
<table><tr><td>S No</td><td>Description</td><td>Specification</td></tr><tr><td>1</td><td>Type of Technology</td><td>SLA/MSLA/LFD</td></tr><tr><td>2</td><td>XY Resolution</td><td>50 microns</td></tr></table>					S No	Description	Specification	1	Type of Technology	SLA/MSLA/LFD	2	XY Resolution	50 microns
S No	Description	Specification											
1	Type of Technology	SLA/MSLA/LFD											
2	XY Resolution	50 microns											

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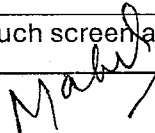
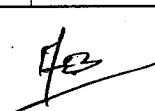
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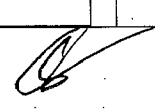
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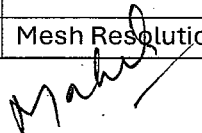
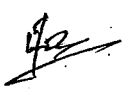
3	Layer Thickness	25 – 200µm
4	Maximum print speed	100 mm/hr or better
5	Material compatibility Resins	Grey, white, clear, black, precision, Fast, Tough 2K, Elastic, Flex, High Temp, Rigid
6	Printable build volume	200 × 125 × 210 mm or more
7	Power source	Backlight Unit and Light Processing Unit
8	Camera	Inbuild camera for capturing continuous images as an option
9	Intelligent control systems	Resin level sensor, Resin Temperature sensor, Force sensor, printer levelling sensor, mixer sensor
10	Simulation Included	Free Slicing Simulation,
11	Cloud connection	Premium Integration available with Simulation
12	Resin Loading	Automatic Refill System
13	Resin tanks make	Flexible resin tank
14	Post Processing	Automated Washing & Curing unit to be provided
15	Operating Temp & Current	(18-28° C)
		100–240 VAC, 2.5A max
		50/60HZ, 220W
16	Operating System	Windows 7 (64-bit) and up
		Mac OS X 10.12 and up
17	Supports	Auto Generated
		Light-Touch Removal
18	Internal Temperature	Auto-heats to 35 °C
19	Temperature	Air-heated print chamber
	Control	
20	Operating Environment	18 – 28 °C
21	Touch screen alerts	Touchscreen alerts

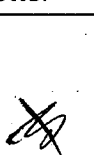
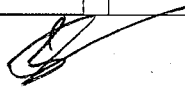
3	Layer Thickness	25 – 200µm
4	Maximum print speed	100 mm/hr or better
5	Material compatibility Resins	Grey, white, clear, black, precision, Fast, Tough 2K, Elastic, Flex, High Temp, Rigid
6	Printable build volume	200 × 125 × 210 mm or more
7	Power source	Backlight Unit and Light Processing Unit
8	Camera	Inbuild camera for capturing continuous images as an option
9	Intelligent control systems	Resin level sensor, Resin Temperature sensor, Force sensor, printer levelling sensor, mixer sensor
10	Simulation Included	Free Slicing Simulation,
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		50/60HZ, 220W
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		Mac OS X 10.12 and up
17	Supports	Auto Generated
		Light-Touch Removal
18	Internal Temperature	Auto-heats to 35 °C
19	Temperature	Air-heated print chamber
	Control	
20	Operating Environment	18 – 28 °C
21	Touch screen alerts	Touchscreen alerts


			SMS/email via Dashboard	1 Nos
	22	Peel Mechanism	Sliding Peel Process with wiper or better	
	23	Light Source	Backlight Unit: 60 uniform-wavelength LEDs, a plano-convex lens array, and integrated air cooling 405 nm optical wavelength 16 mW/cm ² optical power intensity delivered to the cure plane 50 µm pixel size	
	24	Input File formats	STL, OBJ	
	25	Slicing Print Setup Features	One-Click Print Adaptive layer thickness for faster printing with fine details. Remote Print Auto- orient for optimal print position.	
			Auto-mesh repair, Auto- generation of supports, Rotate, scale, duplicate, and mirror.	
			Layer slicer for path inspection. Available in multiple languages	
			Manage prints and printers via the cloud	
			Track resin and tank usage over time	
	26	Dashboard Machine Management features	SMS and email alerts	
			Create enterprise group accounts with admins to more easily share printers and control access	
10	Three-D Scanning Machine			1 Nos
	Sr. No	Nomenclature	Specification	
	a)	Description	Should be Handheld device with Infrared VCSEL structured light technology with Color resolution (on object) 50 to 200 DP	
	b)	Scanning Technology	Invisible light/hair/dark environment scanning. It should be a colour 3D Scanner.	
	c)	Mesh Resolution	0.250 mm (0.01 in) or better	

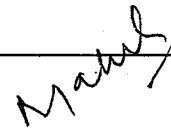
d)	Scanning Area	340 x 475mm (13.39 x 18.7 in) or large
e)	Usage Distance (From Object)	250 to 550 mm (9.8 to 21.7 in)
f)	Scan Speeds	80 sec/m ² or better
g)	Scanner controls	Touchscreen
h)	Projector Light source	IR VCSEL
i)	Color Resolution	50 to 200 DPI
k)	Positioning Methods	Geometry and/or Target and/or texture
l)	Measurement rate	1,250,000 measurements/s or better
m)	Connectivity	USB 3.0
n)	Output Formats	dae, .fbx, .ma, .obj, .ply, .stl, .txt, .wrl, .x3d, .x3dz, .zpr, .dxf, .iges*, .step etc..
o)	Accuracy	0.050 mm (0.0020 in or better
P	Volumetric accuracy:	0.050 mm + 0.100 mm/m (0.0020 in + 0.0012 in/ft
q)	Dimension	≥300 x 125 x 75 mm
r)	Certified	CE / FC Certified & RoHS compliant
t)	RE Simulation	The scanner should be integrated with RE Simulation.
u)	Depth of Field	≥ 300 mm
v)	Recommended object size	Shall be 0.1 - 3.0 m (0.3-10 ft)
w)	Measurement Capabilities	Pin - 1.5 mm (0.059 in) Hole - 3.0 mm (0.118 in) Step - 0.1 mm (0.0039 in) Wall- 1.0 mm (0.039 in) Or better

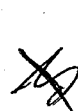
11	Virtual Reality Workstation		1 Nos
	S. No.	Parameter/ Feature	Specification Required
	1.	Tracking	With 6 Degree of Freedom, the headset must track the movement of both head and body of user, then translates them into VR with realistic precision without need of any external sensors.
	2.	Storage	128GB
	3.	Display Panel	Fast-switch LCD
	4.	Display Resolution	1830x1830 per eye
	5.	Display Refresh	120hz
	6.	SoC	Qualcomm Snapdragon XR2 Gen 2
	7.	Audio	3D positional audio built directly into the headset, allowing user to hear what's all around it and a 3.5mm audio port.

8.	RAM	8GB
9.	Battery working Life	Min 2 hours
10.	Charge Time	With the provided USB-C power adapter, charging time less than 3 hours
11.	Controllers	Left- and right-hand controllers having at least four controls compatible with the headset.
12.	IPD	Adjustable IPD with three settings for 58, 63 and 68mm
13.	Play space	3m X 3m (Max.)
14.	Head Strap	Designed to offer lightweight comfort for any type of player. This soft strap should be easily adjusted with any headset.
15.	Sound Distraction	Minimal
16.	VR Headset Carrying Case	Carrying case must be like that VR Headset, controller and its other accessories easily fit in it.
17.	Link Cable	16 Feet long 3.1 USB type A to type C
18.	Microfiber cloth	20cm x 20cm microfiber cloths

Hardware for VR Integration

1.	Processor	Intel Core i7 13 th or Higher
2.	Memory Ram	32 GB DDR 4 Gaming ram
3.	Cabinet	Gaming cabinet
4.	Graphic Card	Nvidia GeForce RTX 3060/RTX5060ti
5.	Mouse & Keyboard	Wired Keyboard and Mouse set.
6.	Solid State Drive/Hard Disk Drive	Min 1 TB & 2 TB PCIe NVMe M.2 SSD or higher. Both the drives have to be installed in the front accessible bay.
7.	I/O Ports	Front 2 - USB 3.1 Type A, 1- USB 3.1 Type C 1 - Universal Audio Jack, Rear 2 - USB 3.1 Type A, 1 - Serial, 1 - RJ45 Network, 1- Display Port, 1 - Audio Line out, 1 - Audio Line in/Microphone
8.	Connectivity	Inbuilt Wi-Fi and Bluetooth
9.	Networking	Integrated Intel i219 Gigabit Ethernet controllers with Intel Remote Wake UP
10.	Audio	Integrated Realtek ALC3234 High-Definition Audio Codec (2 Channel) with internal speaker of higher
11.	Power Supply	Minimum 850W, 90% efficient
12.	OS	Windows 11 Pro
13.	Size	FLAT 27" IPS LED-backlit Anti-glare LCD monitor or Higher, Flat, 1920 x 1080 or Higher


	Virtual Reality Simulation License, including Learning Experiment Modules as per the NIMI curriculum																					
43	Lathe Modular Trainer Kit The system should be absolutely in a modular form & should be modular system, which should allow for countless configurations and CNC applications. The slides of the machines must be equipped with 2A stepper motors. Ideal for the reproduction of work pieces and processing of 3D solid models. It should be assembled and de-assembled with 2-axis turning, 3-axis milling and 4-axis milling of following specification: <table><tr><th>Nomenclature</th><th>Specification</th></tr><tr><td>Number of Axis:</td><td>2</td></tr><tr><td>Drive:</td><td>Steppers, 2A, 1.8° Thread</td></tr><tr><td>spindles:</td><td>Ø6mm, 1mm pitch</td></tr><tr><td>Accuracy:</td><td>0,07mm</td></tr><tr><td>Max. positioning speed:</td><td>300 mm/min</td></tr><tr><td>Travels X-Axis:</td><td>50mm</td></tr><tr><td>Travel Z-axis:</td><td>195mm</td></tr><tr><td>Chuck:</td><td>Metal-3-Jaw chuck with machined spiral (1,8-56mm inside, 12-65mm outside)</td></tr><tr><td>Speed of head spindle:</td><td>3300 rpm</td></tr></table> Controller Technical Specifications: Control electronics incl motion control and pre-installed CNC software Client and drivers included for Win (7, 8, 10), OSX, Linux. Number of Axes controllable: 4 IOs: 6x input for (limit/end) switches, 1x E-stop, 2x relays, 0-10V control signal Board: 1GHz CPU, 512MB DDR3 RAM, 4GB storage Power supply: External, 110-240 V, 24 V, 5 A Connectivity: USB, Ethernet, WiFi File types: ISO G-Code RS-274, DIN 66025 Tool path simulation mode should available	Nomenclature	Specification	Number of Axis:	2	Drive:	Steppers, 2A, 1.8° Thread	spindles:	Ø6mm, 1mm pitch	Accuracy:	0,07mm	Max. positioning speed:	300 mm/min	Travels X-Axis:	50mm	Travel Z-axis:	195mm	Chuck:	Metal-3-Jaw chuck with machined spiral (1,8-56mm inside, 12-65mm outside)	Speed of head spindle:	3300 rpm	1 Nos
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Speed of head spindle:	3300 rpm																					

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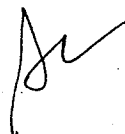
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	Virtual Reality Simulation License, including Learning Experiment Modules as per the NIMI curriculum																					
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Speed of head spindle:	3300 rpm																					

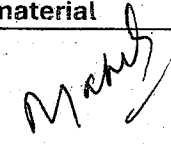


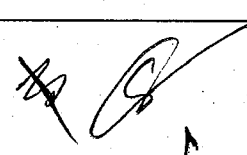







13	Milling Modular Trainer Kit <table><tr><td>Number of CNC Axes:</td><td>3</td></tr><tr><td>Drive:</td><td>Steppers, 2 A, 1.8°</td></tr><tr><td>Thread spindles:</td><td>Ø 6 mm, 1 mm pitch</td></tr><tr><td>Accuracy:</td><td>0,07 mm</td></tr><tr><td>Max. positioning speed:</td><td>300 mm/min</td></tr><tr><td>Travels Z/Y:</td><td>100 mm /50 mm</td></tr><tr><td>Travel X-axis:</td><td>145 mm</td></tr><tr><td>Chuck:</td><td>Metal-3-jaw chuck</td></tr><tr><td>Speed of head spindle:</td><td>3.300 rpm, with 1/8" collet</td></tr><tr><td colspan="2">Controller Technical Specifications:</td></tr><tr><td colspan="2">Control electronics incl motion control and pre-installed CNC software Client and drivers included for Win (7, 8, 10), OSX, Linux. Number of Axes controllable:4 IOs: 6x input for (limit/end) switches, 1x E-stop, 2x relays, 0-10V control signal Board: 1GHz CPU, 512MB DDR3 RAM, 4GB storage Power supply: External, 110-240 V, 24 V, 5 A Connectivity: USB, Ethernet, WiFi File types: ISO G-Code RS-274, DIN 66025 Tool path simulation mode should be available</td></tr></table>	Number of CNC Axes:	3	Drive:	Steppers, 2 A, 1.8°	Thread spindles:	Ø 6 mm, 1 mm pitch	Accuracy:	0,07 mm	Max. positioning speed:	300 mm/min	Travels Z/Y:	100 mm /50 mm	Travel X-axis:	145 mm	Chuck:	Metal-3-jaw chuck	Speed of head spindle:	3.300 rpm, with 1/8" collet	Controller Technical Specifications:		Control electronics incl motion control and pre-installed CNC software Client and drivers included for Win (7, 8, 10), OSX, Linux. Number of Axes controllable:4 IOs: 6x input for (limit/end) switches, 1x E-stop, 2x relays, 0-10V control signal Board: 1GHz CPU, 512MB DDR3 RAM, 4GB storage Power supply: External, 110-240 V, 24 V, 5 A Connectivity: USB, Ethernet, WiFi File types: ISO G-Code RS-274, DIN 66025 Tool path simulation mode should be available		1 Nos						
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14	Four-Axis Milling Modular Trainer Kit <table><tr><td>Number of CNC axes:</td><td>4</td></tr><tr><td>Drive:</td><td>Steppers, 2 A, 1.8°</td></tr><tr><td>Thread spindles:</td><td>Ø 6 mm, 1 mm pitch</td></tr><tr><td>Accuracy:</td><td>0,07 mm</td></tr><tr><td>Max. positioning speed:</td><td>300 mm/min</td></tr><tr><td>Travel Z/Y:</td><td>100 mm/50 mm</td></tr><tr><td>Travel X-axis:</td><td>145 mm (expandable)</td></tr><tr><td>Chuck:</td><td>Metal-3-jaw chuck</td></tr><tr><td>Machined spiral:</td><td>(1,8-56mm inside, 12-65mm outside)</td></tr><tr><td>Increment rotation axis:</td><td>360°/800/4 = 0,1125°</td></tr><tr><td>Speed of head spindle:</td><td>3.300 rpm, with 1/8" collet</td></tr><tr><td colspan="2">Controller Technical Specifications:</td></tr><tr><td colspan="2">Control electronics incl motion control and pre-installed CNC software Client and drivers included for Win (7, 8, 10), OSX, Linux. Number of Axes controllable:4 IOs: 6x input for (limit/end) switches, 1x E-stop, 2x relays, 0- 10V control signal Board: 1GHz CPU, 512MB DDR3 RAM, 4GB storage Power supply: External, 110-240 V, 24 V, 5 A Connectivity: USB, Ethernet, WiFi File types: ISO G-Code RS-274, DIN 66025 Tool path simulation mode should be available</td></tr><tr><td colspan="2">Raw material</td></tr></table>	Number of CNC axes:	4	Drive:	Steppers, 2 A, 1.8°	Thread spindles:	Ø 6 mm, 1 mm pitch	Accuracy:	0,07 mm	Max. positioning speed:	300 mm/min	Travel Z/Y:	100 mm/50 mm	Travel X-axis:	145 mm (expandable)	Chuck:	Metal-3-jaw chuck	Machined spiral:	(1,8-56mm inside, 12-65mm outside)	Increment rotation axis:	360°/800/4 = 0,1125°	Speed of head spindle:	3.300 rpm, with 1/8" collet	Controller Technical Specifications:		Control electronics incl motion control and pre-installed CNC software Client and drivers included for Win (7, 8, 10), OSX, Linux. Number of Axes controllable:4 IOs: 6x input for (limit/end) switches, 1x E-stop, 2x relays, 0- 10V control signal Board: 1GHz CPU, 512MB DDR3 RAM, 4GB storage Power supply: External, 110-240 V, 24 V, 5 A Connectivity: USB, Ethernet, WiFi File types: ISO G-Code RS-274, DIN 66025 Tool path simulation mode should be available		Raw material		1 Nos
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Raw material																														

Machinable Aluminum rods Center punched, $\varnothing 12 \times 100 \text{mm}$, pack of 15pcs

Milling Foam Blocks Prototyping foam, medium density, approx.
24x24x50mm, pack of 30pcs

Coloured acrylic plates, Cast acrylic, suitable for milling, protective
masking on both sides, 50X50x3mm, pack of 30pcs

Resource Kit CNC Incl extra hand tools, tooling (end mills, turning tool),
spare parts, gibs, var. screws, etc.

Handwritten signatures and initials:
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2. *Handwritten signature*
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4. *Handwritten initials*
5. *Handwritten signature*
6. *Handwritten signature*