

# Notice Inviting Tender

## Digital Factory Setup: Virtual & Physical

**Tender No: CPDM/ACB/2019-20/06**



**Centre for Product Design and Manufacturing  
Indian Institute of Science  
Bangalore – 560012**

**May 2019**

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## SECTION 1 – BID SCHEDULE

1	<b>Tender No</b>	<b>CPDM/ACB/2019-20/06</b>
2	<b>Tender Date</b>	<b>28<sup>rd</sup> May 2019</b>
3	<b>Item Description</b>	Supply and Installation of <b>Digital Factory Setup: Virtual &amp; Physical</b>
4	<b>Tender Type</b>	Two Bid System a) Technical Bid (Part-A) b) Commercial Bid (Part-B)
5	<b>Place of Submission and tender opening</b>	The Chairman Centre for Product Design and Manufacturing Indian Institute of Science, Bangalore – 560012, India
6	<b>Last Date &amp; Time for submission of tender</b>	<b>17<sup>th</sup> June 2019, 17:00 hrs</b>
7	<b>For further clarifications</b>	The Chairman Centre for Product Design and Manufacturing Indian Institute of Science, Bangalore – 560012, India <b>Email: <i>chair.cpdm@iisc.ac.in</i></b> <b>with copy to <i>venuallam@iisc.ac.in</i></b>

## SECTION 2 – ELIGIBILITY CRITERIA

### Prequalification criteria:

1. The Bidder's firm should have been in existence for a minimum of 1 years.  
(Enclose Company **Registration Certificate**)
2. The Bidder should have qualified technical service personnel with documented and adequate experience in an Indian Office
3. If the Bidder is a local distributor/dealer/Agent, it is mandatory to attach authorization certificate along with the bid from the original equipment manufacturer.
4. The bidder should sign and submit the declaration for Acceptance of Terms and Conditions as per -Annexure 4.
5. The Bidder must not be blacklisted/banned/suspended or have a record of any service related dispute with any organization in India or elsewhere. A declaration to this effect has to be given as per Annexure 3.

## SECTION 3 – TERMS AND CONDITIONS

### A) Submission of Tender:

1. All documentations in the tender should be in English.
2. Tender should be submitted in two envelopes (two bid system).
  - a. **Technical Bid (Part-A) –**  
Technical bid consisting of all technical details, check list for conformance to specifications, format in which the price bid is quoted without the actual prices (suppliers who include any indication of prices in the technical bid will be automatically disqualified).
  - b. **Commercial Bid (Part-B) –**  
Commercial bid indicating item wise price for the items mentioned in the technical bid , as per the format of quotation in section 6 provided in tender, and other commercial terms and conditions
3. The technical bid and price bid should each be placed in a sealed cover, superscripting on both the envelopes the tender no. and the due date and Both these sealed covers are to be placed in a bigger cover which should also be sealed and duly superscripted with the Tender No & Due Date.
4. The SEALED COVER superscripting tender number / due date & should reach The Chairman, Centre for Product Design and Manufacturing, Indian Institute of Science, Bangalore – 560012, India on or before due date mentioned in the tender notice. In case due date happens to be holiday the tender will be accepted and opened on the next working day.  
**If the quotation cover is not sealed, it will be rejected.**
5. All communications are to be addressed to- The Chairman, Centre for Product Design and Manufacturing, Indian Institute of Science, Bangalore – 560012, India.
6. GST/other taxes, levies etc., are to be indicated separately. The BIDDER should mention GST Registration and PAN in the tender document (Indian Bidders only).
7. The Institute reserves the right to accept or reject any bid and to annul the bidding process and reject all bids at any time prior to the award of contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders.
8. Incomplete bids will be summarily rejected.

### B) Cancellation of Tender:

Notwithstanding anything specified in this tender document, IISc Bangalore, in its sole discretion, unconditionally and without having to assign any reason, reserves the right:

- a. To accept OR reject lowest tender or any other tender or all the tenders.
- b. To accept any tender in full or in part.
- c. To reject the tender offer not confirming to the tender terms.

**C) Validity of the Offer:**

The offer shall be valid 90 Days from the date of opening of the commercial bid.

**D) Evaluation of Offer:**

1. The technical bid (Part A) will be opened first and evaluated.
2. Bidders meeting the required criteria as stated in Section 2 of this document shall only be considered for Commercial Bid (Part B) opening. Further, agencies not furnishing the documentary evidence as required will not be considered.
3. Pre- qualification of the bidders shall not imply final acceptance of the Commercial Bid. The agency may be rejected at any point during technical evaluation or during commercial evaluation. The decision in regard to acceptance and / or rejection of any offer in part or full shall be the sole discretion of IISc Bangalore, and decision in this regard shall be binding on the bidders.
4. The award of contract will be subject to acceptance of the terms and conditions stated in this tender.
5. Any offer which deviates from the vital conditions (as illustrated below) of the tender is liable to be rejected:
  - a. Non-submission of complete offers.
  - b. Receipt of bids after due date and time and or by email / fax (unless specified otherwise).
  - c. Receipt of bids in open conditions.
6. In case any BIDDER is silent on any clauses mentioned in these tender documents, IISc Bangalore shall construe that the BIDDER had accepted the clauses of the tender and no further claim will be entertained.
7. No revision in the terms and conditions quoted in the offer will be entertained after the last date and time fixed for receipt of tenders.
8. Lowest bid will be calculated based on the total price of all items tendered for items section 6

**E) Pre-requisites:**

The bidder will provide the prerequisite installation requirement of the equipment along with the technical bid.

**F) Mode of Shipment:**

In case of foreign bidders, the consignment must be airlifted, insured and transported to the installation site by the bidder. Necessary custom clearance will be done by IISc, Bangalore, through the empanelled Customs Handling Agent(CHA) at Bangalore International Airport.

**G) Customs clearance:**

The IISc, Bangalore will furnish the necessary papers for the import of items into India, necessary custom duty exemption certificate and other supporting documents to facilitate the import of the items will be provided.

**H) Warranty:**

The complete system is to be under warranty period of 3 years including free supply of spare parts and labour from the date of functional installation. If the instrument is found to be defective, it has to be replaced or rectified at the cost of the bidder within 30 days from the date of receipt of written communications from IISc, Bangalore. If there is any delay in replacement or rectification, the warranty period should be correspondingly extended.

**I) Annual Maintenance Contract:**

An annual maintenance contract cost will be negotiated on completion of warranty period. The bidder shall provide an annual maintenance cost.

**J) Purchase Order:**

1. The order will be placed on the bidder whose bid is accepted by IISc based on the terms & conditions mentioned in the tender document.
2. The quantity of the items in tender is only indicative. IISc, Bangalore reserves the right to increase /decrease the quantity of the items depending on the requirement.
3. If the quality of the product and service provided is not found satisfactory, IISc, Bangalore reserves the right to cancel or amend the contract.

**K) Delivery and Installation:**

The bidder shall provide the lead time to delivery, installation and made functional at IISc, Bangalore from the date of receipt of purchase order. The systems and the integration work should be delivered, installed and made functional within 60 days from the date of receipt of purchase order. The supply of the items will be considered as effected only on satisfactory installation and inspection of the system and inspection of all the items and features/capabilities tested by the IISc, Bangalore. After successful installation and inspection, the date of taking over of entire system by the IISc, Bangalore shall be taken as the start of the warranty period. No partial shipment is allowed.

**L) Payment Terms:**

- a. For International bidders the payment 80% will be through a Letter of Credit on receipt of original shipping documents and remaining 20% amount will be paid after installation and acceptance through bank transfer
- b. In case of Indian bidders, the complete 100% amount will be paid after supply, Installation and acceptance.

**M) Statutory Variation:**

Any statutory increase in the taxes and duties subsequent to bidder's offer, if it takes place within the original contractual delivery date, will be borne by IISc, Bangalore subject to the claim being supported by documentary evidence. However, if any decrease takes place the advantage will have to be passed on to IISc, Bangalore.

**N) Disputes and Jurisdiction:**

Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in a court of competent jurisdiction located within the city of Bangalore, India. The purchase shall be governed by the laws of India

**O) General:**

1. All amendments, time extension, clarifications etc., within the period of submission of the tender will be communicated electronically. No extension in the bid due date/time shall be considered on account of delay in receipt of any document(s) by mail.
2. The bidder may furnish any additional information, which is necessary to establish capabilities to successfully complete the envisaged work. It is however, advised not to furnish superfluous information.
3. The bidder may visit the installation site before submission of tender, with prior intimation.
4. All imported equipment should be quoted in the currency of the country of origin, and all locally sourced items should be quoted in Indian Rupees.
5. Any information furnished by the bidder found to be incorrect, either immediately or at a later date, would render the bidder liable to be debarred from tendering/taking up of work in IISc, Bangalore.

**P) Instructions to bidders:**

1. Bidder should provide technical specifications of the quoted product/s in detail.
2. Bidder should attach product brochures along with technical bid.
3. Bidders should provide a table summarising compliance or non-compliance of the technical specifications provided in the tender document.
4. Bidder should provide detailed cost breakup for every item in the commercial bid

**Q) LIQUIDATED DAMAGES**

1. In the event of a delay to the delivery and Installation Completion Date as per the Purchase order schedule for which supplier/Contractor is solely responsible, Supplier/Contractor shall pay Liquidated Damages to IISc, Bangalore at a rate of a quarter of a percent (0.25%) per day of delay, subject to a maximum of ten percent (10%) of the Initial Contract Price.
2. Such Liquidated Damages shall be deemed to be a genuine pre-estimate of the foreseeable damages incurred by IISc, Bangalore due to delay and shall be IISc, Bangalore sole recourse for late performance by Contractor under the Contract.
3. For the purpose of calculating such Liquidated Damages, a grace period of ten (10) days may be considered only on compassionate grounds, and the Purchase order / Contract Schedule shall be extended by any additional time or delays outside the sole control of supplier/contractor or delay not caused by supplier/ Contractor, including but not limited to suspension by IISc, Bangalore or Contractor in accordance with the purchase order or Contract, weather downtime, delay due to Force Majeure, and any time spent or lost on additional work or standby.



## Section – 4 – Technical Specifications

### Technical Specifications of **Digital Factory Setup: Virtual & Physical:**

#### 1. Introduction:

The digital factory shall be setup as per the layout provided by IISc. All the machines on the layout shall be connected onto the Network using OPC-UA over TCP/IP and interface a cloud and server with PLM Software. This system shall include the modules like Design Module, Manufacturing Process Module which consists of tool management, process planning and control, Computer Aided Manufacturing (CAM), Manufacturing Execution System(MES), Manufacturing Instruction Module, Assembly Module, Quality Management System (QMS), Database for PLM and sensor data, factory simulation module (virtual factory commissioning). ERP shall be implemented for inventory management and resource management.

The outcomes shall be delivered in two phases one as **virtual platform which is complete simulation of the digital factory** and the other one is integrated **physical setup of the entire digital factory**. The complete digital factory shall be implemented in virtual factory and after satisfactory results from virtual platform the integrated physical factory shall be initiated for implementation. This shall be implemented for the factory layouts provided by IISc in this document.

Robot, Cobot, Automated Guided Vehicle(AGV), conveyor and smart pallets shall be identified by vendor and procured for integration into smart factory. The brief specifications of these units are enclosed in **Appendix 3. Model and configuration of Robot, Cobot, Automated Guided Vehicle(AGV), conveyor and smart pallets** shall be reviewed and accepted by IISc before procurement.

#### 2. Virtual Factory:

The virtual factory is the simulated environment of the physical setup of the digital factory. All the concepts of physical factory shall be implemented virtually and effective visuals shall be created and shown in simulated environment. The complete visuals and simulations shall be reviewed and accepted by IISc as a proof of concept for physical factory before starting the physical setup. Factory layout 1 and Factory Layout included in this document for reference. Simulation shall be developed for both the layouts.

**The following are the major deliverables:**

- a) Design and development of 3D simulation of the digital factory for virtual commissioning.
- b) Design and development of digital twin of the factory with real time data.
- c) Licensed version shall be provided for the software platform along with APIs.
- d) Simulate and execute the interconnections of all the machines, mentioned in the factory layouts,
- e) In the simulation, the following shall be tested:
  - a. Functioning of all interconnected machines on the network for the data collection and
  - b. Remote programming capability of all the machines including material handling devices like robot, Cobot, AGV and conveyors using the digital factory virtual platform.
  - c. Flexibility & Re-configurability of the of the digital factory to adapt the manufacturing process variation, material flow and handling variations shall be demonstrated
- f) The simulation code and the complete software documentation and know-how shall be shared with IISc for acceptance.
- g) APIs for all the modules shall be provided for the development and interfacing with system.

- h) Database for sensor data shall be established for each sensor along with process parameters, machine parameters and asset/material parameters for all the machines. The detailed parameters for each machine shall be identified and proposed to IISc for review and approval.
- i) **Virtual Data analytics and visualisation:** The following shall be demonstrated in simulation model for entire factory setup and individual machines:
  - a. Configuration of all the machines and predictive capability for maintenance
  - b. Safety parameters
  - c. Quality parameters
  - d. Manufacturing Process parameters, including work flow, and optimisation
  - e. Productivity prediction and estimation
  - f. Resource allocation, utilisation and optimisation
  - g. Conditional monitoring of all the machines installed in the factory
  - h. Visualisation of the all the parameters and predications along with notification alarms for deviations shall be generated.
  - i. Reports shall be generated in detail for all the parameters mentioned above. Reports shall be scalable and reconfigurable
  - j. Any other parameters shall be included in the data analytics on demand by IISc and as suggested by supplier
  - k. Simulation software platform along with source code shall be delivered to IISc
  - l. Demonstrate the configuration and flexibility in connectivity among machine by demonstrating the connectivity of the whole set of machines and also random set of machines. The individual machines, connected in the network, shall also be operated independently and communicate through network and cloud

### 3. Integrated Physical Factory Setup:

The following are the major deliverables (but not limited to realise the physical factory, we solicit recommendations from vendor also). Software code and know-how shall be delivered to IISc of all the development made.

**The following are the major deliverables**

- a) **Establish Network/LAN connection:** Connections shall be made for all the machines as specified in Appendix 1 using OPC-UA over TCP/IP
- b) All the inter-connected machines shall be connected onto a cloud and server with PLM software installed in it.
- c) **Develop the digital factory software** with PLM modules which includes modules like Design Module, Manufacturing Process Module (tool mgmt., process planning, CAM, MES etc), Instruction Module, Assembly Module, Quality Management System, Digital Human Model, Database for PLM and sensor data, factory simulation module (virtual factory commissioning).
- d) **ERP shall be implemented** for inventory management purpose
- e) **A movable platform** for the identified industrial robot shall be created and delivered
- f) **Identify the required end effectors** for the use cases demonstration. The use cases are provided by IISc. Also the use cases can be provided by supplier but that will be considered after the review and approval of IISc.
- g) Establish and ensure all the machines are connected to **digital factory software platform installed in common server**
- h) **Test interconnections of all the machines**, mentioned in the factory layout,
- i) Test the functioning of all the inter-connected machines on the network for the below:
  - a. Data exchange,
  - b. Data collection
  - c. Remote programming capability including material handling devices like Robot, Cobot, AGV and conveyors using the digital factory platform

- j) **Test the coordinated capability** of the material handling devices along with the machines by demonstrating use cases such as
  - a. Drone Manufacturing,
  - b. Smart Drip Manufacturing
  - c. DC motor Assembly
  - d. Any other use cases in agreement with IISc
- j) **Real time Data analytics and visualisation platform:** The following parameters shall be demonstrated in **real time mode** with required graphs and visuals for each machine
  - e. Predictive capability for maintenance
  - f. Safety parameters
  - g. Manufacturing Process optimisation,
  - h. Productivity prediction and estimation
  - i. Resource utilisation,
  - j. Visualisation of the all the parameters and predications along with notification alarms for deviations shall be generated.
  - k. Reports shall be generated in detail for all the parameters mentioned above. Reports shall be scalable and reconfigurable
  - l. Any other parameters shall be included in the data analytics on demand by IISc and as suggested by supplier
- k) **Perform the back ward check** with virtual factory simulation and ensure that both the virtual simulations and physical setup are in-line with each other. If there are any deviations implement the corrections as required.
- l) Demonstrate the configuration and flexibility in physical connectivity among machine by demonstrating the connectivity of the whole set of machines and also random set of machines. The individual machines, connected in the network, shall also be operated independently and communicate through network and cloud
- m) Provide and demonstrate an interface and plug & play with measurement systems such as CMM and other Inspection systems as provided by IISc into the Digital factory setup for future expansion/connectivity
- n) The relevant computing hardware which includes workstations, touchscreens with network connectivity along with cloud connectivity to be delivered. Detailed configuration shall be shared with IISc
- o) Establish the cloud connectivity for computation and data storage of entire Digital factory
- p) Provide and demonstrate an interface to intelligent inventory bins/storage systems, and tracking the inventory and the information shall be available over cloud.

#### 4. Software features

The PLM-MES-ERP software suite/s must have the following features or modules for Assembly, inspection, ergonomic monitoring, asset tracking, Visualisation and Analytics.

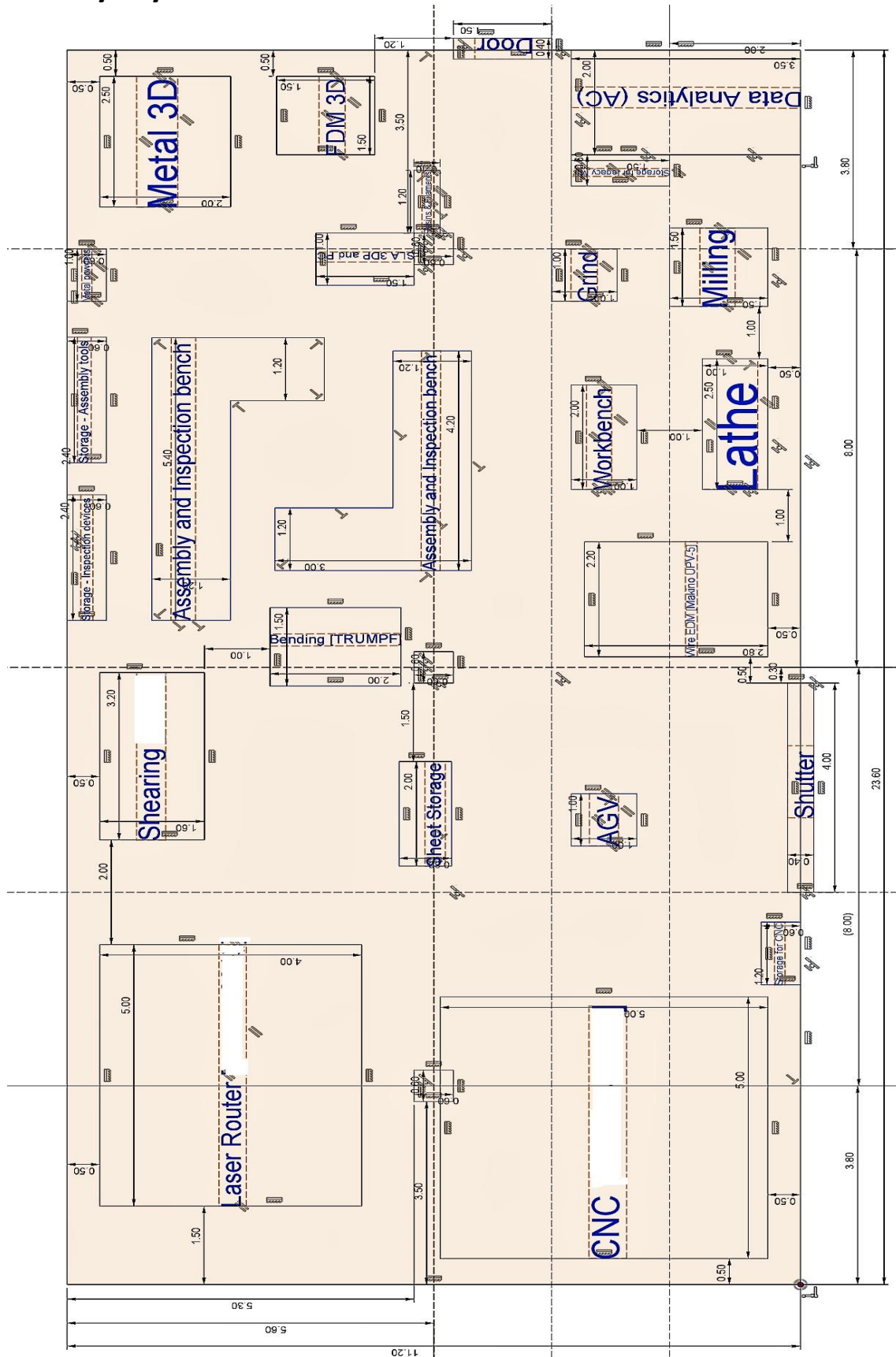
- Integration and the data collection of all the available tools with IISc – DC Torque Tools, Torque wrenches, Rivet tools (As per Appendix 2)
- Demonstrate provisions to create work Instructions for assembly in Text, Graphics [Images, 3D CAD, animation, video], Audio formats
- 3D Virtual Planning – CAD files linked to parts
- Human Machine Interface (HMI) with Augmented Reality (AR) glasses (desirable), Touch tablets, Smartphones, Laptop, Desktop, etc
- Integration of Wireless gauges available with IISc
- Integration of Inspection equipment (PCB Inspection, 3D scanner, CMM, IR camera, Ultrasound, Profilometer, etc )
- Ergonomic Monitoring – Posture recording, assessment and visualization from Motion capture suit/s available with IISc.
- Barcode scanning – 2D, 1D

- Asset tracking – Positioning in layout map, inventory management, status monitoring of parts, raw materials, equipment and people.
- Documentation – As per standard operating procedures in the modern industries e.g. Operator Logs, Feedback reporting, Inspection Reports
- Visualisation – Live condition of production line, KPIs provided by IISc and any other recommendations also acceptable
- Rule-based error-proofing systems – Poka-yoke, Pick-by-Light and Put-To-Light (desirable)
- Knowledge Base – Rules, Context updatable by Data Analytics software
- Data Analytics – To be established and in-built into the system or linked to other platforms [Matlab, Labview, Azure, AWS] for programming applications

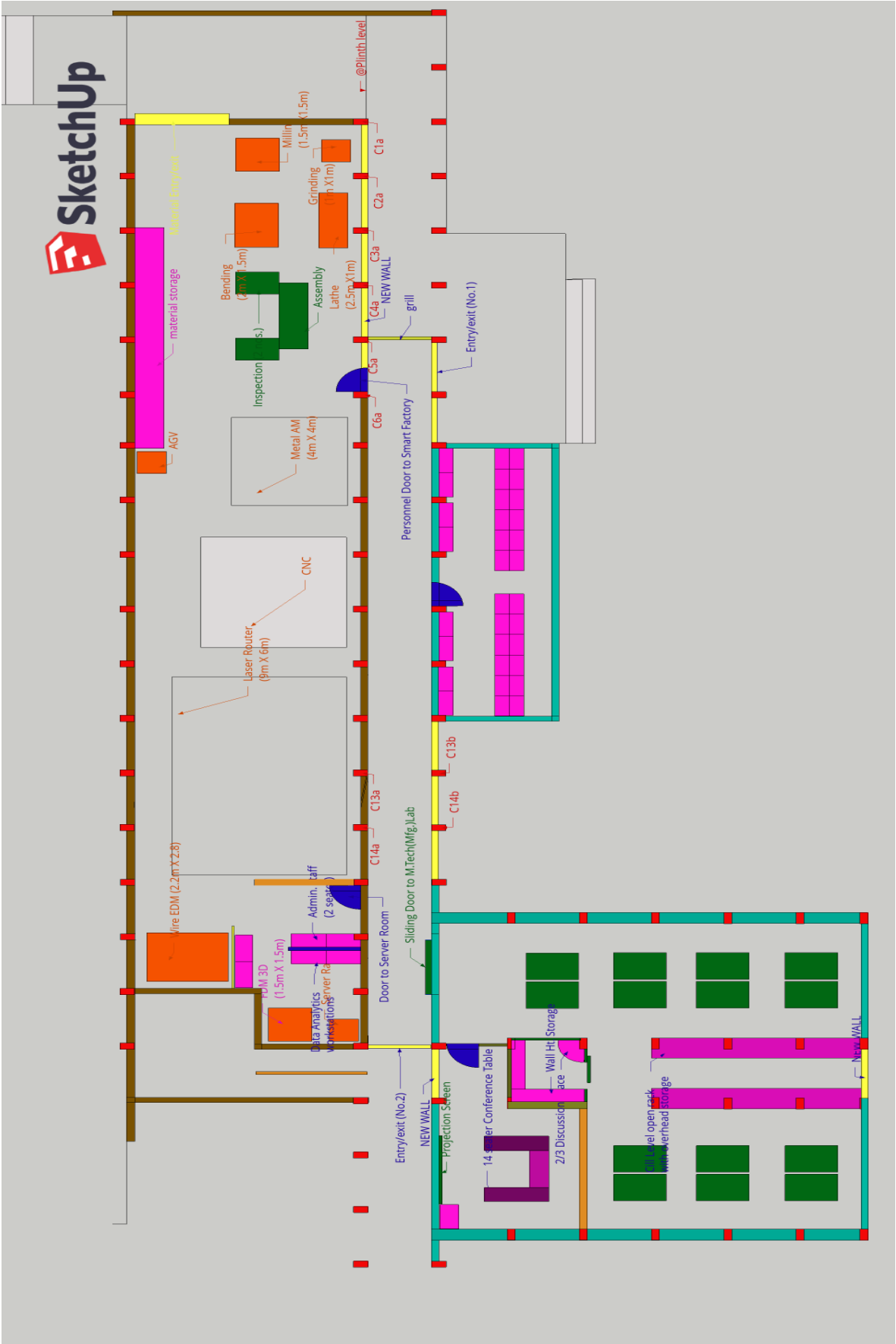
## **5. Typical Use Cases:**

- Following use cases shall be demonstrated in virtual and physical setups
  1. Drone Manufacturing
  2. DC motor Assembly
  3. Smart Drip Monitoring System
  4. Any other Industrial use case recommendations from vendor(desirable)

# Factory Layout 1



Factory Layout 2:



## Appendix 1

### List of the major machines:

SL No	Name of the Machine	Model	Qty ( Nos)
1	5 Axis CNC Machine,	EMCO MAXXMILL 630	01
2	Metal Additive Manufacturing Machine	Formalloy L-221C	01
3	Metal Laser Router	Suresh Indu Lasers, SIL-F-PRO series 1500 by 1500	01
4	Wire EDM	TBD	01
5	Lathe	Legacy Machine	01
6	Electronics PCB inspection Machine	Information will be provided by IISc at later stages	01
7	Ultrasound Machine	Information will be provided by IISc at later stages	01
8	Profilometer	Information will be provided by IISc at later stages	01
9	Laser Scanner (3D)	Information will be provided by IISc at later stages	01
10	Milling	Legacy Machine	01
11	Drilling	Legacy Machine	01
12	Bending	Legacy Machine	01
13	Grinding	Legacy Machine	01
14	Shearing	Legacy Machine	01
15	Vacuum Forming	Legacy Machine	01
16	Crane	Legacy Machine	01

## Appendix 2

### DC Torque Tools, Torque wrenches, Rivet tools

SL No	Name of the tool	Model	Qty (Nos)
1	DC torque tools (Nut runners)	<ul style="list-style-type: none"><li>Atlas Copco ETP STB34-12-10-BD-W</li><li>Atlas Copco ETV STB64-70-13-BD-W</li><li>Atlas Copco POWER FOCUS 6000</li></ul>	1 Each
2	Torque wrenches	<ul style="list-style-type: none"><li>Norbar Nortronic 50</li><li>Norbar Nortronic 330</li><li>Norbar Nortronic USB Wireless adaptor, 868 MHz</li></ul>	1 Each
3	Riveting tools	GESIPA iBird Pro Or VVG-Honsel RivSmart	1 Each



## Appendix 3

### Specification for Robot, Cobot, AGV, Conveyor and Pallet (5 Tables)

Industrial Robot Technical Specifications			
SI No	Parameter	Specifications	Essential/Desirable
1	Pay load	10 Kg ( At Least)	Essential
2	Vertical and Horizontal Reach	1 Meter (At least)	Essential
3	Degree of freedom	6 ( At least)	Essential
4	Data logging and connectivity	LAN and WiFi	Essential
5	Accuracy	±0.1 mm (At least)	Essential
6	Repeatability	±0.1 mm (At least)	Essential
7	Mechanical Brakes	All axis	Essential
8	Mounting Method	Floor	Essential
9	Type of drive system	Electric	Essential
10	Controller	Should be able to communicate with other devices like Sensors, AGV, Robots, Cobots , safety devices, machine tools etc.	Essential
11	Programming	Teach pendant and offline programming capabilities preferably with high level programming languages	Essential
12	Interfacing and communication	Digital I/O ports, should be able to connect with external applications and devices. LAN and WiFi and other industry standard connectivity	Essential
13	Speed	To be indicated by the Bidder	Essential
14	Motion Control	Path Control and Velocity Control	Essential
		Force Control	Desirable
15	Industry Standards	Comply with relevant industrial standards like ISO 10218 or equivalent	Essential
16	Typical Applications	Material Handling/Palletizing, Machine Loading/Unloading, Gluing/Sealing ,Processing operations, Assembly, Inspection	Essential
17	Power Supply	As per industry standards	Essential
18	End-effectors	2-Finger Gripper, 3-Finger Gripper, Suction Gripper	Essential
19	Essential accessories	Accessories required for maintenance, configuration, mounting and connection with other systems must be provided	Essential

(Appendix 3 ...Continued on next page)

<b>COBOT Technical Specifications</b>			
<b>Sl No</b>	<b>Parameter</b>	<b>Specifications</b>	<b>Essential /Desirable</b>
1	Payload [kg]	At least 4 kg	Essential
2	Reach	At least 0.8 m	Essential
3	Degree of Freedom	At least 6	Essential
4	Mounting	Floor, Wall, Ceiling	Essential
5	Footprint	Less than Ø 170 mm or Less than 200x200 mm	Essential
6	Weight	Less than 30 kg	Essential
7	Speed of joint actuation	At least ±180°/Sec	Essential
8	Positioning Repeatability	+/- 0.1 mm or better, with payload, per ISO 9283	Essential
9	IPxx rating	IP54 or better	Essential
10	Power consumption	Less than 500 W	Essential
11	End Tool adapter/flange	Plug & Play compatibility with multiple 3rd party end-effectors as per ISO 9409-1:2004 standard and through 8 pin M8 Plug Electrical interface	Essential
12	Teach pendant	Colour touchscreen GUI on a shock-proof, splash-proof tablet	Essential
13	Connectivity & Data logging	Wi-Fi, Ethernet, USB, Digital I/O ports, industry standard connectivity like Modbus TCP, ProfiNet and Ethernet/IP to connect with external applications and devices	Essential
14	Software	Software for configuring and programming the cobot. Compatibility with ROS. SDKs/APIs must be provided	Essential
15	Certifications	Compliance to EN ISO 13849-1, Cat.3, PL d, and EN ISO 10218-1 or equivalent	Essential
16	End-effectors	2-Finger Adaptive Gripper, Force Torque Sensor, Suction Gripper	Essential
17	Power Supply	230 V AC	Essential
18	Motion Control	Force control, path control and velocity control	Essential
19	Safety Standards	Compliance to like ISO/TS 15066:2016 and ISO 10218 or equivalent industrial standards for cobots	Essential
20	Controller/External Interface	Should be able to communicate with other devices like Sensors, AGV, Robots, Cobots, safety devices, machine tools etc.	Essential
21	Programming	Teach pendant and offline programming capabilities preferably with high level programming languages	Essential
22	Typical Applications	Material Handling/Palletizing, Machine Loading/Unloading, Gluing/Sealing, Processing operations, Collaborative Assembly, Inspection	Essential
23	Essential accessories	Accessories required for maintenance, configuration, mounting and connection with other systems must be provided	Essential

(Appendix 3 ...Continued on next page)

AGV Technical Specifications			
SI No	Parameter	Specifications	Essential/Desirable
1	Maximum Pay Load	Greater than 100 Kg	Essential
2	Running Time	At least 8 Hrs	Essential
3	Maximum Travel Speed	At least 1 m/s	Essential
4	Footprint	Less than 1 X 1 M	
5	Load surface	500 x 500 mm to 900 x 900 mm	Essential
6	Positioning Accuracy	+/- 50 mm or better	Essential
7	IPxx rating	IP54 or better	Desirable
8	Navigation/Guidance	Autonomous (Free Ranging) by means of Camera Vision / LIDAR / ultrasound / Infrared / IMUs / combination of these technologies. Ability to learn the space and adapt to changes.	Essential
9	Data logging and connectivity	Wi-Fi, Ethernet, USB, Digital I/O ports and "Modbus TCP" Or "ProfiNet" or "Ethernet/IP"	Essential
10	AGV Type	Unit load carrier	Essential
11	Load Transfer	Automatic/Manual	Essential
12	Remote Control	Required	Essential
13	Conveyor Coupling	Required	Desirable
14	Laser Bumper	Required	Desirable
15	Power Supply	As per Industry standard	Essential
16	Range and Proximity sensing	To be indicated by supplier	Desirable
17	Industry Standards	Comply with relevant industrial standards like ISO 19649:2017 and R15.08	Essential
18	Guidance Precision	Less than $\pm 10$ mm	Essential
19	Software	Software for configuring and programming the AGV. Compatibility with ROS. SDKs/APIs must be provided	Essential
20	Safety	Comply with Industry Standards like ANSI/ITSDF B56.5:2012 or equivalent	Essential
21	Accessories	Accessories required for maintenance, configuration, mounting and connection with other systems must be provided. Cart, Mounting platform for the cobot	Essential

(Appendix 3 ...Continued on next page)

<b>CONVEYOR Technical Specifications</b>			
<b>Sl No</b>	<b>Parameter</b>	<b>Specifications</b>	<b>Essential/Desirable</b>
1	Load Type	Unit loads and discreet components	Essential
2	Transfer Surface	Roller and/or Belts	Essential
3	Drive Arrangement	Active and Passive	Essential
4	Interfacing and communication	Active components must be ineffectable and programmable for automation tasks	Essential
5	Industry Standards	Comply with relevant industrial standards like ISO	Essential
6	Modularity and Flexibility	Complete physical reconfiguration after initial setup	Desirable
7	Accessories	Programmable direction & orientation changers, sorters, and other modular units to increase the flexibility of the conveyor line	Desirable

<b>SMART PALLET Technical Specifications</b>			
<b>Sl No</b>	<b>Parameter</b>	<b>Specifications</b>	<b>Essential/Desirable</b>
1	Load Type	Unit loads and discreet components	Essential
2	Identification	Unique identification	Essential
4	Interfacing and communication	Ineffectable and programmable for automation tasks	Essential
5	Sensors	Sensing capabilities like weight, location etc.	Desirable
6	Industry Standards	Comply with relevant industrial standards like ISO	Essential

(Appendix 3 ...End)

#### **A) Training and demonstration:**

Training on usage of the machine (hardware and software) must be demonstrated by the successful bidder at bidder's cost of at least two individuals at IISc, Bangalore.

#### **B) Accessories:**

The bidder shall supply the below items along with the machine:

1. Recommended spare parts with specifications.
2. Integrated computer with the software's pre-installed to run the machine and system Operational manuals and maintenance manuals.
3. Two copies of the operational software (in hard disks) should be made available.
4. Special and essential Infrastructure requirements.

## **Section 5: Technical Bid**

The technical bid should furnish all requirements of the tender along with all annexure in this section and submitted to

**The Chairman  
Centre for Product Design and Manufacturing  
Indian Institute of Science  
Bangalore – 560012, India**

**Annexure-1:****Details of the Bidder**

The bidder must provide the following mandatory information & attach supporting documents wherever mentioned:

<b>Details of the Bidder</b>		
<b>SI No</b>	<b>Name of the Bidder</b>	
1	Nature of Bidder (Attach attested copy of Certificate of Incorporation/ Partnership Deed)	
2	Registration No/ Trade License, (if any attach copy)	
3	Registered Office Address	
4	Address for Communication	
5	Contact person- Name and Designation	
6	Telephone No	
7	Email ID Website	
8	PAN No.(attach copy) -if applicable	
9	GST No.(attach copy) -if applicable	

Signature of the Bidder

Name

Designation, Seal

Date:

**Annexure-2:**

**Declaration regarding experience**

To,

The Chairman  
Centre for Product Design and Manufacturing  
Indian Institute of Science,  
Bangalore – 560012, India

**Ref: Tender** No: XXXXXXXXXX

**Dated: XXXXX**

**Supply and installation of Digital Factory Setup: Virtual & Physical**

Sir,

I have carefully gone through the Terms & Conditions contained in the above referred tender. I hereby declare that my company / firm has \_\_\_\_ years of experience in supplying and installing Digital Factory Setup: Virtual & Physical of this class.

(Signature of the Bidder)  
Printed Name

Designation, Seal

Date:

### Annexure-3:

#### Declaration regarding track record

To,

The Chairman  
Centre for Product Design and Manufacturing  
Indian Institute of Science,  
Bangalore – 560012, India

**Ref: Tender No:** XXXXXXXX

**Dated:** XXXXX

#### Supply and installation Digital Factory Setup: Virtual & Physical

Sir,

I have carefully gone through the Terms & Conditions contained in the above referred tender. I hereby declare that my company/ firm is not currently debarred / blacklisted by any Government / Semi Government organizations / institutions in India or abroad. I further certify that I'm competent officer in my company / firm to make this declaration.

Or

I declare the following

Sl.No.	Country in which the company is Debarred /blacklisted / case is Pending	Black listed / debarred by Government / Semi Government/Organizations /Institutions	Reason	Since when and for how long

(NOTE: In case the company / firm was blacklisted previously, please provide the details regarding period for which the company / firm was blacklisted and the reason/s for the same).

Sincerely

(Signature of the Bidder)

Name

Designation, Seal

Date:



#### **Annexure – 4:**

##### **Declaration for acceptance of terms and conditions**

To,

The Chairman  
Centre for Product Design and Manufacturing  
Indian Institute of Science,  
Bangalore – 560012, India

**Ref: Tender** No: XXXXXX

**Dated:** XXXX

##### **Supply and installation of Digital Factory Setup: Virtual & Physical**

Sir,

I have carefully gone through the Terms & Conditions as mentioned in the above-referred tender document. I declare that all the provisions of this tender document are acceptable to my company. I further certify that I'm an authorized signatory of my company and am, therefore, competent to make this declaration.

Sincerely,

(Signature of the Bidder)

Name

Designation, Seal

Date:

**Annexure – 5:**

**Details of items quoted:**

<b>Company Name</b>	
<b>Product Name</b>	
<b>Part / Catalogue number</b>	
<b>Product description / main features</b>	
<b>Detailed technical specifications</b>	
<b>Remarks</b>	

## Section 6: COMMERCIAL BID

The commercial bid should be furnished with all requirements of the tender with supporting documents as mentioned under:

SI No	Description	Catalogue Number	Quantity	Unit Price	Sub Total
1	Virtual Factory setup (Including hardware & software)				
2	Integrated Physical Factory Setup (Including hardware , software and integration)				
3	Robot				
4	Cobot				
5	AGV				
6	Smart Pallet				
7	Conveyor				
8	Accessories for operation and installation				
9	All safety equipment and protective gear				
10	List and cost of consumables				
11	Warranty ( 3 years)				
12	Cost of Insurance and Airfreight				
13	CIP IISc, Bengaluru				

Addressed to:

**The Chairman  
Centre for Product Design and Manufacturing  
Indian Institute of Science, Bangalore – 560012, India**

## **SECTION 7 – CHECK LIST**

(This should be enclosed with technical bid- Part A)

The following items must be checked before the Bid is submitted:

### **1. Envelope “A”: Technical Bid**

- a) Section 5- Technical Bid (each page signed by the authorized signatory and sealed) with the below annexures:

Annexure 1: Bidders details

Annexure 2: Declaration regarding experience

Annexure 3: Declaration regarding clean track record

Annexure 4: Declaration for acceptance of terms and conditions

Annexure 5: Details of items quoted

- b) Copy of this tender document duly signed by the authorized signatory on every page and sealed.

### **2. Envelop “B”: Commercial Bid**

Section 6: Commercial Bid

Your quotation must be submitted in two envelopes: Technical Bid (Envelope A) and Commercial Bid (Envelope B) super scribing on both the envelopes with Tender No. and due date and both of these in sealed covers and put in a bigger cover which should also be sealed and duly super scribed with Tender No. & Due Date.