

ಭಾರತ್ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್ भारत हेवी इलेक्ट्रिकल्स लिमिटेड

Bharat Heavy Electricals Limited (A Government of India Undertaking) ELECTRONICS DIVISION P.B. No 2606, Mysore Road, Bangalore - 560 026

EXPRESSION OF INTEREST FOR ROBOTIC ASSEMBLY OF TRACTION POWER MODULE

EOI REFERENCE NUMBER: PS/1819/EOI/RATPM/02

This document contains 11 pages and 10 attachments

BHARAT HEAVY ELECTRICALS LIMITED, ELECTRONICS DIVISION (BHEL-EDN)

INVITES EXPRESSION OF INTEREST FOR ROBOTIC ASSEMBLY OF TRACTION POWER MODULE

CONTACT PERSON AND SCHEDULE

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Schedule of Events

Publication of EOI : 19.04.2019

Last date for Submission of PQC : 29.04.2019 at 1.15PM Opening of PQC : 29.04.2019 at 1.30PM

Note1: VERY IMPORTANT- This due date is for PQC ONLY. Documents relevant to PQC only need to be submitted. Details are in **Section – 2**.

Note2: Further correspondence with qualified vendors will be through email. All timelines will be mentioned in the email.

1. Mode of Submission of PQC Response:

In sealed cover to the above person by post or email or to be dropped/received at our reception in the **box no 2 marked as 'IT&S'** on or before the date mentioned above.

The cover shall be superscripted (or Subject for email) with Reference number and the words "PQC for EOI – Robotic assembly of Traction Power module".

2. Mode of Submission of offers for EOI (For qualified Vendors Only):

All timelines will be intimated through email.

However, it need to be In sealed cover to the above person by post or email or to be dropped/received at our reception in the **box no 2 marked as 'IT&S'** on or before the date to be intimated through email to all qualified vendors.

The cover shall be superscripted (or Subject for email) with Reference number and the words "Offer for EOI – Robotic assembly of Traction Power module".

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SECTION - 1 EXPRESSION OF INTEREST

1.1 ABOUT BHEL

Bharat Heavy Electricals Limited (BHEL) (www.bhel.com), a Government of India Undertaking, is a major electrical equipment manufacturer for both the Indian and export markets. It is one of the largest engineering and manufacturing enterprises in India and is one of the leading international companies in the field of power generating equipment with an annual revenue of over INR 275 Billion (US\$ 5.5 Billion).

BHEL offers a wide spectrum of products and services for core sectors like Power, Transmission, Industry, Transportation, Oil & Gas and Non-Conventional Energy Systems etc.

1.2 ABOUT ELECTRONICS DIVISION

The Electronics Division (EDN) (www.bheledn.com) of BHEL was formed in 1976 mainly to establish a strong base in the areas of Automation and Power Electronics to supplement the Company's pioneering efforts in the above areas. Most of the power plants and industries in the country today are equipped with electronic products and systems which have been manufactured and supplied by BHEL-EDN. We also have a good international reference by way of our exports to Europe, Middle-East and South-East Asian markets. EDN has been accredited with ISO 9001, ISO14001 and OHSAS18001 standard certifications.

1.3 PROPULSION SYSTEMS

BHEL EDN is manufacturing power converters for AC Locomotives application to Indian Railways. It consists of traction converters and auxiliary converters. There are various types of power modules used in these propulsion system. Similarly BHEL EDN is manufacturing AC EMU/MEMU and Hotel load converters (HLC), which requires about 6 types of Power modules.

1.4 POWER MODULE

Power converters for AC Loco, ACEMU/MEMU and HLC requires power modules for power conversion. These power modules uses high power IGBTs as switching devices.

There are primarily two types of modules - a. Water cooled modules, b. Air cooled power modules.

1.5 PRESENT METHOD OF ASSEMBLY

A water cooled IGBT power module consists of Four IGBTs with gate drivers mounted on water cooled heat sink, interface module, voltage monitoring PCB, two current sensors, one temperature sensor and suitable copper busbars. Interconnections are carried out using Fibre optic cables and copper cables.

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Assembly of Water cooled IGBT module is carried out as below:

Four IGBTs are mounted on a Water cooled Heat sink which in-turn mounted with mounting frames, rubber hose pipe along with coupling. Gate drivers are mounted directly on IGBTs. Interface module along with Voltage monitoring PCB modules are mounted on frame. A prefabricated ferrite core along with cables mounted on the frame assembly. Power supply cables and fibre optic cables are routed between gate drivers and interface module and voltage monitoring PCB. One temperature sensor and two current sensors are mounted on frame assembly and cables are routed between sensors and Interface modules. Copper busbars are mounted on IGBTs with supporting structures. Module assembly is completed by mounting PCB module cover plates and shields.

The process flow chart (Annexure -P) is also enclosed for your reference.

This document also has the details of major components used in the assembly (Annexure-C).

1.6 AUTOMATED MANUFACTURING OF POWER MODULE

Presently BHEL-EDN is manufacturing these Power modules manually, while PCBs are manufactured in automated line. Now BHEL-EDN is willing to align itself with modern manufacturing processes by introducing state-of-art technology in all its assembly and testing operations.

Accordingly, manufacturing of Water cooled IGBT Power module (referred as Power Module) is chosen to start with.

BHEL intend to use the Robotic assembly by getting concepts from experienced vendors. The brief description of existing method along with process flow chart is given above

BHEL prefers to have modular system, so that improvements can be brought in on need basis.

Vendors can include solutions to manufacture sub-assemblies, which can be integrated to main robotic assembly. Hence entire design for assembling/picking component required to be modular.

As we are going introduce a implementation of customized Robotic assembly for manufacture Power module, it is proposed to follow the method of Expression of Interest (EOI).

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1.7 STAGES OF TENDERING

On successful completion of EOI, BHEL will tender out for procurement of system of Robotic automation for IGBT Power module. The complete stages of tendering of the same is shown below-



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1.8 PURPOSE OF "EXPRESSION OF INTEREST" - (EOI)

As we are attempting customized automation for manufacturing and testing operation first time it is found viable to adopt EOI method.

- 1. BHEL-EDN will analyze the responses received towards this EOI to shortlist prospective Vendors who can Design, Supply, Install, commission and maintain the system of Robotic Assembly of IGBT Power Module.
- 2. BHEL-EDN will frame the specification of the system by picking suitable solutions for specific operation or for whole assembly from the concepts you propose as an offer for this EOI. The specification so framed will be tendered subsequently.

1.9 PROCESSING OF EOI EVALUATION

Through EOI, BHEL will identify the Potential bidders who can Design, Supply, Install, commission and maintain the system of Robotic Assembly of IGBT Power Module to the expectations of BHEL.

Firstly, all vendors will be qualified based on their response to our PQC, which basically focuses on their experience and financial strength. Those who qualify for participating in the EOI, will be intimated through their email.

Each qualified Vendor for this EOI has to submit **Annexure – V**, enclosed along with their concept drawings/Layouts along with detailed explanations of each operations to assess the capabilities to supply the system as per our requirements. The concept drawing should indicate-

- I. Location of Robots with reach and payload details
- II. All Component locations and their picking arrangement
- III. Manual operations, if any
- IV. Locations and methods of assembly operations
- V. Overall arrangement with dimensions for individual stations and for whole system including total weight of the system
- VI. Customization possible
- VII. Utilities like Power, air, AC or any other requirements

Based on your concept drawings, and explanations on each operations and system as a whole, the vendor will be qualified for the tender.

The committee may invite the vendor for further clarity on the concept drawing he submitted.

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All qualified vendors will be intimated about tender, once we host it.

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SECTION – 2 PRE-QUALIFICATION CRITERIA (PQC)

2.1 Requirements of PQC

The vendor has to meet all criteria specified in PQC (Annexure-Q) in order to qualify to supply Robotic assembly system, which replaces existing process explained above.

2.2 Note:

- 1. The Pre-Qualification Criteria are mandatory requirements and the vendor will be qualified to offer technical bid only, if all the above PQC are met
- 2. All Supporting documents related to PQC shall be enclosed in a separate cover superscripted as "PQC for EOI Robotic assembly of IGBT Power module".

2.3 Documents to be submitted along with Response to PQC

(Para refers to para in Annexure-Q)

- 1. Filled Annexure-Q
- 2. Copy of MOU/Agreement/JV or any arrangements (as per para 2)
- 3. Technical literature from manufacturer of Robot (as per para 3)
- 4. Self-certification on use of no. of Robots of same make in their supplies till now (as per para 3)
- 5. Technical details of Robot of make other than the specified, if applicable (as per para 3)
- 6. Filled Annexure-E (as per para 4)
- 7. Certificate of satisfactory performance/ User acceptance certificate/ Successful commissioning certificate (as per para 4)
- 8. Audited Annual Report for last 3 years (as per para 5) i.e. FYs 2015-16, 2016-17 and 2017-18

2.4 Submission of PQC:

- 1. Vendor to submit PQC (Annexure-Q) on or before the date mentioned in 'Schedule of Events' in page 02.
- Response should be In sealed cover to the person by post or email or to be dropped/received at our reception in the box no 2 marked as 'IT&S' on or before the date mentioned
- 3. The cover shall be superscripted with Reference number and the words "PQC for EOI Robotic assembly of Traction Power module".
- 4. Your responses to PQC will be verified with documents which you have enclosed along with. BHEL has the right to verify the claims made by the vendor through visits. Vendor shall facilitate the visits.
- 5. Vendors may be called/invited for clarification of documents enclosed.
- 6. BHEL has the right to reject response to PQC, without assigning any reasons thereof.
- 7. Verified and qualified vendors will become eligible for submission of offers for EOI and same will be communicated to each of them.
- 8. Vendors need to submit your company profile (Annexure-Y) along with response to PQC

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SECTION - 3

PRE-BID MEETING

It is proposed to have a pre-bid meeting with the qualified vendor to make them understand detailed assembly process of manufacturing the Power modules through video presentations and one-to-one interactions. BHEL will also display the components that are required for manufacturing.

Following documents are required to submit at the reception while coming to participate in Pre-bid meeting.

3.1 Non-Disclosure Agreement (NDA)

All qualified vendors attending the Pre-bid meeting mandatorily required execute NDA with BHEL, whose format is enclosed as Annexure-N along with this document. Each organization which nominates representative/s should get this NDA printed on **stamp paper of value Rs. 100/- (Rupees one hundred only)** and signed by authorized signatory of the organization.

You are also required to produce following documents while attending Pre-bid meeting-

- **a. Authorization Letter:** An authorization letter from your organization on Company's Letterhead duly signed by authorized signatory of the organization. Format is enclosed as Annexure-L along with this document.
- **b. Proof of Identity (POI):** Proof of Identity like Company's Identity card, Driving License, Aadhaar Card, Passport, Voter card should also be shown at Reception while getting your Pass to enter our premises.

Note: You are NOT permitted to carry mobile with camera, laptops, camera, flash memories or any electronic gadgets to the meeting.

3.2 Presentation on Product Assembly:

Vendors can study Process flow chart attached as Annexure-P and images of component attached as Annexure-C along with this document.

In order to make Vendors understand our process of assembly, a Video will be presented on the specified day. Vendors can also see the components and assembled product which are displayed in the hall.

All Queries related to assembly will be addressed at the venue.

There will not be repetition of this presentation later.

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SECTION - 4

4.1 TECHNICAL REQUIREMENTS/ SPECIFICATION

- 1. Assembled Power module is in Annexure-M
- 2. All components used in assembly is in Annexure-C
- 3. The system should have minimum ONE robots and should cover the all the operations indicated in Process flow chart in Annexure-P
- 4. General features required for the Robot is in Annexure-R. In case of non-compliance for any parameter, Please provide details.
- 5. Component picking can be by Robot or any other means.
- 6. Assembled Power Module should be placed on a conveyor/table/ any other mechanism to enable subsequent transport of module for testing.
- 7. All protocols required for IIoT need to be incorporated in the system

4.2 VENDORS CONFIRMATION

The Vendor shall necessarily confirm the requirements specified in the Annexure-V

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SECTION - 5

LIST OF ATTACHMENTS ALONG WITH THIS DOCUMENT

SI. No.	Document
1	Annexure C: Components of the Assembly
2	Annexure E: Format for your Experience
3	Annexure L: Authorization Letter from the Company
4	Annexure M: Finished Module
5	Annexure N: NDA with BHEL
6	Annexure P: Process Flow chart
7	Annexure Q: Pre-qualification criterion
8	Annexure R: General Specifications of Robot
9	Annexure V: Vendors Confirmation
10	Annexure Y: Company Profile

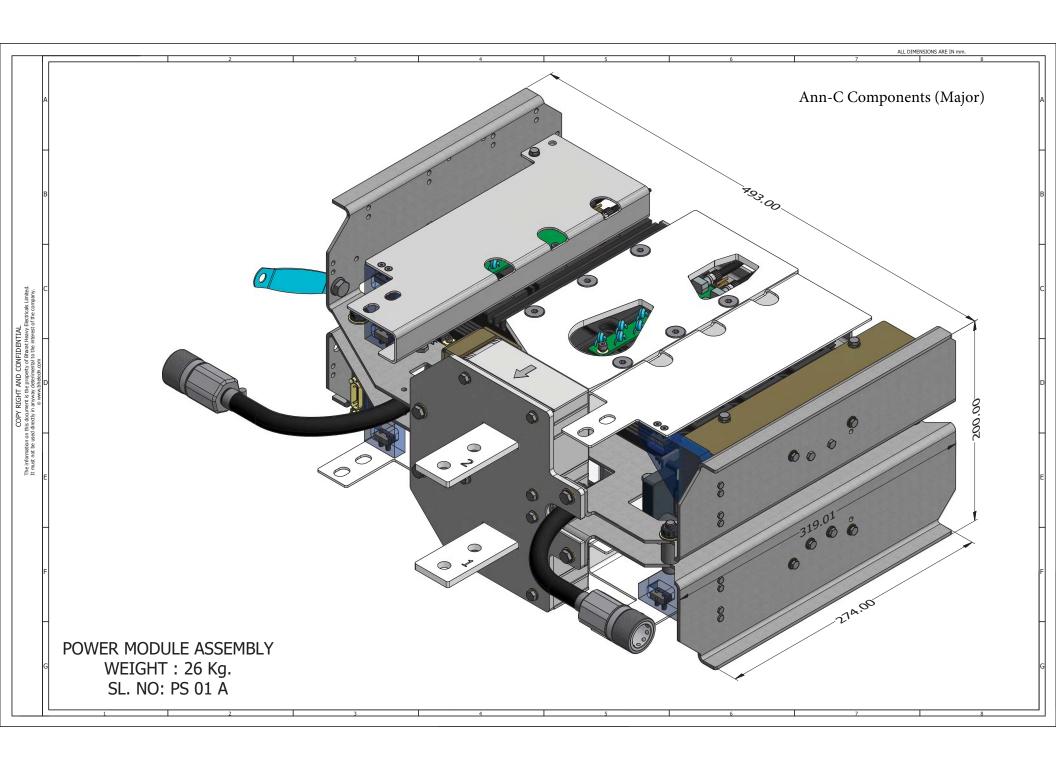
SECTION - 6

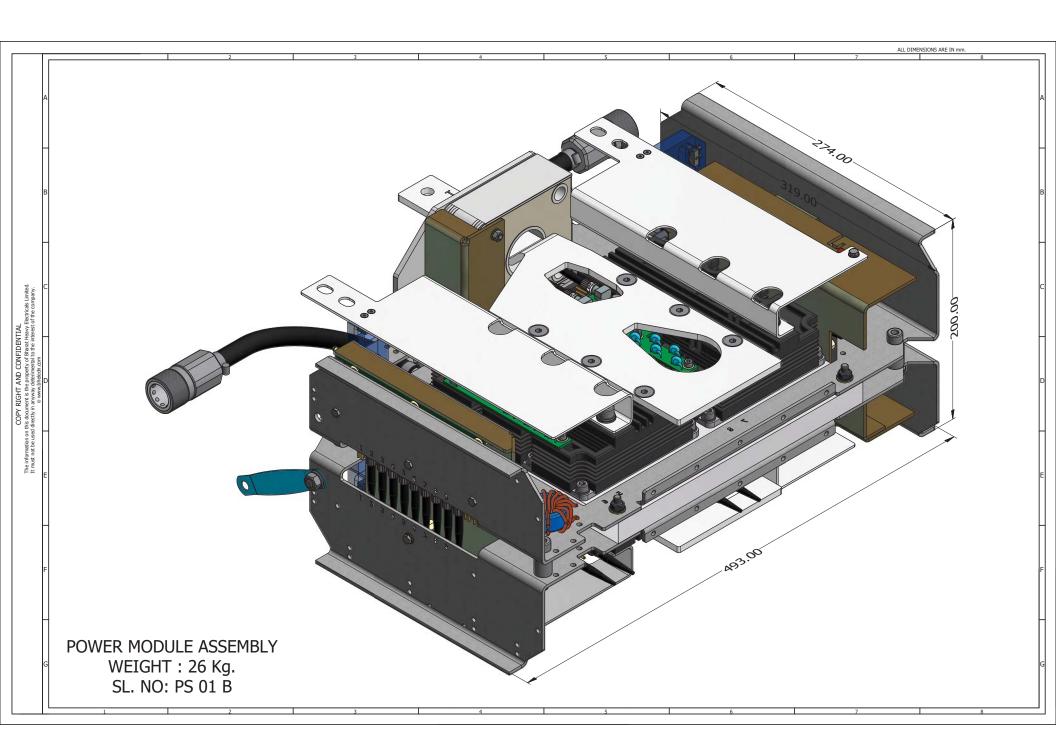
CHECKLIST OF DOCUMENTS TO BE SUBMITTED AS RESPONSE TO EOI (For PQC met Vendors only)

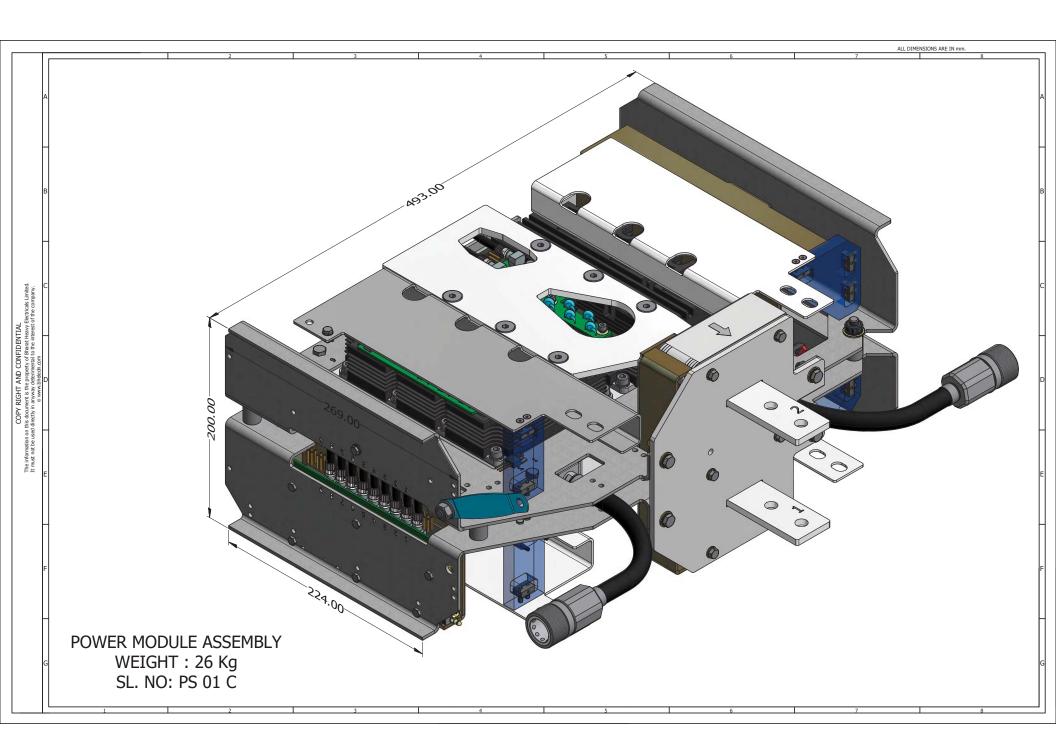
Information/documents to be provided along with response to Expression of Interest:

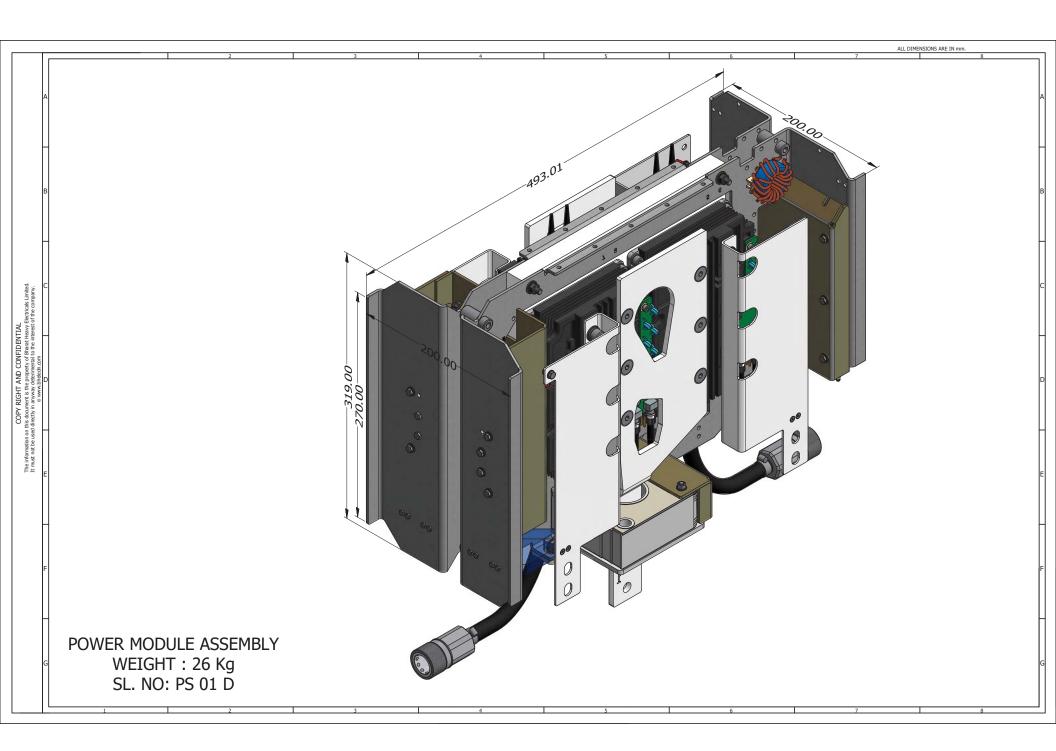
SI. No.	Information / Document	Compliance
1	Covering Letter signed by an authorized Signatory on Company letterhead, listing clearly the Enclosures.	Yes / No
2	Filled-up Requirements/Specification (Annexure –V)	Yes / No
3	Concept drawings	Yes / No

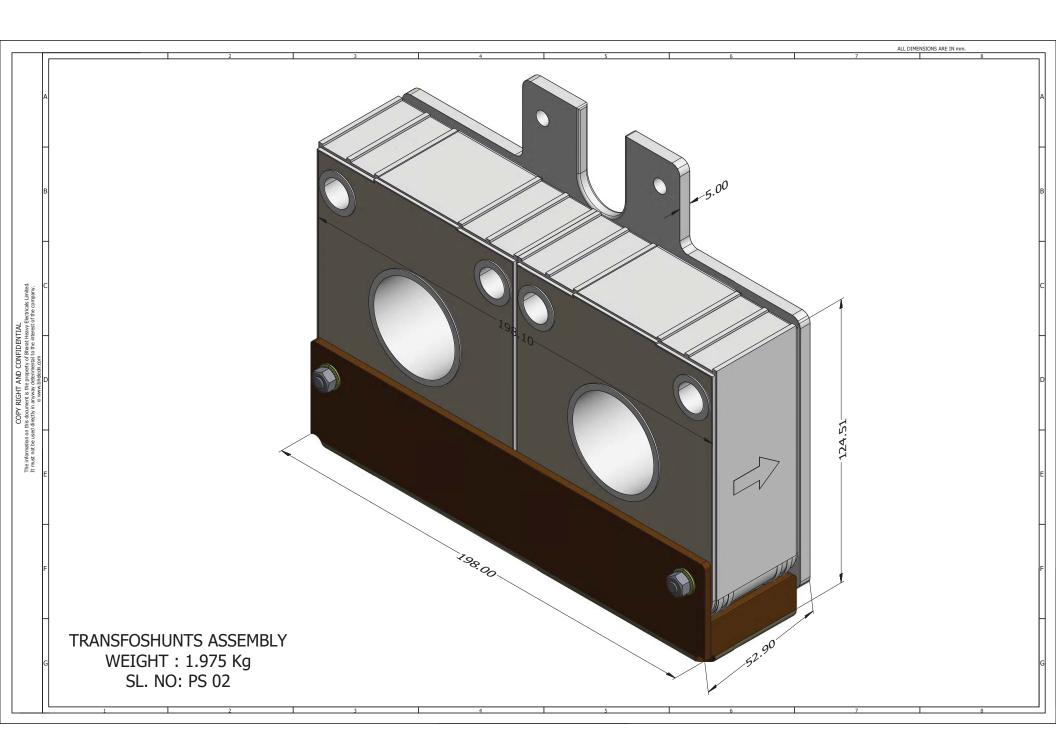
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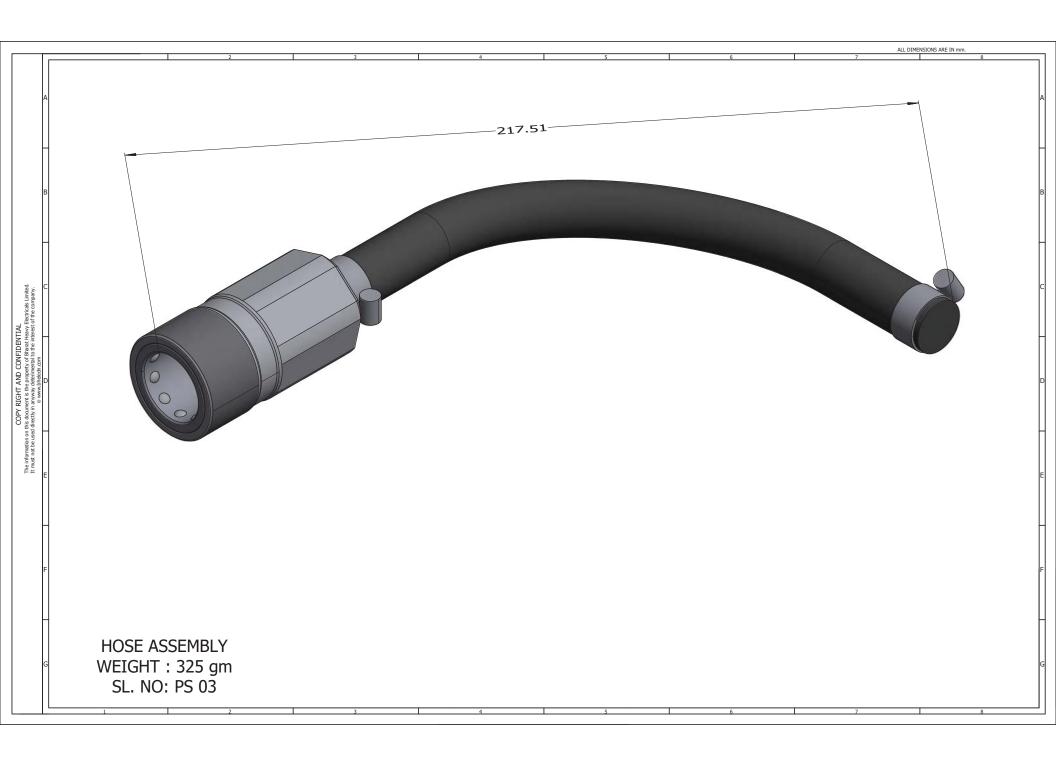


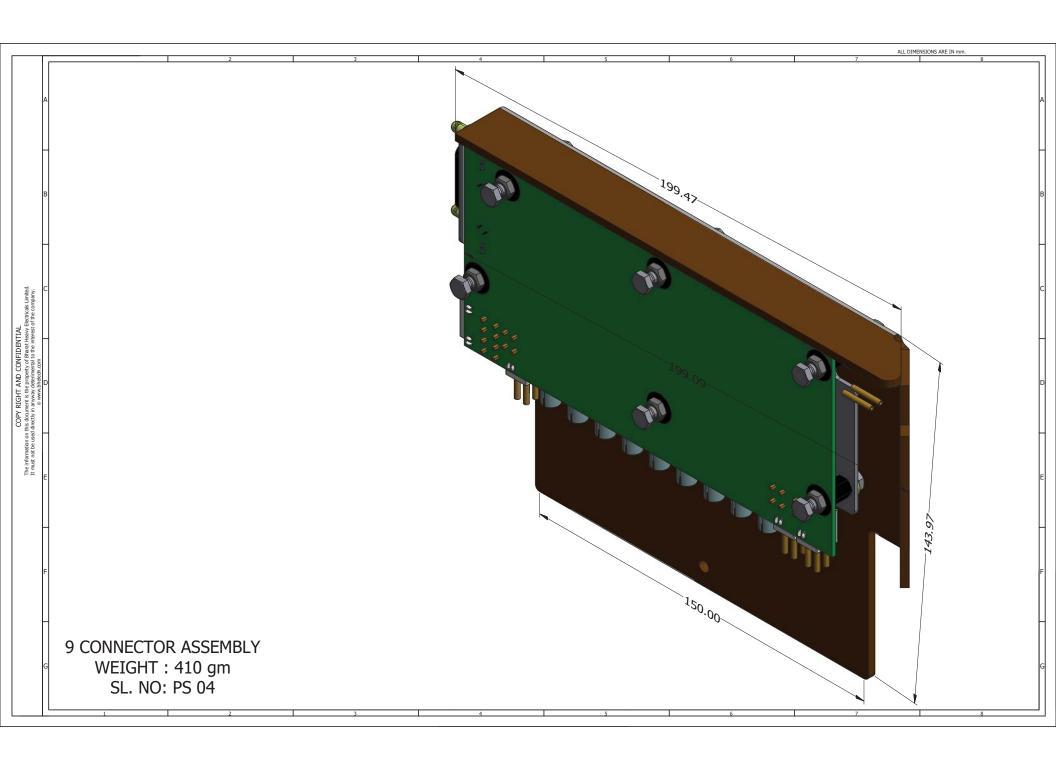


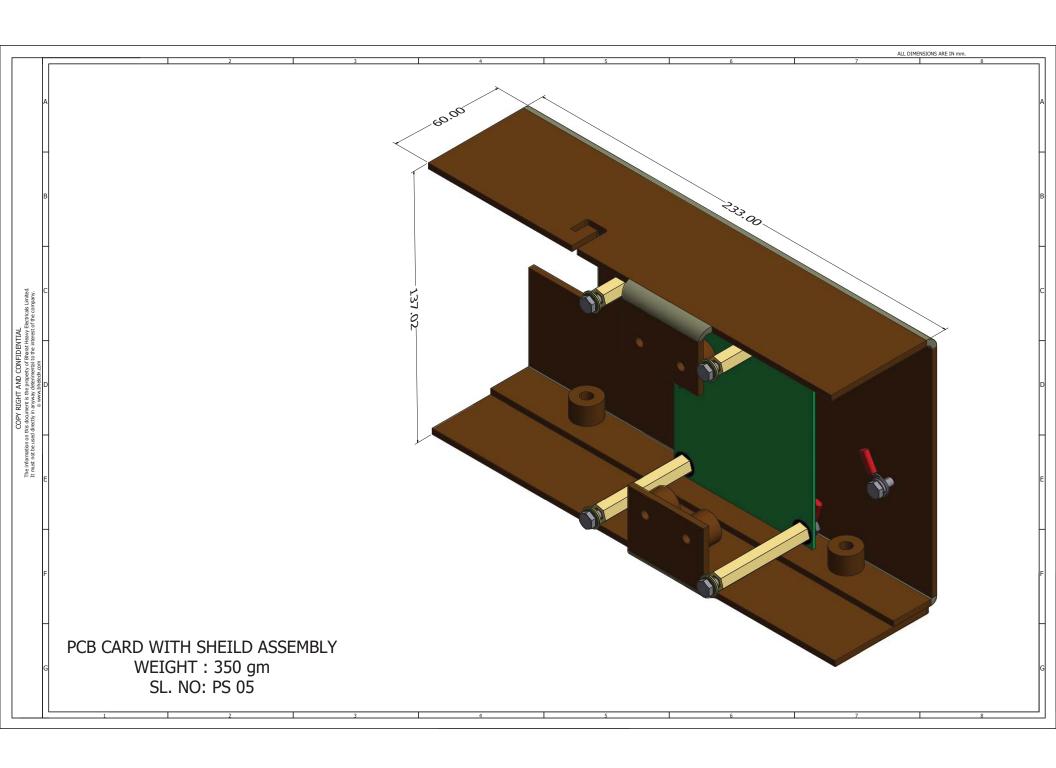


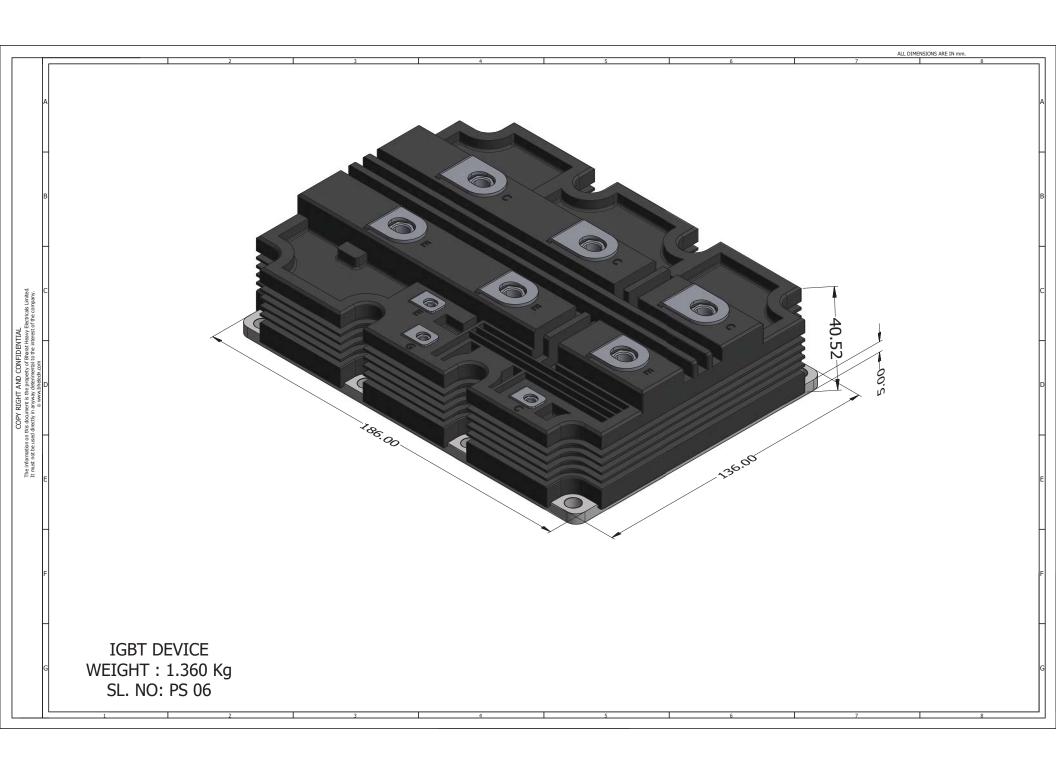


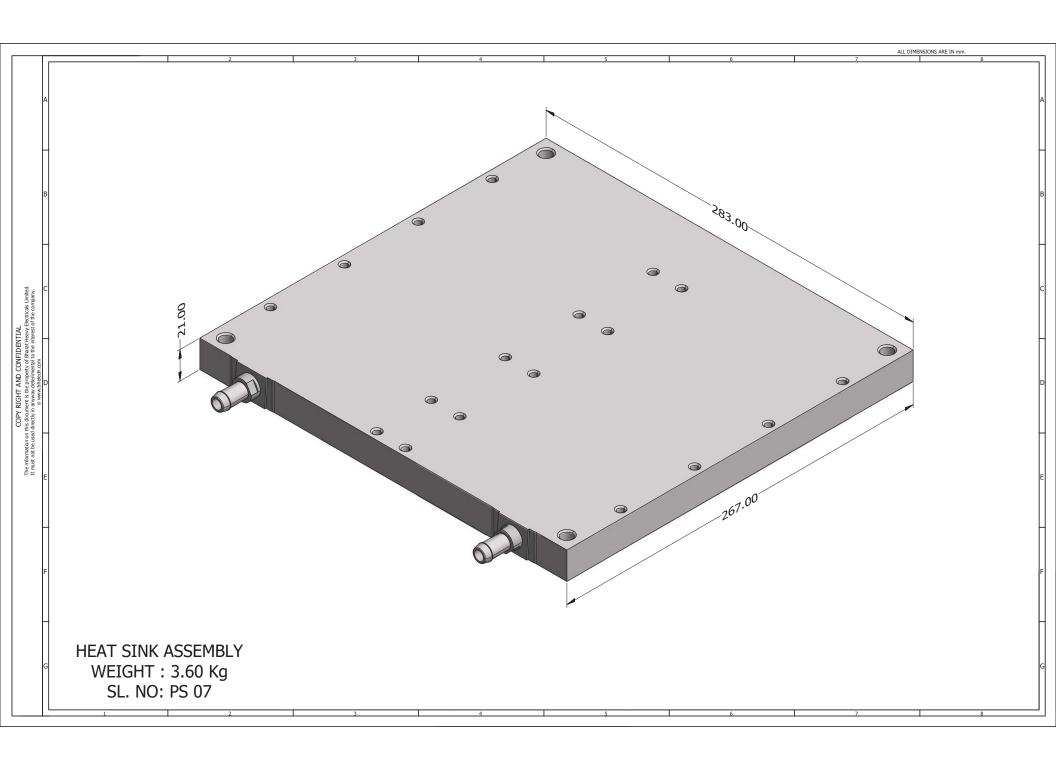


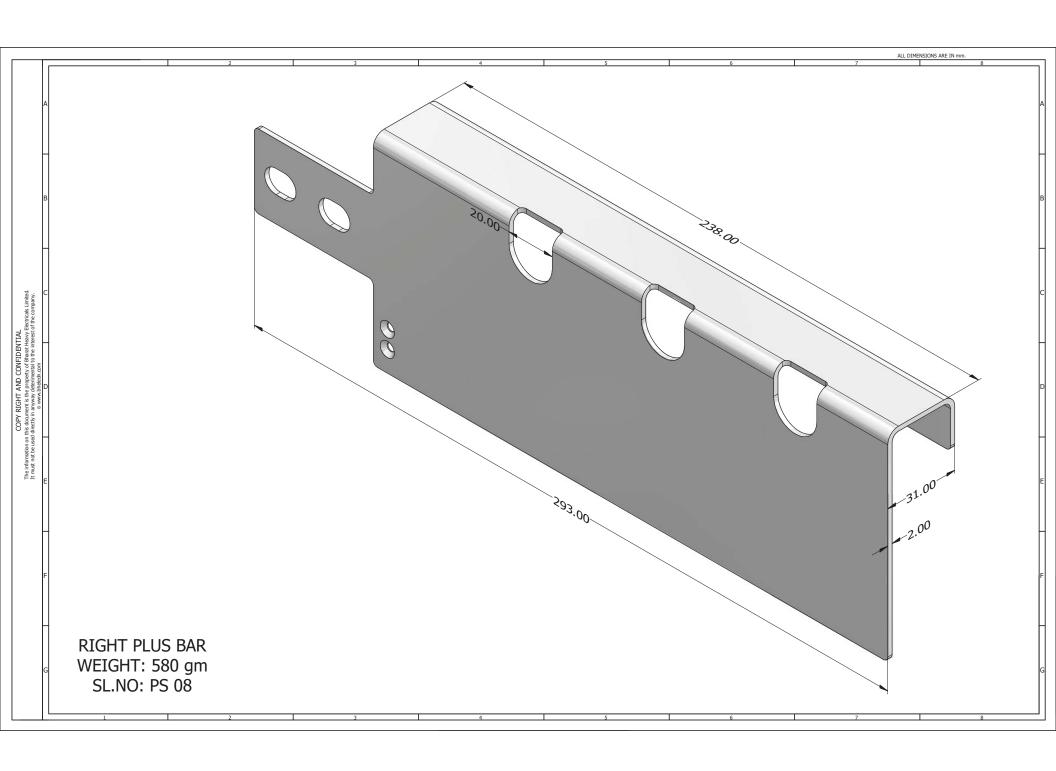


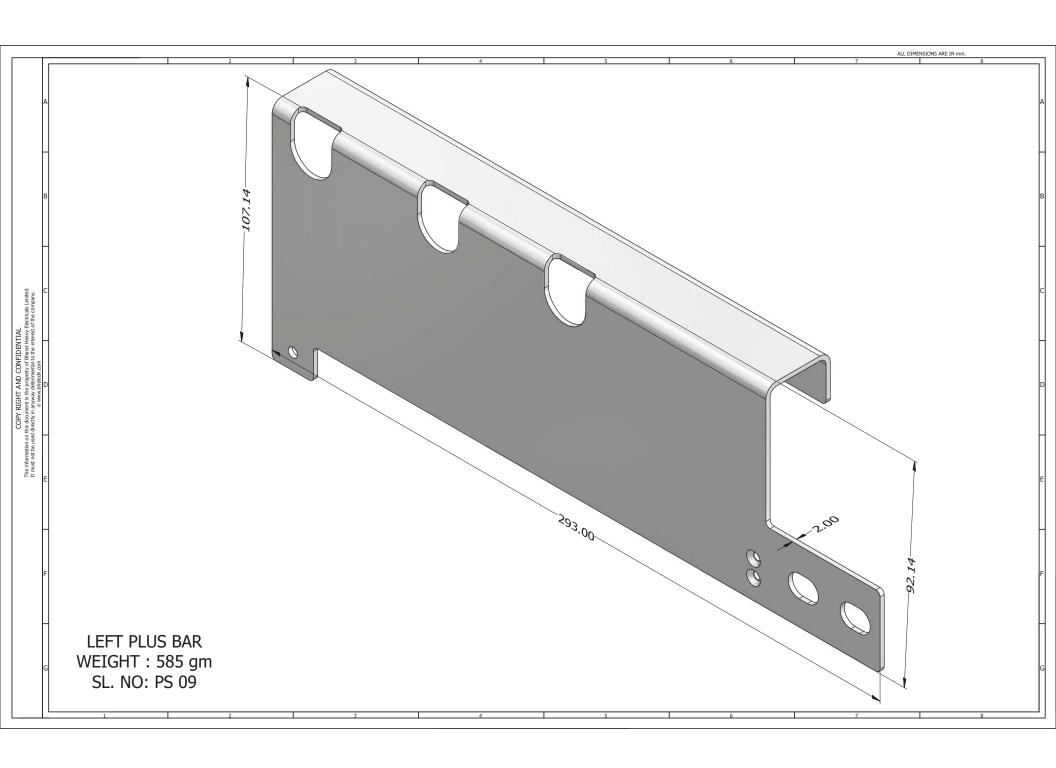


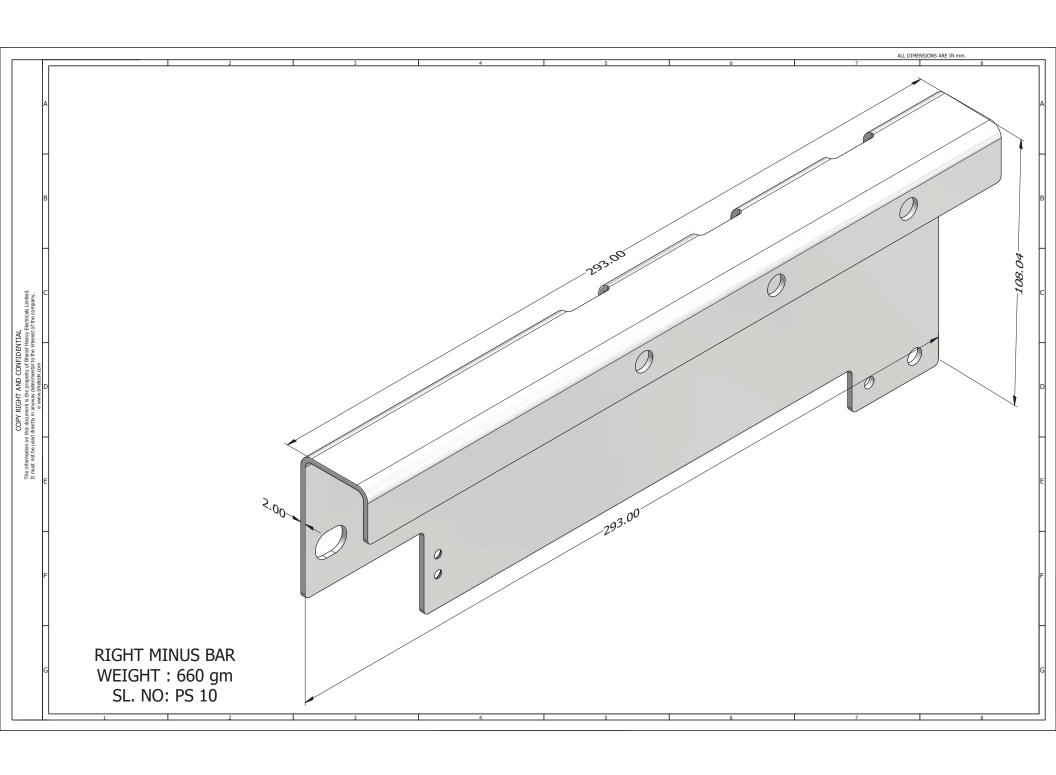


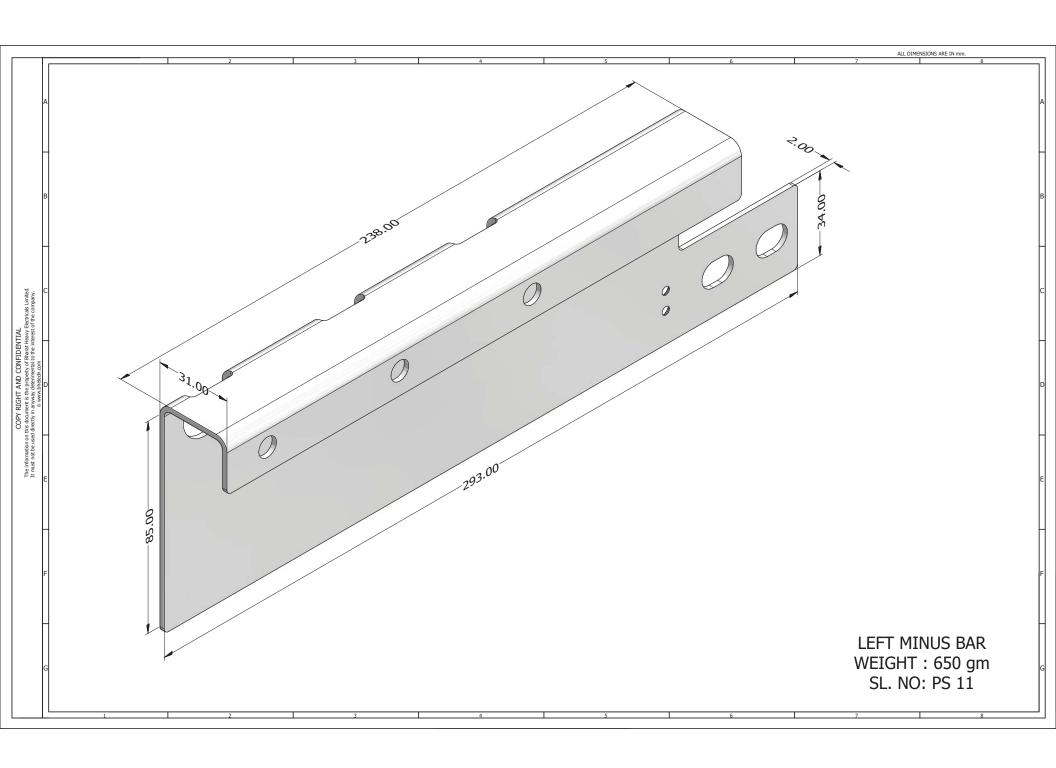


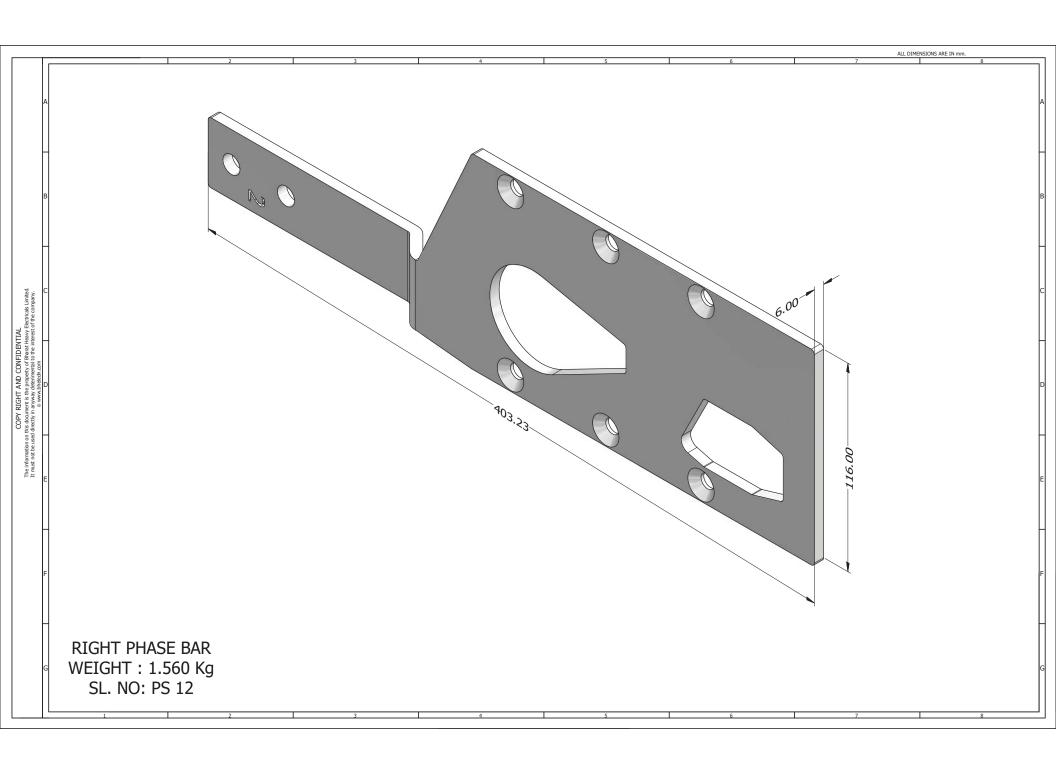


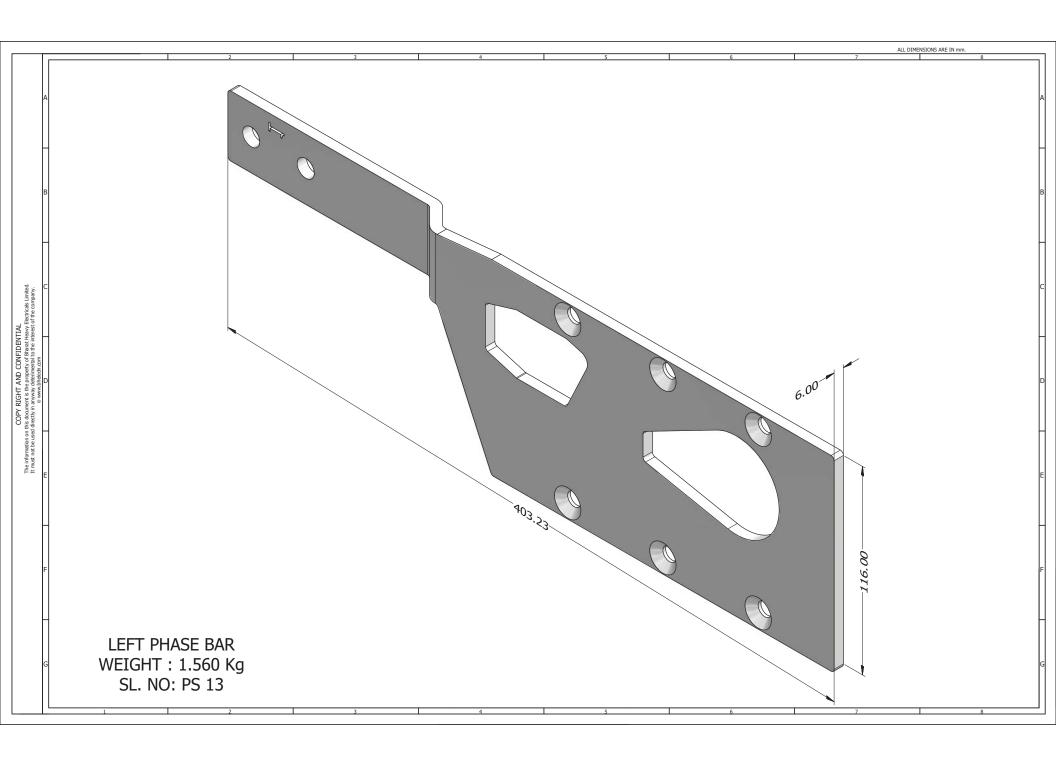


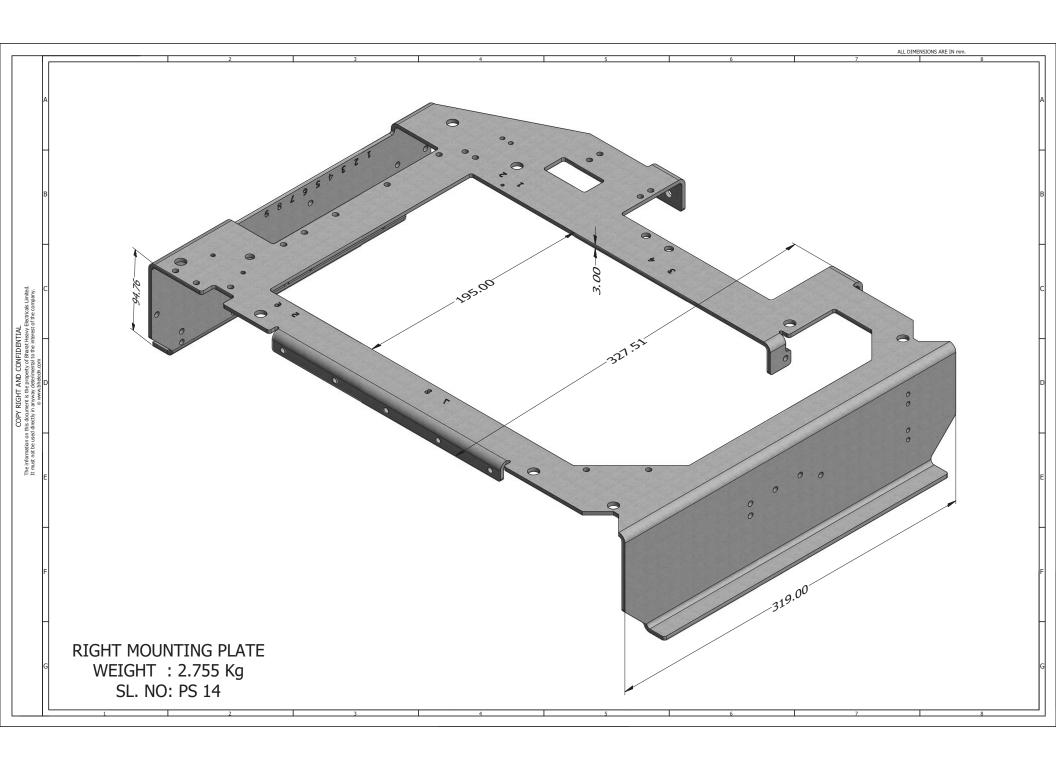


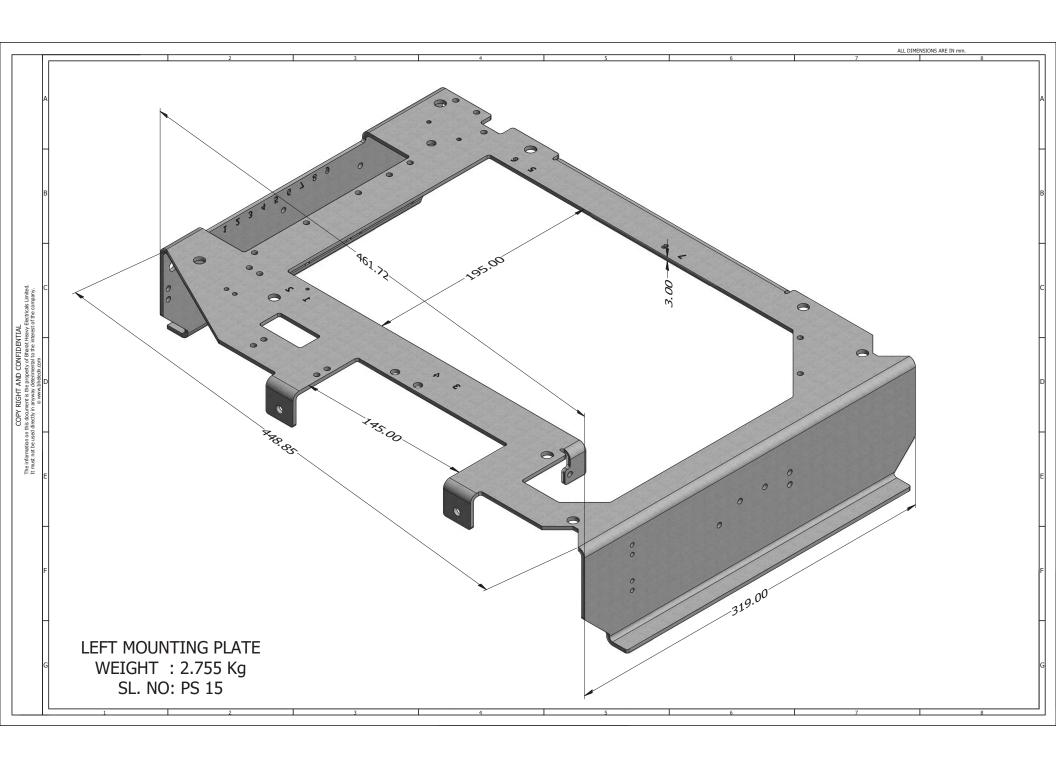












ANNEXURE-E

Details of Experiences

SI. No.	Year of Supply (Jan 2014 onwards)	Name and address of Customer	Description of the system/machine supplied	Creative feature, if any, which vendor want to highlight
1				
2				

To be printed on Company Letterhead

Annexure-L

Date:	
To,	

BHEL-EDN Mysore Road, Bengaluru- 560026.

Sub: Authorization to attend Pre-bid meeting at EDN on Robotic assembly for Traction Power Module

We authorize the following executive/s from our company to participate in Pre-bid meeting scheduled at BHEL- EDN.

SI. No.	NAME	DESIGNATION	STAFF No./ID. No.	Experience in the Company
1				
2				
3				

Thanking you. Regards.
(Signature)
Name:

Designation

AC LOCO Traction converter POWER MODULE

Dimension (approx.): 415x493x200 mm

Weight: 26 kg Qty/set: 18 no's



Ann-M IGBT Power Module

CONFIDENTIALITY & NON-DISCLOSURE AGREEMENT

1. <u>Disclosure of Confidential Information</u>

BHEL-EDN may disclose to Company any information either orally or in any recorded medium which are classified as confidential, including those which may be comprising or relating to its: techniques; schematics; designs; contracts; financial information; sales and marketing plans; business plans; clients; client data; customer lists; vendor lists; business affairs; business practices/strategies; operations; strategies; inventions; methodologies; technologies; know-how; employees; subcontractors; pricing; service proposals; methods of operations; procedures; products and/or services; (herein after referred to as "Confidential Information"). Confidential Information shall mean all nonpublic information including verbal representations: furnished, disclosed or transmitted regardless of form.

2. <u>Confidentiality</u>

Company will use the Confidential Information solely in furtherance of the purpose of studying the electronic modules, whose material codes are listed in Annexure-I and suggest the machines and accessories (the "Purpose") to enable automated assembly. Company shall not disclose the Confidential Information to any unauthorized third party and shall not use the Confidential Information in any way that may be directly or indirectly detrimental to BHEL or its assigns.

Company shall ensure that access to Confidential Information is granted only to those of its employees or agents ("Representatives") who have a demonstrable need to know such information in order to carry out their task in relation to the Purpose. Prior to disclosing any Confidential Information to such Representatives, Company shall inform them of the confidential nature of the information including Company's obligations under this Agreement and shall obtain their agreement to be bound by the terms of this Agreement and not to disclose the Confidential Information. Company and its Representatives will take extreme care for the confidentiality and all out measures to maintain the confidentiality of the Confidential Information, but in no event less than the reasonable measures to ensure confidentiality. The Company shall hold Confidential Information disclosed by BHEL in confidence using the same degree of care as it normally exercises to protect its own proprietary information, but not less than reasonable care, taking into account the nature of the

Information. Company and its Representatives shall not disclose to any person including, without limitation, any corporation, sovereign, partnership, limited liability company, entity or individual (i) the fact that any investigations, discussions or negotiations are taking place concerning the purpose or any other business relationship between the parties, (ii) that it has requested or received Confidential Information from BHEL, or (iii) any of the terms, conditions or any other fact about the purpose or any other business relationship between the parties. The Company shall ensure that anyone to whom the information is disclosed further abides by obligations restricting use, restricting disclosure, and ensuring security at least as protective as this Agreement. In case the Company becomes aware of a breach of any provision of this Agreement by itself or by any of its Representatives/ Employees, it shall promptly notify the same to BHEL and take all the necessary measures to ensure that the disclosures in breach of this Agreement cease immediately. The Company shall also use its best efforts in remedying any unauthorized use or disclosure of the Confidential Information and also shall assist for remediating so by BHEL.

The obligations contained in this Section 2 will not apply to Confidential Information: a) for which the Company can provide documentary evidence to the extent that it was in its lawful possession prior to disclosure to it by BHEL and before the duty of confidentiality commence; or was part of the public domain at the time of disclosure or properly had become part of the public domain, by lawful publication or other lawful bonafide means; or b) for which the Company can provide documentary proof that it was independently developed by the Company without prior knowledge of any Confidential Information obtained from BHEL; or c) which is the subject of a subpoena or other legal or administrative demand for disclosure; provided, however, that the Company has given BHEL prompt notice of such demand for disclosure and the Company reasonably cooperates with BHEL's efforts to secure an appropriate protective order; and shall only disclose the portion of Confidential Information which it has been advised by written opinion of counsel is legally required to be disclosed and shall use its best efforts to obtain assurance that confidential treatment will be accorded such information if the protective order is not obtained or d) for which to the extent that Company can demonstrate that the BHEL has waived confidentiality of such information in writing.

3. Ownership of Materials/No Warranty

BHEL retains all rights, title and interest to its Confidential Information and the Company fully recognizes and agrees that the Confidential Information is owned solely by BHEL (or its licensors). No rights including IPR or license under any trademark, patent or copyright, or that may be obtained hereafter by BHEL (or its licensors) is construed as expressly or implicitly granted to the Company by the disclosure of Confidential Information pursuant to this Agreement. BHEL disclaims all warranties regarding the confidential information, including all warranties with respect to infringement of intellectual property rights and all warranties as to the accuracy or utility of such information. Execution of this Agreement and the disclosure of Information pursuant to this Agreement do not constitute or imply any commitment, promise, or inducement by BHEL to make any business relation with the Company, or to enter into any additional agreement of any kind. Confidential Information is provided "as is" with all faults, if any. In no event shall BHEL be liable for the accuracy or completeness of the Confidential Information.

4. Term

The rights and obligations of the parties under this Agreement shall commence on the date of the first disclosure of Confidential Information or the date of execution of this Agreement, whichever is later, and will continue and terminate only on expiry of 5 years following the last such disclosure or the date of completion of the Purpose. Notwithstanding the termination of this Agreement, the Company's obligations with respect to confidentiality shall survive: (a)With respect to any Confidential Information received from a third party under obligation of confidentiality and disclosed by BHEL as per terms of such confidentiality agreement to the Company during the term of this Agreement with notice at the time of disclosure, for which the term denoted in such agreement would be the term applicable. (b) With respect to such information which the company has failed to return in terms of Clause 5 hereunder, in which case the date of returning all the information would be the date on which confidentiality obligations of the Company would cease to exist.

5. Return of Confidential Information

Upon completion of the business relationship between the parties or if BHEL so requests, Company and its Representatives shall promptly return to BHEL all copies of Confidential Information in its possession including, without limitation, all copies of any analyses, compilations, studies or other documents prepared by Company or its Representatives containing or reflecting any Confidential Information. Company shall

certify in writing that it and its Representatives have returned all such information to BHEL.

6. Provisions in case of Breach

(a) If the Company has committed a breach of any provision of this Agreement, BHEL shall have the right to forthwith terminate any or all provisions of this Agreement by a written notice thereof and without prejudice to any other right or claim for remedy, it may have at law or in contract. The Company shall, in such event, upon request from and at the discretion of BHEL, immediately return all copies of Confidential Information disclosed under or in relation to this Agreement. (b) The Company hereby agrees to indemnify and hold harmless BHEL from and against all damages, losses, claims, liabilities, costs and expenses which BHEL may incur or sustain as a result of a breach of any provision of this Agreement by the Company by itself or through any of its Employees or through anyone else. (c) The Company agrees that (i) No failure nor any delay in exercising on the part of BHEL, any right or remedy under this Agreement, shall operate as a waiver thereof (in whole or in part), nor shall any single or partial exercise of any right or remedy prevent any further, future or other exercise thereof or any other right or remedy. The rights and remedies existing by virtue of this Agreement shall be cumulative and not exclusive of any rights or remedies provided by law. (ii) No term or provision hereof will be considered waived by BHEL, and no breach excused by it, unless such waiver or consent is in writing signed an authorized representative of BHEL. (iii) No consent to, or waiver of, a breach by BHEL, whether express or implied, will constitute a consent to, waiver of, or excuse of any other, different, or subsequent breach by Company or its Representatives

7. General

- a) This Agreement shall be governed by and construed in accordance with the laws of India.
- b) The Company agrees that the unauthorized disclosure or use of such Confidential Information would cause irreparable harm and significant injury to BHEL, the degree of which may be difficult to ascertain for which recovery of money or damages would be inadequate. Accordingly, the Company agrees that BHEL will have the right to obtain an immediate exparte injunctive relief to protect its rights under this Agreement or to prevent an actual or threatened violation of this Agreement in addition to any and all other rights and remedies available at law or in equity. Subject to the Arbitration Clause hereunder, Company and its Representatives hereby irrevocably and unconditionally consent to submit to the exclusive jurisdiction of the courts of the Bangalore for any actions, suits or proceedings arising out of or relating to this Agreement and the transactions contemplated

hereby and further agree that service of any communication, process, summons, notice or document by registered mail or courier service to the address set forth above shall be effective service of process for any communication, action, suit or proceeding brought against Company and its Representatives.

c) In the event of any dispute arising out of or in connection with the subject matter herein or differences relating to the breach, violation or terms of this Agreement, the Parties shall first endeavor to resolve such dispute amicably within twenty (20) days upon notification of such dispute. Should the Parties fail to do so, then such dispute shall be referred to sole arbitration of Executive Director/Head of BHEL-EDN or any other person appointed by him. The arbitration award shall be final and binding on both the Parties. In the event of such Arbitrator to whom the matter is originally referred to is being transferred or vacates his office on resignation or otherwise or refuses to do work or neglecting his work or being unable to act as Arbitrator for any reasons whatsoever, the Executive Director/ Head of BHEL-EDN shall appoint another person to act as Arbitrator in place of outgoing Arbitrator and the person so appointed shall be entitled to proceed further with the reference from the stage at which it was left by his predecessor. The Company hereby irrevocably and unconditionally waive any objection in any such appointment, that arbitrator so appointed is employee of BHEL and hereby further irrevocably and unconditionally waive and agree not to plead or claim in any court that any such arbitration proceeding brought in has been brought in an inconvenient forum. The said Arbitrator shall act under the Provisions of the Arbitration and conciliation Act,

1996 or any statutory modifications or reenactment there of or any rules made thereof.

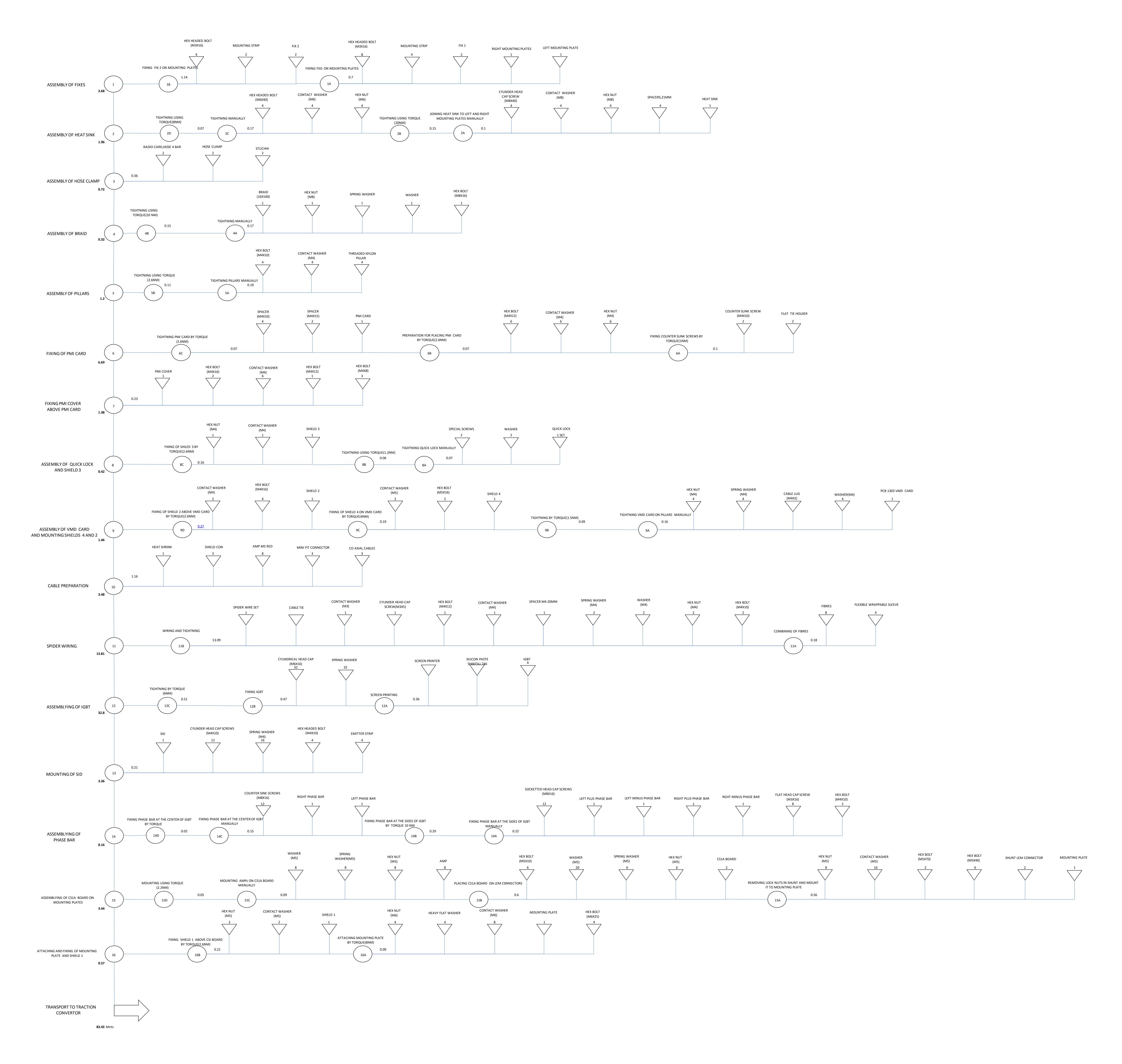
- Company shall not assign any of its rights or obligations under this Agreement without the prior written consent of BHEL whereas BHEL may assign this Agreement to any entity at its convenience upon a notice to the Company. This Agreement shall be strictly binding upon the Company and inure to the benefit of BHEL, its successors and assigns.
- e) This Agreement may be supplemented only by a writing that is signed by duly authorized representatives of both parties.
- f) Notwithstanding any provision herein contained, nothing contained in this Agreement requires BHEL to proceed with the Purpose, or to refrain from pursuing the purpose with a third party and any provision herein contained shall not be construed as imposing on BHEL an obligation to provide or disclose any information
- g) If any part of this Agreement is found invalid or unenforceable, that part will be amended to achieve as nearly as possible the same economic and legal effect as the original provision and the remainder of this Agreement will remain in full force.
- h) This Agreement constitutes the entire agreement between the parties relating to this subject matter and supersedes all prior or simultaneous representations, discussions, negotiations, and agreements, whether written or oral.

Accepted and agreed as of the date first above written by the following authorized representatives of the Parties:

BHEL-EDN		Organisation:	<u>Organisation:</u>	
Ву:		Ву:		
Name:	GIRISH TJ	Name:		
Title:	AGM/SA-ENGG	Title:		
Ву:	_			
Name:	GIRIDHARA KM			
Title:	SDGM/PS			

FLOW PROCESS CHART FOR POWER MODULE

Ann-P Process Flow chart



ANNEXURE-Q

PRE-QUALIFICATION CRITERIA (PQC)

SI. No	Particulars	Supplier's confirmation
1	BHEL cannot provide an advance, part or full for the development of Robotic assembly. However, BHEL will arrange payments in stages, as and when supplies of components of this system are made. Hence vendors should able to manage initial funding this system development on their own.	Yes/No (No documents required)
2	Vendor should have design, fabrication and testing facilities for Robotic assemblies at their organisation (Proprietary) or any organisation with whom he/she has consortium/MOU/agreement/JV or any other means, with active MOU valid for 2 more years. Copy of relevant document shall be furnished	Yes/No (Document to be furnished)
3	The vendor should have experience in using Industrial Robots with metal body and Protection IP67 through-and-through of make ABB/Fanuc/Staubli/Kuka/Yaskawa. For other makes, BHEL may consider based on the technical details and proof, the vendor provides.	Yes/No (Technical literature from manufacturer & a self-certificate to be furnished)
4	Vendor shall have an experience of supplying at least 2 similar* System within last 5 years (details of customers to be provided as per the Annexure - E) as on date of EOI opening. Certificate of satisfactory performance/ User acceptance certificate/ Successful commissioning certificate shall be furnished from at least one such customer. For vendors from outside India, at least ONE customer should be from a country other than the country of origin. Content of Similar* system: a. The system should consist of robot specified in para 3, above	Yes/No (2 Document to be furnished)

	b. The system should have a robot with minimum 1000mm reach and minimum payload of 10Kgs of make stated in para 3, above.c. The grippers employed in the system should operate by electrical/air/vacuum	
5	Average annual turnover for last 3 years shall be more than INR 400 Lakhs. Audited annual report to be submitted.	Yes/No (Document to be furnished
6	The vendor should be in a position to provide warranty for entire system for a period of TWO (02) years from the date of commissioning.	Yes/No (No documents required)
7	Supplier shall agree for Annual Maintenance Contract (AMC) for a period of THREE (03) years soon after the expiration of warranty period. The vendor or their authorized service representative should be equipped to provide prompt after sales service, spares support for the offered System.	Yes/No (No documents required)

Note: List of documents to be submitted is mentioned in para 2.3 of Section 2

PREFERABLE FEATURES IN ROBOT

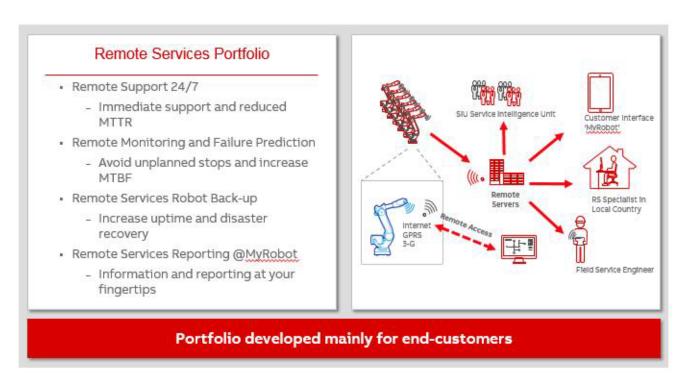
1) Teach Pendant:-

Touch Screen Teach Pendant with Joy-Stick Technology. Joystick is patented technology which will enable programmers to quickly adapt themselves to use technology, which is similar to gaming joystick.

2) Remote Servicing Option:-

Robot should have a Remote Service solution to securely gather information from robots, manage alarms and potentially execute remote commands by OE Supplier/
Manufacturer. This solution consists of an intelligent Service Box plugged to the robot. This Service Box is also connected through GPRS or directly through Internet to create a secure VPN connection to a central Remote Service server. The Remote Service Box is well suited for small customers with 1-10 robots with plug and play Installation.

Connected Service: Remote Services Offering



3) RAPID Programming Language:-

RAPID is a high-level programming language used to control our Industrial Robots. Features in the language include:-

Routine parameters.

Procedures - used as a subprogram.

Functions - return a value of a specific type and are used as an argument of an instruction.

Trap routines - a means of responding to interrupts.

Arithmetic and logical expressions; Automatic error handling

Modular programs; Multi-Tasking feature available.

4) Controllers are not prone to viruses.

In real use scenario, Programmers will use pen drives to download programs on controllers for trial run. This is one of the biggest threats for any Robot controller due to viruses.

5) Robots should come with TrueMove, Quick Move & Collision Detection Option TrueMove and QuickMove are integrated systems of the RobotWare's Dynamic Path Modeling software. Collision detection option provides enhanced safety to Operators.

6) Optional Connector Kit with Hot Plug Arrangement:-

Flexibility to remove and store Teach-Pendant at a remote location when the Machine is in continuous protection cycle. This ensures that no one is able to fiddle with Robot's controller. Enhanced protection with multiple levels of password protection. This Option is used mostly when multiple Robots are there in a line and with 1 or 2 Teach Pendants you'll be able to operate an entire line.

7) Communication Protocol:-

All robots should come with default DeviceNet communication protocol for interfacing with PLC's and HMI's & Profinet IO & Ethernet IP Option as an add-on.

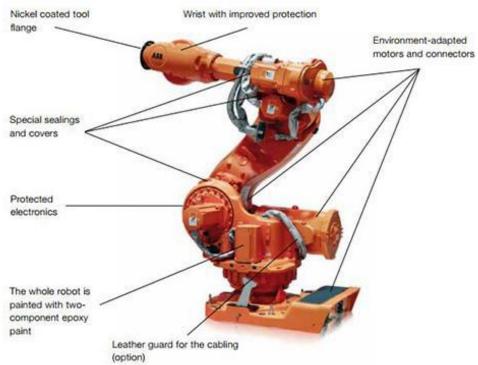
- **8)** Sound level <70 db (as per acc. to Machinery directive 2006/42/EG) with minimal humming sound during movement of Robots, which enables less noisy environment in the same assembly shop floor while the Robot is in articulation.
- **9)** Gear boxes to have of Oil for changing at periodic intervals for Geared Motors. Greasing is a tedious and critical process in comparison to Oil change.
- **10)** Robot Controllers should withstand upto 52 Deg C Temperature.

11) Flex-Pendant Interface:-

Flex Pendant Interface allows users to configure Teach-Pendant as HMI and customized screens shall be made with multiple Options.

12) Total Power Consumption of 20Kg payload Robot should be within 4KVA.

13) Foundry Plus Protection: - Metal Body & Protection for Electronics, Cable guards



ANNEXURE - V

VENDORS CONFIRMATION

4.1 General

SI. No	Particulars	Supplier's confirmation on understanding the requirement
1	Assembled Power module is in Annexure-M	Yes/No
2	All components used in assembly is in Annexure-C	Yes/No
3	The system should have minimum ONE robots and should cover the all the operations indicated in Process flow chart in Annexure-P	Yes/ No
4	General specification of Robot is in Annexure-R.	Yes/ No If non-confirmation, provide details
5	Component picking can be by Robot or any other means.	Yes/ No
6	Assembled Power Module should be placed on a conveyor/table to enable subsequent transport of module for testing.	

4	2	Es	ti	m	at	le	•

Estimate of the system proposed works out to Rs	
(In words Rupees)

ANNEXURE Y

COMPANY PROFILE

SL NO	GENERAL INFORMATION:			
4.1	NAME OF COMPANY:			
4.2	DETAILS OF THE COMPANY ADDRESS:			
	TELEPHONE: FAX: E-MAIL:			
	WEB SITE:			
4.3	DETAILS OF CEO NAME: DESIGNATION: CONTACT NO.: EMAIL:			
4.4	NO. OF EMPLOYEES ON ROLL: NO. OF EXECUTIVES:			
4.5	NO. OF VENDORS REGISTERED:			
4.6	NO OF MOU/AGREEMENTS/JV/ANY OTHER ARRANGEMENTS YOU ESTABLISHED TILL JAN19:			
4.7	QUALITY/HSE CERTIFICATIONS OBTAINED:			
	AGENCY CERTIFIED:			
	VALIDITY OF CERTIFICATE:			
4.8	NO. OF AWARDS/ACCOLADES RECEIVED:			
4.9	ANY OTHER INFORMATION YOU WOULD LIKE TO SHARE:			