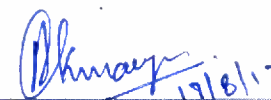


Annexure A
Technical Specifications

S.No.	DETAILED DESCRIPTION / SCOPE OF SUPPLY / SCOPE OF WORK	Remarks
1.0	General system Setup: Electrical	
1.1	The system will consist of SIEMENS make S7-300/400 or higher PLCs, for manipulator with distributed/remote I/O's and Profibus control as detailed in clauses 4.0.	
1.2	One Main Panel with PLC in control room (Ref 2.0) along with remote panel located on Manipulator (Ref 3.0)	
1.3	One PC for operation and maintenance.	
1.4	Power Supply system: 415V AC, 3Phase, 3Wire, 50Hz AC supply with ground.	
2.0	Manipulator Control Panel: Located in press control room	
2.1	PLC Panel having SIEMENS SEMATIC S7-300/400 or higher CPU with distributed /remote I/O's. Fully wired with relays, contactors, MCB, regulated power supply and other switch gear items.	
2.2	This panel will interface with the field devices mounted on operator's desk through hard wiring.	
2.3	This panel will interface with Remote Manipulator Panel through profibus.	
2.4	This panel will interface with MCC Panel for starting of various motors. through hard wire.	
3.0	Manipulator Remote Panel: Located on Manipulator	
3.1	This panel will have communication, Input & Output cards, and Power Supply unit, fully wired with terminal blocks, Solid state relays, contactors, MCB and other Switch gear items. Through this panel switching of analog and digital valves and operation of various manipulator operational features will be established.	
4.0	Motor Control Center Panel (MCC Manipulator) Located at pump station near press remote panel.	
4.1	Panel Incomer: MCCB Incomer with Rotary Drive Switch, Digital voltmeter and Ammeter.	
4.2	Star/Delta starter for Manipulator Motor M1.	
4.3	Star/Delta starter for Manipulator Motor M2.	
4.4	Star/Delta starter for Pilot Pressure Pump.	
4.5	DOL starter for Manipulator Grease Pump.	
4.6	DOL starter for Manipulator Circulation Pump.	
4.7	DOL starter for Manipulator Cooling pump	
4.8	DOL starter for Manipulator Thruster.	
4.9	DOL starter for Pump 10Kw	
4.10	DOL Starter for Pump 10Kw	
4.11	All Starters must have an incomer MCCB rotary switch & MPCB properly interlocked for tripping along with power contactors.	



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4.12	Separate fuse for control supply.	
4.13	All Power contactors selected must be 150% of design calculated current rating.	
4.14	All starters must have run, stop and trip LED indications.	
4.15	All Star/Delta starters must have digital Ammeters.	
4.16	Aluminum Bus bar current density 1A/Sq-mm or less	
4.17	Copper Bus bar current density 1.6A/Sq-mm or less.	
4.18	Copper wires for power wiring current density 2.5A/Sqmm or less.	
4.19	Copper wires for Control wiring 1Sqmm or more	
4.20	Control Transformer 415/220 with tapplings. minimum 3KVA for control supply.	
4.21	All CTs (Current Transformers) to have 1Amp as secondary rating.	
4.22	Incomer to be provided with Digital Energy Meter.	
5.0	Operators Desk:	
5.1	Complete control desk made of 3mm or more thick metallic structure and painted first with corrosion resistant paint and then with two coats of industrial grey paint. The top cover must be 3mm or more thick metallic and anodized sheet.	
5.2	Fully pre wired for all operational controls through industrial joy sticks, foot switches and control interfaces for proper operation of press and manipulator.	
5.3	The operators desk should contain one PC based HMI system for operator control and monitoring. The PC should be pre-loaded with SIEMENS software and HMI along with licenses and archive software for the tag logging (historical trending, alarms etc.) Touch screen based control should not be used.	
6.0	Programming & Maintenance Kit:	
6.1	One PC based engineering station for diagnostics and maintenance. The PC should be pre-loaded with SIEMENS STEP 7 (SEMAC MANAGER) and HMI along with licenses and archive software for the tag logging (historical trending, alarms etc.):	
6.2	The system will have LED monitor of 22 inches or more, CPU will have latest generation core i5 Intel processor, with clock speed 3.0GHz or more, RAM DDR4 8GB or more, 1TB or more SSD ,wired key board & wired optical mouse.	
6.3	UPS of 500VA or more	

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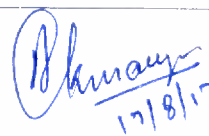
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7.0 25T Rail Bound Manipulator

S.No.	Specification /Operational Feature/Scope of supply	Remarks
7.1	Operation of motors: Start and stop of manipulator motors through MCC and operators desk.	
7.2	Travel; Forward and Backward movement of manipulator with speed regulation, using digital valve along with Servo Valve. There should be foot switch for travel control provided near operator's desk at an appropriate position for ease of control/operation.	
7.3	Jaw Rotation: Clock wise & Anti Clock wise rotation with speed regulation, using digital valve along with Servo Valve. There should be joy stick on operator's desk for jaw rotation control.	
7.4	Jaw; Clamp & Unclamp: Opening and closing of jaws for holding the jobs through digital valves with control using selector switch on operator's desk.	
7.5	Tong Lift; Up & Down: Vertical up and down movement of tong through digital valves with control using selector switch on operator's desk. This function is required to change vertical position of tong as well as inclination of tong axis with respect to horizontal.	
7.6	Tong Lift; Parallel Up & Parallel Down: Up and down movement of tong through digital valves with control using selector switch on operator's desk. The function is required to move tong vertically up and down without changing inclination.	
7.7	Tong Shift; Transverse Left & Right movement of tong through digital valves with control using selector switch on operator's desk. This function is required to change horizontal position as well as horizontal angle of tong axis with respect to manipulator axis.	
11.8	Tong Shift; Parallel Left and Parallel Right movement of tong through digital valves with control using selector switch on operator's desk. The function is required to move tong horizontally left and right without changing angle.	
7.9	Oil Temperature Sensor: A digital sensor mounted on manipulator to measure the temperature of oil.	
7.10	Pump Pressure Sensor: A digital pressure sensor mounted on manipulator to measure the pump discharge pressure.	
7.11	Oil Level Sensor: A digital oil level sensor mounted on manipulator to measure level of oil in tank.	
7.12	Cable trolley /Drag Chain System A new and suitably designed cable trolley/drag chain system for carrying power cables, profibus and house pipe for supply to manipulator.	
7.13	Thruster system for oil accumulator and limit switches The system to be designed to load the oil accumulator with thruster valve mechanism along with synchronized switching by limit switches.	
7.14	Power and Control Cables	

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7.14.1	All Power cables from MCC panel to manipulator through cable trolley/drag chain up to motors and thrusters.	
7.14.2	All control cables from remote panel to valves, limit switches and sensors and other field devices on manipulator.	
7.14.3	All control cables from manipulator panel to MCC panel and Operators desk.	
7.14.4	All these field cables to be water, oil, and chemical resistant and fire retardant	
7.14.5	The field cables should be properly protected with metallic conduits.	

8.0 Make of Items

S.No.	Item	Make	Remarks
8.1	PLC	Siemens, Europe	Preferably Germany
8.2	Relays	Phoenix	
8.3	Cables, Wires	Siemens, Lapp, Igus	Only Copper Core, tinned
8.4	Connectors, Terminal blocks	Phoenix, wago	Screw type. With fuse.
8.5	Pressure Sensors	HYDAC	
8.6	Temperature Sensors	HYDAC	
8.7	Limit Switches	Siemens, BCH	
8.8	Encoders	TWK	Absolute
8.9	Switches, Push Buttons	Siemens, Schneider	
8.10	LED indicators	Siemens, Schneider	
8.11	Joy stick	Spohn & Burkhardt	
8.12	Potentiometer/Variable Resistor	Siemens	
8.13	MCB, MCCB	Siemens, Schneider	
8.14	Contractors	Siemens	
8.15	Fuse Base and Fuse	Siemens	
8.16	Selector switch	Siemens, kaycee	
8.17	Profibus	Siemens	
8.18	Conduits	Reputed	Metallic PVC coated / Stainless Steel
8.19	Panel	Rittal	
8.21	Proximity Switches	Reputed	
8.22	UPS	APC/ Schneider	
8.23	Computer	DELL/HP	

9.0 Making of panel and Field wiring

S.No.	Specification	Remarks
9.1	Indicators of incandescent lamp type not to be used.	
9.2	Current density less than or equal to 2.5A/SQMM for power conductor of tinned copper only. Aluminum conductors not to be used.	
9.3	PLC Wiring by 0.75mm/1sq-mm flexible multi strand annealed copper wire.	
9.4	Panel Power wire not less than 4sq-mm flexible multi strand	

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	annealed copper wire	
9.5	Separate 415/230V to 24V DC Power supply in each Panel. (Main & Remote)	
9.6	Separate 10V DC Power supply for Each Main Panel for joysticks.	
9.7	415/220V Transformer in each main panel with tapping for voltage correction	
9.8	Digital outputs of PLC for all purposes except digital signals to control cards to be realized only through Relays. No direct PLC output to be used except for the purpose of interfacing with control cards.	
9.9	Red colour wire to be used for 220V Ac wiring inside panel, Neutral to be black colour.	
9.10	Blue colour wire to be used for PLC wiring and/or for 24 V DC and /or 10V DC.	
9.11	All relays used for Valves should be Solid State Relays.	
9.12	All Terminal Blocks used for control circuit must have in Built fuses. There should be at least 10% terminals provided as spare in each terminal block.	
9.13	Buses should not be used to connect PLC with Relay board.	
9.14	For feedback of 220V AC, Input to PLC should be realized through Relays.	
9.15	All Cards used for Siemens Sematic PLC must belong to same family. Mixing should not be done.	
9.16	All PLC programming should be in LAD. All networks/blocks should be supported with comments. Customized programs with redundancy not to be used.	
9.17	At least 10% Inputs/Outputs and relays should be spare.	
9.18	Proper laying of cables & wires their arrangement/dressing, marking/numbering/feruling, proper termination of wires and cables with lugs/thimble is to be ensured during the erection process.	
9.19	All wires and cables should be protected with proper metallic conduits with PVC coating/Stainless steel conduits and should be rust free. Flexible conduits should also be used if so required, specially at termination ends.	
9.20	All profibus cables to be covered through flexible metallic conduits.	
9.21	All logics, design, interlocks as per existing electrical drawing and/or proven and engineered system by vendor subject to agreement/approval by BHEL.	
9.22	Manufacturing Drawings to be approved before manufacturing by BHEL.	

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10.0 Exclusions

S.No.	Specification	Remarks
10.1	Manipulator Hydraulic Valves, Pumps and Motors	

11.0 Scope of work.

- 1) Dismantling of all existing control panels, Junction Boxes, control and power cables along with operator desk of existing system.
- 2) Erection of new Manipulator PLC panel in control room and remote panel on Manipulator.
- 3) Erection of new MCC panel at pump station in place of old MCC panel.
- 4) Laying of profibus cable along with conduits and clamps from Main PLC panels to Remote panels.
- 5) Laying of complete control cables along with conduits from Remote panel to field devices on manipulator. Screened cables along with conduits from remote panel to EMG and Encoders.
- 6) Laying of complete control cables with conduits from Main Manipulator Panel to Field devices mounted on Operators desk and on MCC.
- 7) Laying of Power cables from MCC to Manipulator & on the moving trolley system.
- 8) Installation and erection of new hardware and software.
- 9) Calibration and scaling of new sensors and encoders.
- 10) Testing of safety interlocks, functionality tests and no load trials.
- 11) Startup including hot trials.

12.0 General terms and conditions

16.1 The project will be turnkey basis including dismantling, erection, commissioning, cold trial and hot trial. All the man and material require for successful dismantling, erection and commissioning is to be arranged and supplied by vendor. Any other item/material require for the proper functioning or to attain desired features should be quoted and included in the scope of supply and will be on vendor account.

16.2 Services like oxygen, water, air, cranes, and electrical supply only will be provided by CFEP/ BHEL

13.0 Drawing and Documentation (In English Language only)

1. Complete Electrical drawing including layout, wiring diagram, bill of material, itemized product catalogue and details, interlocks and alarms hardcopy in leather bonded folders. The documents should not be photocopies but good quality printouts.- Five Sets
2. Complete Hydraulic drawing, layout, product catalogue, bill of material in leather bonded folders. The documents should not be photocopies but good quality printouts – Five Sets.
3. Operation and Maintenance Manual-Five Sets

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4. Alarm list and fault diagnostic manual-Five Sets
5. A soft copy of above documents(1,2,3&4) in one Flash Drive- Five Sets
6. Copy of PLC Program & HMI Program in one Flash Drive.- Five Sets
7. Image /Backup of all software and programs installed/loaded on PLC and PC Based HMI along with Licenses (Using Norton Ghost or other Suitable software) on a (Seagate/WD/Kingston make portable) Portable SSD.- Two Sets

14.0 Mandatory Spares:- (to be supplied)

S.No.	ITEM	QUANTITY (NO.)	Remarks
1.	CPU	01	Of each type
2	AI,DI,AO,DO	02	Of each type
3	Communication Card	01	Of each type
4	Power Supply 24V	01	Of each type
5	Power Supply 10V	02	Of each type
6	Relays	20	Of each type
7	Amplifier card	01	Of each type
8	Encoder	02	Of each type
9	Proximity Switch	05	Of each type
10	Pressure Sensor	02	Of each type
11	Temperature Sensor	02	Of each type
12	Led Indicator	50	Of each colour & type
13	Push Button	20	Of each colour & type
14.	Selection switch/any other switch	02	Of each type
15	Variable Resistances/Potentiometers	02	Of each type
16	Joy sticks	01	Of each type
17	Any other electronic card	01	Of each type
18.	Limit Switch	05	Of each type

15. Commissioning spares to be provided by vendor.

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Annexure B

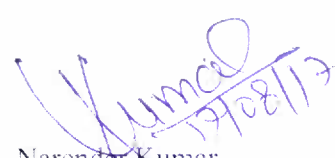
PERFORMANCE PARAMETERS AND SPECIFICATIONS OF
25/50m-T MANIPULATOR

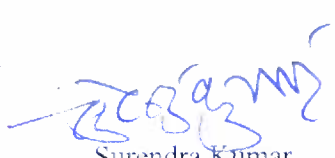
Final acceptance shall be made by M/s CFFP/BHEL at BHEL, Haridwar following successful completion of erection and commissioning as per specification in general along with compliance of clause no. 6, 7 & 13 of annexure A, achieving the operational & functional accuracies of the machine as per proving test and performance criteria as detailed below.

PERFORMANCE PARAMETERS AND SPECIFICATIONS OF MANIPULATOR

MAKE-DEMAG MEER, YEAR OF MANUFACTURE -1976 TYPE HSP 50		
SL. NO.	DESCRIPTIONS	VALUE
06	TECHNICAL DATA	
	TONGS CLAMPING MOMENT	50 Mpm
	CARRYING CAPACITY	25 TONS
	MAXIMUM TONGS OPENING	1100 mm
	MINIMUM TONGS OPENING	400 mm
	TURNING CIRCLE OF FULLY OPENED TONGS	2160 mm
	TOP MOST POSITION OF HORIZONTAL TONGS AXIS ABOVE RAIL TOP	1980 mm
	BOTTOM MOST POSITION OF HORIZONTAL TONGS AXIS ABOVE RAIL TOP	1180 mm
	VERTICAL LIFT OF HORIZONTAL PEEL	800 mm
	HORIZONTAL PARALLEL SIDE SHIFTING OF PEEL	± 250 mm
	TONGS TURNING SPEED INFINITELY VARIABLE UPTO	APPROX. 10 RPM
	TRAVELLING SPEED INFINITELY VARIABLE UPTO	APPROX. 60 m/min
	DISTANCE BETWEEN RAIL CENTRES	3200 mm
	MAXIMUM OPERATING PRESSURE	APPROX. 130 atm. g.
	OPERATING BY MEANS OF 2 ELECTRIC MOTORS EACH OF 75 KW AT 1000RPM, 415V, 50HZ, 2 PUMPS EACH DELIVERING	220 LITRES/min
	ASSOCIATED PISTON-TYPE ACCUMULATOR WITH AIR FILL	125 LITRES CAPACITY


 Anil Kumar Maurya
 Dy. Manager (Forge Maint.)


 Narender Kumar
 Sr.DGM (Shop Maint.& Plg)


 Surendra Kumar
 AGM(M&S.PMG &HSE)


 K S Rana
 AGM (Forge Production)