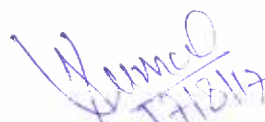
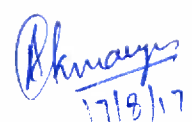


Annexure A
Technical Specifications

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 PLC's, one each for press and manipulator with distributed/remote I/O's and Profibus control as detailed in clauses 2.0	
1.2	One Main Panel with PLC in control Room (Ref 2.0) along with remote panel located at Accumulator Pump Station (Ref 3.0) for Press.	
1.3	One PC for operation and maintenance.	
1.4	Power Supply system: 415V AC, 3Phase, 3Wire, 50Hz AC supply with ground.	
2.0	Press Control Panel: Located in press control room	
2.1	PLC Panel having SIEMENS SEMATIC S7-300/400 CPU, Power Supply, I/O's Cards, fully wired with Terminal Blocks, Solid State relays, Contactors, MCB 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 Press Panel through profibus.	
2.4	This panel will interface with field devices located inside the cellar i.e. Main control, Step control, Planeshing control/mode, long table control, Cross table control etc. and on forging press and table through hard wire.	
3.0	Remote Press Panel: Located at pump station	
3.1	This panel will have communication, Input & Output cards, Power Supply unit, fully wired with terminal blocks, Solid state relays, contactors, MCB and other Switch gear items.	
3.2	This panel will communicate with main press panel with profibus.	
3.3	This panel will communicate with Motor Control Center Panel (MCC) through hard wire for starting of various press motors.	
3.4	This panel will communicate with HT Breaker Panel through Hard wire for controlling HT Pump Motors.	
3.5	This panel will have input /output from HT pumps, Boost pump, Automatic Shut off valve, Manual Shutoff valve, temperature and pressure sensors for HT pumps.	
3.6	This panel will also have the control system for measurement and control including alarm and emergency shut-off of water level in the Accumulator. There should be provision for display of water level, temperature, pressure and status of various valves and limit switches through LED indicator.	
4.0	Motor Control Center Panel (MCC Panel Press) 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 Boost Pump.
4.3	DOL starter for Lubrication Pump P1
4.4	DOL starter for Lubrication Pump P2
4.5	DOL starter for Lubrication Pump P3
4.6	DOL starter for Press Grease pump
4.7	Star/Delta Sump Pump Starter 15 Kw.
4.8	Star/ Delta Sump Pump Starter 10 Kw.
4.9	All Starters must have an incomer MCCB rotary switch & MPCB properly interlocked for tripping along with power contactors.
4.10	Separate fuse for control supply.
4.11	All Power contactors selected must be 150% of design calculated current rating.
4.12	All starters must have run, stop and trip LED indications.
4.13	All Star/Delta starters must have LED based digital Ammeters.
4.14	Aluminum Bus bar current density 1A/Sq-mm or less
4.15	Copper Bus bar current density 1.6A/Sq-mm or less.
4.16	Copper wires for power wiring current density 2.5A/Sqmm or less.
4.17	Copper wires for Control wiring 1Sqmm or more
4.18	Control Transformer 415/220 with tapings, minimum 3KVA for control supply.
4.19	All CTs (Current Transformers) to have 1Amp as secondary rating.
4.20	Incomer to be provided with LED Based 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	Operation & Maintenance Kit:
6.1	One PC based engineering station for Operation 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 systems (Operators & programming Kit) 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

7.0 2650T Forging Press

S.No.	Specification /Operational Feature/Scope of supply	Remarks
7.1	Main control: There should be a closed loop control system incorporating joy Stick, PLC, Servo valve, amplifier card, Encoder/Position sensor etc. to operate the Main Control valve in continuous controlled (PID control) mode to achieve smooth return, stand still, approach and forge positions. All hydraulic, electrical and electronic components will be in scope of vendor.	
7.2	Step Control: A closed loop control system to operate the valves of step control block to achieve selection of single, double and triple cylinder pressure of forging press with proper interlocks. The drive mechanism for operation of valves, along with electrical and electronic components will be in scope of vendor.	
7.3	Switch Control: Provision for operating the press in Pressing and Planishing modes by switching of valve. The drive mechanism for operation of valves, along with electrical and electronic components will be in scope of vendor.	
7.4	Table control; Long Table: There should be provision to Operate the table control valve through solenoid valves of 24V DC in Left and Right directions at slow and fast speeds through joystick mounted on operator Desk. Appropriate position sensors for proper centering of Long Table to be provided.	
7.5	Table control; Cross Table: There should be provision to operate the table control valve through solenoid valves of 24V DC in direction normal to table long movement through joystick mounted on operator. Appropriate position sensors to be provided for positioning at both end limits.	
7.6	Die Clamping: There should be provision to operate the die clamping cylinders through oil hydraulic solenoid valves (220V AC) for in /out operation of plungers in Inching mode from operator desk.	
7.7	Level Control and measurement system: A suitable and reliable method to measure the level of water in the accumulator and control it with HT Pumps. It should also be capable to measure the pressure of Accumulator up to 300bar. It should be synchronized with HT pump and press remote panel. The display of level and pressure to be provided in Press Panel, Remote Panel, and Operator's Desk and a separate large display unit provided at Accumulator Station.	
7.8	Power Cables & Control Cables	
7.8.1	All power cables from MCC panel to Boost Pump, Pilot pressure pump, grease pump & three lubrication pumps.	
7.8.2	All control cables from press panel to field devices, operator's desk, etc.	

7.8.3	All Control cables from remote panel to MCC, HT Breaker Panel, temperature and pressure sensors of three HT motors, automatic shut off valve, manual shutoff valve, boost pump and three bypass valves.	
7.8.4	All control wiring from Pressure measurement system to remote panel.	
7.8.5	All communication cables between PLC Panel(s), Remote Panel(s), Computer System(s), Operator's Desk(s) etc.	
7.9	Sensors & limit Switches	
7.9.1	Temperature (three) and pressure (three) sensors for three HT pumps.	
7.9.2	Limit Switches for Boost pump, Automatic shutoff valve, Shutoff valve, Long table, Cross table.	

8.0 2650T Forging Press – Hydraulics (working fluid Water)

S.No.	SYSTEM/ITEM/MATERIAL REQUIRED	DETAILED DESCRIPTION / SCOPE OF SUPPLY / SCOPE OF WORK	QUANTITY
8.1	Centralized Oil Hydraulic (Pilot Pressure) Power Pack	This will consist of Main Tank, Two nos. Pump Motor Sets (One in Normal Operation and other as Standby), Heat Exchangers, Filters, Cooling Pumps (Coupled with main pump or Operated through Separate Motor), Appropriate Oil Flow Control Valves, Temperature and Pressure Gauges etc. All Pilot Control Valves and Proportional Valves for Operation of Different Sub-Systems of Press shall be mounted on this Oil Hydraulic Power Pack itself. For changeover from Operating Pump to the Standby Pump, a changeover switch shall be provided on the Power Pack itself. In case the Power required for Pumps exceeds 15HP appropriate MCC with separate Power Contactors for all the pump-motor sets involved shall be provided with changeover control function available at the control desk. Automatic switching between pumps in case of tripping of running motor to be provided.	01 Set
8.2	Oil Hydraulic Actuation System for Main Control, Step Control and Switch Control.	This will consist of suitable oil hydraulic valves, Cylinder-Piston based Actuation Systems, Pipes, Proportional Valves, Feedback devices etc. The existing Control Actuation Systems are to be completely removed and new control actuation systems are to be accommodated to match the existing different control blocks. The Oil control Valves are to be placed at the Pilot Pressure Hydraulic Unit.	01 Set (for main, switch, step controls)
8.3	Control Unit for	The existing Table Travel Control Unit with Water	01 Set

13

	Table (Longitudinal) Travel Control.	Hydraulic Pilot Control is to be replaced with the new Travel Control System consisting of Cylinder-Piston arrangement for controlling table travel control valve. The Pilot control is to be changed to Oil Hydraulic in place of existing Water Hydraulic. Feedback devices are to be provided as per need for a smooth control of table. The existing control blocks are to be completely removed and new control blocks are to be provided. The Oil control Valves are to be placed at the Pilot Pressure Hydraulic Unit. Slow down near Center and Stop at Center Features must be included and incorporated in Electronic and Oil/Water Hydraulic Control Devices.	
8.4	Control Unit for Die (Cross) Shifting Control.	The existing Die Cross Shifting Control Unit with Water Hydraulic Pilot Control is to be replaced with the new Die Shifting Control System consisting of Cylinder-Piston arrangement for controlling Cross Shifting control valve. The Pilot control is to be changed to Oil Hydraulic in place of existing Water Hydraulic. Feedback devices are to be provided as per need for a smooth control of Die Shifting. The existing control blocks are to be completely removed and new control blocks are to be provided. The Oil control Valves are to be placed at the Pilot Pressure Hydraulic Unit. Position sensors to be provided for positioning of Die.	01 Set
8.5	Replacement of control units suiting to pure water application.	Existing control units are either leaking or not functioning properly due to wear & tear of various internal and external components. To be replaced as per assembly drg no. DEMAG Drg nos. 5030004-04.000, 5030004-04.200 and 5030004-04.400 with modifications on rocker shaft to enable the movements of shaft with horizontal mounted suitable cylinders by replacing the existing solenoid operated pilot valves. Materials of all the blocks should be changed to stainless steel to operate under hydraulic medium as pure water.	03 sets

For # 8.1, 8.2, 8.3, 8.4 & 8.5, the system may be replaced with an equivalent and proven hydraulic block with control combining the functionality of forging press to obtain the desired operational features.

Vendors has to provide only connection terminal along with the hydraulic blocks. Piping work will be in BHEL Scope.

[Signature]
17/8/17

[Signature]
17/8/17

[Signature]
17/8/17

[Signature]
17/8

[Signature]
17/8

9.0 Make of Items

S.No.	Item	Make	Remarks
9.1	PLC	Siemens, Europe	Preferably Germany
9.2	Relays	Phoenix	
9.3	Cables, Wires	Siemens, Lapp, Igus	Only Copper Core, tinned
9.4	Connectors, Terminal blocks	Phoenix, wago	Screw type. With fuse.
9.5	Pressure Sensors	HYDAC	
9.6	Temperature Sensors	HYDAC	
9.7	Limit Switches	Siemens, BCH	
9.8	Encoders	TWK	Absolute
9.9	Switches, Push Buttons	Siemens, Schneider	
9.10	LED indicators	Siemens, Schneider	
9.11	Joy stick	Spohn & Burkhardt	
9.12	Potentiometer/Variable Resistor	Siemens	
9.13	MCB, MCCB	Siemens, Schneider	
9.14	Contractors	Siemens	
9.15	Fuse Base and Fuse	Siemens	
9.16	Selector switch	Siemens, kaycee	
9.17	Profibus	Siemens	
9.18	Conduits	Reputed	Metallic PVC coated / Stainless Steel
9.19	Panel	Rittal	
9.20	Pressure/Level Sensor 300Bar	ABB/Reputed	
9.21	Proximity Switches	Reputed	
9.22	UPS	APC/ Schneider	
9.23	Computer	DELL/HP	

10.0 Making of panel and Field wiring

S.No.	Specification	Remarks
10.1	Indicators of incandescent lamp type not to be used.	
10.2	Current density less than or equal to 1.6A/SQMM for power conductor of copper only. Aluminum conductors not to be used.	
10.3	PLC Wiring by 0.75mm/1mm flexible multi strand annealed copper wire.	
10.4	Panel Power wire not less than 2.5mm flexible multi strand annealed copper wire	
10.5	Separate 415/230V to 24V DC Power supply in each Panel. (Main & Remote)	
10.6	Separate 10V DC Power supply for Each Main Panel for joysticks.	
10.7	One 415/220V Transformers in each main panel with tapping for voltage correction	
10.8	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.	
10.9	Red colour wire to be used for 220V Ac wiring inside panel, Neutral to be black colour.	
10.10	Blue colour wire to be used for PLC wiring and/or for 24 V DC and /or 10V DC.	
10.11	All relays used for Valves should be Solid State Relays.	
10.12	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.	
10.13	Buses should not be used to connect PLC with Relay board.	
10.14	For feedback of 220V AC, Input to PLC should be realized through Relays.	
10.15	All Cards used for Siemens Sematic PLC must belong to same family. Mixing should not be done.	
10.16	All PLC programming should be in LAD. All networks/blocks should be supported with comments. Customized programs with redundancy not to be used.	
10.17	At least 10% Inputs/Outputs and relays should be spare.	
10.18	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.	
10.19	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.	
10.20	All profibus cables to be covered through flexible metallic conduits.	
10.21	All logics, design, interlocks as per existing electrical drawing and/ proven and engineered system by vendor subject to agreement/approval by BHEL.	
10.22	Manufacturing Drawings to be approved before manufacturing by BHEL.	

11.0 Exclusions

S.No.	Specification	Remarks
11.1	HT Panel	
11.2	HT Motors & Pumps	
11.3	Piping	

12.0 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 Press PLC panel in control room and remote panel near Pump station (In place of old panel).
- 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 along with conduits from Remote panel to field devices on MCC panel, HT Panel And field devices mounted on HT Pumps, Shut off valve, Automatic Shutoff Valve and Boost Pump. Complete mounting and cabling with conduit of Level measurement system
- 7) Laying of complete control cables with conduits from Main Press PLC panel to Field devices mounted in cellar and on operators Desk. Screened cables along with conduits from Main Press PLC to EMG and Encoders.
- 8) Dismantling of Hydraulic Blocks and associated piping, Erection and Commissioning of new Hydraulic control system supplied.
- 9) Installation and erection of new hardware and software.
- 10) Calibration and scaling of new sensors and encoders.
- 11) Testing of safety interlocks, functionality tests and no load trials.
- 12) Startup including hot trials.

13.0 General terms and conditions

13.1 The project will be turnkey basis including dismantling, erection, commissioning, cold trial and hot trial. All the man and material required 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.

13.2 Services like oxygen, water, air, cranes, and electrical supply only will be provided by CFFP/ BHEL.

14.0 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

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

15.0 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 Cards	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
19	Hydraulic control valve	01 Set	Of each type

16. Commissioning spares to be provided by vendor.

Annexure B**PERFORMANCE PARAMETERS AND SPECIFICATIONS OF 2650T PRESS**

Final acceptance shall be made by M/s CFFP/BHEL at BHEL, Hardwar following successful completion of erection and commissioning as per specification in general along with compliance of clause no.7 & 14 of annexure A & functional accuracies of the machine as per proving test and performance criteria as detailed below. The equipment shall be deemed to have been successfully Erected / Commissioned after it gives desired Speed as mentioned below of technical specifications for five consecutive jobs or one month period whichever is earlier. Plannishing Speed-**50/65strokes/min.** Press.

MAKE-DEMAG MEER, YEAR OF MANUFACTURE – 1976		
SL. NO.	DESCRIPTIONS	VALUE
01	PRESS	
	MAX. OPERATING PRESSURE (WATER-HYDRAULIC)	200BAR
	PRESS POWER STEP I – FORGING	8.83 MN
	PRESS POWER STEP II – FORGING	17.67MN
	PRESS POWER STEP III – FORGING	26.50 MN
	PRESS POWER STEP I – PLANNISHING	5.83 MN
	PRESS POWER STEP II – PLANNISHING	14.67 MN
	RETURN POWER	3.00 MN
	STROKE	2000mm
	DAYLIGHT	4000 mm
	COLUMN SPACING	3400x1800 mm
	CLEARANCE BETWEEN COLUMN PROTECTIVE SLEEVES	2750x1800 mm
	MAXIMUM RADIUS FOR ECCENTRIC LOADING AT FULL PRESS POWER	300 mm
	OVERALL HEIGHT ABOVE FLOOR LEVEL	9650 mm
	OVERALL HEIGHT BELOW FLOOR LEVEL	3450 mm
	SPEED OF RETURN AND APPROACH	0.3m/SECOND
02	SHIFTING TABLE	
	TABLE DIMENSIONS (USEFUL CLAMPING AREA)	1800x5000 mm
	MAXIMUM OPERATING PRESSURE (WATER-HYDRAULIC) SHIFTING FORCE	200 BAR
	STROKE OF SHIFTING CYLINDER	0.70 MN
	SHIFTING STROKE OF TABLE FROM PRESS CENTRE TO EITHER SIDE (BY RESETTNG THE COUPLING PIN)	3000 mm
03	DIE TRANSVERSE SLIDE	

	MAXIMUM OPERATING PRESSURE (WATER-HYDRAULIC)	200 BAR
	SHIFTING FORCE	0.24 MN
	STROKE OF SHIFTING CYLINDER (FOR 2DIES)	3300 mm
04	DIE CLAMPING DEVICE	
	MINIMUM AND MAXIMUM OPERATING PRESSURE(OIL-HYDRAULIC)	60/70 BAR
	4 CYLINDERS, 180 mm DIA. CLAMPING FORCE (BY CUP SPRINGS)	4x95 KN = 380 KN
	MINIMUM RELEASING FORCE (OIL-HYDRAULIC)	4x150 KN = 600 KN

[Signature]
17/8/17
Sandeep Kumar
Dy. Manager (Forge Maint.)

[Signature]
17/8/17
Dy. Manager (Forge Maint.)

[Signature]
17/8/17
Narendra Kumar
Sr.DGM (Shop Maint. & Plg)

[Signature]
17/08/2017
Surendra Kumar
AGM (M&S, PMG &HSE)

[Signature]
17/8
K S Rana
AGM (Forge Production)