

SPECIFICATION FOR UPGRADATION OF ANGLE FORMING PRESS

IN TRM DIVISION

Specification No.: MTD-TRM-61-11-322

1. GENERAL

Presently, Press board angles are formed and pressed on the existing hot pressing machine in 2 sets at a time. This machine is in use for the last many years and comes under frequent breakdown. Further, there is no water cooling arrangement on the same and as such angle boards are to be naturally air cooled at room temperature. All these result in reduction in quality of joints & cause twisting & de-lamination. So, it is proposed to upgrade the press to do away the above problems.

2. CONFIGURATION:-

EXISTING PRESS: (Ref. Drg. No. 3-MTD-06-2386 & 2387)

The existing angle forming press comprises of press structure, horizontal & vertical hydraulic cylinders, hydraulic powerpack, job fixtures, steam heating line, control desks & control panel, etc., generally inline with our drawing no. 3-MTD-06-2386 & 2387. Press is having two pressing sides and each side contains 4 Nos. of horizontal & 4 Nos. of vertical cylinders. Press structure is fabricated structure made of plates & bars and hydraulic cylinders are mounted on it. Paper / press board angles which are to be formed are placed on the job fixture and uniform force is transferred by cylinders thru a pressing body. Material of the angle board is soft calendered press board-Solid & Pre-compressed Press Board-Solid having tensile strength of 50 N/mm² to 120 N/mm². During pressing, job is steam heated thru heating platens placed on the press structure. After heating, board angles are allowed to be naturally air cooled at room temperature. One hydraulic powerpack, one control panel & two control desks separate for each pressing side have been provided.

PROPOSED UPGRADATION: (Ref. Drg. No.: 3-MTD-06-2388)

To eliminate the bottlenecks, it is required to upgrade the angle forming press. The whole upgradation of the press is to be carried out generally inline with our G.A. Drawing 3-MTD-06-2388, enclosed and would be having following sub assemblies:-

- A. Press structure & job fixture.
- B. Hydraulic horizontal & vertical cylinders.
- C. Hydraulic Power pack assembly.
- D. Control panel & control desks.
- E. Steam & Water line assembly.

A. PRESS STRUCTURE & JOB FIXTURE:

The upgradation involves the extension of press structure for two pitch of cylinders so that press could cater the large sized jobs. A new job fixture with increased length is to be provided. Further, heating platens and equalizing bar mechanism are to be extended.

B. HYDRAULIC HORIZONTAL & VERTICAL CYLINDERS:

Upgraded press would be having total 12 nos. of horizontal & 12 nos. of vertical cylinders. Of these, 4 Nos. of horizontal & 4 Nos. of vertical cylinders are to be retrofitted to the extended press structure. Horizontal cylinders have bore dia. 120 mm and stroke of 115 mm while vertical cylinders have bore dia. 82 mm & stroke of 240 mm. The hydraulic cylinder body are made out of steel blocks of size 205 mm X 205 mm and 155 mm X 155

mm. The piston rod is to be of high tensile carbon steel induction hardened precision ground & hard chrome plated to extend bushing & seal life.

All the seals/O-rings are to be used should be of Viton of Parker/Busak/Shanbom/Equivalent make of standard size to withstand temperature of upto 150°C. Further, all the existing vertical & horizontal cylinders are to be reconditioned and provided with new seal kit.

C. HYDRAULIC POWERPACK ASSEMBLY:

The hydraulic power pack for the above upgradation should be complete with suitable oil capacity tank, breather, oil level indicator, electric motor and control panel & pendants, hydraulic pumps, couplings, guards, high pressure hoses/tubing/connectors, pressure relief valves, non-return valves, solenoid operated direction control valves, return line filter, suction filter, quick release couplings, flow control valves, pressure gauges, shut off valves etc. All the elements incorporated should be pre-tested (Certificates to be shown during inspection). The pressing cycle involves; application of hydraulic pressure upto 150 bar for upto 2 hours in tandem with steam heating & water cooling cycles, to enable consolidation of angles within tolerance of 0.1 mm.

For meeting the above requirement, a high LPM, geared pump operated by around 10 HP motor is to be used for initial setting/filling of the headers/cylinders. The pressing beyond the knee pressure to set pressure is done by a low LPM, high pressure radial piston pump. The switching from knee pressure to high pressure, low LPM pump & respective solenoids is to be done by means of pressure switches. Also pressure switches as well as direction control valves of each side of press as well as Horizontal & Vertical pressing are to be independent. Further suitable mutually linked NRV's are to be provided for both the direction control valves for vertical as well as horizontal pressing circuits on either side of press. Suitable manual isolation valves are to be provided so that either of the pressing header can be used. After the first setting in the manual mode, the press is to be switched to auto mode and the high pressure pump would act as a compensating pump. The pressure variation should not be more than $\pm 5\%$ of the set pressure. The internal leakages should be very low, so that compensating pump should not switch ON/OFF frequently.

The working pressure of hydraulic power pack should be around 150 bar and the pressure switch adjustments should be from 50 to 150 bar. Further suitable glycerin filled Pressure Gauges with needle valve are to be provided for checking the set pressure of the vertical as well as horizontal circuit. Further all hydraulic components to be selected should be rated for around 250 bars. The sequencing of all the operations is to be done by a PLC. The tank capacity should be min. 300 liters and should be provided with suitable water based chiller unit (Further, a Freon based Chiller unit is to be Quoted as Optional). All hydraulic components should be in either Parker/Rexroth/Bosch/Romheld/Towler make only. Other Hydraulic auxiliaries like isolated valve, etc should be of Hydac/Hydrodyne make.

Only Rexroth/Parker/Veljan/Wipro/Romheld/Equivalent make cylinders with imported Parker/Busak & Shanbom/Merkel/Equivalent make Viton seals suitable for steam working temperatures of upto 170° C is to be provided. Further, all the hoses to be used shall be rated for a Bursting pressure of 4 times of maximum working pressure.

D. CONTROL PANEL & CONTROL DESK:

The control panel is to be Programmable Logic controller (PLC) based with all the push button controls like Main motor ON/OFF, Compensating motor ON/OFF to be integrated into the panel, Auto/Manual mode, Overload etc and Pressure switch contacts as Digital Inputs & Solenoid valves of each of the direction control valves; Signal to Main motor contactor & Compensatory motor contactor etc. as outputs. All the valves/ motors etc.

are to be actuated through interposing relays with suitable snubber circuits, PLC should leave at least 38 DI & 24 DO and atleast 15% of the same should be spare. The PLC should be either from Siemens / Allen Bradley / Modicon make and should be easily programmable with the following softwares easily available with us:

- a) Siemens Step 7, Version 5.3
- b) Allen-Bradley RS logix 500, Version 6.10.10
- c) Modicon, PL7, Version 4.3

All the controls are to be provided on control panel. The control panel is to be ergonomically built & should be in conformance with IP54. It should be atleast 300 mm above the floor level so that maintenance people can access it without being required to lie down. The wiring is to be ferruled & properly laid out. The same should be of self standing type and should be spacious enough to accommodate all the power and control elements like contactors. Fuses, Motor overload, Drives etc. Suitable conducting & cabling are to be provided for the same.

In addition to the control panel 2 Nos of control desks are to be provided to be placed near the press with all the controls for horizontal and vertical pressing, Auto cycle selection, Emergency stop etc.

A two set point temperature controller unit is to be provided to display & control the temperature upto 200° C. This unit is to be flush mounted on the door of the Control panel and should be of 1", 3 digit specification & should be provided with a iron constantan thermocouple which is to be placed near the job.

An additional temperature display along with TC is to be provided to display incoming steam temperature. The cable from the thermocouple is to be properly routed through the conduit. A TD200/Suitable HMI is to be incorporated for providing Data interface for operation & fault enunciation.

E. STEAM & WATER LINE ASSEMBLY:

The platens are heated by steam which is available at 12 Kg/cm² and 170°C and cooling of the platens is to be done by cold recirculating water at around 25°C. For the same water line is to be incorporated. Manually operated valve / stop cock are to be provided at the inlet & outlet of both steam & water connection. Further piping of steam & water is to be same, except at inlet. Pneumatic actuated solenoid valve is to be provided for steam & solenoid valve for water line. Steam, water piping & associated valves/drain traps would be used as existing. Further, hot steam pipes are to be lagged with thermal insulation such as ceramic modules and covered with aluminium/GI sheets and clamped properly by the supplier.

3. SPECIFICATION OF THE PRESS:

Horizontal Cylinder:

- Hyd. cylinder bore – 120 mm
- Hyd. cylinder stroke ~ 115 mm
- Hyd. cylinder rod dia. ~ 105 mm
- Working pressure - 110 bar
- Max. pressure - 150 bar

Vertical Cylinder:

- Hyd. cylinder bore – 82 mm
- Hyd. cylinder stroke ~ 240 mm
- Hyd. cylinder rod dia. ~ 64 mm
- Working pressure - 110 bar

- Max. pressure - 150 bar

Power Pack:

- Hyd. power pack Main pump rating ~ 30 lpm, 50 Bar, 10 HP
- Hyd. power pack Compensation pump rating ~3 lpm, 150 Bar, 3 HP
- Hyd. oil tank capacity - 300 lts.

4. MAKE OF B.O. ITEMS:

- Make of motors - Bharat Bijlee/ABB/Siemens only.
- Make of pump - Dowty/Rexroth/Towler/Bosch only.
- Make of Hyd. cylinder - Rexroth/Veljan/Wipro/Romheld/Parker/Equivalent only.
- Make of Hyd. elements – Rexroth/ Bosch/Parker/Romheld/Towler only.
- Make of Hyd. auxiliaries - Hydac / Hydrodyne only.
- Hyd. cylinder seals –Viton Seals of Parker/Busak & Shanbom/Merkel/ Equivalent make suitable for above temperature only.
- Make of PLC – Siemens/Allen Bradley/Modicon only.
- Make of Control elements - Siemens only.
- Make of Hose/Cable drag chain – IGUS/Electromag only.
- Temperature Controller Make - Chino/Eurotherm/Yukokawa/Radix/Siemens only.

5. SCOPE OF SUPPLY:

- Complete upgradation package for the press with extended press structure, : 1 Lot
new job fixture, extended heating platens, extended equalizing bar
mechanism, etc. as per our specification.
- New hydraulic horizontal cylinders : 4 Nos.
- New hydraulic vertical cylinders : 4 Nos.
- Reconditioned existing hydraulic horizontal cylinders : 4 Nos.
- Reconditioned existing hydraulic vertical cylinders : 4 Nos.
- Hydraulic Power pack with Valves, PG, Pressure Switches, Pumps, : 1 Lot
Motors, 400 Lts tank, Headers, Rigid Copper/suitable tubings, Flexible
hoses, Quick connecting couplings, Water based chiller unit etc.
- PLC based Control Panel : 1 No.
- Control desks to be placed near Press. : 2 Nos.
- Mechanical Kit comprising of bracketories, fasteners, fittings, : 1 Lot
manifolds, foundation bolts, levelling screws, plates, bolts, nuts,
screws, dowel pins, limit switches etc.
- Pipes, Hoses, Manifolds, Connectors, Valves, Brackets, : 1 Lot
Lagging material, Solenoid valves, NRVs, Steam trap etc. for water
& steam connection as per circuit.
- Operations & maintenance manuals : 4 Sets
- Test & Guarantee Certificates : 4 Sets.
- Freon based intercooler for Hyd. Oil Cooling in lieu of Water chiller
(To be quoted as Optional) : 1 No.
- Spare parts (To be quoted as Optional as per para # 8) : 1 Lot

6. SCOPE OF WORK WOULD BROADLY BE AS FOLLOW:

- Extension of Press structure for two pitch of cylinders.

- b) Extension of heating platens & equalizing bar mechanism length. Fitment of new 150 mm X 150 mm size fixture.
- c) Mounting & Piping of 4 Nos. of extra horizontal & 4 Nos. of extra vertical cylinders.
- d) Reconditioning of 8 nos. of existing vertical & 8 Nos. of existing horizontal cylinders.
- e) Replacement of existing Power pack with the new one.
- f) Hydraulic piping with necessary external headers, flexible tubing, valves, connectors, hydraulic hose drag chain etc is to be provided for all the pressing heads, viz on fixed track and adjustable track.
- g) Control panel and control desks with cable routing thru drag chain, steel reinforced PVC conduits etc to be carried out.
- h) Incorporating new water cooling arrangement with solenoid valves.
- i) Re-laying out the steam line with electro-pneumatic valves for Auto operation.
- j) System to be made operational in both Auto as well as in Manual mode.
- k) Complete painting of the press with heat resistance paint of Opaline Green colour.
- l) Complete installation & commissioning of the press and proving out of the same for desired performance.

Note: - Supplier to bring their own technicians and tools for doing the above work. All Civil work shall be done by BHEL. Help of crane shall be given.

7. ELECTRICAL EQUIPMENT:-

All electrical control components are to be of Siemens make only. We are having only 415 volt AC, three phases, 3 wire supply. No neutral is available. Control circuit is to be at 110 V AC. Suitable transformer is to be incorporated for the same. All the wiring in the panel is to be well laid out through PVC channels and outside the channels the same are to be routed through steel reinforced PVC conduits of Finolex/ Equivalent make. All the wire terminations are to be properly ferruled and provided with lugs. All control components are to be mounted on DIN channels. Further the panel should be generally in line with IP54 and appropriate ISs are to be followed for deciding colour coding scheme of the wires. Suitable glands are to be provided for all the cable terminations/ junctions.

8. SPARES:-

Spares for successful running of system for 2 years should be incorporated in scope of supply. This may be quoted separately. A list of spares required thereafter with information on their normal life should be given. Offer of essential spares is required separately.

9. TEST AND GUARANTEE:-

The system should be guaranteed for a period of 12 months after commissioning for any breakage, faulty material or workmanship and supplier should replace the parts during this period free of charge.

Further, test certificates in respect of this equipment and other bought out items going into this is to be furnished at the time of inspection.

10. INSPECTION AND SYSTEM CHECKS:-

Inspection of the elements will be done at supplier's works before dispatch to see the workmanship, lubrication arrangement, straightness, concentricity, flatness and alignment of the major items and physical inspection of B.O. items and testing of power pack etc.

11. DESIGN APPROVAL:-

The manufacturer should present Design/Drawings (2 Sets) for our concurrence before starting its manufacturing. For any deviations/changes from our specification, they will have to take prior approval. Despite the design concurrence, final responsibility of proving the system at BHEL shall be that of the manufacturer.

12. LITERATURE:-

Four sets of following is to be furnished.

- a) General layout drawing showing construction details, dimensional details and location of various items.
- b) Operating, servicing and installation manuals of the equipment system. It should also contain full electrical schematics, wiring diagrams, PCB details and circuit diagrams of conversion package. Further ladder logic & Input/Output list is to be furnished in the O & M manuals, along with soft copy of the same.

13. ERECTION, COMMISSIONING & PROVING FOR PERFORMANCE:

The erection, commissioning and proving of the system for desired performance with our actual material is to be done by the supplier at our works. In job proving 5 shift of actual jobs, in continuation, are required to be manufactured on this line. Supplier may quote charges for the above separately.

Supplier should comply with the following during Erection, Commissioning and proving:

- (a) Experienced & qualified team headed by a team leader fully conversant with the work scope should only be deputed. Labours, if required should be brought or arranged locally.
- (b) E & C work has to be completed in one go except where it is agreed with mutual consent.
- (c) Drawings related to civil work should be sent to BHEL at least 8 weeks in advance.
- (d) Any help required from BHEL during E & C has to be indicated in the offer itself. Except where agreed, rest has to be organized by the supplier. Supplier should arrange required hand tools etc.
- (e) Supplier's team is required to comply with general discipline, incl safety rules and workshop norms while doing the work. Any work with safety hazards etc should not be done in any case. No work should be done without proper authorization or permission.

14. SAFETY:-

The system should be provided with suitable safety devices to guard the system from any damage and also for the safety of the operator.

15. DETAILS TO BE FURNISHED WITH THE OFFER:-

Following details must be supplied with the offer:-

- a) Only Parties who have supplied Presses working at 210 bar or executed such Upgradation and is working satisfactorily for last 1 year need to quote. List of customers along with contact details to be furnished. Submission of the same is must for further processing of offer.
- b) Full technical details/specifications, general arrangement drawing, electrical schematics, control diagrams illustrating construction of the system along with the Hydraulic Circuit Diagrams.

- c) Material specifications which are used in the manufacturing of the equipment.
- d) Point to point reply to specification is must for further processing of the offer.
- e) Overall dimensions and space requirements.
- f) Power requirements.

16. OTHER UTILITIES AVAILABLE WITH BHEL:-

Compressed air at 3 kg /sq. cm Max. and regular water supply are available but constant water supply for cooling purposes cannot be given.

17. AMBIENT CONDITION AND TROPICALISATION:-

All electronic components should be tropicalised to with stand environmental temp. variation from 4 to 50 degree and RH variation from 5to 95 %.

18. STRESS RELIEVING OF ALL FABRICATED ITEMS:-

All fabricated brackets / items are to be stress relieved and certificates for the same to be furnished.

19. MATERIAL & HEAT TREATMENT FOR MAJOR COMPONENTS :-

All wear components (in motion) needs to be properly heat treated for maximum durability. Further test certificates for the critical materials like cylinder body etc are to be furnished.

20. PAINTING:-

The equipment, including existing press, should be painted in Heat Resistant Opaline green colour after up-gradation work.

21. TRAINING:-

Training should be imparted to our operators & maintenance team for 3-4 days so that they should be in a position to run / maintain the system independently.

