

SPECIFICATION FOR THE DEVELOPMENT OF FLEXIBLE LINK BASED MECHANISED MATERIAL HANDLING SYSTEM FOR SAW MACHINE IN FBM DIVISION.

SPECIFICATION NO.: - MTD-FBM-69-10-308

1. GENERAL:

Presently, the movement of the RE Joints & other flange type hydro jobs from bay 6 to 7 for carrying out its welding on a Submerged Arc Welding (SAW) Machine and back is carried out by handling the jobs thru the EOT crane to the main gangway and from there the jobs are transferred thru the manually / locomotive pushed trolley / wagon. Since the jobs are to be transferred to and from the main gangway thru the EOT crane, there is a lot of waiting time for the same.

To avoid this problem, it is proposed to develop a new dedicated flexible link based mechanised material handling system for the inter-bay material transfer between the columns near the Submerged Arc Welding (SAW) Machine and on a new curved rail track to be laid for the same. This development of a dedicated flexible link based mechanised system would eliminate the dependency of the material movement on the manually pushed trolley / locomotive powered wagon. Further, it will reduce the crane engagement to almost half the time, as the job to be transferred for welding would be kept on one trolley structure & the other would be empty. When the trolley reaches on the other bay, the already completed job on the SAW machine rotary table would be directly alighted on the empty trolley & then the fresh job from the other trolley structure would be loaded on the SAW machine rotary table. This would eliminate multiple handling of the job; would lead to faster material movement and reduced idle time of the various welding / handling resources.

2. CONFIGURATION: (Refer Layout Dwg. No.: 1-MTD-21-2357/2358)

The newly developed flexible link based mechanised material handling system would broadly comprise of two basic trolley Structures with wheels & axles, Drive arrangement on one of the trolley bottom & attached bracketories for housing the complete drive system. The drive system would include a motor, a gearbox, chain & sprocket / geartrain mechanism, spring operated cable reeling drum, spring loaded buffers, couplers, anchor unit, control panel, etc. The drive system would be mounted on the bracketories at the bottom of one of the two trolleys & its elements should not interfere with the working surface of the trolley. Also covers are to be provided for all the drive moving parts to confirm operator's safety. The power from the gearbox drive end would be transmitted to the driven shaft via a chain & sprocket arrangement / geared drive arrangement. The trolley drive arrangement is powered by a 10 HP rating geared motor for it's, to and fro movement. The supply voltage to the drive arrangement is to be AC 3Ø, 415 V. Since the trolley is to travel a distance of around 15 m the safety of the operators from electrical hazard has to be ensured. For the same a suitable RCCB / suitable device is to be installed into the electrical circuit. Control panel required for the operation of the trolley is to be placed near the column.

The cable reeling drum is to be fixed at a suitable place towards the column side and the rubberised cable would be guided by roller and travel thru a 100 mm straight channel, which would be embedded into the floor, to match with the floor level. A LM slide is to be mounted on the trolley so that float can be provided to roller as trolley moves on curved rails. The power supply to the cable reeling drum is to be supplied from the point near column. Suitable Dead Weights have to be provided at strategic points on both the twin trolleys so as to avoid slipping of the trolleys when the load is kept on any of the two trolleys. The same would be in the BHEL Scope. The trolley travels on a track of around 15 m of length with its gauge of 1676 mm (B.G.).

Curved rails assembled with base channels & angles are in supplier's scope of supply and should be as per IS 1762 with min. tensile strength of 710 MPa & hardness not less than 200 HB. The load capacity of the twin trolleys, excluding its tare weight, should be around 30 Tons & the same should travel at a speed of tentatively around 4 m/min. Suitable bracketories along with covers are to be provided to prevent drive system from being damaged. Both the trolleys are to be coupled with a flexible link arrangement. Cumulative as well as individual SWL of the trolleys is to be clearly mentioned on the trolley. The float length of the wheels of the trolley should be such so as to cater the curvature of the rails. The spring loaded buffers should be rigid enough to allow the compression upto 350 mm.

3. BROAD SPECIFICATION OF PROPOSED TROLLEY: (Refer G.A. Dwg No.: 1-MTD-21-2358)

- a) Combined Load Carrying Capacity - 30 Tons (Excluding Combined Trolley's Weight)
- b) Load Carrying Capacity of each trolley - 15 Tons (Excluding Trolley's Weight)
- c) Each Trolley Loading area ~ 3500 mm x 2200 mm
- d) Track width - 1676 mm (Broad Gauge)
- e) Rails - As per IS 1762
- f) Min. Tensile strength of rails - 710 MPa
- g) Min. hardness of rails - 200 HB
- h) No. of axles - Min. 02
- i) Trolley height from the ground level ~ 950 mm
- j) Wheel Dia. ~ 600 mm.
- k) Trolley travel - 15 m (Max.)
- l) Geared Motor - AC 10 HP, 3Ø, 1440 RPM with suitable worm / heli-worm reduction.
- m) Tentative Speed of the trolley - around 4 m/min
- n) All the gears are to be suitably hardened & tempered.
- o) Suitable hooters are to be provided for the safety of the operators & trolley.
- p) A suitable Cable Reeling Drum with 15 m of cable is to be mounted separately along with twin roller unit.
- q) Max. float for pickup cable - Around 500 mm.

4. MAKE OF B.O. ITEMS

- 1 Make of motors - Bharat Bijlee/ABB/Siemens/ NGEF only.
- 2 Make of gearbox - Bonfiglioli/Radicon/Elecon only.
- 3 Chain & sprocket make - Rolkobo/Rolon/Diamond/Suitable.
- 4 Make of Cable reeling drum - Electromag only.
- 5 Make of Bearings - FAG / SKF only.
- 6 Make of Control elements - Siemens only.
- 7 Make of Limit switches - Siemens only.

5. SCOPE OF SUPPLY:

- a) Flexible link based mechanised twin trolley system of cumulative load capacity of 30 Tons, as per our specification to meet our requirements and complete with Electric geared motor, suitable reduction to achieve the desired speed, Pinion and gear set, Chain & Sprocket set and Spring loaded Cable reeling drum, Spring loaded Buffers, etc as per our specification No.: MTD-FBM-69-10-308. - 1 Lot.

- b) Curved rails assembled with base channels & angles as per drawing No.-**3-MTD-21-2382**. - 1 Lot.
- c) One complete set of mechanical kit comprising of bracketories, fasteners, covers, Steel reinforced PVC conduits, etc.
- d) Control panel & pendant. - 1 No. each
- e) Four sets of Operation & Maintenance Manuals.
- f) Four sets of Test & Guarantee certificates.
- g) Erection, Commissioning and proving of the trolley on actual jobs.

6. CONTROLS:

All controls should be available on the Control Panel located at a convenient place as per the requirements of the operator / shop.

The control pendant should have switches / push buttons for FWD / REV, inch control & emergency switch. It should have suitable nameplate so that the operator understands the functions of each switch. All the circuit diagrams are to be submitted with the offer. Proper nomenclature & ferruling of the circuit is to be done & should be as per the circuits given.

7. DESIGN:

Design of the Mechanised Twin Trolleys should be according to the latest standards keeping latest trends and developments in mind. Manufacturer may examine the proposed layout & jobs to be transferred with the trolley and should design the system after seeing the site conditions. Before taking up manufacturing, the Manufacturer should get the G.A. Drawing of their proposed system duly approved by us.

8. LUBRICATION:

Suitable arrangement for lubrication is necessary. Provision is to be made for the above by providing nipples, etc. at strategic places wherever required. The lubrication charts indicating the periodicity of lubrication should be properly brought on the trolley.

9. ELECTRICALS:

All electricals should have suitable safety devices such as thermal overload trip devices, current limiting devices, electronic shear pin, fuses etc. Electrical power supply available is 415 V, 3Ø, 3 wire only at 50 Hz. (No neutral is available). Hence, if there's any requirement of 220 / 110 Volts, suitable transformers may be incorporated. All controls are to be at 220V / 110 V.

All wiring to be suitably numbered / ferruled for easy maintenance. All electrical components should be of Siemens make.

ICTP to be included in the panel as the supply shall be given at this point. Cable from supply point to ICTP on panel shall be in BHEL scope. All other cables/ wires are to be provided by the supplier.

10. SPARES:

Spares such as bearings, chain, sprockets and other items for successful running of system for 2 years should be incorporated in Scope of Supply. This may be quoted separately.

11. PAINTING:

The Twin trolleys are to be painted after Red oxide primer with heat resistant paint of

Yellow & Black Colour strips, as per IS Standards of industrial trolleys.

12. GUARANTEE:

The Twin trolleys should be guaranteed for successful performance and for free replacement of faulty material or components / defective workmanship for a period of 12 months from the date of commissioning.

13. SAFETY:

The mechanised Drive system i.e., Motor, Reduction Gear Box, Chains & Sprockets, Control Panel, Cable Reeling Drum, etc. Should be provided with suitable safety devices, covers: -

- a) To guard it against heat, slag, spatter, dust and from any damage.
- b) For the safety of the operator.

14. INSPECTION & SYSTEM CHECKS:

Inspection of the trolley will be carried at the manufacturer's works before dispatch of the system for satisfactory performance of the system and for the accuracies mentioned in this specification. Broadly following items shall be checked before despatch.

- (a) Scope of Supply (b) Make / Rating of all BO components such as motor / Gearbox / Chains etc. (c) Workmanship (d) Ergonomics (e) Structural Stability (f) Joint Strength (g) Maintainability (h) Controller Layout / components used / tolerance level built in (i) Dimensional checks. (j) Load / No-load trials as far as possible.

15. LITERATURE:

Four copies of Operation & Maintenance manuals, General Arrangement drawings, Circuit diagrams, Lubrication charts, Test Certificates are to be supplied with the system.

16. INSTALLATION, COMMISSIONING AND PROVING FOR PERFORMANCE:

The installation, commissioning and proving of the Twin trolleys for desired performance on our actual jobs is to be done by the supplier at our works. Supplier may quote charges for the above separately.

Manufacturer 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 atleast 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 organised by the manufacturer should arrange required hand tools etc.
- (e) Manufacturer's team is required to comply with general discipline, industrial 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.

17. DETAILS TO BE INCLUDED WITH THE OFFER:

Following details must be supplied with the offer:-

- a) Only parties having atleast one year/six month in case of BHEL, experience of supplying similar trolleys need to quote.
- b) Full Technical details / Specifications, General Arrangement drawing, Electrical Schematics, etc.
- c) Control diagrams illustrating construction of the system / equipment.
- d) Material specifications which are used in the manufacturing of the equipment.
- e) Overall dimensions and space requirements.
- f) Power and compressed requirements.
- g) List of customers to whom similar / identical system / equipment have been supplied.
- h) Point wise reply to each & every point of our specification is a must. If not complied, then the offer will not be considered.

18. OTHER UTILITIES AVAILABLE WITH BHEL-BHOPAL:

Compressed air at 4 Kg / sq. cm Max. and regular water supply.

19. AMBIENT CONDITION & TROPICALISATION:

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

20. STRESS RELIEVING OF ALL FABRICATED ITEMS:

All fabricated bracketories are to be stress relieved.

21. MATERIAL & HEAT TREATMENT FOR MAJOR COMPONENTS:

All wear components (in motion) needs to be properly heat treated for maximum durability.

22. TRAINING:

Training should be imparted to our operators & maintenance staff for 2 days so that they should be in a position to run the system independently.

