

**SPECIFICATION FOR THE DEVELOPMENT OF MECHANISED DRIVE  
ARRANGEMENT FOR JOB CLAMPING SYSTEM ON THE ELECTRO  
SLAG WELDING MACHINE (M/C No. 1/B/2214).**

**SPECIFICATION NO.: MTD-FBM-66-09-302**

**1. GENERAL: -**

Presently, ring type jobs are welded on an Electro Slag Welding (ESW) machine. These jobs are clamped on a Job clamping system which comprises of adjustable self-centering pedestals with idler rollers, adjustable self-centering support columns with adjustable clamping and swivelling hydraulic system & a common bottom slide with a pair of LH/RH lead screw nut arrangements. These pedestals and support columns are adjusted manually with the help of ratchet spanner. This causes fatigue to the operator and leads to higher set-up time.

To do away with the above problems, it is proposed to develop mechanised drive arrangement for adjusting pedestals and support columns thru push buttons & eliminate operator's fatigue & reduce set-up time drastically.

**2. CONFIGURATION (Ref. Dwg. No.: 3-MTD-21-2326): -**

The proposed development should generally be in line with our **Drawing No. 3-MTD-21-2326, Rev. 00.** and would broadly comprise of two Helical geared motors, one for self-centring Pedestals and one for self-centring Support Columns, Chain & sprocket arrangement for both, Dogs & Limit switches and Control panel & Control pendant. Maximum weight of the ring type job is upto 6 tons and its maximum diameter is 5000 mm and it rests on the idler rollers on the top of self-centring pedestals. LH and RH lead screws are to be driven by helical geared motor with the help of chain & sprocket arrangement. Motion of pedestals and support columns is to be limited by Dogs and Limit switches. Chain & sprocket arrangement is to be covered with split type chain cover. Manual operation of both the idler rollers & columns should be possible. Suitable electrical interlocks with the hydraulic system of the Job clamping system is to be ensured such that when the job is clamped hydraulically, the motion of the rollers & columns should not take place.

**3. BROAD SPECIFICATION: -**

**A. JOB SPECIFICATIONS: -**

- a) Type of job – Pre-fabricated rings made of 4 to 6 segments.
- b) Dia. Of rings – 1500 mm (min) to 5000 mm (max).
- c) Thickness of rings – From 70 mm to 200 mm.
- d) Width of rings – From 125 mm to 550 mm.
- e) Position of job while welding – Vertical.
- f) Job material – MS.
- g) Max. Weight of job – 5 to 6 Tons.

**B. SPECIFICATION OF EXISTING JOB-CLAMPING SYSTEM: -**

- a) Length of bed = 5500 mm.

- b) Centre distance between LH/RH lead screws = 150 mm.
- c) Pitch of lead screws = 10 mm.
- d) Lead screw square head dimension = 33 mm (1 1/4") X 33 mm (1 1/4")
- e) Length of square head = 55 mm.
- f) Stroke ~ 1500 mm.
- g) Roller pedestals & Support columns traverse speed ~ 900 mm/min.
- h) Width of flat guideways – 100 mm.

**C. BROAD SPECIFICATION OF THE PROPOSED SYSTEM – (REF. DWG NO.: 3-MTD-21-2326)**

**1. HELICAL GEARED MOTOR DETAILS: -**

- a) Helical geared motors ~ 2 Nos.
- b) Motor Power ~1. 0 HP, 1440 RPM
- c) Gear ratio ~ 16:1 / Suitable
- d) Output RPM ~ 90 RPM
- e) Motor make – Bharat Bijlee / ABB / Siemens only.
- f) Gearbox / Geared motor – Bonfiglioli / Elecon / Radicon only
- g) Make of couplings – Fenner / Rolex / Eqt.
- h) Make of bearings – FAG / SKF only
- i) Electrical control elements – Siemens only
- j) Chain make – Rolon / TI / Diamond only.

**4. SCOPE OF SUPPLY: -**

- |  |         |
|--|---------|
| 1. The complete Mechanised drive arrangement comprising of 2 helical geared motors, 2 chain sprocket arrangement, dogs and limit switches, as per our specification no.: MTD-FBM-66-09-302 | 01 Lot  |
| 2. Control panel complete with its controls including suitable length steel reinforced armoured conduit etc  | 01 No.  |
| 3. Push button type control pendant complete with connecting cable of suitable length.   | 01 No.  |
| 4. Kit comprising of bracketories, fasteners, guards, covers, levelling, bolts, cables, insulation sheets, steel reinforced PVC conduits, ferrules, fuses etc.                             | 1 Lot.  |
| 5. Operation and Maintenance manuals   | 04 Nos. |
| 6. Test & Guarantee certificates   | 04 Nos. |
| 7. Spares (To be quoted as optional -Ref. para-8   |         |
| 8. Erection, Commissioning and proving on actual jobs  |         |

**N.B.:** - All the fabricated parts and brackets used in the system should be made out of structural steel. All the control circuit elements such as contactors, relays, fuses etc. to be of Siemens make only.

**5. CONTROLS: -**

All controls should be available on an operator's pendant. It should be of a small size box separate from main control panel. Operator's pendant should be connected to the main control panel through a steel reinforced PVC conduit cable to provide flexibility to the operator to operate emergency stop buttons. Since the working of the machine is in an area with lot of fumes and dust particles, proper dust proofing and cooling arrangement is to be provided in the control panel. Proper insulation sheets / partitions are to be provided

inside the control panel to ensure safety of the maintenance personnel. Environmental factors as mentioned below should be considered while designing the control panel.

#### **6. LUBRICATION: -**

Suitable arrangement for lubrication is necessary. Provision is to be made for the above by providing nipples etc. For grease lubrication at strategic places wherever required. All gear boxes should be oil filled with their own system of lubrication. Periodicity of lubrication should be brought out by colour code system. This is to be clearly brought out in the offer.

#### **7. ELECTRICALS: -**

All electricals should have suitable safety devices such as thermal overload trip devices, current limiting devices, fuses etc. Electrical power supply available is 415 V, 3 phase, 3 wire only at 50 Hz. (No neutral is available). Hence if there's any requirement of 220 / 110 / 48 / 24 / 12 / 6 / 5 Volts AC or DC, suitable transformers and rectifiers should be incorporated. These units should be tolerant to wide fluctuations.

All wiring to be suitably numbered / feruled 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 put by the supplier.

#### **8. SPARES: -**

Spares Bearings, Chain-Sprockets, Control Pendant and other items for successful running of system for 2 years should be incorporated in scope of supply. This may be quoted separately. A list of spares, along with address of the suppliers, required thereafter with information on their normal life should be given.

#### **9. GUARANTEE: -**

System 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.

#### **10. PAINTING: -**

System is to be painted after Red oxide primer with heat resistant paint. The complete system is to be painted with finished coat of Verdigris green.

#### **11. SAFETY: -**

Mechanised drive system i.e. Motor, Gearbox, Chains & sprockets, Control Panel etc. should be provided with suitable safety devices to guard the system from any damage and also for the safety of the operator. Structure should be stable and should not fall / collapse / bulge causing any harm to the surroundings. Wherever desirable edges should be strengthened and rounded to remove sharpness.

#### **12. INSPECTION & SYSTEM CHECKS: -**

Inspection of the system will be carried at the supplier'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 / gear box / chains etc. (c) workmanship (d) ergonomics (e ) structural stability (f) Joint strength ( g) maintainability (h) Controller Layout / components used / tolerance level built in . (l) Dimensional checks. (j) Load/ No-load trials as far as possible.

### **13. DESIGN APPROVAL: -**

For any deviations in offered designs, Supplier will have to take a prior approval in writing before hand. However, we would welcome every suggestion for improvements in the design. Heat treatment & material of critical components is to be strictly adhered to and mentioned in quotation itself.

### **14. LITERATURE: -**

Four copies of operation & maintenance manuals, general arrangement drawings, circuit diagrams, lubrication charts, test charts, spare part's list are to be supplied with the system / equipment. One set of manual is to be sent before hand.

### **15. 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. 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 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 supplier. Supplier should arrange required hand tools etc.
- (e) Supplier's team is required to comply with general discipline, 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.

### **16. DETAILS TO BE FURNISHED WITH THE OFFER: -**

Following details must be supplied with the offer:-

- a. Only parties having atleast one year of experience of supplying similar mechanised systems 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, the offer will not be considered.

### **17. OTHER UTILITIES AVAILABLE WITH BHEL-BHOPAL: -**

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

**18. 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 %.

**19. STRESS RELIEVING OF ALL FABRICATED ITEMS: -**

All fabricated bracketories are to be stress relieved.

**20. MATERIAL & HEAT TREATMENT FOR MAJOR COMPONENTS: -**

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

**21. TRAINING: -**

2 days hands on training are to be given to shop and maintenance people of BHEL for proper operation and maintenance of the system.

