

ANNEXURE (III)

Reconditioning & CNC Retrofitting of Oxy-Actylene Flame Cutting Machine,

Item No. 1/B/2110 (FBM DIVISION)

A) Brief Scope of supply:

A1) Electrical & Electronics:

1. CNC Controller: It should be Industrial PC Based, Windows XP, 80 GB Hard Disk min, USB, 10 inch min. LCD/TFT colour display, floppy drive, Mouse etc. Make: Burny 10 LCD plus/Messer Explorer III/Esab (latest model). Operating and Programming features as per Annexure I.
2. PLC for controlling the logic operation. Make : Siemens/Fanuc/Burny.
3. Operator Console to control the torches /gas control.
4. AC Servo Motor and Drive of suitable rating. Siemens make AC Servo motors and AC drives (2 No. each) are available in the existing machine which may be retained. The specifications of the existing AC Motors and AC Drives are as follows:

Make : Siemens

(a) 3 Ph.-motor: 1FK7060-5AF71-1AA0, (2No.)
Mo- 6Nm Io-4.5A Nmax-7200/min
Mn- 7Nm In-3.7A Nn-3000/min

(b) U/E Module (INT-EXT 5/10KW) (1No.)
6SN1148-1AB00-OBA1

(c) LT Module: INT 2X15A (1No.)
6SN1123-1AB00-OAA1

(d) Control Card: 6SN1118-1NH01-OAA1 (1No.)

Feed range for both axes should be: 0-5 m/min.

5. Electrical panel complete with all switchgear, contactors, relays, on/off switch, overloads, tube lights etc. Suitable lamp to be provided for the operator and Machine.
6. Position feedback system to be provided. (motor encoder feedback is also acceptable).
7. Suitable interface cables, conduits, connectors for the machine. Cables of flexible type, conduits to be fire resistant and of reputed make.
8. Suitable Air conditioners for the Electrical panel as well as operator panel. (2 No)

9. Limit Switches for Axes.
10. Electrical Drawings, PLC printout, Machine data Backup, Mechanical drawings, Spare parts manual, Operating manual : 4 sets
11. Suitable isolation transformer for Drives and CNC System. Input of Machine: 415 Volt/3 phase, 3 wire w/o neutral. Temp range: 3-50 Degrees C, RH =0-95%.

A2) **Mechanical Items:**

1. Mechanical modification of the present beam for CNC application. The supplier can provide a totally new beam also suitable for the machine. The machine to be converted to GANTRY type with Rack & Pinion arrangement.
2. Planetary gear boxes of ZF/Neugart/Atlanta/equivalent make for the axes.(3 No)
3. Mech. brackets to mount racks, servomotors, panel, limit switches, sheet metal covers.
4. All bearings and bushes to be changed. New bearings and bearing assembly for both side guiding of the beam.
5. Main and torch hose pipes with over head drag chain arrangement for Oxygen and acetylene gas.
6. Hose drag chain system for both the torches.
7. Complete new Gas panel to be provided. This should have Line pressure gauges for three gas lines, Solenoids/Valves for main line as well as individual torches for Cut Oxy, Heat Oxy, Acetylene, Exhaust, copper piping, regulators and all other accessories.
8. Motorised torch lifters(Burny designed /Esab/Messer make) for 250 mm travel and 50 mm horizontal manual adjustment facility with flash back arrestors, torch holders for 32 mm dia torch, torches with nozzles of Esab BGB 220/Tanaka CHC 326C make for 6 -300 mm thick plates, auto ignition system, manual regulators for individual gases : 2 sets
(One spare set of Gas regulators & flash back arrestors to be provided)
Cutting speed required: 100mm/min for maximum sheet thickness
300 mm/800 mm/min for 4 mm sheet thickness.

Direct Piercing should be possible upto 100 mm.

Available maximum Gas pressures are as following:

- i) Cutting Oxygen pressure : 7.0 bar
- ii) Heat Oxygen pressure : 2.5 bar
- iii) Acetylene pressure : 0.3 bar

The torches supplied should be able to provide the cutting parameters as per above pressure.

9. Racks for Cutting length 5 metre cross axis and 17 metres for longitudinal axes.
10. Mechanical stoppers, Sheet metal covers for motors, limit switches .

11. Cable ducts and covers for cable ducting, miscellaneous items for retrofitting .

B) Scope of Work:

1. Dismantling of the machine into various subassemblies & identification of the faulty components to be done. The decision to change such components shall be taken jointly by the executing agency and BHEL
- 2 .The machine should be reconditioned completely to restore the accuracies of slides and other accessories.All the bearings ,bushes etc to be changed and provided new .
3. Interfacing of the complete mechanical /electrical and electronic items and proving out on Fabrication components.
4. Rail alignment ,levelling for the complete machine to be done. (Rails, pedestal supports for the Machine will be provided by BHEL. Rail machining and grinding will be done by BHEL .
The civil work will be done by BHEL.
5. Installation and commissioning of new CNC Controller, Motors, drives and complete material as per scope of supply.
6. Positional Accuracy, repeatability and job proveout.
- 7.Training of operators and maintenance personnel: 1 week each at supplier's works/BHEL works.

C) Place of Work: The supplier can execute the complete reconditioning and retro fitment activity at BHEL, Bhopal or at supplier's works. If the machine is taken to the supplier's works the transportation cost has to be borne by the supplier.

D). The total offer should be submitted in the following manner

1. Material cost: (a) Electrical & Electronics
 (b) Mechanical Items.

2. Labour Cost:

The Techno-commercial and price bids should be submitted separately. The Price bids will be opened after finalization of Techno-commercial bids. The Techno- commercial bid should contain the technical details and the commercial terms and conditions. The price bid should contain the only total price along with the price break up for all the major items. The supplier can inspect the Machine for any further clarifications any time after issue of tender.

E). Guarantee: The supplier should provide guarantee of one year for the Machine after acceptance at BHEL, Bhopal.

F) Qualifying Criteria:

Only those parties who have done at least one CNC Conversion of Flame Cutting Machine of similar size in the last three years will be considered. The supplier has to submit a performance certificate from the end user for satisfactory working of the Machine for at least six months.

G) Duration of Work:

The party has to complete the retrofitting activity in 4 months after start of work. The party has to start the work within 15 days of release of Work Order or release of Machine whichever is later.

Annexure I

Operation and Programming features of CNC Controller.

I) Operation features.

1. 3 axis continuous path control system.
2. Selectable operation modes:
 - i) Automatic/Single block
 - ii) Continuous and incremental jog
 - iii) Dry run
 - iv) Input/output of Part program, Machine data, PLC program etc.
 - v) Repositioning
 - vi) Position preset
 - vii) Manual data/Automatic for part program execution.

3.Setting up controls:

- i) Torch up/down
 - ii) Feed rate override 0-120%
 - iii) Directional keys + & -/Axes Selection for X & Y
 - iv) Rapid traverse key
 - v) Ignition on/off
 - vi) Program edit lock on/off
 - vii) Feed hold button.
 - viii) Over storing of feed function in automatic mode (Inputting of parameters like cutting speed in automatic mode)
 - ix) Dry run switch
4. Display features: 10"min LCD screen , 80 GB Hard Disk minimum.
 5. Part-program input via:
 - i) Key board (Manual entry) .
 - ii) RS232C port for bilateral communication with external devices (1 number port), USB port, Floppy Drive
 6. Part-program editing with Block/Word delete, Block/Word insertion, Block/Word modification, Block search facilities.
 7. Resolution of 0.01 mm.
 8. 1GB memory for part-program storage.
 9. Position Preset facility,reset facility on control system,.
 10. Part-program rename facility,facility to store upto 99 part-programs.
 11. Repeated reading-in of the part-program into the program memory should be checked automatically.
 12. Exact stop, i.e, exact approach of the programmed position.
 13. Facility for program exchange through RS232, USB port, Floppy Drive.
 14. Editing while cutting should be available. (Background programming)

15. Facility of viewing of the graphic tool path with zoom of any program .
16. It should be possible to return to the original start position (home position) at any time.
17. Monitoring:- It should have the following facilities-
 - i)System self check on power-up
 - ii)Display of machine set-up parameters and correction
 - iii)Initiation of diagnosis with the help of software routines.
18. Safety features- It should incorporate safety features for axis over travels, feed drive over loads, power supply overloads etc.
19. Backlash compensation and Pitch error compensation facilities.
20. The control system should be completely sealed against conducting dust and oil.
21. Scaling factor.(Multiplication & Division)
22. Programmable skip, Conditional & unconditional jump.
23. The Digital Master-Slave Synchronization through CNC system for X-axis should be provided (The motors and Drives for both ends of the X-axis should be provided).

II) Programming features:

- 1) EIA-RS274 (G,M code type) /ESSI format/Absolute/Incremental/programming.
- 2) Linear & circular interpolation on both axes
- 3) Programmable mirror image facility in both axes. The mirror image should automatically take care of kerf compensation direction.
- 4) Full circle programming (360 degree circular interpolation)
- 5) Facility of inclusion of alphanumeric messages in the part-program.
- 6) Tangential path approach exit for both the torches.
- 7) Coordinate rotation and transformation.
- 8) Programmable block skip,programmable dwell.
- 9) Library of standard shapes Provision of continuous cutting for standard shapes should be provided For standard shapes it should be possible to select number of pieces to be cut.
- 10) Programmable cutting speed.
- 11) Macro system Standard shape Macros should be available and should be programmed using real or symbolic (parameter) dimension The editor should enable the parameters to be replaced by real values.
- 12) Multitasking facility
- 13) Plate alignment facility
- 14) Auto reverse feature. Possibility of retrace the cut path if required.
- 15) Auto Nesting facility in the CNC controller.
- 16) Direct conversion of Autocad Drawing to part program.
- 17) Power loss recovery : Machine should restart from the same point after power loss.

PRESENT FLAME CUT M/C

MAKE : HANKOMATIC(CANTI LEVER TYPE)

LENGTH (Cutting Capacity) : 1.8 meter

Width (Cutting Capacity) : 1.6 meter

NOTE:

Bidders are strongly advised to study the machine and its documents before submitting the bids