

Tender No.

Annexure-‘A’

SPECIAL CONDITIONS OF CONTRACT

Name of Work: Reconditioning of Bogie Frame Machining Center (JOBS) Machine No.0159-01 by replacing Two Axis Positioning Milling Head RCF, Kapurthala

- 1.0 MECHANICAL ,ELECTRONIC and ELECTRICAL Reconditioning work to eliminate vibrations in X Y & Z AXIS movement and SPINDLE HEAD Reconditioning work on existing Bogie Frame Machining Centre JOBS CNC M/C (Model No: JOMECH 245 SL NO. W1041)installed in Bogie shop of Rail Coach Factory,Kapurthala,Punjab,India.
- 1.1 In this connection you are invited to submit your competitive offer for undertaking the work as per the Scope of Work and other Terms and Conditions given below. It is emphasized that you shall give Para-wise comments for all the following paras in the same sequence to facilitate early finalization of tender.

2.0 USAGE of the Machine System

2.1 The Machine shall be required for machining involving various rough and finish machining operations such as Pre Milling , Milling, Chamfering ,Pre Drilling ,Drilling ,Boring ,Counter Boring ,Reaming ,Threading ,Turning ,Tapping ,and Spot face Milling of High speed Bogie to M/s FIAT/Italy design to be fitted on Railway Passenger coaches to the required accuracy as per drawing No. LW03008 ALT.C

2.2 GENERAL DESIGN FEATURE: JOBS CNC M/C (Model No: JOMECH 245 SL NO. W1041)
The basic essential design features/leading parameters of the machine are as under:

2.2.1	Machine Configuration	Portal/Gantry with fixed work-table
2.2. 2	No. of work loading table Work Envelope (Bogie Frame Machining)	02 Nos
2.2.3	Longitudinal Travel –X axis	10000mm (To accommodate 2 frames)
2.2.4	Transverse travel -Y axis	3500mm
2.2.5	Vertical travel of the RAM –Z axis	1200mm or more
2.2.6	Job passage height clear	1300mm or more
2.2.7	Machine feeds	
2.2.7.1	Rapid Power Transverse –X axis	24000mm/min
2.2.7.2	Rapid Power Transverse –Y-axis	24000 mm/min
2.2.7.3	Rapid Power Transverse –Z-axis	24000mm/Min
2.2.8	Main Spindle Size	to suit job requirement
2.2.9	Taper Spindle size	ISO-50
2.2.10	Speed Range (infinity variable)	10-4000 RPM
2.2.11	Spindle Power (minimum)	AC36KW (S6-60%)
2.2.12	X –Axis feed rate	5-1000mm/Min
2.2.13	Y-Axis feed rate	5-1000nmm/Min

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2.2.14	Z-Axis feed rate	5-1000mm/Min
2.2.15	W-Axis feed rate	5-10000mm/Min
2.2.16	Admissible Bench Load	1000Kg/ M2
2.2.17	Nos. of Magazine spaces	64
2.2.18	Tool carrier DIN 69871/72 Form A	SK-50
2.2.19	Electrical Power Supply (AC 3 phase)	400+10%Volts 400-15%Volts
		50+/-3%Hz

3.0 SCOPE OF WORK AND SPECIFICATIONS

3.1 MECHANICAL SCOPE OF WORK

(I) X Axis and Machine Bed

1. Dismounting of X (Master) –X1 (Slave) Axis columns, Base with guide ways blocks, Slide assembly bearings with taper wedges, screws, Set of 4 servomotors , planetary gearboxes ,X-X1 Axis columns and associated lubrication system.
2. Replacement of X (Master) and X1 (Slave) Axis guide ways and blocks with standard new LM guide ways including RS Linear block bearing, Limit switches. Supply and installation of LM Rails for X Axis (11 mtr) Width of Guide way should be 63-83 mm and capable to bear the load of heavy duty gantry. Load calculation is required to be submitted along with offer. Make of LM guide ways should be Rexroth, THK or Equivalent international manufacturer. Supply and installation of runner blocks for X axis Guideway .Make should be Rexroth, THK or Equivalent international manufacturer.
3. The exact size may be measured on site. Installation of associated lubrication system of guide blocks.
4. Movement of gantry on X axis guide ways should be free from all kind of Jerks, vibration. Both X and X1 axis should maintain parallelism within the standard permissible limit.
6. Alignment and tuning of Master and Slave servo motors with planetary gear boxes. Geometrical alignment and Re-parameterization of Gantry & Axis parameters.
7. Movement of X-axis should able to achieve required positional accuracy as per international standards.
8. Inspection, cleaning and alignment of X-X1-Y-Z linear scales and scanning head. (i.e. linear scale tape, sealing, scanning heads, aluminum housing or any other sub assembly of linear scale).

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(II) Y-axis and RAM Assembly.

1. Dismounting of existing Ball screw assembly .Supply and installation of Ball Screw for Y Axis: 80X20 LF=5020 LT=5420 and Nut (Preloaded): Make: Rexroth, Korta Spain or equivalent manufacturer of international standard. Replacement of Y-axis ball screw & rotary nut housing bearings with proper preloading of bearing assembly to maintain the axial & radial play between ball screw & Nut assembly as per international standards.
2. Inspection and Repairing involving grinding of main guide way and blocks of Y axis. Supply an installation of Dyco -Linear end bearings for Guide ways of make INA for ball screw for Y axis.
3. Movement of Y axis should be free from vibration and should able to achieve required positional accuracy as per international standards.
4. Proper lubrication checking of y-axis during the repair work.

(III) Z-AXIS Assembly

1. Dismounting of existing Ball screw assembly of Z axis. Supply and installation of Ball Screw for Z Axis: 80X20 LF=2000 LT= 2265 and Nut (Preloaded) of Make: Rexroth, Korta Spain or equivalent manufacturer .Replacement of Z-axis ball screw & rotary nut housing bearings with proper preloading of bearing assembly to maintain the axial & radial play between ball screw & Nut assembly as per international standard.
2. Inspection and Repairing involving grinding of main guide way and blocks of Z axis. Supply an installation of Dyco -Linear end bearings for Guide ways of make INA for ball screw for Z axis
3. Movement of Z-axis should be free from vibration and should able to achieve required positional accuracy as per international standards.
4. Proper lubrication checking of Z-axis during the repair work

(IV) SPINDLE HEAD

1. Head assembly dismounting with Hirth assembly,Hirth assembly dismantling, Head de-clamp overhaul, Removal of Tool unclamp drawbar system, Spindle Shaft asper ISO 50 taper replacement of spindle bearings ,repair of assembly of drawbar system with collets ,New Index gear assembly with adjustment of gear

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engage cap ,reassembly of spindle head with hirth assembly ,testing of head hirth clamp and de clamping ,testing of tool clamp and unclamp system. Cleaning of the spindle taper, Inspection of spindle bearing noise, Inspection of spindle bearing lubrication. Universal Milling Head Supply and installation of Bearings, Hydraulic Connectors, Seals, O rings, Packing seals and Hoses for overhauling the Spindle up to the accuracy of international standards. Spindle head Gear assemblies will be provided by RCF.

2. Inspection of Main spindle motor, its encoder and bearings and rectification of fault, if any. Alignment of spindle motor w.r.t X,X1,Y,Z and both tool magazines.

(V) RECONDITIONING OF LUBRICATION, HYDRAULIC, PNEUMATIC, COOLANT SYSTEM

1. LUBRICATION.

- 1) Supply and installation of Motorized Grease Lubrication system for Guide way bearing controlled with progressive distribution block with piping and hoses for X axis (2 set) And Z axis (1 set).Cleaning & efficiency checking of lubrication pump , Inspection of metering cartridges (progressive distributors) ,Cleaning of all progressive distributors , Inspection of all the lubrication points for proper lubrication ,Inspection of Lubrication circuit for proper functioning & arresting of leakage.

- 2) All axes lubrication spares will be arranged by the firm

2. HYDRAULICS

- 1) Accumulators air bleeding , Inspection of non-return valves (NRV'S) ,Inspection of N2 gas pressure if required recharging of accumulators ,If bladder of the accumulator has gone bad, replacement of the same ,Counter balance cylinder seals inspection ,Arresting of leakage in the hydraulic circuit, Adjustment of pressure sensor parameters , General circuit (TOOL unclamping) accumulator N2 gas pressure checking. If required recharging of accumulator, Inspection of pressure switch. If required adjustment/replacement of the same, Inspection of Tool unclamps & clamp process and required repairing, Optimization of maximum & minimum oil pressure in the counter balance circuit
- 2) Supply, commissioning and interfacing of complete chiller unit for Hydraulic System of Min cap 3 Tons required to maintain the temperature of hydraulic oil as per standards. Ambient temperature at RCF varies from 10°C to 50°C. The chiller should be of reputed make complied to IS standards.

- 3) Firm shall supply and Replace all associated Oil filters.

3. PNEUMATIC

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- 1) Inspection of Pneumatic system, Replacement of valve & other items (e.g seal, pressure switch etc) found faulty or not working.
- 2) Firm shall supply and Replace all associated air filters

4. COOLANT

Overhauling of coolant system, Replacement of valve & other items (e.g seal, pressure switch etc).

(VI) OTHER ITEMS COVERED UNDER LABOUR CHARGES

i) Overhauling of automatic tool changer assembly & its proper functioning, Replacement of broken tool gripper, limit switches, & reconditioning of chain drive, associated hydraulic assembly & any other related component

ii) Electro-magnetically operated vertical z-axis brake inspection, replacement of seals, overhauling of Coolant pump ,all the pressure & limit switches, solenoid valves if required replacement of the same , replacement of timer belts of the axes.

iii) LASER CALIBRATION (LASER INTERFEROMETER) AND GEOMETRICAL ALIGNMENT OF ALL AXIES (X-X', Y & Z AXIES)

iv) Optimum parameter setting on the existing 840-D control system of Siemens. Reconditioning and connection inspection of all IR modules, drives of X-Y-Z-Spindle and tool magazines, encoder cables, power cables, PLC modules, all servo motors, rotary encoders, motor encoders, limit switches, PCU50, probe and radio module and its tuning/alignment, if required. Repair/replacement of any of these items found fault with same make. All above mentioned material in para (iv) if required will be supplied by RCF. Validation of Existing NC/PLC program and Intervention of NC/PLC expert for Modification of NC/ PLC if required.

Following **Consumables** are provided by RCF, if available at the time of reconditioning

- 1) Head cooling unit (Chiller) coolant.
- 2) Hydraulic power pack oil.
- 3) Lubrication oil / grease.
- 4) Bunyan Cloth

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4) All essential but not available spares at the time of reconditioning are provided by successful bidder.

(III) SAFETY/OPERATIONAL CONTROL/LIGHTING

- 1 Reconditioning of all safety devices to provide protection to operator and machine against all possible operational and machinery failure.
- 2 Suitable interlocks shall be reviewed to prevent machine operations in event of:
Faulty sequence of operation, Fluctuation in supply voltage, Resumption in power supply after power failure, Non -positioning of safety guards, Failure of Hydraulic system, Failure of Lubricating System, Provision of phase sequence relay at the Input.
- 3 A fault or damage in the control circuit or interruption, re-establishment after an interruption of fluctuation in whatever manner in the power supply to the machinery must not lead to dangerous situation.
4. Inspection and rectification of fault if any in tool presetter to bring it in working.
5. Disconnection of Electrical cables to separate the electrical panels from the machine and restoration.

4.0 PROVING OUT

1 The following system (both) shall be capable of satisfactorily working with the Bogie Frame Machining Center (JOBS) Machine to be operated in three shifts/days. Six days per week through out the year.

Prove out the machine on minimum 24 bogie frame assembly as per Drg.No. LW03008 ALT.C. for various rough and finish machining operations such as Pre Milling , Milling, Chamfering ,Pre Drilling ,Drilling ,Boring ,Counter Boring ,Reaming ,Threading ,Turning ,Tapping ,and Spot face Milling using automated tooling selection transfer/exchange. It should be possible to carry out machining operation on 01 FIAT Bogie frame in a shift of 12 hrs.

- 2 The machine performance shall be demonstrated by the contractor after successful reconditioning at the consignee's work for **12 coaches**. Thereafter, the machine performance shall be watched by the consignee for a period of one month before a final proving out test certificate is issued. The reliability/availability of the machine during proving test running should be at least **85%**.
- 3 The Machine should be free from Vibrations and abnormal operational noise when working at full capacity on sustained two shift working.

5.0 WARRANTY

Firm shall give warranty for a period of one year from the date of successful commissioning/Proving out of the machine. In case of any fault, firm will repair/replace the equipment at its own cost. In case of any damage due to miss-handling

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by the firm, firm will bear the cost of repair. The unit will be brought back in working condition.

6.0 **SCOPE OF WORK OF RCF**

The following Workshop facilities will be provided by RCF.

- 6.1 Providing Welding/Gas cutting equipment at RCF premises while dismantling or commissioning the machine freely as available. However, the contractor shall arrange the Welding electrodes.
- 6.2 Water, Electric Power, Compressed Air, Gases and Sheets required for proving of the machine at RCF will be provided free as available.

7.0 **INSPECTION**

The contractor shall offer all the supply items for inspection to RCF, before their actual fitment on the machine.

8.0 **CREDENTIALS**

The tenderer shall submit credentials of having done similar work of retro fitment /reconditioning/manufacture of Minimum Five axis Machining Center or similar machine failing which the bid will be summarily rejected.

9.0 **PAYMENT TERMS**

a) Eighty percent (80%) of progressive payment with Cent percent (100 %) taxes and duties of materials supplied will be made to Tenderer after proving out of the machine at RCF duly certified by SSE/ELN and SSE/MW.

b) Remaining twenty percent (20%) of material value and 100 % commissioning charges along with the Performance Guaranty will be made only after successful working of the machine for one month (30 days continuously in single shift operation) after commissioning jointly certified by Production and Mill Wright (both Electrical and Mechanical) duly withholding 5% of machine-wise value towards the warranty obligation for one year. This warranty amount will be released after expiry of warranty period of one year duly certified by Production and Mill Wright (both Electrical and Mechanical) for no pending warranty complaints. This warranty amount will be also released if the Firm furnishes an equivalent Bank Guarantee in lieu with the validity period covering the warranty period

10.0 **SAFETY**

The tenderer shall be responsible to take necessary precautionary measures in order to ensure the safety against injury etc., of his personal when working at the railway premises and should confirm to the rules and regulations of the railway.

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11.0 OTHER TERMS AND CONDITIONS

- (a) If there is any variation between description in contract schedules and actual work, Dy.CPE-II will review and authorize corrective description in writing and his decision will be final and binding on the successful Tenderer.
- (b) The unit rates quoted shall be unaltered and there shall not be any variation of the rates during the currency of the contract.
- (c) Validity of offer shall be minimum 90 days from the opening date of work contract.
- (d) Firm may inspect the machine at site and contact the undersigned for any technical specification in this regard.
- (e) Firm shall provide use its own mechanical digital measuring instruments for measuring displacement.
- (f) The firm may contact the undersigned for any clarification and inspection of the machine in RCF on any working day between 8:00 hrs. to 17:00 hrs. From Monday to Friday before submission of quotation.

Bidders are advised to visit the consignee to assess the existing environment in which machine will be utilized and get acquainted with the existing machine on which the reconditioning work is to be performed prior to submission of their offer. Tenderer will have to deposit security deposit of equivalent amount in Rupees of the material being taken out of RCF for repair.

All Kind of material transportation required in retro fitment /new material will be borne by the Tenderer.

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