

WORKS ENGINEERING AND CENTRAL SERVICES
CMX (Machine Shop)

Enquiry no: WEX/CMX-MC/AMC/1920/Enq/01

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Scope of work

Name of the work: - Preventive & Breakdown Maintenance (Electrical and Mechanical) of 26 no. of machines in CMX Machine shop for the period of one year.

Preventive Maintenance: Preventive Maintenance means scheduled preventive maintenance of all the machines (as per list of machines – ANNEXURE-‘II’) and accessories as per check list handed over by Engineer-in-charge. This maintenance work will generally include.

1. Checking and ensuring proper lubrication of the machines guide-ways and other machine elements requiring lubrication either manually or through automatic lubrication system
2. Upkeep of hydraulic oil and lubrication oil.
3. Checking/replacement of Filters
4. Checking of electrical connections for loose wiring and other abnormality.

These are the generalized check points. However, machine specific tickets shall be handed over by Engineer-in-Charge at the time of execution.

Breakdown Maintenance: Breakdown means stoppage of machine due to some fault as a result of breakage of parts or malfunctioning of some elements of machines and it is not possible to run the machine. The work of breakdown maintenance shall be to restore the machine to its original working condition for all the machines (as per list of machines – ANNEXURE-‘II’). The contractor has to attend day to day machine breakdown promptly and efficiently so as to keep the breakdown time minimum against the services of CMX. A generalized list of mechanical and electrical work is given below. However, any other activity required to restore the machine in desired state shall be carried out by the manpower deputed by the contractor. Any guidance, drawing or machine manual can be sought from Reconditioning Section. . But the responsibility to restore the machine to normal shall rest with the contractor. All the spares and consumables shall be supplied by BHEL, Bhopal.

A.	<u>MECHANICAL :</u>
1	Check oil level in hydraulic & lubrication tanks in frequency (once in a week/machine), in case of low level, top up oil.
2	Clean air filters/oil filters by kerosene, compressed air.
3	Clean Telescopic covers, provide on column guide-ways. Table guide ways and bed guide ways.
4	Check for oil leakages on machine arrest oil leakage, if any
5	Clean coolant tank surface, coolant filter etc.
6	To inspect parts of the disassembled units. To make out the defect list.
7	Clean machine guide-ways of ram & spindle by marking cloth and apply low viscosity oil by oil cane.
8	Clean air filters pad, provided on oil chilling AC units & panels AC with compressed air.
9	Clean cable trenches and remove oil/coolant from cable trenches of machines.
10	Remove rain water /seepage water from machine pits.
11	Maintenance of all chip conveyors
12	Repair and maintenance of drag chain, telescopic covers

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13	Preventive and repair of all attachment.
15	To replace all worn out bushes and damaged bearings.
16	To replace worn out gears and worm / worm wheels
17	To restore / replace worn out lead screws and nuts of longitudinal and transverse feeds.
18	To replace worn out fasteners and clean the remaining ones
19	To replace / restore and scrape regulating wedges and clamping plates.
20	To restore accuracy of lead screws by machining threads (machining by BHEL).
21	To check and clean unworn-out parts left out in the mechanism of the machine.
22	To repair /replace coolant pumps and pipe fittings.
23	To repair oil pumps and lubricating / hydraulic systems. To replace oil.
24	Check & rectify complete gear box of the machine.
25	To replace damaged pipes and fittings.
26	To scrape guide surfaces of slides, carriages, traverses, slide blocks etc. (if the wear exceeds the permissible limits).
27	To repair / replace guards and fencing (provided for proper safety) and also the arrangements for protecting the machine parts from metal chips and abrasive dust (covers on belt drive, casings, shields, screens).
28	To assemble the repaired units, check proper inter-operation of the units and all the mechanisms of the machine. B&P
29	To run the machine on no-load at all speeds and feeds. To check for noise and heating.
30	To check for accuracy of repaired unit.
31	To check & replace the belts if necessary.
B	<u>ELECTRICAL :</u>
B.1	A.C. & D.C. ELECTRIC MOTORS :
1	To disassemble the motor completely and to rectify the winding damages or replace with new motor (Winding and New motor in BHEL scope)
2	To clean units and parts of the electric motor and to change the defective insulating bushes.
3	To wash and grease the ball / roller bearings and change the damaged ones.
4	To wash the bush bearings and if necessary, metalize the same.
5	To weld and machine the end covers, if necessary.
6	To change/clean the ventilation fan and the flanges.
7	To replace brush mechanisms and commutator cleaning.
8	To assemble and check the motor on no-load and also on load after repair.
B.2	ELECTRO MAGNETIC FRICTION COUPLINGS (if applicable):
1	To disassemble the coupling, to clean and wipe out the parts, to change the friction lining, to check for the discs wear and if necessary, replace the same.
2	To check the gap between the guiding bush of the armature and the shaft and, if necessary, change the bushes.
3	To REPLACE /REPAIR the slip rings.
4	To change the seals.
5	To check for normal functioning of the coupling

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B.3	ELECTRO MAGNETS :
1	To completely disassemble the electro magnet.
2	To check the various parts and change, if necessary.
3	To coat the coils with varnish.
4	To check the insulation OF WIRE and the proper movement of the core.
B.4	STARTER AND CONTACTORS:
1	To check and adjust the motion of the moving contacts.
2	To adjust the simultaneous switching off of the 3-phases.
3	To check the action and adjustment of thermal overload relay.
4	To adjust the gap between fixed and the moving contacts and to check the withdrawal of the armature while switching off the magnetic coil.
5	To change the defective parts.
B.5	END LIMIT SWITCHES :
1	To completely disassemble the switch.
2	To clean and check all the parts and to change the worn out ones.
3	To adjust the lever with respect to the fixator.
B.6	KNIFE SWITCHES OF ALL TYPES :
1	To rectify the distortion of the knives and the pincers of the switch.
2	To file and clean the contact surfaces of the knives and the pincers.
3	To change the defective parts.
B.7	ELECTRIC PANEL BOXES :
1	To check and adjust the movement and the pressure of the moving contacts.
2	To check the working of the thermal overload protection relay and test the same.
3	To change the electrical conductors (cables) wherever necessary.
4	To replace the defective apparatus/components.
B.8	ELECTRICAL APPARATUS AND ELECTRIC WIRING ON THE MACHINES :
	Check the electrical motor surface temperature and check for abnormal sound from motor if any.
	Check cables of machines, check cable drag chain
	To replace the defective section of the wiring.
	Check electrical control panel and tighten loose connection /wiring if any in electrical control panel. Clean electrical contractors with contact cleaner.
	To replace the defective apparatus/component.
C	OTHER RELATED WORKS
A3.1	Cleaning of Machine Oil Return Pockets & Coolant.
A3.2	Cleaning of Machine
A3.3	Removal of Chips, Cleaning of Bed/Table etc.
A 3.4	CNC Electronics and software related breakdown will be done by BHEL EMX department.

Scope of work shall also include all other preventive checks and breakdowns which are not covered above and are necessary for operation, performance and accuracy requirements.

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1. **Working Hours:** Party has to work in 1st Shift **(07.00 am to 04.00 pm)** only during all working days of BHEL Bhopal.
2. **Duration of Contract:** 1 Year only. Manpower deployment shall be for one year from the date of starting of WO.
3. Payment to the contractor on monthly basis (limited to the pro-rata work order value) shall be made on the basis of actual manpower deployed, which will be verified as per attendance record of CMX.
4. The person deployed shall wear shoes, uniform and helmet as per General Terms & Conditions and Safety Regulations. Contractor shall provide helmet, safety shoes and uniform to workers as per following schedule:
 - a) One industrial safety helmet at starting of WO.
 - b) One set of ISI standard Safety Shoes in every one year.
 - c) One set of uniform to workers in every six month. Uniform shall include T-shirt/Shirt and Trouser. Stitching charges will be paid by contractor to workers.
5. **MANPOWER DEPLOYMENT REQUIREMENT:**

Sr. no.	Description of manpower	No of workers	Educational qualification & experience.
1	Fitter (Skilled)	1	ITI in Fitter grade with 1 year working experience.
2	Electrician (Skilled)	1	ITI in Electrician grade with 1 year working experience.
3	Helper (Unskilled)	1	Min. 8 th pass & 1 year working experience.

6. **Price Variation Clause**

The price shall be firm/ fixed throughout the contract period.

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7. PAYMENT TERMS

- a. Payment shall be made against the submitted bill as per BHEL specified format on monthly basis after verification by engineer in charge along with all necessary supporting documents as per the requirements.
- b. Payment will be made to contractor on the basis of actual attendance of manpower.
- c. Penalty, if any, shall be deducted from the running bill payments as per clause no. 8.
- d. GST and any other new taxes introduced by GOI shall be applicable during the contract period with applicable rate notified by the authority.

8. Penalty

Payment to the contractor will be on the basis of actual attendance of manpower. Contractor can provide substitute in place of absent worker. In case, contractor fails to deploy required manpower as per agreed terms and conditions, the maintenance work in CMX machine shop will suffer. Therefore, penalty shall be deducted from running bills on the basis of following rates: Penalty shall be deducted, if total man days supplied by the contractor are less than 85% of actual man days to be deployed as per contract agreement as per following rates:

- i) Rs. 140 for each man day of skilled worker
- ii) Rs. 90 for each man day of un-skilled worker
- iii) The maximum cumulative penalty shall be limited to 10% of the work order value.

The man days for penalty (if attendance is less than 85%) shall be calculated as difference between 85% of man days as per contract agreement and actual man days deployed.

All the above deductions shall be calculated after every 3 months of the contract period and shall be deducted from the current RA bill.

Illustrative example for better understanding is as follows:-

Case- 1	April		May		June		Total	
	Skill ed	Unskilled	Skilled	Unskilled	Skilled	Unskilled	Skilled	Unskilled
Required Man days as per contract agreement	26	26	27	27	26	26	79	79
Actual man days deployed (A)	24	25	22	23	22	24	68	72
				85% of required man days as per contract agreement (after rounding off) (B)			67	67
				Total man days for penalty (If A ≥ B, it will be 0)			0	0
				Penalty Deduction			Nil	Nil

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Case- 2	April		May		June		Total	
	Skill ed	Unskilled	Skilled	Unskilled	Skilled	Unskilled	Skilled	Unskilled
Required Man days as per contract agreement	26	26	27	27	26	26	79	79
Actual man days deployed (A)	22	20	21	24	20	20.5	63	64.5
	85% of required man days as per contract agreement (after rounding off) (B)						67	67
	Total man days for penalty (C) (If A<B, then B-A)						4	2.5
	Rate of deduction per man days (In Rs.) (D)						140	90
	Penalty Deduction= C x D						560	225
	Total Penalty Deducted (In Rs.)						785	

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