

SPRUE GRINDING MACHINE

1.0 Introduction:

Rail Wheel Plant, Bela, Saran (Bihar) is a Production Unit of Indian Railways where manufacturing of cast steel wheels (BOX-N, BG Coaching, BLC & EMU etc.) is being done by using pressurized bottom pouring technique and graphite Mould blanks. During the casting process, according to the demands of the process, risers are provided to feed molten metal during the solidification process. When the Mould is split, and wheel is taken to the conveyor, a portion of the extra-solidified metal called Sprue is left over as a remnant deposit on the wheel. The Sprue Grinding System takes wheels from hot wheel klin, cuts the stopper pipe and provides the wheels after grinding the Sprue to the SPG discharge conveyor for punching of wheels.

2.0 Details of the Cast Steel Wheel: -

The front side of the wheel is termed the cope side. The deep conveyer surface of the cope side joining from front rim to the front hub is known as front plate. This front plate profile is formed of two radii. In this portion of the profile, occur the Sprues, where the extra-solidified metal is deposited as a remnant and off shoot of the process as explained above. The Sprue is a projection of a metal of 70-78 mm dia. approximately and weighs 500-700 grams each for different types of wheels (BOX-N, BG Coaching, BLC & EMU etc.). Sand cores are baked in-situ in the copes of each riser. The area of the wheel encountering this core is called a riser pad which surrounds the Sprue and is of approximately 150 mm dia. Front hub and front plate are connected by front hub fillet. The rim is connected to the front plate by rim fillet. The portion of the wheel which encounters the rails while working is called tread.

ANNEXURE-II

SCOPE OF WORK FOR SCHEDULE-1

Following Scope of Work is applicable for both Machines (SPG-1&4) for complete Overhauling : -

Scope of Work for Schedule-1(A)

(A) MECHANICAL SCOPE OF WORK:

Sr. No.	Name of assembly	Details of work
1.	X-Axis Assembly	Dismantling X-axis Assembly.
		Dismantling X-axis Ball Screw Assembly.
		Intensive cleaning of X-axis bed and its surrounding areas.
		Replaced Ball Screw, Locknut, Locking element, LM rail, LM block, wear strip & Runner block with new one.
		Timer belt & Mounting bolts of servomotor replaced with new one.
		Gear Coupling replaced with new one.
		Grease to be filled in gear coupling.
		All hoses replaced with new one.
		All PU pipe & defective nipple replaced with new one.
		Locking element, Timer pulley shall be replaced with new one.
		Guide way, wedge, wedge pin shall be replaced with new one.
		Oil seal & 'O' ring shall be replaced with new one.
		Provide some arrangement to avoid dust ingress in ball screw assembly.
		Relocation of X-axis motor and making motor base arrangement to outside the machine.
		Dismantling Z-axis Assembly.
		Dismantling Z-axis Ball Screw Assembly & Top Bracket assembly.
		Dismantling C-Block Assembly.
		Dismantling Bottom Block Assembly.
		Intensive cleaning of Z-axis bed and its surrounding areas.

2.	Z-Axis Assembly	Replaced Ball Screw, Locknut, Locking element, LM rail, LM block & Runner block with new one.
		All Bearings, bearing seal replaced with new one.
		Timer belts & timer pulleys replaced with new one.
		All hoses replaced with new one.
		All PU pipe & defective nipple replaced with new one.
		All Hydraulic pipes be replaced with new one.
		Oil seal & 'O' ring shall be replaced with new one.
		Provide bellows for dust on ball screw assembly
		Z-axis support bracket replaced with new one.
3.	Y-Axis Assembly	Dismantling Y-axis Assembly.
		Ball screw & all bearings shall be replaced with new one.
		Replaced locknut, locking element, timer belt, timer pulley with new one.
		Oil seal & 'O' ring shall be replaced with new one.
		Provide bellows for dust on ball screw assembly
4.	Spindle shaft assembly	Dismantling Grinding Wheel Assembly.
		Dismantling Spindle Shaft Assembly.
		Replaced Spindle shaft, Bearings & Locknut with new one. Spindle shaft Straightness checking by dial Gauge after mounting.
		All oil seal, 'O' ring replaced with new one.
		Checking Axial run out of Spindle Shaft after fitment.
		Spindle flange, spindle assembly shall be replaced with new one.
		All bolts of adapter and grinding wheel replaced with new one.
		Through Cleaning of machine from inside.
		All Hydraulic pipes replaced with new ones. Re-routing of all hydraulic pipelines for ease in Maintenance. No hydraulic pipes routed below grinding motor.
		Attention to Water Jacket after dismantling. Fitment after complete Overhauling. All defective parts replaced with new one during overhauling.
5.	Drive & Idle Roller Assembly	Dismantling Drive & Idle roller.
		Dismantling idle roller shaft & top & bottom bearings.
		Replaced shaft, Drive Roller, Idle Roller, idle & Drive roller bearing, Locknut, gear shaft & pinion with new one.
		Overhauling of Drive roller gearbox assembly. Replacement of defective parts with new one. Fitment of Drive Roller Gearbox after overhauling.
		Dismantling of Clamping Cylinder & Brake assembly. Fitment after overhauling. All defective parts replaced with new one during overhauling.
		All hoses of clamping cylinder shall be replaced with new one.
		Clamping Cylinder clevis taken out, inspected & refitted. Defective Clevis shall be replaced with new one.
		Oil seal & 'O' ring, locking element shall be replaced with new one.
		Modification to avoid frequent falling of idle & drive roller during grinding operation.
6.	Door Assembly	Modification required in door rollers or its track to avoid frequent derailment of door.
		Door frame found bend/buckled shall be replaced with new one.
		All door cylinders shall be dismantled, overhauling& refitted with proper mounting bracket. All defective parts replaced with new one during overhauling
		Machine enclosure and cover guiding shall be replaced with new one.
7.	Hydraulic power pack	Flushing of power pack tank. Clean inside the tank thoroughly by removing the inspection cover. After cleaning replenish with new hydraulic oil.
		Flushing of all hydraulic pipeline and refitted. Defective shall be replaced with new one.
		Replaced the return line and suction line filter with new one
		Replaced the pump coupling rubber spider with new one
		Replaced all types of filters in power pack and lubrication line with new one.

		Checking of all Gauges for its working & shall be replaced defective Gauge with new one
		Checking of Relief valve for its working & shall be replaced defective Relief valve with new one
		All hydraulic hoses, solenoid Valve shall be replaced with new one.
8.	ACCUMULATORS	All accumulators dismantled, overhauled & refitted. Replace Bladder with new one.
		Charging of accumulators by nitrogen gas. All tools & attachment required for charging of accumulators arranged by contractor without any extra cost. Nitrogen gas also arranged by Contractor without any extra cost.
		Setting of accumulator Pressure as per requirement.
		Check for proper working as per requirement.
9.	Relocation of DC valve Assembly	Relocation of all DC valve to a suitable location as decided by RWP-Bela. All Hydraulic pipe connection rerouted as per relocated position of DC valve assembly.
10.	Wheel Loader Assembly(02 nos.)	All Rack assembly (V&W-axis) attention and replacement of defective one by new one.
		All gear box of V & W-axis overhauling & fitment. All defective parts replaced with new one during overhauling.
		Greasing of all rack & pinions.
		Thorough cleaning of Wheel loader assembly by diesel and air.
		Cleaning of its overhead maintenance platform.
		Rack & pinion shall be replaced with new one.
		Track roller, V roller, Bearings, Locknut, locking element shall be replaced with new one.
		Provide suitable stopper assembly.
11.	CDLR Conveyor for wheel discharge	Replaced all conveyor Chains with new ones.
		All defective Rollers replaced with new ones.
		All Gear Drive motors dismantle, overhauled & refitted. Defective Gear motor replaced with new one.
		Replaced all Drive Chains with new ones.
		All Jack shafts & Pillow block checking. Defective shall replace with new one.
		All bearing shall replace with new one.
12.	Dust Collection System	All screw Conveyors (02 nos.) Opened & cleaned for any accumulated dust.
		Repair of screw conveyor by welding.
		Dismantle all Rotary Air Lock (RAL) and replaced with new one.
		All bunkers (04 nos.) & cyclones (02 nos.) opened & cleaned for any accumulated dust. Cyclones to be replaced with new one.
		Replace all filters bags (400 nos.) with new one.
		All pulsejet valves were checked and made operational. Defective valve replaced with new one.
		Arrest leakage of air.
		All impellers, Pillow/Plumber block, bearings
		Attention to all doors of dust collection in basement. Door locking arrangements are provided in all doors.
13.	SPG Chiller Unit	Replacement of existing MS tank with new Heat Resistant SS Water Tank of capacity 1000 Liters. & Ensure all pipe connection done as per requirement & design.
		Flushing of water from tank. Clean inside the tank thoroughly. After cleaning replenish with new Process water provided by Railways.
		Check all water pumps are in working condition. Defective one replaced with new one.
		Check for any water leakages and rectification.
		Check all ball valve in water line is in working condition.
		Replacement of Heat Resistant Asbestos wired cloth of all Water Pipeline of chiller unit recirculation system.
		Supply erection and commissioning of Distilled Water machine of suitable capacity with a Stainless-Steel Tank of suitable capacity. This

		tank suitably connected with SS Tank of 1000 Liters Capacity to Top-up distilled water for chiller unit.
		Replacement of existing MS tank with new Heat Resistant SS Water Tank of capacity 1000 liters. & Ensure all pipe connection done as per requirement & design.
		Arrangement of Drainage system of condensed water from Panel AC of the CNC Panel Area. No. of AC water outlet =21, Approx. length of platform 2x50= 100Mts.
14.	Operationalization of X- Clamp Assembly	All 02 Nos X-clamp assembly of SPG-1&4 made operational.
		All design, supply of materials for the said work & commissioning is in Contractor Scope.
		It is ensured by the contractor that any change made in the existing arrangement of 02Nos SPG's machine for operationalization of X-clamp assembly does not affects the working of Machine in any manner. If so, the contractor made good all previous arrangement of machine without any extra cost.

ELECTRICAL & ELECTRONICS SCOPE OF WORK

Sr. No.	Details of work
1	Existing 840D CNC system shall be replaced with the Sinumeric 1 or 828DSI CNC system or latest available version. All CNC components, Servomotors, communication cables should be replaced for upgradation..
2	Replacement of V1, V2, W1& W2 induction motors with New servo motors for all machine loaders. CNC systems, LT modules in CNC should be modified accordingly.
3	Rewiring of all control wirings and Power wirings of machines, Panel to JB's. JB to machine should be done.
4	All the switchgears and electrical/electrical items of the panels should be replaced with new one. Existing Panel AC may be used for new panel.
5	All control panel doors shall replace with new one.
6	All door locks for 600x600 junction boxes shall be replaced with new one.
7	200x200 junction box shall be replaced with 300x200 for machine loader assembly.
8	Front cover for the 400x200 junction boxes shall be replaced with new one.
9	All door locks for operating pendant shall be replaced with new one. Operating Pendant AC to be repaired.
10	Existing Hydraulic motor VVFD shall be replaced with SOFT starters, with all digital protection, Over current, Earth Fault, Single phasing and other basic protections. The starter should have facility to communicate with PLC with DI/DO.
11	X-Axis, Y-Axis & Z-Axis servomotor & wheel rotation spindle motor shall be overhauled. All defective parts replaced with new one during overhauling
12	All cable from junction box to machine shall be replaced by new one.
13	All limit switches, all sensors & all drag chain for SPG Loader, RAM Loader, Wheel Transfer Car shall be replaced with new one.

NOTE: - All materials required for execution of this Schedule supplied by the tenderer.

Scope of Work or Schedule-1(B)

Name of Work: - Upgradation of Wheel Loader Assembly of SPG-1&4

- The wheel loader arrangement should be suitably upgraded with suitable counterbalance arrangements and hydraulic / servo operated movements or both to eliminate slipping, jerking & Free fall in all moving conditions.

Scope of Work or Schedule-1(C)

Name of Work: - Design, Supply, installation, commissioning & Training of Hydraulic/Pneumatic Press arrangement as per scope of work (Mechanical & Electrical/Electronics) mentioned in Annexure-II in Mould Room at Rail Wheel Plant, Bela-Saran (Bihar)

- A hydraulic/ pneumatic press arrangement to break the graphite head on drag side of hub in between Transfer car (HW4B) & stamping machine before hot wheel send for punching of heat number on hot wheels.

SCOPE OF WORK FOR SCHEDULE-2

Brief Description of Machines:-

1.0 Existing System of Wheel Feeding System to Sprue Grinding Machine at RWP-

The Wheel feeding System of Sprue Grinding Machine at RWP/Bela Consists of

- **Upender Assembly:** - To rotate wheel in horizontal position to vertical for cutting of stopper pipe. At this station all the Risers on wheel drop down in chute.
- **Stopper pipe cutting machine:** - Cut stopper pipe.
- **Down ender Assembly:** - To laid down wheel in vertical position to horizontal position with Drag side on upper side.
- **Ram Loader Assembly:** - To lift Wheel at down ender and place on Wheel trolley of SPG machine.

2.0 Constraint of existing system: -

2.1 The wheel feeding System consists of Upender Assembly, Stopper Pipe cutting machines, Down ender, Ram loader & Wheel Trolley is major a constraint for desired production.

2.2 Any breakdown of wheel feeding system leads to idling of all SPG's Machines. The overall cycle time of wheel feeding system is high resulting in sub-optimal utilization of the Sprue Grinding Machines. The SPG system fails to meet the wheel casting rate and results in wheel bypass.

2.3 The ram loader and wheel loader both experiences slipping, jerks and occasional free fall situations. This has reduced the reliability of the Sprue grinding system.

2.4 The system is not capable of handling all types of wheels being produced at RWP simultaneously. The production of BLC wheels is hindered at up-ender, stopper pipe cutting machine, down ender and Ram loader.

Scope of work for Schedule-2(A)

Name of Work:- Complete Overhauling of Wheel Feeding of Sprue Grinding System

The scope of work provided below is not exhaustive in nature. The firm is free to replace the items in the wheel feeding system to attain the given cycle time. **The schedules regarding overhauling will not be applicable in case of items of wheel feeding system which are replaced/ upgraded under Schedule of upgradation.**

A. MECHANICAL SCOPE OF WORK		
1.	Ram Loader Assembly	All Rack assembly (V&W-axis) replaced with new ones.
		All gear box of V & W-axis overhauling & fitment. All defective parts replaced with new one during overhauling.
		Greasing of all rack & pinions.
		Thorough cleaning of Wheel loader assembly by diesel and air cleaning of its overhead maintenance platform.
		Made suitable arrangement to clamp all types of Wheels (BOXN, BGC, BLC& EMU) for lifting & lowering of wheels on Wheel trolley of SPG. Clamping finger movement is to be suitably design as per requirement of types of Wheels (BOXN, BGC, BLC& EMU) with minor or NIL adjustment.
		Hydraulic Power Pack Attention as indicated in Sr.No.-12
2.	Down ender Assembly	Dismantle wheel pusher assembly, Overhauled & refitted. Defective spares replaced with new one.
		All mounting bracket of Down ender, pneumatic cylinder & Rail attention for any fabrication or modification as per requirement. All Rails replaced with new one
		Down ender shafts taken out& replace with new one.
		Dismantle pusher cylinder, overhauled & refitted. All defective parts replaced with new one during overhauling.
		Alignment of rail and its strengthening. All rails from Upender to Downender replaced with new one with suitable gradient for easy movement of cast Wheels.
		Attention of rollers for easy sliding of wheels.
		All flow control valves are dismantled, overhauled & refitted. Defective one replaced with new one.
		All DC valves are dismantled, overhauled & refitted. Defective one replaced with new one.
		Dismantle Down ender Cylinder, Overhauled & refitted. All defective parts replaced with new one during overhauling.
		Replace all hoses with new one.
3.	Stopper Pipe Cutting Assembly	Dismantle Stopper Pipe cutting Assembly.
		Shaft & coupling replaced with new one.
		Dismantle all pneumatic cylinders, overhauled & refitted. All defective parts replaced with new one during overhauling.
		All flow control valves replaced with new one.

		All DC valves replaced with new one.
		Replacement of existing pneumatic cylinder for stopper pipe cutting blade movement with Suitably designed Pneumatic cylinder to avoid infringement of stopper pipe with blade when it is in home position.
		Made suitable arrangement to accommodate all types of Wheels (BOXN, BGC, BLC & EMU) for stopper pipe cutting arrangement without any manual adjustment.
4.	Uponder Assembly	All mounting bracket of Uponder, pneumatic cylinder & Rail attention for any fabrication or modification as per requirement.
		Alignment of rail and its strengthening. All Rails replaced with new one.
		All flow control valves are dismantled, overhauled & refitted. Defective one replaced with new one.
		All DC valves are dismantled, overhauled & refitted. Defective one replaced with new one.
		The guard plate of Uponder attention for any fabrication work.
		Replace all hoses with new one.
		Dismantle Uponder Cylinder, Overhauled & refitted. All defective parts replaced with new one during overhauling.
		Overhauling of all CDLR rollers. Replaced all bearing of rollers with new one.
		All CDLR chains replaced with new one
		Overhauling of Geared motor. All defective parts replaced with new one during overhauling.
		Made suitable arrangement to accommodate all types of Wheels (BOXN, BGC, BLC & EMU) for stopper pipe cutting arrangement without any manual adjustment.
5..	SPG Wheel Trolley	Overhauling of all wheels of trolley.
		Repair of rail by welding & grinding. If required, replace with new one.
		Overhauling of Geared motor. All defective parts replaced with new one during overhauling.
		Stopper attention for any fabrication work.
		Attention of Centering arrangement of Wheel Trolley with SPG's
		Standby geared motor arrangement to be made. Geared motor provided by the tenderer.
		To meet the cycle time of Sprue Grinding Machine and Wheel Feeding System, the SPG Wheel Trolley should be suitably upgraded if required.
6	Transfer car (02 nos) HW4A & HW4B	Overhauling of all wheels of Transfer cars.
		Repair of rail by welding & grinding. If required, replace with new one.
		Overhauling of Geared motor. All defective parts replaced with new one during overhauling.
		Stopper attention for any fabrication work.
		Attention to CDLR Transfer Cars. Replaced all bearing of rollers with new one.
		All CDLR chains replaced with new one
		Standby geared motor arrangement to be made with support structure for both CDLR conveyor & transfer car movements. Geared motor provided by the tenderer.

ELECTRICAL SCOPE OF WORK	
1.	Repair and Arrangement of All outdoor motor covers with MS Sheet. Motor Size 0.75 KW= 12 Nos., Size: 30KW= 02 Nos.
2	<p>Servicing of all VVFDs of Make Rockwell Automations provided in anywhere in the SPG system.</p> <p>Following work must be incorporated during servicing VVFDs:</p> <ol style="list-style-type: none"> i. De-dusting of VVFD panel including proper blowing of conductive dust from VVFD unit. If required, VFD shall be removed from the panel. ii. Inspection of internal VVFD components, PCBs, heat sinks, etc by removing top cover to assess any damage and cleaning of the same by high-speed blowers, soft brush, cleaning agent, as required. iii. Checking of cooling fan flow & cleaning of the same, if required. iv. Cleaning of power devices heat sinks & cooling fan. v. Tuning of All VVFD to the concerned motor. vi. Checking of all ground connections, checking of ground voltage, etc. vii. Replacement of defective components found if any in the VVFD panel. viii. Online checking of general operation of the VVFD Drive system. ix. Predictive maintenance / life assessment of major components with recommendations from OEM. Report should be submitted. x. Test Report should be submitted. <p>Note: The repair/Maintenance of Rockwell Automation make VVFD parts should be attended by trained Engineers only.</p> <p>Any damage of parts/components due to improper handling by service engineer, the VVFD should be repaired by contractor without any charges.</p> <p>Released parts will be retained by the Railways.</p>
NOTE: All materials required for execution of this Schedule supplied by the tenderer	

ANNEXURE-IV

3.0 Up gradation work of Wheel Feeding System: -

The purpose of the Complete overhauling and up-gradation is to reduce Cycle time of wheel feeding system. The wheel feeding system should deliver wheel at SPG wheel trolley at an interval of not more than 100 seconds & 110 seconds with a penalty of 10% of the total contract value. Following Penalty will be applicable for payments of this schedule (i.e, Schedule-2A & 2B) as per cycle time attained as per Annexure-V

ANNEXURE-V

SN	CYCLE TIME ATTAINED	PENALTY
1	Upto 100 seconds	Zero
2	Upto 120 seconds	10% of the contract value of Schedule (2A & 2B)
3	Upto 100 seconds	20% of the contract value of Schedule (2A & 2B)
4	Beyond 120 seconds	100% of the contract value of Schedule (2A & 2B)

- 3.1 All necessary modifications in the Wheel feeding system to attain the above-mentioned cycle time will be in the scope of the contractor.
- 3.2 The wheel lifting arrangement (Ram Loader) from down-ender should be suitably designed with counterbalance and hydraulic / servo movement to avoid any kind of jerk, slipping or free fall during operation.
- 3.3 The upgraded wheel feeding system should be capable of handling different types of wheels (BLC, BOXN, BGC, EMU) simultaneously with minor or NIL adjustment.
- 3.4 The Wheel Trolley movement should be suitably optimized that the trolley is capable of feeding wheel to all 04 nos. Sprue grinding Machines without interrupting the Grinding Cycle (Wheel taken from wheel trolley to wheel placed at discharge conveyor after grinding) of the any other Sprue Grinding Machines.

NOTE: - All materials required for Up-gradation of Wheel Feeding System to meet cycle time of 100 seconds supplied by the tenderer.

SCOPE OF WORK FOR SCHEDULE-3

- 1.0 The work involved services of Preventive & breakdown Maintenance of Sprue Grinding System (both Mechanical & Electrical/Electronic) in Mould Room at RWP-Bela for the period of 05 years after completion of work under schedule 1 & 2. The tenderer will provide Preventive Maintenance Schedule of the machine to ensure availability of Sprue Grinding System more than 95%.
- 2.0 The details of preventive maintenance to be provided during AMC period shall be indicated by the tenderer giving details of type of preventive schedule, periodicity on items to be checked, items to be replaced and expected plant down time. Preventive maintenance schedules shall be conducted on weekends as far as possible or any other day through mutual agreement with consignees. Total breakdown hours shall be calculated after discounting grace period and preventive maintenance period.
- 3.0 During AMC period this preventive maintenance schedule will be followed.
- 4.0 The scope of work covers 02 nos. Sprue Grinding Machines (1&4) with dust collection system & wheel feeding arrangements of Sprue Grinding System.
- 5.0 The break down Maintenance in all three shifts (round the clock) will be in the scope of Tenderer during the period of AMC.
- 6.0 The AMC covers both Mechanical & Electrical/Electronic part of Sprue Grinding System.
- 7.0 If availability of Sprue Grinding System falls below 95% during AMC period, penalty will attract as per Annexure-VI.

ANNEXURE-VI

Penalty: -

Machine availability for each machine calculated after adding both Mechanical & Electrical breakdown for each machine on a quarterly basis.

SN	Description	Penalty
1.	Above 95% availability of machine	NIL
2.	95% to 90% availability of machine	1% of Quarterly bill on every 1% drop in availability
3.	90% to 85% availability of machine	1.5% of Quarterly bill on every 1% drop in availability
4.	85% to 80% availability of machine	2% of Quarterly bill on every 1% drop in availability
5.	80 % to 75% availability of machine	2.5% of Quarterly bill on every 1% drop in availability
6.	Below 75% to 70% availability of machine	3% of Quarterly bill on every 1% drop in availability
7.	Below 70% availability of machine	3.5% of Quarterly bill
8.	Below 60% availability of machine	Zero Payment

Formula for imposing penalty is as under: -

$$\frac{\% \text{ Availability of SPG Machine}}{\text{Machine}} = \frac{(\text{Total Machine hours in a Quarter} - \text{Breakdown Hours per Quarter})}{\text{Total Machine hours in a Quarter}} \times 100$$

• **DEFINITION OF BREAKDOWN HOURS: -**

- The number of hours for which any SPG's machines (1&4) are not functional or not available for production activities due to any reason.
- In each Quarter cumulative breakdown upto 24 hrs. will be allowed for each machines (1&4) as grace and will not counted in breakdown hours. This grace period applicable only for Sprue Grinding Machines & SPG wheel loader assembly. For Wheel feeding system of Sprue Grinding System, this grace period is not allowed.
- The contractor must ensure availability of both SPG's machines all the time.
- Any breakdown in Ram loader, Upender, Stopper pipe cutting machine, Down ender, Wheel trolley, CDLR conveyor & Transfer cars results into unavailability of all machines and will be counted for breakdown hours. No grace period will be permitted for wheel feeding System(Upender, stopper pipe cutting machine, downender & Ram Loader).
- The machine handed over for complete overhauling & up gradation to the contractor will not be counted for breakdown hours till the mutually agreed completion period mentioned for that schedule. Time taken beyond the completion period of the said schedule will be counted for breakdown hours.

8.0 The activity in all schedules will be attended as & when Railway spared the machines for Maintenance. Advance intimation given to the contractor.

9.0 Comprehensive Annual Maintenance Contract (AMC):

- 9.1** Tenderers are required to enter into a comprehensive Annual Maintenance Contract for the machine overhauled/one time repair/upgraded for a period of five years on yearly basis giving the rates for each year i.e. first year, second year & so on which will be inclusive of all preventive maintenance services, Breakdown Maintenance in all three shifts, spares, material and labor costs. The duties and taxes as applicable should be indicated separately. All consumables except Diesel/ fuel, lubricating oils or coolant, consumables for cleaning plants, MPT, water purifier Hydraulic oil, tooling's, drills, and taps shall form a part of the scope of comprehensive AMC.
- 9.2** The duration of AMC shall be 5 years after completion of schedule 1 and 2. Rates for AMC shall be quoted by the tenderer on a yearly basis, which will remain applicable during the duration of AMC and not subject to any variation except any statutory changes in taxes and duties as compared to quoted rates.
- 9.3** The detailed terms and conditions of AMC shall be given by the tenderer in his offer. However, final terms & conditions of AMC shall be decided in consultation with Rail Wheel Plant, Bela can suggest changes/additions/ increase in the scope of work of AMC as it deems fit for proper performance of the machine.
- 9.4** The tenderer must provide AMC services at the consignee location i.e., Rail Wheel Plant, Bela, Distt- Saran, Bihar without any precondition. The AMC should include complete responsibility for the bought-out sub-assemblies and components like CNC, PLC system, AC unit etc.
- 9.5** The details of preventive maintenance services to be provided under AMC shall be provided by the tenderer in the following format.

SN	Type of Preventive Schedule	Periodicity	Items to be checked	Items of replacement	Expected down time

- 9.6** Preventive maintenance shall preferably be conducted on weekends through mutual agreement with the consignee. Each preventive maintenance schedule should not affect the production. The total shutdown time for preventive maintenance should be kept as low as possible including time for cleaning, weekly, fortnightly, monthly, quarterly schedules etc. The preventive maintenance regime offered must be aimed at achieving a minimum of 95% uptime of the plant excluding the plant down time for preventive maintenance schedules. The AMC also includes breakdown Maintenance activity (mechanical & Electrical both) in all three shifts (round the clock), 06 days a week.
- 9.7** In case preventive maintenance is carried out along with breakdown maintenance schedule. Preventive maintenance time will be deducted from breakdown time of the Plant.

- 9.8** A bank Guarantee equivalent to the average annual value of the AMC or Security deposit (SD) of the total contract value whichever is higher will be submitted by the tenderer/bidder before start of schedule 3. The tenderer/bidder will have to maintain the Sprue Grinding system during the gap period in between completion of all activities of Schedule-1 & 2 if any.
- 9.9** In case the Bidder fails to provide AMC services successfully; the AMC Bank Guarantee (BG) will be forfeited. This will be in addition to penalty as per clause above.
- 9.10** Any spare part or material necessary to restore the plant to proper working order will be arranged by the Bidder as a part of AMC.
- 9.11** In case of damage to the machine on account of any external factor, viz., floods, earthquake, fire, arson or sabotage, entire cost of spare parts and material necessary for repair of the plant shall be borne by the railways. However, the tenderer shall provide services of their engineers free of cost as a part of AMC to restore the plant to working order.
- 9.12** AMC is part of evaluation of offer, it is the sole responsibility of bidders to stock all spares and materials as required for smoother execution of AMC to achieve response time in compliance to machine availability as per stipulated requirements.
- 9.13** Normally quarterly payment under AMC will be made to the Bidder within 30 days from the end of that quarter subject to submission of the following documents by the Bidder to the paying authority assigned by the consignee:
- a. Consignee's certificate for work done as per prescribed Proforma with calculation of down time and penalty applicable.
 - b. A certificate by consignee that no spare part is due with the tenderer.

10.0 The AMC contract shall be terminated in following ways:

- a. Notice in writing by either party, giving 3 months' clear notice period. Dues, if any, will be settled in accordance with the conditions of the agreement.
- b. In the event of failure of tenderer to provide AMC services as per the AMC agreement.

GENERAL TERMS & CONDITIONS OF THE CONTRACT

- The total price of the contract will include AMC charges for 5 years. Bidders are required to quote on a yearly basis for a Comprehensive Annual Maintenance Contract for Five years as per Schedule-3 of this contract. However, AMC shall be operated, managed and paid for by consignee end i.e. Rail Wheel Plant, Bela after completion of schedule 1 & 2. AMC is part of the scope of work of this contract and should be included in commercial evaluation criteria.

PAYMENT SCHEDULE

(A) Payment terms for Schedule-1&2

The 100 % payment of sub schedules will be paid after completion of work in all respect.

(B) Payment terms for Schjedule-3

100% Quarterly payment as per accepted rate will be made after completion of work for the period subject to deduction if any.