

**TECHNICAL SPECIFICATIONS  
LIST OF ANNEXURES**

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**RAIL WHEEL PLANT, BELA**

**SCHEDULE OF WORKS**

**Name of Work:-Procurement of 02 nos. Sprue Grinding Machines & Comprehensive AMC of Sprue Grinding Machines for a period of Five Years.**

<b>S.N</b>	<b>Sch. No.</b>	<b>Description</b>	<b>Unit</b>	<b>Qty.</b>	<b>Rate (INR)</b>	<b>Total Amount (INR)</b>
01.	01	Design, Supply, installation, commissioning & Training of Sprue Grinding Machine in Mould Room at Rail Wheel Plant, Bela-Saran (Bihar) as per <b>Annexure-1</b>	Nos	02		
02	02	Cost of Comprehensive AMC with Spares & services for Preventive & breakdown Maintenance for all the items supplied in Schedule-1(i.e,1(a), 1(b) & 1(c)). during warranty period of 02 years				
03	2A	1 <sup>st</sup> year	Quarterly	4		
04	2B	2 <sup>nd</sup> year	Quarterly	4		
05	3	Cost of Comprehensive AMC with Spares & services for Preventive & breakdown Maintenance for all the items supplied in Schedule-1(i.e,1(a), 1(b) & 1(c)) for the period of 5 years after expiry of warranty period of 02 years				
06	3A	1 <sup>st</sup> year	Quarterly	4		
07	3B	2 <sup>nd</sup> year	Quarterly	4		
08	3C	3 <sup>rd</sup> Year	Quarterly	4		
09	3D	4 <sup>th</sup> Year	Quarterly	4		
10	3E	5 <sup>th</sup> Year	Quarterly	4		
			Sub-Total			
			GST			
			<b>Grand total</b>			
<b>Amount in words: -</b>						

**Note: -**

- i. Amount should be quoted both in figures and words.
- ii. Only the rates in words will be considered in case of discrepancy of words and figure.
- iii. Column for unit rate should be filled by tenderer. All overwriting and cutting, if any should be duly attested by the contractor.
- iv. Grand total rate should be inclusive of all kinds of taxes, license fee, and royalty charges levied by State/Central Government etc.
- v. Details cost breakup of schedule-1&2 must be provided in **Annexure-1** of the tender documents.
- vi. All the bidders/tenders should ensure that they are GST compliant and their quoted tax structure/ rates are as per GST Law.
- vii. GST Act and Structure amended from time to time will be applicable.

**Signature of Tenderer.**

Annexure-1						
Details cost breakup of Schedle-1						
<b>SN</b>	<b>Schedule No.</b>	<b>Description of work</b>	<b>Qty.</b>	<b>Unit</b>	<b>Unit Rate (In INR)</b>	<b>Total cost (In INR)</b>
1	1(a)	<i>Design, Manufacturing &amp; Supply of Sprue Grinding Machine with dust collection System as per <b>Annexure-A</b></i>	Nos.	<b>02</b>		
2	1(b)	<i>Design, Manufacturing &amp; Supply of other concomitant accessories as per <b>Annexure-B</b></i>				
3	1(b)-A	<i>Chiller unit for 02 nos. new Sprue Grinding Machines as per scope.</i>	01	Nos.		
3	1(b)-B	<i>Isolation Transformer for 02 nos. new Sprue Grinding Machines</i>	02	Nos.		
4	1(b)-C	<i>UPS of CNC system for 02 nos. new Sprue Grinding Machines</i>	02	Nos.		
5	1(b)-D	<i>Grinding Wheels &amp; other consumables for Performance Guarantee Test for 02 nos. new Sprue Grinding Machines</i>	01	lot		
7	1(b)-E	<i>Feeder Panel &amp; cable input power for 02 nos. new Sprue Grinding Machines</i>	01	lot		
8	1(b)-F	<i>Cost of Spares for Preventive &amp; breakdown Maintenance for 02 nos. new Sprue Grinding Machines during warranty period</i>	01	lot		
9	1(b)-G	<i>Uprooting of existing Sprue Grinding Machine (2&amp;4) in Mould Room at RWP-Bela as per scope of work.</i>	01	lot		
10	1(c)	<i>Design, supply &amp; installation of EOT cranes of 5T capacity with support structure as per suite at site as per scope of work attached as <b>Annexure-C</b></i>	01	Nos.		

**ANNEXURE - A**

**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.

**1.1 The machine shall incorporate following Design Features: -**

- a) Provide complete protection to the operator and the machine from all possible operational failure's damages.**
- b) Suitable arrangement to observe vibration of X-axis & Z-axis during Grinding operation in digital display and HMI.**
- c) The movement in X & Y axis should be suitably designed to bear the impact load, vibration, jerks generated during grinding operation.**
- d) A suitable mechanism must be provided to reduce or damp the undue vibrations generated during wheel grinding operation.**
- e) A suitable mechanism must be provided to eliminate falling of idle roller & Drive roller disc.**
- f) The wheel loader arrangement should be suitably designed with counterbalance and hydraulic or servo-controlled movements or both to eliminate slipping, jerking & free fall in all moving conditions.**
- g) Standardization /interchangeability of spares must be ensured in both machines.**

**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.

- 2.1** This specification aims at Design & supply of an automatic hot Sprue grinding machine. The Machine should also be capable of removal of the Sprues in line with plate surface and riser pad unevenness within the Sprues area including grinding plate area within the Sprues area on hot cast steel wheels. Drawings of various types of wheels to be grounded are attached.

- 2.2 The fully automatic hot wheel Sprue-grinding machine is required for removal of Sprues in line with plate surface, riser pads unevenness within Sprue area and plate grinding within Sprue area. on cast steel wheel at temperatures ranging from **350°C to 600°C** with a maximum hardness of 190 BHN.
- 2.3 The existing System consists of four Sprue Grinding Machines. Two of these machines are to be replaced with new machines procured through this tender. These heavy-duty grinding machines have hydraulic/CNC control with complete accessories, safety guards/ enclosures to prevent grinding dust going out and complete instrumentation and control. The machine shall be robust in construction and all axes fully dust proof enclosures.
- 2.4 Different types of cast steel wheels (BOX-N, BG Coaching, BLC & EMU etc.) with sizes, weight and Chemistry of wheels are indicated in attached drawing.
- 2.5 The data, drawing etc. are only for guidance and references and does not absolve the tenderer of the responsibility to check adequacy of design to satisfy himself and the Railways for safe and efficient performance of the equipment.
- 2.6 The Tenderers may visit Rail Wheel Plant, Bela, to understand the requirements, various constraints including space, proximity with other Machines etc. before submitting their offer.
- 2.7 The machine along with connected fixtures, as proposed, shall be supplied and commissioned by the tenderer.
- 2.8 The dust collection System so designed to suck all the dust generated inside the machine during grinding operation as well as dust accumulated on the subassembly for X, Y & Z- axis movement as per requirement.

### **3.0 Working Conditions.**

- 3.1 The automatic Hot Sprue grinding equipment shall be required to work efficiently in tropical conditions under ambient temperature range from **5°C to 60°C**, relative humidity up to 98% and highly dusty foundry shop atmosphere. The wheels to be processed in this equipment shall be at temperatures ranging from **350°C to 600°C**.
- 3.2 During Grinding Operation heavy dust accumulated (ferrous) inside the machines, doors, X, Y & Z-axis feeding mechanism. Suitable dust collection system with cyclone must be provided with the machine to overcome above issues & capable of sucking the accumulated dust(ferrous & Non- ferrous).
- 3.3 The equipment shall be designed to enable 24 hours round the clock working to meet the process requirement.

### **4.0 EVALUATION CRITERIA:**

Total value of the offer will be calculated based on

- 4.1 The cost of the basic machine.
- 4.2 Cost of the concomitant accessories according to tender specifications.
- 4.3 Cost of Turnkey Charges viz. foundation, installation & commissioning etc. Cost of Preventive Maintenance during 1 & 2<sup>nd</sup> year of Warranty Period.
- 4.4 Cost of comprehensive AMC for five years after the warranty period of 02 years in Mould Room at RWP-Bela inclusive of applicable duties and taxes, insurance, freight, installation & commissioning charges, etc.

### **Design, Manufacturing, installation & Prove out of Sprue Grinding Machine**

- 1.0 The scope of supply covers design, manufacture, supply, erection, testing, commissioning, and putting into beneficial use of the fully automatic Special Purpose CNC/Hydraulic controlled Grinding Machine for removal of Sprues in line with plate surface, riser pads unevenness within Sprue area

and plate grinding within Sprue area from Hot Cast steel Wheels (Temperature **350°C to 600°C** and approximate hardness of about 190 BHN maximum) at Rail Wheel Plant, Bela, Chhapra, State-Bihar (India) on a turnkey basis. The special purpose Automatic Grinding Machine shall have the option for use in the manual mode whenever such necessity arises.

- 1.1 Each grinding machine shall comply with cycle time of 06 minutes per wheel for removal of Sprues in line with plate surface, riser pads unevenness within Sprue area and plate grinding within Sprue area. The Cycle starts from pickup of wheels from Wheel Trolley and ends with placement of wheels on Sprue Grinding Discharge conveyor after Grinding of Sprues.
  - 1.2 However, the Machines shall be designed for removal of Sprues in line with plate surface, riser pads unevenness within Sprue area and plate grinding within Sprue area for different types of cast steel wheels (BOXN, BGC, EMU & BLC) manufactured by Railways as per drawing attached as **Annexure-2**.
  - 1.3 The machine shall be designed to work 24 hours continuously six days in a week without any attention excluding time taken for tool changing and preventive maintenance schedule throughout the year except for the period of Annual Maintenance shutdown of 15 days in a year.
- 2.0 At present 04 nos. Sprue Grinding Machines installed & in- service at RWP-Bela. Railways intend to procure two (02) additional machines in place of existing 02 machines (Machine No-2&3) to match the overall cycle time of 06 minutes per wheel for each machine. The existing machines will be dismantled & handed over to Railways. Supply of all concomitant accessories as per **Schedule-1(b) of Annexure-1** of this tender. Details scope of work attached as **Annexure-B**.
- 2.1 The contractor will provide the list of spares to be maintained during warranty and AMC period for SPG system.
  - 2.2 Supply of special tools, if any.
  - 2.3 Execution of connected Electrical and required Civil works for both 02 nos. new as mentioned in Para- 2.0 above.
  - 2.4 The machine data such as approximate weight, vibration level etc. shall be furnished.
  - 2.5 The time required for grinding wheel change and its frequency shall be furnished. Locating and Securing the railway wheels to the work holding assemblies of the machine. The tread to be used for location as shown in the attached drawings.
  - 2.7 The system shall be sufficiently flexible to handle different sizes of wheels with minimum adjustment or Nil adjustment.
  - 2.8 Details of the Sprues of different types of wheels as shown in Drawings attached.
  - 2.9 Grind the cope surface within the Sprue area so as to remove the uneven surface including the riser pad unevenness within the Sprue area.
  - 2.10 Deliver the wheel to the existing conveyor leading to the number stamping machine.
  - 2.11 The surface finishes after the grinding operation shall be N-10 or better.
  - 2.12 The grinding operation shall not affect the parent metal in any way. It should not produce any crack including micro cracks or burns on the parent metal or change the property of the parent

metal. After grinding operation is completed, the temperature of the cast steel wheels shall **not be less than 350°C** to meet the process requirement in the subsequent stations.

- 2.13 Each grinding station shall have its own wheel holding fixtures, grinding tools for grinding and onward transmission device with independent prime movers.
- 2.14 The tenderer must follow the standardization of parts during design of machines i.e., must ensure interchangeability of mechanical spares of both SPG's machines. Every effort shall be made to have standard gear ratio and motor speed for easy maintenance, inventory, interchangeability, etc.
- 2.15 The existing Sprue Grinding wheel discharge conveyor, support structure of wheel loader, wheel trolley can be used for the new machine. However, any design modification required to meet the cycle time must be done by tenderer without any extra cost.

### **3.0 Cycle Time and Production Rate**

- 3.1 The cycle time for each machine for the standard 1000 mm wheel namely BOXN wheel is 06 minutes per wheel. The Cycle starts from pickup of wheels from SPG Trolley and ends with placement of wheels on SPG Discharge conveyor after Grinding of Sprues.
- 3.2 The tenderer should clearly indicate productivity of standard BOXN wheels in an 8-hour shift with an efficiency of 95%, using the required grinding wheels. Full details of loading, metal removal and unloading cycle time for standard BOXN wheel should be clearly indicated in the bid. The tenderer shall submit a detailed process sheet for the extent of various operation planned giving details of operation wise, speed, feed, rate of metal removal etc. The successful tenderer will be required to demonstrate the claimed productivity.
- 3.3 The consistency of operation and repeatability shall be indicated by the manufacturer, which is expected to be cent percent.

### **4.0 Utilities Standards**

- 4.1 Electric Power      415 V/3 phase/50 Hz AC 230V/Single Phase/50 Hz AC
- 4.2 Compressed Air      4.5 Kg/cm<sup>2</sup>
- 4.3 Water      2 Kg/cm<sup>2</sup>

### **5.0 General Design Data**

- 5.1 **The wheel loader arrangement should be suitably designed with counterbalance and hydraulic/ servo-controlled movements or both to eliminate slipping, jerking & Free fall in all moving conditions.**
- 5.2 The machine shall be fully functional when installed, commissioned, and connected to a power source.
- 5.3 The equipment shall have both automatic and manual mode.
- 5.4 The Hot Sprue Grinding Machine shall be designed for severe continuous duty cycle.
- 5.5 The bought-out items shall be of reputable make/brand, which are to be approved by Railways. The bought-out items shall conform to the latest ISO 9000/ISO 14000 quality standards.

- 5.6 The tenderer shall furnish a type of oil to be used for hydraulic power pack.
- 5.7 Only Viton seals shall be used in the components of total hydraulic system.
- 5.8 Suitable capacity of chiller unit installed with new Sprue Grinding Machine. If Water is used for cooling medium of Hydraulic oil used for Hydraulic & Spindle Power pack, suitable capacity distilled water plant is to be installed for feeding of process water to overhead stainless-steel water tank of suitable capacity to feed chilled water to chiller unit. The scope of work mentioned in **Schedule-1(b)-A of Annexure-1**. Detail scope of work attached as **Annexure-B**.
- 5.9 The hydraulic pipes shall undergo pickling process before being fitted in the equipment.
- 5.10 Due care shall be taken during the design of the grinding machine, as these machines are proposed to be placed on the floor below which a basement exists. The selection of material for the sub-assemblies and components of the grinding machine shall not in any way result in forming scoring marks or impression/dent on any part of the wheel.
- 5.11 All bearings used shall be heavy duty of reputed make such as SKF/FAG/TIMKEN/INA.
- 5.12 Any other accessory/equipment, which the manufacturer considers essential to make the machine fully operational, when installed and commissioned connected to power source and give the specified output/productivity will be supplied by tenderer without any extra cost.

## **6.0 MACHINE STRUCTURE**

- 6.1 The machine should be rigid and of sturdy construction. It should be designed to meet heavy-duty demand of grinding of various types of wheels (BOXN, BGC, BLC& EMU) within the maximum rated power utilization and should be free from undue vibration and chattering while working on full load, without distorting the required profile.
- 6.2 All machine castings wherever used should be manufactured using FG 260 cast iron to IS:210 or SGCI cast iron similar to "Meehanite". The casting including the base should be stress relieved or suitably aged to eliminate distortion there by preventing loss of accuracy in equipment life.
- 6.3 The fabricated structures wherever involved should be sound and the welding should be flaw free.
- 6.4 The machine shall operate in automatic mode. Provision should also be kept for manual mode with all operating controls located preferably on a swivel-able pendant or positioned within the easy reach of the operator and should be of push button type clearly color coded and/or marked with user friendly symbols. In other words, the equipment should have both "Automatic" and "Manual" modes.
- 6.5 The International/Indian specification to which the material conforms should be indicated.
- 6.6 **The machine shall incorporate following Design Features: -**
  - a) Provide complete protection to the operator and the machine from all possible operational failure's damages.
  - b) Suitable arrangement to observe vibration of X-axis & Z-axis during Grinding operation in digital display and HMI.
  - c) Firm an utilize the existing Sprue Grinding wheel discharge conveyor, support structure of wheel loader, wheel trolley can be used for the new machine. However, any design



modification required to meet the cycle time must be done by the tenderer without any extra cost.

- d) The movement in X & Y axis should be suitably designed to bear the impact load, vibration, jerks generated during grinding operation. A suitable mechanism must be provided to reduce or damp the undue vibrations generated during wheel grinding operation.
- e) **The wheel loader arrangement should be suitably designed with counterbalance and hydraulic/ servo-controlled movements or both to eliminate slipping, jerking & Free fall in all moving conditions.**
- f) Provide suitable interlocking against -
  - i) Faulty sequences of operation.
  - ii) Sudden power failure.
  - iii) Fluctuation of supply voltage.
  - iv) Faulty receipt of wheels.
  - v) Failure of lubrication.
  - vi) Excessive Vibration during grinding
  - vi) Failure of hydraulic/pneumatic system, if any.

**7.0 Besides the above the equipment must include the following features:**

- a) All safety devices have a mechanism against overloading.
  - b) Safety device for drive mechanism against overloading.
  - c) An emergency “Stop” should be provided to interrupt all machine functions whenever required at an easily accessible and convenient location.
- 8.0 The Equipment shall have necessary guarding and chutes which can be connected to the existing dust collection system. The Overall system shall have an efficient system for collection/removal of grinding dust/other metallic and non-metallic refuse. The details of all safety and interlocking devices should be explained in the offer.
- 8.1 The equipment should meet pollution control norms and airborne suspension particles limits and shall comply with the Factory’s Act rules. Adequate protection/safety guards shall be provided to prevent accidents.
- 8.2 The tenderer is requested to make sure that the design of the equipment shall take care of the respective standards of ISO-14000.
- 8.3 Each grinding machine shall have a sufficient system for collection/removal of grinding dust, refuse etc.
- 8.4 Adequate accessories shall be added to ensure a pollution-free atmosphere with respect to air, water, and noise pollution.

**10.0 SPECIFIC DESIGN DATA**

**10.1 Grinding head and drive arrangement**

The grinding head with suitable drive arrangement shall have provision to rotate the grinding wheel, to move the grinding head forward or reverse and to pivot the grinding head up & down to match the contour of the wheel held in the manipulator. Details are described below.

- a) The grinding Spindle shall be mounted on a spindle housing supported at both the ends by heavy duty bearings of reputed make like SKF/FAG/TIMKEN. The bearing selected shall be able to arrest the lateral movement of the spindle inside the housing during rotation and avoid

vibration during grinding operation. The spindle shall be directly coupled to the heavy-duty electric motor through a coupling. The direction of rotation of the motor shall be same as that of the rotation of the wheel held in the manipulator. The grinding head shall be moved on the guide ways forward or reverse by connecting it directly to a hydraulic cylinder or Servomotor. The rate of feed and the movement of the grinding head cylinder shall be variable through precise controls.

- b) The grinding head shall have compound movement, one to lift and lower the grinding head and another forward and reverse movement of grinding head by individual servo motors or Hydraulic Cylinders to bring the grinding wheel in proximity to contact the Sprue and riser pad areas of the cast wheels. The compound movement shall be achieved by controlling the movement of the servo motors through variable precise control to suit the different sizes of wheels (BOXN, BLC, BGC & EMU)
- c) Further, the compound movement of the grinding head and positioning of the manipulator with wheel shall be thoroughly synchronized so that the grinding wheel shall not touch the hub or any other portion of the wheel except Sprue and riser pad area of the wheel during or after grinding the Sprues and riser pads of the cast steel wheel.

### **10.2 Hot Sprue grinding station.**

The proposed grinding station equipment's shall consist of the following.

- a) A manipulator for clamping, positioning and rotation of the hot cast steel wheel for grinding of Sprues and risers.
- b) Grinding head to accommodate the grinding wheels and suitable drive arrangement for the grinding wheel positioning, rotation, and manipulation of grinding wheel for removal of Sprues in line with plate surface and unevenness of riser pads and plate within Sprue area.
- c) Grinding wheel for grinding Sprues and unevenness of riser pads within Sprue area. Also, grinding of cope surface within Sprue area to the required depth to remove the any uneven surface in plate area is required.

### **10.3 Hot cast steel Wheel Manipulator**

- a) The manipulator shall have an arrangement to receive the hot wheel, clamp it properly, swing it from vertical to near horizontal and rotate the wheel in the tilted position. The hot wheel shall be clamped at the tread portion of the wheel. The clamping force and the material of the clamping arrangement contacting the hot wheel shall be such that it shall not create any scoring mark or dent on the surface of the wheel.

The clamping arrangement of manipulator shall be such that it can accommodate different sizes of wheels (BOXN, BGC, BLC & EMU) as mentioned in the attached drawing in **Annexure-2**

- b) There shall be an arrangement in the manipulator to tilt the frame after clamping the wheel by a hydraulic cylinder or servomotors to make the wheel from vertical to near horizontal according to the requirement of the different types and sizes of the wheel. The rate of speed and movement of the cylinder or servomotor shall be variable through precise control to suit the contour of the plate surface of the wheel.
- c) There shall be an arrangement to rotate the wheel in clamped and tilted position. The direction of rotation of the wheel shall be same as that of the direction of rotation of the grinding wheel. The speed of the rotation of the wheel shall be variable to suit the different types and sizes of cast wheels.
- d) The manipulator shall tilt the wheel to horizontal position with back hub face on top and flange in up position as required at stamping machine.

### **10.4 Hydraulic System**

10.4.1 The hydraulic oil tank, pump, electric motor chiller unit etc. shall be free standing to eliminate effects of hydraulic oil temperature on the machine.

10.4.2 Seamless hydraulic pipe circuits shall be suitably designed, and pipes adequately clamped without undue strain on pipe joints.

10.4.3 The system should be provided with suitable in line gas accumulators, to safeguard against pressure surges and to hold the job while grinding in case of hydraulic failures.

10.4.4 The pump aggregate should have the following provisions.

10.4.4.1 Dust proof cover with single slot for entry of air, which should be filtered.

10.4.4.2 Oil level sight gauges or any other equipment showing the minimum and maximum oil levels in the tank.

10.4.4.3 A suction side filter having filtration capacity up to 40 microns or less at the inlet of the pump. Line filter capacity should be 25 microns or better at the pump outlet.

10.4.4.4 A magnetic drain plug at the lowest portion of the tank. The tank shall be located in such a way so that oil can be drained out without disconnection of pipes.

10.5 Suitable capacity of chiller unit installed with new SPG machine. If Water is used for cooling medium of Hydraulic oil used for Hydraulic & Spindle Power pack. suitable capacity distilled water plant is to be installed for feeding of process water to overhead stainless-steel water tank of suitable capacity to feed chilled water to chiller unit. The scope of work mentioned in **Schedule-1(b)A of Annexure-B**. All work related to chiller unit, distilled water plant & SS water tank of suitable capacity is in firm's scope. Integration of chiller unit, distilled water plant & SS water tank with 02 nos. new Sprue Grinding Machines is in Firm's scope

10.5.1 Hydraulic circuits must be equipped with the following safety and inspection equipment.

10.5.1.1 Pressure gauges at all places where pressure must be set or inspected.

10.5.1.2 Safety valves for every hydraulic circuit.

10.5.1.3 Suitable filters (magnetic and media screen) shall be provided to ensure a clean supply of oil. A reusable filter after due cleaning will be preferred. The type of filters provided, their estimated life and the stipulated cleaning process should be indicated in the offer. These filters shall be located at easily approachable points. Sufficient spare filters shall accompany the offer.

10.5.1.4 The system should have warning light/siren indication for:

Clogged filter	:	Excess pressure
Low oil level	:	High oil temperature
Vibration Level	:	Low, Medium, High
Water Temperature	:	Low, Medium, high

10.5.2 The hydraulic system and elements used in the machine shall be of reputed and well-known make and preferably from M/s Eton/Rexroth/Parker/Yuken.

10.5.3 The temperature of oil in hydraulic circuits shall not exceed 60°C in any case. Suitable arrangements shall be incorporated to ensure that the oil is not overheated under local weather conditions at continuous normal working of the machine.

10.5.4 Facilities for bleeding air in case of air lock shall be provided.

- 10.5.5 The hydraulic reservoir, pump and allied equipment shall be suitably segregated from the machine to remove major source of heat.
- 10.5.6 Hydraulic oils used on the machine shall be available in India, Successful tenderer will be required to indicate brand names of approved oils supplied by various Indian Oil Companies
- 10.5.7 The first fill of hydraulic oils used on the machine shall be provided with the machine.
- 10.5.8 Gauge Isolator must be provided. Pressure Gauge must be provided at power pack as well as at the end user point for ease in Maintenance.

#### 10.6 **Lubrication**

- 10.6.1 An automatic lubrication system covering all the bearings (including runner block of X&Z-axis), driving gears, feed screws, guide ways of the cross rails. Saddle and slideways and all other moving parts and components shall be provided. Details of the lubrication system offered should be indicated in the offer.
- 10.6.2 All lubricants used in the machine shall be available in India. For the bidders outside India, at least two Indian equivalents of each type of lubricant shall be indicated along with the bid.
- 10.6.3 The system shall be provided with interlock to prevent machine operation/starting in the event of failure of lubrication system. An indicator for the lubrication system failure/clogged pipeline shall be provided. Sufficient Nos. of visual indicators shall also be provided. Protection against excess pressure and low lubrication oil pressure should be provided. Complete details in this regard should be fully explained in the offer.
- 10.6.4 The filling points and the periodicity of checks should be clearly displayed on the machine.

### 10.8 **ELECTRICAL SPECIFICATIONS**

#### 10.8.1 **Scope**

The scope of supply of electrical items under this work includes the following:

- a) CNC system of required configuration and capacity to meet the specification requirements. CNC should be compatible to Industries 4.0. The CNC should be of given make listed in GENERAL SPECIFICATION FOR SUPPLY OF M&P Para 22.02
- b) All the field devices such as the servomotors, encoders, limit switches, solenoids, pressure switches, push button stations pendent operators' station.
- c) Suitable AC spindle drive with motor, feedback devices like tacho-generators, switchgear etc all complete.
- d) Suitable CNC and PLC Programming terminal with valid license key and software should be provided in each control panel separately
- e) Control panels duly incorporate the panel air conditioning and dust proofing arrangement.
- f) The CNC and VVFD used should have latest version and its service and spare support should be available for sufficient time. The contractor should give a certificate from CNC/VVFD manufacturer for the existence of the CNC/VVFD Spare and Service support to be remain available for sufficient time.

#### 10.8.2 **CNC System for Grinding**

The machine shall be provided with CNC control having adequate/appropriate control over the number of axes for the grinding operation of Wheel plate and removal of Sprues and risers as described in Mechanical part of the specification.

The system shall have accurate Electro hydraulic / Servo positioning control with capacity to position rapidly and retract rapidly a table load of appropriate weight as per the design, (Table carrying spindle drive and grinding wheel assembly etc.)

The required number of axis and the configuration selected shall be indicated by the tenderer to match the requirement of the special purpose grinding machine operation. The CNC control shall be preferably of Siemens (Germany) or Fanuc latest series.

### **10.8.3 Operators Panel and the MMI**

There shall be provision:

1. Of a slim line 19"operator panel with 14" colour monitor.
2. To indicate Auto or manual mode.
3. Selection and indication of Edit mode.
4. Indication of Tool position (grinding wheel) in terms of radial distance of wheel being ground and depth from the hub.
5. Status of axis movement/dwell.
6. Spindle speed (Grinding wheel).
7. Wheel rotating speed.
8. Feed rate.
9. Tool offset and control of the same.
10. Emergency stop.
11. Selection operation through MDI or Floppy drive.
12. Membrane type switches and selectors.
13. Facility of machine lock, machine lock on each axis, auxiliary function lock and dry run shall be available for checking the program.
14. Facility of program search using program name or program number shall be available. It shall be possible to select the sequence number required to be searched.
15. The CNC control shall perform various kinds of diagnostic checks and display error status, if any, in plain English text.
16. It shall be possible to store program numbers and program names for identifying the program. The number of characters in the program name shall be indicated.
17. To facilitate programming, it shall be possible to program angles, chamfers, corner-rounding values from the machining drawings by direct inputting of these values.
18. Data protection key shall be provided. It shall prevent the program-offset parameters, data etc. from being registered, modified, or deleted erroneously.
19. The stored stroke limit shall be provided thus enabling creation of forbidden zones where the cutting tool (grinding wheel) may not travel.
20. Shall be possible to return the machine tool to the reference point through program commands as well as manually.

21. Provision of adequate tool offsets (with 10% extra provision) to compensate for the difference of tool actually used (Grinding Wheel) to the imaginary tool used in programming shall be available. It shall also be possible to enter tool offsets through programmable command.
22. Absolute/incremental programming shall be available. It shall be possible to use both of them in the same block.
23. The part program shall be protected in the event of power failure. An automatic tool withdrawal facility in the event of power failure shall also be available.
24. Feed rate command shall be available in mm/min. and inch/min.
25. CNC PART Program PLC part program should be configured so that machine federate to be taken in closed loop with grinding motor current, vibration.
26. The manufacturer's infrastructure for repair and maintenance of the control, particularly for repair of PCBs in India, shall be commented upon in detail in the offer.
27. CNC control cabinets shall be air-conditioned and tropicalized.
28. Facility to withdraw the grinding wheel in case of the rotation of either cast wheel or the grinding wheel is stopped.
29. The input resolution and position control resolution for linear axis (least input increment) shall be designed to match the requirement of N-10 finish after the grinding operation.
30. For manual positioning, provision of manual pulse generator shall be available.
31. Software should be comprehensive to interlock electrically the MHS (Material Handling System i.e. Conveyor) with the loading and unloading operation of machine.
32. Auto grinding wheel wear compensation shall be provided, the rate of which can also be set by the operator based on the experience of wear rate.

**10.8.4 Graphic Programming for the following Operations are required.**

1. Simple program developments supported by graphics.
2. Easy operation using windows.
3. Programming directly on machine tool.
4. Fast modification of existing program.

**10.8.5 Integrated safety functions for the protection of Personal and Machine.**

1. Safe reduced speed.
2. Safe operations stop.
3. Safe standstill.
4. Safe stopping process.
5. Safe limited absolute position.
6. Safe limit switches.

7. Safe cams.
8. Safe relevant input/output signals.

#### **10.8.6 CNC Hardware**

The CNC system offered shall be of standard make having features specified and the other components selected shall match the quality and performance at the ambient temperature (55<sup>o</sup> C max.) specified. Prior approval of Railways is invariably required regarding the making of all the CNC components and peripherals.

- 10.8.6.1 **Servo drive:** AC servo drives (AC servo amplifiers) shall be adopted for the control and positioning of the machine. Positioning of the swing frame assembly and feed frame assembly shall be achieved in such a way before starting of grinding, during and after grinding cycle to affect the grinding off of the Sprues and risers from the wheel face meeting the required finish (N-10), dimension and the production rate. The speed of rotation of grinding wheel, the speed of wheel being ground, the feed rate and the rate of correction for positioning shall be selected according to the need of specifications.
- 10.8.6.2 **Servo valve:** The servo valve if used shall be of close loop type having facility to adjust the null position and gain. The valve shall drive the positioning cylinder, which position the table of the weight as per design. Finer positioning with the rate and accuracy to achieve the specified finish shall be possible without any oscillations, hunting, or jerks.
- 10.8.6.3 **Position feedback elements:** Digital linear/rotary encoders suitable to the range and accuracy shall be employed.
- 10.8.6.4 **Spindle drive:** AC, frequency variable (PWM) spindle drives shall be employed for the grinding spindle. Speed and capacity shall be commensurate with the grinding job specified to meet the requirement of the cycle time and production rate. The VVFD should have been equipped with DBR facility.

#### **10.8.7 Control Circuits and Accessories**

- 10.8.7.1 The control circuit voltage shall be 110V AC, 50 Hz AC, from a Transformer with an isolated secondary winding and it is protected against overloads and short circuits. For CNC components, I/P, O/P HMI,MCP, Servomotor brake, 24 VDC, from a regulated DC Power supply within the machine control unit may be used as per requirement.
- 10.8.7.2 Main spindle Drives shall be interlocked with feeds to ensure that spindle drives are energized before, while in Auto cycle.
- 10.8.7.3 Automatic return of Feed frame assembly to its starting position, after completion of its feed cycle.
- 10.8.7.4 Proper clamping of the cast wheel shall be indicated by a suitable indication device/lamp before the start of the grinding cycle.
- 10.8.7.5 The control circuits shall be suitably interfaced with material handling equipment (conveyors).
- 10.8.7.6 The switch gear for AC Motors and other controls shall be designed to match the control supply of 110V AC, 50 Hz, and conform to IS 13947 pt. I to 5 /IEC/BS Specs.
- 10.8.7.7 The Jog or inch circuits shall be so designed, that automatic operation shall be prevented, during jogging.
- 10.8.7.8 All AC Motors shall be protected by Motor circuit protectors, for safe operation of the Motors.

10.8.7.9 The Motor shall have IP-54 protection and above.

**10.8.8 Operator Control Station**

10.8.8.1 The operator Control station shall be a fixed control station and shall be dust proof, moisture proof, oil proof, and vermin proof with IP 55 protection.

10.8.8.2 The controls shall be within easy reach of the equipment operator and does not have to cross or reach other moving parts, which may cause injury.

10.8.8.3 Control devices shall be free from the possibility of accidental operation by normal movement of the equipment or operator.

**10.8.9 Control Equipment's and Devices**

10.8.9.1 All control devices such as CNC field devices like Limit switch, Selector switch, and Pressure switch shall conform to latest revision of IS/13947 or BS or IEC specification.

10.8.9.2 All Control devices shall be oil tight type and indicating lamps shall be preferably transformer mounted integral with Lamp base or LED type.

10.8.9.3 Emergency Push Buttons shall be Mushroom type red coloured of Push to stop type. Colour coding shall be:

Stop:	Red colour
Start:	Green colour

10.8.9.4 All "Start" Buttons shall be mounted above, and to the Left of "STOP" button and shall be in "Green" colour.

10.8.9.5 Inscription plates shall be provided for all Push Buttons, selector switches and field devices.

10.8.9.6 Field devices shall be unaffected by coolants, oil and shall not make Electrical contacts causing Malfunctioning.

10.8.9.7 Field devices shall be fitted firmly in oil proof enclosures and provision for earthing is required.

**10.8.10 Control Panels**

10.8.10.1 The Control Panels shall be dust proof, vermin proof, made of 14-gauge thick sheet steel cubicle, painted in 'olive' green color, having provision for cable entry, earthing points and adequate lighting is required inside panel.

10.8.10.2 Control Panel doors shall be side-hinged type and door opening shall not affect the machine movements.

10.8.10.3 The control panel shall be located at suitable locations, such that no accidental contact with machine or forklift movement takes place.

10.8.10.4 The control panel shall be kept above the operating floor of the shop and shall be readily accessible.

10.8.10.5 The Terminal Blocks and control devices such as control relays, O.L. relays, timers, counters shall be rigidly fixed and readily accessible for maintenance and suitably placed.

10.8.10.6 The door opening of the control panel shall be adequate and convenient for servicing and maintenance.



- 10.8.10.7 In case enclosures are mounted on machine, the button of enclosure shall be 600 mm minimum above floor.
- 10.8.10.8 Panel mounted Air conditioning units shall be used with Dehumidifiers and non-concentration of moisture.
- 10.8.10.9 Drawing packets shall be provided on each panel.

**10.8.11 Control Cables and Wiring**

- 10.8.11.1 PVC insulated, copper conductor, multi-stranded cable of suitable size shall be used for control circuit with number ferrules at each end and crimped terminal ends (lugs). No wire joints shall be used. Make of cables shall be UNISTAR, FINOLEX, INCAB, POLYCAR, HAVELS, UNIVERSAL and generally conform to IS-694 or IEC or BS Specs. Multi-core cable can also be used of above makes and standards.
- 10.8.11.2 The color coding as per standard practices are given below:
  - I) AC CONTROL CIRCUITS: RED.
  - II) DC CONTROL CKTS: BLUE.
  - III) GROUNDING CONDUCTOR: GREEN.
  - IV) INTERLOCKING CONTROL CKTS: YELLOW.
  - V) LINE AND POWER CKTS WITH MARKING 'R','Y','B' SEQUENCES BLACK.
  - VI) Additional color may be used wherever necessary with mentioned in drawing.
- 10.8.11.3 Whenever Control cable length is more from field devices, pull box/Junction box shall be used. Junction boxes shall be dustproof and oil tight.
- 10.8.11.4 There shall be no exposed live terminals outside of control panel, junction box etc.
- 10.8.11.5 Power cables of adequate capacity shall be used depending upon the HP of motor, starting and running current of motor.
- 10.8.11.6 Control cable shall be supported firmly in panel Wire ways; raceways and it shall not be 60% of area/volume in full. No metallic parts shall be used. Only insulating material like Tags, Tapes shall be used for binding.
- 10.8.11.7 The power and control signal cables shall be separated wherever required, preferably to prevent damage and interference.
- 10.8.11.8 The wiring shall be so carried out using Multi-pin plugs/Receptacles so that equipment shall be detachable in case of shipments for ease of packaging.
- 10.8.11.9 The wiring of control cable and Power cable shall be carried out in oil tight rigid metallic conduit and Metallic Reinforced Flexible conduits of "ANACONDA" Make or Similar. Suitable oil tight fixtures shall be used to withstand external Forces, foreign particles like metallic chips and entry of oil, coolant etc. into conduits. The size of conduits shall be such that only 60% of area is occupied by control cables with sufficient Spare Cables be provided for future usage.
- 10.8.11.10 Control and power cables to the moving parts of machine, shall be carried in "cable drag chain" of suitable size to make it possible to feed power to these parts and to prevent entry of Metallic chips into the conduits etc.

10.8.11.11 All sharp edges, burrs, rough surfaces with which insulation of control cables may be damaged, shall be removed from Rigid and flexible conduits and its accessories.

10.8.11.12 All wiring external to control panel enclosure shall be terminated at suitable terminal blocks in enclosures, suitably numbered as given in drawings.

10.8.11.13 All the Boxes shall be oil tight with suitable Lock nuts, Gaskets and necessary earthing connection. They shall be numbered for identification.

#### **10.8.12 Motors for Auxiliary Equipment**

10.8.12.1 All AC motors are preferably foot mounted/flange mounted, TEFC, continuous duty, with class 'F' insulation, 3 PH, 415 V AC +/- 10%, 50 Hz +/- 3%, up to 100 HP capacity, with single end shaft, anti-friction bearings and conforming to IS: 325 and IS: 1231, makes of Kirloskar, NGEF or SIEMENS. Other makes shall be preferably with ISO 9002 certification. The motor should have energy efficiency class IE-3 or the latest.

10.8.12.2 Mounting of Motors shall be easily accessible for maintenance and shall be rigid with mounting on Foundation Bolts and accessories.

10.8.12.3 All Motor shall have Name Plate with complete details and protection to IP.54.

#### **10.8.13 Safety Controls**

10.8.13.1 The machine shall incorporate safety devices to provide protection to the operator and machine against all possible operational and machinery failures.

10.8.13.2 Suitable interlock shall be provided to prevent machine operation in the event of:

- Faulty sequence of operation.
- Fluctuation in supply voltage.
- Resumption of power supply after power failure.
- Non-provision or improper provision of safety guards.
- Failure of Hydraulic system (where applicable).
- Failure of lubricating system (In case of automatic, including drop in pressure lubrication).

10.8.13.3 A fault or damage in the control circuit or interruption or re-established after an interruption of fluctuation in the power supply (in whatever manner maybe) to the machinery must not lead to dangerous movements/situations, particularly in the following situation.

- The machinery must not start unexpectedly.
- The machinery must not be prevented from stopping if command has already been given.
- No moving part of the machinery or piece held by the machinery shall fall or be ejected.
- The protection devices must remain effective.

10.8.13.4 The machines shall be fitted with an emergency stop device to enable actual or impending danger to be averted. This device must be

- Conveniently located.
- Clearly identifiable.
- Stop the machine as quickly as possible without causing additional hazards.

- The emergency stop must remain engaged. It should be possible to disengage only by appropriate operation. Disengaging the control must restart the machinery but only permit restarting.
- 10.8.13.5 Safety features shall also include safety devices, against overload for all mechanical and electric items, to the extent possible. Safety stops against over-running of slides.
- 10.8.13.6 Guard and protection devices shall protect exposed persons against risks related to moving transmission parts (such as pulleys, belts, gears, rack and pinion, shafts etc) and moving parts directly involved in the process to the extent possible. This shall meet the following requirements.
- Be of robust construction.
  - Not give rise to any additional risk.
  - Not be easy to bypass or render nonoperational.
  - Be located at an adequate distance from danger zone.
  - Cause minimum obstruction to the view of the production process.
  - Rigidly connected and not prone to rattling.
  - Enable essential work to be carried out without the guard or protection device having to be dismantled.
- 10.8.13.7 A load meter shall be provided to indicate the load on the machine. The meter shall have a suitable mark to indicate the maximum load that machine can take. Full details of the above and other safety features indicating how each one function must be explained in the offer.
- 10.8.13.8 Separate Plate earthing to be made for each machine and connection to be done in machines and electrical panels.

## **11.0 Foundation**

It will be preferable if the machine can be installed on heavy duty flooring without any foundation. In case the separate foundation is essential, the design of the foundation should be adequate and simple to construct. The design of the foundation of the machine shall be such that it can be installed on the existing structure without affecting the strength. The supplier shall furnish six copies of the foundation drawing and related diagram, giving over all dimensions, foundation details including RCC and other dimensions details, electrical load and circuit drawings within six weeks from the date of acceptance of the tender.

## **12.0 Erection and Commissioning**

It shall also include receipt, storage, preservation, and conservation of all the items at the Railways site till the acceptance of the work as per the conditions of contract.

## **13.0 Warranty**

The warranty clause as laid down in the Special Conditions Clauses shall be applicable and the comprehensive Warranty period of 24 months shall be applicable from the date of acceptance of the complete works by Railways.

## **14.0 Inspection and Testing at Firm's Premises**

- 14.1 The grinding operation of the wheels either in cold conditions or in hot conditions shall be demonstrated pre-dispatch at the manufacturers works with respect to their workability and meeting the required parameters desired. The firm will have to submit indemnity bond

equivalent to the cost of wheels provided for Testing at firm's premises. Cost of wheels damaged during such tests will be deducted from firms payment.

14.2 The load test shall be carried out for the grinding machines at the manufacturer's works. The rigidity of the machines shall be demonstrated to the satisfaction of the authorized Inspector of Railways or the authorized Inspection Agency.

14.3 The manufacturer must have suitable facilities at their work for carrying various performance tests on the machines. The tenderer should clearly confirm that the facilities exist and shall be made available to the Inspecting Authority for conducting Performance Tests.

14.4 A sample inspection chart for inspection shall be supplied along with the offer. The inspection chart should indicate all the tests that are carried out during the manufacture of machines as required for the grinding machine. The tenderer shall submit a quality assurance plan being followed at the manufacturer's works for ensuring quality of the products offered.

**15.0 Training of Personnel:**

The Tenderer shall arrange suitable training of staff for the operation and maintenance of the grinding machine with conveyors as indicated in the following paragraphs.

15.1 The tenderer shall arrange to provide training for 8 persons for a period of 2 weeks (8 x 10 working days) at the manufacturer's works in operation and maintenance of the grinding machine. The boarding, lodging and travel expenses will be borne by the Railway.

15.2 The training for the maintenance of equipment shall include trouble shooting and repair of the machines covering all mechanical/ hydraulic/ electrical/ electronic/programming.

15.3 In addition to the above, Officers and Supervisors connected with the operation and maintenance of the equipment for 2 weeks shall be given training at plant site during commissioning.

**16.0 Maintenance Spares for Sprue Grinding Machines**

The required list of Spares to be maintained for comprehensive Warranty for 2 years and under comprehensive AMC for 5 years after expiry of warranty period of all four Sprue Grinding Machines & Wheel Feeding System must be submitted along with tender.

At the time of commissioning the tenderer must submit Make/Model, Sr no., Source of supplier with their contacts in India, as built drawing of each spare and sub-assembly of the machine.

A tentative list of Sares are as under

SN	Description of Spares	Make/Model	Unit	Quantity
<b>Mechanical Items</b>				
1	Each type of Geared motor	As approved Drawing	Nos.	01
2	Ball screw assembly with double nut , bearing & lock nut		Nos.	01
3	Bearing of each type		Nos.	05
4	Locknut of each type		Nos.	05
5	Timer pulleys each type		Nos.	02
6	Timer belt of each type		Nos.	05
7	Track Rollers of each type		Nos.	05
8	Clamping Cylinder of each type		Nos.	05
9	Electromagnetic brakes for clamping of ach type		Nos.	01
10	Door Cylinders of each type		Nos.	01
11	Idle roller each type		Nos.	02
12	Drive roller each type		Nos.	02
13	Drive gear shaft with pinion		Set	02
14.	Hydraulic Cylinder each type		Nos.	01
15.	Seal kit for Hydraulic Cylinder of Each type		Set	05
16.	Repair kit of geared drive each type consists of all types of seal, pinion, brake assembly & Rectifier		Set	02
<b>Electrical Items</b>				

1	Each type of CNC Card, modules.	As approved Drawing	per	Nos.	20 % of the total installed items or Minimum 01 Nos. whichever will higher.
2.	Each type of PLC parts		Nos.		
3.	MPCB each type and rating		Nos.		
4.	MCCP each type and rating		Nos.		
5.	MCB each type and rating		Nos.		
6.	Aux. Contactor each type		Nos.		
7.	Power Contactor each type and rating		Nos.		
8.	Servomotor each type and rating		Nos.		
9.	Induction Motor each type and rating		Nos.		
10	VVFD each type and rating		Nos.		
11.	Push Buttons, Selector switches, LED Indicators each type		Nos.		
12.	Sensors, Limit Switch each types and ratings.		Nos.		
13.	Isolation Transformers Each types and Rating		Nos.		
14	Any other Critical items suggested by OEM		1 LOT	1 LOT	

**16.2 Special Tools**

16.2.1 The tenderer shall supply special tools, if any, necessary for regular operation and maintenance of thee equipment.

16.2.2 **A portable hydraulic arrangement or Fixtures for fitment of Grinding Wheel is to be supplied with the machines.**

**17.0 Supply of Concomitant Accessories**

The tenderer shall supply concomitant accessories as per **Schedule-1(b) attached as Annexure-1** of this tender which are required for the grinding line. The cost of these concomitant accessories will be considered along with the total price offered for the machine.

**18.0 Documentation Required**

18.1 The manufacturer shall furnish six (6) sets of complete literature of major assemblies, sub-Assemblies, and spare part drawings with reference to construction details, materials used and other Technical parameters including operating manual, troubleshooting manuals and catalogues for brought out items.

- a. Tenderer shall provide all CD/Software with valid license key used in the machine.
- b. Tenderer shall provide all As Built Drawing (PDF), PLC program/CNC program, VVFD settings chart at the time of handing over.
- c. Detailed spare list with part drawing with vendor list to be provided.
- d. For bought out items make/model/sr. no & catalogue submitted after successful commissioning.

**LIST OF DRAWINGS referred**

<b>Sl.No.</b>	<b>Description</b>	<b>Drawing No.</b>
4	1000 MM DIA BOX N WHEEL FOR SPRUE GRINDING.	WAP/SK/M-153- Sheet-1 of 1
5	Cast Steel Wheel for BG Coaching	RWF/SK/M-343- sheet-III of 17
6	Cast Steel Wheel for EMU Wheel	RWF-W-III
7	840 MM Dia Wheel for Container Flat wagon (BLC)	WAP-WA-003 – Sheet-1 of 1

**PROVING OUT TESTS**

1. The contractor shall establish to the satisfaction of the Railways the operational capability of the automatic hot Sprue grinding machine to meet the standard of output stipulated in the contract. After satisfying himself that the equipment has been installed properly and necessary adjustments have been made the contractor shall inform Railways of the Performance guarantee tests enumerated in the following paragraphs. The Railway shall provide necessary wheels, electric power, compressed air and staff for assisting the contractor to carry out the performance guarantee tests under his (contractor's) supervision.
2. The tests shall be conducted for all types of wheels individually as indicated in the attached Drawing as per **Annexure-2**. However, the decision regarding selection of type of Wheels for PG test would rest with Railways Site Engineer. BOXN wheel will be taken as standard unit for computation purposes.

3. **PROCEDURE FOR PROVE OUT TESTS**

1. Successful bidder shall establish to the satisfaction of the Railways the operational capability of the automatic hot Sprue grinding machine with Conveyors to meet the standard of output stipulated. After satisfying, the equipment shall be installed properly, and necessary adjustments shall be made for the Performance guarantee tests enumerated in the following paragraphs. The Railway shall provide necessary wheels, electric power, compressed air, and staff or assistance to carry out the performance guarantee tests under supervision. The cost of Wheels damaged during Performance Guarantee test will be deducted from firm's payment. The cost of the wheels will be decided in terms of the date of opening of this tender.
2. The tests shall be conducted for one type of wheel as indicated in attached drawing as per Annexure-2. However, the decision regarding selection of type of Wheels for PG test would rest with Railways Site Engineer. BOXN wheel shall be taken as standard unit for computation purpose.
3. **The PROVE OUT Tests shall consist of-**
  - 3.1 Test for each item of the Sprue grinding machine under the contract, to establish its compliance with the operating characteristics and technical parameters, as stipulated in the technical specifications.
  - 3.2 The grinding machines shall work continuously for 24 hours per day for 6(six) working days. The working days need not be consecutive. The Performance of the grinding machines working continuously for 7(seven) hours in a shift of 8 hours shall be considered for the

performance guarantee test.

- 3.3 Successful bidder, in the aforesaid tests, shall prove that the grinding machines supplied by the contractor can remove Sprues in line with plate surface and grinding unevenness of riser pads and plate within Sprue area within 6 minutes. Each grinding machine shall comply with cycle time of 06 minutes per wheel for remove Sprues in line with plate surface and grinding unevenness of riser pads and plate within Sprue area from the standard BOXN Hot Cast Wheel. The Cycle starts from pickup of wheels from Wheel Trolley and ends with placement of wheels on Sprue Grinding Machine Discharge conveyor after Grinding of Sprues.
- 3.4 Successful bidder shall ensure the reliability of the grinding machines and conveyor during PG tests in such a way that there is no failure. However, a successful bidder should be permitted to carry out preventive maintenance of the grinding machines, if required, and the same shall be detailed in the bid.
- 3.5 If fails to demonstrate the Performance Guarantee test figures as indicated in 4 above, during the first instant, Railway shall permit us to carry out necessary modification and repairs to the equipment and to repeat the PG test.
- 3.6 The extra cost incurred by Railways for repeating the PG test, including modifications and repairs to the equipment, if any, shall be borne by the contractor.
- 3.7 The Railway shall issue an acceptance certificate after it has proved the operational capability of the work as defined in Para 3.3 and 3.4.
- 3.8 If firm fails to demonstrate the performance guarantee figure as stipulated in clause 4.3 even after repeated tests (total of 3 tests), the machine may be rejected.
- 3.9 All Other items which are not specifically mentioned in above scope of work but are necessary for efficient working of machine will be in firm's scope. The same should be considered by the firm while quoting the rates.**



**ANNEXURE-B**

**SCOPE OF WORK FOR SCHEDULE-1(b)-A**

**Name of Work: -Chiller unit for 02 nos. new Sprue Grinding Machines as per scope of work.**

**The scope of supply shall include: -**

- Suitable capacity of chiller unit will be installed with new SPG machine. If Water is used for cooling medium of Hydraulic/Spindle oil, suitable capacity distilled water plant to be installed for feeding of process water to overhead stainless-steel water tank of suitable capacity.
- The chiller unit should be capable of providing sufficient cooling to maintain the temperature of hydraulic oil in proper range in all working conditions. The tenderer must provide the capacity & specification of chiller unit and operating temp ranges of hydraulic oil along with its offer.
- A new Heat Resistant SS Water Tank of suitable capacity to be installed for storage of distilled water for chiller unit. All pipe connection to be done as per requirement & design for new Sprue Grinding Machines (02 Nos.)
- **All Other work which is not specifically mentioned in above scope of work but require for smooth running of machine is executed by the contractor without any extra cost.**

## **SCOPE OF WORK FOR Schedule-1(b)-E**

**Name of Work: Supply, erection and commissioning of Feeder Panel & applicable for all Sprue Grinding Machines and their accessories.**

Design, Supply Erection commissioning of Three Phase and Neutral 415V LV Switchboard to receive power source from Melt ESS by 04 different feeders and to Distribute To different SPG Feeders. Detailed Distributions are as below: -

<b>S.No.</b>	<b>Supply Received from</b>	<b>Switchgear Type</b>	<b>Separate Outgoing Feeder to</b>
1	ESS (SPG-1 Feeder)	MCCB, 800A	1. SPG-1 machines, 2. SPG1- VVFD 3. EOT Crane
2	ESS (SPG-2 Feeder)	MCCB, 800A	1. SPG-2 machines 2. SPG2- VVFD 3. Dust Collector System
3	ESS (SPG-3 Feeder)	MCCB, 800A	1. SPG-3 machines 2. SPG3- VVFD 3. Wheel Handling System
4	ESS (SPG-4 Feeder)	MCCB, 800A	1. SPG-4 machines 2. SPG4- VVFD

**Note: -**

- 1. The supplier may use the existing cable to feed the LV Distribution board and to connect the load. If additional length of cable or other accessories will be required, it will be supplied by Firms. All switchgears should be of reputable make.**
- 2. Location of the new Feeder Panel will be near the SPG CNC panel area.**

## **SCOPE OF WORK FOR Schedule-1(b)-F**

- 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 warranty period of 02 years for all the items supplied in **Schedule-1(i.e,1(a), 1(b) & 1(c))**. The tenderer will provide Preventive Maintenance Schedule of the machine to ensure availability of Sprue Grinding System more than 95%.
- During the warranty period this preventive maintenance schedule will be followed.
- The scope of works covers all items supplied in **Schedule-1(i.e,1(a), 1(b) & 1(c))**.
- The AMC covers both Mechanical & Electrical/Electronic parts of Sprue Grinding System.
- **The breakdown Maintenance in all three shifts (round the clock) will be in the scope of Tenderer during warranty period of 02 years.**
- If availability of Sprue Grinding System falls below 95% during warranty period of 02 years, penalty will be imposed as per Penalty clause mentioned in **Annexure-4**.
- **The warranty shall stand extended for the period of total breakdown time during warranty period.**

## **Scope of Work for SCHEDULE-1(b)-G**

**Name of Work:** - Uprooting of existing Sprue Grinding Machine (2&4) in Mould Room at RWP-Bela.

The followings conditions shall be followed during Uprooting:

- 1) The firm must submit its plan for uprooting the machine to Railway for approval.
- 2) It shall be ensured that all electrical power supply connections are disconnected before uprooting. Insulation of all live end wires. Proper shut down in that area with due intimation to SSE/Elec shall be ensured.
- 3) Removal of all coolant, oil and disconnect power pack hydraulic connections, if any.
- 4) The foundation of nearby machines shall not be affected. The machine should be moved out without damaging nearby machines and structure.
- 5) The arrangement of material handling equipment, gas cutters, etc., required for the uprooting and moving the M&Ps will be in the contractor's scope. Accessibility to the machines to be uprooted shall be examined & arranged by the tenderer wherever required.
- 6) The plan shall be submitted for uprooting & removal of M&P, and it shall be approved before commencement of the work.
- 7) After approval, the successful bidder shall obtain necessary permits like Work at height, hot work permit, excavation permit, entry permit etc., before commencement of the work.
- 8) The parts of uprooted machines were handed over to the concerned SSE/In charge (Mechanical & Electrical) of RWP-Bela.
- 9) The released machine to be placed at designated place decided by RWP-Bela.

**ANNEXURE-C**

**SCOPE OF WORK FOR Schedule-1(C)**

**Name of Work: -Design, supply & installation of EOT cranes of 5T capacity with support structure in Mould Room at RWP-Bela**

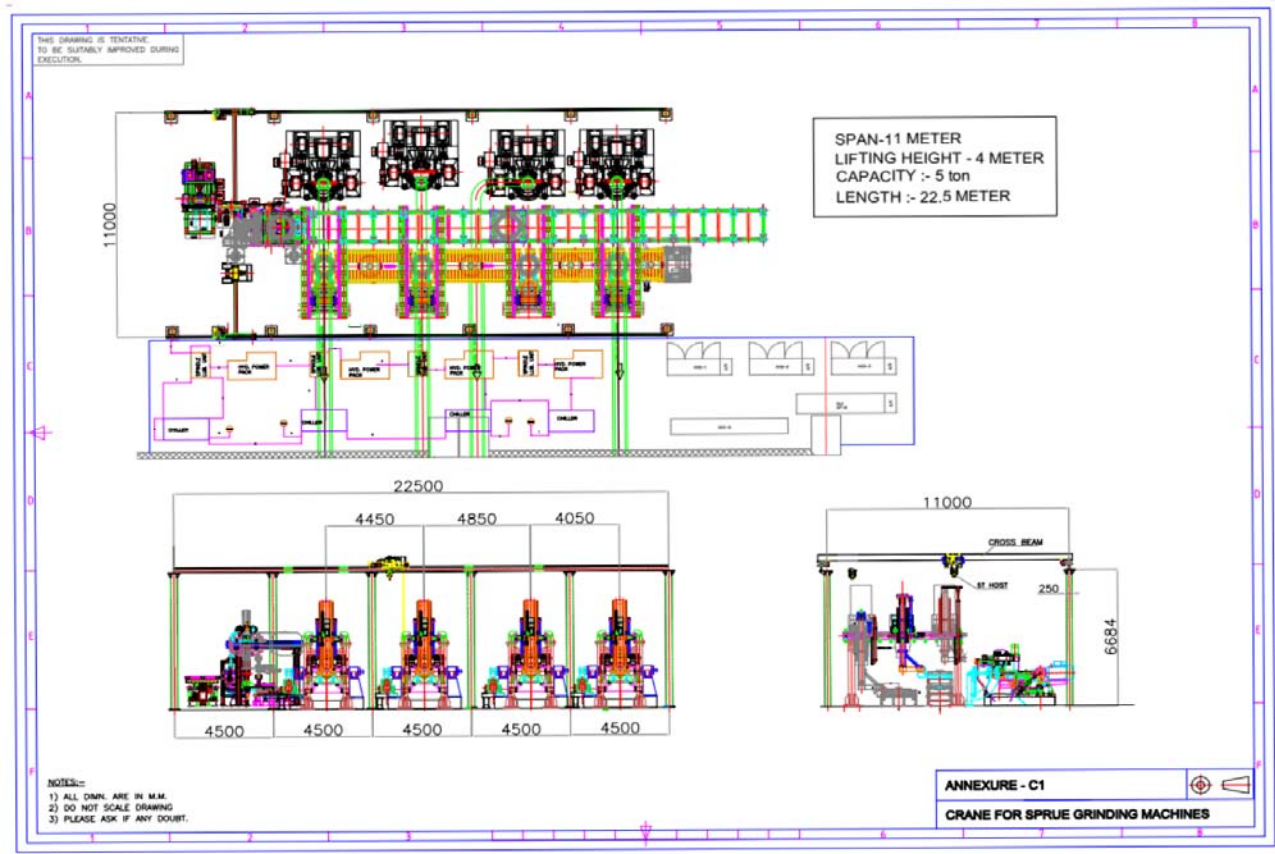
The scope of supply shall include: -

An overhead EOT crane will be provided above Existing Sprue Grinding Machine for uprooting of existing machine, installation & commissioning of new machine as well as Maintenance after commissioning. All the works for this arrangement like supply, Erection & commissioning of overhead EOT crane and support structure is in contractor scope. Power Supply arrangement from ESS to the crane feeder will be included in the work. All CIVIL work also in Contractor scope.

**Basic Requirement: -**

- 1) Gantry Span : - 11 Mtrs
- 2) Bay Length : - 22.5 Mtrs
- 3) Lifting Height : - 04 Mtrs.
- 4) Class-III
- 5) Pendant Control
- 6) Operating speeds (Loaded) in m/ min.
  - i) Main Hoist : - 8 m/min.
  - ii) cross Traverse : - 20 m/min.
  - iii) Long Travel : - 32 m/min.

## Details of 5 Ton Crane



### Maintenance Spares for 5T EOT Crane

The required list of Spares to be maintained for comprehensive Warranty for 2 years and under comprehensive AMC for 5 years after expiry of warranty period of 5T EOT Crane must be submitted along with tender.

At the time of commissioning the tenderer must submit Make/Model, Sr no., Source of supplier with their contacts in India, as built drawing of each spare and sub-assembly of the machine.

A tentative list of Sares are as under

SN	Description of Spares	Make/Model		Quantity
<b>Mechanical Spares</b>				
1	Each type of Gered motor	As per approved Drawing	Nos.	01
2	Bearing of each type		Nos.	05
3	Hook Assembly		Nos.	01
4	LT Wheel set		Nos.	01
5	CT wheel set		Nos.	02
6	Wire Rope		Mtrs.	01 full length
7	CT Gear box Assembly		Nos.	01
8	Equalizing pulley		Nos.	05
9	Pulley of each type		Nos.	01
10.	Shaft for CT wheel		Nos.	01
<b>Electrical Spares</b>				
1	MPCB each type and rating	As per approved Drawing	Nos.	20 % of the total installed items or Minimum 01 Nos. whichever will higher.
2	MCCP each type and rating		Nos.	
3	MCB each type and rating		Nos.	
4	Aux. Contactor each type		Nos.	
5	Power Contactor each type and rating		Nos.	

6	Motor each type and rating		Nos.		
7	VVFD each type and rating		Nos.		
8	Push Buttons, Selector switches, LED Indicators each type		Nos.		
9	Sensors, Limit Switch each types and ratings.		Nos.		
10	Current Collector,		Nos.		200% of installed qty
11	DSL SPARE		Nos.		20% of the installed qty
12	DSL INSULATOR		Nos.		100% of installed qty
13	PENDENT		Nos.		01
14	REMOTE		Nos.		01
15	Any other critical items suggested by OEM		1 lot		1Lot

**ANNEXURE-D**

**SCHEDULE-3**

**Name of Work: - Comprehensive Annual Maintenance contract of 02 nos. Sprue Grinding System including their wheel Loader in Mould Room at RWP/Bela for 05 years after Expiry of warranty period of 02 years.**

SN	Schedule No	Description of Works	Quantity	Unit	Unit Rate	Total Cost (In INR)
1		Cost of Comprehensive AMC with Spares & services for Preventive & breakdown Maintenance for a period of 05 years for all the items supplied in <b>Schedule-1(i.e,1(a), 1(b) &amp; 1(c))</b> after expiry of warranty period of 02 years				
2	3A	1st year	4	Quarterly		
3	3B	2nd year	4	Quarterly		
4	3C	3 <sup>rd</sup> Year	4	Quarterly		
5	3D	4 <sup>th</sup> Year	4	Quarterly		
6	3E	5 <sup>th</sup> Year	4	Quarterly		

**SCOPE OF WORK**

1. 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 expiry of warranty period of 02 years. The tenderer will provide Preventive Maintenance Schedule of the machine to ensure availability of Sprue Grinding System more than 95%.During AMC period this preventive maintenance schedule will be followed.
2. The scope of works covers all the items supplied in **Schedule-1(i.e,1(a), 1(b) & 1(c))**.
3. The AMC covers both Mechanical & Electrical/Electronic parts of Sprue Grinding System.
4. **The breakdown Maintenance in all three shifts (round the clock) will be in the scope of Tenderer during AMC period of 05 years.**

5. If availability of Sprue Grinding System falls below 95% during warranty period of 02 years, penalty will be imposed as per Penalty clause mentioned in **Annexure-4**.

**ANNEXURE-4**

**6. Penalty: -**

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

<b>SN</b>	<b>Description</b>	<b>Penalty</b>
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: -

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

**7. DEFINITION OF BREAKDOWN HOURS: -**

- The number of hours for which any Sprue Grinding Machine are not functional or not available for production activities due to any reason.
  - In each Quarter cumulative breakdown upto 24 hrs. allowed for each machine as grace and not counted in breakdown hours. This grace period applicable only for Sprue Grinding Machines
  - The contractor must ensure availability of both SPG's machines all the time.
  - 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. 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 supplied against this specification 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, 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 from the date of expiry of warranty. 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.

9.6

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

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 expiry of the warranty period of **Schedule-1**. The warranty period of the Sprue Grinding system will start simultaneously after PTC or completion of all activities under **Schedule-1** whichever is later. 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.
- 9.9 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.
- 9.10 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.
- 9.11 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.
- 9.12 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-2 &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 warranty period of 24 months. AMC is part of scope of supply and should be included in commercial evaluation

**SPECIAL CONDITIONS OF CONTRACT**

**1.0. Instruction to Tenderers for filling Technical and Financial Bids:**

- a) The Tenderer must furnish the information as per the format given in **Annexure- I of special conditions of contract**. All the information as asked for, in the format must be given accordingly e.g. wherever a parametric value is asked for, it should be furnished, if a write up is asked for, this should be provided and if a brochure or drawing or sketch is expected this should be provided. In case of incomplete/sketchy information, the technical offer being incomplete is liable to be rejected.
- b) Unless otherwise stated, latest alterations/ revisions of specifications/ standards/ drawings shall be applicable. In respect of safety standards and environmental standards relevant to the machine, the machine manufacturers shall ensure compliance with international (CE/ISO/DIN/JIS)/National standards (IS) (where applicable).
- c) The bidder should quote only for the specified make of machinery and plants, sub-assemblies and equipment wherever mentioned. Makes of sub-systems other than the specified ones will normally not be acceptable. In case, some other make is quoted, specific reasons for the same including its features/advantages over specified makes must be brought out in the offer.
- d) In case there is a contradiction in any information provided (some parametric values given in the specification and those given in the brochure, or some other document enclosed by the tenderer), unless specifically mentioned in the deviation cum confirmation statement under **Annexure-I of special conditions of contract**, the values as given in the specification shall be taken as confirmed by the tenderer and offer evaluated accordingly.
- e) Tenderer or his authorized agent, in their own interest, should visit the work site with prior appointment with field officer and acquaint themselves with processes of maintenance work, site conditions, facility etc.
- f) The Railway may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. However, the decision of the Railway in this regard shall be final. A copy of the alternative specifications offered should be sent along with the offer. The Tenderer should also furnish "Statement of Deviations" from tender specifications (as per **Annexure-I of special conditions of contract**.) in the tender document.
- g) Railway reserves the right to verify the details submitted by the bidder by actual site visit.
- h) The Tenderer should fill in the **Annexure-I** of this special condition along with information in schedule-I of specification for M&P items, which shall be submitted in Technical Bid of the tender.

**1.1 Definitions:**

The following terms and expressions as used in this Contract shall have the meaning hereof assigned to them except where the context otherwise requires:

- 1.1.1 "Approval" shall mean the written approval by the Railway of a document or drawing or other particulars or matters in relation to the Contract.
- 1.1.2 "Contract Drawings" shall mean the designs, plans, drawings, sketches, tracings and prints thereof and details which have been supplied by the Contractor as per terms of the Contract for the execution of this Contract and shall include the once approved by the Railway. This shall also include "good for construction drawings" for construction work supplied by the Railway.
- 1.1.3 "Contract Specifications" or "Specifications" shall mean the Technical specifications, General Specifications, schedules, detailed design drawings, statements of technical data, performance characteristics value and all such "particulars" mentioned in the Contract and such other modifications required by the Railway relating to the work.
- 1.1.4 "Delivery" shall mean delivery by the dates on FOR site basis as specified in the Contract for work or materials which are found acceptable by the Railway and not the submission of equipment, materials and supplies which are not to the required standard or which are not delivered by due dates, and in case of erection work, delivery shall mean the approval by the Railway of the said erection work within the period prescribed for such completion.
- 1.1.5 "Dimensions" shall mean the extent of a line, area, volume. They are to be based on the metric system.

- 1.1.6 "Erection" shall mean the putting up of structures and / or installation of the Plant & Equipment under the supervision of the Contractor and / or sub-Contractor and will include any service which the Contractor is required to perform at the site with his own and/or other staff and/or labour for the due fulfillment of this Contract.
- 1.1.7 "Inspector"/"Inspecting Engineer" shall mean any person or firm nominated by or on behalf of the Railway or his duly authorized agent to inspect equipment, supplies, materials, tests or work under the Contract.
- 1.1.8 "Engineer" shall mean an Engineer appointed by designation from time to time by the Railway.
- 1.1.9 "Engineer's Representative" means any assistant of the "Engineer" or any other employee or Agent appointed from time to time by the Railway or the Engineer to perform the various duties.
- 1.1.10 "Plant" shall mean and include "Equipment", "Stores", "Item", and "Material", "Machinery" or any part thereof to be provided for under the Contract.
- 1.1.11 "Site" shall mean the place or places envisaged by the Railway at which the plant & equipment supplied under the Contract are to be erected and / or the construction are to be carried out and/or services are to be performed under the Contract with such other places as may be specifically provided by the Railway for the purpose of the Contract.
- 1.1.12 "Supervision" shall mean the successive control and directions given to the Contractor in relation to Contract work during execution of the Contractor's and/or his Sub- Contractor's work at site.
- 1.1.13 "Supply and Services" shall mean and include any and all equipment, supplies, materials, drawings, documents and engineering & technical services to be made/performed by the Contractor under this Contract.
- 1.1.14 "Test" shall mean and include any and all tests to be performed under the Contract in order to ascertain the quality and efficiency of the Contract work or part thereof and material tests in particular.
- 1.1.15 "Time" shall be reckoned by months, weeks, days and hours, the period of a month being equivalent to the calendar month according to the Gregorian Calendar. The day or days unless herein otherwise expressly defined shall mean calendar day or days of 24 hours each.
- 1.1.16 "Unit/sub-unit" shall mean the functional plant areas as described in Contract Specification.
- 1.1.17 "Writing" shall include manuscript, typewritten, printed statement under or over signature or seal as the case may be.
- 1.1.18 "Manufacturer" refers to a person or firm who is the producer and supplier of material or designer and fabricator of equipment to either the Railway or the Contractor or both under the Contract.
- 1.1.19 "Government" means the Central Government or a State Government, as the case may be.
- 1.1.20 "Preliminary Acceptance Test(PAT) Certificate" means the Certificate to be issued by the Engineer on completion of erection and commissioning of Plants and Equipment's as per clause 7.2 of Special Condition of Contract..
- 1.1.21 "Proving-out Test (PTC) Certificate" means the Certificate to be issued by the Engineer on successful completion of Proving-out Tests as per clause 7.3 of Special Condition of Contract.
- 1.1.22 "Taking Over" means the physical possession by the Railway, after issuance of PAT and PTC Certificate as per clause 7.4 of Special Condition of Contract. However, the Contractor shall not be relieved of his obligations under the Contract.
- 1.1.23 "Final Acceptance Test (FAT)Certificate" means the Certificate to be issued by the Railway/Engineer on fulfillment of the obligations in accordance with the provisions of the Contract, as per Clause 7.5 of Special Condition of Contract.
- 1.1.24 "Works" shall means the work contemplated in the drawings and schedules set forth in the tender forms and required to be executed according to the specifications.
- 1.1.25 "Project Manager" shall mean the Contractor who shall be overall in-charge of the Project at site shall be appointed /deputed in consultation with the Railway.

2.0 **The scope of work is broadly divided into seven major parts: -**

- (i) Design& drawing of machine layout and its sub-systems, process flow, Equipment layout, load data & other drawings as per specification of machineries and plant (M&P) will be prepared by contractor but can be improved upon by the Railway with or without associates within the time schedule and without extra cost to the Railway.
- (ii) Design, Manufacture, Inspection, Supply, Erection, Testing & Commissioning and Proving out tests of Machinery and Plant (M&P) and concomitant accessories.
- (iii) Inspection to be carried out as per the approved Drawings and QAP at firm's premises.

- (iv) Any other activities which are not mentioned in above scope for successful. Design, Manufacturing, Inspection, Supply, Erection, Testing & Commissioning, training, proving out tests of M&P and bidders' scope shall be in contractor's scope.
- (v) Complete Overhauling & up gradation of 02 nos. old Sprue Grinding Machines & Wheel Feeding System
- (vi) Comprehensive AMC of Sprue Grinding System for a period of 05 years after expiry of warranty period of 02 years.

**(vii) Civil Engineering Works:**

The bidder shall arrange for provision and construction of necessary foundation for the machines as per the drawings supplied by the OEM and allied Electrical & Mechanical works of all schedule of tender documents where ever applicable shall be included in the cost of the machine including hand railing, maintenance platform, ladder with hand railing etc.

**SUBMISSION OF GA, FOUNDATION & RELATED DRAWINGS FOR APPROVAL:**

For each machine, the supplier shall first submit 01 copy of foundation drawings with details of construction of foundations, complete layout of machine elements like bed, hydraulic tank, coolant tank, electrical panel, Servo Controlled Voltage Stabilizer etc. and other related diagrams (Mechanical, Hydraulic, Electrical & Electronics) along with machine weight, overall dimensions, electrical load with length of 3 phase, 415 V AC electric power cable for approval as per time schedule specified in **Annexure-9** for approval to Railway and to enable them for making necessary arrangements for Installation & Commissioning of Machine on receipt. After getting approval from Railways, the supplier shall supply six copies of approved GA foundation drawings and related diagrams for each machine as per time schedule specified in **Annexure-9** from the date of approval of GA drawing for information only directly to RWP-Bela. This information should be furnished on the pattern indicated in detail in the following IS Specifications (Latest) or relevant international standards.

**2.1 Supply of M&P Equipment: -**

This includes design, engineering, manufacture and supply of equipment and facilities including mechanical equipment, electrical equipment & controls and utility services as per the Contract Specifications of Plant & Equipment together with the necessary vibration pad, foundation (if any), foundation bolts, special inserts, integrating parts, field foundation plates and bolts, railings, cross-over and safety guards within the stipulated delivery time.

**2.2 Commissioning spares Maintenance spares and consumables:**

**2.2.1 Commissioning spares:**

The Contractor shall provide necessary commissioning spares as may be required during erection, cold tests, start-up and initial operation of the unit till successful completion of Proving-out tests.

**2.2.2 Tools & Tackles:**

- i) The Contractor shall provide necessary tools, tackles, instruments and appliances for erection, testing, operation & maintenance, and commissioning of the unit as required. The cost of the same is included in the Contract Price for Plant & equipment.
- ii) The Contractor shall provide ordering specification including the names of suppliers giving sufficient details to enable the Railway to procure at a later date, when necessary, such special tools, tackles, instruments and appliances. The Contractor shall furnish such information not later than two months from the date of approval of M&P by Railway.

**2.2.3 Initial Fill of Oils, Lubricants and Consumables, and initial supply of refractory (if any) and thermal insulations (if any).**

- i) The Contractor shall, within the Contract price of the equipment, supply all consumables including oils, lubricants, fuels, chemicals, usual stores and small materials and other consumables required for flushing the first fill, as well the quantity required during the Contract with extra provision to cover the normal wastage for transportation, storage, handling, PAT and Proving-out tests till the machine is taken over after PTC. The Contractor shall be fully responsible for ensuring adequate quantities at site so as not to delay implementation of the project.
- ii) Equipment related consumables till the machine is taken over after PTC, are to be supplied by contractor.

iii)The Contractor shall also furnish machine design specific consumables with optimal consumption rates of consumables along with estimated annual requirement and ordering specification to enable the Railway to procure these in time for uninterrupted operation of the unit. The Contractor shall furnish such information not later than twomonths from the date of approval of M&P by Railway.

**2.3 Concomitant Accessories:**

- a) The machine should be accompanied by all the concomitant accessories as mentioned in **Schedule-1(b)** of this contract to make the machine fully operational on installation or as mentioned in technical specification of machine.
- b) The cost of concomitant accessory will be included in the basic price of the machine.
- c) The scope of concomitant accessories may also include among other things the anti-vibration pads, voltage stabilizer and isolation transformers, loading and unloading systems etc., where necessary.

**2.4 Tooling (Applicable if there is change in existing specification):**

- a) The contractor shall provide all machines in fully tooled up condition.
- b) The tools should be supplied, sufficient for a period of two years covering normal consumption.
- c) The tenderer should quote separately for each of the tooling items(whenever applicable).
- d) The tenderer shall furnish full details regarding tooling items including the make, part number, source and expected annual consumption for each of the tooling.

**2.5 The Scope also includes preparation of the following:**

**2.5.1 Engineering & Technical services:**

The engineering & technical services of the Contractor shall generally include amongst others the following:

- a) Equipment layout, load data & other part assembly drawings as per specification.
- b) Backup drawings, necessary data, to enable the Railway to check and approve drawings only where modifications and design changes are made by the contractor for system integration etc. Also, in some packages, the contractor is required to design the system before construction. He will be required to supply the drawings and data for these items also.
- c) Quality control and time schedule control of site work.
- d) All coordination relating to design, manufacture, supply, transportation, insurance & claim settlement, inspection, construction planning and scheduling and all other services till handing over of the plant & equipment.
- e) Clearance of installations from the Statutory Authorities.
- f) Drawings of layout, proposed floor plan of the machines in the shed, layout drawings for pneumatic pipelines, water pipelines & industrial gas pipeline (if required) shall be prepared and submitted to Railway for approval before commencing the work

**2.5.2 Scope of work for storage, handling, inspection, erection, testing, commissioning and carrying out demonstration of proving out tests.**

The Contractor shall make all arrangements to deliver the equipment at site by trucks/trailers, build his own stores (covered, uncovered and air-conditioned, if necessary) for the proper storage of equipment, maintain the stores and all related documents and records, transport the equipment to site for erection purpose.

All security arrangement also shall be made by the Contractor. Only open space shall be made available to the Contractor by the Railway.

The Contractor shall be responsible for proper and neat storage and also undertake conservation of all consignments including damaged consignments.

During storage of equipment, the Contractor shall take into account deterioration and carry out the re-conservation of the complete equipment/parts/ supplies as may be necessary as per the Storage Instructions of the Manufacturer of equipment/components. The Contractor shall also supply the consumables required for such re-conservation work and repair/replace parts required thereof for the proper functioning of the equipment after erection and commissioning.

**2.5.3 The Contractor shall unpack and do visual checking against physical damages to the equipment/cases, cleaning of equipment before start of erection. Damage/shortage if any, will be reported to the Railway and shall be rectified/ replaced expeditiously, free of charge to the Railway so as not to upset the erection and**

- commissioning schedule. Delay on account of settlement of insurance claims by the Contractor shall not be considered an excuse for delay in completion.
- 2.5.4 The Plant and equipment will be installed on civil foundation/structures including grouting, anchoring and fixing etc. complete by the contractor unless otherwise specified.
- 2.5.5 The Contractor shall provide erection consumables like oxygen and acetylene gas, welding rods, solder lugs, oil, grease, kerosene, cotton waste, etc. required for erection of equipment.
- 2.5.6 The Contractor shall provide all necessary construction tools & tackles, compressors, small hand tools, instruments, all testing & commissioning instruments, welding equipment, service bolts, nuts, jigs and fixtures, winches, alignment tools, precision levels etc. and the material handling equipment and other equipment which may be required for carrying out the erection and commissioning work efficiently within the time schedule provided in the Contract. Unless otherwise specified, the above construction materials shall be the property of the Contractor after the erection work is over. The Contractor shall ensure that proper documentation is followed at the entry gate of the Railway's premises for such items which shall be carried back by the Contractor after completion of work.
- 2.5.7 The Contractor shall provide all temporary ladders, scaffolding materials, platforms, supports and other necessary facilities required for handling, erection, testing and visual inspection of supplies at the point of installation and shall also provide necessary packing plates, wedges, shims, leveling screws etc. required for erection of equipment.
- 2.5.8 The Contractor shall erect and maintain his own site offices, main stores and site stores as required for the work and arrange for maintaining in a neat manner the area placed at the Contractor's disposal. The plans for the same shall be approved by the Railway.
- 2.5.9 The contractor shall provide sufficient fencing, notice boards and lights to protect the work site, as well as contain the disturbance, noise and other pollution within tolerable limits within the worksite. He will also make necessary arrangements to prevent the entry of outsiders and warn them of the ongoing work and prevent their entry to the worksite, accidentally or otherwise as may be considered necessary by the Railway.
- 2.5.10 The Contractor shall mobilize himself with adequate material handling equipment like mobile cranes, forklifts, trailers, etc. in addition to other erection tools and consumables, keeping in view the erection schedule. Within one month of placement of order, Contractor shall provide his detailed scheme for mobilization with Bar Chart clearly indicating the resources, manpower and machinery proposed to be deployed to ensure timely completion of work and quality of workmanship.
- 2.5.11 The equipment will be erected as per the instructions of the suppliers/manufacturers and under the supervision of the supervisory personnel to be deputed by the Contractor along with supervisory personnel of equipment supplier/ manufacturer, if so desired at site and with the approval of the Railway. The Contractor shall use to the maximum extent pre-assemblies and mechanization to fulfill erection targets.
- 2.5.12 The Contractor shall align, level and couple, and securely fix all equipment, appurtenances, and accessories. All precision survey instruments including leveling instruments, theodolite etc. shall be arranged by the Contractor.
- 2.5.13 The Contractor shall procure and carry out flushing and filling of oil and lubricants till successful commissioning and demonstration of Proving-out tests.
- 2.5.14 The Contractor shall be responsible for checking the correctness of erection of mechanical equipment and auxiliary systems, electrical equipment etc as per the specification.
- 2.5.15 The Contractor shall be responsible for Installation and connection of all piping and fittings as per the specification/approved drawing.
- 2.5.16 The Contractor shall be responsible for installation and connection as well as supplying, laying and termination of cables, bus bars, bus ducts, lightning protection and earthing as well as to check electrical connections to individual items.
- 2.5.17 The Contractor shall be responsible for the management of erection work with proper and adequate supervision for ensuring progress of erection work and quality of workmanship.
- 2.6.18 The Contractor shall organize the work in a manner that other work at site is not impeded and the workmen therein not endangered and shall arrange temporary access at site, if required for the erection work.
- 2.5.19 The Contractor shall deploy required number of supervisory, skilled, unskilled and auxiliary labour as required for the erection work and comply with such reasonable instructions of the Railway/ in the interest of satisfactory progress and completion of the work according to the schedule. The Contractor shall work in 3 shifts per day basis for meeting the completion target, if required without any extra price. However, in such cases, Contractor shall obtain the prior approval from the Railway.

- 2.5.20 The Contractor shall return to the Railway all returnable materials such as empty crates, packing materials, supporting materials for consignment etc. belonging to the Railway at a place designated by the Railway.
- 2.5.21 All necessary tests/checks shall be conducted during erection by the Contractor. The Contractor shall attend the rectification of erection defects, if any, expeditiously. The Contractor shall arrange all testing instruments for such testing at the site.
- 2.5.22 The Contractor shall carry out final painting of the Plant & Equipment and structures erected as per the instructions of the Railway.
- 2.5.23 The Contractor shall be responsible for total commissioning of the Plant including trial run and carrying out demonstration of proving out Tests. Railway's supervisory and skilled operating personnel shall, however, be associated during erection of equipment's and their commissioning and proving out tests.
- 2.5.24 The Contractor shall comply with all applicable statutory Rules & Regulations with respect to the employment of labour at site.
- 2.5.25 All safety measures as required to be adopted as per the Statutory Regulations and the Safety Rules of the Plant shall be strictly followed by the Contractor during the execution of the Contract. The Contractor shall set up a suitable safety organization of his own in this regard.
- 2.5.26 The Contractor shall be responsible for commissioning of all the machines, equipment and infrastructure as stipulated as per the Contract Specification and shall also ensure that it is fit for operation and achieve the Performance standards and other parameters as specified. Railway's supervisory personnel shall, however, be associated during erection of equipment's and their commissioning and proving out tests
- 2.5.27 If the Railways is not satisfied with the progress of work at site, it shall direct the Contractor to depute more number of supervisory personnel/workers to meet the completion schedule as per the contract. Upon receiving such direction Contractor shall deploy additional personnel within 7 days without any extra cost.
- 2.5.28 All guarantees and test certificates obtained by the Contractor during the execution of work shall be transferred to the Railway before issue of PAT certificate.
- 2.5.29 The contractor shall provide and install all measuring instruments required for checking the guaranteed performance which are not included among the permanent measuring instruments of the Unit/sub-units
- 2.5.30 Materials brought to the site shall not be removed from the site without the written consent of the Railway. Any material brought to site and rejected by the Railway shall be removed by the Contractor from the site of work immediately at Contractor's expense.
- 2.5.31 The Railway may during the progress of work, order the removal of part or whole of the work executed, found not in accordance with the approved drawings/ specifications/ instructions. No extra claims shall be entertained for re- executing or altering such work.
- 2.5.32 Construction of site office, labour huts, store sheds etchant arrangement of required water and electricity for all purposes in connection with this work shall be at the contractor's responsibility, liability ,and cost as per tender condition. Security as per the requirement shall also be arranged by the Contractor. Any delay in making arrangements for the same shall not be taken as an excuse for the delay in starting the work. However, Railway may give land at very nominal rent for the purpose of fabrication yard, batching plant & site office within the project premises.
- 2.5.33 Contractor shall equip his site office with adequate number of Computers equipped with high-speed internet facility, photocopy machine and Fax machine along with operators conversant with software programs such as Primavera/MS-Projects, MS-Office and AutoCAD. These are to be provided at the site office till completion of the project. Contractor shall submit daily/weekly/monthly diagrammatic progress reports on approved format.
- 2.5.34 On completion of the work, the site shall be left in good order and the excess materials, scraps, debris, if any, shall be removed & dumped by the Contractor at place/places as designated by the Railway.
- 2.5.35 **Certification:**
- a) The design of the machine foundation & Construction of the foundation is in accordance with the latest version of the relevant part of the Indian Standard for Code of practice for design & construction of machine foundation as specified in IS:2974.
  - b) The contractor shall arrange certification of the foundation design by an approved design consultant.
  - c) The original certificate issued by the design consultant for certification of foundation design and a copy of the same shall be submitted by the contractor to the Railway.



d) Bidders must study the statutory requirements, laws like Indian Electricity Act, Indian Industrial Safety procedures, Contractor Labour Act, Pollution Control Act etc and once the work is awarded, they shall be liable to conform to all the statutory requirements including local and State laws, rules and regulations.

2.5.36 The Contractor shall be responsible for proper fencing, lighting, guarding and watching of all works at site until they are handed over and further proper provisions for like period of temporary power, drainage, roadways, footways, guards and fences as far as may be rendered necessary by reason of works for accommodation and protection of the Railway's and occupiers of adjacent property, the public and others. No naked light shall be used by the Contractor on the site otherwise than in the open air without the special permission in writing from the Railway.

2.6 **Construction Water:**

The Contractor shall at his own expenses, arrange for, and lay and maintain, the pipelines for the water required for construction purpose (including drinking water) for the work covered under the scope of the contract for his work site with suitable connections, storage reservoir, etc. as may be necessary. The Contractor shall ensure avoidance of misuse or wastage of water, make adequate arrangements for storage and regulate supply and if necessary, install supplementary arrangements for supply of water. The Contractor will endeavor to maintain a regular supply of water to meet the construction requirements.

2.7 **Construction Power:**

2.7.1 The Contractor will make his own arrangement for electrical power for the construction, erection & commissioning work at the site till start of proving out test. Railway shall arrange power from Proving out test.

2.7.2 The Contractor shall make his own arrangements to lay and maintain further distribution lines and wiring necessary for the work at his own cost and in accordance with latest Indian Electricity Rules. The distribution diagram with loadings and specifications shall be submitted to the Engineer for his approval before the system is installed.

2.7.3 The Contractor shall obtain the approval of the Engineer for installation of machinery, construction of buildings and electric power supply connection to them. The Contractor shall be responsible for any defect therein. Any defects pointed out by the Engineer in the distribution system shall be rectified forthwith to the satisfaction of Engineer by the Contractor, failing which the power supply may be cut off by the Employer/Engineer.

2.7.4 To operate any electrical equipment's of the contractor at site for their activities, contractor should always use PVC insulated and PVC sheathed core cable and not with plastic cables (single core) and avoid using of many joints and with suitably rated fuses, switches and plugs in order to ensure safety at site.

2.8 **Completeness:**

2.8.1 Any supply and services as set forth hereinabove and which might not be even specifically mentioned in this Contract relating to the Project or in the specifications and drawings in respect of the Plant and equipment package under the scope of work of the Contractor and which are not expressly excluded there from but which are necessary for the performance of the Plant and Equipment in accordance with the specifications as an integral part of the Plant and/or for normal and efficient running and maintenance under Indian conditions, shall be provided for and rendered by the Contractor **without any extra cost**.

2.8.2 The approval by the Railway at any stage for any supplies and services by the Contractor shall not relieve him of his obligations under **Clause 2.8.1** above.

2.9 **Total responsibility:**

The Contractor shall be solely responsible for the entire supplies and services irrespective of whether supplies and services have been made/rendered by him directly or by his Sub-Contractors with or without the approval of the Railway.

2.10 **Progress Report and Photographs:**

2.10.1 The Contractor shall furnish copies of all Purchase Orders without prices placed by him on various sub-suppliers/ Contractors and work orders issued to his own manufacturing units containing scope of work, technical specification, time schedule etc.

2.10.2 THE RAILWAY shall have the right to depute his representatives to ascertain the progress of work at the premises of works of the Contractor or any of his Sub- Contractors.

2.10.3 The Contractor shall submit a weekly progress report in a Proforma including photograph with such details as may be required by the Railway so as to enable the Railway to monitor the progress of the Project.

- 2.11 Total value of the offer will be calculated on the basis of scope of work as specified in the tender document, and shall include:
- The cost of all machinery & plant including concomitant accessories, complete foundation, installation and commissioning of the machines.
  - Applicable duties and taxes, insurance, freight, packing and forwarding charges.
  - Cost of training, maintenance spares, warranty spares, tools & tackles etc.
  - The cost of preventive maintenance to be carried out during a warranty period of 2 years shall be included in the total value of the offer.
  - Uprooting of SPG 2 &3
- 3.0 **Contract Price:**
- 3.1 The offer must be quoted in the format given in **the Schedules** of tender documents. Detailed cost breakup of **schedule- 1 &2** must be quoted in **Annexure-1** and uploaded with the offer.
- 3.2 **Price of Equipment's/Machines:**
- The prices are inclusive of all taxes and duties.
  - The prices are inclusive of civil work including foundation wherever applicable, supply, Inspection, erection/installation, commissioning, Proving-out tests, and training as per the specifications.
  - The prices are inclusive of packing, forwarding, freight, insurance, & training charges.
  - The prices are inclusive of the cost of concomitant accessories and maintenance spares.
  - Drawings, Manuals, documents, Part catalogues, Software with license key/dongle etc. related to operation & maintenance of machine/equipment. The list of accessories and maintenance spares along with price may be obtained from OEM and supplied.
  - The prices of warranty spares and services.
  - The contract prices are inclusive of all charges & expenses including storage, loading, unloading, handling, erection, testing & commissioning and performance guarantee test towards labour, tools & tackles, construction plant & equipment, scaffolding, power, fuel, oil, lubricants, etc. including 3 shifts working, if required up to issue of FAT.
  - No Service Tax is payable on Railway contracts as on date. If at a future date this becomes applicable, the contractor will be reimbursed in actual.
- 3.3 Amongst other, the contract price for supplies shall be deemed to include the cost of all foundation bolts, anchoring parts, floor plates, hand railings, crossovers, safety guards etc. and cover all royalty/fees for all articles and processes protected by letters, patents or otherwise incorporated in or used in connection with the work and all other payments in connection with obtaining all the materials for the work and shall indemnify the Railway.  
Indemnity which the Contractor hereby gives against all actions, proceedings, claims, damages, costs, and expenses arising from the incorporation in or use of work of any such articles, processes or supplies.
- 3.4 The Contractor is responsible for the total scope of work starting from design and manufacture till the unit is successfully commissioned and proved out. The break-up of the contract price is only for the purpose of release of payments to the Contractor for the various activities involved in respect of this contract and this cannot be construed as full and final payment in respect of each activity for which such break-up is given.  
In the event of the Contractor failing to fulfill all his contractual obligations till successful commissioning, proving out and Final acceptance of the whole unit covered under this contract, the Contractor shall be liable for forfeiture of all the amounts received under this contract, without prejudice to such rights and remedies which are available under this contract for the Railway and the Contractor.
- 3.5 Total contract value of the work will be ascertained based on the total final value including the total cost of concomitant accessories and warranty spares, Slings/Chains/Lifting tackles/tools as specified in respective technical specifications.
- 3.6 ***The rates quoted for machinery and plants by tenderer and accepted by Railway administration shall hold good for the contract period and no additional individual claim will be admissible on account of fluctuation in market rates, increase in taxes/ any other levies/tolls etc.***

4.0 **Terms of Payment:**

Individual liabilities register for Supply, Erection & Commissioning and Maintenance Spares, tools& tackles, concomitant accessories of each schedules to be maintained at site shall be jointly certified by the Railways and Contractor. Subject to any deductions from the Contract price, which the Railway is entitled to make, the Contractor shall receive the payment in the following manner:

4.1 **Manufacture and supply of plant & equipment:**

(A) **Payment terms for Schedule-1**

The 100 % payment under this schedule will be net of price quoted in Schedule-1.

- I. 70% of the contract price of individual M&P items as per approved Billing Schedule of **Schedule-1** shall be released after receipt of equipment / items at site in full and good conditions, subject to submission of requisite documents as detailed in the Contract along with relevant supporting inspection certificates, duly certified by Railways. Establishment of "Good Conditions" as mentioned above would be done with a joint verification (Railway and tenderer) for completeness of supplies as per Bill of Materials and visual inspection as per the prescribed Proforma.
- II. 20% of the contract price of individual M&P items covered under **Schedule-1** shall be released after issuance of PAT and PTC certificate including supply of, tools & tackles, concomitant accessories as per schedule, duly certified by the Railways as per the prescribed proforma. This 20% of the contract price as per approved Billing Schedule is further bifurcated into two stages i.e.
  - a) 10% of total contract value of **Schedule-1** shall be released after Issuance of PAT certificate.
  - b) Balance 10% of total contract value of M&P items covered under **Schedule-1** shall be released after Issuance of PTC and supply of tools & tackles, concomitant accessories etc.

(B) **Balance 10% Payments:**

Balance 10% of the contract value of schedule 1&2 shall be released on submission of a separate bill by the contractor along with the following documents: -

- a) Final Acceptance Certificate issued by the Railway for schedule 1 & 2.
- b) Final work completion certificate issued by Railway.
- c) Bank Guarantee of 10% of the contract price of Schedule 1 and 3 as Warranty Guarantee (WBG).
- d) No objection certificate (NOC) issued by the Railway.
- e) No claim certificate (NCC) submitted by the firm.

(C) **Final Payments:**

Final payment shall be released on submission of following documents: -

- a) Final work completion certificate issued for schedule 4
- b) No objection certificate (NOC) issued by the Railway.
- c) No claim certificate (NCC) submitted by the firm.

(D) **Payment terms for Schedule-2**

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

(E) **Payment terms for Schedule-3**

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

5.0 **Responsibility for Performance of Contract:**

- 5.1 The Contractor shall be responsible for the due and faithful performance of the Contract in all respects according to the intent and meaning of the drawings, specifications and all other documents referred to in this Contract. Any approval which the Railway may have given in respect of the stores, materials, supplies or other particulars and the work or the workmanship involved in the Contract (whether with or without test carried out by the Contractor or the Railway) shall not bind the Railway and notwithstanding any approval or acceptance given by the Railway, it shall be lawful for the Railway to reject the material on arrival at site, if it is found that the materials supplied and/or erection work carried out by the Contractor are not in conformity with the terms and conditions of the Contract in all respects.
- 5.2 The Contractor shall co-operate with the Railway's other Contractors, if any, for any associated plant and coordinate for any interface activity at his battery limits.

**6.0 Dispatch Schedule:**

6.1 The Contractor shall prepare and submit in triplicate detailed dispatch schedule for the Machinery and Plant to be dispatched to the Railway. A tentative delivery schedule for schedule-1&2 is attached as **Annexure-9** and for Schedule-3 is attached as **Annexure-10**.

**6.2 Dispatch of Materials and Dispatch Documents:**

The dispatch of equipment / materials shall be as per dispatch schedule. All dispatch/shipment documents shall be submitted by the Contractor to the Railways at the time of supply of Machinery and Plants.

6.3 All packing cases, containers, packing and other similar materials shall be new and supplied free by the Contractor and same will not be returned unless otherwise stated in the contract specifications.

6.4 Notwithstanding anything stated in this Clause, the Contractor shall be entirely responsible for loss, damage or depreciation or deterioration to the materials & supplies due to faulty protective and insecure packing.

**7.0 Acceptance of the Unit:**

**7.1 Inspection:**

The firm will be required to submit a detailed Quality Assurance Program (QAP) for each of the machine that will be followed during the manufacturing of the machine. Railways may change/add/modify the Quality Assurance Program (QAP) of a machine in case it is not satisfied with the QAP submitted by the firm. The QAP should incorporate check points at every stage from the raw material procurement stage to in-process inspection of various assemblies and final inspection of the machine.

**7.2 Preliminary Acceptance Test (PAT)**

7.2.1 On completion of erection and commissioning of the plant & equipment preliminary acceptance tests shall be performed to conduct the systematic check of the components which have been machined/assembled on the equipment supplied by the contractor.

7.2.2 Tests shall be performed on the individual sub-assemblies of the unit and shall be designed to conduct the systematic check of the components and of the functional operation thereof.

7.2.3 Tests shall be conducted by the Contractor as per **Clause 7.2** under his sole responsibility and employing his personnel. Results of the tests shall be recorded jointly by the Contractor and the Railway. The Contractor shall hand over all the test certificates obtained by them during execution of the work.

7.2.4 A detailed program of tests shall be drawn up by the Contractor and shall be subject to the approval of the Railway. Such program may be revised and adjusted as may be required by the Railway during the test run.

7.2.5 The Contractor shall rectify the defects observed during commissioning. On successful completion of erection & commissioning and liquidation of the defects as mentioned in joint commissioning note (JCN) in prescribed Performa (**Annexure-K**) to special condition of contract, PAT certificate shall be issued by the Railway within 30 days from JCN/liquidation of defects/deficiencies whichever is later.

**7.3 Proving out Test (PTC)**

7.3.1 Proving-out tests will be carried out and performance values achieved in accordance with **Technical Specification no.-RWP/Bela/SPG/Specification/2023**. Proving-out test will be carried out within 30 days after issuance of PAT certificate of the Machinery and Plant.

**7.3.2 The Sprue Grinding System (04 nos. SPG's machine are in working condition) delivers wheels at discharge end in every 90 seconds after remove Sprues in line with plate surface and grinding unevenness of riser pads and plate within Sprue area for onward punching of wheels at stamping machines.**

7.3.3 A Proving-out Test Certificate (PTC) shall be issued by the Railway within 30 days for each of the machine on a prescribed Performa (**Annexure-M**) to Special condition of contract on successful completion of proving-out test and supply of complete maintenance spares, Slings/Chains/Lifting tackles, tools required for smooth operation and maintenance.

7.3.4 Inspection and approval of installation of statutory authorities like electrical inspectorate/CEA etc shall be obtained by the Contractor (if required) before issue of Proving-out Test Certificate (PTC).

**7.4 Taking over of Machinery and Plants:**

7.4.1 The unit shall be taken over physically by the Railway when:

- a) Contractor has completed erection & commissioning and proving-out test of all the equipment's as perspective technical specifications.
- b) PAT and PTC certificates have been issued by the Railway.
- c) The Contractor has submitted all documents as per the provisions of this Contract/Technical Specification of Machinery and Plants.
- d) The Contractor has supplied concomitant accessories, tools & tackles and maintenance spares required for smooth operation and maintenance.
- e) The Contractor has complied to the satisfaction of the Railway with all the objections / observations, if any.

7.4.2 The Contractor shall submit un-priced copies of purchase orders placed on Sub-Contractors.

**7.5 Final Acceptance Test (FAT):**

Final Acceptance Test certificate shall be issued by the Railway within 60 days from the following date (whichever is later) when:

- a) PTC has been issued after Proving-out tests carried out and performance values achieved in accordance with **Clause 10**.
- b) The Contractor has rectified in a definitive manner all defects/ objections/ observations mentioned in the Proving-out Test Certificates (PTC) if any.
- c) Final documentation incorporating latest modifications has been submitted by the Contractor in requisite copies,
- d) The Contractor has met any and all other obligations under this Contract.

**8.0. Supply, Installation, commissioning and proving-out tests:**

8.1 **Joint Check:** The contractor or his agent would be required to carry out a joint check at consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint receipt inspection be done immediately on receipt of the machine by consignee & contractor representative to avoid commissioning delays due to shortages/transit damages.

After receipt of the machine as above a Joint Receipt Inspection Note (JRI) as per **Annexure-J** to the special conditions of contract for Mechanical works shall be prepared by the consignee and the firms representative indicating the tentative time schedule for various activities of installation and commissioning.

8.2 A Joint Commissioning Note (JCN) to this effect shall be made as per the format at **Annexure-K** to the special conditions of contract for Mechanical works. After joint recording of JCN, the PAT shall be issued within 30days after liquidation of defects as mentioned in JCN and other contractual obligations. If any breakdowns are noticed after issuance of JCN, these shall be attended by the contractor without any extra cost before issuance of PAT Certificate.

8.3 A Proving-out Test Certificate (PTC) shall be issued by the Railway within 30 days for each of the machine on a prescribed Performa (**Annexure-M**) on successful completion of proving-out test and supply of complete maintenance spares, Slings/Chains/Lifting tackles, tools required for smooth operation and maintenance. If any breakdowns are noticed after the issuance of PTC, these shall be attended by the contractor without any extra cost before issuance of FAT Certificate.

**9.0 Inspection and Tests at Manufacturer premises:**

9.1 THE RAILWAY or its authorized Inspecting Agency shall have the right of inspecting and testing the contract work or any part thereof at any time during the manufacture. The Contractor on demand from the Railway/Inspection Agency shall carry out such tests in an appropriate manner in the presence and free of charge to the Railway/Inspection Agency. Should a part of the plant be manufactured not on Contractor's own premises but on other premises, the Contractor shall likewise obtain permission the Railway to inspect and test the work as if the said plant were being manufactured on the sub-contractor's premises. The inspection, examination or testing carried out by the Railway/ Inspection Agency shall not relieve the Contractor of any of his obligations under this Contract.

- (a) The machine shall be inspected and tested during different stages of its manufacture starting from raw material till the completion of machine, by the purchaser or his authorized representative at the supplier's or his sub-supplier's works. The Quality Assurance Program as per Annexure-I shall be

submitted along with the bid. The bidder must submit the exhaustive QAP incorporating the tests as given in Annexure-I along with other tests /stage inspection as followed by them.

- (b) A load and functional test like no load test and maximum Horsepower test must be carried out at the manufacturer's works. The rigidity of the machine shall be demonstrated to the satisfaction of an appointed inspector or inspecting agency.
  - (c) Manufacturers must have suitable facilities at their work for carrying out various performance tests the sub-assembly/assembly/machine. The tenderer shall clearly confirm that all on facilities exist and shall be made available to the inspecting authority.
- 9.2 The inspection and tests shall be so conducted as not to unreasonably impede the progress of manufacture.
- 9.3 The Contractor shall bear all costs of any and all inspections and tests as per **Clause 9.1** above and extend all such facilities to the Railway or its authorized representative to accomplish the same. Where special tests in addition to agreed tests are required by the Railway, the Contractor shall bear the cost of the testing only if such special test proves that the equipment is not in accordance with the specifications. All expenses relating to travel, boarding etc. shall be borne by Railways or its authorized inspecting agency. Other costs of organizing the inspection have to be borne by the contractor.
- 9.4 THE RAILWAY upon giving 7 days' notice in writing and stating any grounds of objection, shall have the right to reject any or all equipment or demand rectification or replacement thereof.
- 9.5 The Contractor shall submit to the Railway quarterly program of inspection and tests one month in advance of the commencement of the quarter. The Contractor shall give the Railway a minimum of six weeks' clear notice of any work being ready for inspection and tests specifying the period likely to be required for such inspection and tests. Thereafter, the Railway or its inspector shall, unless inspection or test is voluntarily waived, on giving 3 days previous notice in writing to the Contractor attend at the Contractor's or his Sub-Contractor's premises, such inspection and test. Should however the Railway so instruct the Contractor, the Contractor shall proceed with the inspection and test which shall be deemed to have been made in the Railway's presence and shall forthwith forward to the Railway copies of inspection /test certificates for acceptance by the Railway.
- The Proforma and number of copies for inspection/test certificates shall be mutually agreed and included in the project manual.
- 9.6 When the tests have been satisfactorily completed at the Contractor's or sub-Contractor's premises, the Railway shall forthwith issue a certificate to that effect.
- If the tests were not witnessed by the Railway or its representative the certificate shall be issued on receipt of the test reports from the Contractor but not later than 30 days after the receipt of the test reports by the Railway. No plant shall be shipped or otherwise dispatched before such certificates have been issued.
- 9.7 In case any inspection/tests fail, re-inspection/ retest shall be carried out after necessary rectification/ replacement by the Contractor. No plant & equipment and material shall be shipped before inspection certificate and dispatch instructions have been issued by the Railway.
- 9.8 The satisfactory completion of inspection/test or issuance of the certificate by the Railway or his inspector/representative shall not discharge the Contractor of his liability should the equipment on further inspection/ test during or after erection, be found not to comply with the requirement of the contract.
- 9.9 In the case of commissioning spares and operating & maintenance spares, the same shall be offered for inspection only after the main equipment has been inspected and satisfactorily tested. In the case of such plant & equipment, where tests set forth above cannot be conducted either partially or fully in Contractor's premises but have to be conducted at site only after assembly/erection, the provisions under this article shall also apply. However, in such cases prior approval of the Railway shall be obtained by the Contractor.
- 10.0 **Proving-out Test for Machinery and Plants:**
- 10.1 The Contractor shall guarantee smooth, safe and reliable working of the project as per Contract Specification.
- 10.2 The Contractor shall also demonstrate and establish Proving-out Tests for the M&P and achieve performance parameters as indicated in Technical Specifications.
- 10.3 Performance of concern Machinery and Plants shall be demonstrated in a test run as specified in the Technical Specification. Performance parameters are specified in Technical Specification individually for each Schedule. It is clarified that if the performance parameters of the various M&P and equipment, as laid

down are achieved individually for 6 days continuously on three shifts basis (with 95% up time), the plant will be acceptable to Railways.

- 10.4 Proving-out Tests shall be held only after removing/rectifying any/all deficiencies of the M&P.
- 10.5 Details of Proving-out Tests and methods of computation of performance values shall be in accordance with Technical Specification.
- 10.6 The Contractor shall supervise and direct the operation during Proving-out Tests and shall take full responsibility in this regard.
- 10.7 The Contractor shall provide and install all measuring instruments required for checking the performance which are not included among the permanent measuring instruments of the Unit/sub-units. Such instruments shall be provided by the Contractor for the duration of the Proving-out Tests.
- 10.8 If, subject to provisions in Contract for reasons for which the Contractor is responsible, the performance values as per Contract Specification cannot be reached in whole or in part during the Proving-out Tests, the Contractor shall repeat the tests in whole in order to demonstrate the performances values not yet reached. Before repeating the tests, the Contractor shall at his own cost take any and all measures as may be needed in order that the performance values can be achieved.
- 10.9 The observations and facts of each Proving-out test shall be established and formulated between the Railway and the Contractor and shall be recorded.
- 10.10 Subject to the provisions in the Contract, if during the test period an interruption or reduced performance should occur due to the reason solely attributable to the Railway, the test period shall be extended reasonably, at least by the duration of any such occurrence. Such time of interruption or reduced performance and the production achieved during this period shall be discarded in evaluating the tests.
- 10.11 If, even with two repetitive tests the performance values are not achieved for reasons within the Contractor's responsibility, the Contractor shall undertake at his own cost such modification or replacement as are considered necessary to obtain the performance values as stipulated in Contract Specification and the responsibility to demonstrate successful Proving-out Tests shall continue to remain with the Contractor till so established.
- 10.12 If, within three months, after several attempts of rectification one or several of the essential performance data can, in the opinion of the Railway, not be achieved and if such shortcomings are not offset by better performance and other essential data, then liquidated damages shall be levied up to a maximum of 5% of the accepted rate of concerned M&P items of schedule-1 .
- 10.13 Should the performance values fall below rejection level then the Contractor shall be liable either to replace the plant or to pay damages to the Railway as may be determined solely by the Railway.
- 10.14 For carrying out rectification work for achieving performance values, the Contractor shall do so without seriously hampering the normal operation.
- 11.0 **Approvals:**
- 11.1 Detailed Design & Drawings, Part Assembly drawings and Documents shall be submitted by the Contractor and shall be subject to the approval/review of the Railway. All changes from the agreed specifications/drawings shall be subject to the approval of Railway.
- 11.2 All sub-contracts as per **Clause 12** for design and engineering, manufacture, supplies and any other work/services covered under the Contract shall be subject to prior written approval of the Railway.
- 11.3 While the Contractor shall make/execute/perform supplies, work and services in terms of the Contract, the Railway shall have the right to check and approve design, type, quality, quantity, materials and workmanship of any or all items of supplies, work and services where considered necessary by the Railway to ensure that supplies, work and services made/executed/ performed by the Contractor are in accordance with the provisions of this Contract.
- 11.4 The **Project Manager** of the Contractor who shall be overall in-charge of the Project at site shall be appointed /deputed in consultation with the Railway.
- 11.5 To enable the Railway to accord approval/review as **per Clause 11.1**, the Contractor shall submit back-up data/calculations /assumptions as may be required by the Railway.
- 11.6 Insurance Policies shall be subject to the approval of the Railway as per **clause 27.0**.
- 11.7 Where approval of the Railway is necessary or implied but is not specifically provided for elsewhere in this Contract, such approval shall also come within the purview of this schedule.
- 11.8 Approval by the Railway in terms of this schedule shall not relieve the Contractor of his obligations under this Contract.
- 11.9 **Foundation and detailed engineering Drawings for Machinery and Plants:**

- a) The contractor shall furnish 4 copies of foundation drawings, electrical cable layout drawings and other related diagrams indicating overall dimensions of foundation design details, including design calculation of Machinery and Plants to the Railways for approval. The foundation design should be based on bearing capacity of the soil which should be submitted along with design calculation. On approval of the drawings, the supplier shall execute and complete all the civil foundation work of Machinery and Plants and keep the site ready for erection and commissioning of the machine on receipt.
- b) The contractor shall furnish 4 copies of detailed engineering drawing of all Machinery and Plants including electrical, electronics etc. to the Railways for approval. On approval of the drawings, the supplier shall execute and complete all work of Machinery and Plants for erection and commissioning of the machine on receipt.
- c) The contractor shall furnish a soft copy (PDF & AutoCAD) of all the drawing approved by the Railways in DVD.
- d) On completion of contractual works, the contractor shall furnish two hard copies of all as built drawings and one soft copy (AutoCAD) of as built drawing along with relevant software at the time of handing over of Machinery and Plants.

**11.10 Manuals/Documents/Software's:**

The contractor shall furnish 04 sets of operation and maintenance manuals along with trouble shooting guide and Parts catalogue of M&Ps and one copy of operating & application software with license key/dongle at the time of handing over of Machinery and Plants.

**12.0 Sub-Contracting:**

- 12.1 The Contractor shall not assign or sublet the contract or any part thereof or allow any person to become interested therein any manner whatsoever without the special permission in writing of the Railway.
- 12.2 The Contractor may sub-contract a portion of the Contract Work to third parties with the prior written approval of the Railway. The Contractor shall furnish full particulars about the proposed Sub-Contractor(s) and the details of the work to the Railway while seeking such approval.
- 12.3 THE RAILWAY shall give approval or shall refuse approval in writing within 15 days of receipt of request along with all supporting details.
- 12.4 Bought-out items, critical components, proprietary items and equipment manufactured and supplied by specialized manufacturers which the Contractor intends to incorporate in the Contract Work shall also come within the purview of the provision.
- 12.5 Unless otherwise specified approval of the Railway shall not be required in the case of materials bearing test certificates such as rolled steel materials, pipes or such other standard materials.
- 12.6 In case of sub-contracting the Contractor shall hire the services of manufacturer's erection/commissioning personnel for supervision of erection/commissioning, testing and commissioning of the equipment supplied by them. The sub- Contractor should also have necessary valid licenses of wireman / electrician / supervisor which shall be submitted for verification by the Railway.
- 12.7 The approval extended by the Railway to Sub-Contractors recommended by the Contractor shall not discharge the latter from his Contract obligations. The Contractor shall remain solely liable for any action, deficiency, and/or negligence on the part of his Sub-Contractors.
- 12.8 The Contractor shall submit un-priced copies of purchase orders with technical specifications included in all orders placed on Sub-Contractors.
- 12.9 In the event if certain obligations extended by a Sub-Contractor to the Contractor are extended beyond the guarantee period specified in the Contract, the Railway shall automatically be entitled to the benefit thereof.
- 12.10 In no event shall the Railway be deemed to have any Contract obligations whatsoever in respect of Contractor's, Sub-Contractors and/or title-holders of any sub-orders placed by him.

**13.0 Responsibility for Damage to Contractor's Materials:**

- a. The Railway Administration will not be responsible for any loss or damage to Contractor's materials, equipment's, tools and plants due to fire, flood or any other cause(s) whatsoever.
- b. The materials issued by Railway to the Contractor for use in the works shall be treated as Contractor's materials for this purpose, and the Contractor(s) shall make good these materials in the event of any loss/ damage thereto.



- c. Works finished but not taken over by the Railway shall be treated as Contractor's materials for this purpose, and the Contractor shall be responsible for making good any loss or damage thereto.

14.0 **Patents:**

- 14.1 If the performance of the Contract involves the use of a patent, trademark, registered design, copy rights and/or industrial property rights of which the Contractor holds the title, the Contractor shall not be entitled to any license fee, royalty and/or compensation from the Railway outside the Contract price which shall be deemed to include such license fee, royalty and/or compensation.
- 14.2 Where the title holder of a patent, trademark, registered design, copy rights and/or industrial property rights used is a third party, the Contractor shall be liable for settling with such party and paying any license fee, royalty and/or compensation thereon.
- 14.3 The Contractor shall submit to Railway a certificate from the licensor attesting that the equipment supplied fully complies with their recommendations and the technology of the license granted.
- 14.4 In the event of any third-party raising claim or bringing action against the Railway including but not limited to action for injunction in connection with third party's alleged rights affecting the equipment covered under the Contract or the use thereof, the Contractor agrees and undertakes:
  - i) To defend and to assist the Railway in defending at the Contractor's cost against such third party's claim and/or actions and against any lawsuits of any kind initiated against the Railway.
  - ii) To indemnify, keep indemnified and hold harmless the Railway against all actions, claims, demands, costs, charges and expenses arising from or incurred by reason of any infringement of patent, trademark, registered design, copy rights and/or industrial property rights by manufacture, sale or use of the equipment supplied by the Contractor whether or not the Railway is held liable for by any court judgment.

**Provided, however, that:**

- a) THE RAILWAY shall, as soon as reasonably possible notify the Contractor in writing of such third party's claims and/or actions and:
    - i) The Contractor shall at its own cost defend or assist the Railway in defending its rights against any such claims and/or actions; or
    - ii) If the Contractor defends the case, the Railway shall, assist the Contractor free of charge by providing all such information and documents as are available with the Railway, save and except that in case of production of any witness at the request or instance of the Contractor, the Contractor shall bear all costs and expenses required in this regard.
  - b) THE RAILWAY shall not without the Contractor's consent (which shall not be unreasonably withheld) enter into any commitment or admit any fact capable of supporting third party's claims, unless the Railway shall release the Contractor of its liabilities and obligations.
  - c) The Contractor shall at its own cost, without prejudice to the provisions of this Schedule, may either carry out such alterations or modifications of the equipment which are necessary to avoid the infringement without affecting the efficient operation of the unit to the satisfaction of the Railway or to procure a right to the unrestricted use of the infringing equipment by the Railway.
- 14.5 Nothing in this Schedule shall abrogate or abridge the Contractor's own liability for infringement or violation of patent, trademark, registered design, copy rights and/or industrial property right of a third party, if such infringement or violation is proved before and sustained in court of law and the Contractor fails to take action in terms of provisions of **Clause 14.4** above.
- 14.6 The rights and liabilities of the parties under this Schedule shall survive this Contract.

15.0 **Co-Operation with other Contractors:**

The Contractor shall co-operate with the Railway's other Contractors, if any, for any associated plant and freely extend all help. The Contractor shall adjust, if found necessary his work so as to co-ordinate with the work of other Contractors. No compensation for such co-operation / adjustment of work can be claimed from the Railway on any account.

16.0 **Waiver:**

- a. Non-enforcement by either party of any of the provisions of this Contract shall not operate or constitute as a waiver of the provision itself or any subsequent breach thereof.
- b. The validity of the Contract shall not be affected, should one or more of its stipulations be or become legally invalid and such stipulation is severable from and not fundamental to the obligations of either

party to this Contract. In such a case, the parties shall negotiate in good faith to replace the invalid clause by an agreed stipulation which is in accordance with the applicable law and which shall be as close as possible to the parties' original intent.

17.0 **Language:**

All documents, instructions, catalogues, brochures pamphlets, design data, norms and calculations, drawings, operation, maintenance, trouble shooting and safety manuals, reports, labels, on deliveries and any other data shall be in English Language.

18.0 **Care of Work:**

From the commencement to the completion of work, the Contractor shall take full responsibility for the care of Plant and Equipment and for all temporary works and in case of any damage or loss to the Plant and Equipment or to any temporary works or to any surrounding property of the Railway from any cause whatsoever, the Contractor shall at his own cost replace or repair and make good the same.

19.0 **Restriction of Visitors:**

The Contractor shall not allow any visitors at site without the prior written approval of the Railway.

20.0 **Possession Prior to Completion:**

THE RAILWAY shall have the right to take possession of or use any completed or partially completed work. Such possession or use shall not be deemed to be an acceptance of any work done not in accordance with the Contract.

21.0 **Bought Out Items:**

The tenderer shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the tenderer and proposed to be used, along with the manufacturer's name, brand model etc. The successful tenderer may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

***Test certificates of bought item should be provided by the supplier with proper identification at the time of inspection.***

22.0 **Deviations:**

22.1 The tenderer shall certify that the offered Machinery and Plant (M&P) fully meets the specification. Various design features incorporated in the Machinery and Plant (M&P) to fulfill different technical performance requirements shall be fully explained in the offer. However, minor deviations from these specifications which do not affect or in any way interfere with the stipulated performance standards or would result in improved safety/ reliability or would reduce recurring maintenance/operating cost of the Machinery and Plant (M&P) can be considered for acceptance. The tenderer in such eventuality shall clearly indicate the details of these deviations and their implications **as per Annexure- I of Special conditions of contract.**

22.2 All Deviations in Technical specification of Machinery and Plants (if any) should be clearly indicated in the deviation statement of **Annexure- I of Special conditions of contract.** If the bidders fail to submit any deviations, then it will be safely assumed by Railways that there is no deviation and the bidder has agreed to comply with all the conditions of the **schedules.**

23.0 **Warranty:**

The warranty period of entire system (including 02 nos. old machines & 02 nos. new machines and wheel feeding system) will start simultaneously after PTC or completion of all activities under Schedule-1,2 &3 whichever is later. The firm will have to maintain the SPG system during gap period in between completion of all activities of Schedule-1,2&3 if any.

The following conditions regarding Maintenance and reliability shall also apply: -

23.1 Within the terms of the Warranty, the Contractor shall be liable for any defect/deficiency in design, material, manufacture, packing, transport, shipment, construction, erection, installation testing, commissioning, Proving-out tests, workmanship, any act of omission of the contractor, any defects/deficiencies not specifically mentioned & not attributable to Railways.

23.2 Warranty will be from the date of issue of PTC Certificates.

23.3 Up to expiry of the Warranty period, the Contractor shall remain solely liable for compliance of his supplies with the Contract provisions and with the best trade and engineering practice. He shall be held to perform entirely at his expense any modification, adjustment and/or revision acknowledged to be required to meet the conditions of the Contract.

- 23.4 The Contractor shall also, at his expense, replace any part having defects rendering it unsuitable for the use for which intended or liable to reduce the operating lifetime thereof without the Railway having to identify the nature of such defect to which the defective facility might be exposed.
- 23.5 Where it is established that a defect is occasioned by a genuine error in design, the Contractor shall replace all identical components furnished within the compass of the Contract with components better suited to perform the same functions in the same conditions, even though such components may not have given rise to any failure.
- 23.6 If during the Warranty period some parts of the supplies are replaced owing to the defects/damages under the Warranty, the Warranty period for such replaced parts shall be 24 from the date of replacement unless otherwise agreed.
- 23.7 The tenderer shall ensure that in case a failure is reported by a consignee qualified service engineers shall visit the site within two days from the date of complaint on calendar day's basis.  
The period of two days after the failure report shall be treated as a grace period, which will not count towards breakdown time for up to one failure per month and a maximum of 3 failures per quarter. In case the number of failures exceed one failure per month or three during any quarter of warranty, grace period of only 1 day will be permissible for such additional failure. Complaints shall be lodged by Railway by fax phone, e-mail or per bearer at the address given by the tenderer.
- 23.8 If the warranty period expires on a Saturday/ Sunday/ Holiday, it will be deemed to have been extended to the following working day.
- 23.9 If during the period of Warranty, the entire plant should be unavailable for reasons ascribable to the Contractor or for performing a design modification to better adapt the facility of new technological progress, the period of Warranty covering the entire works shall be extended by all of the period of unavailability of the equipment.
- a) Upon detection of defects either by the Railway or by the Contractor and/or notification thereof in writing to the Contractor by the Railway, the Contractor shall immediately take appropriate or efficient measures to remove the defects at his cost by repair or replacement as may be approved by the Railway.
  - b) If the Contractor does not commence the rectification either by repair or replacement of such defects within 30 days from the date of notice by the Railway or does not complete the said rectification with reasonable diligence and within a reasonable time as may be mutually agreed, the Railway may, at its option, rectify the defects at the Contractor's expense. The Railway shall, in such a case, deduct from payment due to the Contractor the expenses incurred by the Railway for remedy of such defects without prejudice to the other rights of the Railway under this Contract.
  - c) In the case of defective parts not repairable at site but essential in the meantime for the use of the plant, the Contractor shall replace at site free of cost to the Railway they said defective parts, before the defective parts are removed to his works. If the spare parts are available with the Railway, the Contractor shall be allowed to use the same in replacing the defective parts, provided that the Contractor shall replace such parts within a reasonable time thereafter as may be required by the Railway.
  - d) If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repairs/replacement either before commissioning or during warranty, the manufacturer or his agent would be required to submit an Indemnity Bond. In case the entire Plant/Equipment has to be taken back, a Bank Guarantee would have to be submitted. The Indemnity Bond/Bank Guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the Plant/Equipment.
  - e) If the Contractor, on account of the defects, repairs and/or replaces certain items by changing the design or materials, such change shall not reduce the performance of the unit.
- 23.10 If any drawings/documents supplied by the Contractor are found to be incorrect or incomplete within the period of Warranty, the Contractor shall correct or complete such drawings/documents at his cost within a reasonable time.
- 23.11 The issuance of any acceptance certificate/inspection certificate/ approval by Railway shall in no way relieve the Contractor from the provisions of this contract.

**24.0 QUALIFYING REQUIREMENTS OF TENDERERS**

**24.1.** The tenderer shall provide satisfactory evidence acceptable to the Purchaser to show that —

- (a) He is a manufacturer, who regularly manufactures the items offered and has adequate technical knowledge and practical experience.
- (b) He has financial strength and resources to meet the obligations under the contract for which he is required to submit duly audited Annual financial statements (Balance sheet, profit & loss account etc.) for the last 3 years or a report from a recognized bank or a financial institution on financial position.
- (c) He has adequate plant and manufacturing capacity to manufacture and supply the items offered within the delivery schedule offered by him.
- (d) He has established a quality control system and organization to ensure adequate control at all stages of the manufacturing process.
- (e) He satisfies the provisions mentioned in “Special conditions of tender (Reference Clause)” contained in “Special Conditions of Tender”.

**24.2. For purposes of clause-24.0, the tenderers should additionally submit: —**

- (a) A performance statement as in **Annexure-5**, giving a list of major supplies of same/similar equipment's effected in last 5 years or for such period as specified elsewhere in Bid Document & special conditions of tender of the items offered by him, giving details of the User's name and address, order no. and date and the quantity supplied and whether the supply was made within the delivery schedule. Such a period shall be reckoned from the date of opening of tender.
- (b) A statement indicating details of equipment deployed and quality control measures adopted by the manufacturer as in **Annexure-6**.

**24.3.** In addition to the above, further information regarding his capacity, capability, if required by the Purchaser, shall be promptly furnished by the tenderer and he would offer all facilities to representative of Purchaser for assessing capacity, capability by actual visit to his works/office.

**24.4.** The evidence/documents submitted for meeting the qualifying requirements, if found false/fake/forged/manipulated at any stage during evaluation of offers and or even during the currency of Contract, the purchaser reserves the right to summarily reject the offer or terminate the Contract at his risk and cost and take action as per applicable law including banning of business dealings etc.

**COMMERCIAL DETAILS & PAST PERFORMANCE**

Tender No.....Date of Opening.....

A. **COMMERCIAL DETAILS** (i) Is the firm a unit registered as MSE (as per Clause 0109 of “Instructions to Tenderers”)? (If so, a copy of the registration certificate should be enclosed.) (ii) Name and address of the Banker. (A copy of the Banker’s report should be enclosed.) (iii) Last 3 years turn over. (Documentary evidence should be enclosed.)

B. **PAST PERFORMANCE** Details of orders for the major suppliers of same/similar equipment’s executed during the past five years or for such period as specified in Bid Document Part-II should be furnished in the following format.

SN	Full address of User	Order no. & date	Description of Stores	Qty.	Value of order	Date of delivery	Remarks
1	2	3	4	5	6	7	8

Signature-----  
Name-----  
Designation-----

**Note:** A certificate from the User should preferably be enclosed to indicate that the contract was satisfactorily performed.

**PROFORMA FOR EQUIPMENT AND QUALITY CONTROL EMPLOYED BY THE MANUFACTURER**

Tender No. .... Date of Opening .....

**1. NAME OF THE FIRM**

**2. LOCATION**

i) Head Office

ii) Works/Factory

**2.2 Telephone No. (with STD code)**

i) Head Office

ii) Works/Factory

**2.3 Telegraphic address & Telex/fax**

i) Head Office ii) Works/Factory

**3. DESCRIPTION OF FACTORY/WORKS**

i) Total Land area (in Sq. meters)

ii) Total covered area (in Sq. meters)

iii) Different Sub-units (with details of covered/uncovered area, etc.)

iv) Special features, if any:

**4. NO. OF PERSONNEL EMPLOYED(CATEGORY-WISE)**

i) Managerial\*

ii) Supervisory\*

iii) Skilled artisans

iv) Unskilled

\* The qualification may also be indicated.

**5. GENERAL INFORMATION- TECHNICAL**

5.1 Description of different departments in the Factory/Works and function of each department, along with an organization chart

5.2 Detailed description of machinery and plant in each department (make and year of procurement/commissioning to be provided. For special type of equipment copy of pamphlets/write-ups to be furnished so as to supplement the description).

5.3 Details of raw-materials held in stock (state whether imported/indigenous).

5.4 Production capacity of the quoted items

i) Per month or Per year

5.5 List of other items, which the firm regularly manufactures and corresponding production capacity.

**6. DESIGN CAPABILITY**

6.1 Details of Qualified Personnel (indicating qualification and experience)

6.2 Other facilities available.

**7. MANUFACTURING PROCESS**

7.1 Level of in-house facilities

7.2 Important items of work done by outside vendors.

7.3 Brief details of manufacturing process relevant to the items quoted.

8. Deleted.

**9. AFTER-SALES-SERVICE**

9.1 Facilities available at works and branch offices.

9.2 Assessment of quality of service including response times.

Signature.....

Name.....

Designation.....

**25.0 PENALTY FOR DELAY IN COMMISSIONING: -**

The Contractor or his agents shall commission the machine within the stipulated time as shown in the contract. This time frame will be applicable from the consignee in respect of readiness and installation of the machine in cases where the machine is to be installed by the consignee. The time schedule includes the time for installation in cases where installation is also to be undertaken by the supplier. The time allowed for commissioning of the machine by the contractor, or his agent shall be deemed to be the essence of the contract. In case of delay in commissioning of the machine on the part of Contractor, the Purchaser shall be entitled to recover and the Contractor shall be liable to pay pre estimated liquidated damage at the rate of 2% of the total contract value of machine not commissioned (except in cases where commissioning & performance of machine is inter dependent on each other in turnkey contracts) for each and every month or part thereof for which commissioning is delayed. Provided always that the entire number of liquidated damages to be paid under the provision of this clause shall not exceed 10% of the total contract value. After expiry of 5 months period from the date of default i.e., from the date of commissioning provided in the contract, purchaser will be at liberty to invoke the PG Bond submitted by the supplier. Continuance of commissioning work after expiry of the stipulated time will also not absolve the contractor from the liquidated damages as stated above. The decision of the Purchaser, whether the delay in commissioning has taken place on account of reasons attributed to the contractor shall be final.

**26.0 Communications with Contractor(s):**

Subject to and as otherwise provided in this contract, all notices as are required to be given shall be signed by the competent officer of the Railway for and on behalf of The President of India and all other actions shall be taken by the Engineer and/or his representative.

**27.0 Insurance:**

27.1 The Contractor shall be responsible and take a comprehensive Insurance Policy for "transit-cum-storage-cum-erection" in the joint name of the Railway and Contractor for value covering all risks and liabilities for all supplies on **FOR site basis**, storage at site up to erection, testing & commissioning and handing over of the Plant to the Railway as per terms of Contract. The Contractor shall also take insurance for Third Party Liability covering loss of human life (engineers and workmen not belonging to Contractor) and also covering the risks of damage of other's material/ equipment/ properties during execution of the Contract. However, the value of third-party liability for compensation for loss of human life and damage of equipment/property shall be subject to the approval of the Railway. The Contractor shall produce the insurance policy and the receipts for the premium at the appropriate time.

27.2 The Contractor shall ensure that the insurance coverage is obtained to take care of future cost escalation and variation in taxes & duties during the tenure of the Contract. The Contractor shall, if necessary, also enhance and extend the insurance coverage till completion of the work and handing over of the unit. The Insurance cover shall remain in full force up to the time the Machinery and Plant is accepted, and Final Acceptance Test Certificates (FAT) are issued by the Engineer.

- 27.3 In order to adequately cover under comprehensive transit-cum- storage-cum-erection insurance, the Contractor shall fulfill the necessary requirement/obligations of the Insurance Company including provisions of adequate firefighting facilities, watch & ward etc.
- 27.4 In all cases, the Contractor shall lodge the claims with the Underwriters and also get the claims settled. However, the Contractor shall proceed with the repairs and /or replacement of the equipment /components in their scope of supply without waiting for the settlement of the claims. In case of seizure of materials by concerned authorities, the Contractor shall arrange prompt release against bond, security or cash as required. The Railway will extend all assistance to the Contractor in such a case.
- 27.5 All the insurance claims pertaining to their scope shall be processed by the Contractor and the missing / damaged items shall be replaced / repaired by them without any extra cost to the Railway and without affecting the completion time.
- 27.6 The Contractor shall also arrange Accident Insurance Policy for his personnel deputed to site including a separate policy as per Workmen's Compensation Act.
- The Accident Insurance policy shall be for payment of an ex-gratia amount of (INR) Rs. 1,00,000/- (Indian Rupees One lakh only) per head in case of fatal accident to the Contract labour engaged by him in addition to the Workmen's Compensation Insurance Policy. As and when a fatal accident takes place, along with the Workmen's Compensation, the Contractor is required to pay the ex-gratia amount within seven (7) days from the date of accident.
- In case of any delay in paying the ex-gratia amount as above, Railway has the right to pay such amount directly to the family of the deceased and recover the same from the Contractor's running/future bills.
- 27.7 The vehicles, mobile equipment and any other equipment (whether or not those are owned by them) deployed at site by the Contractor or his sub-Contractor shall be covered under Automobile Liability Insurance at Contractor's cost.
- 28.0 **Indemnity:**
- 28.1 The Contractor shall at all times indemnify and keep indemnified the Railway against all claims which may be made against the Railway in respect of any infringement of any rights protected by patent as per **Clause 14**. In this connection, the Railway shall pass on all claims made against him to the Contractor for settlement.
- 28.2 The Contractor assumes responsibility for and shall indemnify and save harmless the Railway from all liability, claims, costs, expenses, taxes and assessments including penalties, punitive damages, attorney's fees and court costs which are or may be required with respect to any breach of the Contractor's obligations under the Contract or for which the Contractor has assumed responsibility under the Contract including those imposed under any Contract, local or national law or laws, or in respect to all salaries, wages or other compensation of all persons employed by the Contractor or his Sub-Contractors or suppliers in connection with the performance of any work covered by the Contract. The Contractor shall execute, deliver and shall cause his Sub- Contractor and suppliers to execute and deliver, such other further instruments and to comply with all the requirements of such laws and regulation as may be necessary there-under to conform and effectuate the Contract and to protect the Railway at all times.
- 28.3 THE RAILWAY shall not be held responsible for any accident or damages incurred or claims arising therefrom during the period of execution of work under the responsibility of the Contractor and putting into operation of the plant under the supervision of the Contractor in so far as the latter is responsible. However, the Contractor shall be liable for such accidents as may be due to negligence on his part in accordance with Indian laws and regulations.
- 28.4 The contractor shall submit the **Indemnity Bond** as per the format given in **Annexure-N** of special conditions of contract for Mechanical Works before supply of machines.
- 29.0 **Service Facility in India and Technical Support:**
- 29.1 The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period in the appropriate section of Annexure 'L' of Special condition of contract. The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated. Bidders not offering complete servicing/repair facilities in India to ensure quick response to maintenance/ servicing calls are not likely to be considered.
- 29.2 After the warranty period, if any, the manufacturer or his agent shall agree to provide service supports for trouble shooting and obtaining spare parts. The manufacturer shall be obliged to provide spare parts required by the Purchasers for a period of 15 years from the date of delivery of the machine at the ultimate destination to safeguard against obsolescence.



- 29.3 Tenderer who are OEM, shall undertake to supply spare parts for a period of expected life of machine. Other tenders shall submit undertaking from OEM for supply of spare parts for a period of expected life of the machine.
- 29.4 Tenderers shall indicate the list of spares required for maintenance of the machine beyond warranty period. Current cost of such spares and current service charges for the items of work of repair of machine shall also be indicated.

**JOINT RECEIPT INSPECTION NOTE**

Date.....

<b>Sub:</b>	Receipt of consignment for machine _____	
<b>Ref:</b>	Contract No _____	
1.	Name of consignee/Railway	
2.	Machine name	
3.	Quantity	
4.	Name of supplier	
5.	Consignment of the machine received on	

It is certified that the consignment of the machine has been received complete and in good condition as per specification shown in the contract.

**Tentative plan for installation and commissioning of the machine is as under:**

1.	Date of clear site provided	
2.	Contract	
3.	<b>Status of readiness of foundation:</b>	
(a)	Already constructed on	
(b)	Under construction & likely date of its completion	
(c)	Construction yet to be started from ..... and & likely date of its completion	
4.	Status of availability of electrical power, water and compressed air etc.	Available/Not-available
5.	Number of components to be proved out on the machine	
6.	Likely date for start of erection	
7.	Likely date for switch-on the machine	
8.	Likely date of completion of commissioning of the machine	

Remarks (if any):

**Representative of firm  
Designation**

**Representative of consignee  
Designation  
(Minimum Gazetted level)**

**JOINT COMMISSIONING NOTE**

Date.....

<b>Sub:</b>	<b>Commissioning of (name of machine)</b> _____
<b>Ref:</b>	<b>Contract No</b> _____

1. Name of consignee/Railway
2. Machine name
3. Quantity
4. Name of supplier
5. Machine received on
6. The machine was operated from ..... to ..... . All the leading parameters specified in technical specification schedules as well as approved drawing of the machine is found ok subjected to defects and deficiencies as mentioned in sl no 8.
7. The machine is being kept under one month observation to watch its performance.
8. Following minor deficiencies (if any) found during joint observation trials are to be attended/rectified by the firm during one month observation and before issuance of the PAT certificate:
  - a.
  - b.
  - c.

**Representative of firm  
Designation**

**Representative of consignee  
Designation  
(Minimum Gazetted level)**

**FORM FOR PERFORMANCE APPRAISAL ON COMPLETION OF WARRANTY PERIOD**

Date.....

To,  
M/s. ....

1.	Contract Agreement No	
2.	Consignee/Railway	
3.	Name of supplier	
4.	Machine Name	
5.	Machine received on	
6.	Machine commissioned on	
7.	PAT issued on	
8.	PTC issued on	
9.	Warranty period expired on	
10.	<b>Performance during warranty period:</b>	
10(a)	Total number of breakdowns	
10(b)	Total downtime in number of days	
11(a)	Any warranty complaint pending on date	Yes/No
11(b)	If yes, then the date and nature of defect(s)	

12. In case, Reliability clause No.23 of the machine during warranty period is also given in Special Condition of contract for Mechanical Works, then following details of breakdown hours for preceding eight quarters may also be furnished

Quarter	Period		Breakdown hours
	From	To	
1			
To			
8			

Signature

Name

Designation

Office Stamp

**Note:**

- a) This appraisal may please be sent immediately on completion of warranty period. If any extension of warranty period required, may please also be mentioned with details.
- b) Sr.Scale Officer having independent charge is also authorised to sign.

**PROFORMA OF PROVING-OUT TEST CERTIFICATE (PTC)**

No..... Date:.....

M/s.....

.....  
.....

**Sub: Certificate for commissioning & prove out of machine**

1. This is to certify that the machine as detailed below has been received in good condition along with all the standard and special/optional accessories and spares and same has ben installed and commissioned:

- (a) Description of the machine :
- (b) Machine No :
- (c) Quantity :
- (d) Date of receipt of machine :
- (e) Date of commissioning :

2. Following items/documents received in full and good condition:

- (a) Maintenance spares :
- (b) Concomitant accessories :
- (c) Optional accessories :
- (d) Maintenance tools and tackles :
- (j) Data, Drawing and Manuals as per :  
Technical Specifications of M&Ps.

3. Accessories/Spares not yet supplied and recoveries to be made on that account as per details given below:

Sr No	Description	Amount to be recovered

4. Training was imparted to the staff as per provisions made in the contract.

5. The proving-out test has been done to our satisfaction.

6. You have failed to fulfill the contractual obligations with regard to the following:

- a) \_\_\_\_\_
- b) \_\_\_\_\_

7. The amount of recovery on account of non-supply of accessories and spares is as per details given above. Losses/damage on account of your failure to fulfill the contractual obligations will be recovered from your bills/Performance Guarantee Bond in terms of Para \_\_\_\_\_ of General Conditions of Contract. Bid Documents \_\_\_\_\_ governing the contract.

The issuance of proving-out certificate (PTC) proves only the technical acceptability and functioning of the machine on the date of issue of the Certificate. The issue of this PTC does not amount to waiver of any of the terms and conditions of the contract or delay in supply of drawings, machine or commissioning thereof and it does not absolve the supplier of its liability for any loss or damages suffered by the Railways due to the same.

**Signature**

**Name**

**Designation**

**With**

**Stamp**

**Note: -**

- a) This certificate should be signed by an officer not below the rank of J. A. Grade.
- b) A separate PTC should be issued for each machine.

**PROFORMA OF IDEMNITY BOND FOR MACHNERY AND PLANTS**

1. Indemnity for Machinery and Plants as per Special Conditions of Contract for Mechanical Works under Agreement No.....dated: .....for the work“ ”

We (Name of Contractor) .....hereby undertake that we shall hold at our Workshop at .....for and behalf of the President of India and in trust for him the stores/articles(mentioned in Technical Specifications, details to be given for quantity for each schedules) which may be and/or which has been made over to us, in connection with “.....“ against the contract agreement No..... Dated.....

2. We shall be and remain absolutely responsible for the safe custody and protection of the said stores and articles against all risks, whatsoever, till those and duly delivered to the President of India or to his representative as he may direct and as such do hereby indemnify the president of India against any loss and/or damage to the said stores and articles while in our possession/custody. The said stores and articles shall however be at all times, open to inspection by officers who may be authored on that behalf by ministry of Railways or its nominee.

3. Should however, at any time any loss or damage to as aforesaid, occurs or a refund become otherwise due to the President of India, he or his representative shall be entitled to recover from us compensation for, and in respect of such loss or damage, if any, or the amount to be so refunded without prejudice to any other remedies which may be otherwise available to the said president of India by way of deduction from any sum due to/or any sum which at any time hereafter may become due to us under this or any other contract.

4. We hereby irrevocably agrees to indemnify the indemnified that in the event of the said machine not achieving the performance of Machinery and Plants, the indemnifier shall as may be deemed necessary repair the defective machine at site, free of cost, within a reasonable time specified by the indemnified.

In the event of any loss or damage as aforesaid, the assessment of such loss or damage and the assessment of the compensation therefore would be made by the President of India or his authorized nominee and the said assessment would be final and binding upon us.

Bidder's authorized signatory

With seal

Station:

Date:

**DECLARATION FORM**

For receiving materials from the Railways by the Firm.

“I/We hereby solemnly declare that the .....(Material) obtained is required for the purpose of Manufacturing.....(finished product) against Contract Agreement No..... dated.....The .....(material) will not be utilized for any other purposes or otherwise disposed of without the prior approval of the president of India/Railways or his nominee”

**Note:-**

***This Performa is only for guidance and may be changed/amended at any stage at the discretion of Engineer. This is to be submitted on stamp paper of appropriate***

Witness:

1.-----

Signature

Name

Designation

Address

2.-----

Signature

Name

Designation

Address

**ANNEXURE-I**  
**FORMATE FOR SUBMISSION OF TECHNICAL BID**

1. We, M/s.----- offer our ----- machine, model no---- as per the description given in Schedule of Requirements. We further state that, except for the following, for which clause wise brief description and justification for deviation has been indicated, our machine fully complies with all the clauses as given in technical specification and we also confirm all the schedules given in the Delivery Schedule:

S.No.	Clause/Item	Brief description of Deviation	Justification for deviation

**Note1**

: In case there is a contradiction in any information provided (some parametric values given in the specification and those given in the brochure, or some other document enclosed by the tenderer), unless specifically mentioned in the specification shall be taken as confirmed by the tenderer and offer evaluated accordingly.

**Note2:** In case tenderer offers internationally accepted alternative specifications as per clauses 1.7, complete details of alternative specification, apart from filing above deviation statement, may be enclosed.

2. We further certify that we are meeting the reference clause as.

(A) We are manufacturer of similar type of machine.

(B) We have made the following past supplies of similar machines as per special conditions during last 15 years: -

S No	Name of purchaser with postal address	P.O. No. and date (along with the copy of PO)	Name of contact person with designation	Phone fax / e-mail nos. Of contract person	Date & place of commissioning of the machine

(C) We are submitting following performance certificate from past users as per special conditions: -

S.N.	Username	Date Supplied	Date of issue of certificate	Application/ Use	Centre to center Distance, centre height, spindle motor power & surface finish	Performance

3. We are having following facilities available with us or our agent for providing adequate after-sales service in India during warranty period. Complete details of after sales service, availability of technically competent engineers and warehousing facilities for spares is indicated below:

- After sales service centers:
- Availability of technically competent engineers.
- Warehousing facilities for spares:



4. We have quoted for the following optional accessories as indicated under clause 4.3 of section-IV

Sr. No.	Description of the optional accessory	Quantity (in Nos.)	Rate (in Rs.)	Indigenous	Shelf Life (in Months)

5. We have quoted for following recommended perishable and non-perishable spares required for normal maintenance to cover complete range of mechanical, hydraulic and electrical equipments including **Perishable Spares**:

Sr. No.	Description of the spares	Part number	Quantity (In Nos.)	Rate (In Rs.)	Shelf Life (in Months)
<b>Non-perishable spares:</b>					

6. \*We hereby confirm that we are the OEM and undertake to supply spare parts for a period of expected life of machine.

**OR**

. \*We hereby confirm that we are not the OEM but are submitting undertaking from OEM for supply of spare parts for a period of expected life of the machine to provide maintenance spares (as and when ordered) after the expiry of the Warranty/AMC for X years (life of machine – 15yrs) including the maintenance spares required for the bought out sub-assemblies and parts.

(\*Strike out whichever is not applicable)

7. We have quoted consumables required as per clause 6.1 of Section-V of Bid document Pt-II, in format give below:

Sr No.	Description of the consumable spares	Qty	Unit	Rate

8. It is certified that we have suitable facilities at our works for carrying out various performance tests on the sub-assembly/machine and these shall be made available to the inspecting authority.

9.	BOUGHT OUT ITEMS: We hereby furnish a list of all critical items/ sub-assemblies which are bought out by us and proposed to be used, along with the manufacture's name brand model etc.				
	Sr. No.	Description	Item no. 1	Item no.- 2	Item no.- 3
	1.	Brief description of item			
	2.	Model no.			
	3.	Make			
	4.	Quantity/machine			
	5.	Manufacturer's name and complete address			
	6.	Whether imported or indigenous			
	7.	Country of origin			



**ANNEXURE-7****DELIVERY SCHEDULE CHART FOR SCHEDULE-1**

In the event of acceptance of the offer, the machine(s) shall be supplied as per following Milestone Chart:

**Name of machine: -CNC Sprue Grinding Machine**

**Specification No.:RWP/Bela/SPG/Specification/2023**

<b>S.N.</b>	<b>Activity</b>	<b>Activity Code</b>	<b>Outer Limit of Time Schedule RWP-Bela</b>	
1	Issue of LOA	D1		
2	Submission of PBG By Successful Bidder	D2	D1+30 days	
3	Issue of AT/Contract By RWP-Bela (after verification of PBG)	D3	D2+30 days	
4	Submission of GA drawings and requisition for the trial component (s) (if applicable) to consignee by Successful Bidder/Supplier along with information on total power required for operation of machine and during installation of machine.	D4	D3+45 days	
5	Approval of GA drawings by consignee and confirmation of availability of components to be proved out at manufacturer premises and value of BG required for providing prove out components.	D5	D4+45 days	
6	Confirmation of availability of clear site by consignee	D6	As per Production plan of RWP-Bela	
7	Uprooting of 02 nos. old machines	D7	D6+30 Days	
8.	Completion of foundation	D8	D7+30 days	
9	Submission of BG and collection of components from consignee by the supplier for prove out of machine at manufacturer's works.	D9	D6+60 Days	
10	Supply of New Machine	D10	D5+9 Month	
11	Power connection for the machine and other onsite requirement to be provided by railways.	D11	Equal to D10	
12	Installation, commissioning and prove out test of machine by supplier.	D12	D10+90 or D11+90 days (whichever is later)	
13	Issue of PTC by consignee	D13	D12+30 days	
14	Warranty by supplier	D14	D13+ 2 years	

**GENERAL SPECIFICATION FOR SUPPLY OF M&P (AS APPLICABLE)**

General Technical Specifications for all M&P including Lubrication, Cooling, Hydraulic, Pneumatic and Electrical Systems, features of CNC controls etc. (as applicable). The condition/ features indicated in main specifications shall over-ride those mentioned anywhere else.

**1.0 Important Notice:**

- a) Tenderers are required to give comments/ compliance precise, specific and to the point. Bidder shall also give specific information wherever asked for. Deviations, if any, shall be clearly indicated with details and proper justification to avoid back reference.
- b) Tenderers must offer all the specified concomitant accessories, as considered essential for commissioning and utilization of the machines and equipment's.
- c) The bidder will quote only for the make of sub-assemblies and equipment wherever specified. Other makes of sub-systems will normally not be acceptable. In case, some other make is quoted, specific reasons for the same including its features/advantages over specified makes must be brought out in the offer.
- d) In respect of safety standards and environmental standards relevant to the machine, it is mandatory for the machine manufacturer to ensure compliance with international (CE/ISO/DIN/JIS)/National Standards (IS) (where applicable) in their offer.
- e) Offers are likely to be ignored in case of non-compliance of these instructions.
- f) In case, any item is required in sets, please specify nos./ pieces per set.
- g) If a bidder feels that details provided in a clause/ para pertaining to any item or machine are inadequate/ incomplete, the bidder may furnish further information pertaining to that item/ machine and upload the same along with his offer. However, decision of Railways shall be final regarding all such interpretations.

**2.0 Machine Maintainability:**

The machine shall be so designed as to require minimum possible maintenance and to give trouble free service. The machine / equipment should have the following features:

- a) All assemblies/ parts of the machine /equipment will be easily accessible for maintenance to the extent possible.
- b) The machines will not require major dis-assembly for checking and replacement of a particular part, especially for parts requiring periodical checkup and replacement.
- c) The manufacturer must provide means of access e.g., stairs, ladders, cat walks etc. (as per requirement / design, wherever applicable) to allow access safely to all areas used for production, adjustments and maintenance operations.
- d) **Wear Compensation Adjustment:** The original built-in accuracy of the machines shall be capable of being maintained conveniently and economically by suitable adjustments for taking up wear on slides, bearings and lead screws etc. wherever required.

**3.0 Safety features (as applicable)**

- a) **Work area Lighting:** Machines should be provided with light (Halogen light/CFL/LED) to illuminate work area with minimum illumination level of 300 lux. Tube lights in electrical cabinets for maintenance purposes shall also be provided. Four coloured signal lights displaying operational status of the machine and visible from a distance should be provided for CNC machines.
- b) **Noise Level:** The maximum noise should not exceed 85 dB. The measurement should be carried out at a distance of 07 meter away from the periphery of the machine as per NMTBA noise measurement technique / ISO 3740-1980 / DIN 45635-16 / IS 10988. The noise level of the machine in dB should be clearly indicated in the offer along with relevant standards.
- c) **Other Safety Features:**

- (i) Work area enclosure with transparent windows should be provided, wherever applicable and required.
- (ii) The work area should be completely enclosed and interlocked so that no cutting operation in auto mode can take place as long as it is open except for motions in jog mode.
- d) The machine shall incorporate safety devices to provide protection to the operator and machine against all possible operational and machinery failures.
- e) Suitable interlocks shall be provided to prevent machine operations in the event of:
  - (i) Faulty sequence of operation.
  - (ii) Fluctuation in supply voltage.
  - (iii) Resumption of power supply after power failure.
  - (iv) Non-positioning of safety guards, wherever moving guards are provided.
  - (v) Failure of hydraulic system (where applicable)
  - (vi) Failure of lubricating system (In case of automatic including drop in pressure lubrication)
- f) 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 situations in particular.
  - (i) The machinery must not start unexpectedly.
  - (ii) The machinery must not be prevented from stopping if command has already been given.
  - (iii) No moving part of the machinery or piece held by the machinery shall fall or be ejected.
  - (iv) The protection devices must remain effective.
- g) The machine shall be fitted with an emergency stop device to enable actual or impending danger to be averted. This device must be:
  - (i) Conveniently located.
  - (ii) Clearly identifiable.
  - (iii) Stop the machine as quickly as possible without causing additional hazards.
- h) The emergency stop must remain engaged. It should be possible to disengage it only by appropriate operation. Disengaging the control must not restart the machinery but only permit restarting.
- i) Safety features shall also be included.
  - (i) Safety device against overload for all mechanical and electric items to the extent possible.
  - (ii) Safety stops against over-running of slides.
- j) Guards and protection devices shall protect operators against risks related to moving transmission parts (such as pulleys, belts, gears, rack and pinion, shafts etc.) and moving parts directly involved in the process to the extent possible. These shall meet the following requirements: -
  - (i) Be of robust construction
  - (ii) Not give rise to any additional risk
  - (iii) Not be easy to bypass or render non-operational.
  - (iv) Be located at an adequate distance from danger zone.
  - (v) Cause minimum obstruction to the view of the production process.
  - (vi) Rigidly connected and not prone to rattling.
  - (vii) Enable essential work to be carried out without the guard or protection device having to be dismantled.
- k) A load meter shall be provided to indicate the actual load on the machine. The meter shall have a suitable mark to indicate the maximum load the machine can take.

**4.0 Environment Conditions:**

- a) The machines/ equipment's are required to work in an ambient condition of temperature range of 0°C to 50°C and relative humidity of 100% and comparatively dusty atmosphere. All equipment's/ machines should be designed to function effectively under these conditions.

- b) The electrical/electronic/CNC equipment should be tropicalized, and also other sub-assemblies of the machine should be suitably designed to function efficiently under tropical conditions.
- c) All the enclosures of the electrical equipment's should confirm to suitable standard (IP etc) to ensure all-weather proofing.
- d) The Electrical Control Cabinet shall be fitted with proper air-cooling arrangement by means of heavy duty blowers, filters & heat dissipation system.

**5.0 Special Features:**

The bidder should clearly indicate the special features incorporated in the machine, if any, and also the advantages of the special features.

**6.0 Scope of Supplies and Services**

**a) Concomitant Accessories:**

- (i) The machine should be accompanied by all the concomitant accessories to make the respective machine/ equipment fully operational after installation.
- (ii) The scope of concomitant is specified in the respective specifications as applicable.

**b) Scope shall also include the following:**

Storage, handling, erection, testing, commissioning of all equipment and carry out demonstration of performance guarantee tests till issuance of **Final Acceptance Test Certificate (FAT)/ Prove-out Test Certificate (PTC)**.

**7.0 Coolant System (Where Applicable)**

- a) A suitable coolant system with pump, motor, tank, filter etc. shall be provided. The coolant pump shall be as per IS:2161-1962. The filter shall be of reusable type and indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on a double shift basis shall be provided. The unit cost of machine will be inclusive of spares. Details of the coolant system shall be indicated.
- b) The supply of coolant shall be in ample volume. Provision to re-circulate the coolant shall be available. A chip and coolant tray shall be provided. The volume of coolant flow shall be indicated. It shall be adjustable.
- c) An enclosure shall be provided to prevent the coolant from splashing outside the machining zone. Details of the enclosure shall be provided. Specific requirements of the coolant system for grinding machines etc. shall be clearly indicated.

**8.0 Lubrication System (Where Applicable)**

- a) The machine shall be provided with an automatic lubricating system for ensuring delivery of an adequate quantity of lubricant to areas requiring continuous lubrication. Suitable arrangements must be provided for indication of failure of the lubricating system.
- b) The system shall be provided with interlock to prevent machine operating/starting in the event of the failure lubrication system.
- c) Reusable filters capable of filtering chips, dust particles etc. shall be provided. Indicators for showing clogged condition of filters shall be available. The filters shall be indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on a double shift basis shall be provided as spare. The unit cost of machine will be inclusive of spares Details of the coolant system shall be indicated.
- d) Arrangement shall be provided to indicate failure of the lubricating system and protecting the machine.
  - (i) Periodicity of cleaning/replacement of filters
  - (ii) Periodicity of replenishing lubricating oil in the sump.
- e) The lubrication system shall be explained in the bid with a lubricating diagram.

- f) Lubrication and filter cleaning chart shall be displayed on a metal plate at a conspicuous location on the machine indicating: -
  - (i) Specific location of points on the machine to be oiled lubricated/greased.
  - (ii) Periodicity of lubrication of these points.
  - (iii) Filter to be cleaned.
  - (iv) Periodicity of cleaning filters.
  - (v) Periodicity of replenishing lubricating oil for the centralized system.
  - (vi) Any other similar relevant information.
- g) Points where manual lubrication is needed shall be separately indicated. Frequency of lubrication shall be also clearly mentioned.
- h) Lubricating oils used in the machine shall be available in India. Successful tenderer will be required to indicate brand names of approved oils manufactured by various Indian Oil Companies.
- i) The first fill of lubricating oils used in the machine shall be provided with the machine. Details of lubricating system provided shall be indicated.

**9.0 Pneumatic System (Where Applicable)**

- a) The compressed air supply shall be sourced from the outlet connections provided on the columns as a part of that project. The pneumatic system of the machine should be designed accordingly. An alarm shall be provided for low air pressure.
- b) Suitable filter/moisture trap shall be provided by the contractor in the system of pneumatic air intake.
- d) The filter shall be reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be easily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare. The unit cost of machine will be inclusive of spares. Details of the coolant system shall be indicated.
- c) An air pressure regulator, if necessary, shall be provided by the tenderer.
- d) The make of pneumatic control equipment shall be of reputable make. The makes shall be indicated.

**10.0 Hydraulic System (Where Applicable)**

- (i) The hydraulic power pack, reservoir, pumps, valves, gauges etc. shall be conveniently located to facilitate maintenance. The hydraulic power pack and all hydraulic elements shall be of compatible makes. Type, make and model no. of each hydraulic element shall be furnished. Only Rexroth/Vickers/Yuken/Mico-Bosch make hydraulic power pack shall be accepted.
- (ii) Hydraulic circuit must be equipped with the following safety and inspection equipment's:
  - a. Pressure gauges at all places, where pressure has to be set up or inspected.
  - b. Safety valves for hydraulic circuit if relief valve does not fulfill this function.
  - c. Equipment for checking temperature in the circuit or in the pump wherever necessary.
  - d. Arrangement to show if the filters (including those in the pump set) are choked and need cleaning. The filters shall be of reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare. The unit cost of machine will be inclusive of spares.
  - e. Alarm for low oil level.
- (iii) The sump aggregate shall have the following:
  - a. Oil level sight gauges or any other equipment showing the minimum and maximum oil levels in sump.
  - b. It shall be possible to drain the oil from the tank without disconnecting any pipes or other fittings.
  - c. Dust proof cover
  - d. Filters to prevent ingress of dust/dirt into the hydraulic system.
  - e. Drainage connection to drain out the complete oil without disconnecting any pipe.

- (iv) The temperature of oil in hydraulic circuits shall not exceed 60 degrees C in any case. Suitable arrangements shall be incorporated to ensure that the oil is not overheated under local weather conditions at continuous normal working of the machine.
- (v) Facilities for bleeding air in case of air lock shall be provided.
- (vi) The hydraulic reservoir, pump and allied equipment shall be suitably segregated from the machine in order to remove major source of heat.
- (vii) Hydraulic oils used on the machine shall be available in India. Successful tenderer will be required to indicate brand names of approved oils supplied by various Indian Oil Companies.
- (viii) The first fill of hydraulic oils used on the machine shall be provided with the machine.
- (ix) A suitable maintenance free, chiller type heat exchanger of adequate capacity shall be provided to ensure that the hydraulic oil temperature does not exceed 50<sup>0</sup>C. Arrangement shall be provided to automatically connect the hydraulic system to the heat exchanger if oil temperature exceeds 45<sup>0</sup>C. The details of the system shall be furnished.

**11.0 Power supply connection:**

The Railway shall provide 415 V  $\pm$  10%, 50Hz  $\pm$  3% (mains) electrical supply at one point in the shed. Further electrical work like cables, laying of power/electrical cables & earthing wires from mains to panel as well as within the machine, with supply of all materials shall also be carried out by the supplier for operation of the machine.

**12.0 General Electric Specification**

12.1 The provision of this General Specification shall apply, wherever relevant.

12.2 All equipment's and material shall comply with appropriate Indian Standards (latest), International Standards or National Standards of the country of origin provided the latter are equivalent to or better than the former.

The tenderer shall indicate the Standards applicable. The following standards are applicable in particular. (Corresponding International Standards like ASA, NEMA, BIS, DIN etc. may also be quoted).

- a. IS: 325-1979 (latest) - Three phase induction motors (corresponding to IEC pub-34-1) (Latest).
- b. IS: 1248 (Latest) - Direct acting indicating analogue electrical measuring instruments and their accessories (corresponding to IEC Pub-51) (Latest).
- c. IS: 1231-1974 (Latest) - Dimensions of three phase induction motors (corresponding to IEC Pub-72-1) (Latest).
- d. IS: 1271-1985 (Latest) - Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub-85) (Latest).
- e. IS: 6875 (Latest) - Push Buttons and related control switches corresponding to IEC Pub/73) (Latest).
- f. IS: 375-1963 (Latest) - Marking and arrangement of switch gear, bus bars, main connection & auxiliary wiring.
- g. IS: 996-1979 (Latest) - Single phase small AC and universal electrical motors.
- h. IS: 1356 (Latest) - Electrical equipment of machine tools.
- i. IS: 2516 (Latest) - Circuit breakers (corresponding to IEC Pub-56) (Latest)

12.3 The control gear for motors shall incorporate the following protection devices as concomitant accessories.

- a. **No Voltage Protection** - No voltage protection shall be provided so that the machine will not start up again by itself when, following an interruption the supply is restored.
- b. **Short Circuit Protection** - To protect against short circuits due to insulation failure of faulty connections, HRC fuses / MPCBs should be provided for each motor. The rating of the fuse / MPCB shall be such as to take care of the over current due to motor starting.
- c. **Overload Protection** - To prevent motors from overloading, overload protection / MPCB shall be provided separately for each motor. Three phase motors shall be protected by overload tripping devices on each phase.
- d. **Single Phasing Protection** - A separate current sensitive delayed action single phasing preventer / MPCB shall be provided for each motor separately. Overload protection shall not be treated as a single phasing preventer.



- 12.4 Control equipment shall be mounted in separate drip proof enclosures. Control enclosures and compartments are to be so designed as to give adequate protection against ingress of dust, oil, coolant or chips. All control devices like contractors etc. shall be front mounted on a rigidly fabricated metal panel for ease of operation. All other electrics shall be installed so that they are readily accessible when the doors and covers are opened. Hinged covers shall be interlocked with the machine tool control to prevent operation of the machine when the cover is open.
- 12.5 The motor shall be totally enclosed with or without a fan cooled frame. Screen protected drip proof type motor may be provided if it is mounted inside protective enclosures.
- 12.6 The electrical equipment shall comply with the requirement of Indian Electricity Act and Rules (latest).
- 12.7 All instruments shall be of the Industrial Grade "A" (IS-1248) switch board type the range of the instrument shall be such that the maximum load expected in the circuit shall produce a deflection of 60% to 80% of the full scale.
- 12.8 Two earthing terminals shall be provided on all electric motors including the control gear.
- 12.9 The supplier shall furnish 4 sets of complete electrical and electronic wiring diagrams in full details to enable the maintenance staff to locate faults in the circuits, 4 sets of part catalogues, maintenance manuals operating instructions with details of coils and windings, used in the equipment to facilitate repairs and maintenance should also be supplied.
- 12.10 For main motor class minimum "F" Class insulation shall be provided. If any other class of insulation is proposed, detailed justification for providing a different class of insulation shall be given.
- 12.11 Motors shall be designed to withstand frequent starts, stops and reversals as demanded in the operation of the machine.
- 12.12 All motors shall be of the heavy-duty efficiency class-I or IE2, type equipped with sealed ball bearings and overload protection. Enclosures will be of either steel or cast iron. Overload protection is provided for motors to permit operation within their rating under all design load conditions.

**12.13 Power Supply**

- a. The machine shall be suitable for operation on 415 volts 3 phase 50 cycles AC 3 wire or 4 wire system with neutral solidly earthed. The supply voltage may vary up to  $\pm 10\%$ . The frequency may vary up to  $\pm 3\%$ . However, full rated power of the motor shall be available at the lower voltage. Firm should confirm satisfactory performance of the machine at incoming power supply in the range  $415V \pm 10\%$  and  $50\text{HZ} \pm 3\%$  frequency. The bidder shall provide voltage stabilizer for machine if electrical motor power requirement is more than 30kW as specified below of required capacity.
- b. The voltage stabilizer, if required, shall conform to:
- (i) Input Voltage - 320 to 460 volts 3 phase 4 wire supply.
  - (ii) Output Voltage - 415 volts
  - (iii) Regulation - + 1% from No load to Full load.
  - (iv) Rate of correction - 20 volts per second per phase.
  - (v) Wave form distortion - NIL
  - (vi) Efficiency - Not less than 97%.
  - (vii) Winding and class of - Copper wire wound with "B" class of insulation or better insulation.
- c. In case of machines equipped with NC, Solid State, CNC, Thyristor controlled devices and other sophisticated electronic gadgets including microprocessors etc. which are susceptible to power line spikes and surges, a suitable voltage stabilizer and ultra isolation transformer of adequate capacity to cover for the entire electrical load of the machine shall be offered as a concomitant accessory conforming to Specification for voltage stabilizer as mentioned in clause above and isolation transformer to the parameters mentioned below.
- (i) Transformer ratio - 1:1
  - (ii) Winding - Copper wire wound with "F" class insulation or better.

- (iii) Protection - To arrest spikes and surges to the order of 3 KV for 200-400 microseconds duration
  - (iv) Common mode rejection ratio - 120 dB
  - (v) Isolation - Capacitance .005 Pf: resistance greater than 1000 Mega Ohms
- d. The voltage stabilizer shall be equipped with a protective relay to trip the AC power supply to the machine instantaneously with audio and visual indication to the operator. Settings of the protective relay for low and high voltage shall be 320 volts and 460 volts respectively.
- e. The panel of machine shall have digital energy meter if rating of machine is more than 10 KW.
- 12.14 The ambient temperature at the site at which the machine will be installed may vary from 0°C to 50°C over the year. The relative humidity may be as high as 100%. The atmosphere is expected to be dusty. The machines offered shall be suitably tropicalized to work under these atmospheric conditions without any adverse effect on their performance.

The temperature rise shall not reach such a value that there is a risk of injury to any insulating material or adjacent parts.

The drive shall be capable of operating at any one of the speeds required independent of the load in accordance with the requirements of the machine.

### **13.0 Operational Controls**

- 13.1 The operation of the machine shall be by push buttons or levers. The basic rules for the direction of operation of controls and the corresponding direction of movements of the machine tools shall be as per IS:2987-1985.
- 13.2 The control devices shall be
- a) Clearly visible and identifiable.
  - b) Ergonomically positioned for safe operation without hesitating or loss of time, and without ambiguity.

### **14.0 CNC System (Where applicable):**

- a) The CNC control shall be with high processing speeds. It shall be based on the latest multi-processing/multi-tasking technology especially for welding operations.
- b) The CNC control shall ensure easy/ quick man-machine interface/ communication.
  - ✓ Easy Programming.
  - ✓ Manual override feature.
  - ✓ Storage capability for Program with quick access to main and sub-programs.
  - ✓ Fixed cycle and sub-Program facility.
  - ✓ Manual data input with editing facility.
  - ✓ Interactive graphics with Program simulation and dry run capability.
  - ✓ DNC capability/linkup with RS 232/USB/LAN port for controlling production.
  - ✓ CAD/CAM capability including graphic simulation on monitor/color Graphic control, if applicable.
  - ✓ Facilities for simultaneous programming.
  - ✓ Battery Backup for retaining memory during power shut- off/failure.
  - ✓ Complete self-diagnostic capability for ease in maintenance.
  - ✓ The off-line programming equipment with interface.
  - ✓ A voltage stabilizer with spike and surge filter and an ultra-isolation transformer shall be provided for protection of CNC system wherever indicated as Concomitant accessory in respective specifications.
  - ✓ Industries 4.0 compatible.
- c) Adaptive feed control system should be provided.
- d) The control system (latest generation), AC servomotors, AC drives, feedback devices, PLC's and drive

circuit should be of the same make as that of CNC control.

- e) The control cabinet should be of IP 55 or better degree of protection. The electrical & electronic control cabinets & panels should be dust and vermin proof.
- f) All electrical / electronic panels to be provided with adequate door locks.
- g) All electrical & electronic panels including operator's panel should have sufficient illumination and power receptacles/plug points of 220 Volts, 5/15 Amp AC with on/off switch for maintenance purposes. All electrical adapters/receptacles, fittings, consumables etc. should be compatible with Indian equivalents.
- h) The CNC and electrical control equipment cabinet for the machine should be provided with air conditioning equipment consisting of filter, fan, de-humidifier and temperature control. The air conditioning system should be equipped with environmentally friendly refrigerant.
- i) All necessary back up data and program like NC, PLC, HMI and DP data/parameters, Fixed cycles and part programs, PLC program should be made available on PEN DRIVE of 16 GB capacity and ghost program should be made available on spare hard disk drive as fitted on the CNC Control.
- j) Execution and PLC programs should be in F-EPROM so that power failure should not affect system execution and PLC program.
- k) Ladder diagram/STL diagram with cross-reference listing of the PLC program should be displayed provided for ease in maintenance purpose. In case this cannot be provided, the alternate documents/means should be given to assist maintenance staff for troubleshooting.
- l) Fanuc/ Siemens/Heidenheim/Allen Bradley unit of the country which supplies CNC system should enter in to repair & Service contract with Fanuc/ Siemens/ Heidenheim/Allen Bradley India for attending the defects.
- m) There should be provision of password protection for operator name, component number and data log registration in CNC system, using PMC (programmable machining controller).

**16.0 Lighting (Where applicable):**

- a) Integral lighting suitable for the operations concerned where its lack is likely to cause a risk despite ambient lighting of normal intensity shall be provided.
- b) The manufacturer must ensure that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects due to lighting provided by the manufacturer.
- c) Integral parts requiring frequent inspection and adjustment and maintenance areas must be provided with appropriate lighting.
- d) The machine lighting should be of low voltage so as to prevent any hazard to the operator.

**17.0 Painting**

The machine and its accessories shall be painted in Apple Green Colour No.281 to IS:5-1978, (if any specific colour code standardized by BIS is available, the same be given). The machine can also be painted in equivalent RAL/DIN/other International Standards. If there is a standard color scheme of the manufacturer, the same may also be considered if specified.

**18.0 Following items are also included in contractor scope: -**

- a) Consumables like first fill of lubricating oils etc. for the initial operation of the equipment till handing over.
- b) Commissioning and start-up spares, Special tools & tackles, if required.
- c) All drawings/documents along with operation and maintenance manuals, spare parts manual and troubleshooting guides as per requirement mentioned elsewhere in the tender document.
- d) Getting approval of design and drawings including part assembly drawings and any design calculation related to the equipment from Railways.
- e) Design of foundation as well as flooring (if required) of sufficient thickness, suiting local soil conditions at the site.

- f) Construction of foundation as well as flooring (if required) of sufficient thickness suiting local soil conditions, for machine shall be completed by the bidder at the site provided by the Railway before receipt of the machine at their premises.
- g) Carrying out any modifications /deletions /addition /alternation in design /drawings /documents as required by client for proper execution of works at site till completion and handing over of the equipment to the purchaser should be brought to the notice of Railways.
- h) All Civil work including foundation (if any) except laying, fixing & fitting of track inside the shed area for said equipment shall be in contractor scope. Payment of laying, fixing & fitting of track inside the shed area as per approved drawing would be governed by clause 2.0 (v) of Special condition of contract for Mechanical Works.
- i) The supplier shall demonstrate machine performance and prove out the claimed capability for successful commissioning at the consignee's works. The M&P shall be deemed to be "commissioned" at consignee premises on the date when it is tested and meets with the specified capabilities/functions according to the technical specifications.

In addition to above, in case of tooled-up M&P, the M&P shall be deemed to be "Commissioned" at consignee premises on the date when "prove out" components specified as per the relevant clause of technical specification have been successfully proved out meeting the productivity requirements of technical specification.

- j) If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repair/replacement either before commissioning or during warranty, the manufacturer or his agent would be required to submit BG of suitable amount. In case the entire machine has to be taken back, a Bank Guarantee for the cost of the machine would have to be submitted. The bank guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the machine.
- k) Trailing/flexible cables as required for the equipment shall be in bidder's scope.
- l) All types of cables, connections, conduits, circuit breakers etc. required for connecting power supply points to different parts of the machine/control cabinets, shall be the responsibility of the bidder. Requirement of grounding/earthing with required material shall also be incorporated by the bidder during construction of foundation.

3phase, 415V, 50Hz power supply shall be provided at one point inside the shed. Further connection including supply, laying & termination of FRLS armored power cables and lighting shall be in Bidder's scope.

Electrical work like laying of power/electrical cables & earthing wires from mains to machine control panel as well as within the machine, with supply of all materials shall also be carried out by the supplier.

Power to the equipment and control panels shall be obtained by laying suitable size and rating cables in the trenches or other means from the designated distribution panels/Mains placed at different locations on the shop floor. All sundry erection material required for installation and connecting up of electrical equipment shall be included in the scope of supply.

The cables shall be laid as per the standard procedure and loops shall be provided as per the standard. Both ends of the cables shall be terminated with proper size cable glands. End terminals of correct size and rating shall be crimped on both ends of the cable cores. The power cables must be rated for 150% of the maximum load current at 55 deg. C ambient.

All non-current carrying metallic parts shall be double earthed as per IE rules. Separate earth pit for control and power circuits as per IS shall be in the contractor scope.

Control circuits shall be protected against overload and short circuit with miniature circuit breaker (MCB) of suitable rating.

Incoming supply to the control panel shall be directly connected to main molded case circuit breaker (MCCB) of sufficient rating having adjustable magnetic and thermal overload setting.

The power contactors rating shall be 1.5 times the rated full load current of the motor or next higher size as per standard.

Control panels shall be provided with illuminating lamps of sufficient wattage with supply voltage of 110 Volts AC.

Depending upon the application, the different voltages other than 415, 3 phase, 50 Hz AC shall be obtained through individual separate transformers units connected to 3-phase 415 volts A.C. supply.

The control panel shall have a minimum of one 5/15 amps switch and socket outlet of 220 volts AC for connecting soldering iron, hand lamps etc.

The location of the junction boxes shall be such that it is easily accessible during commissioning and troubleshooting.

**Note: -**

The cost of requirements explained in clause 18.0 above will be inclusive of the basic price of the machine.

**19.0 Service Facility in India and Technical Support**

The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period. The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated.

**20.0 Technical Literature:**

**20.1 General:**

One copy of the printed illustrative catalogue showing features of the machine and its elements and One (1) reproducible copy (e.g., tracing, ozalid, etc. of each drawing) shall be furnished. The contractor will also have to furnish following documentation in **English Language** only. One set of technical literature should cover the following details (wherever applicable):

- a. Spare parts catalogues(02sets) giving the part list no. of each component with exploded views and assembly drawings. For the bought-out items, supplier shall furnish catalogue number and price list of their OEMs for such items and the address of the likely supplies.
- b. Installation, interfacing, operation and maintenance manuals (04 sets), inclusive of trouble shooting guide for CNC system, and power source. It should clearly guide the maintenance personnel for easy diagnosis of fault or any trouble in the machine and to rectify the same with the minimum possible time. "Dos" and "Don'ts" should be clearly brought out in the manual for the smooth operation and avoiding any mishandling of any component.
- c. The manual shall also cover trouble-shooting tips of all the bought-out items from the vendors, covering mechanical; Electrical/ Electronic; hydraulics, pneumatics etc.
- d. Electrical/electronic circuit diagram with component level details (04 sets).
- e. Soft copy of the Software Program of all EPROMS used in CNC system along with ladder diagrams for the PLC systems wherever applicable.
- f. Soft and hard copies of PLC Program in ladder form with cross reference listing and PLC project file.
- g. Programming, Operator Guide, Diagnostic & Trouble shooting Guide and Start-up Guide for CNC Control System.
- h. License Software in CD along with key.
- i. Wiring diagram, in which length of wires must be mentioned, hard copies in A-2 size as well as soft copy in PDF format.
- j. Mechanical (part detailed drawings), hard copies in A-1 size as well as soft copy in PDF and AutoCAD format.
- k. Drawings of tooling & fixtures, hard copies in A-2 size as well as soft copy in PDF format.
- l. Pneumatic and hydraulics circuit diagrams & test charts (04 Sets).
- m. Recommended preventive maintenance schedule details for the machine.
- n. Lay out drawings in A-0 size, which clearly shows the position of all types of electrical components in machine.
- o. All drawing mentioned below should be supplied in PDF format:
  - ✓ Arrangement drawings & General assembly drawings
  - ✓ Electrical circuit diagrams
  - ✓ Hydraulic schematics
  - ✓ Lubrication schematics
  - ✓ Machine control diagram
  - ✓ Detail drawings of parts from local scope supply
  - ✓ Detail drawing of forging dies/fixtures etc.
  - ✓ Operation and maintenance manuals.
  - ✓ List of spares and wearing parts.

**Note: These documentations are required to be submitted along with the machine/equipment.**

In all cases, GA drawing for each machine and the whole plant will be submitted by the firm. A nominated representative of the Railway shall either approve the GA drawings or if necessary, return them for correction(s), within two weeks.

## **21.0 Training**

- a) As a broad principle, free training has to be given by the contractor through OEM/ authorized representative for all M&Ps at the site to the nominated personnel by Railway at the time of commissioning of the machine and later in operation and maintenance of each machine.
- b) Training by the firm shall be imparted in the operation and maintenance of the machine and shall cover all mechanical, hydraulic, electrical & electronics equipment part programming.
- c) Contractor shall be required to prepare and submit a summary of the course contents for review and approval by Indian Railways.

- d) The supplier will be responsible for coordinating with the consignee to ensure that the training is imparted on the machine at its assembly and testing stage.

**Note: All training should be imparted in English/Hindi only.**

**22.0 Bought Out Items:**

- 22.1** The bidder shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the bidder and proposed to be used, along with the manufacturer's name, brand model etc. The successful bidder may be required to produce invoices to ensure the genuineness of such products / verification by the Inspecting agency.
- 22.2** The bidder should clearly indicate that in case of components/sub-assemblies taken from reputed companies such as Vickers, Rexroth, RITTAL, THK, and Shen burger etc., the parent company has already entered into contract with their Indian units/affiliates for undertakings repairs/after sales service during warranty and post warranty.

SN	Description	Make
1	CNC & Drive Controller	SIEMENS, FANUC, SCHENIDER ONLY
2	Motors	ABB/ CROMPTON/BBL / SIEMENS/ KIRLOSKAR /MARATHON /SEW EURODRIVE/ NORD/ NGEF/ Allen Bradley/ Schneider/ Fanuc/Hindustan Motors/ ROSSI
3	Cables	LAPP/SIEMENS /POLYCAB/ ICC/ UNIVERSAL/ Havells/ FINOLEX/ L&T/Alpha/Ajanta/Gloster/ Nicco/ Radiant/ Mardia/ Incab/Plaza/ Anchor/ Roliflex
4	Control gears: proximity switches, contactors, relays, MCB, MCCB, MPCB, push buttons, selector switches, indication lamps, meters,	L&T/Siemens/BCH/ABB/Schneider/C&S/ AE/ HAVELLS/ Teknik/ Mecco/ Harting/ Kontakt/ Omron/OEN/Esbee/Rishabh /Electronic Switches/ Elap/Scanner/Balluf/Shubhadha
5	Connector	Harting/Kontakt/L&T/Omron/Indoelectric/Phoenix/ Elmax
6	Limit Switches	SPEED-O-CONTROL/CCE/ ELECTROMAG /C&S/ CMK ELECTRO POWER PVT LTD/Siemens/ BCH/ Teknik/ L&T/Euchener/Honeywell
7	Master controller	SPEED-O-CONTROL/CCE/ELECTROMAG /C&S
8	Resistors.	SPEED-O-CONTROL/ELECTROMAG/CCE/ C&S/ BCH
9	Control Panels	RITTAL/BCH/ SIEMENS with IP55protection
10	Pendent	Demag /Telemecanique /CMK Electro Power Private Limited,
11	VVVF Drive	ABB, / L&T(Yasakawa)/SIEMENS/ Fanuc / ALLEN BRADLEY/ SCHNEIDER
12	Electrical isolators	SIEMENS/L&T/BCH/C&S
13	Starter	Siemens, BCH,L&T
14	Sockets for hand lamps etc.	CROMPTON/BCH/REYROLL
15	Junction Box	RITTAL/BCH/ SIEMENS
16	Air conditioner for Control cabinet	RITTAL/Warner Finley/Kelvin/M&G/Wallia/Advance cooling /Sunbeam
17	Servo Controlled Voltage Stabilizer	Neel/Unity /Servomax/ Consul/ Aplab/ Neelkanth/Golden/Power Gaurd
18	Ultra Isolation Transformer	Neel/Unity /Servomax/ Consul/ Aplab/ Neelkanth/Golden/ Power Gaurd
19	Feed back Devices	Heidenhain /Balluf /Fagor /Sony /Siemens/ Fanuc/Kubler/ Hengsler/ Lika
20	PLC	Siemens/Messung/Hitachi/Mitsubishi/ Fanuc/ABB / Allenbradley / Schneider/L&T

21	Electromagnetic clutch	Vortex
22	Toolings	Sandvik/Kennametal-Widia/Taegu-Tec/Iskar
23	'O' Rings & rubber seals	Merlin/Parker/Busak/Hunger/Merkel/Soloseal/ Halite/ Walkersolo/ Seal Mart
24	Hydraulic pumps & valve	Yuken/Rexroth/Vickers/Mico Bosch/ Parker / Atos/Voith
25	Centralized lubrication system	Vogel/Cenlub/Rexroth/Dropco/BijurDelimon
26	Ball screws	THK/INA/Rexroth/Star/Shenberger/NTN/Tsubaki/ Gamfier
27	Hydraulic system	Rexroth/Vickers/Yuken/Atos/Parker
28	Bearings	NBC/SKF/FAG/TIMKEN/KOYO/NTN
29	Pneumatic Control Equipment	Festo/ShavoNorgen/ShradderScovil/Electro Pneumatics/Parker/SMC Pneumatics
30	Filters	Hydac/Hydroline/Parker/Rexroth/EPE, Germany/ Vickers/Purolator
31	Belts	Fenner/Hilton/Dunlop
32	Gear reducer	Elecon/Greaves/Shanathi/ZF/New/Allenbury/ Bongfillivali
33	Chains	T.I. Diamond/Rollon
34	Sprocket	Rollon/T.I. Diamond
35	Couplings	Fenner/Love Joy Inc., USA
36	Rubber sheets	Rubber Products Ltd.
37	Hydraulic oil air cooler type heat exchanger	Rittal/Werner finley/Pfamenberg
38	Chiller type heat Exchanger	WARKIN/ADVANCE COOLING/ FREEZTECH/ SPAN ASSOCIATES
39	Hydraulic Oil	IOCL/BPCL/HPCL/Castrol/ESSO
40	Hydraulic seamless tubes	Parker/Maharashtra seamless/Indian seamless/ Gandhi Speciale Tubes/ Sainest Tubes
41	Air circuit breaker	Siemens/L&T/Schneider/ABB
42	Cutting tools	SANDVIK/KENNAMETAL – WIDIA/ TAEGU-TEC/ ISCAR
43	Drills and Taps	Addison/Zenith(IT)/Universal
44	Thrustor brakes	SPEED-O-CONTROL/CCE/ELECTROMAG/GALVI
45	Wire Rope	USHA MARTIN/ BOMBAY WIRE ROPE/MAHADEV
46	Gear Box	SEW EURODRIVE/NORD/NU-TECK/DEMAG
47	Brake	PETHE/STROMAG
48	Hoist	DEMAG/ABUS/HERCULES

**Note:-**

*Test certificates of bought item should be provided by the supplier with proper identification at the time of inspection. The tenderer should explicitly mention "not applicable" against the items indicated above, whichever is not applicable in the offered machine.*

\*\*\*\*\***End of Tender Documents**\*\*\*\*\*