Bharat Heavy Electricals Limited
(High Pressue Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

An ISO 9001 Company

ENQUIRY NOTICE INVITING TENDER	Phone: +91 431 257 79 38 Fax : +91 431 252 00 31 Email : tvenkat@bheltry.co.in Web : www.bhel.com

TWO PART BID Tender to be submitted in two Parts	Enquiry Number: 2851400012	Enquiry Date: 21.01.2014	Due date for submission of quotation: 07.03.2014

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of tender opening.

Item	Description	Qty.	Delivery Required	Delivery Terms Required
10	**Tube Handling System for RTR Station as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)**	**3 Nos.**	**10 Months**	**F.O.R, BHEL Stores, Power Equipment Fabrication Plant, Bharat Heavy Electricals Ltd., Mundipar- 441804, Sakoli Taluk, Bhandara District, Maharashtra State.**
20	**Tube Handling System for RTR Station as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)**	**1 No.**	**8 Months**	**FOR, BHEL Stores, High Pressure Boiler Plant, Bharat Heavy Electricals Ltd., Tiruchirappalli – 620014, Tamilnadu**

Important points to be taken care during submission of offer:-

1. **Compliance Form No.** BND/IMP/01 & BND/IND/01A and Annexure II (Details of Company Performance) **to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**
2. **EMD for this Tender will be Rs.** 2,00,000.00/-
3. **All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.**
4. **The time period required for Erection and Commissioning of the item shall be 3** weeks **from the date of intimation from BHEL requesting supplier to depute Service Engineers about site readiness.**
5. **Offer shall be evaluated on a single package basis for item Sl. No. 10 & 20 (overall L1 basis) and hence offer should be submitted for both items (Sl. No. 10 & 20) without any fail, otherwise your offer will not be considered.**

BHEL's General guidelines / instructions (refer MM/CE/GENL/001-EMD**) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site** http://www.bhel.com **or from the Government tender website** http://tenders.gov.in **(public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference "**2851400012**".**

Tenders should reach us before 14:00 hours on the due date
Tenders will be opened at 14:30 hours on the due date
Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

Sr. Manager / Capital Equipment / MM

T. VENKATESWARAN
Senior Manager
Capital Equipment
BHEL, Tiruchirappalli

TUBE HANDLING SYSTEM FOR R T R STATION (24 metres)

PART – A

SECTION- 1: Qualifying Criteria

The BIDDER has to compulsorily meet the Qualifying Criteria indicated in **Section 1** to get qualified. Otherwise the technical offer will not be considered.

S NO.	REQUIREMENTS	VENDOR'S RESPONSE
1.1	The BIDDER / VENDOR (**OEM**) shall have a minimum TEN Years of Continuous Experience in Design, Manufacture & Supply of Tube handling system of length 24 meter or more, for Real Time Radiography Station (RTR). Vendorshall indicate the actual number of years of experience in the field.	
1.2	Only those vendors (**OEMs**) fulfilling the following conditions should quote: who have commissioned in the last 10 years (as on the original date of tender opening) at least **ONETube handling systemfortubes of length of 24m or more with variable speed transfer of tubes and tube rotation systems**. **EITHER** (i) In at least any one country other than the country of origin to establish vendor's global business activity. **OR**(ii) InIndia and the referred system are presently working satisfactorily for more than one year after commissioning (as on the original date of tender opening). The name and contact addresses of the customers to whom the Tube handling systemfor Real Time Radiography Station (RTR) were supplied to be furnished with details.	
1.3	Vendor has to submit at least ONE PERFORMANCE CERTIFICATEfrom their customers in India or from the customersto whom the machine was supplied outside the country of origin, for satisfactory performance of the Tube handling system,referred under clause 1.2 above, for a minimum period of one year from the date of commissioning (as on the original date of tender opening). Performance certificate as Original Certificate or E-mail directly from the customermay be submitted. The original certificate may be returned after verification by BHEL, if required. For obtaining the Performance certificate, a suggestive format is provided at the end of Part A.	
1.4	BHEL reserves the right to verify the information provided by the Vendor for the referred system at their referred customer's works. It shall be the responsibility of the vendor to facilitate the visit of BHEL's team at their referred customer works. The Travel, Board and Lodging expenses for BHEL Personnel shall be borne by BHEL. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected. BHEL reserves the right to accept or reject the OEMs based on the assessment of their technical and financial capability.	

SECTION - 2:

The BIDDER / VENDOR are requested to provide the following information:-

S NO.	REQUIREMENTS	VENDOR'S RESPONSE
2.1	The BIDDER / VENDOR to furnish Reference List of Customers, with complete address, details of contact person, where Tube handling system for Long tubes / rolled sectionshas been supplied in the past.	
2.2	Specify details of Tube handling system forLong tubes / rolled sections supplied to other units of BHEL, if any (Year of commissioning with details etc.	
2.3	Details on SERVICE-AFTER-SALES Set-up in India including the Address of Agents / Service Centres in India.	
2.4	Any Additional data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

SECTION – 3:

The BIDDER to note:

S NO.	REQUIREMENTS	VENDOR'S RESPONSE
3.1	The BIDDER / VENDOR shall submit the offer in TWO parts. 1. Technical Offer [**with PART A & PART B**] 2. Commercial Offer and Price bid.	
3.2	The Technical Offer shall contain complete details against all clauses of Technical Specifications given by BHEL.	
3.3	The Technical Offer shall be supported by copies of product Catalogues, Datasheets and technical details of Bought- Out- Items.	
3.4	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation.	

Suggestive Formatof Performance Certificate:

The Performance should be certified by the customer on **Customer's Letter Head**and submitted along with the offer.

PERFORMANCE CERTIFICATE

1.0	Tube handling systemfor–Application to be specified.	
	Supplied by : (Manufacturer's name)	
2.0	Make & Model number of the Machine	
3.0	Month & Year of Commissioning	
4.0	Application for which The Machine is used	
5.0	**Machine Details**	
5.1	Length of tube handled.	
5.2	Speed of conveyor	
5.3	Kick off mechanism	
5.4	Tube longitudinal travel by VFD or other system	
5.5	Tube clamping pneumatic or other system	
5.6	Tube rotation by hydraulics or other system	
6.0	Performance of the Machine (Please tick the appropriate option)	Satisfactory
		Not Satisfactory
7.0	Service after sales (Please tick the appropriate option)	Satisfactory
		Not Satisfactory
8.0	Other remarks (if any)	
Date:		Signature & Seal of the Authority Issuing the Performance Certificate

PART B – TECHNICAL SPECIFICATION

TUBE HANDING SYSTEM FOR R T R STATION (24 metres)

Note:-

1.0 The Column **"Vendor's offer with Technical details & Remarks"** of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous or unsustainable information against any of the clauses of the specifications / requirements shall be treated as non-compliance.

2.0 The offer and all documents enclosed with offer should be in **English language** only.

Name & Address of the Vendor:	Name & Address of the Indian agent:
Telephone no.:	Telephone no.:
Fax no.:	Fax no.:
e-mail:	e-mail:

3.0 Scope: - Design, Manufacture, Supply, Erection & Commissioning of **Tube Handling System for RTR station (24 metres)-04Nos** for BHEL complying with the specification as below.

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
1.0	**AREA OF APPLICATION**	1. The fully MECHANISED Tube Handling System is meant for the transportation of the Butt welded 24 metres long tubes from the out-feed stand of Straight tube butt welding machine to the (RTR) radiographic testing station and then to Out-Feed stand of RTR station and kick-off to Storage dumps. 2. The butt welded joints in the long tubes will be tested by radioscopy in the RTR Station (Real Time Radioscopy Station) and hence the system shall have the facility to hold the tube and rotate in either direction, while undergoing radiographic testing & evaluation	
2.0	**SYSTEM CONFIGURATION**	The Tube Handling System shall consist of the following sub systems: **A) <u>IN-FEED Conveyor system:</u>** 1. Tube transfer / kick off system (pneumatic) to transfer the welded tube from out-feed stand of STBW machine to a buffer stand. 2. Buffer stand to store the tubes. 3. Tube transfer / kick off system (pneumatic) to transfer the welded tube from the buffer stand to the RTR in-feed roller stand. 4. In-feed roller stands with pinch roller mechanism to transport the welded tube to the RTR room for radioscopy test. 5. Forward & Reverse inching movement to locate the weld joint in front of X ray system.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
2.0 Cont..		**B)** **<u>Supporting roller stands</u>** Roller supports for the tubes during rotation for weld examination provided intermittently on In-feed and Out-feed conveyor roller stands, pneumatically operated for lifting. **C)** **<u>Tube rotating device</u>** (variable speed) to hold the tube and rotate. **D)** **<u>Defective Weld Joint</u>** Slitting on weld joint of defective joints by using abrasive wheel. **E)** **<u>OUT-FEED conveyor system:</u>** 1. Independent out-feed roller stand aligned with In-feed roller stand with pinch roller mechanism to transport the tested tube out of the RTR room. 2. Kick-off system (pneumatic) to suitably transfer the accepted and rejected tubes in separate dumps. 3. Tube dumps for receiving the accepted and rejected tubes. **[Refer to the SCHEMATIC SKECTH given in ANNEXURE –1 for lay-out guidance]**	
3.0	**SEQUENCE OF OPERATION**	1. Transferring the welded tubes of lengths from **2m to 24m** from the out feed roller stand of Straight Tube Butt Welding Station to the buffer stands by kick off system. 2. Transfer of the tubes from the buffer stand to the RTR In-Feed Roller Stand by kick off system 3. Transportation of the welded tubes to the RTR Station by In-Feed roller with pinch roller mechanism. 4. Positioning the weld joint at the RTR inspection point by adjusting through forward and reverse movement. 5. Lift the supporting roller stands and hold & rotate the tube by 360 degree on either direction for real time weld joint examination. 6. After the Radioscopy examination, down the supporting roller stands and roll out the tube with pinch roller mechanism.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
3.0 cont..		7. Tubes with accepted weld joints are transported out from RTR room by tube out feed roller pinch roller mechanism and transferred to the respective storage dump by tube kick off system (Pneumatic). 8. Tubes with defective weld joints are slit partially by using abrasive cutting wheel, outside the RTR room. Then transported out by out feed system and transferred to the Rejected / Defective tube storage dump. 9. Repeat the above points for the next and subsequent weld joints.	
4.0	**DESIGN INPUTS**	It is suggested that the BIDDER may make a visit to BHEL/TRICHY Works for an 'ON THE SPOT' study of the requirements of BHEL (based on the existing tube handling system), prior to submitting the technical offer.	
5.0	**JOB DETAILS** **JOB DETAILS**	a) Tube OD Range: 28.6 mm to 76.1 mm [Specific OD sizes: 28.6, 31.8, 38.1, 44.5, 47.65,51, 54, 57,60.3, 63.5, 69.85 and 76.1mm] b) Tube Wall Thickness: 3 mm to 16.5 mm c) Tube Length: 2 metres to 24 metres [One batch will have tubes of same length only] d) Tube Weight: 3-8 kg/m e) Tube Rotation Speed: 1 to 10 RPM [Steplessly variable speed by Hydraulic Motor to achieve sufficient torque to rotate tubes at low speeds of 1 rpm] f) The number of welds in a tube can vary between one and four joints. g) The minimum distance at which the weld joint is located from the tube free end is 200 mm. **h)** Weld reinforcement over tube OD surface is around 3mm.	
6.0	**TUBE HANDLING RATE**	The Handling System has to be designed to handle 80 Tubes of length 24m in a shift of 8 hours.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
7.0	**OPERATING PARAMETERS**	a. Rate of linear travel of tube at the In-Feed Side: max. 60m/min (variable speed) b. Speed of Tube Rotation (in either direction) for Testing : 1 to 10 RPM c. Rate of linear travel of tube at the Out-Feed Side: max. 60 m/min (variable speed) d. Creep Speed at both In-Feed and Out-Feed Sides: 1 meter/minute (for positioning the weld joint in RTR Station) to be effected after detection by sensor.	
8.0	**ELEMENTS of TUBE HANDLING SYSTEM**		
8.1	**In-Feed : Tube Storage Rack / Buffer Stand**	1. Shall be of Fabricated Steel (extruded) Structure and of enough rigidity to withstand rough handling of tube bundles (like impact loading) 2. Tube OD Range: 28.6 mm to 76.1 mm 3. Tube Wall Thickness: 3 mm to 16.5 mm 4. Tube Length: 2 metres to 24 metres 5. Tube Weight: 3 kg to 8 kg/m 6. The stand width shall be 1600 mm to hold SIX Tons weight (30 tubes of OD 51mm). 7. The entire stand shall be rigid structure and leveled to the full length and fixed on the floor with heavy duty expansion type anchor bolts. 8. The loading surfaces of the stands shall be fixed with hard nylon strips to prevent noise generated by tube falling.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
8.2	**Kick-Off System at In-Feed & Out-Feed Side**	1. In-feed side Kick off system shall be independent for transferring welded tubes from STBW out-feed roller stand to buffer stand. The control shall be located with STBW machine operator. 2. Kick off system for transferring tube from buffer stand to RTR in-feed roller stand. 3. Out-feed side Kick off system on the out feed side alone shall have suitable integrated mechanism to transfer the accepted tube and rejected tube independently to the respective tube dumps. 4. Only one tube shall be kicked-off at a time 5. The Kick off shall be operated by a set of Pneumatically operated system, spaced at equal distance to handle minimum length of 2 metres. 6. Kick off mechanism shall be with a set of Lift & Pick and Roll & Drop type pneumatically operated levers. 7. BIDDER has to furnish complete details with arrangement, capacity and required air pressure rating in the Technical Offer. BHEL shall supply 4.5 to 5 kg/cm2 air pressure in ¾ inch tube at one location. Vendor to specify the BOOSTER requirement if any. Suitable FLR unit in pneumatic airline to be provide	
8.3	**Roller Stand on In-feed and out-feed side**	1. Length of roller stand on In-feed side and out-feed side shall be suitable to handle tubes of 2m to 24m length. 2. The Roller Stand for in-feed and out-feed shall be fabricated out of heavy-duty steel structural. (If formed structure plate thickness should be minimum 4 mm) 3. All rollers in the Roller Stands shall be of heavy-duty class with 'V' roller groove, bearing mounted with shallow 'V' angle. Angle to be specified by vendor. 4. Rollers shall be made of wear resistant steel casting. 5. The Roller shall have a diameter of 200mm. Width to be specified by Vendor. 6. The pitch between rollers shall be around 750mm	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
8.3 Cont..	**Roller Stand on In-feed and out-feed side**	7. The bearings shall be double sealed type. Shaft diameter to be specified by Vendor. 8. The height from floor to bottom of tube shall be 1000 to 1050mm. The final dimension shall be decided while ordering. 9. The roller assembly shall be of the nature of easily removable from the roller stand. 10. The Roller Stand shall be leveled to the full length and fixed on the floor with heavy duty expansion type foundation bolts. 11. In-feed and Out-feed roller stand shall be aligned in single straight line. The design shall be suitable for the system Operating Parameters specified under the **Clause Sl. No. 7.0**	
8.4	**Supporting Roller on In-Feed & Out-Feed Sides**	1. A set of supporting rollers while rotation of tube during weld examination shall be provided on the in-feed and out-feed side. 2. The supporting rollers shall vertically lift the tube such that the tubes shall not rub on the In-feed and Our-feed rollers while rotating the tube. 3. The actuation of lifting shall be through pneumatic cylinder attached to a common shaft and with cam & follower mechanism. 4. Vertical lift shall be around 50mm above the bottom reference line of tube on the in-feed / out-feed roller stand. 5. These supporting rollers in normal position shall be lower than the bottom reference line of tube on the in-feed / out-feed roller stand. 6. Vendor to specify the total vertical lift. 7. Vendor to specify the no.of Supporting rollers on IN-FEED side and OUT-FEED side and pitch distance between them.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
8.5	**Pinch Roller Drive on In-Feed & Out-Feed Sides**	1. Pinch Roller driving mechanism to be deployed for transporting the tube on either sides of the RTR room i.e one at the end of In-feed roller stand and another at the start of Out-feed roller stand. The structure shall be rigid to handle the loads. 2. The Pinch Roller mechanism shall be driven by electrical motor and variable speed drive system and should enable forward and reverse movement of tube. 3. The pinch roller drive to be shall have pneumatically actuated clamping and electrically driven. 4. The pinch roller drive unit adjacent to the RTR room on either sides must have four rollers. Push-Pull type for forward and reverse tube movement. 5. The pinch roller drive farther away from the RTR room may have two rollers. One number on each side of In-feed and Out-feed. 6. The total number of Pinch roller drive units shall be Two Nos. on the in-feed side and Two Nos. out-feed side. 7. The axes of pinch rollers shall be vertical to the floor 8. To withstand Heat and Wear the pinch rollers shall be Metalon lined rollers 9. Adjustable to accommodate the range of tube diameters as mentioned in the specification. 10. The pinch roller diameter shall be 175mm or more and having width of 80mm or more. 11. The maximum speed of transporting tube shall be 60m/min. The speed shall be adjustable. 12. Pinch roller drive unit shall be anchored to the shop floor.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
8.6	**Idler Roller Stand inside the RTR Station**	1. The tube entry and exit from the RTR room is through the holes provided in the RTR Station concrete walls. 2. Idler Roller Stand for tube transportation at the RTR room shall be of steel fabricated structure suitably designed and installed with heavy duty expansion type anchor bolts along the RTR room for a length of 8.5 meters 3. The idler rollers stand has to support and transport the tube inside the RTR room. 4. This Idler Roller Stand shall be aligned in line with the In-Feed and Out-Feed Roller Stands. 5. The roller configuration and size shall be same as that for the in feed and out feed rollers under clause No. 8.3	
8.7	**Tube Rotation and Clamping System**	1. The tube shall be rotated in both directions for RTR inspection. 2. The tube shall be clamped by TWO numbers of pneumatic rollers from top side. 3. The tube rotary motion by grip and rotate (TWO rollers) through a Hydro Motor with 50 mm vertical height adjustment to accommodate various tube sizes. 4. The tube rotation speed shall be steplessly variable between 1 and 10 rpm. 5. The gap between the top and bottom rollers in the un-clamped position shall be min 150mm in order to permit free movement of the tube, so that the tube does not hit the tube rotation device, while the Pinch Roller moves the tube in the linear direction. 6. Interlock to be provided between clamping for rotation and lifting of supporting roller stands. The clamping can operate only after lifting of supporting roller stands. 7. The rollers shall be METALON lined rollers. 8. BIDDER shall furnish the complete technical details for clamping and rotation, in the TECHCNIAL OFFER.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
8.8	**Defective Tube Slitting Unit**	1. During weld quality inspection, weld butt joints coming in the tube are tested for acceptance or rejection. 2. If the weld joint is found defective, the intended system shall have a facility for making a slit (partial cut) by using abrasive cutting wheel to avoid the defective weld joints in further processes. 3. The above facility shall have an abrasive cutting machine to be located in the OUT-FEED Line and preferably at the exit point from the RTR Station Cabin. 4. The necessary controls for this shall be provided near the abrasive cutting machine. 5. The BIDDER shall furnish technical details for the above marking system, with the TECHCNIAL OFFER.	
8.9	**Tube Dumping Stands**	1. Separate dumping stand is to be provided for collecting the Accepted and Rejected Tubes. 2. The Tube Dumping Stand shall be suitably designed, so that the removal of tubes in a bundle is made possible and easy, by using slings from an EOT Crane [i.e., enough clearance is available at the bottom for bundling the loose tubes into one single lot]. 3. The tube dumps shall be on either side of the OUT-FEED roller stand. 4. Both the dumping stands shall be erected leveled and grouted using expansion type foundation bolts. 5. Necessary slope shall be provided with nylon strip beadings to reduce noise during tubes falling. 6. Tube Dumping Stand for Accepted Tubes: (minimum): - 1 meter (width) x 1 meter (height) x 24 meters (length) 7. Tube Dumping Stand for Rejected Tubes: (minimum): - 0.5 meter (width) x 1 meter (height) x 24 meters (length)	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
9.0	**Drawing Approval**	GA drawings, Complete Tube Handling system detailed constructional (main & sub assembly) drawings with dimensions Hydraulic / Pneumatic / Lubrication / Electrical / Electronic circuits with detailed BOM, are to be submitted within 45 days from the date of ordering (in case of an order) for approval by BHEL before start of manufacturing. BHEL shall provide approval within 15 days after all the clarifications sought have been submitted by supplier.	
10.0	**Foundation Layout Drawing**	Supplier to submit Civil Foundation layout drawing with details of static & dynamic loads, within one month after BHEL approval of manufacturing drawings. The shop floor at BHEL works has 200mm concrete thickness with M15 concrete mix. Based on the submitted foundation layout, BHEL shall prepare Civil Foundation drawing. Civil foundation work is under the scope of BHEL. In case there is no foundation, the anchoring type to be specified and all the anchoring bolts are in the scope of vendor.	
11.0	**Machine Levelling & Anchoring System**	Complete anchoring system including foundation bolts, anchoring materials, fixators, levelling shoes, anti-vibratory pads etc. shall be supplied with the machine.	
12.0	**LUBRICATION**	1. Automatic centralized lubrication system with timer control and suitable metering cartridges shall be provided. Vendor to confirm 2. First filling of Lubrication Oil & Grease to be provided by Vendor. Indian equivalent shall be mentioned. Vendor to confirm.	
13.0	**PNEUMATIC SYSTEM**	1. The pneumatic operated elements of the machine shall work efficiently with BHEL compressed air supply at a pressure of 4.5 to 5.0 kg/cm2. 2. BHEL will provide compressed air at only one point near / on the machine. Vendor shall provide suitable filter-regulator-lubrication (FRL) unit fitted with hand wheel valve at this point. 3. Hydraulic, Pneumatic & Lubricating oil piping should be preferably metallic except places where flexible piping is essential. All the pipes required for the same shall be included in the standard scope of the machine. 4. Pneumatic components shall be of FESTO / SMC / NORGREN make only	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	**VENDOR'S OFFER** / CONFIRMATION [with Complete Technical Details]
14.0	**Piping**	Hydraulic, Pneumatic & Lubricating oil piping should be preferably metallic except places where flexible piping is essential. All the pipes required for the same shall be included in the standard scope of the machine.	
15.0	**HYDRAULICS**	1. Details of the Hydraulic Motor to be specified by Vendor. The Hydraulic motor used for tube rotation shall be located inside the RTR room beside X-ray equipment. Suitable motor to be selected for trouble free operation. Make and capacity and other technical specifications shall be provided by Vendor. 2. The oil to be used shall be of standard ISO Viscosity Grades – 32 / 46 / 68. 3. Pumps, valves, accessories etc shall be of REXROTH / VICKERS make or equivalent reputed make acceptable to BHEL. 4. The seals used in cylinders shall be of MERKEL / PARKER / BUSHAK + SHAMBAN / HUNGER / SIMRIT make. Vendor to confirm & furnish details 5. The flexible hoses used in the system shall be of GATES / AEROQUIP / PARKER or any other reputed make acceptable to BHEL. Vendor to specify 6. Suitable type cooling system of sufficient capacity to maintain complete Hydraulic System at a temperature not exceeding 40°C irrespective of the ambient conditions. Details shall be specified by Vendor. 7. The control voltages for all the Solenoids of the valves shall be of 24-V DC and all solenoid operated DC valves should have manual over-ride provision and light indicating solenoids 8. Maximum Operating Pressure of hydraulic system. The maximum pressure of the system should preferably not to exceed 310 bar 9. Main Pump flow in LPM and Motor Power in kW 10. Reservoir capacity (in litres) to be specified. 11. All hydraulic pipelines, hoses and electrical control cables to be neatly laid out with proper clamps and flexible hose conveyors wherever required 12. Suitable metallic tray to be provided for oil collection (in case of leakage) wherever required. Vendor to confirm	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
16.0	**ELECTRICAL FEATURES & ELEMENTS for MACHINE CONSTRUCTION**		
16.1	**Electrical Input Power Supply**	1. The input electrical power supply shall be 415 with of ± 10 % V, 50 ± 3 % Hz, 3 Phase AC supply through a 3 Wire System without neutral. 2. BHEL will provide this supply at one point only near the equipment and the supplier has to take care of all other electrical distribution network required for the Tube Handling System.	
16.2	**Control Voltage**	Control Circuit Voltage shall not exceed 24 V.	
16.3	**Power Requirement**	Bidder has to indicate the total tentative power requirement (including that required for all the sub-systems) in kVA with the offer.	
16.4	**Alarm Tripping Logics**	All alarm tripping logics and control logics incorporated in the machine to be listed out by the vendor.	
16.5	**Electrical Control Cabinets**	1. All electrical control cabinets & panels should be dust and vermin proof. Vendor to confirm 2. Air Conditioners with Dehumidifiers of suitable capacity to be provided for all Electrical / Electronic Panels / Cabinets considering specified ambient conditions. Make: Rittal / Warner & Finley or any other reputed make acceptable to BHEL. Specification to be submitted. 3. All electrical panels should be provided with CFL lamps for sufficient illumination and electric power receptacles of 220 Volts, 5/15 Amp, 3 pin. AC. All adapters/receptacles should have compatibility with Indian equivalents. Vendor to confirm 4. All electrical components in the cabinets should be mounted on DIN Rail. Vendor to confirm	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
16.6	**Drive Motor and VFD**	1. Suitable feedback system has to be ensured between the AC Motor & VFD Control Drives. 2. All the PLC Relay out puts (with LED indication) shall be with and through relay board and control fuses. 3. The normal operating modes such as Auto / Semi-Auto / Manual, Start / Stop are to be ensured. 4. The online monitoring of each function and consequent alarm message is to be displayed. 5. The Trouble-Shooting Chart and Mode of editing of Programs for VFD to be provided. 6. The Sequence of Operation and Function Statement in Hard Copy (Literature) shall be furnished.	
16.7	**Field Elements**	1. All the field sensors, proximity switches, limit switches, pressure switches, should be suitable for heavy duty applications and wired up with flexible PVC insulated screened cables 2. All Electromagnetic Clutches shall only be of 24 V DC control. 3. All limit switches used in the machine shall be sturdy and rigid and shall not fail frequently due to vibrations in the actuating mechanisms. The vendor may employ non-contact type limit switches/limit switches with metallic rollers having less spring-like properties to avoid vibration. 4. All field elements such as Encoders, limit switch, feed back devices shall be suitably placed to have easy accessibility for maintenance	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
16.8	**Electrical Wiring**	1. All electrical motors, limit switches etc, on the machine shall be Wired using PVC sheathed screened cable running in conduits to cable ducts to common terminal block. 2. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. 3. All electrical motors, limit switches etc, on the machine shall be wired using PVC sheathed copper cable running in conduits and converging to common terminal block 4. External wiring from / to control panel, control desk, external motors, etc. shall be by means of screened multi-core cables. All machine cables shall be of copper. 5. All cables moving with traversing axes should be installed in metallic cable drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer. 6. All components / devices / terminals are to be incorporated with ferrules. 7. Cables shall be routed through totally enclosed cable trays. There shall not be cable trenches.	
16.9	**Control Panel**	1. The Main Electrical Control Cabinet shall be a box type and self-standing with a locking arrangement. 2. Operator Control Panel are to be provided with locking arrangement. 3. Control panel -1 shall be operated by STBW operator for tube kick off from STBW out feed roller stand to tube buffer stand. 4. Control panel-2 shall have all other controls and located inside RTR control room. 5. Control panel-2 located inside the RTR control room, suitable for the following operations: a) ON/OFF an Emergency Stop b) Separate controls for Tube kick off from buffer stand to RTR in feed roller stand, tube feed to RTR room, RTR room to out feed roller stand and kick off to dump stand with linear speed variation	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
16.9 Cont..	**Control Panel**	c) Tube Clamping and Rotation in either direction and speed variation in rotary direction d) Variable speed for Inching operation for accurate positioning of the Weld Joint for inspection inside the RTR Station. e) Tube Feed (IN & OUT) from OUT-FEED Side with linear speed variation f) Defective Tube slitting by using abrasive cutting machine in the weld joint location These pendant or remote control shall have facility for display, indication lamps and push buttons to operate the system in all the modes – viz., ON/OFF, Emergency Off, Forward & Reverse, Creep Feed, and Speed Variation for tube Travel.	
16.10	**Earthing**	Vendor should ensure the proper earthing for the machine and its peripherals.	
16.11	**IP Protection**	All electrical equipment shall be Tropicalized and shall have IP 54 degree of protection.	
16.12	**Electric Motors**	All Electric Motors shall be of any of the following makes: Crompton, SIEMENS / ABB / Bharat Bijlee or MAKEs acceptable to BHEL. Motors & other electrical components shall conform to IEC or Indian Standards	
16.13	**Drives for Motors**	Type of drives used for motors to be indicated. Electrical drives shall be of Siemens / ABB /L&T/ Eurotherm / Yaskawa / Mitsubishi or any other reputed makes acceptable to BHEL.	
16.14	**Electrical components**	All electrics such as contactors, relays, MCBs, MCCBs, limit switches and other control elements shall be of reputed make like Siemens, L&T, BCH, and Tele-technique/Schneider or any other reputed makes acceptable to BHEL.	
17.0	**SAFETY**	All the safety features provided in the machine shall be listed out by vendor.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
18.0	**General Points**	1. All Bearings shall be of standard make like FAG, SKF, NTN and NBC only. 2. All components and fasteners are to be in metric dimensions. 3. The machine configuration and element/ system arrangement should be such that they have easy accessibility, higher rigidity, self-aligning arrangement of machine components 4. All structural shall be made out of heavy duty, rolled sections /extrusion of suitable size. 5. The OFFERED Tube Handling System with all the Sub-Systems are to be designed for working in continuous duty.	
19.0	**MACHINE WORKING ENVIRONMENT**		
19.1	**Ambient Atmospheric Conditions**	a. The offered Tube Handling System shall be suitable for operation in an ambient temperature of +5 to +50°C and with a Relative Humidity of 90% (both higher values do not occur simultaneously). b. The ENTIRE EQUIPMENT shall be TROPICALISED in Design and CONSTRUCTION.	
19.2	**Safety Systems**	1. Machine shall have Safety Guards / Sliding Doors and Mechanical and Electrical safety interlocks shall be ensured for personnel and equipment protection. 2. BIDDER to submit COMPLETE details on this arrangement with the Technical Offer.	
20.0	**PAINTING**	1. The machine parts are to be heat-treated (wherever necessary) after fabrication (including castings and forgings) and painted with One coat of Primer and Two coats of synthetic Enamel Paint (Colour – Apple Green – IS281) 2. Control Panel to be painted with Two coats of IS 281 Synthetic Enamel Apple Green Color Paint	
21.0	**MACHINE SPARES**		
21.1	**List of Spares**	The Supplier shall LIST DOWN with the OFFER, the complete set of replaceable parts / items / components coming in the Tube Handling System and shall QUOTE the Unit Price for each item.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
22.2	**Compulsory spares**	Vendor has to COMPULSORILY quote for the following items with the OFFER : 1. Mechanical wearing components due to linear movement & rotation. [Each 4 Nos.] 2. Hydraulic seals (Each 4 Nos) 3. Pneumatic spares like valves & repair kit [Each 4 Nos] 4. Electrical & Electronic Items:- PCB & PLC I/O Cards, Digital to Analogue Card, Field Sensors (such as Encoders, Sensors Proximity Switch, Limit Switch), Display Unit, etc. [Each 4 Nos.]	
23.0	**MACHINE INSPECTION & ACCEPTANCE**		
23.1	Machine Performance Testing and Acceptance	1. The complete system has to be assembled and offered for Pre-dispatch inspection at Suppliers works. 2. The Tube Handling System shall be tested for its performance prove-out (after trial assembly) as per BHEL Specifications, at the Supplier's Works prior to despatch. 3. Tube Handling trials have to be done with any of tube sizes that will be specified in the PO.	
24.0	**MACHINE ERECTION & COMMISSIONING**		
24.1	**Mechanical Erection**	SUPPLIER's SERVICE ENGINEERS and Working Personnel shall do erection and Commissioning of the Equipment. Necessary crane handling facility inside shops only will be provided by BHEL free of cost. Erection equipments and consumables are in the scope of vendor. Any civil works required is in the scope of BHEL.	
24.2	**Machine Performance Prove-Out**	After the successful commissioning of the machine and sub-systems, the COMMISSIONING ENGINEER of the Supplier have to establish the Performance Prove – Out for the System's Capability and the Handling Rate by the Machine, as given under the **Clause Sl. No. 3.0, 6.0 and 8.0**	

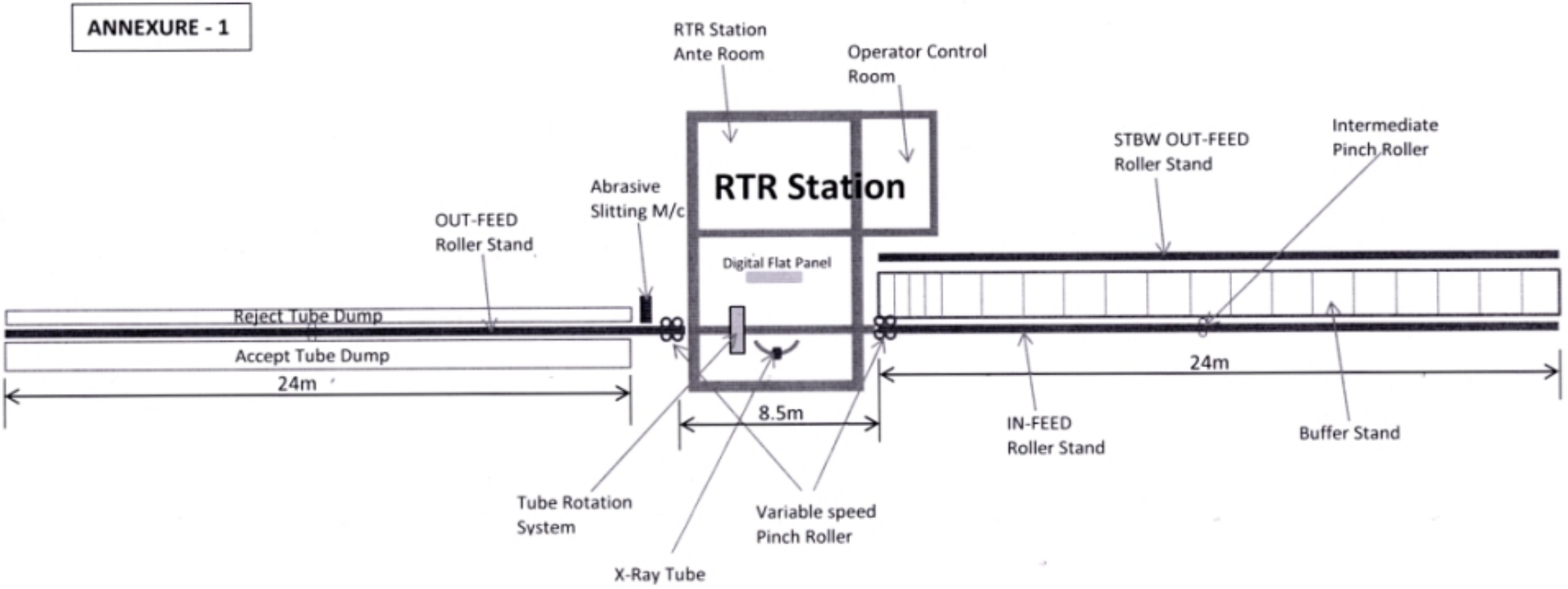
S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
25.0	**MACHINE DOCUMENTATION**		
25.1	**O & M Manuals**	Three Copies of the O & M [Operation and Maintenance] Manual in English with one copy in CD form (SOFT COPY), for each Tube Handling System to be provided by the vendor.	
25.2	**Documents and Technical Details**	The following documents and details shall form part of the Operation & Maintenance Manual 1. General Arrangement Drawing of the Tube Handling System in total. 2. Sub-Assembly Drawings for sub-systems for maintenance purpose. 3. Electrical Wiring Drawings for Power and Control Circuits. 4. PCB Details and Circuit Drawings 5. PLC Ladder Diagrams (Hard & Soft Copy) with Flash Memory Card. 6. Complete PCB Schematics indicating check points (Test Points) for Electronic Controls 7. Specifications of All Bought-Out-Items 8. Warranty / Guarantee Card for all Bought-Out-Items 9. Trouble Shooting Chart for Main and all Sub-Systems 10. Total weight of the Tube Handling System	
26.0	**TRAINING**	The Supplier's Service Engineer shall train of BHEL Staff in the Operation, Trouble Shooting and Maintenance of the Tube Handling System at BHEL Works for a minimun of 2 days after the SUCCESSFUL COMMISSIONING of the Equipment, at BHEL Works.	
27.0	**TECHNICAL OFFER**	The Technical Offer shall contain the following: a. Complete Scope of Supply, including Main Handling Equipment, Control Station, All Accessories and Sub-Systems, etc. b. List of Spares c. Complete description of all systems/sub-systems forming part of the Tube Handling System d. A schematic diagram showing the layout of the machine & associated systems with dimensions e. The operating sequence of the machine with broad outline of various operations involved	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER / CONFIRMATION [with Complete Technical Details]
28.0	**PERFORMANCE GUARANTEE**	The Performance of the Total Equipment and/or the Components / Sub-Assemblies / Bought-Out-Items shall be guaranteed for a minimum period of 12 months from the date of performance acceptance at BHEL Works or 18 months from the date of supply whichever is earlier.	
29.0	**SCOPE OF SUPPLY**		
29.1	**SUPPLIER'S SCOPE**		
	1. Design, Manufacture, Supply, Erection, Commissioning and prove out of STBW machine as per clause 1.0 2. Accessories 3. Hydraulic Oil, grease, tooling during pre-dispatch inspection 4. All anchoring & foundation bolts, levelling plates for the complete machine. 5. Levelling Instruments, Power Tools / Hand Tools / Special tools for erection of the machine. 6. Crane required for handling outside shop, if any. 7. Commissioning Engineers for supervision of erection and commissioning 8. Manpower for erection 9. First Fill of Hydraulic Oil 10. Job Quality and Productivity Prove-out		
29.2	**BHEL SCOPE**		
	1. Drawings approval 2. Civil foundation work as per manufacturer's drawing 3. EOT crane facility inside shop 4. Tubes for trials and prove out 5. Single Compressed air point at the location indicated in the drawing 6. Single Electrical Supply point at the location indicated in the drawing 7. Welding machines and consumables required for erection if any		

TUBE HANDLING SYSTEM FOR RTR STATION – 24m

SCHEMATIC SKETCH OF LAYOUT

ANNEXURE - 1



BHEL, Triuchirappalli