An ISO 9001 Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT / CAPITAL EQUIPMENT

ENQUIRY **NOTICE INVITING TENDER**	Phone: +91 431 257 76 53 Fax : +91 431 252 00 31 Email : skaruna@bheltry.co.in Web : www.bhel.com

TWO PART BID	**Enquiry Number:** **2711300003**	**Enquiry Date:** **09.01.2013**	**Due date for submission of quotation:** **11.02.2013**

You are requested to quote the Enquiry number date and due date in all your correspondences. 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.

S.No	Description	Quantity
1	**Online One Channel Wall Thickness Gauge at HM SRM Exit** as per the technical specification, general guidelines instructions & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 No.

IMPORTANT POINTS TO BE TAKEN CARE DURING SUBMISSION OF OFFER FAILING WHICH THE OFFER WILL NOT BE CONSIDERED FOR EVALUATION.

1. **CHECKLIST FOR COMMERCIAL TERMS ACCEPTANCE TO BE FILLED AND ENCLOSED ALONG WITH THE OFFER**
2. **THE CAPACITY /SUPPLY DETAILS AS REQUIRED IN CLAUSE 17.0 OF THE CHECKLIST FOR COMMERCIAL TERMS ACCEPTANCE IS TO BE ENCLOSED**
3. **THE EMD FOR THIS TENDER WILL BE (INR) : 2,00,000.00**
4. **DELIVERY REQUIRED 8 MONTHS FROM THE DATE OF PURCHASE ORDER.**

All updates, amendments, corrigenda etc (if any) will be posted only on the above websites from time to time, as and when required, until tender is opened. There will be no publication of such updates, amendments corrigenda etc. Through newspapers or any other media.

BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats 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 above **.**

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** Engineer / MM / Capital Equipment

Technical Specification of One channel Online Hot seamlesssteel Tube Wall Thickness Gauge at the Exit of Stretch Reducing Mill (SRM)

1 GENERAL:

1.1 This document deals with requirements for submitting offers and executing the order on placement of Purchase order / Contract for the subject item. The equipment under this specification is required for hot rolling Mill in Seamless Steel Plant in BHEL, Tiruchirappalli, to measure the wall thickness and mean, max. and min. values of wall thickness along the length of seamless tubes at the exit side of the Stretch Reducing Mill (SRM) using an One channel on-linehot seamless tube wall thickness, non-contact gauge including temperature, outside diameter and length measuring system.

1.2 Bidders have to submit the offers as below by filling in the "Vendor's response" column with relevant information against each point in the respective sections below by providing all information. The technical requirements shall also be confirmed for each clause.

1.3 Note: A just 'CONFIRMED' or 'COMPLIED' or 'YES' or 'NO-DEVIATION' or similar words in the "Vendor's response" column is not acceptable and may lead to disqualification of the Technical Offer.

1.4 Brand and model No. of the items offered must be indicated in the offer.

1.5 The offer shall Consist of Sections:

1.5.1 Part A:

a. General Requirements
b. Technical offer
c. Commercial terms and conditions
d. Un-priced Price bid as per Part B (i.e. Price bid as per list shown in Part B of this Specification with the price value blanked)

1.5.2 **Part B:** Price bid for all items with split of major components:

Sl.No	Particulars	Qty	Rate
01			
02			
03			
05			

1.6 The supplier shall visit SSTP, BHEL/Tiruchirappalli, Tamilnadu, India and to understand site condition before submitting offer.

1.7 Break up cost for Main equipment and Optional Systems / items shall be indicated separately.

1.8 Portion of Supplies from Foreign countries and from Indian source shall be separately grouped both in the Technical offer (Part I) and in the price bid (Part II).

1.9 An approximate break up of weight of each sub-system as above shall be indicated in the offer for comparison purpose.

1.10 List of spares with part identification no. (Tools, Mechanical, Electrical & Electronics) to be maintained for ensuring continuous operation with least delay time shall be provided in the offer with price.

1.11 Schedule of erection and commissioning to be indicated in the offer.

1.12 The supplier shall specify the safety requirements including health hazards if any along with applicable standards in the offer.

2. QUALIFYING CRITERIA FOR THE SUPPLY

2.1. The VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for this equipment. Confirmation against each clause is to be indicated in the space provided.

Sl. No.	REQUIREMENTS	Vendor's confirmation and ref. to detail enclosed
1.0	The VENDOR shall have a minimum of **FIVE Years** of Continuous Experience in the Design, Manufacture & Supply of '**OnlineHot seamless steelTube Wall Thickness Gauge'.**	
2.0	The VENDOR shall have supplied at least 2 numbers of the offered model, within the last five years. The equipment shall be working satisfactorily at least for the past 2 years. Indicate the number of equipment (of QUOTED MODEL) sold in India & Other Countries.	
3.0	Reference List of Customers with full details of the customer's CONTACT PERSON for cross reference by BHEL shall be provided. Proof of performance of the offered equipment shall be provided in the offer based on similar systems supplied to other customers by way of certification of performance fromatleast onecustomer.	

2.2. The VENDOR has to necessarily provide the following details for making an assessment of the firm's capability and competency: The VENDOR is expected to give complete details against each clause in the table given below and wherever necessary an additional sheet may be attached (giving clear reference number) to cover the required details.

Sl. No.	PARTICULARS	Vendor's response with ref. cl. No. of detailed offer.
4.0	Number of Years of Experience of the VENDOR in the field of design, Manufacture and supply of '**Online Hot seamless steelTube Wall Thickness Gauge'.**	
5.0	YEAR of Launch of the Model quoted against this ENQUIRY	
6.0	Is there any other model launched after the quoted Model? Why it is not quoted. Otherwise, indicate the likely year in which the next model is likely to be launched.	
7.0	Number of One channelonline hot seamless gauges for Seamless Steel Tube plant supplied, installed and commissioned till date for tube manufacturers. Attach list of organizations with model and contact address.	
8.0	Confirmation to performance testing requirement of the equipment prior to dispatch from supplier's end.	
9.0	Details of Quality System followed (Kindly furnish the salient aspects of the QA system followed)	
10.0	Details on SERVICE-after-SALES Set-Up in India including the addresses of Agents/Service Centers in India and Asia	
11.0	Any Additional Data to supplement the manufacturing capability of the VENDOR.	

2.3. TheVENDOR has to comply with the following for accepting the Technical Offer for scrutiny by theBHEL**.** Confirmationagainst eachclause is tobe indicatedin the spaceprovided**.**

Sl. No.	REQUIREMENTS	Vendor's confirmation and ref. to detail enclosed
12.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items" with copies of Product Catalogue and Selection Criteria	
13.0	The Commercial Offer (given with the Technical Offer – Part I) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid for confirmation of Scope of Supply.	
14.0	The points confirmed by the supplier based on the clarifications sought for the original offer shall be incorporated in the revised final offer wherever applicable. Pl. confirm	
15.0	The Vendor shall provide a complete list of out sourced electrical, electronic and mechanical components with Source name, Model no., Specification and drawings	

3.Technical Specification

3.1 Measuring task

It is required to measure the wall thickness and mean, max. and min. values of wall thickness along the length of seamless steel tubes at the exit side of the Stretch Reducing Mill (SRM) using an on-line, non-contact tube gauge including temperature, outside diameter and length measuring system.

Product Data:

Product: Seamless steel tubes at the exit of SRM
Material: Carbon steel and alloy steel
Density: 7.6 ... 8.1 g/cm³
Tube outside diameter: 26.7 ... 133.0 mm
Tube wall thickness (single wall): 3.50 mm... 20.0 mm
Tube length: 4 ... 65 m
Tube temperature: 750°C to 1050 °C
While travelling, tube will not rotate.

The tube gauge must be installed directly at the exit of the SRM, in line with the conveyor, leading to the cooling bed. Hot tubes thus pass through the measuring position (frame) at a constant vertical pass line in reference to the V-shaped rollers.

After each tube has left the measuring frame, the wall thickness along the length of the tube has to be displayed on a color monitor.

This displayed information, and the following parameter values calculated by the tube gauge computer should be used to carry out process optimization by means described below.

Measured parameters:

Wall thickness profile along the tube length
Mean value "finished tube thickness"
Diameter profile along the tube length
Mean value "finished tube diameter"
Temperature profile along the tube length
Mean value "finished tube temperature"
Value "finished tube length"

Process optimization from tube gauge measured data by:

Rapid and simple adjustment of the wall thickness target value from the SRM set-up
Cut End Control (CEC) for Thick Ends by use of the wall thickness and tube length measuring system
Wall Thickness Control Average (WTCA)
Wall Thickness Control Local (WTCL)
Speed Drop Compensation (SDC)
Exit Speed Control (ESC)
Tube Length Control (TLC)
Quality control and production documentation

3.2 Display of measured values

A Visualization-station with colour monitor must be used at the SRM control pulpit for production tracking. Additionally, Visualization-stations are to be installed at following other locations:

- Push Bench control room
- Cold saw control room

Details of the proposed monitor system to be given in the offer.

3.3 Tube gauge data evaluation

3.3.1 Measuring principle

The measuring principle must be NDT method like X-ray, gamma ray or Ultrasonic. The method to be used must be robust against typical mill environment with dirt, water and heat. The tube itself or its surface must not be changed or damaged by the measurement.

3.3.2 Description

The measurement must determine the true mean, max. and min. values of wall thickness along the length of the pipe and in each individual measuring section.

4 Tube wall thickness measurements

4.1 Technical data

4.1.1 Measuring material & Process parameter

Product: Seamless steel tubes at the exit of SRM
Material: Carbon steel, Low alloy steel and High alloy steel up to 9.5% chromium
Density: 7.6 ... 8.1 g/cm³
Tube outside diameter: 26.7 ... 133.0 mm
Tube wall thickness (single wall): 3.50 mm... 20.0 mm
Tube length: 4 ... 65 m
Tube temperature at SRM exit: 750°C to 1050 °C

4.1.2 Tube sequence

Rolling mill cycle time 20 sec.
Tube frequency max.120 pieces/hour
Time between tubes 2 sec.

4.1.3 Transport unit

Type: Roller conveyer
Tube speed: 6.0 m/s max. at Exit of SRM
Roll type: Bicone roll 90 °

4.1.4 Tube measuring position

Tube pass line constant mill centerline
Horizontal tube position constant mill centerline
Vertical tube position constant mill centerline

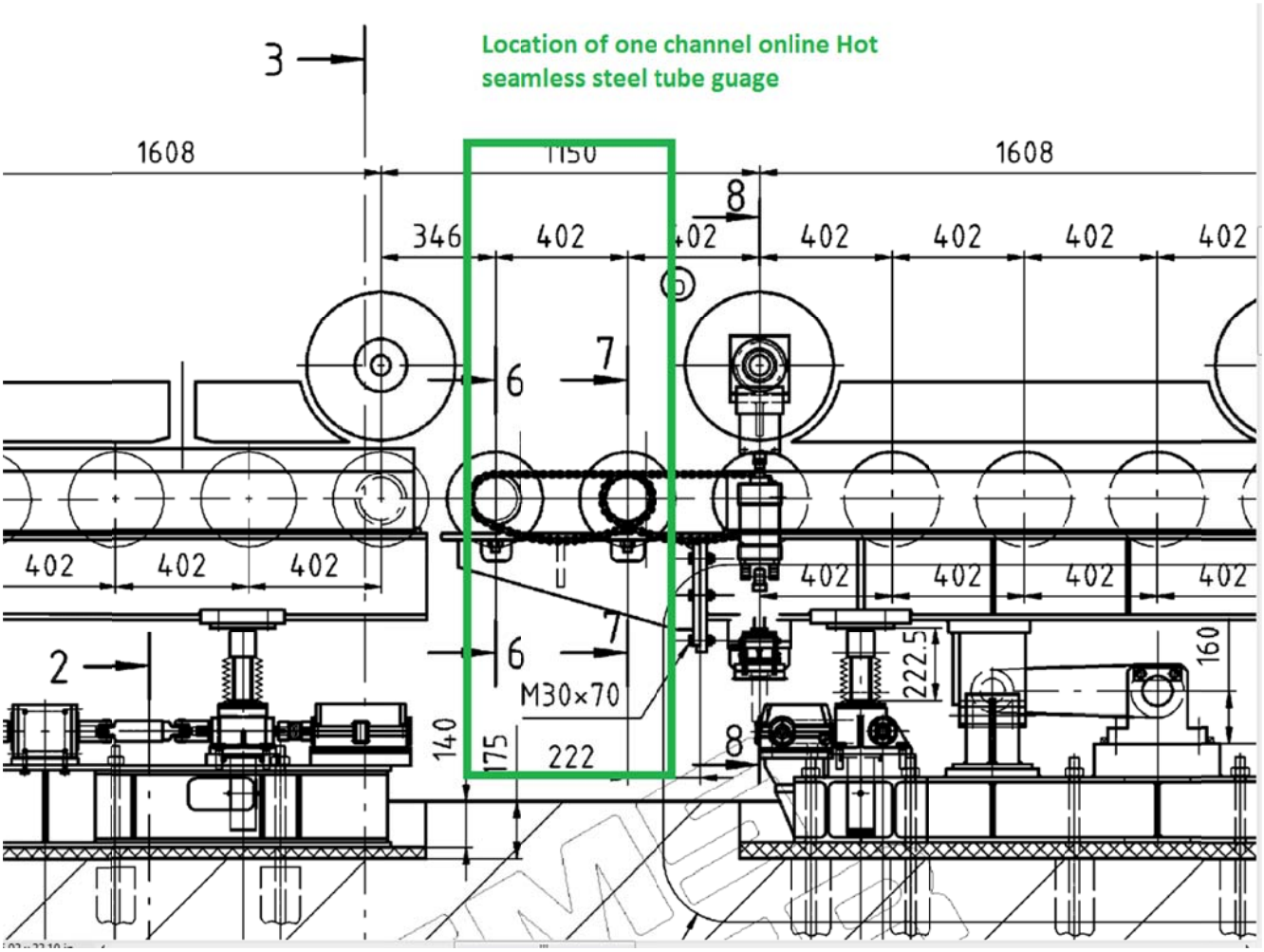
4.1.5 Tube center position

Horizontal tube position +/- 10 mm
Vertical tube position +/- 10 mm

4.2 Description of tube wall thickness measurement

The wall thickness measuring position must be installed directly at the exit of the SRM in line with the run out conveyor leading to the Cooling Bed.

Location of the proposed gauge is given in the figure below:



Hot tubes thus pass through the measuring position (measuring-frame) at a constant vertical and horizontal pass line in line with the central axis of the tube.

All components as wall thickness-, diameter- temperature and length measurement must be housed in one compact measuring frame without any open movable parts.

The measuring position consists essentially of

- Electric or pneumatic drive system (measuring- / service-position)
- Closed loop water cooling system
- Heat shield plates against infrared radiation
- Stainless steel cooling water pockets
- Over temperature monitoring,
- Complete mounted, wired and tested, ready for installation
- Heat resistant paint finish
- Electric, pneumatic and cooling water supply via cable track
- Distribution box for electric, pneumatic and cooling water supply.

4.3 Measuring accuracy tube wall measuring

4.3.1 Measuring accuracy tube wall
Measurement accuracy shall be better than 0.1 mm.

4.3.2 Measuring cycle time
Cycle time 5 ms

4.3.3 Measuring stability
The Equipment should require minimum maintenance and wear of components must be indicated in the offer – if any.

4.4 Calibration routines
It is required to have routines for automatic gauge calibration after each pipe, to compensate normal dust or dirt. The routines must not reduce the production cycle time.

4.5 Correction of actual measured value to cold-thickness values
The actual thickness value is dependent on the material composition and the measured material temperature (material density). The conversion to cold thickness, or hot thickness, is performed using an appropriate correction factor is to be derived from the tube temperature signal. Final tube parameters shall be displayed as in the cold condition.

5 Tube position- and diameter measurement

5.1 General description of tube position and diameter measurement
At the exit of the SRM, the external diameter of the finished tubes must be determined for optimal process control and quality inspection purposes. The measuring data shall be converted to cold dimensions (reference temperature 20 °C) and recorded along the length of the tube in parallel with the tube wall thickness.

By correctly utilizing all available measuring data obtained in an efficient and timely manner, the actual condition and size details of the finished tubes shall be monitored constantly and the mill operation can be adjusted for optimum performance.
A high degree of measuring accuracy is required for the determination of the tube outside diameter. Measurement errors caused by shifts in tube position (geometric errors caused by vertical and horizontal tube shifts) must be minimized. Suitable adopted method shall be given in the offer.

Position measuring data and wall thickness measuring data shall be aligned by proper aligning system like, optical measuring system.

5.2 Tube length-/ tube speed measurement

5.2.1 General description of tube length/ tube speed measurement

In order to ensure the correct distribution of measured values along the length of the tube, it is necessary to measure the tube speed. Tube gauge measurements are taken on a time base which means that if the tube speed should vary during measurement, the tube data calculated by the gauge computer after the tube has left the frame, will be distributed unevenly along the length of the tube.

By measuring the tube speed, due account can be taken of speed variations when calculating the distance between data points along the tube length. It is required to measure tube speed with a high degree of accuracy for reasons stated above, a non-contact Laser/Doppler length measuring device must be integrated into the measuring system.

6. Peripherals

6. 1 Notes concerning monitor screen displays

All screens required for production purposes (Visualization-Stations only) shall have text displayed in the English language, If BHEL requires specific modifications to the operator screens, these will be indicated up to two months prior to delivery of the gauge. A draft specification of the desired screen contents will be discussed and finalized along with supplier shortly after order placement. The gauge computer software shall be developed and supplied in accordance with the requirements described before. Additional calculation procedures and/or statistical calculations must be feasible based on BHEL options.

6.2 Visualization station at Stretch Reducing Mill operation room

At the control pulpit in Stretch Reducing Mill operation room, a visualization station for display, data entry and operation is to be located, which is connected to the central station via network connection. A protocol printer for hardcopies and data print out is connected to one of this PC.
The visualization station is running on Latest Windows OS and its details shall be given in the offer.
Following components shall be available in the visualization station:

- TFT colour monitor 17“
- Keyboard and mouse
- Computer system with hard disk, DVD drive and USB connection
- Network components
- UPS with suitable capacity with minimum half an hour backup.

Note Power supply (230V AC, 50Hz) for visualization station and printer can be connected from Stretch Reducing Mill operation room.

6.2.1 Visualization station at Push Bench control room

A Visualization-station with colour monitor must be provided at the Push Bench control room for production tracking. Details of the proposed monitor system to be given in the offer.

6.2.2 Visualization station at Cold saw control room

A Visualization-station with colour monitor must be provided at the Cold saw control room for production tracking. Details of the proposed monitor system to be given in the offer.

6.3 Display of measured data

During the period of time when a tube is passing the frame on-line values are displayed on the monitor screens. After each tube has left the frame new curves shall be displayed on the individual grids and mean, max., min., values of the different dimensions of the tube shall be shown.

6.4 Hardcopy of measured data

Monitor screen contents are printed out on receipt of the appropriate status command on the Laser colour printer.

6.5 Electrical control panels and operating desk

Basic electrical engineering and control drawings shall be sent along with offer. Make of the components used in the system shall also be given in the offer. Drawing approval shall be obtained from BHEL before manufacturing.

7. Equipment Scope of supply.

Tube wall thickness measurement (measuring-frame) prepared for temperature, diameter- and speed/length measurement
Cooling system for tube wall thickness measurement
Temperature measurement (pyrometer)
Diameter measurement (1 camera, infrared)
Length measurement (measuring head)
Local shutter status indication lamps (radiation shutter)
Local shutter status indication lamps (laser shutter)
Local operation terminal (housed in service cubicle)
Visualization station (network-PC) Provision for two year of measured data.
Visualization station monitors at remote locations 1. Push Bench control room 2. Cold saw control room
Necessary cabling for the visualization system and net working
Laser Printer
Central station (electronic cubicle)
Set of Special cable and flexible conduits including a complete set of appropriate plugs and connectors, for routing between the system component shall be supplied as per the requirement.(layout drawing is shown in fig(1))
System documentation: 3 sets of hard copy of operating / maintenance manualsconsistof Electrical&Mechanical drawings, operating procedures and safety precautions. 1 system documentation on CD-ROM which consists of all the above. All the back-up programs shall be given in the soft form.

Drawings for all the mechanical parts with material and strength requirements have to be supplied along with the equipment. Stage wise and total Electrical and electronics circuit drawings for the complete system to be supplied with the equipment.
Flow and pressure rating of hydraulic/pneumatic/cooling/lubrication details with circuit to be provided wherever required.
Licence of all the installed soft ware's used in the entire systems shall be given along with the supply of equipment.
Annual Maintenance Contract (AMC) scopes and conditions to be furnished in the offer rates for a period of three years (After the completion of warrantee period)
Calibration Test tube samples
Erection and Commissioning
Training and instruction
Performance test

8.0 Training:

Supplier shall provide operational and first level system maintenance for Electricals, Mechanical and instrumentation system training for 4 persons at supplier's works. Further training as required shall be provided at BHEL for operation and maintenance personnel.

9.0 The Following commercial points also may be confirmed.

S.No	Description	BHEL Offer / Requirement	Vendor's confirmation
01	DELIVERY	8 Months from the date of purchase order	
02	INSPECTION	Will be carried out at Vendor's Works and the Performance test is to be witnessed by BHEL Officials prior to despatch.	
03	WARRANTY	The equipment shall be warranted for a minimum Period of 12 months from Commissioning or 18 Months from the date of dispatch whichever is earlier	
04	TRAINING	Refer Clause 8.0	
05	PERFORMANCE	i. Performance shall be proved for min., max. & middle sizes ii. Functional performance shall be proved for three Continuous shifts. iii. Necessary test parameters shall be indicated in the Offer.	

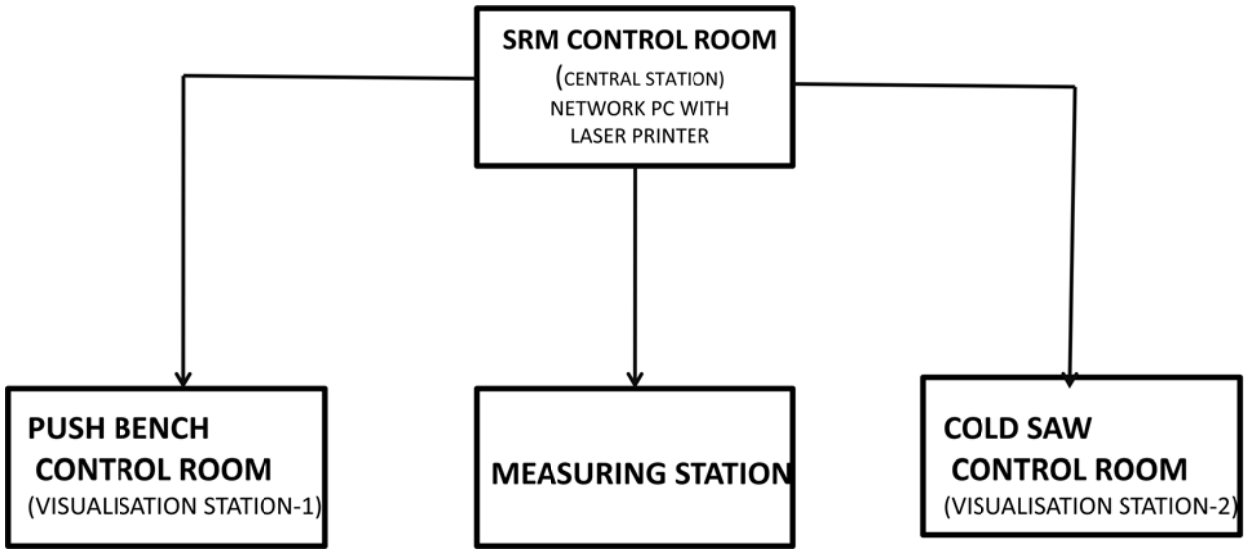


Fig (1)

(1) Distance between Measuring station and
Central station (SRM Control Room) **≤ 20 meters**

(2) Distance between Central station and
Visualization station 1 (Push Bench Control Room) **≤ 100 meter**

(3) Distance between Central station and
Visualization station 2 (Cold saw Control Room) **≤ 100 meter**