BHARAT HEAVY ELECTRICALS LIMITED

(A Govt. of India Undertaking)
Boiler Auxiliaries Plant,
Ranipet - 632 406, Tamilnadu, INDIA.

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* This is only a request for quotation and not an order

* The Enquiry No., Date and Due Date shall be super-scribed on the cover containing your offer

* We work on Sundays and our weekly-off falls on Thursday until further notice.

ENQUIRY

Enquiry No. and Date	Due Date
BAP/OT-14/E1e & 26.03.2008	26.05.2008

Test Certificate	Guarantee Certificate	Sample	Rev. No. & Date	No. of Items	Destination	Sheet No.
Required	Required	Not Required	00	001	BHEL Stores, Ranipet	01

Sl. No.	Material Code, Description & Specification	Unit	Quantity	Delivery Schedule		
				Lot No.	Delivery Qty.	Dely. Reqd. by
001	IM8610101000 ON-LINE DATA ACQUISITION SYSTEM as per the scope of supply given.	Set	1	1	1	Supplier to specify

Note:

1. This is a Notice Inviting Tender.
2. Sealed tenders (under two-bid, three-cover system) are to be submitted against this Enquiry.
3. Tender Documents - Technical Specification, Commercial Terms & Conditions etc. are to be downloaded from our web site www.bhel.com
4. Any Change/s and / or Corrigenda to the Tender Enquiry including change of tender opening date, if any, would be hosted on the web only. No separate publication in the newspapers or notice through other media would be given to the intending bidders by BHEL.
5. Tender fee for this tender is INR 5000/- (Indian Rupees Five Thousands only) for domestic suppliers and US $ 250/- (US $ Two hundred and fifty only) for foreign suppliers. Tender fee includes all taxes and duties, as applicable.

Supplier's Name and Address

Dear Sir,

Please submit your lowest quotation on FIRM PRICE, in duplicate subject to our terms & conditions for the above materials so as to reach us on or before the due date by 1000 hrs.

1. Quotations will be opened at 1030 Hrs. on the due date in the presence of the tenderers who may like to be present.
2. No revision of prices will be entertained after tenders are opened.
3. Late tenders are liable to be rejected.
4. The purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any tender in part or full without assigning any reason whatsoever.
5. Manufacture's Name, Trade Mark or patent No., if any should be specified, illustrative leaflets giving particulars are required along with quotation wherever necessary.

Please quote Enquiry No., Date, Due Date and Material Code in all your correspondences.

For and on behalf of
Bharat Heavy Electriclas Limited, Ranipet

Dy. Manager - Capital Purchase

Document Information

Specification For	Data Acquisition System Fan Testing Station, BHEL, Ranipet
Ref No	EDC/ Fans/ FTS/ T 05
Date	12.02.2008
Compiled By	Desigan. M, Manager/ FES (F) & FTS
Approved By	Subramanian. V, Sr. DGM/ FES & FTS

Data Acquisition System

Fan Testing Station
Bharat Heavy Electricals Limited
Boiler Auxiliaries Plant
Ranipet – 632 406

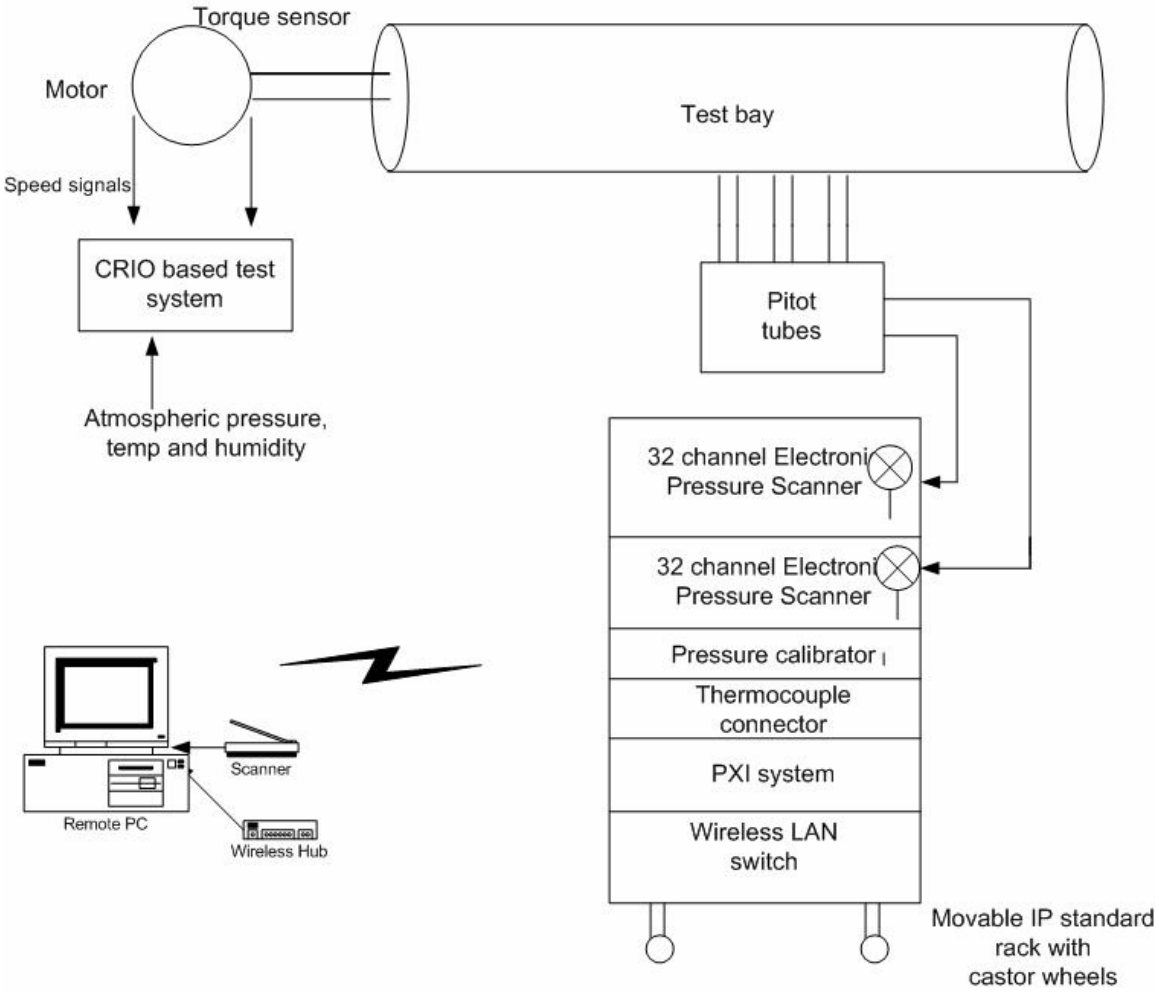
1. Statement of Confidentiality

BHEL, Ranipet submits the enclosed information to the vendors for the purpose of offering **Data Acquisition System**. This proposal is not intended to create a binding agreement between the parties. Such an agreement shall be reflected only by a definitive contract, signed and delivered by authorized signatory from **BHEL** and the respective vendor.

2. System Configuration:

Input/Output Parameters	**No of channels**
Static Pressure	25
Dynamic Pressure	24
Speed	1
Ambient Temperature and Humidity sensor	1
Thermometer	1
Barometer	1
Torque	1

3. System Details:



The requirement of the data acquisition system is to measure various parameters during the fan testing operation in BHEL and store the data in a remote PC and do various user defined analysis on the data and create a report as per user requirement.

The basic requirement of the data acquisition system is to measure 48 channels of pressure (24 ch absolute, 24 ch diff) from 24 pitot tubes. The pressure signals should be measured by means of a electronic pressure scanner. The pressure scanner should be mounted in a rack and should be controlled from the data acquisition system. The pressure scanner should be controlled using CMOS compatible digital I/O lines. The scanner should be able to scan the pressure channels upto 20KHz frequency. The corresponding data acquisition

system should have the capability to acquire the data as per the scanning frequency of the pressure scanner.

Each pressure scanner should be able to scan upto 32 channels. The scanners should be suitably mounted in the rack.

Appropriate calibration instrument for the transducer/scanner should be provided along with the supply. The calibrator should be preferably pneumatic based with a hand pump and should be a portable for field applications.

The scanner output should be connected to the ADC card terminal block. The system should be housed in an industrial rack with castor wheels so that the same can be used in different test tracks. The internal wiring of the system should be done with Teflon wiring and elmax connectors.

The system should also be capable of measuring temperature from the Thermocouples. Necessary signal conditioners should be quoted for the data acquisition from thermo couples.

The fan is tested with the help of a motor and associated hardware. The measurement of torque, speed and ambient temperature and humidity also needs to be done. These measurements are carried out near to the control room. So a portable data acquisition system (different from the main data acquisition system) should be provided near to the control room. This data acquisition should have a controller and corresponding modules for the measurement of different parameters. The system should have at least 2 empty slots for future up-gradation.

The main data acquisition system and sub data acquisition system should communicate in Realtime with a control room PC. The communication between the two systems and the PC should be through wireless LAN. BHEL prefers to have industrial grade wireless instruments to be used. The user should be able to configure and control the two data acquisition systems using the control room PC through wireless LAN.

Main Data Acquisition System:

The main data acquisition system should be used to measure 49 channels pressure and temperature signals. This system should be universally accepted PXI platform. This system should consist of a data acquisition chassis, controller, data acquisition cards, digital DIO card for pressure scanner, pressure scanner, pressure calibrator unit and should be mounted on an IP55 movable rack.

Detailed Description:

1. 3 U chassis:

Features required for 3 U chassis:

- Chassis should have 8 slots to mount controller, data acquisition card and digital I/O
- Chassis should be directly connected to the 100 to 240 VAC supply
- Chassis should dedicate 1 slot for controller and 7 slot for input and output modules
- Chassis should be 3U size and should be operated at 0 to 55 °C
- Maximum current rating up to 8 A and over current protection of 10 A.
- Accept both 3 U Universal PXI modules and Compact PCI modules
- Should have built-in 10 MHz reference clock, PXI trigger bus, star trigger, and local bus.

2. Controller

Features required for controller:

- Intel Core 2 Duo Processor T7400 (2.16 GHz) processor and Mobile Intel 945GM Express chipset or better
- 1 Ethernet, 1 RS232, 4 USB and 1 GPIB Interface.
- 512 MB DDR2 SDRAM and 60 GB Hard drive.

- Windows XP Operating System
- Controller should be of Universal PXI Platform and fit into the PXI chassis

3. Data Acquisition Card to measure pressure:

Features Required for Data Acquisition Card:

- 16 Channel Analog Inputs, 2 Channel analog outputs, 24 channel digital I/O's and 2 channel counters in single card
- Should be of Universal PXI Platform preferably of 3U size and easily fit in to chassis.
- Data Acquisition card should be modular
- Should synchronize with digital I/O card through Backplane.
- 16 analog inputs channel (Analog to Digital Conversion) should have 16 Bit resolution, Voltage range of ±10 V, and Maximum Sampling rate of 250KS/s to acquire pressure signals
- Should provide signal conditioners up to 4 channels to measure thermocouple
- 2 analog output channels (Digital to Analog Conversion) should have 16 Bit resolution, Voltage range of ±10 V, update rate of 833 kS/s and current drive of 5 mA to analog voltages.
- 24 channel digital I/O's should have Input/output range of 0-5V, current drive of 24mA per channel/1A for total channels.
- 2 channel counters should have 32 Bit resolution, voltage range of 0-5V, Maximum source frequency of 80 MHz
- Data Acquisition Card should have digital triggering for starting acquisition based on Events.
- Suitable connecter block and 2 m shielded cable should be supplied

4. Digital Output card to address pressure scanner:

Features required for Digital input card

- Digital output card should have 96 digital output channels
- Supports 5V (TTL/CMOS)
- Should be of Universal PXI Platform preferably of 3U size and easily fit in to chassis.
- Should synchronize with data acquisition card through Backplane.
- Programmable Power-up states, watchdog timer
- Suitable connecter block and 2 m shielded cable should be supplied

5. Digital output card to control actuators:

Features required for Digital output card

- Digital output card should have 24 digital output in single card
- Should be of Universal PXI Platform preferably of 3U size and easily fit in to chassis.
- Should synchronize with Data Acquisition card through Backplane.
- Each Digital Output should have sink/source output range of ±60 V and current drive 150 mA.
- channel to channel Isolation
- Programmable Power-up states, watchdog timer, change detection, programmable input filters
- Suitable connecter block and 2 m shielded cable should be supplied

6. Pressure Scanner to measure static and dynamic pressure

Features required for pressure scanner:

- 0-1 psi (0-68 mbar) for dynamic pressure measurement
- 0-2.5 psi (0-170mbar) for static pressure measurement
- Each module should have maximum of 32 in built sensor
- Should have 20 KHz scanning rate or greater

- Pressure scanner should be portable/compact
- Accuracy of ±0.1% full scale for both 0-1 psi and 0-2.5 psi
- Operating temperature range of 0-60° C
- ± 10 V output
- Digital addressing for selecting channels

7. Pressure calibrator:

Features required for pressure calibrator:

- 0-2.8 psi for pressure calibration
- Accuracy of 0.025% full scale
- Should have integral combined pressure/vacuum pump
- Should have at-least 92 Kbytes of data storage
- Should have hand pump
- ± 10 V output

8. Industrial Wireless Access Points:

Features required for Industrial Access Points:

- Should support IEEE 802.11g/b
- Redundant dual 24 VDC power inputs
- Metal enclosure,
- Should be IP30 rated; Class I, Division 2 hazardous locations

9. Desktop PC:

Specifications for Desktop PC:

- Intel(R) Core(TM)2 Quad Processor Q6600 or better
- Genuine Windows Vista(R) Business OEM Version or better
- Integrated Fast Ethernet 10/100
- 2GB (2X1GB) NECC Dual Channel DDR2 667MHz SDRAM Memory or better
- 320GB SATA 3.0Gb/s Hard Drive
- 16X DVD+/-Reader
- Microsoft(R) Office 2007 Basic OEM Version (English)
- Key board and mouse
- 19" Wide screen LCD Monitor

Sub data acquisition system:

The sub data acquisition system should be used to measure torque (±10V), speed (±10V), humidity (±10V) and temperature (±10V). This system should consist of chassis, controller and analog input module.

1. Controller:

Features required for controller:

- 400MHz Pentium class processor or better
- 128 MB of nonvolatile Compact Flash storage, 64 MB DRAM memory
- 10/100baseT Ethernet port
- RS232 serial port for connection to peripherals
- -40 to 70 °C operating range
- dual 9 to 35 VDC supply inputs

2. Chassis:

Features required for chassis:

- 1 M gate reconfigurable I/O (RIO) FPGA core or higher in the back plane
- Minimum 4 slots for I/O modules
- -40 to 70 °C operating range

3. Analog Input module:

Features required for analog input module:

- Minimum 8 analog input channels
- 500 kS/s aggregate sampling rate
- 12-bit resolution
- single-ended inputs
- screw terminal connectivity for field signals

4. Industrial Wireless Access Points:

Features required for Industrial Access Points:

- Should support IEEE 802.11g/b
- Redundant dual 24 VDC power inputs
- Metal enclosure,
- Should be IP30 rated; Class I, Division 2 hazardous locations

Application software

The application software should be built as per the user requirement in **LabVIEW.**
The software should have the following basic modules

LOGIN

The login feature in the software should give the user security protection for the software. The software should have two levels of login like administrator and user. The administrator should have the power to change the configurations.

CONFIGURATION

The system should have options to configure different types of test and also enter details like test name, type of test etc. The software should have features to assign different names of each channel, assign high/low limits for each channel and engineering unit conversion.
The software should also have features to save the existing configurations and also open the existing test configurations.

DATA ACQUISITION LOGGING AND CONTROL

The software should have features to start/stop data acquisition and time stamped data acquisition, the sampling rate in the acquisition window. Once the acquisition starts, the data should be displayed in realtime in the screen. The software should have display options like graphical/numerical/tabular displays. The data should be logged in realtime to the hard disk of the controller in a user specified location and also transfer the data through wireless.
The software should have features to control the actuators. The acquisition of data can be stopped either manually or through some digital trigger command.

OFFLINE ANALYSIS

The software should have features of offline analysis with the acquired data like comparing the results of the test with a predicted data, mathematical calculations of the acquired data (formulae will be provided by BHEL). Based on the calculation the

graph should be generated on the existing formats provided by BHEL to calculate the efficiency of the fan.

REPORT GENERATION

The software should have features of custom report templates (details will be provided by BHEL) and also directly print the desired reports from the software itself.

Scope of Supply:

Hardware:

Main data acquisition system:

Sl No	Description	Qty
1	3U chassis	1
2	3U controller	1
3	Data Acquisition card	1
4	Digital Output card (5 V)	1
5	Digital Output card (24 V)	1
6	Industrial Wireless Access points	2
7	Pressure scanner (0-1 psi)	1
8	Pressure scanner (0-2.5 psi)	1
9	Pressure Calibrator	1
10	Thermocouple	1
11	Atmospheric pressure sensor	1
12	19” wide screen LCD display	1
13	Desktop PC	1
14	Power Supply (24 V)	5
15	Application software with user manual in CD/DVD format (common for both systems)	1

Sub data acquisition system:

Sl No	Description	Qty
1	Chassis	1
2	Controller	1
3	Analog Input module	1
4	Humidity and temperature sensor	1
5	Industrial Wireless Access points	2

Warranty:

- The quoted items should include one-year standard warranty.
- AMC charges should be quoted separately

Test Acceptance Criteria:

- The functionality of all the deliverable Hardware should be demonstrated free of cost at BHEL, Ranipet.

- All required instruments, accessories, cable and cabling other than the deliverable bill of materials for satisfactory demonstration of the system is to be identified and listed and should be mentioned as the scope of BHEL, Ranipet. Those items not specifically identified as "BHEL Scope" should be provided by the vendor towards completion of the project.

Terms and Conditions for Software

- Detailed Software Specification should be prepared by the vendor after detailed system study. BHEL Ranipet shall accept and duly sign the Software Requirement Specification prepared by the vendor on mutually agreed upon Software features before the commencement of Design document Preparation.

- No deviation/change in the Software Requirement Specification or Design Features will be accepted after commencement of coding.

- Any bugs detected in the software (within the deliverables) should be rectified free of cost provided the same is brought to vendor's notice within 12 months of handing over the system to the customer.

- Necessary training should be given to operators for safe and proper use of the system as part of installation
- All the products will be inspected at the vendor site before dispatching to BHEL.

PROJECT ACTIVITY CHART

PHASE	ACTIVITY	RESPONSIBILITY
1	Project Allocation	Vendor
2	Preparation of Scope Statement	Vendor
3	Review and Approval	BHEL
4	Work breakdown Structure	Vendor
5	Work Schedule	BHEL
6	Risk management Plan	BHEL & Vendor
7	Review and Approval	BHEL
8	Preparation of Software Requirement Specification	Vendor
9	Review and Approval of Software Requirement Specification	BHEL
10	Sign off on Software Requirement Specification	Vendor & BHEL
11	Preparation of Test Acceptance Criteria	Vendor
12	Review and Approval of Test Acceptance Criteria	BHEL
13	Sign off on Test Acceptance Criteria	Vendor & BHEL
14	Preparation of Design Document	Vendor
15	Coding	Vendor
16	Testing	Vendor
17	Submission of Test Report	Vendor
18	Acceptance and issue of Project Completion Certificate	BHEL
19	Submission of User Manual	Vendor