DOCUMENT

Open Competitive Bid (OCB)

For

Supply and Installation of Equipments To the Material Testing Lab of MME Department. at the three campuses of Rajiv Gandhi University of Knowledge Technologies

Proprietary & Confidential

RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES
Ground Floor, Vindhya C4 Building,
IIIT-H Campus, Gachibowli
HYDERABAD- 500 032
Phone: 040-23001830

Tender Ref: RGUKT/Proc/MME/MTL/T38/2012

Phone: 040-23001830

Proprietary & Confidential

Web document

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News paper advertisement

Tender Notice

RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES

Ground Floor, Vindhya C4 Building, IIIT-H campus, Gachibowli, HYDERABAD- 500 032
Phone: 040-23001830

Separate Sealed Tenders are hereby invited from reputed Manufacturers or Authorised dealers for supply and installation of equipments for the following labs of Metallurgy and Materials Engineering Department at the three campuses of RGUKT located at Basar(Adilabad District), Nuzvid(Krishna District) and RK Valley (YSR Kadapa District) of Andhra Pradesh:

i. Materials Processing Laboratory
ii. Physical Metallurgy Laboratory
iii. Corrosion and Environmental Degradation Laboratory
iv. Materials Characterization Laboratory
v. Materials Testing Laboratory

Last date of submission of tender along with EMD as specified in the bid document is on 19.03.2013 before 04.00 pm.

Interested parties can collect the Tender document for each laboratory separately from the office of the RGUKT from 09.03.2013 to 19.03.2013 up to 03.00PM against payment of Rs. 1,000/- towards the cost of each Tender document fee (non-refundable) through D.D. drawn from any Nationalized Bank, in favour of "REGISTRAR, RGUKT" payable at Hyderabad. For further details, visit our website www.rgukt.in

Date: 09.03.2013

Sd/-
Registrar

Web document

Time schedule of various Short tender related events

Bid calling date	09.03.2013
Sale of document	From 09.03.2013 to 19.03.2013 up to 03:00 P.M
Pre bid meeting	13.03.2013 at 04.00PM
Bid closing date/time	19.03.2013 at 04:00 P.M.
Technical Bid Opening date/time	19.03.2013 at 04:30 P.M.
Price Bid opening date/time	20.03.2013 at 04:00 P.M.
Bid Document fee	Rs.1,000/-
Contact person	Registrar, RGUKT
Reference No	RGUKT/Proc/MME/MTL/T38/2013

Note: Tender documents purchased bidders are only allowed to participate in Pre-Bid meeting.

Registrar,
RGUKT.

Web document

TENDER FORM

Not transferable

Reference. No. RGUKT/Proc/MME/MTL/T38/2013 Dated 09.03.2013

Subject: Invitation of Tenders for Supply, installation and commissioning of Material Testing Lab Equipments to the MME Department at three campuses of RGUKT located at Basara (Adilabad Dist), Nuzvid (Krishna Dist) and RK Valley (YSR Kadapa Dist) of Andhra Pradesh.

Last date and time for submission of the TENDER AT RGUKT, Vindhya-C4, IIIT Campus, Gachibowli, HYDERABAD **is 19.03.2013 up to 4:00PM**

Dear Sir/Madam,

A. RGUKT invites sealed tenders comprising technical bid and price bid separately from reputed manufacturers (or) authorized dealers for its three campuses located at Basara (Adilabad Dist), Nuzvid (Krishna Dist) and R K Valley (Kadapa Dist) of Andhra Pradesh.

B. The Tender form consists of 50 pages of which pages from 7 to 18 are instructions and page No.41 contains the format for financial bid. The duly completed Technical Bid together with a copy of the bid document (this tender) signed on all pages by the Bidders authorized signatory and the Price Bid should be kept in separate sealed covers. These sealed covers must be submitted in a sealed master envelope super scribed "Tender for Supply, Installation & Commissioning of Material Testing Lab Equipments to the MME Department at the three campuses of RGUKT. The last date for submission of bid is **19.03.2013 and closing time is 04:00 PM.**

C. The Sealed Tenders should be deposited in the Tender box kept in the office of Registrar, RGUKT, Hyderabad up to **04:00 P.M. on 19.03.2013.**

For any clarification and further details on the above tender please contact by Telephone No: 040-23001830 or Contact in Person during office hours.

Thanking you

Yours faithfully,

Registrar,
RGUKT.

Web document

STATEMENT OF IMPORTANT LIMITS/VALUES RELATED TO BID

Item	Description
EMD	**Rs. 1,00,000/- by way of Demand Draft from any Nationalised Bank or by way of irrevocable bank guarantee from any Nationalised Bank only. DD/BG from other than Nationalised Banks will not be accepted.**
Bid Validity Period	90 days from the date of opening of Financial bid
EMD Validity Period	90 days from the date of opening of Financial bid
Warranty Period	3 years Comprehensive Warranty
Variation in quantities/number of residents	**± 40 %**
Period for furnishing performance Security Deposit	Within 10 days from date of receipt of award
Delivery Schedule	Bidder shall deliver the goods in one single lot within 30days from the date of award of the contract.
Performance security value	5% of contract value by way of irrevocable Bank Guarantee from any Nationalised Bank
Performance security validity period	38 months from award of contract (including 30 days of installation period)
Period for signing the order Acceptance	Within 7 days from date of receipt of notification of award

Payment terms	
On delivery at user site	Payment for goods and services shall be made in Indian rupees as follows. 1. 80% of payment will be paid after installation, commissioning 2. Balance 20% will be paid after 3 months after obtaining the satisfactory certificate from the Director, RGUKT IIITs.
Maximum Liquidated Damages for late deliveries	For delays:- If the supplier fails to deliver any (or) all of the goods or perform the services within the time period specified in the contract the purchaser shall without prejudice to its other remedies under the contract deduct from the contract price as liquidated damages a sum equivalent to 0.25% of the contract value per day until actual delivery or performance up to a maximum deduction of 10% of the delayed goods or services contract price. Once the maximum deduction is reached, the purchaser may consider the termination of the contract duly forfeiting the performance security etc.,

ELIGIBILITY CRITERIA

5.1. This bid is open to all firms within India who are eligible to do business under relevant Indian laws as in force at the time of bidding, subject to meeting the pre-qualification criterion. They should provide list of customers of previous supply of similar/ same items to IITs, NIT's or Central Universities or any Academic Institute of National repute with contact details. Copies of orders received from the reputed firms on bidding firm need to be submitted.

5.2. The bidder should have servicing facility or work shop with in India so the provision of service is possible at a short notice and without incurrence of delay.

5.3. The Bidding firm should have minimum turnover as follows:

Bid Value offered against the tender call	**Last financial year's business turnover**
Up to 25 lakhs	50 lakhs
More than 25 lakhs	3 crore

The bidder should have adequate experience in supply of such materials as required in the tender. Bidder should furnish proof of having supplied such materials as required in the tender in the previous financial year ending 31st March 2012 as mentioned above . A certificate indicating the Turn Over value details (in Rupees) of subject material, during the financial year 2011-12 (for the year ending 31.03.2012) from a Firm of Chartered Accountants must be enclosed (in original) as a proof for Turnover. The Turn Over of the subject Material must be separately indicated in the certificate.

5.4. The bidder should furnish satisfactory performance certificate from the parties concerned to whom bulk supplies were effected, in case such supplies were made. RGUKT may contact any such parties to elicit details**.**

5.5. Bidder should be registered under VAT Act/CST Act with the relevant State Sales Tax Authorities. He should furnish along with the bid document, the relevant VAT/CST Registration Document and PAN / TAN Card copies.

5.6. All bidders shall also include the following information and documents with their tenders (in the Technical bid cover)

5.6.1. Copies of original documents defining the constitution or legal status, place of registration, and principal place of business of the bidding firm/entity; written power of attorney of the signatory of the Bid to commit the Bidder.

5.6.2. Machinery/equipment owned by the bidder and number of employees.
5.6.3. Latest Income Tax returns and **VAT/ CST** Returns filed.
5.6.4. List of Present Clientele with contact addresses & telephone numbers.

5.7. All the certificates furnished along with technical bids should be attested by a Gazetted Officer, counter signed by bidder along with their seal.

The bidders must submit all relevant documentary evidence to support their claim for eligibility in placing bid. **The tenders received without the above documents will be rejected.**

Requirement of Material Testing Lab equipments

Sl. No	Equipment	Qty for three Centers
1	100 KN HIGH TEMPERATURE UNIVERSAL TESTING MACHINE TO CONDUCT TENSILE AND COMPRESSION TESTS UNDER CONSTANT TRUE STRAIN RATE, CONSTANT STRAIN AND CONSTANT LOAD	3
2	LOW CYCLE FATIGUE: +/- 100Kn CAPACITY SERVO HYDRAULIC TESTING MACHINE	1
3	HIGH CYCLE FATIGUE SYSTEM	1
4	+/- 100Kn CAPACITY SERVO HYDRAULIC TESTING MACHINE	1

1. 100 KN HIGH TEMPERATURE UNIVERSAL TESTING MACHINE TO CONDUCT TENSILE AND COMPRESSION TESTS UNDER CONSTANT TRUE STRAIN RATE, CONSTANT STRAIN AND CONSTANT LOAD.

Scope of the bid

Testing unit for doing, on metals and their alloys, and ceramics,

1. Static tests in axial tension, axial compression and flexure at room temperature

2. High temperature static tests in axial tension, compression, and flexure between 300 to 1000^0C

3. Ambient temperature testing of Fibre reinforced composite panels.

All accessories that are required to completely fulfill the above scope of the system must be quoted.

Specifications

A. 100 kN Capacity Materials Testing System

- High stiffness (frame axial stiffness >110 kN/mm) dual column floor standing electromechanical testing system that can be adjusted to ergonomic working position for the operator (driven by AC servo motor)
- Testing speed range: 0.0001 to 750 mm/min step-lessly adjustable without any limitations including full speed at full load capability.
- Return speed: >1000mm/min
- Vertical Test Space: >1200 mm without Grips
- Industry standard Ethernet interface to the computer for fast, reliable communication with laptop or desktop

- Integrated digital closed-loop control and data acquisition electronics including load measurement, crosshead extension and strain measurement, strain rate channels.
- In addition, two input Sensor Conditioner Cards for additional measurements through transducers.
- Test control panel with results display, start, stop and return functions, programmable function keys, test status indicators, variable speed jog and specimen protection
- 24-bit resolution card with data acquisition rate of minimum 2 kHz simultaneously on load, extension, and strain channels.
- To save energy, the Controller should automatically switch to Eco Mode when not in use
- The controller should have data sampling rate of 400kHz or better.
- Position Measurement Accuracy: Better or equal to ±0.0002 mm
- Load Measurement Accuracy: High precision auto-ranging load cell with very low nominal deformation of less than 0.5mm and accuracy ±1% of reading down to 1/500 of load cell capacity complying with ISO 7500-1
- Strain Measurement Accuracy: ASTM E83 Class B or ISO 9513 Class 1 extensometer
- Automatic recognition of capacity, calibration & safety limits.
- Rigid and play free connection to minimize bending moments
- Must fulfill all 5 criteria according to ISO 7500-1

B. Product Control Panel

- Crosshead Jog with Fine Position to easily maneuver the frame crosshead with speed and precision & The Fine Positioning wheel on the Productivity Panel moves the frame in very small increments, allowing operators to load specimens without the risk of overloading them.
- Quick Start/Stop Buttons: for total control over testing with quick start and stop buttons. Users will have the ability to load a specimen and start a test without the use of a PC.
- Protection of specimen and fixtures:
- Machine should have the capability of automatically adjusting the crosshead without damaging the specimen while gripping before the test commences.
- Prevent overloading of specimens, fixtures, and load cells during crosshead adjustment

C. Mechanical Wedge action Grips:

- Simple, safe and quick operation, robust gripping system.
- Suitable for testing at room temperature the flat specimens up to12mm thickness, and round specimens up to 12 mm in diameter

- Capacity: 100 kN. Suitable for a large variety of materials.
- Where grips become heavy, means of fixing and removing them should be provided .

For Flat specimens: Separate sets of jaw inserts for flat specimens of thickness 0.5 to 12 mm

For Round specimens: Separate sets of jaw inserts for round specimens of diameter 4 to 19 mm

D. Compression anvils : 150mm diameter
Three point bend fixture with 10mm upper and lower rollers,

- Capacity 100kN.
- Maximum specimen width 50mm,
- Load span adjustable load span between 30 to 250mm

E. For high temperature testing

- 3 point/4point flexure test kits for testing up to 1200^0C
- Compression test kit for testing up to 1200^0C

F. High-temperature furnace:
3-Zone High temperature furnace for determination of elastic behavior, Plastic behavior at elevated temperature in air.

- Min. temperature: 300°C
- Max. temperature: 1200°C
- Maximum heating rate: 20 °C/min
- Nominal power: 3.6 kW
- Nominal voltage: 3 x 240 V
- Heating zones: 3
- Temp. Constancy: < ± 2K
- Constancy zone: 200 mm
- Inner diameter: ~100 mm
- Heated length/zone: ~300 mm
- Temperature tolerance at the specimen at a length of 100 mm shall be ± 2K
- Temperature constancy at the specimen shall be ± 2K (according ASTM 139)
- 3 channel PID controller with connection for 6 thermocouples (3 thermocouples for the
- Heating zones of the furnace and 3 thermocouples for the specimen)
- Ability for digital display of temperature from all 6 thermocouples on monitor.
- Interface for connection to the software
- It may have cut-out for insertion of gauges
- Swivel unit for furnace
- High-temperature specimen holders that can withstand the above load capacity

- High Temperature pin mounting grips for flats and round specimens: Pair of high temperature pin mounting grips made of Inconel-713C or equivalent) for flat specimens, for testing specimens up to 5 mm thickness. ,
- The temperature controller should automatically set the control parameters for even temperature distribution along specimen and preventing temperature overshoots. Therefore there is no need for setting the PID factors by empirically established means for various temperatures.It has to be provided in a standalone cabinet to house the controls, electronics, and cabling connections

G. Strain Gauge Extensometer & Strain Card
   - Strain Gauge Extensometer, 25 mm gauge length, +-20% maximum strain.
   - Strain gage extensometer, 25mm gauge length, ±40% maximum strain
   - A separate extensometer to work in the operating temperature range of 200°C - 1000°C should be quoted.
   - Two additional sensor Conditioner Cards that should provide closed loop control and data acquisition capability for transducers.

Optionally a high-resolution digital extensometer may be quoted for our consideration.

- Digital extensometer with freely selectable Gauge lengths from 10 to 100 mm to suit the various test standards
- The extensometer arms must close automatically at start of test and open at sample break
- The resolution of the extensometer must be better than or equal to 0.03 µm
- The gauge length must be automatically set as required by operator or according to the formula according to standards
- The extensometer must also be able to measure compressive and bending deflections
- Sensor Conditioner Card that should provide closed loop control and data acquisition capability for transducers.
- It should be possible to add an automatic digital transverse extensometer for measuring the r- value across the entire width of the sample.

H. Compression anvils for compression testing at elevated temperatures
   Compression fixture adapter + compression platens, 100kN diameter, 50mm+ LVDT deflection sensor ±15mm

I. Advanced Material Testing Software:
   - The software package should meet the needs of a wide variety of applications (ex: Metals including strips wires etc.).It should offer precongirued test methods and the support documentation.
   - Should have the capability for tension, compression, flexure, tear, adhesion, and test control based on extension, load or strain (per ASTM E8,ASTM E370, ASTM E517,ASTM 646, ASTM E 345, ASTM 615, ASTM E21, ASTM F 2516)

- The software should have the capability to save the test method along with the start position, limit positions etc. so that the machine automatically comes to the start position for testing when the file is opened.
- To create customized reports that can be linked with test methods and used to export test results
- To import ASCII data from NPL UK into the test software as a means of verification
- The software must have three levels of user access based on user login name and password protection.
- The software shall allow a user to configure a specific transducer (such as load cell or extensometer) and link it with a specific method such that the method will require that the specific transducer is used. If a different transducer is connected when a test is run with that method, the test will not run.
- It should be possible to export the raw data and the test data channels by a single mouse click into Excel or Word etc.
- The software must have the safety inspection square concept, which will help in fast and secure set up by description of the set test. Operator-independent security through the position-controlled system with the continuous backup of the current crosshead position in electronics. This means that the operator, when conversion of tools no longer have to worry about the settings!
- Preferably, testing software should have an "Education Module" to teach the students various testing configurations, virtually.

J. Computer and peripherals:-

A standard PC from the local market may be provided.

K. Explicit Need:

- Compliance to ASTM E8 Methods A&B and ISO 6892-1 Method A Strain control in closed loop with extensometer.
- The machine should perform tests in accordance to the above requirements in addition to the normal standards and the strain rate should be displayed.

L. Spare parts and toolkits

- The tool kit shall contain all tools required for handling the components of the system e.g., mounting and un-mounting of furnaces, grips, fixtures, and subsystems
- Essential and recommended Spare Parts for three years of trouble-free operation.

M. Calibration

- Force verification up to ±100kN at installation, Required accuracy is 0.5% down to 1% of force capacity
- Actuator stroke verification at no load to an accuracy of 1.0% of full scale.
- Strain verification of the dynamic extensometer

N. Installation, Training and Support
Installation shall be performed at user site by the trained service engineer/representative from manufacturer. Qualified personnel shall train the user's representatives on working, set up of the electrical and mechanical, hydraulic subsystems, mounting, un-mounting of grips, fixtures, furnace and other accessories, calibration and tuning of load cells, extensometers, strain gages, controllers, any adjustments there off, safety procedures and system interlocks, and usage of software, testing procedures, creating the templates for modified test procedures, on test data handling, and report generation.

O. User list:
Vendors should have supplied these advanced systems to reputed laboratories/ Institution of National Importance in India and the user list needs to be provided.

P. Compliance Statement:
Vendors must provide a compliance statement (point wise) along with the quote.

Q. Freight & Insurance –
The applicable freight on-board, insurance and the delivery charges to Hyderabad Airport shall be clearly indicated. Indicate separately the cost for CIP & CIF (ICD), Hyderabad

R. Warranty
The quote for the system shall include a three year period of Comprehensive warranty from the date of installation.

2. LOW CYCLE FATIGUE: +/- 100kN CAPACITY SERVO HYDRAULIC TESTING MACHINE

(For testing at ambient and high temperatures)

Scope

This system shall be used to test (1) Low cycle fatigue properties of metals and alloys under ambient and high temperatures up to 700^0C. (2) Static tension, compression and flexure properties under ambient conditions of metals, their alloys, and ceramics, (3) Ambient temperature testing of static mechanical properties of Fibre composite specimens.

Features

- System shall be a Floor mounted, twin column, servohydraulic system designed maximum fatigue rated capacity of ±100kN. .
- It shall have axial actuator with hydrostatic bearings and with a total actuation of ≥75mm.
- It shall have ±100kN rated dynamic load cell with integral accelerator for inertial mass compensation
- There shall be servo-valves, manifolds, and actuator of adequate capacity

- ❖ Control electronics comprise of Personal Computer and console software which shall allow tests to be performed under a choice of either displacement, load or strain control. It should include features such as automatic loop shaping, adaptive control and amplitude control to ensure greater test accuracy. Control Software should provide full system control from the PC - Including waveform generation, calibration, and limit set up; status monitoring
- ❖ There shall be an operator panel to provide a supplementary manual user interface to the controller
- ❖ System shall comprise of 50mm diameter fatigue rated compression platen and fatigue rated bend fixture or 100kN dynamic capacity, with 25mm diameter rollers

A. Essential requirement
All accessories that are required to completely fulfill the above scope of the system must be quoted.

B. Controller specifications:

- Adaptive Control System, shall allow continuous update of PID terms at 1 kHz, eliminating the need for operator set-up and automatically compensating for specimen stiffness changes.
- 5 kHz control loop update, and continuous synchronous data acquisition at 5 kHz on all channels
- Advanced sensor technology should provide 19 bit data resolution across the complete span of the sensor
- Mixed-mode control technology allowing advanced bi-modal and tri-modal control techniques to be used.

C. Load cell: +/- 100kN Capacity with accelerometer on the load axis.
Fatigue life of the unit should be 109 full stress reversed cycles at 100kN. Overload capability of 300% before mechanical failure of the cell. Dynamic inertia compensation is essential for the cell.
Machine capability to include manual Crosshead Clamps and Hydraulic Lifts: shall enable user to adjust the upper crosshead position by means of the hydraulic crosshead lifting cylinders which are operated using the hydraulic hand pump.

D. Frame
Daylight & width of Machine: Maximum Daylight between crosshead to platen: 1200mm minimum & width between columns ≥575 mm.

Voltage: Mains Supply Voltage 240V.

E. Hydraulic power pack : variable displacement type, provided with orprotection devices for temperature, oil pressure, oil level, typically 250 to 300l capacity

F. Hydraulic wedge grips and Jaws
  - o These shall be suitable for flat and round specimens. They should provide an accurate centering of specimen in the load train.

- These should be suitable for tension and compression and reversible fatigue loading
- Should come with a suitable high pressure hydraulic grip controller and manifold
- Serrated jaws should facilitate gripping both flat and round specimens.

G. 1000°C Three-Zone Split Furnace for Low Cycle Fatigue Testing:

Furnace shall include:

- ~90mm bore diameter,
- Three-zone split resistance furnace configuration with durable embedded heating elements
- 1000 °C nominal maximum specimen temperature
- 300 - 600 °C nominal minimum specimen temperature
- High efficiency insulation (refractory ceramic fiber free)
- Extensometer cut-out
- Power rating ~3kW
- Should also include side port insulation plug for blanking extensometer slot
- Temperature control system shall feature reliable high quality temperature controllers in a master-slave configuration capable of following a single ramp to set-point. Should include indicator configured as an over- temperature alarm. This should have the capacity to be reconfigured for use with customer-supplied specimen thermocouple to indicate specimen temperature. An RS232 interface for temperature control/logging via software needs to be provided.
- All necessary furnace mounting brackets shall be provided.

H. Reverse Stress Pull-rods:
   - Vendor to provide reverse stress pull rods capable of withstanding 1000 ^{0}C and shall also contain specimen holders for specimens with M20, M16 threaded ends, water cooled adaptor and alignment rings.

I. High temperature strain gauge extensometer & Strain Channel: Suitable for use up to 1000^{0}C in resistance furnace with 25mm gauge length +10% -5%. Shall be provided with Spare Alumina Rods with Vee-Chisel point to suit round specimens, and spare ceramic cords with 10 pairs of spring assemblies.

   Strain Channel shall operate on closed-loop control and data acquisition shall be carried with transducer of the following features:
   - Data resolution of 19 bits across the entire span of the transducer.
   - Automatic transducer recognition and calibration for transducers.
   - 32 bit waveform generation.
   - Data acquisition rates up to 5kHz.
   - User selectable signal filters from 100Hz to 1kHz in increments of 1/1000Hz.

J. Alignment fixture Electronics & software:
   - 100 kN Alignment Fixture to be mounted between the load cell and crosshead to provide full angularity and concentricity adjustment with load cell fully pre-loaded.

   The software and electronics for measurement of specimen bending - software to perform graphical display and test report generation for validation of testing system

alignment. Electronics to perform strain gage conditioning, bridge completion, and data acquisition.

(Strain-gaged Alignment Cell, 8 gages, 10mm dia.)

K. Softwares:

Basic: - All controller set up functions such as Specimen Protect, transducer calibration, limits, control loop settings (PID´s) and calculated ("Modal") control channels shall be incorporated.

- System status displays indicating current control mode, limits, wave form generator, transducer calibration and hydraulics/power
- Auto Tuning Wizard to perform automatic set up of control loop PID values
- Loop tuning tool with fast-refresh digital scope to facilitate manual setting and adjustment of control loop PID values
- Multiple digital Live Displays of transducer values and cycle/time counters that can be rearranged and resized, with setup save/recall from computer disk.
- Waveform control (start/pause/stop at specified cycle count) to run simple fatigue tests
- Data acquisition software for up to four transducers, with data storage to computer disk at rates up to 5kHz continuous and one real time graph
- Comprehensive on-line help system
- Static materials testing software using windows GUI with the functionality of doing (i) tests in tension, compression, flexure (ii) to control crosshead movement as afunction of load, strain, true strain and stress, (iii) cyclic tests, (iv) report generation and graphing

L. Low Cycle Fatigue Testing Software: To provide system control, data acquisition, real-time graphs, calculation of results, storage of data to disk, and post-test graphs and reports in accordance with the relevant sections of ASTM E606-04, BS 7270 (2006), and ISO 12106 (2003).

M. Features shall include:

- Fatigue tests to be run in controlled axial strain, plastic strain or stress control

- Test method editor allowing for simple test method creation and recall

- Support of rectangular, cylindrical and tubular specimens

- Automatic calculation of Modulus within user specified limits

- Temperature control and monitoring

- Automatic adjustment of gauge length when at test temperature

- Support of Sine, Triangular and Trapezoidal waveforms

- Ability to perform stress controlled run-out tests at up to 50Hz

- Selectable specimen break criteria to accurately pinpoint specimen failure

- Combined linear, logarithmic and peak interval data logging

- Review of summary data

- User configurable run-time screen capable of displaying results fields and up to 3 graphs.

- Ability to stop and re-start test at any point, with modulus checking as required.

- Off-line analysis with user configurable trend and hysteresis plots.

- Export of graphs and test data.

N. Dynamic Testing Software: Should provide users the ability to define and run tests, and to acquire data for a wide range of dynamic and quasi-static applications. Tests can range from simple single-axis ramps and repetitive waveforms.
   - Test methods shall be quickly and easily constructed using a series of steps within a matrix structure, allowing the user full control over waveform shape, control mode, data logging and test progress. Test results are to be automatically grouped together within a logical project structure allowing quick access to the data files and batch transfer of results.

O. Features to include:
   - Capable of 1ms inter-block transfer time from one step in the sequence to the next
   - Trend monitoring function - a change in max, min, mean or amplitude from a user defined reference cycle can be used to control test flow or end test
   - Amplitude control to correct for peak errors in a cyclic waveform
   - Supported waveform types; sine, triangle, square, holds, ramps, trapezoidal, user defined turn points files, and sample data playback
   - Mixed mode control on cyclic waveforms
   - User defined events to control test progress
   - The ability to automatically balance extensometers and derived position channels at any stage of the test
   - Up to four real time graphs; X-Y, Double Y, Trend, Multi-channel, chart recorder
   - Single and nested looping of steps
   - Advanced Data Reduction; either on time basis or change in channel value.
   - Extensive data logging; per cycle data (max /min /amplitude /mean level), full hysteresis data, or both combined; at linear, logarithmic, change in value or user defined intervals
   - Data storage to computer disk in ASCII format at rates up to 5kHz synchronous
   - Ability to pause and resume a test, either immediately or at some point in the future
   - Control of digital and analogue outputs
   - Waveform start and stop enveloping
   - Tracking and Peak & Trend Live Displays

P. Potential drop measurement unit for rate of crack growth studies.

Q. Computer
   Minimum Specification that needs to be supplied as follows:

- Processor (2.66 GHz, 4 MB,1333 MHz) , Vertical Chassis Orientation (ATX)
- 8GB DDR2 667 ECC Dual Channel Memory (2x1GB) ,500GB HDD(7,200rpm), SATA2 Hard Drive , 16X DVD+/-RW , 256MB PCIe x16 nVidiaQuadro NVS 290 (ULGA8), Dual Monitor DVI or VGA Graphics Card, Internal Speaker - 1 x Integrated Ethernet Port and 1 x Ethernet PCI-E Network Card (for use with Ethernet Frame Interface) ,- 3 PCI Slots (2 full length, 1 short length)
- - 1 free PCI Express Slots ,- 2 Button USB Scroll Optical Mouse ,- 22 in Wide Screen Flat Panel Monitor , Printer - Color laser HP
- -to be Supplied with Microsoft Windows 8 operating system

R. - Spare parts and toolkits

S. The tool kit shall contain all tools required for handling the components of the system e.g., mounting and un-mounting of furnaces, grips, fixtures, and subsystems

T. Essential and recommended Spare parts for three years of trouble-free operation.

S. Calibration

- Force verification up to ±100kN at installation, Required accuracy is 0.5% down to 1% of force capacity
- Actuator stroke verification at no load to an accuracy of 1.0% of full scale.
- Strain verification of the dynamic extensometer

T. Isolation mounts : These must be supplied to facilitate testing above 15Hz.

U. Installation, Training and Support

Installation shall be performed at user site by the trained service engineer/representative from manufacturer. Qualified personnel shall train the user's representatives on working, set up of the electrical and mechanical, hydraulic subsystems, mounting, un-mounting of grips, fixtures, furnace and other accessories, calibration and tuning of load cells, extensometers, strain gages, controllers, any adjustments there off, safety procedures and system interlocks, and usage of software, testing procedures, creating the templates for modified test procedures, on test data handling, and report generation.

V. User list: Vendors should have supplied these advanced systems to reputed laboratories/ Institution of National Importance in India and the user list needs to be provided.

W. Compliance: Vendors must provide a compliance statement (point wise) along with the quote.

X. Freight & Insurance – The applicable freight on-board, insurance and the delivery charges to Hyderabad Airport shall be clearly indicated. Indicate separately the cost for CIP & CIF (ICD) 1., Hyderabad

Y. The quote for the system shall include a three year period of Comprehensive warranty from the date of installation.

3. SPECIFICATIONS FOR HIGH CYCLE FATIGUE SYSTEM

1. Details of Load Frame

- Fully integrated 25 kN servo-hydraulic test system with standalone load frame assembly
- Configuration: Load-frame with manually moveable top crosshead and actuator mounted on bottom platen supported on base frame enclosing pump and controls.
- Noise during routine operation not to exceed 65-70 dB
- Power: Single phase 220V only, 3-phase supply unacceptable
- Load frame - 2 column, 25 kN dynamic capacity
- Column spacing - ~400 mm
- Column diameter - 40 mm
- Vertical daylight - ~700 mm

2. Servo-Hydraulic Actuator Assembly

- 25 kN fatigue rated double acting, double ended, equal area actuator with an integrated manifold, anti rotate fixture and a monolithic piston design.
- Inline mounted LVDT for displacement measurement of actuator
- Actuator manifold mounted with servo valve of suitable capacity, and accumulators
- Total stroke: 50 mm

3. Fatigue rated load cell

- 25 kN dynamic capacity
- Static capacity : 150% of rated capacity
- Precision machined shear-web type design for protection against side loads and high stiffness
- Fitted with 350 Ohm precision transducer class strain gauges)
- Conditioner including the shunt calibration
- Linearity : 0.3% of full scale
- Accuracy: 1% of readout
- Resolution : 0.05% of full range

4 Servo Hydraulic Power pack

- Contamination insensitive servo-hydraulic power pack of 3.8 LPM flow, 210 bar, 1.5 kW system operating on single phase AC supply

- Variable frequency drive based control hardware to achieve required combination of flow and pressure from hydraulic power pack with suitable gear pump.

- Relief valve to limit system pressure and electrically adjustable pressure regulation to set pressure from zero to 210 bar. Shall be incorporated with trip protection against over temperature, low oil level, filter clogging, phase failure and motor overload safety interlock.

- Remote or local power pack operation with suitable return line filter, Pressure transducer for power pack pressure sense and temperature sensor.

- Radiator based natural air-oil cooling unit for 4 LPM HPS

5. Digital Servo Controller

- High performance 32-bit controller integrated into test system and compatible with off-the-shelf notebook personal
- Computers running MS-Windows and USB interface preferred.
- Stroke, load and strain signal conditioners with 32-bit data acquisition at up to 7.5 kHz.
- 32 bit servo loop update at up to 8 kHz.
- Auto calibration for all strain channels
- Mother board with stroke/high level, load, strain & encoder channels - 1 each
- Digital IO including pump control and sense - 8
- D - A output - 2 Channels
- External cable set (for 3 transducers, one servo)
- Suitable software

6. Computer Specifications:

- Laptop of latest high end specification .
- Microsoft Windows XP Professional operating environment and MS-Office basic edition.
- All required cabling must be provided with supply.
- Accessories shall be quoted separately.

7. Accessories for High Temperature HCF/LCF Testing

- High Temperature Three Zone Box Type Furnace capable of operating up to $\geq 1000^0$C
- Dimensions Internal: ~8" W x ~8" D x ~12" H
- Temp Accuracy better than or equal to ± 2 deg. C
- Power Capacity: 5800 Watts / 25 Amps @ 230 VAC, 1Ph, 50 Hz.
- Thermocouple: K type and connector with mounting port
- Quartz Glass view port of 100 x 100 mm dimensions for viewing the specimen during tests
- Shall include mounting brackets on to the material test system
- Furnace Controller: Digital furnace control system with PID Control
- Standalone unit

- Heating rate up to 15 deg. C/min
- Temperature accuracy ± 2 deg. C

8. High temperature Mechanical LCF grip assembly

- Force rating: up to 25 kN, Operating temperature: up to 900 deg. C
- Manual lockable and self aligning, Zero backlash,
- Light weight and easily mountable without special tools
- shall include High temperature mounting cups for testing
- M8 & M10 threaded specimens
- One set of spiral washer for positive locking of grip on actuator and load cell side.
- Water cooling unit for grip cooling complete with hoses and pump

9. High Temperature Axial Extensometer Specifications:

- Gage length: 12.5 mm, Measuring range: +/-1.5 mm
- General purpose extensometer for axial tensile, compression and cyclic testing
- Strain gauged devices, making them compatible with any electronics designed
- Temperature Range: up to 900 degree C
- Cable: Ultra-flexible cable, 2.5 m standard

10. Test Control software for HCF and LCF testing according to

- ASTM E 466 and ASTM E 606 respectively

11. Grip-hoist- where necessary

12. Spares:

Essential recommended Spare Parts for three years of trouble-free operation.

13. Installation, commissioning & training:

System Installation, System commissioning & software training to be done by factory trained Service Engineer, at RGUKT's Installation site, for two weeks at no extra cost.

14. Load cell & extensometer calibration:

Both the load cell & extensometers needs to be calibrated during Installation.

15. User list:

Vendors should have supplied these systems, in the last three years, to reputed laboratories/ Institution of National Importance in India and the user list needs to be enclosed.

16. Compliance:

Vendors must provide a compliance statement (point wise) along with the quote.

17. Freight & Insurance –

The applicable freight on Board, insurance and the delivery charges to Hyderabad Airport shall be clearly indicated. Indicate separately the cost for CIP & CIF (ICD), Hyderabad

18. Warranty : The system quoted shall have three years of comprehensive warranty.

4. +/- 100kN CAPACITY SERVO HYDRAULIC TESTING MACHINE

(forFracture testing at ambient and high temperatures)

Scope

This system shall be used to test (1) Fracture mechanical properties of metals and alloys, ceramics under ambient and J_{IC} testing up to 650^0C. (2) Static tension, compression and flexure properties under ambient conditions of metals, their alloys, and ceramics. (3) Ambient temperature testing of static mechanical properties of Fibre composite specimens.

Features

- System shall be a Floor mounted, twin column, servohydraulic system designed maximum fatigue rated capacity of ±100kN. .
- It shall have axial actuator with hydrostatic bearings and with a total actuation of ≥50 mm.
- It shall have ±100kN rated load cell with integral accelerator for inertial mass compensation
- There shall be servo-valves, manifolds, and actuator of adequate capacity
- Control electronics comprise of Personal Computer and console software which shall allow tests to be performed under a choice of either displacement, load or strain control. It should include features such as automatic loop shaping, adaptive control and amplitude control to ensure greater test accuracy. Control Software should provide full system control from the PC - Including waveform generation, calibration, and limit set up; status monitoring
- There shall be an operator panel to provide a supplementary manual user interface to the controller
- System shall comprise of bend fixture of 100kN dynamic capacity, with 25mm diameter rollers

A. Essential requirement

All accessories that are required to completely fulfill the above scope of the system must be quoted. e.g., Fatigue pre-cracking unit of fracture mechanics specimen.

B. Controller specifications:

- Adaptive Control System, shall allow continuous update of PID terms at 1 kHz, eliminating the need for operator set-up and automatically compensating for specimen stiffness changes.
- Double acting hydraulic servo-actuator with a force capacity of 100kN

- 5 kHz control loop update, and continuous synchronous data acquisition at 5 kHz on all channels
- Advanced sensor technology should provide 19 bit data resolution across the complete span of the sensor
- Mixed-mode control technology allowing advanced bi-modal and tri-modal control techniques to be used.
- Servo valves: 40l/m or 65l/m
- Actuator Stroke 150mm
- Maximum Cross head speed : ~1000mm/min
- Hydraulically powered lifts and locks

C. Load cell: +/- 100kN Capacity with accelerometer on the load axis. Self identifying type
Machine capability to include manual Crosshead Clamps and Hydraulic Lifts: shall enable user to adjust the upper crosshead position by means of the hydraulic crosshead lifting cylinders which are operated using the hydraulic pump.

D. Frame
Daylight & width of Machine: Maximum Daylight between crosshead to platen: >1200mm
minimum& width between columns ≥575 mm.
Voltage: Mains Supply Voltage 240V.

E. GripHoist –Capacity 250kg for lifting accessories

F. Hydraulic wedge grips and Jaws (±100kN)
   - These shall be suitable for flat and round specimens. They should provide an accurate centering of specimen in the load train.
   - These should be suitable for tension and compression
   - Should come with a suitable high pressure hydraulic grip controller and manifold
   - Serrated jaws should facilitate gripping both flat and round specimens.

G. Fracture mechanics grips
   - Fracture mechanics grips and crack measuring sensors for 25mm thick CT specimen
   - Fracture mechanics grips and crack measuring sensors for 50mm CT specimen
   - High temperature Clevis grips for CT specimen 12.5mm Thick specimen
   - 3-point bend fixture capacity 100kN
   - COD gauge (ASTM E399-09)– Gauge length 5mm, axial travel 2mm; 10mm gauge, 4mm travel
   - 100mm diameter compression fixture
   - Adapters for clevis grips

H. Globally compliant safety features in the system

I. 1000°C Three-Zone Split Furnace for Fracture mechanical parameter Testing:
Furnace shall include:

- ~ bore diameter to suit testing of J_{IC} tests at higher temperatures
- Three-zone split resistance furnace configuration with durable embedded heating elements

- 1000 °C nominal maximum specimen temperature
- Up to 700 °C nominal working specimen temperature
- High efficiency insulation
- Extensometer cut-out
- Power rating ~3kW
- Temperature control system shall feature reliable high quality temperature controllers in a master-slave configuration capable of following a single ramp to set-point. Should include indicator configured as an over- temperature alarm. This should have the capacity to be reconfigured for use with customer-supplied specimen thermocouple to indicate specimen temperature. An RS232 interface for temperature control/logging via software needs to be provided. Temperature controller for the furnace shall be provided in a standalone cabinet to house the controls, electronics, and cabling connections.
- All necessary furnace mounting brackets shall be provided.

J. Pull-rods:
   - Vendor to provide pull rods capable of withstanding 1000 ^{0}C and shall also contain specimen holders for specimens with M20, M16 threaded ends, water cooled adaptor and alignment rings.

K. Strain gauge extensometer : 25mm gauge length +10% -5%.
   Strain Channel shall operate on closed-loop control and data acquisition shall be carried with transducer of the following features:
   - Data resolution of 19 bits across the entire span of the transducer.
   - Automatic transducer recognition and calibration for transducers.
   - 32 bit waveform generation.
   - Data acquisition rates up to 5kHz.
   - User selectable signal filters from 100Hz to 1kHz in increments of 1/1000Hz.

L. DC Potential drop measurement unit for Crack growth measurements.

M. Alignment fixture Electronics & software:
   - 100 kN Alignment Fixture to be mounted between the load cell and crosshead to provide full angularity and concentricity adjustment with load cell fully pre-loaded.

   The software and electronics for measurement of specimen bending - software to perform graphical display and test report generation for validation of testing system alignment. Electronics to perform strain gage conditioning, bridge completion, and data acquisition.

   (Strain-gaged Alignment Cell, 8 gages, 10mm dia.)

N. Softwares:

Basic: - All controller set up functions such as Specimen Protect, transducer calibration, limits, control loop settings (PID´s) and calculated ("Modal") control channels shall be incorporated.

- System status displays indicating current control mode, limits, wave form generator, transducer calibration and hydraulics/power
- Auto Tuning Wizard to perform automatic set up of control loop PID values

- Loop tuning tool with fast-refresh digital scope to facilitate manual setting and adjustment of control loop PID values
- Multiple digital Live Displays of transducer values and cycle/time counters that can be rearranged and resized, with setup save/recall from computer disk.
- Waveform control (start/pause/stop at specified cycle count) to run simple fatigue tests
- Data acquisition software for up to four transducers, with data storage to computer disk at rates up to 5kHz continuous and one real time graph
- Comprehensive on-line help system
- Static materials testing software using windows GUI with the functionality of doing (i) tests in tension, compression, flexure (ii) to control crosshead movement as a function of load, strain, true strain and stress, (iii) cyclic tests, (iv) report generation and graphing

O. Fracture Mechanics Testing Software: To provide system control, data acquisition, real-time graphs, calculation of results, storage of data to disk, and post-test graphs and reports in accordance with the relevant sections of ASTM 399, ASTM E1820, and ISO 12106 (2003). Crack propagation (da/dN) software for machine control and data acquisition for tests of ASTM E647-08. Crack length is measured by compliance, AC Potential Drop, or DC Potential Drop techniques.

P. Features shall include:

- Test method editor allowing for simple test method creation and recall

- Support of Fracture mechanics standard test geometries.

- Automatic calculation of Modulus within user specified limits

- Temperature control and monitoring

- Automatic adjustment of gauge length when at test temperature

- Support of Sine, Triangular and Trapezoidal waveforms

- Selectable specimen break criteria to accurately pinpoint specimen failure

- Combined linear, logarithmic and peak interval data logging

- Review of summary data

- User configurable run-time screen capable of displaying results fields and up to 3 graphs.

- Ability to stop and re-start test at any point, with modulus checking as required.

- Off-line analysis with user configurable trend and hysteresis plots.

- Export of graphs and test data.

Q. Dynamic Testing Software: Should provide users the ability to define and run tests, and to acquire data for a wide range of Fracture mechanical (K_{IC}, J_{IC}, COD,)and quasi-static applications.

- Test methods shall be quickly and easily constructed using a series of steps within a matrix structure, allowing the user full control over waveform shape, control mode, data logging and test progress. Test results are to be automatically grouped together within a logical project structure allowing quick access to the data files and batch transfer of results.

R. Features to include:
- Capable of 1ms interblock transfer time from one step in the sequence to the next
- Trend monitoring function - a change in max, min, mean or amplitude from a user defined reference cycle can be used to control test flow or end test
- Amplitude control to correct for peak errors in a cyclic waveform
- Supported waveform types; sine, triangle, square, holds, ramps, trapezoidal, user defined turn points files, and sample data playback
- Mixed mode control on cyclic waveforms
- User defined events to control test progress
- The ability to automatically balance extensometers and derived position channels at any stage of the test
- Up to four real time graphs; X-Y, Double Y, Trend, Multi-channel, chart recorder
- Single and nested looping of steps
- Advanced Data Reduction; either on time basis or change in channel value.
- Extensive data logging; per cycle data (max /min /amplitude /mean level), full hysteresis data, or both combined; at linear, logarithmic, change in value or user defined intervals
- Data storage to computer disk in ASCII format at rates up to 5kHz synchronous
- Ability to pause and resume a test, either immediately or at some point in the future
- Control of digital and analogue outputs
- Waveform start and stop enveloping
- Tracking and Peak & Trend Live Displays

S. Computer

Minimum Specification that needs to be supplied as follows:

- Processor (2.66 GHz, 4 MB,1333 MHz) , Vertical Chassis Orientation (ATX)
- 8GB DDR2 667 ECC Dual Channel Memory (2x1GB) ,500GB HDD(7,200rpm), SATA2 Hard Drive , 16X DVD+/-RW , 256MB PCIe x16 nVidiaQuadro NVS 290 (ULGA8), Dual Monitor DVI or VGA Graphics Card, Internal Speaker - 1 x Integrated Ethernet Port and 1 x Ethernet PCI-E Network Card (for use with Ethernet Frame Interface) ,- 3 PCI Slots (2 full length, 1 short length)
- - 1 free PCI Express Slots ,- 2 Button USB Scroll Optical Mouse ,- 22 in Wide Screen Flat Panel Monitor , Printer - Color laser HP
- -to be Supplied with Microsoft Windows 8 operating system

T. - Spare parts and toolkits

5. The tool kit shall contain all tools required for handling the components of the system e.g., mounting and un-mounting of furnaces, grips, fixtures, and subsystems

6. Essential and recommended Spare Parts for three years of trouble-free operation.

U. Calibration
   - Force verification up to ±100kN at installation, Required accuracy is 0.5% down to 1% of force capacity
   - Actuator stroke verification at no load to an accuracy of 1.0% of full scale.
   - Strain verification of the dynamic extensometer

V. Isolation mounts : These must be supplied to facilitate testing above 15Hz.

W. Installation, Training and Support
   Installation shall be performed at user site by the trained service engineer/representative from manufacturer. Qualified personnel shall train the user's representatives on working, set up of the electrical and mechanical, hydraulic subsystems, mounting, unmounting of grips, fixtures, furnace and other accessories, calibration and tuning of load cells, extensometers, strain gages, controllers, any adjustments there off, safety procedures and system interlocks, and usage of software, testing procedures, creating the templates for modified test procedures, on test data handling, and report generation.

X. User list: Vendors should have supplied these advanced systems to reputed laboratories/ Institution of National Importance in India and the user list needs to be provided.

Y. Compliance: Vendors must provide a compliance statement (point wise) along with the quote.

Z. Freight & Insurance – The applicable freight on-board, insurance and the delivery charges to Hyderabad Airport shall be clearly indicated. Indicate separately the cost for CIP & CIF (ICD), Hyderabad

A1. The quote for the system shall include a three year period of Comprehensive warranty from the date of installation.

7. General Requirements & Qualification Criteria

- Bidding Firm offering the product should have ISO 9001 Accreditation certification.
- Bidding Firm, offering the product, should have supplied similar type of test systems for a several years to government establishments, defense organizations & National higher learning institutions like IITs, IISC etc., in India
- Bidding Firm offering the product should submit list of supplies made by it, during last two years with complete contact details of the end users such as phone number, fax number, e-mail ID etc. It should submit copies of order

placed by such organizations and user certificates for goods of same/similar nature.

- Bidding Firm offering the Product should have a Local Service Support Facility, preferably in Hyderabad, and should submit address and contact details
- Bidding Firm should give an Undertaking that, un interrupted service support will be given for a minimum period of 10 years with unbroken availability of spares supply.
- Bidding Firm should give an undertaking that, the Software upgrades if any, during the warranty period of three year, should be supplied free of charge
- Bidding Firm should offer pre-dispatch inspection free of charge at their factory premises for 2 users for 3 days and post installation training at our three laboratories in different campuses to 2 users for 5 days.

Web document

NOTE

A complete set of bidding documents may be purchased by interested bidders from the RGUKT contact person upon payment of the bid document price which is non-refundable. Payment of bid document price should be by demand draft drawn from any Nationalized Bank only in favour of "Registrar, Rajiv Gandhi University of Knowledge Technologies" and payable at Hyderabad (India).

- **Tender documents purchased bidders are only allowed to participate in Pre-Bid meeting.**