Request for Quotation (RFQ) for the supply and installation of a 100 kN Capacity Universal Composites Testing Machine (Tensile Tester) to the CSIR for the Composites Innovation Centre (CIC) at Tshwane University of Technology (TUT) in Pretoria

Request for Quotation number: 9120/18/01/2019

Date of issue	14/12/2018
Submission closing date and time: Queries closing date and time:	18/01/2019 11/01/2019
Contact details and submission of quotations is via email only to:	tender@csir.co.za
Category	Computer Equipment
Business hours	08:00 – 16:30

1 INVITATION FOR QUOTATION

Quotations are hereby invited for the supply and installation of a 100 kN Capacity Universal Composites Testing Machine (Tensile Tester) to the CSIR for the Composites Innovation Centre (CIC) at Tshwane University of Technology (TUT) in Pretoria.

2 QUOTATION REQUIREMENTS

1x 100 kN Capacity Universal Composites Testing Machine

I. GENERAL

- The testing instrument shall consist of a 100kN capacity electromechanical load frame, a load weighing system, and software for machine control, data

acquisition and data manipulation. All of these components must be fully integrated and supported by the vendor.

- The system should be designed for ambient composites testing but should be modular and expandable to allow for future non-ambient testing via a temperature chamber between the 2 columns – an extra height testing frame should be included should this be a requirement for a future temperature chamber.
- All accessories included should therefore have a minimum temperature range of -80°C to +200°C to allow for use within the temperature chamber in the future.
- The system should be designed to allow for composites tensile testing according to the latest ASTM and ISO standards and should allow for future NADCAP certification if required.

II. MATERIAL TESTING SYSTEM SPECIFICATIONS

This unit shall integrate the following major sub-systems into a complete operating system. The major sub-systems and their specifications are:

A. LOADING FRAME

1. The dual column-loading frame shall be capable of tension, compression, flexure, shear, and reverse stress testing.
2. The frame should have an extra height configuration which allows for the addition of a temperature chamber in the future.
3. The moving crosshead will be driven by two precision screws each with dual preloaded nuts providing zero backlash during reverse stress loading.
4. For lateral stiffness and robustness purposes, in addition to the two 2 ball screws described above, the load frame should include at least two guidance rods for the moving crosshead to ride on.
5. The ball screws shall be fully enclosed to eliminate pinch points and protect the precision surfaces from damage from grips and contamination.
6. The load frame shall include a bright red ISO approved emergency stop switch. For safety purposes, the system shall not restart the crosshead moving when the emergency stop button is released.
7. The emergency stop switch will remain active when covers are removed for service.
8. The frame shall include dual level mechanical limit switches on the front of the frame that prevent the crosshead from traveling too high or too low. The first level switch should stop the crosshead and the second level limit switch should cut the power to the frame should the first level limits ever fail in the future.
9. The frame shall include adjustable leveling feet and an integrated graduated measurement scale.

10. The vertical distance between the top surface of the base platen to the bottom surface of the moving crosshead shall be at least 1430 mm for load cells, grips and fixtures.
11. The total height of the load frame shall be a maximum of 2273 mm.
12. The maximum load capacity shall be at least 100kN (10,000 kg).
13. The speed range should be 0.0001 mm to 1016 mm per minute and shall be settable continuously.
14. The steady state speed accuracy shall be within +/-0.1%, of set speed measured over full speed range.
15. The maximum load at 1016 mm per minute shall be at least 75kN.
16. For safety purposes, the frame shall incorporate an auto-frame standby mode that automatically stops the frame when the transducer, interface, or computer is disconnected or shutdown.
17. The frame shall include integrated T-slots on the front and back of both column covers for easy mounting of accessories.
18. The frame must have a clearly labeled buttons to jog the frame UP or DOWN. When released, the crosshead should stop.
19. The frame shall include an operator panel which can be used to run and stop tests at the frame as opposed to through the PC and software.
20. The operator panel shall have up to (2) live displays that are in sync with the testing software live displays as well as (2) shortcut keys that can be used to carry out functions such as balancing load, strain or marking data.
21. The operator panel shall also have a fine position wheel that can be used to move the frame crosshead in small increments to aid in the installation and removal of fixtures.

B. LOAD WEIGHING SYSTEM, TRANSDUCERS, & ELECTRONICS

1. The system should be supplied with a +/-100kN capacity load cell mounted under its moving crosshead.
2. Load cell and extensometer transducers available for the system shall include self-identification (recognition) electronics in the connector directly attached to these transducers which automates the calibration of these devices. For safety and data integrity issues, operators should not have to select the capacity of a load cell from a list or type in a value in order to calibrate different load cells (or extensometers). In addition to the above, the system should allow for manual calibration of third party transducers.
3. The load weighing system accuracy shall be within +/-0.5% of reading down to 1/1000th of the load cell capacity.
4. Any load cell provided shall have 105% over range protection that will stop the frame automatically. For safety purposes, the maximum load for a test should be set by identification electronics located in the connector directly attached to the load cell. Operators should not have to select the capacity of a load cell from a

list or type in a value in order to calibrate different load cells. Because this identification connector automatically sets the maximum load for a test, this connector should not be detachable from the load cell to prevent it to be used with a smaller capacity load cells.

5. To avoid expensive repairs and downtime, the tension/compression load cell shall have an overload capacity without permanent zero shift of 150% of capacity.
6. The computer shall communicate with the frame though an Ethernet interface.

C. ACCESSORIES

1. Grips

a) 100kN capacity precision manual mechanical wedge grips.
b) Grips should be suitable for composites testing and not create any compressive loads during gripping (moving body wedge design)
c) Grip operation via a safe and easy to use ratchet handle.
d) Moving body design must provide accurate and repeatable specimen alignment that meets NADCAP AC7122-1 and AC7101.
e) Jaw faces can be changed without the use of tools.
f) Temperature Range of -80°C to +250°C
g) Adjustable specimen stops included to ensure specimen alignment.
h) Flat serrated jaw faces included for flat specimens with a specimen thickness range from 0 mm to 15mm.

2. Compression Platens

a) A pair of 100 kN chrome-plated compression platens are required for compression testing.
b) Compressions platens must be piggybacked on the mechanical grips and not require the removal of the grips for attachment to the frame.
c) Compression platens should have dimensions 150 x 150 mm or greater and be circular in shape.
d) Compression platens should have a temperature range of -80°C to +250°C or greater.
e) Platens should include LVDT Mounting Holes and spacers.
f) 1 x Lower fixed compression platen should be included
g) 1 x Upper lockable spherical seated compression platen should be included

3. Extensometry

a) A clip-on manual biaxial extensometer is required.
b) Should provide one averaged axial strain measurement and one transverse strain measurement simultaneously.
c) Gauge Length: 25 mm
d) Axial Travel: -0.5 to +1.25 mm (-2% to +5%)
e) Transverse Travel: +/-0.5 mm

f) Specimen Thickness: 0.1 to 34 mm
g) Specimen Width range: 0.1 to 55 mm
h) Specimen Diameter range: 0.1 to 34 mm
i) Temperature Range: -200 °C to +200 °C
j) Should have replaceable specimen contacts to suit a range of materials and specimens
k) Simple, single handed, attachment and removal
l) Robust design, for reliable operation under demanding conditions
m) Should be capable of calculating Poisson's Ratio.
n) Extensometer should meet ASTM E83 B-1, ISO 9513 grade 0.5 and ISO 527 (annex C).
o) Should have electrical calibration and should be self-identifying.

4. Alignment

a) The system should be supplied with an alignment fixture which provides angularity and concentricity adjustment with the load cell fully pre-loaded.
b) The system should also be supplied with alignment software and electronics for measurement of specimen bending. The software should perform graphical display and test report generation for validation of testing system alignment.
c) The system should be supplied with an enclosed, strain-gaged alignment specimen with 8 strain gauges in total which is used in conjunction with the alignment fixture and alignment software to perform and verify system alignment.

D. SOFTWARE

1. General

a) The software must have three levels of user access based on his or her login name and include password protection.
b) Run time screen must be capable of displaying both the real time graph and the calculated results of multiple specimens simultaneously.
c) The control software shall be capable of acquiring data at 1000 Hz across load, displacement, and up to two optional strain channels. Data rates should not be affected by the number of strain channels collected.
d) Data shall be acquired at a user selectable with intelligent test data logging, continuous rate without gaps. No test data interpretation between taken data points would be acceptable.
e) Specimen geometry's for each specimen shall include rectangular, irregular (area), cube, cylindrical, 3- and 4-point bend specimens, and 90-, 180- and T-peel test geometries and geometries for tear specimens and coefficient of friction tests.

f) A real time X-Y plot of two selected variables will be displayed. The variable for each axis will be load, stress, extension, and optional use of either of 2 strain channels as selected by the user. The available system of units for each axis will be US Customary, Metric, or SI and will be independently set by the user. Other graph features will include manual and automatic scaling, legend symbols, to distinguish individual test curves, horizontal and vertical offset between test curves, double-Y axis, multi-channel, and selectable number of test curves per display.

g) Software should include pre-loaded ASTM and ISO test methods for the following standards: Airbus AITM 1-0002 (Issue 3 November 1998), AITM 1-0005 (Issue 2 June 1994), AITM 1-0007 (Issue 3 Dec 2004), AITM 1-0008 (Issue 5 July 2010), AITM 1-0009 (Issue 3 November 2003), AITM 1-0010 (Issue 3 October 2005), Airbus QVA-Z10-46-05 (Issue No.: 2.0 28.10.05) ASTM C365-05, ASTM C1358-05, ASTM D1781-98, ASTM D2344-00, ASTM D3039-08, ASTM D3410-03, ASTM D3518-94, ASTM D3846-08, ASTM D4018-99, ASTM D5379-05, ASTM D5961-09 Procedure A & B, ASTM D5766-07, ASTM D6641-09, ASTM D7137-07, EN 2243-3:2005, EN 2377:1989, EN 2561:1995, EN 2563 (1997), EN 2597:1998, ISO 527-4 (1997) & ISO 527-5 (1997), ISO 14125:1998, ISO 14126:1999, ISO 14129:1997, ISO 14130:1997, prEN 2850 (P2 November 1997), prEN 6033 (December 1995), prEN 6038 (P1 November 1995)

2. User Interface

a) Digital displays on the computer monitor should show live readings of all physical measurements, such as load, displacement, and optional strain and virtual measurement values in engineering units that can be selected to be Metric, S.I., U.S. customary.

b) The software shall allow the user to define significant digits or decimal places for all live displays.

c) The software shall allow the user to assign up to 4 soft keys on the test UI providing quick access to functionality such as: balance load, balance strain, reset gauge length and balance all.

d) The software shall have at least 2 user defined graphs.

e) The software shall provide its own raw data viewer and not require the user to go to a different program to see a table of individual data points.

f) The software shall have autoscaling plots.

3. Test frame control

a) The software shall allow for a wide variety of tests to be performed, including tension, compression, flexure, peel, tear, friction, creep, stress relaxation, and block testing.

b) The software shall allow for control on any physical transducer (load, strain, crosshead extension, etc.) (with the exception of video-type strain devices).
c) The software shall allow the user to create an unlimited number of measurements for use in live displays, graphing and results. The measurements are either derived from physically connected transducers (such as load, strain or crosshead extension) or from an expression.
d) The software shall allow the user to end a test based on up to 4 different criteria/conditions simultaneously.
e) The software shall allow the user the option to store data in time based increments directly to the hard drive such that no data is lost from the specimen under test in the case of a power loss.
f) The software shall allow for data collection on up to 3 different measurements, including, but not limited to load, time, and extension.
g) The software shall allow for recording of a test with a USB camera device (such as a webcam).
h) The software shall allow the user to define a system bandwidth of either 10Hz or 100Hz.
i) The software shall allow the user to define a measurement even on which a digital output line or audio alert is triggered.

4. Calculations & Results

a) The software shall have at least 2 different results tables.
b) The software shall allow the user to define a calculation based on either a standard expression or unary expression.
c) The software shall allow the user to define rounding rules for each calculation.
d) The software shall allow for peak, modulus and yield calculations to be evaluated real-time during the test and displayed in the live displays.
e) The software shall allow for results to display in the live displays.

5. Outputs & Exports

a) The software shall allow a method to be configured to automatically email test reports and results.
b) The software shall allow the user to choose between MS Word, PDF or HTML report format types.
c) The software shall allow the user to export raw data into a .CSV file per specimen.
d) The software shall allow the user to export results into a .CSV file per sample.
e) The software shall allow the user to create and save any number of report templates that include graphs, results tables, pictures, text, company logo, sample file name, test date and time, and sample author. The report editor must allow the user to configure the look of the report editor to include any number of these elements.

6. Help System

a) The system shall include an integrated context sensitive help and reference system. The help screen shall demonstrate both how a function works and why it is used. A search capability shall allow the user to find a specific topic from the help index or by cross-referencing information from another help topic. The software must have full context sensitive on-line help including hypertext definitions and hypergraphic (pictures) displays of the software screens.

b) The help system shall include descriptive procedures for commonly performed tasks, such as how to edit software parameters, how to prepare the system for a test and how to edit a test method.

7. Data manipulation

a) The software shall offer the following calculations:
- Maximum Peak (all available channels)
- Minimum Peak (all available channels)
- Specimen Break Point (all available channels)
- Yield (Zero slope, Offset and Energy at Yield)
- Modulus (Secant, Tangent, Automatic Young's, User-defined Young's, Chord)
- Slope (Secant, Tangent, Automatic Young's, User-defined Young's, Chord)
- Unlimited number of Present Points
- Unlimited number of User Calculations
- Average Load Between 2 Points based on average load, number of peaks, number of troughs, number of peaks and troughs
- Total creep & delta creep
- Total relaxation & delta relaxation
- Seam slippage
- Area reduction
- Coefficient of friction (static & dynamic)
- Local peak
- Poisson's ratio
- Metals calculations for n-value, r-value & YPE/Ae & non-proportional elongation
- Channel values at defined limits per cycle

b) The software must include the capability to define correction factors such as machine compliance, slack, pretension, load and gauge length.

c) The ability to re-analyze past test data using different calculations must be provided.

d) The software shall allow the user to define the company logo as a part of the method for display on the home screen and on a test report.
e) The software shall include 4 default report templates.
f) The software shall provide a direct printout and CSV results output.
g) The software shall provide CSV raw data output.
h) The software shall provide the option of storing test reports in one of three formats: MS Word, HTML or PDF.
i) The software shall provide a mechanism for editing of the report template including the header, footer and body. The body of the report must be completely customizable with pictures and text and allow for import of test results and graphs. The report editor must be integrated with the test UI to allow for instant update of the report content when each test is run.

E. SERVICEABILITY AND SYSTEM STATUS

1. Factory trained service engineers based in Gauteng, South Africa must be available for additional training or warranty service.
2. Factory trained service engineers must perform the installation of the system and review all operating instructions and safety mechanisms with the primary users.
3. Factory trained service engineers must provide software training to users of the system and help those users create up to 5 test methods during that session.
4. Extended warranty plan should be included for 2 years.
5. The supplier shall install the system and provide basic on-site training for a minimum of one day.
6. The supplier must supply a list of references using the exact same system (manufacturer and model) as the system quoted as well as date of installation and contact persons.
7. A suitable PC should be supplied to run the software.
8. All delivery, installation, rigging, insurance and commissioning costs should be included in the total cost of the system.
9. The supplier should provide proof of at least 2 factory trained service engineers based in Gauteng, South Africa.

Important:

- Local support in South Africa is required.
- Brochure with specifications to be included with the quotation
- Delivery and installation at Tshwane University of Technology (TUT) in Pretoria

3 EVALUATION CRITERIA

3.1 Selection of suppliers will be based on the 80/20 preference point system.

3.2 Indicate valid B-BBEE status on quotation. No B-BBEE status will equal zero points.

3.3 Indicate CSD number (National Treasury Central Supplier Database) on quotation. If not registered yet on CSD, use www.csd.gov.za to register.

3.4 No order will be issued or no contract will be signed without a valid CSD number.

4 PRICING QUOTATION

4.1 Price needs to be provided in South African Rand (excl. VAT), with details on price elements that are subject to escalation and exchange rate fluctuations clearly indicated.

4.2 Price should include additional cost elements such as freight, insurance until acceptance, duty where applicable, etc.

4.3 Payment will be according to the CSIR Payment Terms and Conditions:

4.3.1 The Invoice amount will be paid within forty-five (45) days after receipt of a valid Invoice, subject thereto that the Goods and/or Services fully complied with the specifications of the Purchase Order.

4.3.2 No deposits/prepayments will be allowed.

5 OTHER TERMS AND CONDITIONS

5.1 The supplier shall under no circumstances offer, promise or make any gift, payment, loan, reward, inducement, benefit or other advantage, which may be construed as being made to solicit any favour, to any CSIR employee or its representatives. Such an act shall constitute a material breach of the Agreement and the CSIR shall be entitled to terminate the Agreement forthwith, without prejudice to any of its rights.

5.2 A validity period of 90 days will apply to all quotations except where indicated differently on the quote.

6 No goods and/or services should be delivered to the CSIR without an official CSIR Purchase order. CSIR purchase order number must be quoted on the invoice. Invoices without CSIR purchase order numbers will be returned to supplier.

7 Note: This is not a Purchase Order.