SOUTH AFRICAN NATIONAL SPACE AGENCY (SANSA)
SPACE ENGINEERING PROGRAMME

Request for Information (RFI)
for
Houwteq Vibration Test Facility Shaker Upgrade

RFI No.: RFI/006/09/2024

Request for Information Issue Date: **27 September 2024**

Request for Information Due Date**: 25 October 2024 at 16:00**

1. INTRODUCTION

The South African National Space Agency (SANSA) was established by an Act of Parliament – SANSA Act 36 of 2008. SANSA's mandate is to provide for the promotion and use of space and cooperation in space-related activities, foster research in space science, advance scientific engineering through human capital and support the creation of an environment conducive to industrial development in space technologies within a framework of national government policy.

Furthermore, SANSA has a legislative mandate to develop the space industry in South Africa.

The Houwteq Vibration Test Facility has been established as part of a previous era of space technology development in South Africa in 1985. The facility is in the process of being upgraded.

This RFI is issued as a means of technical discovery and information gathering only, and aims to determine and identify capabilities in the South African Aerospace and Engineering Industry Sector. This RFI is not an invitation to pre-qualify prospective contractors and participation is voluntary.

2. BACKGROUND

This SANSA project aims to upgrade Houwteq Vibration Test Facilities to a state with which the national space industry could professionally address their future growing needs for development testing, qualification and at times acceptance of primarily space equipment and systems.

This RFI is issued solely for information gathering and planning purposes; this RFI does not constitute a formal solicitation for proposals. Note that responses to this RFI will be kept strictly confidential and used only for topic development for future in support of the South African space engineering industry sector.

3. INFORMATION REQUESTED

All information shall be submitted in accordance with the instructions provided in this document. Classified responses will not be accepted.

SANSA request that respondents assess the requirements as stated in Annexure A of this RFI and submit proposals on solution systems that they are able to provide. The proposals should address the technical solution concepts and scope, implementation plan and timeline, risk aspects, assumptions made, expected customer supplied items and interfaces, long lead items, and any relevant SHEQ aspects.

SANSA further requests that respondents complete Columns 4 and 5 (i.e. "Proposed Performance" and "Compliance…") of Table A-1 in Annexure A and include the fully completed table as part of their response. Where compliance is indicated as "Partly" or "No", respondents are encouraged to indicate alternative performance/function requirement levels for SANSA consideration using a referenced list in the response document.

SANSA appreciates responses from all capable and qualified organisations within the South African engineering industry sector.

4. RFI INQUIRIES

Inquiries to this RFI must be submitted to scm@sansa.org.za. No telephone inquiries will be accepted. SANSA will review queries and if relevant post responses on the SANSA website in the RFI site. Queries must be submitted by 4 October 2024 to be considered by SANSA for a response.

5. SUBMISSION INSTRUCTIONS

Responses to this RFI are due **no later than 16:00, on 25th October 2024**. All submissions must be electronically submitted to scm@sansa.org.za, as a PDF file attachment not to exceed 10MB. The information provided in response to this RFI will not be disclosed publicly.

The information is requested for planning purposes only. The release of the RFI does not indicate that SANSA will issue a solicitation, nor does it obligate SANSA to invest any resources specific to the targeted system areas declared in the responses to this market research activity.

A non-compulsory site visit shall be attended by respondents for the 17th and 18th October 2025 at the Houwteq site. All respondents to indicate their attendance by no later than 11th October 2024 to scm@sansa.org.za.

SANSA may request respondents to present their proposal after the submission have been assessed.

6. DISCLAIMERS AND IMPORTANT NOTES

This RFI is issued solely for information gathering and planning purposes; this RFI does not constitute a formal solicitation. Respondents are advised that SANSA is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI.

Responses to this RFI are not offers and cannot be accepted by SANSA to form a binding contract. Respondents are solely responsible for all expenses associated with responding to this RFI. SANSA will not provide reimbursement for costs incurred in responding to this RFI. It is the respondent's responsibility to ensure that the submitted information has been approved for public release by the information owner.

SANSA does not intend to award a contract on the basis of this RFI or to otherwise pay for the information solicited, nor is SANSA obligated to issue a solicitation based on responses received. Neither proprietary nor classified information should be included in the submittal.

Annexure A: Houwteq Vibration Test Facility Shaker Upgrade Requirements Statement

1. PROBLEM STATEMENT / PURPOSE

The Houwteq Vibration Test Facility has been established as part of a previous era of space technology development in South Africa in 1985. The facility was initially well used but fell into irregular use and minimum maintenance support from 1994. The result is that currently the facility is inoperable and due to aging parts of this high-powered machinery, mostly unrepairable/unmaintainable.

This SANSA project aims to upgrade Houwteq Vibration Test Facilities to a state with which the national space industry could professionally address the future growing needs for development testing, qualification and at times acceptance of primarily space equipment and systems.

2. SCOPE OF WORK

Specify, supply, deliver, install and commission a requirements compliant mechanical vibration test shaker system at Houwteq Vibration Facility. Any site preparations, SHEQ aspects and disposal aspects should be addressed in appropriate detail.

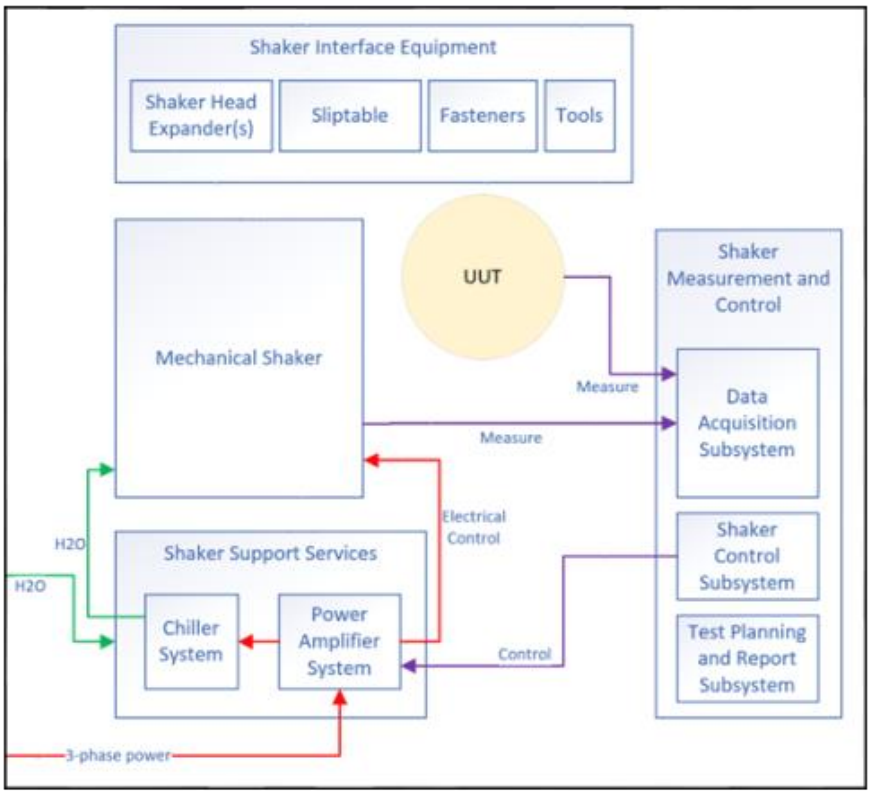

Figure 1: Mechanical vibration test shaker system scope and architecture

3. Key Aspects to be addressed:

- The proposed shaker system must be capable of providing all the specified minimum requirements and be installed in such a way as to fully enable the prescribed test functions and procedures by trained operators.
- It is critically important for all Safety, Health, Environmental, Risk and Quality (SHERQ) aspects on this project to be in line with and comply to standard South African legislation, therefore responses should clarify the respondents' proposed execution strategy on-site at Houwteq.
- Manuals (Operations, User Procedures, and Maintenance) shall be included in deliverables.
- Annual maintenance, and on- and off-site support services shall be offered for a period of 5 years.
- Operations and Maintenance training shall be provided to SANSA as part of the maintenance and support services.
- Asset alteration, tracking and disposal of any existing items according to Denel/SANSA instructions shall form part of the scope of work. As a starting point all removed items will be stored in an adjacent building to the vibration facility.

4. DETAILED VIBRATION SYSTEM REQUIREMENT SPECIFCIATIONS

The vibration system required is specified in detail in Table A-1 below. The requirements table indicates the functions and performances that a complete end solution and its subsystems shall provide and comply to.

Respondents should, as part of their submitted documentation, provide a full proposed system solution description document covering at least all the specified requirements. The proposed solution system should be described to the equipment level. A table detailing the proposed solution system's subsystems and associated equipment and quantities should be provided as part of the solution system description. Completion of the compliance column of the below requirements tables, indicating the proposed performance, is mandatory. Compliance to each specified item according to the respondent shall be stated in the last column.

Table A-1: Shaker System Requirements

Req.No.	Function/Parameter Description	Functional/Performance Requirement	Proposed Performance	Compliance Full/Partly/No
3.1	**Shaker**			
3.1.1	Maximum thrust			
3.1.1.1	Sine testing [kN]	>= 160		
3.1.1.2	Random testing [kN RMS]	>= 160		
3.1.2	Frequency range:			
3.1.2.1	Sine testing (min-max) [Hz]	2-200		
3.1.2.2	Random testing (min-max) [Hz]	2-2000		
3.1.2.3	Shaker system resonance	None in operational range		
3.1.3	Maximum displacement			
3.1.3.1	Sine testing [mm p-p]	>=76		
3.1.4	Maximum no-load acceleration:			
3.1.4.1	Sine testing (bare table) [g]	>=100		
3.1.5	Maximum Velocity [m/s]	>=1.8		
3.1.6	Payload accommodation			
3.1.6.1	Maximum Test mass [kg]	>= 940		
3.1.6.2	Test item dimensions [m]			
3.1.6.2.1	Test Item Diameter [m]	Up to 1.5		
3.1.6.2.2	Test Item height [m]	Up to 7.0		
3.1.7	Armature interfacing size [m]	>= 0.59		
3.1.8	Bolt grid fastener sockets	M12 metric through hole SS inserts		
3.1.9	Shaker Bearing type	Hydrostatic		
3.1.10	Shaker Centering & Support	Active centering of armature.		

Req.No.	Function/Parameter Description	Functional/Performance Requirement	Proposed Performance	Compliance Full/Partly/No
3.1.11	Cooling technology	Water-based		
3.1.12	Vibration Isolation	Pneumatic mounts (or similar function) between the shaker and the floor shall limit the amount of unwanted vibration energy from being transmitted into the floor and surrounding infrastructure.		
3.1.13	EMI [Gauss] (>=76mm above armature interface)	<6.0		
3.2	**Head Expander**			
3.2.1	Expander Configuration	Round		
3.2.2	Diameter dimension [m]	>=2.0		
3.2.3	Armature interface	Compatible with shaker		
3.2.4	Armature interface	Bolt holes shall be counterbored.		
3.2.5	Lifting point	Centered using M20 eyebolt		
3.2.6	Test Item bolt grid pattern	50mm spaced over full interface area		
3.2.7	Test Item bolt grid pattern	Centered on center expander-armature hole		
3.2.8	Accelerometer mounting interfaces	Multiple threaded stud mounting interfaces		
3.2.9	Expander Material	High-quality aerospace-grade magnesium alloy		
3.2.10	Expander Mounting tool kit	To include 2 sets of: * Armature screws * dedicated wrench key		

Req.No.	Function/Parameter Description	Functional/Performance Requirement	Proposed Performance	Compliance Full/Partly/No
		* torque wrench * Hazard warning labels		
3.2.11	Head Expander CAD model	In standard electronic CAD format inclusive of all critical usage features and dimensions.		
3.3	**Slip Table**			
3.3.1	Technology	Oil-based; >=6 bearing system;		
3.3.2	Accelerometer mounting	Multiple threaded stud mounting interfaces		
3.3.3	Integration with shaker	Unibase or similar configuration		
3.3.4	Payload interface size [m]	>1.5 x >1.5		
3.4	Cooling System			
3.4.1	Technology	Water		
3.4.2	Installation	Installation site compatible		
3.5	**Power Amplifier System**			
3.5.1	Inverters	Class D solid state switching inverters		
3.5.2	Output Signal Distortion	a) <0.5% 0-3kHz at full output b) <1.0% 0-3kHz at 50% output c) <1.5% 0-3kHz at 10% output		
3.5.3	User Console	Complies with appropriate UL, CE, or CSA standards, including interlocked access doors		
3.5.4	Amplifier System Cooling	Air cooled for continuous operations		

Req.No.	Function/Parameter Description	Functional/Performance Requirement	Proposed Performance	Compliance Full/Partly/No
3.5.5	Safety mechanisms	a) Automatic protected from over temperatures b) Automatic protected from over current events c) Automatic protect from over travel events d) Built-in diagnostics monitoring, reporting and critical failure handling		
3.5.6	Enclosure design	Enclosure design and circuitry shall include RFI/EMI suppression to minimize interference effects from the vibration system's amplifier		
3.5.7	Remote monitoring minimum capabilities	a) TRIP events b) RESET events c) STATUS FLAGS d) OPERATING HISTORY for critical parameters		
3.5.8	Remote control minimum capabilities	a) EMERGENCY STOP b) CONTROL POWER ON/OFF c) P.A. ON/OFF d) RESET		
3.6	**Vibration Monitoring and Control System**			
3.6.1	Vibration Modes to control, monitor, manage and support	a) Random b) Sine with Resonant search/sweep & dwell c) Classical Shock d) Shock Response Spectrum (SRS) e) Sine-on-Random f) Random-on-Random g) Real data acquisition and playback (RDAP)		
3.6.2	Dynamic Range	a) >=60dB b) >=12bit data converters		
3.6.3	Spectral Resolution	>= 800 lines		

Req.No.	Function/Parameter Description	Functional/Performance Requirement	Proposed Performance	Compliance Full/Partly/No
3.6.4	Scope includes	All equipment (controller, computers, human interfaces) and software.		
3.6.5	Licensing	All licensing shall be permanent full ownership.		
3.6.6	Data Acquisition and Reporting			
3.6.6.1	Monitor and control inputs	>=3 x 3-axis accelerometer control and monitor inputs (i.e. 9 control and monitor input channels)		
3.6.6.2	Control strategies minimum	a) multipoint averaging b) maximums c) minimums		
3.6.6.3	Test Data capturing inputs	>=48 measurements (accelerometer input) channels)		
3.6.6.4	Data handling	a) Data shall be stored locally with transfer to network function b) Data shall be exportable post-test in standard CSV text format. c) Real-time alarm shall be generated from inputs		
3.6.6.5	Data reporting	a) Standardized post-test reports shall be generated from data.		
3.6.7	Controller interfacing	b) Outputs channels: >= 2 c) Output/Input interfaces: BNC/Ethernet/RS485/etc. d) Inputs shall be compatible with voltage, charge, TEDS and IEPE sensors. e) LCD display f) Buttons providing appropriate user		

Req.No.	Function/Parameter Description	Functional/Performance Requirement	Proposed Performance	Compliance Full/Partly/No
		control of critical functions g) Remote monitoring and control through network connected interface		
3.6.8	User interfaces	Operating systems and interfaces shall be robust and familiar to the user.		
3.6.9	Equipment connection interfaces	USB and Ethernet connections shall provide quick and easy access to and control of data and peripherals.		
3.6.10	Expandability option	Controller shall be able to be expanded to 64 or more channels for measurement and control.		
3.6.11	Mains supply compatibility	Functionality shall not be negatively influenced by mains power supply.		
3.6.12	Safety	Ensures safe performance of the overall vibration system and optimal protection of the product under test.		
3.6.13	System checking	Capable of performing a loop check at the beginning of each test to ensure that integrated system is in operating order.		
3.6.14	Safety limits	High and low tolerance and abort limits should be set at prescribed levels that will provide warning and automatic shutdown when these out-of-range limits are exceeded.		
3.7	**Accelerometers**			

Req.No.	Function/Parameter Description	Functional/Performance Requirement	Proposed Performance	Compliance Full/Partly/No
3.7.1	Accelerometer Type1	10 mV/g		
3.7.2	Accelerometer Type2	100 mV/g		
3.8	**Overall Vibration System**			
3.8.1	System Corrosion resistance	a) Non-machined parts treated, painted or similar corrosion protection; b) Machined parts coated with lubricant or similar corrosion protection;		
3.8.2	System Cleanliness	a) Comply to ISO Class 8 (Class 100,000 cleanroom) usage/operations b) No open access to oiled/lubricated surfaces c) Protection against contamination of UUT under all circumstances/modes of operation		
3.8.3	Mains Power Supply Interface	Single South African electrical standard, 3-phase main power interface to system. All subsystems' main electrical power to be provided from this interface.		
3.8.4	Mains Power Quality	Compliance to South African national standards.		
3.8.5	Payload Interface bolt grid pattern	29 holes as follows: * 1 hole in centre * 4 equispace on 101.7mm PCD * 8 equispace on 203.4mm PCD		

Req.No.	Function/Parameter Description	Functional/Performance Requirement	Proposed Performance	Compliance Full/Partly/No
		* 8 equispace on 305.1mm PCD * 8 equispace on 406.4mm PCD (where PCD=Pitch Circle Diameter)		
3.8.6	Equipment quality	Only creditable brand equipment with traceable heritage shall be used.		
3.8.7	Operator and Maintenance Training	Theory and practical training in English shall be provided during installation and commissioning to enable daily maintenance and successful operational use to the following group: a) SANSA (6 people) b) Industry (6 people) c) Academia (6 people) d) Consultants (2 people)		
3.8.8	Manuals to be provided in English in PDF format	a) Operator manual(s) b) Maintenance Manual Logbook (Usage and Maintenance)		
3.8.9	Localization	a) Maximize local manufacturing options b) Maximize local site work supply chain usage		
3.8.10	**Safety and Protection**			
3.8.10.1	Personnel safety	Safety Manual and Training shall be provided		
3.8.10.2	Personnel protection	Safety focussed interlocking mechanism &		

Req.No.	Function/Parameter Description	Functional/Performance Requirement	Proposed Performance	Compliance Full/Partly/No
		procedures shall be provided.		
3.8.11	Implementation Codes, Standards Rules and Regulations to adhere to as a minimum	a) National Health and Safety Standards b) SABS Building codes and standards c) SABS electrical wiring codes and standards d) SABS Explosive Area codes and standards e) Applicable Denel codes and standards f) Applicable professional engineering standards		
3.8.12	Permits and Licenses	a) Building b) Electricity c) Water d) Crane/Hoist operation e) SHEQ		

5. EXPECTED DELIVERABLES

The following configuration items (deliverables) should be proposed as part of the respondents' solution:

5 Fully operational and performing shaker system comprising of at least the following integrated subsystems:
5.1 Mechanical Shaker
5.2 Power and Amplifier subsystem
5.3 Cooling subsystem
5.4 Vibration control subsystem
5.5 Data Capturing, Handling and Reporting subsystem
5.6 Slip table
5.7 Head Expander
5.8 Cabling and Piping
5.9 Houwteq support infrastructure compliant interfaces for power supply, water supply, compressed air supply, and physical location fixing.
5.10 Supporting equipment:
5.11 Asset Tracking and Disposal Report (covering all relevant currently installed and removed items)
5.12 Warrantee(s)
5.13 Service Level Agreement

6. CUSTOMER FURNISHED

The following facility support interfaces, features and functions will be available for interfacing to the proposed solution system:

a) 3-phase power at 400V and 50Hz
b) Compressed air
c) Potable water
d) Hoisting crane with 10ton capability over shaker location
e) Facility layout consist of following primary areas for installation considerations:
    i. Shaker area
    ii. Control room area
    iii. Supporting services area (amplifier, cooling system, hydraulic oil system, compressed air system)
    iv. Outside supporting services area (primarily for cooling system)

Note: Responses to this RFI should be based on the supplied information and assumptions made by the respondent.

7. PROPOSED METHODOLOGY / APPROACH

The following high-level milestones (and associated project implementation stages) should be present in the proposed solution implementation strategy:

a) Mandatory site visit (for RFQ phase purposes)
b) Critical System Design Review
c) Site Establishment Review
d) Factory acceptance
e) Site Readiness Review
f) Other Importation Review(s) and Reporting
g) Equipment Site Delivery Acceptance Review(s)
h) Installation and Commissioning progress reviews
i) Training acceptance review
j) Vibration Facility Acceptance review
k) Vibration Facility Handover (to SANSA)

8. Risk Management

A risk management strategy addressing all perceived risks, impact description and mitigation plans/actions should be presented in the respondent's solution, to include (but not limited to) the following:

- Import licensing, end user declarations and controlled item aspects
- Insurance aspects and all financial impacts
- Supplier liability coverage considerations