



GDS Triaxial Automated System (GDSTAS)

Overview: The GDS Triaxial Automated System (GDSTAS) is a load frame-based triaxial testing system. The system is configured by choosing from a range of load frames, triaxial cells, pressure controllers and software. The system can be configured as a multi-station commercial testing apparatus right through to high range rock testing at research level. If an existing system requires upgrading, parts of the GDSTAS system can be incorporated with existing equipment (including those from other manufacturers) to upgrade the system.

Key Features:

Benefits to the User:

Each system can be configured to the customer's specification and budget:	The user can choose the load frame, pressure controllers, triaxial cell or just parts to integrate into existing equipment to build their ideal GDSTAS set-up.
Automated software control:	The software directly controls the cell & back pressure, testing rate, in addition to managing all data acquisition. Automated control allows tests to proceed constantly and increase throughput of tests.
Interchangeable multiple range loadcells:	If the user decides he would like to run some different tests the GDSTAS set-up allows them to change the loadcells accordingly.
Submersible load cells are standard:	Seal friction does not affect load readings.
Standard set-ups available:	GDS has a range of standard GDSTAS set-ups to help the user identify the correct set-up. The set-ups are based on the pressure the systems will run to. See technical specifications below for system information.
Compatible with other manufacturers products:	If a user has existing components they can incorporate them with GDS equipment to create a system, saving expense.

Technical Specification:

Load Frame:	50, 64kN
Cell Sizes:	76, 100, 150mm
Cell Pressure:	2MPa standard (alternatives available, dependant on triaxial cell chosen)
Top Caps and Base Pedestals:	50, 70, 100 or 150mm (dependant on triaxial cell)

Upgrade Options:

Alternative Load Cell	2, 4, 5, 10, 25, 38, 40, 50, 64kN
Vertical Bender Elements	50, 70, 100, 150mm
Horizontal Bender Elements	50, 70, 100mm
LVDT Local Strain Transducers	50, 70, 100mm
Hall Effect Local Strain Transducers	38, 50, 70, 100mm
Mid Plane Pore Pressure & Suction Probe	up to 100mm
Stainless Steel (Toxic / Marine)	50, 70, 100mm
Permeability Upgrade	Available
Lifting System	Available
Unsaturated Testing	Available
Dynamic Testing	Upgrade to Quasi-Dynamic Testing (0.1Hz)

Systems Elements & Options

The fundamental system hardware elements are shown in Fig. 1 below. The actual hardware used may be chosen to suit your testing and budgetary requirements.

GDSLAB Software

The GDSLAB control and acquisition software is a highly developed, yet extremely flexible software platform. Starting with the Kernel module and the ability to perform data acquisition, additional modules are added for your testing requirements.



Note: Connection via USB interface to PC.

USB 8 Channel Logger (PAD)

The USB Pad provides eight fully independent channels of simultaneously sampled ultra-high resolution 24-bit data. Each channel provides 22 software selectable gain ranges, precision ratiometric transducer excitation, monitoring and acquisition - an industry standard DIN connection allows the full-range of GDS transducers to be quickly and easily connected and configured.



Pore Pressure (kPa)
Axial Strain (mm)
Load Cell (kN)

Load frame control

Cell pressure / volume

Back pressure / volume



Pressure Volume / Controllers

- Enterprise Triaxial Automated System (ELTAS), which utilises the 1MPa Enterprise Pressure / Volume Controller.
- Standard Triaxial Automated System (STDTAS), which utilises the Standard Pressure / Volume Controller, 1-4MPa.
- Advanced Triaxial Automated System (ADVTAS), which utilises the Advanced Pressure / Volume Controller, 2-8MPa.
- High Pressure Triaxial Automated System (HPTAS), which utilises the High Pressure Controllers (≥ 8 MPa).

Load Frames & Triaxial Cells

- The user can choose the load frame, for their ideal set-up, with frames from 10kN to 1MN.
- 2000kPa, specimens up to 150mm (load frames > 50kN for 150mm cell due to size).
- 3400kPa, specimens up to 77mm.
- 14MPa, specimens up to 100mm.
- 20MPa, specimens up to 70mm.
- 64MPa, specimens up to 100mm.

Upgrade Options:

Upgrade to Local Strain Measurement

Any GDSTAS system may be upgraded to perform Local Strain measurement using either Hall Effect or LVDT transducers. Both device types enable axial and radial deformation to be measured directly on the test specimen via lightweight aluminium holders. Hall Effect transducers may be used in water up to 1700kPa.

LVDT transducers come in 2 versions:

- Low pressure (up to 3500 kPa) version for use in water.
- High pressure (up to 200 MPa) version for use in nonconducting oil.

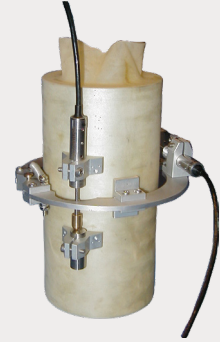


Fig. 2 LVDT transducers as shown on sample.

Upgrade to Unsaturated Testing

Any GDSTAS system may be upgraded to perform unsaturated triaxial testing with the addition of the following items:

- Unsaturated pedestal with high air entry porous stone
- 1000cc Advanced Pressure/Volume Controller (for application of pore air pressure and measurement of air volume change).

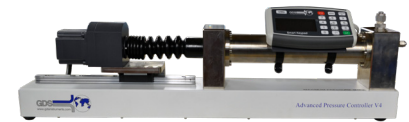


Fig. 3 Advanced Pressure Controller used in Unsaturated Testing

For further information on unsaturated testing methods, please refer to the dedicated unsaturated datasheet.

Upgrade to Bender Element Testing

Any GDSTAS system may be upgraded to perform P and S wave bender element testing with the addition of the following items:

- Bender element pedestal with bender element insert.
- Bender element top-cap with bender element insert.
- High-speed data acquisition card.
- Signal conditioning unit which includes amplification of source and received signals (P and S-wave) with user controlled gain levels (via software).

GDS Bender Element Analysis Tool (GDSBEAT):

The subjectivity and lack of satisfactory standards for interpreting shear wave travel times across the industry from bender element test data, has led GDS to develop a bender elements analysis tool. The tool allows the rapid, automated analysis of bender element tests to objectively estimate the shear wave travel time. The analysis tool is available to download from GDS' website.

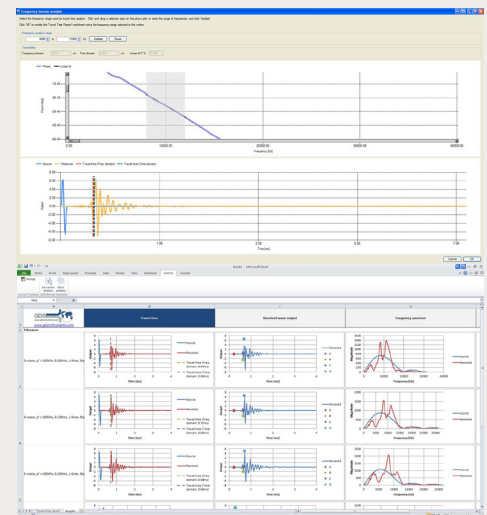


Fig. 4 Shows screenshots of the GDSBEAT software.

Standards:

- ASTM D-4767, ASTM D-5084, ASTM D-2850, ASTM D-2850-03a, ASTM D-7181
- AS 1289.6.4.1, AS 1289.6.4.2, AS 1289.6.6.1
- BS 1377-6, BS 1377-7, BS 1377-8
- CEN ISO/TS 17892-8, CEN ISO/TS 17892-9, CEN ISO/TS 17892-11
- JGS 0412, JGS 0521, JGS 0522, JGS 0523, JGS 0524

Tests that can be Performed:

B-Check, Consolidated Drained (CD) Triaxial, Consolidated Undrained (CU) Triaxial, Consolidation (Triaxial), Constant rate of Loading (CRL) Consolidation, Constant rate of strain (CRS) Consolidation, Slow Cyclic Testing, K0 (K-Zero), Multi-stage Testing, Quasi-Static (low speed/creep) Tests, Stress Paths and Unconsolidation Undrained (UU) Triaxial.

GDSLAB Control Software

GDSLAB is the control and data acquisition software for geotechnical laboratory applications. GDSLAB starts with a core application known as the kernel. The GDSLAB kernel allows for data acquisition from your hardware, but no test control. Simply add the appropriate module or modules to complete the test suite functionality you require. GDSLAB is compatible with all existing GDS equipment and furthermore key hardware from other manufacturers.

GDSLAB has the ability to be configured to your hardware of choice, no matter how unique the arrangement. A text file (*.ini) or initialisation file is created that describes the hardware connectivity to the PC. The hardware layout is available in graphical format via the GDSLAB 'object display'. This makes setting up the devices and checking the connectivity extremely simple.

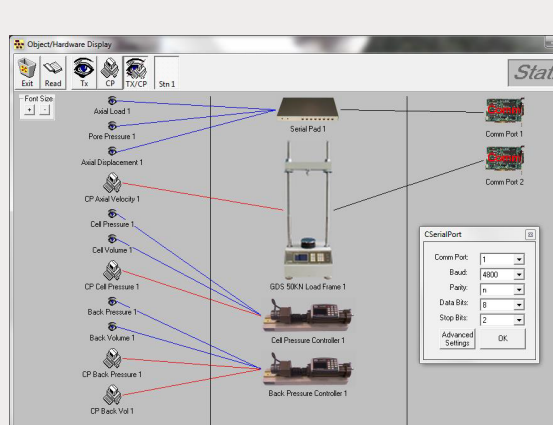


Fig. 5 Show a typical set-up screen in GDSLAB

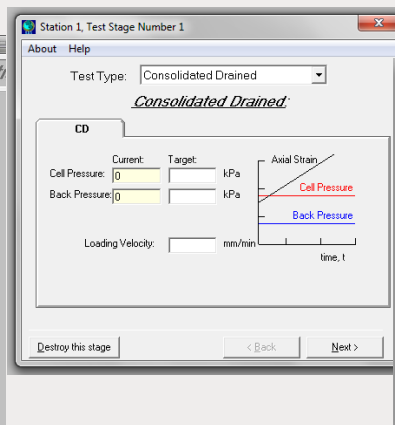


Fig. 6 Show a typical station test stage set-up in GDSLAB

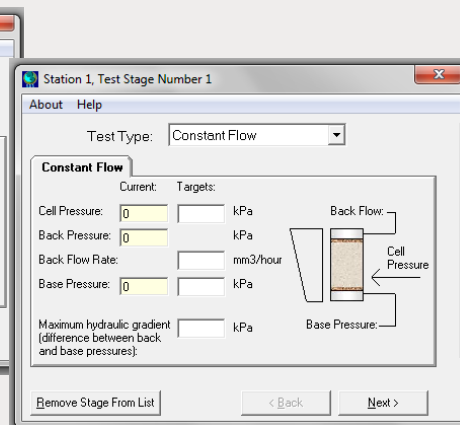


Fig. 7 Show a typical station test stage set-up in GDSLAB

Required Operating System: Windows 7 SP1 or higher (We strongly recommend that Windows is fully up to date and running the latest Service Pack/Version available). Recommended PC Specification: 2GHz processor, 4GB Ram, 64Bit Operating System and USB connectivity. Note: GDS software can run on lower spec PC's however; performance and processing of data may be affected.

GDSLAB REPORTS Presentation Software

GDSLAB REPORTS software presents data obtained by GDSLAB to the National Standard, BS 1377:1990. The program can be used to present data whether obtained from a GDSLAB data file or inputted by hand.

GDSLAB Reports can as be used with other manufacturer's dataloggers as well as all versions of GDS data logger. The results can be exported as a CSV file into Microsoft Excel, allowing the user to customise the layout of results.

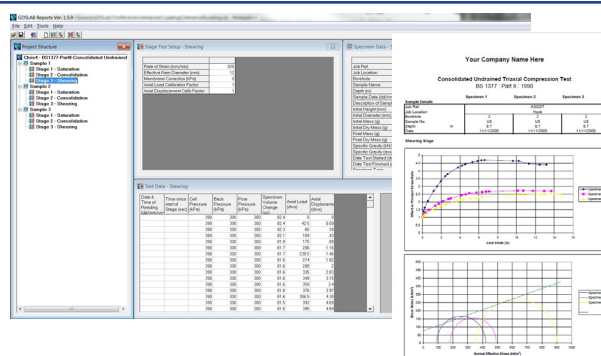


Fig. 8 show a selection of screenshots from the GDSLAB Reports software.

USB 8 Channel Logger Used in GDSTAS



Overview: The USB 8 channel logger is a 24 bit digital acquisition system developed specifically for use with transducers likely to be used in a geotechnical laboratory.

The device provides eight fully independent channels of simultaneously sampled high resolution data. Each channel has 22 software selectable gain ranges with precision ratiometric transducer excitation and input. Industry standard DIN connectors allow the full-range of GDS transducers to be quickly and easily connected and configured.

A standard USB interface provides direct PC connectivity and is fully supported by the GDSLab test software allowing seamless integration into new and existing test setups. With the ability to connect multiple USB Pads per PC it is possible to build, expand and customise data acquisition systems by using multiple devices to suit requirements.

Technical Specification:

Connection to PC:	USB
Acquisition Channels:	8
Multi Box Capability:	x10
Max Number of Channels:	Up to 80
Sample Rate:	1Hz
Resolution:	24 Bit: 16,777,216
Gain Ranges:	22 (User defined in software)
Software:	GDSLAB
Voltage Resolution:	~ 0.000003 mVolts (3 nanovolt) at +/-22mV range
Voltage Input Type:	Fully Differential, Balanced Precision Inputs with Integrated Signal Conditioning
Transducer Excitation Voltage:	10V DC, differential +/-5V independent excitation
Input Ranges:	22 Independently Selectable Ranges Per Channel from (-22...+22mV) to +/-23.5V
Excitation Fault Tolerance:	Independent per channel, if any channel is shorted the other channels will continue to operate normally
Excitation/Transducer Fault Detection:	Overvoltage, Overcurrent, Absent Transducer
Data Acquisition Options:	Digital filtering for noise reduction from 300Hz oversampled source
Transducer Calibration:	Linear
Display and Monitoring:	Data acquisition in GDSLab via USB interface

GDS have supplied equipment to over 86% of the world's top 50 Universities:

GDS have supplied equipment to over 86% of the world's top 50 Universities who specialise in Civil & Structural Engineering, according to the "QS World University Ranking 2020" report.

GDS also work with many commercial laboratories including BGC Canada, Fugro, GEO, Geolabs, Geoteko, Golder Associates, Inpijn Blokpoel, Klohn Crippen, MEG Consulting, Multiconsult, Statens Vegvesen, NGI, Ramboll, Russell Geotechnical Innovations Ltd, SA Geolabs, SGS, Wiertsema and Partners to name a few.

**TOP
50**

Would you recommend GDS equipment to your colleague, friend or associate?

100% of our customers answered "YES"

Results from our post-delivery survey asked customers for feedback on their delivery, installation (if applicable), supporting documentation, apparatus and overall satisfaction with GDS. The survey ran for two years.



Made in the UK:

All GDS products are designed, manufactured and assembled in the UK at our offices in Hook. All products are quality assured before they are dispatched.

GDS are an ISO9001:2015 accredited company. The scope of this certificate applies to the approved quality administration systems relating to the "Manufacture of Laboratory and Field Testing Equipment".

**40 YEARS OF
BRITISH
INNOVATION**



Extended Warranties:

All GDS apparatus are covered by a 12 month manufacturers warranty. In addition to the standard warranty, GDS offer comprehensive extended warranties for 12, 24 and 36 months, for peace of mind against any repairs in the future. The extended warranties can be purchased at any time during the first 12 months of ownership.



GDS Training & Installation:

All installations & training are carried out by qualified engineers. A GDS engineer is assigned to each order throughout the sales process. They will quality assure the apparatus prior to shipping, if installation has been purchased, install the apparatus on the customers site & provide the training.



Technical Support:

GDS understand the need for ongoing after sales support, so much so that they have their own dedicated customer support centre. Alongside their support centre GDS use a variety of additional support methods including remote PC support, product helpsheets, video tutorials, email and telephone support.

