



GDS Triaxial Testing System (GDSTTS)

Overview: The GDS Triaxial Testing System (GDSTTS) is a fully automated triaxial testing system designed principally for stress path testing. The GDSTTS is based on the classic Bishop & Wesley type stress path triaxial cell which controls stress directly on the sample. The system can be configured using Enterprise, Standard or Advanced level controllers (depending on the required accuracy / maximum pressure).

The 38/50mm cell can provide up to 7kN axial force, with the larger 70/100mm cell up to 25kN. This is the system of choice for teaching laboratories and research institutes.

Key Features:

Each system may be configured to the customer's specification and budget:	Users can choose the transducers, pressure controllers, triaxial cell or just parts to integrate into existing equipment to build their ideal set-up.
Direct actuation of axial stress through the hydraulically controlled ram in the base of each cell:	The Bishop and Wesley cell is designed specifically for stress path testing. Direct axial stress application means greater accuracy for stress control.
GDSTTS can run advanced tests:	Tests such as stress paths, slow cyclic and K0, all under PC control.
Standard through to advanced configurations:	GDS provide advanced (ADVTTTS) systems with all the features of the standard systems but with higher accuracies and resolution.
May be upgraded at any time:	Additional transducers, software modules, bender element testing and unsaturated testing makes the system future proof.

Tests that can be Performed:

B-check saturation, unconsolidated undrained (UU) triaxial, consolidated drained (CD) triaxial, consolidated undrained (CU) triaxial, consolidation (Triaxial), constant rate of loading (CRL), constant rate of strain (CRS), slow cyclic testing, K0 (K-Zero), multi-stage testing, quasi-static (low speed/creep) tests and stress paths.

Please Note - The availability of tests may depend on selected hardware/software.

Upgrade Options:

Bender element system (Vertical, Horizontal, S and P waves), hall effect local strain, LVDT local strain and unsaturated testing. A high pressure STDTTTS is available for cell pressure up to 10MPa.

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Accuracy of Pressure Measurement:	Standard (STDTTTS) <0.15% full range, Advanced (ADVTTTS) <0.1% full range
Accuracy of Volume Measurement:	Standard (STDTTTS) 0.25% measured value , Advanced (ADVTTTS) <0.1% measured value
Load Range (kN):	Standard (STDTTTS): 7 or 25 , Advanced (ADVTTTS): 7 or 25, High Pressure (HPTTS): 7 or 25
Pressure Range (MPa):	Standard (STDTTTS): 1 or 2. Advanced (ADVTTTS): 1 or 2. High Pressure (HPTTS): Up to 10
Resolution of Pressure Measurement:	Standard (STDTTTS): 1kPa, Advanced (ADVTTTS): 0.1kPa
Resolution of Volume Measurement:	Standard (STDTTTS): 1mm ³ , Advanced (ADVTTTS): 0.1mm ³
Sample Sizes (mm):	38/50 or 70/100

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. The standard modules chosen for this system are, Auto Saturation and Consolidation, Stress Path Testing, Standard Triaxial (Shear)



Note: Connection via USB interface to PC.

8 Channel Serial Pad

The standard GDS 8 channel data acquisition device, known as the "serial data pad", may be used within any of the system combinations. This 16 bit device has 8 computer controlled gain ranges, specifically designed to suit transducers used in a triaxial test. i.e.

+/-10mV, +/-20mV, +/-30mV (load cells)
 +/-100mV, +/-200mV (pressure transducers)
 +/- 1V, +/- 5V, +/- 10V (displacement transducers)



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

Load frame control

Cell pressure control

Axial stress and axial displacement control

Setting back pressure and measuring volume change.



Pressure Volume / Controllers

- Enterprise Triaxial Automated System (ELTAS) which is based on 1MPa Enterprise Pressure/ Volume Controller (ELDPC).
- Standard Triaxial Automated System (STDTAS) which is based on 3MPa Standard Pressure/ Volume Controller (STDDPC).
- Advanced Triaxial Automated System (ADVTAS) which is based on 2MPa Advanced Pressure/ Volume Controller (ADVDPC).
- High Pressure Triaxial Automated System (HPTAS) which is based on High Pressure Controllers ($\geq 16\text{MPa}$).

Load Frames & Triaxial Cells

- 7kN/2000kPa, for specimens up to 50mm (38mm and 50mm as standard).
- 25kN/2000kPa, for specimens up to 101.8mm (38, 50, 70 and 100mm as standard).
- 20kN/10MPa, for specimens up to 50mm (38mm and 50mm as standard).

Upgrade Options:

- Local strain measurement, unsaturated testing and bender element system (Vertical, Horizontal, S and P waves),

Upgrade to Local Strain Measurement

Any GDSTAS system may be upgraded to perform Local Strain Measurement using either Hall Effect or LVDT transducers. Both devices 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 GDSTTS system can 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).

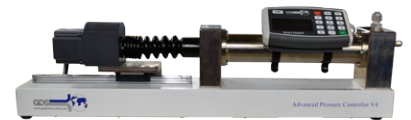


Fig. 3 Advanced Pressure Controller used in Unsaturated Testing

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

Upgrade to Bender Element Testing

Any GDSTTS system can 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:

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.

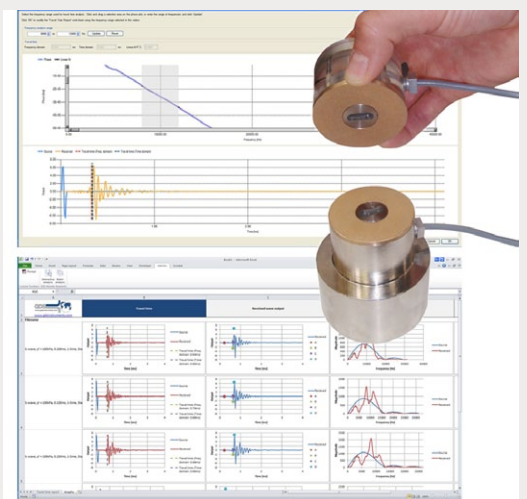


Fig 4. Screen shots from GDSBES software

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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.

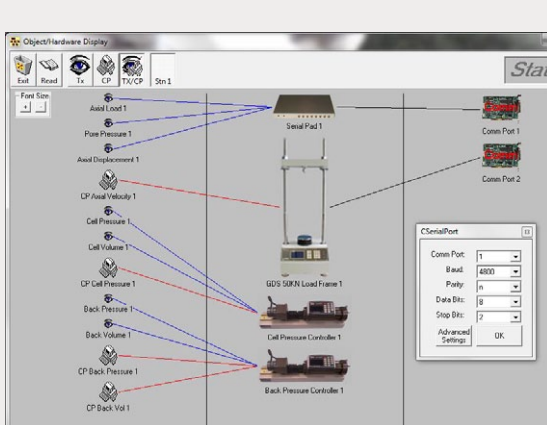


Fig 5. Show a typical set-up screen in GDSLAB

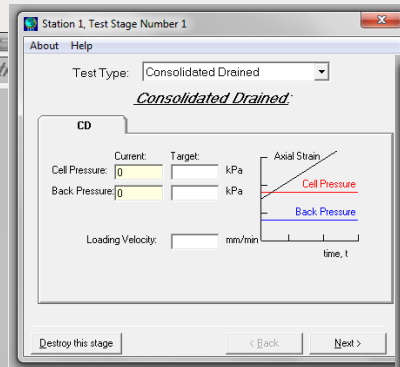


Fig 6. Show a typical station test stage set-up in GDSLAB

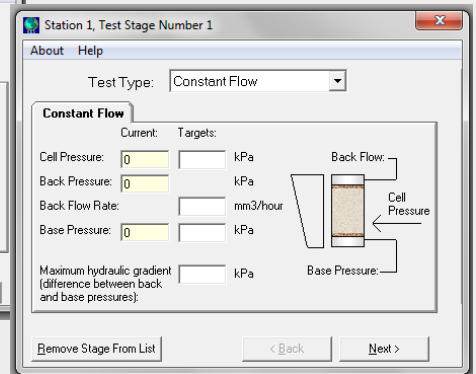


Fig 7. Show a typical station test stage set-up in GDSLAB

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.

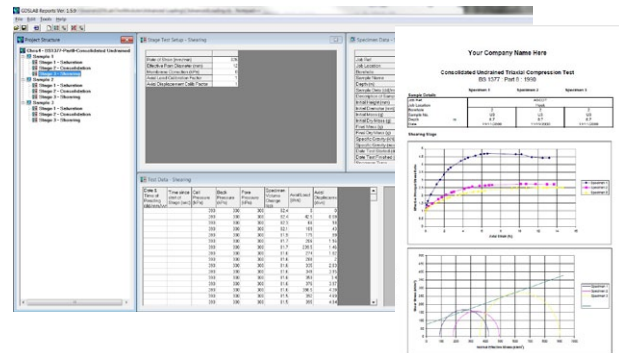


Fig 8. show a selection of screenshots from the GDLAB Reports software.

Why Buy GDS?

GDS have supplied equipment to over 84% of the world's top 50 Universities:

GDS have supplied equipment to over 84% of the world's top 50 Universities who specialise in Civil & Structural Engineering, according to the "QS World University Ranking 2019" report.

GDS also work with many commercial laboratories including BGC Canada, Fugro, GEO, Geolabs, Geoteko, Golder Associates, Inpijn Blokpoel, Klonn 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.

