



### GDS Shearbase System (GDSSS)

The GDS Shearbase System (GDSSS) is an electro-mechanical shear testing device that is primarily designed to perform static simple shear testing, but can also be used for direct shear testing with the addition of the appropriate sample set. Switching between test types can be performed easily by the user.

The apparatus is a fully self contained system with no requirements for compressed air or hanging weights. Normal (axial) and shear forces are applied using GDS electro-mechanical force actuators. The use of GDS force actuators makes the system very flexible in terms of performing tests. Each axis (normal or shear) can be controlled in displacement (strain or velocity) mode as well as load or stress mode.

#### Key Features:

#### Benefits to the User:

Desktop apparatus:	This desktop apparatus comes with built in controllers, resulting in a small footprint of just H x 660mm, L x 660mm, D x 220mm.
Runs from mains electricity:	The GDSSS comes with an integrated power supply, meaning the only laboratory service required for the system is mains electricity (110Vac – 240Vac).
No requirements for compressed air or hanging weights:	The apparatus is a fully self contained, no lifting of heavy hanging weights.
Normal (axial) and shear forces are applied using GDS electro-mechanical force actuators:	The use of GDS force actuators makes the system very flexible, each axis can be controlled in displacement (strain or velocity) mode as well as load control.
Topcap fixity:	Topcap fixity is assured through a system of crossed roller linear guides to minimise topcap rocking during shearing.
Sample preparation and topcap support apparatus:	Simple shear sample preparation and insertion into the system is made easy by using the included sample preparation and optional topcap support apparatus. This ensures that no load is applied to the sample during preparation and insertion.
Closed loop feedback:	Axial and shear load readings are controlled under closed-loop feedback.
Fully automated:	For simple shear, once the top-cap is docked all consolidation and shearing stages can proceed with no further user intervention. For direct shear, once the shear gap has been set, the test can complete with no further user intervention.

#### Technical Specification for Simple Shear:

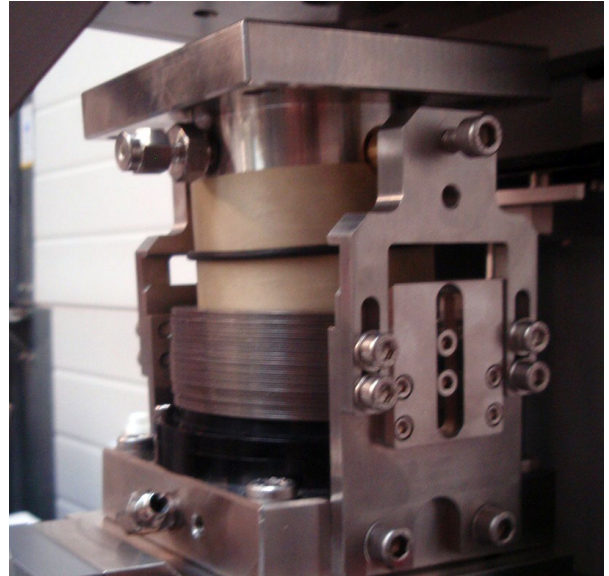
- Axial load capacity = 5kN
- Simple Shear load capacity =  $\pm 2.5$ kN
- Available sample sizes (one size supplied with system):
  - $\Phi 50$ mm,  $\Phi 70$ mm,
  - Other sizes available on request,
- Built in data logging for axial and shear loadcells,
- Low friction sample slip rings,
- High quality, low friction linear guides used to ensure strength and alignment in normal and shear directions,
- Available control parameters:
  - Axial Load / Stress,
  - Axial Strain / displacement,
  - Shear Load / Stress,
  - Shear Strain (up to 15mm/min),
- Available control modes for each control parameter:
  - Ramp (monotonic), Cycle (slow speed) and hold.
- To comply with ASTM standard D6528-07 an optional 2.5kN configuration can be supplied.

#### Technical Specification for Direct Shear:

- Axial load capacity = 5kN
- Direct Shear load capacity =  $\pm 5$ kN
- Available sample sizes (one size supplied with system):
  - $\Phi 50$ mm,  $\Phi 70$ mm,  $\Phi 100$ mm
  - Bespoke sizes between 50mm and 100mm available
- Direct Shear Test Module Controls:
  - Simple rate of displacement (forward and reverse),
  - Continuous reversal cyclic displacement (constant velocity),
- Advanced Shear Test Module Controls:
  - Shear Load,
  - Shear Stress,
  - Displacement (speeds up to 15mm/min),
- Available control modes for each control parameter:
  - Constant, Ramp and Cyclic\*, \*available Cyclic waveforms: triangular and sinusoidal
- Computer automated control of testing – not just data logging,
- BS 1377-7, ASTM D3080, CEN ISO/TS 17892-10:2004/ AC:2005 (With additional equipment).

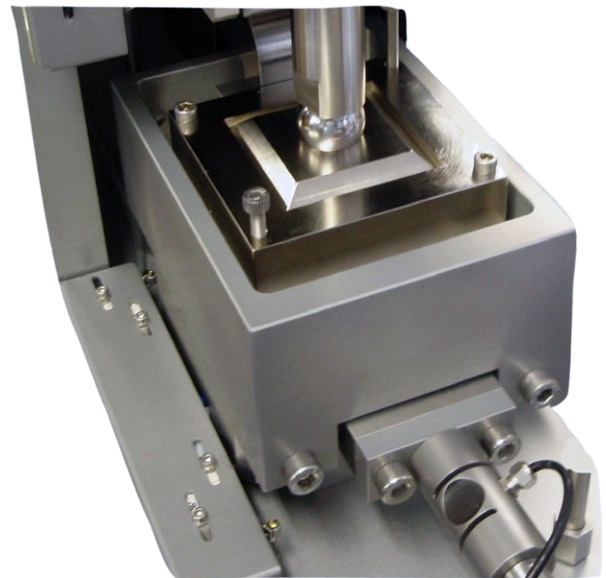
### Simple Shear Test

- Closed-loop feedback from both an in-line load cell and displacement transducer for direct control of sample movement on each axis.
- The data acquisition and control of each axis is built in to the machine itself (no external logging).
- The system can be upgraded by the addition of bender elements to measure small strain stiffness, please see below for further details.
- System designed to conform to and above the requirements of ASTM D6528 - 07.



### Direct Shear Test

- When in direct shear mode, the apparatus is a fully self contained system with no requirements for compressed air or hanging weights.
- Normal (axial) and shear forces are applied using GDS electro-mechanical force actuators. The use of GDS Force actuators makes the system very flexible, each axis (normal or shear) can be controlled in displacement (strain or velocity) mode as well as load or stress mode.
- Conventional + Parallel Controlled.
- System designed to conform to and above the requirements BS 1377-7, ASTM D3080, CEN ISO/TS 17892-10:2004/AC:2005,



### The Electro-Mechanical Advantage

The use of GDS electro-mechanical actuators has the following advantages over pneumatic or weight based systems:

- Energy Efficiency - No inefficient and noisy air compressor is required,
- No manual intervention – no operator is required to be present to add weights during consolidation stages, the stage can move on automatically under software control,
- The loads applied to the sample are measured by calibrated loadcells not assumed from weight hangers.

### The Automation Advantage

GDS have consistently demonstrated that the slightly higher cost of automated systems is far outweighed by efficiency savings during the course of the systems life due to the following:

- Less human intervention is needed,
- Under software control, test histories can be repeated more easily and more consistently,
- Less repeated tests due to human error,
- Test can proceed more rapidly, for example where a test stage is due to finish in the middle of the night or at a weekend a manual system would have to wait for intervention where as an automated system can move directly on to the next stage.

### Tests that can be Performed:

Direct shear tests, simple shear, cyclic loading of samples under either load or strain, slow cyclic simple shear,  $k_0$  ( $k$ -zero), multi-stage testing, quasi-static (low speed/creep) tests, stepped loading, constant normal stiffness.

### Upgrade Options:

- The Shearbase system can be upgraded to 10kN axial and 10kN shear load actuators, however the simple shear test can only be used to a maximum of 2.5kN in the shear direction.
- Bender Elements (Simple shear only).

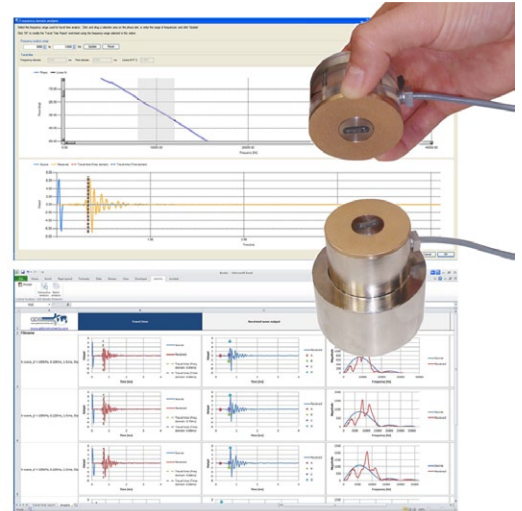
### Upgrade to Bender Element Testing

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):

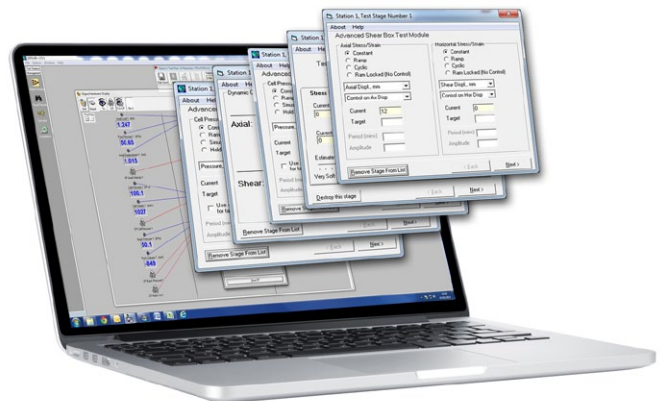
The subjectivity and lack of satisfactory standards for interpreting shear wave travel times across the industry from bender element test data, has led GDS to develop a bender elements analysis tool. The tool allows the rapid, automated analysis of bender element tests to objectively estimate the shear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



Screenshots of the GDSBEAT software.

### GDSLAB Control Software

Additional transducers may be easily configured at any time due to the flexible nature of the GDSLAB software. Spare channels may also be configured for use with an adjacent system, therefore enabling computer control and acquisition from multiple systems simultaneously from the same PC. This makes the system "future proof", as the software is expandable to include additional transducers, hardware or complete systems. GDSLAB has the ability to be configured to your hardware choice, no matter how unique the arrangement.



The GDSLAB control and acquisition software from GDS is a highly developed, yet extremely flexible software platform. Starting with the Kernel module and the ability to perform data acquisition only, additional modules may be chosen for your testing requirements. Some currently available modules available are as follows:

- Direct Shear Box Control,
- Advanced Direct and Simple Shear Module
- Dynamic Simple Shear

Depending on the module, 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.

## 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.

