Enterprise Level Dynamic Triaxial Testing System (ELDYN)

Overview: The GDS Enterprise Level Dynamic Triaxial Testing System (ELDYN) is a triaxial system, based on an axially-stiff load frame with a beam mounted electro-mechanical actuator. The ELDYN has been designed to fulfil the demand within the geotechnical laboratory testing industry for a lower cost, more basic dynamic triaxial testing system, yet still performs to the very advanced standards that customers expect from GDS.

For standards see website.

Key Features:

<table>
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<th>Benefits to the User:</th>
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<td>Electro-mechanical system:</td>
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<td>The ELDYN system supersedes systems using pneumatic actuators in terms of life costs and overall usable performance. Electro-mechanical systems can carry out full load dynamic testing to the stated frequency. Pneumatic systems tend to reduce the available amplitude with load due to the amount of air that needs to be moved from one side of the actuator to the other.</td>
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<td>Cost savings, environmental benefits and safer operation:</td>
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<td>Electro-mechanical systems are more environmentally friendly as they only draw the energy required to do the test, resulting in lower life costs. Electro-mechanical systems are also safer to run due to no high pressure air or hydraulic pipelines being required. No large noisy power packs are required to be running all the time, the ELDYN only requires a standard mains electricity outlet, this reduces the laboratory space required and the installation costs.</td>
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Tests that can be Performed:

Static and dynamic triaxial - consolidation undrained (CU), consolidation drained (CD), cyclic testing of samples under both strain and load control, slow cyclic testing, quasi-static (low speed/creep) tests, stress paths and user defined waveforms.

Upgrade Options:

Optional upgrade to user defined waveforms, upgrades from 5kN to 10kN, Bender element system (Vertical, Horizontal, S and P waves), hall effect local strain, LVDT local strain and unsaturated testing. Optional upgrade to Resilient Modulus with the addition of the RM software module only (specific range transducers may have to be purchased, depending on the RM standard). Note: the ELDYN by default is supplied with the capability of performing RM waveshapes for AASHTO, AS and AG standards.

Technical Specification:

| Actuators: | Highly accurate dynamic electro-mechanical actuator |
| Axial Displacement Encoder: | Yes |
| Axial Load: | +/- 5 kN at 5Hz (upgradeable to +/-10kN) |
| Computer Interface: | USB |
| Data Acquisition: | 16 Bit |
| Load Range (kN): | 5 (optional 10) |
| Operating Frequency (Hz): | 5 (optional 10) |
| Pressure Range (MPa): | 1 standard (Up to 2) |
| Sample Sizes (mm): | Depends on cell chosen (38 to 150 standard) |
 Systems Elements & Options

The fundamental system hardware elements are shown in Fig. 1 below.

**Pressure Volume / Controllers**

The cell pressure is controlled by a enterprise level controller and the back pressure is controlled by a pneumatic controller.

- The GDS Enterprise Level Pressure/Volume Controller (ELDPC) is a general-purpose water pressure source and volume change gauge for the precise regulation and measurement of fluid pressure and volume change.

- The GDS pneumatic controller is an economical source of computer controlled regulated air pressure control. The controller regulates an external pressure source such as a compressor or compressed air cylinder to provide a controlled output pressure.

**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.

**Frequency Range (Hz)**
- 5 & 10.

**Load Range (kN)**
- 5 & 10

**Specimen Sizes (mm)**
- 38, 50, 70, 100, 150,

Note: Connection via USB or RS232 depending on system chosen.
Upgrade to Unsaturated Testing

Any EYDYN 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 digital air Pressure/volume controller (ADVDPC) for the application of pore air pressure and measurement of air volume change (see Fig. 3).
• Optional HKUST double cell (for more information on this please see the data sheet 'Unsaturated Triaxial Testing of Soil (UNSAT).
• Optional double walled cell.

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

The temperature controlled ELDYN is attached to a steel work bench. The work bench has a sliding rail and a mounted lifting frame for easy cell removal. The work bench also contain all pressure / volume controllers and data loggers for the apparatus, therefore reducing the space required in the laboratory.

- Heating and cooling options for the ELDYN:
  - -20°C to +65°C
  - -30°C to +85°C
  - -30°C to +100°C
- Heating only is from ambient to +100°C
- Sample size up to 150mm
### 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:

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.

### 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.
Technical Support:

GDS provide comprehensive on-site product training and installation. GDS understand the need for ongoing after sales support, so much so that they have their own dedicated customer support centre. The support centre allows the user to log queries, download helpsheets and get the latest information on product updates. The site is fully searchable and provides a great resource to customers.

Alongside their support centre GDS use a variety of additional support methods including...

- **Remote PC Support**: Remote PC support works by GDS providing a secure link to a customers PC, thereby allowing GDS to take control. Once in control of the PC, GDS can help with any problems associated to software, installation, testing etc.
- **Product Helpsheets**: The helpsheets are the GDS FAQ documents. They cover a multitude of hardware and software questions and are free to download from our online support centre.
- **YouTube Channel**: GDS YouTube channel holds both software and hardware video’s aimed to give you better understanding of how the products work.
- **Email & Telephone Support**: If you prefer you can email requests to support@gdsinstruments.com where they will be automatically added to the support system and then allocated to a support engineer.

GDS Awarded Queens Award for Enterprise in International Trade:

GDS have been presented with the most prestigious corporate award made in the UK – The Queen’s Award for Enterprise in the International Trade category. GDS are delighted to have won the award which has been given to GDS for increasing overseas trade by 190% over six years of continuous sustained growth, and for selling over 85% of their production overseas. GDS have achieved this through a combination of continuous product development, understanding customer’s requirements and a company wide dedication to customer support.

Made in the UK:

All GDS products are designed, manufactured and assembled in the UK at our offices in Hook. Quality assurance is taken of all products before they are dispatched.

GDS are an ISO9001:2000 accredited company. The scope of this certificate applies to the approved quality administration systems relating to the “Manufacture of Laboratory and Field Testing Equipment”.

Due to continued development, specifications may change without notice. See the GDS website for the full product range & to visit our Geotechnical Learning Zone.