

# Durability Test Scheduler

Flexible, Accurate, and Powerful Lifecycle Testing Software

## DTS ENGINE

The Durability Test Scheduler (DTS) is a highly flexible robust, real-time data acquisition and control application that can be easily integrated with a wide variety of instrumentation options. A proven component in many of V I Engineering's custom built dynamometer and lifecycle test systems, the DTS includes advanced mathematical algorithms to accurately convert actual data channels into user defined analysis channels (for more detail on the functions see chart on back).

With the addition of several key performance upgrades and a new, easy to use GUI, it is the perfect manager for all the commonly required product validation functions including:

### Test Scheduling Control

Test schedule execution may be in predefined steps, groups of steps in nested loops, or dynamically determined by event processing. Output channels may be determined using a wide variety of internal variables including iteration counts, sequence timing or time spent in a specific step. Outputs can also be controlled in an open-loop manner (pattern generation) or by specifying a feedback channel, control parameters, and a set point (PID control).



DTS delivers dependable performance and proven results when paired with National Instruments hardware

### Data Acquisition

- ◆ The DTS supports a host of National Instruments (NI) I/O and signal conditioning modules (see list below).
- ◆ Modular design facilitates customer specified instrumentation including GPIB, RS-232 instruments, or CAN bus communication.
- ◆ Up to 256 channels available.
- ◆ Sampling rate at 2 KHz per channel.

### Alarms and Events

- ◆ The DTS Engine features an extensive alarm and event detection and processing capability.
- ◆ Single or multiple actions may be specified in response to alarm conditions.
- ◆ Alarm or event conditions can trigger user specified data logging ranges, update of a user-interface object, altering of a control output, or the steps in the test sequence.

### Data Logging *(three methods supported)*

- ◆ An automatically triggered data file which logs selected channels to disk at separately defined rates with user-defined duration.
- ◆ A history file, which can log any real or analysis channel at user-defined intervals.
- ◆ An event log or action detected or processed by the DTS can be logged to disk with a descriptive message and time stamp.



V I Engineering has a long history of successful durability and lifecycle test systems that utilize the DTS

## KEY BENEFITS

- ◆ Highly flexible and customizable, the DTS provides proven and dependable performance for a wide range of product durability and lifecycle testing requirements.
- ◆ Development time is reduced and quality is increased with an application that's proven in over a dozen durability test applications.
- ◆ Facilitates unattended testing that accelerates test cycles, reduces time to market and lowers development costs.
- ◆ Programmed conditions or alarm events can generate operator emails, numeric pages, audible alerts or trigger automated responses.

Recommended Hardware	Signal Conditioning
PXI/SCXI Combination Chassis - PXI 1052 with 2.0 GHz Embedded Controller - NI 8196	8 Channel Analog Input - SCXI 1125/TB 1313
	8 Channel Thermocouple - SCXI 1125/TB 1328
PC Workstation or Laptop with MXI 4 PXI Controller - NI PXI-PCI8331 kit	8 Channel Strain Gage - SCXI 1520/TB 1314
	8 Channel Accelerometer - SCXI 1531
DAQ Card - PXI 6250 M	6 Channel Digital to Analog Converter - SCXI 1124/TB 1325
CAN Communication Interface - PXI NI-CAN	32 Channel Solid-state Relays - SCXI 1163R/TB 1326
FPGA Programmable I/O - PXI 7830 R	32 Channel Digital Input - SCXI 1162HV/TB 1326
	8 Channel Frequency Input - SCXI 1126/TB 1327

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# Complete Test and Measurement Solutions that Exceed Expectations

## DTS Solution Examples

### Engine Dynamometer Control System

A dynamometer allows vehicles to be tested and diagnosed under real driving conditions. V I Engineering developed a system with pendant data entry, graphical displays, automated analysis, robotic accelerator control, exhaust gas analyzer, opacity meter, safety procedures and alarm limits checking. The DTS Engine, working with NI data acquisition boards, communicates with the analog and digital I/O, while controlling the pendant, gas analyzer and opacity meter through serial communication. The application created, in conjunction with the customer's existing hardware, provided a diagnostic system that significantly out performed the legacy system.



### Generic Tractor Drivetrain Testing

V I Engineering created a flexible control and monitoring system to test drive train components on tractors. The system schedules multiple-step tests running over a period of several days, while displaying and recording data and performing open and closed-loop control. The DTS Engine is able to accommodate a wide variety of drivetrain alternatives by allowing analog and digital channels, along with communication via various vehicle bus protocols, to be easily reconfigured for each test.



### Electric Drive Inverter Test System

V I Engineering was contracted by a world class manufacturer of automotive electric drive systems to develop an automated stand for testing inverter units. The company is a world leader in the design and development of electric drive systems for automotive applications and stationary power generators. The test stand is used as a Key-Life Tester to monitor for pulse overlaps that may occur on adjacent lines within a single inverter. Since each inverter's durability cycle is over 45 days, the DTS can easily provide dependable, uninterrupted testing and comprehensive data file management for the full length of the validation period.



## Algorithmic Functions

Type	Supported Feature
Unary operator	- (negative), + (positive), ! (logical NOT)
Binary operator	+ (add), - (subtract), * (multiply), / (divide), ^ (x to the power of y), && (logical AND),    (logical OR)
Relational operator	== (equal), != (not equal), < (less than), > (greater than), <= (less or equal), >= (greater or equal)
Conditional operator	? : (a ? b : c gives b when a is true and c when a is false)
Mathematical Function	abs (absolute value), acos, asin, atan, ceil (smallest integer >= operand), cos, cosh, exp, floor (largest integer <= operand), ln, log, fmod (modulo for floating point arguments), sin, sinh, sqrt (square root), tan, tanh, atan, rand (pseudo-random number generator), j0, j1, jn, y0, y1, yn (Bessel functions), derivative, integral, table (read value from a look-up table at operand (index) value)

## V I Engineering

V I Engineering is an experienced systems integrator that provides automated test and measurement systems, engineering information management, and LabVIEW productivity tools to Fortune 500 customers in the automotive, life sciences, manufacturing, and aerospace industries. We are also a leading Select Integrator in National Instrument's Alliance program.

### VISTA

VISTA is V I Engineering's branded line of software tools, process consulting, and advanced design training that improves programming productivity and quality through the implementation of software engineering best practices for the development, management, and release of LabVIEW and TestStand applications of any size.

### ENGINEERING INFORMATION MANAGEMENT

The EIM team provides software solutions that improve the efficiency of Test Planning, Execution, Analysis, and Document Management. Clients gain productivity through automated reporting, and fast, easy access to all their engineering intelligence.

### CUSTOM FABRICATED TEST HARDWARE

With the addition of experienced hardware engineers, V I Engineering now designs and fabricates a wide range of PCBs and fixtures. Plus, our new 3,000 sq. ft. build area allows us to fully assemble and validate almost all types of automated testing equipment in-house.

## Locations

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