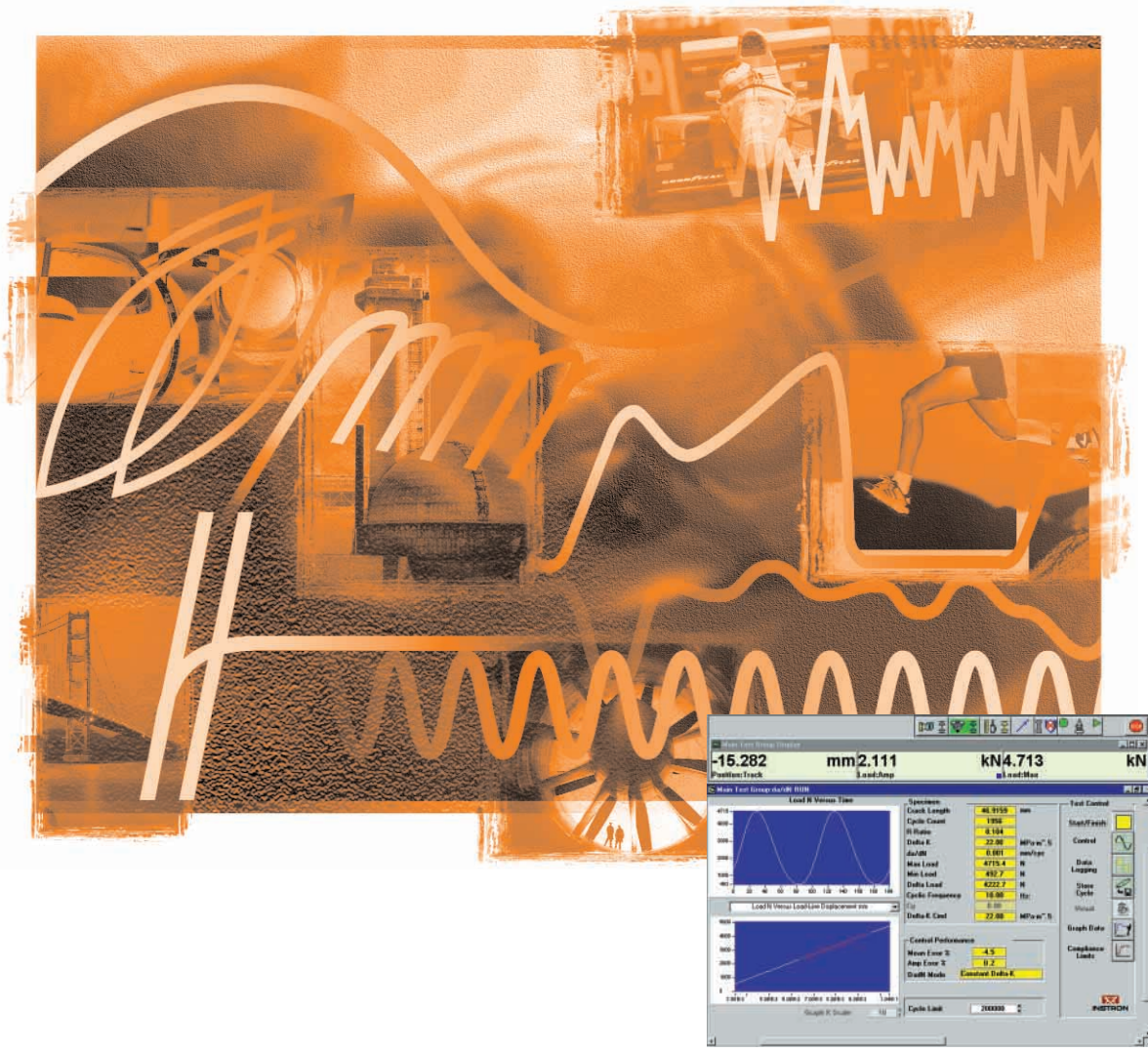




Fatigue Crack Propagation

da/dN software for use with FastTrack 8800 servohydraulic testing systems



The difference is measurable

Wide range of specimen pre-cracking and fatigue crack propagation testing to ASTM E647

The FastTrack 2 da/dN program performs in accordance with, and exceeds, ASTM E647. It runs a wide range of fatigue crack propagation (da/dN) tests on a variety of specimen geometries. da/dN can also be used to accurately and efficiently pre-crack specimens for other applications such as K_{IC} and J_{IC} .

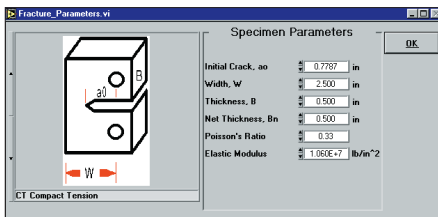
Testing flexibility and your investment

The Instron Fatigue Crack Propagation software runs in the Windows® 95, NT and 98 environments under FastTrack Console, the software interface for FastTrack 8800, or alongside the FastTrack Operator Panel.

Its modular approach allows test set-up and analysis from the machine computer or a remote network computer. Both the set-up and data files are stored in ASCII format, enabling test configuration and analysis to be performed using Instron software or other commercially available packages. This ensures the software will fit alongside your laboratory's existing framework improving efficiency, traceability and results presentation.

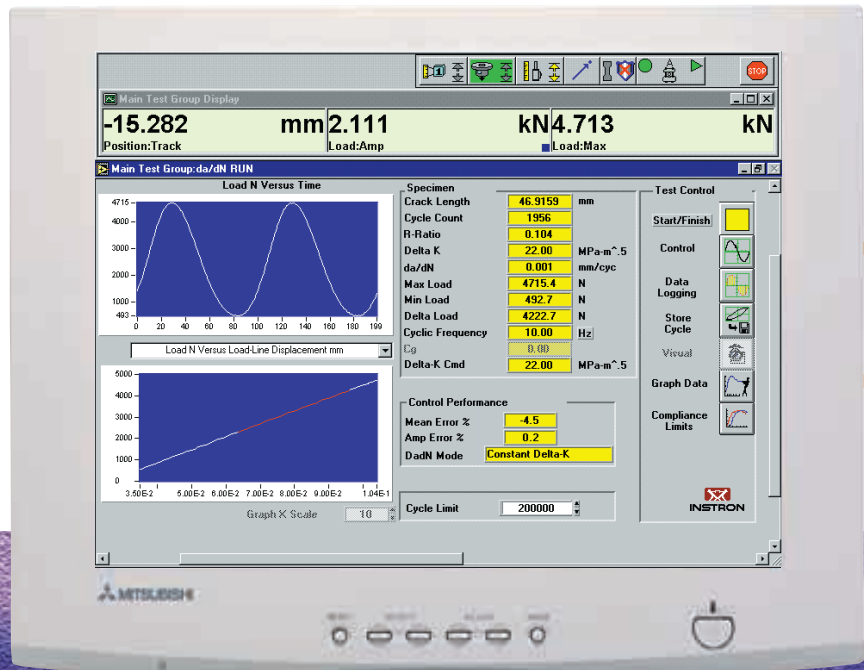
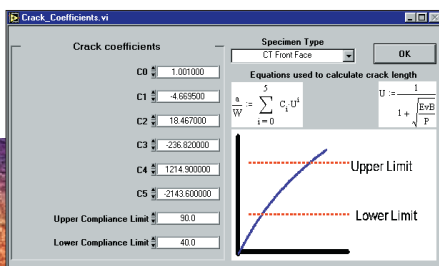
FastTrack 2 Fatigue Crack Propagation software can be used with any of the Instron FastTrack 8800 range of products. As a part of a retrofit package, this software can also be used on older servo controlled testing machines from virtually any manufacturer. This enables consistent electronics and software products to be used throughout your laboratory, saving time in operator training and standardizing test procedures. In addition, FastTrack 2 da/dN file formats are totally compatible with FastTrack 1 on 8500 Plus, maximizing the benefit and compatibility from your investment.

da/dN software will operate with a wide variety of specimen types, all of which are selected from graphical representations of the specimen outlines, with annotations showing which dimensions must be entered into the program (see specifications for more detail).



All the information you need whilst running your test.

Default crack coefficients can be changed to suit your individual test when using the compliance crack measurement method.

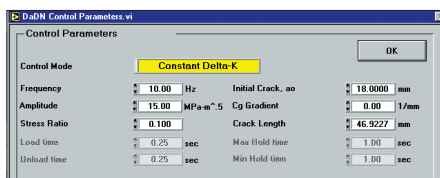


Comprehensive testing capability

FastTrack 2 da/dN software can be used for load or stress (ΔK) control values during crack growth. The crack growth is monitored by a compliance method using a clip-on crack opening displacement gauge, a potential drop method (ACPD or DCPD) or direct measurement using a microscope. A variety of specimen types are supported: compact-tension, three-point bend, center crack-tension, corner cracked, and other non-standard geometries.

Cycling with sinusoidal, triangular or trapezoidal waveforms, the following control modes are available:

- Constant load - cycling between two load values
- Constant ΔK - cycling to achieve constant stress intensity range
- Decreasing ΔK - cycling to achieve exponentially decreasing or increasing stress intensity range
- Constant KMax - cycling with K maximum held constant



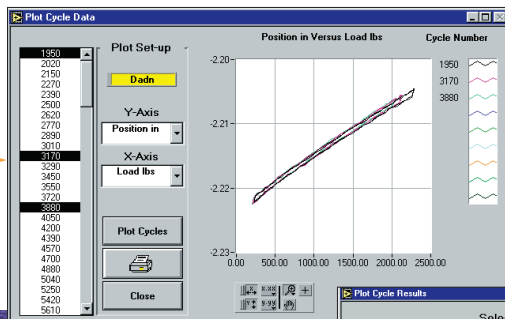
Should the operator feel adjustments are needed during the test, the realtime control allows the test parameters to be changed.

Realtime graphics and control

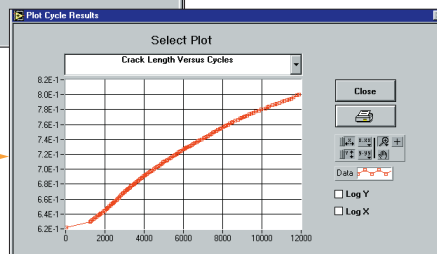
The da/dN program also allows the operator to monitor the test by displaying realtime results and graphics, which are constantly updated throughout the test. Should the operator feel adjustments are needed, the realtime control allows the test parameters to be changed. When running any test, the following parameters may be adjusted without pausing the test:

- ΔK or load amplitude
- Testing frequency
- Data logging criteria

In addition, should you require non standard realtime data to be displayed, you can choose the dynamic data exchange (DDE) option. Each specified cycle of data is automatically transferred into Excel, such that calculations and graphics can be produced. Using the Windows® multitasking facility, you can display the updating Excel graph on the computer screen with the da/dN software. Once the test is completed, test data analysis or reanalysis can be performed. A choice of cycle plots, loop data or tabulated data is available to the operator.



Graphs are available realtime and post-test in two basic formats with a comprehensive choice of data in each (see specifications for more detail).



FastTrack

FastTrack is Instron's family of software applications for use with FastTrack 8800 testing systems. FastTrack applications work within the FastTrack Console environment or alongside the FastTrack 8800 Operator Panel. The FastTrack family includes:

- **MAX** for simple fatigue testing
- **WaveMaker** for more advanced fatigue applications
- **Merlin** for tension, compression and other static tests
- **K_{IC}** for fracture toughness/CTOD applications
- **da/dN** for fatigue crack propagation testing
- **J_{IC}** for unloading compliance testing
- **LCF** for low cycle fatigue testing
- **Random/spectral loading** for end-point data playback
- **RSPlus** for continuous data playback
- **Block Program** for simple block tests
- **LabVIEW Drivers** for programming FastTrack 8800 in the LabVIEW environment
- **Other applications** including stress corrosion and elastomeric tests

Data from all FastTrack applications can be freely exchanged with other Windows programs.

Specifications

Control

- Test procedure - in accordance with ASTM E647
- Specimen types - compact-tension, SENB three-point bend, MT (middle-tension) centre cracked tension, DCT (disk compact-tension), SEN (single edge notch) bend, corner crack, four-point bend
- Control modes - constant load, constant ΔK , decreasing ΔK , constant K_{max}
- Waveform types - sine, triangular, trapezoidal
- Crack measurement methods - compliance, DCPD, visual, imp, DCPD IEEE, Matelect X, Matelect X/Y
- Crack length measurement using any device with a calibrated $\pm 10V$ signal through FastTrack 8800 controller strain channel
- Test end criteria - cycles, crack length
- Test resume facility - test may be interrupted or stopped at any point and then resumed on the same specimen at a later date. The test data file may be appended such that the historic record of loading versus cycles is continuous

Data logging

- Hysteresis loops stored every number of cycles or crack length increment

- Data logging frequency - automatically adjusted to give two hundred data sets per logged cycle for test frequencies up to 25Hz. For frequencies above 25Hz the maximum data acquisition rate is 5KHz
- User storage - during the test the user may push a key and demand capture and storage of the current cycle in addition to those defined pre-test

Data storage

- File format - ASCII for all data read or created. Tab delimited
- File compatibility - Microsoft Excel, Microsoft Word, Microsoft Access, Microsoft Notepad, Lotus 123™, Microcal Origin™ and others
- Realtime storage of hysteresis data - file contains position, load, COD and cycle number
- Realtime storage of cyclic data - file contains cycle number, crack length, EvB/P, da/dN, delta-P, delta-K, R-ratio, active PD, Ref. PD, date/time

Test end criteria

- User specified number of cycles
- User specified specimen crack length

Realtime control parameter adjustment

- Control mode

- Frequency, amplitude, stress ratio, initial crack a_0 , Cg gradient, crack length

Realtime graphics

- Continuously updated load versus time
- User selectable graphics display - choice of unloading load versus time, load versus load line displacement, load versus reduced LPD
- Crack length, cycle count, R-ratio, Delta-K, da/dN, max load, min load, delta load, cyclic frequency, Cg, Delta-P command, mean error %, amp error %, da/dN mode, crack limit

Realtime and post-test graphics presentation

- Cycle number plots - da/dN versus delta-K, crack length versus cycles, EvBP versus cycles, da/dN versus cycles, Delta-P versus cycles, Delta-K versus cycles, R-ratio versus cycles, active PD versus cycles, reference PD versus cycles, date/time versus cycles
- Hysteresis plots - X/Y plots of stress, total strain, plastic strain or time for an individual cycle or individually selectable groups of up to ten cycles

End of test summary

- Number of cycles
- Reason for test termination

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