eXpress™ Newsletter

New in *eXpress* 6.3: Multi-Thread Diagnostic Processing

Diagnostic Processing Status (Advanced)

Current Isolation Path: GGGGBBBBB	Calculating Isolation	Current Isolation Path: BBBGGGBBG
Current Isolation Tests: 3845 tests		Current Isolation Tests: 461 tests
Current Calculation Time: 00:00:13 (93.75% of possible paths)	Fault Isolation Sequences: 67 of 169 (39.64%)	Current Calculation Time: 00:00:01 (11.13% of possible paths)
40152 : Gain Matching , channel 1 to 2, FH	Maximum Isolation Path: 12 tests [161287 instances]	40150 : Gain Matching , channel 1 to 2, FC
Current Isolation Path: BBBGBBGGB	Total Isolation Tests: 161444 tests	Current Isolation Path: GGBGGGGBGBB
Current Isolation Tests: 310 tests	Total Isolation Time: 00:01:40	Current Isolation Tests: 3564 tests
Current Calculation Time: 00:00:01 (7.42% of possible paths)	8 threads are currently processing	Current Calculation Time: 00:00:13 (86.91% of possible paths)
40854 : SNR, FCH channel 1		40102 : Gain Matching , channel 0 to 2, FH
Current Isolation Path: GGBBGBGBGBGG		Current Isolation Path: BBBBGGBGBGBG
Current Isolation Tests: 3248 tests		Current Isolation Tests: 220 tests
Current Calculation Time: 00:00:11 (79.17% of possible paths)		Current Calculation Time: 00:00:01 (5.20% of possible paths)
40151 : Gain Matching , channel 1 to 2, FL	(Thread is disabled)	40804 : SNR, FCH channel 0
Current Isolation Path: BBBGGBGG		Current Isolation Path: BBBGBGGGGBG
Current Isolation Tests: 436 tests		Current Isolation Tests: 386 tests
Current Calculation Time: 00:00:02 (10.55% of possible paths)		Current Calculation Time: 00:00:01 (9.30% of possible paths)
40101 : Gain Matching , channel 0 to 2, FL	(Thread is disabled)	40100 : Gain Matching , channel 0 to 2, FC

For large and medium-sized designs, the time it takes to generate diagnostics can now be reduced significantly by calculating fault isolation sequences for multiple detection tests at the same time. In the example above, the Advanced diagnostic status dialog (new in *eXpress* 6.3) shows fault isolation being calculated on a computer that supports eight simultaneous threads, with the processing status of each thread shown in a separate (green) window and the overall status shown in the main (blue) window.

New Releases of RTAT & Workbench

The *eXpess* Run-Time Authoring Tool (RTAT) version 4.2 has been updated with a more intuitive, Explorer tree-style user interface. This will not only reduce the learning curve for those who are new to the tool, but will also improve the efficiency with which experienced users can navigate its many options.

DSI Workbench 3.5 has new features (in particular, the ability to report and/or consume fault codes) that facilitate deployment in a wider range of diagnostic environments. Also, enhancements have been introduced to improve interaction with the tool's integrated History & Feedback module. Contact DSI for details.

Inside this Issue...

Fault Codes: The Link Between Different Levels of Diagnostics

One key aspect of many full-scale diagnostic solutions is the ability to integrate different levels of diagnostics, whether performed in the field, at a maintenance facility or at the manufacturer. Using *eXpress* (with its integrated Maintenance Module), you can develop diagnostics that—in addition to identifying the set of suspected items—report a fault code that can be used as the starting point for additional troubleshooting. This allows you, for instance, to enter a fault code from the field into a maintenance workstation and your troubleshooting will pick up precisely where your field diagnostics left off. And if you have to ship an item back for repair, you can report a fault code that tells the manufacturer everything that was learned from previously performed diagnostics!

The *eXpress* Maintenance Module automatically generates fault codes for a diagnostic procedure (using a format that can be customized for a given project) and then provides the means of developing additional diagnostics based on those fault codes. Moreover, you can continue to update your design—*eXpress* will not only reuse the same codes for the same fault groups, but will keep track of which codes have been newly added (or are no longer needed), so that various diagnostic and maintenance development efforts can proceed concurrently.

New in *eXpress* 6.3...
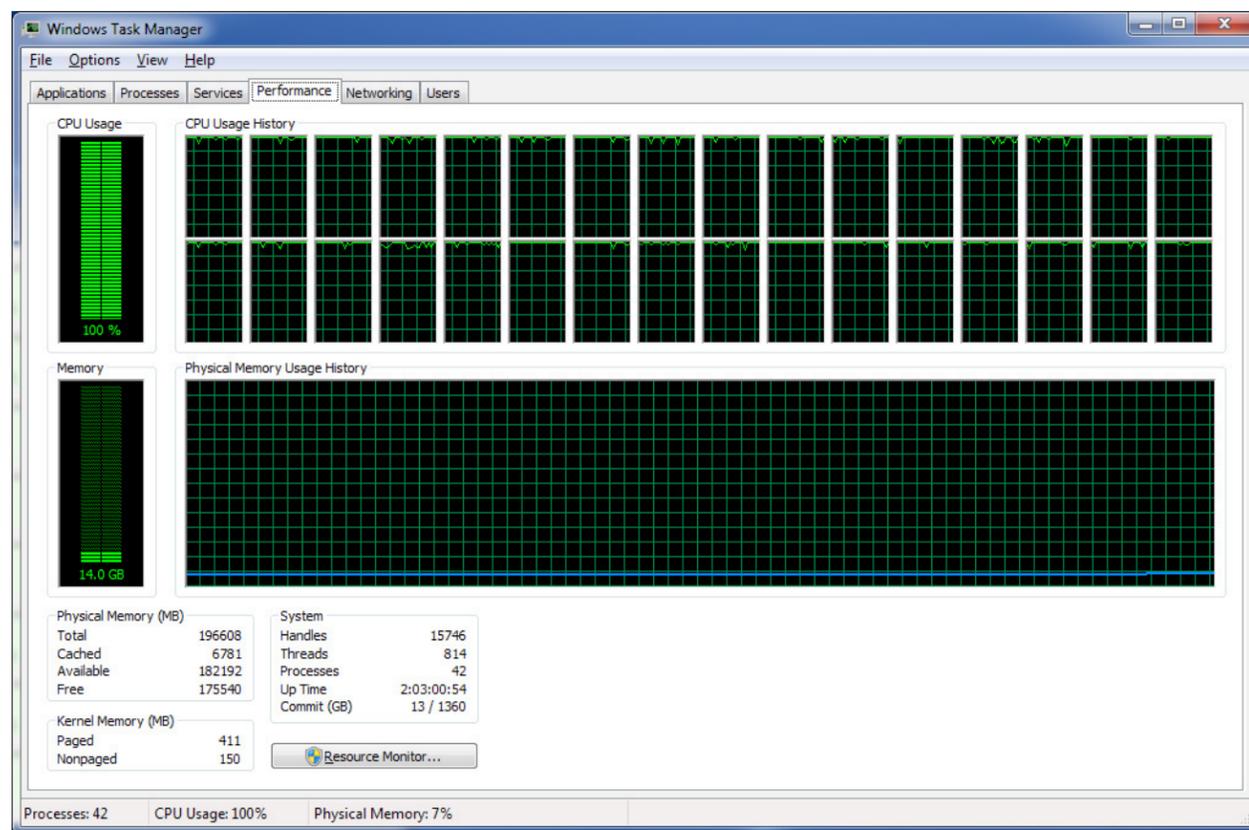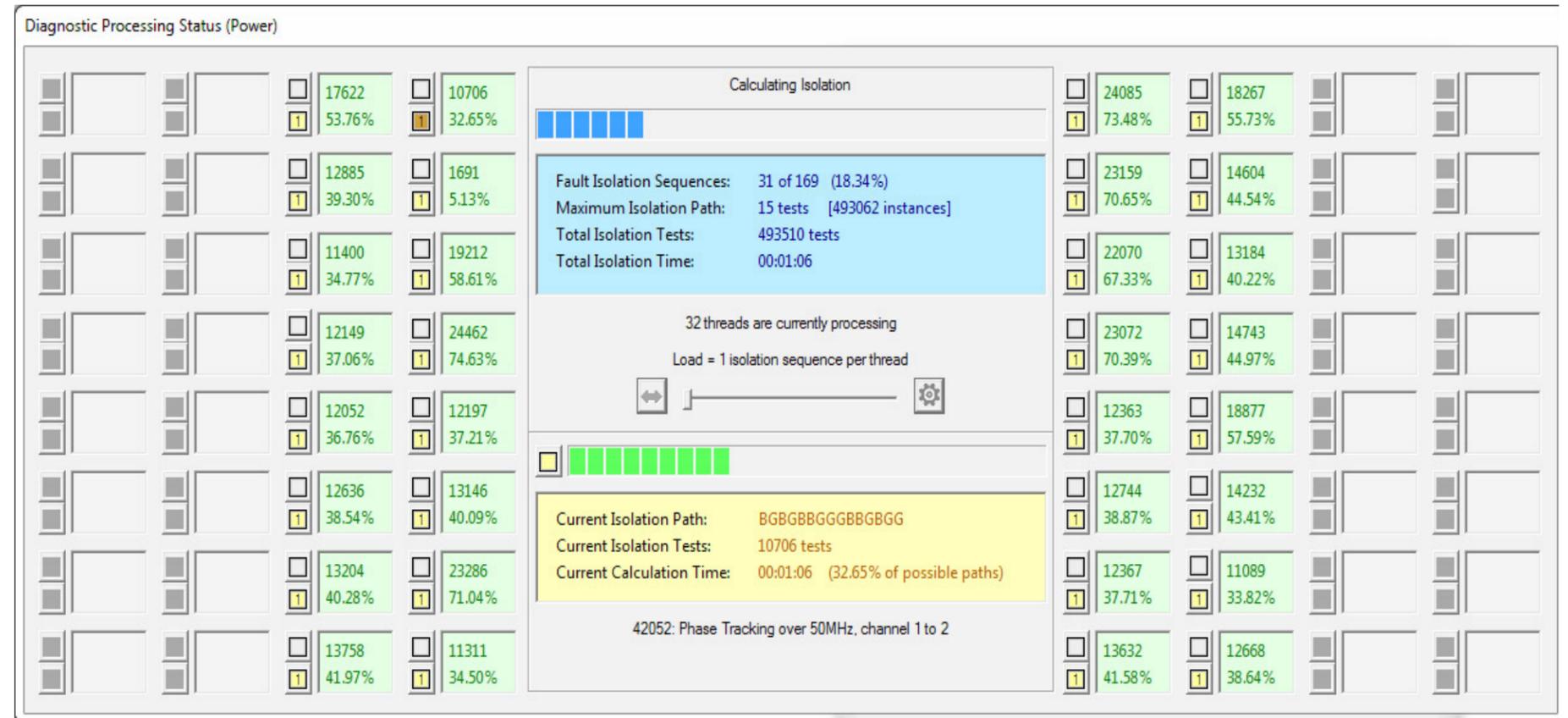
The Power diagnostic status dialog (new in *eXpress* 6.3) supports the parallel processing of fault isolation in up to sixty-four separate threads—the maximum currently available in a desktop system! The number of threads allowed is, of course, limited by the number of physical ("core") and virtual processors available on your machine. Generally speaking, the more powerful your machine, the more threads you can run at once.

In the example at right, diagnostics are being calculated on a system that supports thirty-two simultaneous processing threads, all of which have been enabled for this run. For each thread, the number of isolation tests and the percentage complete is displayed in a small (green) window. Each thread also has a small (yellow) button; if you click on this button, then the detailed calculation status for that thread will be displayed in the (yellow) window at the bottom of the dialog. The overall processing status is displayed in the main (blue) window.

As the number of isolation threads increase, however, threads may finish faster than new ones can be launched. To reduce the idle time for each processor (as it waits for a thread to re-launch), multiple isolation sequences may be generated within each thread.

Diagnostic Processing Status (Power)

Calculating Isolation

Fault Isolation Sequences:	31 of 169 (18.34%)
Maximum Isolation Path:	15 tests [493062 instances]
Total Isolation Tests:	493510 tests
Total Isolation Time:	00:01:06

32 threads are currently processing

Load = 1 isolation sequence per thread

Current Isolation Path:	BGBGBBGGGBBGBGG
Current Isolation Tests:	10706 tests
Current Calculation Time:	00:01:06 (32.65% of possible paths)

42052: Phase Tracking over 50MHz, channel 1 to 2

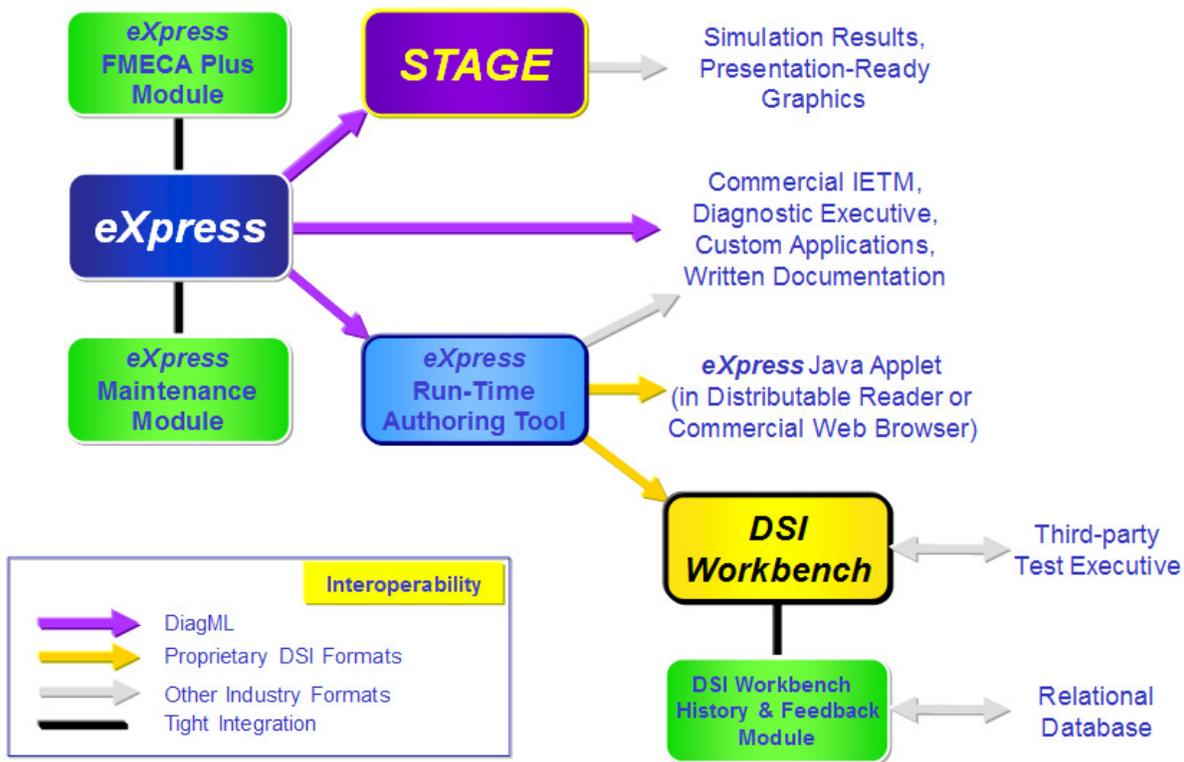## ...Multi-Thread Diagnostic Processing

You can manually adjust the "load"—the number of isolation sequences assigned to newly-launched threads—using the slider bar in the middle of the Power dialog (the current load is displayed directly above this slider bar). It is usually better, however—at least at first—to let *eXpress* automatically adjust the load based on performance.

When diagnostics are calculated using the Power dialog, *eXpress* monitors the amount of time that completed threads "wait" to be relaunched. When this idle time is relatively long, the load is increased to maximize CPU usage. When the idle time is relatively short, the load is decreased to maximize parallel processing. Finally, as the calculation of fault isolation approaches its end, the load is automatically reduced so that the maximum number of threads are used for as long as possible.

At left is a screen capture of the Windows Task Manager for a computer that has two dual-quad processors—that's sixteen core processors supporting up to thirty-two separate processing threads (serious power, right?). When isolation is calculated using a single thread, however, the maximum CPU usage on this machine is only about 3%. Why invest in a powerful machine if you're going to let it go to waste? With the Power dialog in *eXpress* 6.3, it is easy to achieve 100% CPU usage so that fault isolation calculates using your machine's full processing power—in a fraction of the time!

The ISDD Tool Suite
(Integrated System Diagnostic Design)

Training Course Schedule

Course Number	Pre-requisite	Course Description	Dates	Location	POC
T-100		System Diagnostics Concepts and Applications	June 23	Orange, CA	Denise Aguinaga, DSI
T-110	T-100	Basic Modeling & Introduction to Testing	June 24-25	Orange, CA	Denise Aguinaga, DSI
T-120	T-110	Introduction to Testing & Analysis	June 26-27	Orange, CA	Denise Aguinaga, DSI
		ADVANCED TRAINING COURSES			
T-200	T-120	Advanced Model Development and Analysis	July 8-10	Orange, CA	Denise Aguinaga, DSI
T-205	T-200	Advanced Test Development and Importing	July 11-12	Orange, CA	Denise Aguinaga, DSI
T-230	T-205	*eXpress* Advanced "Tips & Tricks"	Call for Dates	Orange, CA	Denise Aguinaga, DSI
T-240	T-205	FMECA Development and Assessment using FMECA Plus	Call for Dates	Orange, CA	Denise Aguinaga, DSI
T-250	T-200	STAGE Time-Based Assessments & Principals	Call for Dates	Orange, CA	Denise Aguinaga, DSI
T-260	T-100	RTAT and Workbench Theory and Application	Call for Dates	Orange, CA	Denise Aguinaga, DSI

World Wide Representatives

United Kingdom

Cassidian
Test Engineering Services
+44 1202 872800
penri.jones@eads-ts.co.uk
www.cassidian.com

France

Cassidian
Test & Services
+33 (0)6 88 61 33 91
michel.schieber@cassidian.com
www.cassidian.com

Japan

Y-MAX, Inc.
+81-45-789-0701
massayo@y-max.com.jp
www.y-max.com

South Korea

Realtimewave Co, Ltd
+82-2-572-9471/2
sales@realtimewave.com
www.realtimewave.com

China

MTCS
Systems Engineering Co. Ltd
+86-10-5881-6565
sales@mtcs.com.cn
www.mtcs.com.cn

www.dsiintl.com

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