

## EUG was “YUGE”!

DSI would like to thank all presenters and attendees of the “yugely” successful 2016 *eXpress* User’s Group, which was held in concert with Autotestcon 2016 in Anaheim this September!

It was clear to all in attendance that *eXpress* users are extremely knowledgeable in the many areas where Diagnostic Engineering can have a significant positive impact—both in the Design Development and Sustainment Lifecycles. Some users shared new or advanced techniques and methods, while others discussed their search for better ways of gaining the attention of the decision-makers within their organizations. Many voiced that there are areas in their respective programs that would thrive through a wider use of Diagnostic Engineering processes and data.

Along with recent enhancements to the ISDD tool suite (including improvements to its core tools *eXpress*, RTAT, DSI Workbench and STAGE), DSI announced powerful new integration with ATMLPad, a COTS ATML translator that provides scalable interoperability with both existing and future IEEE & AIA Standards. This integration allows expert diagnostic knowledge from *eXpress* to be utilized by any tool that can import ATML data. Ion Neag of Reston Software presented this capability as it was demonstrated at Autotestcon and for NAVAIR.

Guest speakers from the MoD (Malcolm Brown) and Raytheon IDS (Kelly Barrows) provided excellent insight into how they are advancing diagnostic engineering through a broader use and reuse of expert knowledge captured in *eXpress*!

Kelly presented an overview of his team’s unique way of improving productivity in their production labs by combining expert knowledge from *eXpress* with their own historical data. Following this approach, Raytheon uses DSI Workbench to quickly identify malfunctions that can be easily repaired, resulting in greatly reduced stockpiles of failed units. Most importantly, Raytheon has pioneered an approach in which the entire “data populated model” for a given design can be created and deployed IN JUST A FEW HOURS!

Please visit the “new” DSI Website to view Kelly’s entire presentation, along with the other presentations that were presented at EUG-2016!

Below is Kelly’s final slide:

### Reduces Troubleshoot Times and Costs

**Raytheon**

- Workbench can quantify rework histories and show applicable conditions, relative costs and effectiveness trends of the repairs.
- Relevant rework histories are easily accessible for troubleshooters to use to disposition hardware.
- Workbench compiles and presents data making it easy to formulate troubleshoot plans for guidance addressing failures with histories.
- Troubleshoot plans created based on the data compiled in Workbench can be used to more quickly tackle backlogs of failed units.



DSI was offered unprecedented visibility at this year’s Autotestcon, with our booth located at the “Front and Center” of the exhibition hall. While the conference was held at the Disneyland Hotel in Anaheim—a short three miles from our headquarters—we were blessed with many visitors from all over the world!



DSI has been attending and exhibiting at Autotestcon since 1980, but never have we experienced such a sustained level of interest in *eXpress* and ISDD than we did at our booth at this conference.

DSI thanks all who stopped by and shared a moment of your day !!!

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## DSI International's Application Notes

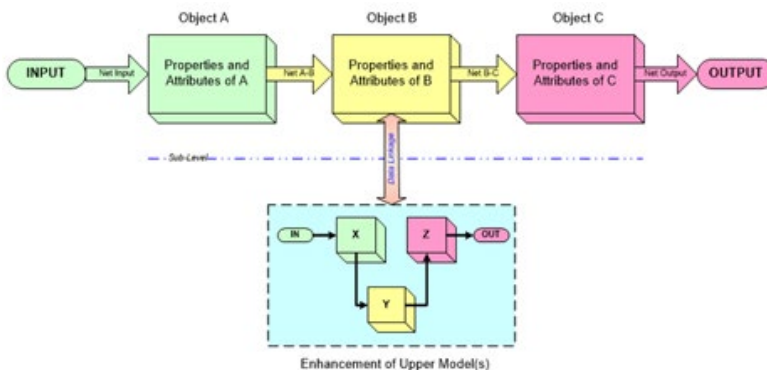
We regularly get questions—from both new and veteran users—about our diagnostic engineering tool, **eXpress**. Although most of DSI's in-house analysts have a thorough understanding of the tool—from the most basic to the most esoteric—it is easy to take this knowledge for granted and assume that other users understand various techniques and the concepts behind them. Because this is not always the case, we have created this section of our newsletter (and, eventually, our new website) where we can address some of these topics.

**Measurement Diagnostics vs. Diagnostic Engineering Analysis:** Perhaps the most common question we get is “What does **eXpress** do that is so special? After all, my company already has Built-In-Test (BIT) to do our diagnostics. If we need to, we can always supplement it with manual troubleshooting.” On the surface, it would appear that **eXpress** analysis is a duplication of effort; this, however, is not the case.

Measurement Diagnostics is typically based on Test Requirement Documents (TRD) or Test Programming Sets (TPS), which use a test flow algorithm (usually in the form of a tree) to find faults exposed via testing. What many find confusing is that **eXpress** analysis also uses tests and a flow diagram—but it is not the same, nor does it imply the same things.

With a test flow algorithm, when a test passes, you follow the flow in one direction; when it fails, you proceed in another direction. In either case, the diagnostics will then either require another test or call out a suspected failure. This works fine...in theory. Indeed, Measurement Diagnostics may work perfectly well for simple designs. There may be cases, however, where it does not produce the correct diagnosis. When dealing with BIT, for instance, diagnostic accuracy is dependent on the extent to which each indicator covers not merely the functions it was intended to test, but *all* malfunctions that can cause that test to fail.

Diagnostic Engineering Analysis takes a completely different approach to solving this diagnostic challenge. **eXpress** uses a modeling concept and a methodology called *dependency analysis* to determine what components are involved, or covered, by any test. Importantly, tests are not just used to determine pass/fail criteria. Rather, they are used to identify the nominal or non-nominal behavior which would then lead to a hypothesis, or conclusion.



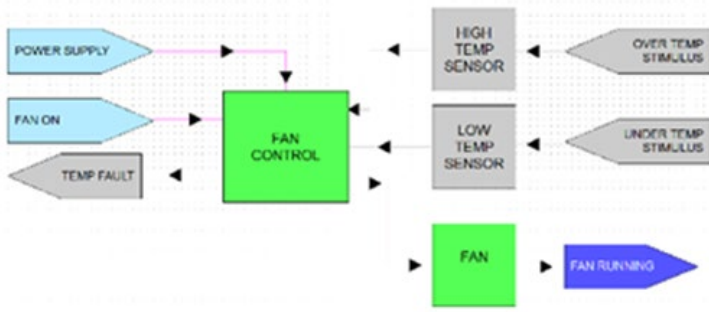
All information about a design element is encapsulated in the objects. The objects then form the building blocks of a larger structure (system, components, subcomponents, etc.).

**eXpress** uses the design itself to determine which component, or components, functionally lead to a fault. In **eXpress** terminology, test definitions based on this approach are known as *path-based tests*. Should a test point not be available, then **eXpress** can use *inspection-based testing*, which allows any number of unique components to be evaluated by other means (including observation, sound, external “testers” and the application of empirically-derived rules).

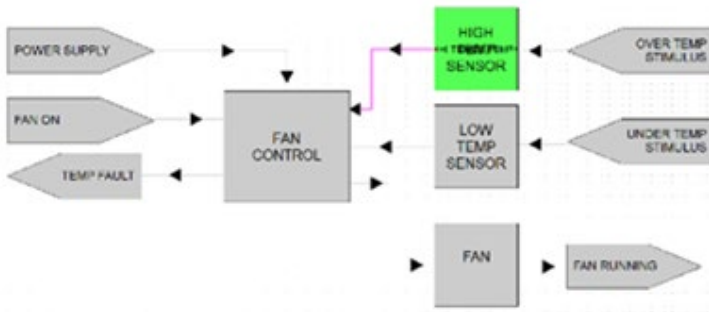
## Partial List of eXpress Users!

Logos displayed include: Raytheon, BAE SYSTEMS, Boeing, Hewlett Packard, Lockheed Martin, GE - Transportation, General Dynamics, Airbus, Huawei, Xingyi Electronic Equipment, Mitsubishi Heavy Industries, Ltd., Exelis, Northrop Grumman, Thales, Rockwell Collins, AMRDEC (Aviation & Missile Strength Through Technology R&E Center), General Atomics, IHI, Sikorsky (A Lockheed Martin Company), NavAir, MBDA (Missile Systems), and NASA.

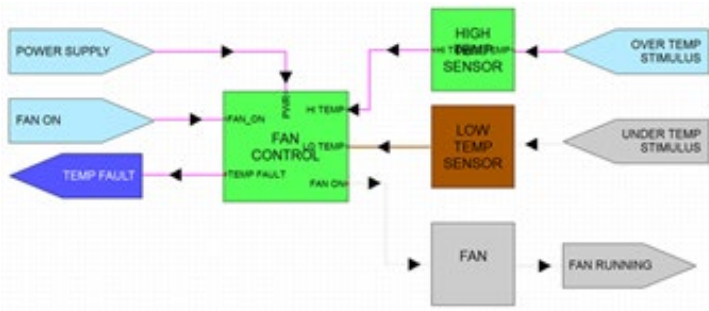




The diagrams on this page depict the coverage of a simple path-based test, an inspection test, and a test definition that accounts for interference.



Perhaps one of the greatest features of the **express** diagnostics is its ability to identify and handle something known as “interference”. Interference describes the situation where there are functions that impact a diagnostic test, but were not considered to be part of the test’s intended coverage. **express** recognizes three types of interference—creation, propagation, and observation—based on where the “interfering” functions are located relative to the coverage—upstream, downstream, or tangential. The concept of interference bridges the gap between what a test is intended to communicate and what the diagnostics must learn from that test. Quite often, ignorance of interference is precisely what causes Measurement Diagnostics to produce a misdiagnosis.



The next issue will deal with bringing these into the diagnostic analysis study environment.



Notice the new “DSI” logo!

## “Thanksgiving Surprise”

DSI will be launching its long-awaited new website for Thanksgiving!

One of the primary goals for this new website was to provide an educational resource for industry that greatly expands on the far-reaching value of Diagnostics Engineering.

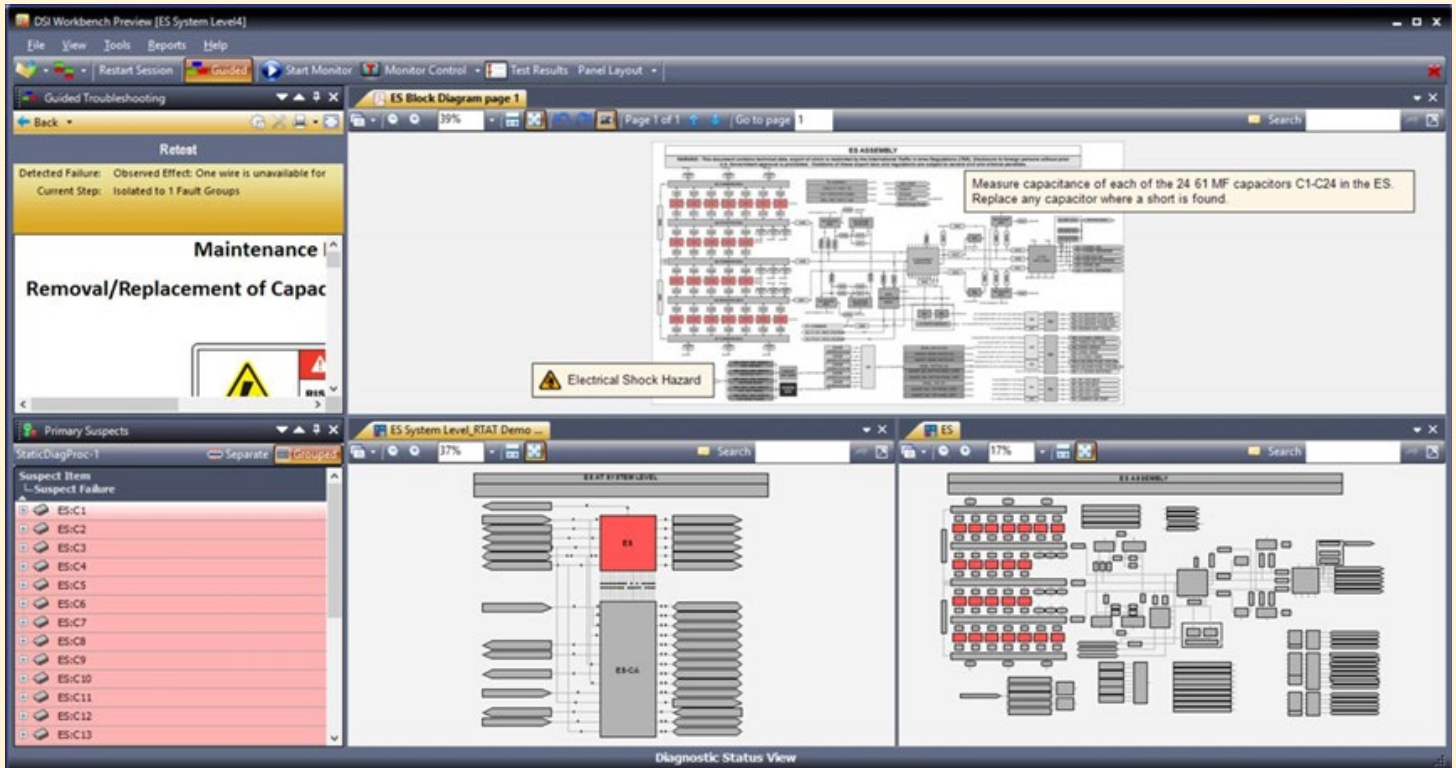
DSI’s new website will allow the viewer or student, for the first time, to seek answers to common concerns related to diagnostic engineering and learn about the unknown costs that result from traditional and antiquated approaches to design development and product sustainment.

While solutions are expressed mainly in terms of DSI’s core ISDD Tools, the objective is also to make clear the advantages of employing highly-collaboratively methods and processes that feature the leveraging, “(re)use”, interoperability, integration and validation of design data for any sustainment paradigm.

Below is a sneak preview of the DSI website showing the pull-out menu for “Improve the Diagnostic Capability of a System or Design”:



# DSI Workbench 5.0 – Diagnostic Deployment – Maintenance Environment



## Upgrade Now to DSI Workbench 5.0.

## Current Versions of DSI Software

**Some of the Core Capabilities of DSI Workbench**

- Isolated faults displayed using multiple views
- Views that can be tailored to show what is relevant for each test/fault group
- Maintenance troubleshooting initiated by Fault Codes (either entered manually or imported from a results file generated by a Test Executive)
- Maintenance procedure reference for items in isolated fault groups

*The picture above depicts a typical Guided Troubleshooting layout in DSI Workbench*

Product	Version	Release Date
eXpress	6.5.3	July 7, 2016
eXpress Design Viewer (free)	2.0.0	September 21, 2016
STAGE	Act II, Scene 3	May 26, 2015
Run-Time Authoring Tool (RTAT)	5.0.5	November 2, 2016
DSI Workbench	4.6.6	October 3, 2016
DSI Workbench Reports	1.7.2	October 30, 2015
DSI Workbench API	1.3.1	September, 21, 2016

## Training Course Schedule

Course Number	Pre-requisite	Course Description	Dates	Location	POC
T-100		System Diagnostics Concepts and Applications	December 5, 2016	Orange, CA	Denise Aguinaga, DSI
T-110	T-100	Basic Modeling & Introduction to Testing	December 5 - 7, 2016	Orange, CA	Denise Aguinaga, DSI
T-120	T-110	Introduction to Testing & Analysis	December 7 - 9, 2016	Orange, CA	Denise Aguinaga, DSI
<b>ADVANCED TRAINING COURSES</b>					
T-200	T-120	Advanced Model Development and Analysis	December 12 - 13, 2016	Orange, CA	Denise Aguinaga, DSI
T-205	T-200	Advanced Test Development and Importing	December 14 - 15, 2016	Orange, CA	Denise Aguinaga, DSI



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