Historical Retrospect of the
“International Symposium on the Nondestructive Characterization of Materials”

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Materials and Sensors Technologies, Inc.

WHAT CAN BE DIRECTLY AND REPRODUCIBLY MEASURED?
Historical Retrospect of the Symposia on *Nondestructive Characterization of Materials, NDCM*

12th International Symposium on Nondestructive Characterization of Materials (NDCM-XII)

Virginia Tech
Blacksburg, Virginia, USA

June 19-23, 2011

WHERE WE WERE?

WHERE WE GO FROM HERE?
WHERE WE WERE?

This is the 12th meeting in the series:

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<th>NDCM</th>
<th>Year</th>
<th>Location</th>
<th>Country</th>
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<tr>
<td>I</td>
<td>1984</td>
<td>Hershey,</td>
<td>PA, USA</td>
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<td>II</td>
<td>1986</td>
<td>Montreal,</td>
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<td>III</td>
<td>1989</td>
<td>Saarbrucken,</td>
<td>Germany</td>
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<td>IV</td>
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<td>V</td>
<td>1992</td>
<td>Karuizawa,</td>
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<td>1994</td>
<td>Oahu,</td>
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<td>VII</td>
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<td>VIII</td>
<td>1998</td>
<td>Boulder,</td>
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<td>Australia</td>
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<tr>
<td>X</td>
<td>2000</td>
<td>Karuizawa,</td>
<td>Japan</td>
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<tr>
<td>XI</td>
<td>2002</td>
<td>Berlin,</td>
<td>Germany</td>
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The Symposium series was started by Robert Green, Johns Hopkins University and Clay Ruud, Pennsylvania State University.
Every meeting to date was supported by Professor Green.
After Clay Ruud retired from Penn State University, he wanted to return to his native Spokane and ski. So he designed a house in Northwoods and built a custom kitchen so his wife Paula Mannino, second from left, could offer cooking classes.

Professor Robert Green in the CNDE office next to some of his travel acquisitions.
WHERE WE GO FROM HERE?

• Materials Characterization is more and more important
  but
  it is confused with defects (Cracks...) and conventional NDT.

• Engineering is interested in materials properties, materials behavior and degradation.

• There are still enormous gaps in the technology for the characterization of materials.

• Common traditional materials properties practice is sample and recipe based statistics:
  ❖ With assumptions of the applicability to every part/product
  ❖ With assumptions of uniformity (absolutely false in composites...)

• The Symposium has served well in technical interchange, evolution of ideas and
  promotion of the science, engineering and the technology applications.

• We need to recognize that failure mechanisms are related to the understanding
  of materials properties and our ability to properly characterize materials.
Issues with Structural NDT Diagnostic

MATERIAL DAMAGE DIAGRAM

NDT REQUIREMENTS PREDICTION PATH:
Measure and model material damage from micro to macro to structural effects

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What am I testing for?

• DO WE UNDERSTAND EFFECTS OF DEFECTS?
• DO WE UNDERSTAND WHAT ARE DEFECTS?
• WHAT ARE FAILURE MECHANISMS?

• If you use the same old tools without innovative methods, you’re going to make the same old discoveries.

• Doing the same thing over and over while expecting different results is a definition of insanity.
Expensive Catastrophes in History

Titanic - $150 Million

Failure Mechanisms?
Expensive Catastrophes in History

B-2 Bomber Crash - $1.4 Billion

Failure Mechanisms?
Expensive Catastrophes in History

Challenger Explosion - $5.5 Billion

Failure Mechanisms?
Expensive Catastrophes in History

Space Shuttle Columbia - $13 Billion

Failure Mechanisms?
“It’s time we face reality, my friends. ... We’re not exactly rocket scientists.”
WHY do we need to test?

\[ P(F) > 0 \]
Composites fail!

AA Flight 587, 12 November 2001

MECHANICAL PROPERTIES: TIME, TEMPERATURE, DIRECTION

Layer stress conventions.
• We have become very sophisticated with materials and did not keep up with materials characterization.

• We need to continue this quest and impact the technology via future Symposia.

• How we go about it is to be discussed Tuesday 16:30, please contribute.
WELCOME TO Virginia Tech

SUMMARY OF SESSIONS AND EVENTS:

Sunday
1800 Welcome Reception

Monday
A-01 1330 J. Duke
A-02 1600 T. Yolken

Tuesday
A-03  800 I. Solodov
A-04 1030 J. Duke
A-05 1320 R. Gr. Maev
A-06 1530 J. Duke
A-07 1630 NDCM IOC meeting

Wednesday
A-08  800 B. Tittmann
      Picnic     1730 Duck Pond

Thursday
A-09  800 S. Kendarian
A-10 1030 R. Zoughi
A-11 1320 B. Djordjevic
A-12 1530 W. Arnold

NESC NDE TDT Face-to-Face Meeting
Wednesday, June 22, 2011, 1:00 – 5:00 pm

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