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Introduction to Workshop on Accuracy of Load and Strain Measurement of Testing Machines

How accurate is accurate?

What does traceability mean?

How can anyone be sure that the data they receive has enough resolution to maintain the accuracy they are looking for?

These questions and others, relating to the accuracy of test results in material testing, were subjects of the papers presented at the Workshop on Accuracy of Load and Strain Measurement of Testing Machines, held on 18 November 1992 in Miami, FL.

The accuracy and traceability of the main parameters of testing machines (load and strain) received increased attention due to the regulatory organization's requirements (ISO 9001, Guide 25, MIL STD 45662A, etc.) for traceable documentation related to M&TE (Measurement and Test Equipment).

Several national and international standards are regulating testing machine performance and accuracy of test results (ISO 7500/1, ASTM E 4 and E 83, United States, JIS B7721 and B7728, Japan, and BS1610, Great Britain, etc.), some of which are similar and some different. ASTM Committees, E-28 and E-9, (currently E08) recognized the importance of the subject and sponsored the workshop. In the past few years, ASTM Committee E-28 has done a lot of work to improve and enhance the existing standards relating to force and strain machine verification. As an example, current changes in the most widely used standard, ASTM E 4, Practices for Force Verification of Testing Machines, allows verification of repeatability based on global accuracy, establishing the definition of resolution and definitely bringing the United States, European, and Japanese standards closer together. Attendance by participants from the United States, Great Britain,

and Germany, in this slow economy, indicates the interest that the subject has generated around the world.

Presentations and discussions of the resulting workshop confirm that the accuracy of the basic parameters of material, due to testing machine performance, is definitely a topic of interest. The workshop had eleven presentations which resulted in nine fine papers. Five of them were represented in the November 1993 issue of this Journal and four are presented in this issue.

Two of the papers related to the verification of the performance characteristics of the extensometers in dynamic conditions. F. J. Albright and J. Anala presented experimental data which clearly demonstrated the importance of the fact that the performance of extensometers is dependent on the dynamic parameters of the testing machine. This factor has been left out of ASTM standards regulating dynamic verification of testing machines.

There is always the question as to how to verify the automated data acquisition. A paper presented by B. Roebuck, J. D. Lord, P. M. Cooper, and L. N. McCartney described a method to validate the data acquisition relative to the calculation of Young's Modulus for the properties of metal matrix composites (MMCs). Results achieved will contribute toward the process of quantifying the uncertainties associated with each component of the measurement process.

Last but not least is a paper presented by F. M. Tovey that deals directly with uncertainties of the force calibration system. The methodology described is generic and could be useful in many applications where uncertainty analysis is critical. The actual error evaluations are specific to the measurement process and testing equipment used.

Overall, the workshop confirms the importance of the subject of accuracy of the main parameters of the testing machine (load and strain), and there is great interest throughout the materials testing community.

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