Professional Affairs

YES, BUT WOOD IS SUCH A VARIABLE MATERIAL . . .

How many times have you heard this expression or its equivalent: "Well, you know, wood is a biological material . . .", followed by a knowing glance that elicits, among us practitioners, a reassuring response? If the glance had to be verbalized, it might be translated as: "You and I are clever fellows, but the problems we are confronted with are so difficult that we, as bright as we are, will not be able to solve them." All of us wood scientists are a little guilty of this way of thinking. Perhaps there is an element of truth to this sentiment but unfortunately, it is unproductive.

I have had the good fortune in the past few years to attend conferences that dealt with various subject areas related to materials science. I was struck by the complexity of the problems confronting other materials scientists. It was refreshing to see new approaches. It seemed to me that wood science could benefit by exposure to these new ideas and conversely we have unique problems that others would be interested in if we would take the time to communicate them. With this in mind, I would like to review briefly two meetings and share some thoughts concerning the integration of wood science into the overall material science community.

The conferences I attended were the Fourth International Congress for Stereology and the Second International Conference on Mechanical Behavior of Materials (ICM-II). The stereology conference was held at the National Bureau of Standards in Gaithersburg, Maryland, on September 4–9, 1975. It was sponsored by the International Society for Stereology (ISS), the National Bureau of Standards, and the National Science Foundation. The conference proceedings are available as a special publication of the National Bureau of Standards[1].

What is stereology? The ISS defines stereology as the study of methods for the exploration of three-dimensional space when only two-dimensional sections through the solid, or their projections on a surface, are available. The basic objective of the society is to develop and promote the use of methods to quantify this information. A partial list of the keywords found in the abstract of the proceedings should give a flair of the topics with which the society concerns itself: anatomy, automated microscopy, curvature, geometric probability, image analysis, materials science, microstructure, mathematical morphology, oriented structures, pattern recognition, probability theory, quantitative microscopy, serial sectioning, shape parameters, size distributions, stochastic models, and three-dimensional reconstructions.

As with all societies, there are within the ISS internal affinity groups. At the conference, the mathematical types concerned themselves with solutions to problems involving relationships between the physical/geometrical characteristics of the material elements and sampling data obtained by superimposing grid systems on two-dimensional views of the microstructure. A group from the biomedical community applied the sampling techniques to characterize numerically, anatomical features of different organisms. By quantifying certain features, the development of changes in tissues accompanying various

[1] Underwood, E. E.; R. deWit; and C. A. Moore, eds. 1976. *Proceedings of the Fourth International Congress for Stereology held at the National Bureau of Standards, Gaithersburg, MD, September 4–9, 1975.* National Bureau of Standards Special Publication #431, 547 pp.

disorders were portrayed in time. Metallurgists used the techniques to estimate sizes and shapes of microstructural elements and related this information to the mechanical and physical properties of metals. (Is not one of the main goals of materials science to establish structure/property relationships? How is this to be done without numerical values for the geometrical aspects of the material microarchitecture?)

There were other interesting applications presented at the meeting. The development of crack patterns in concrete during compressive loading was monitored and the degree of anisotropy of the patterns was determined. An attempt was made by a Swiss physicist to categorize snow on the basis of textural parameters and mechanical properties (hardness and tensile strength!). This was the first stage of a research program to predict avalanches. As I listened to these papers, the following questions occurred to me: Since the strength of wood and wood products is essentially related to defects, why haven't we started characterizing defects? And, why hasn't microstructural information been used to establish utilization categories for wood? Is density the only microstructural parameter we need?

Conspicuously absent from the meeting was any sizable contingent of scientists from botany-related areas. Of the 113 papers, only three dealt with plant material (two involved wood). This was unfortunate as there must be any number of areas where the standard techniques of stereology could be used to augment research on plant materials. In wood science, for example, more quantitative microstructural information could be incorporated in studies involving growth, genetics, identification, structure/property relationships, and quality control of wood products. It should not go unnoticed that the age of image analyzers undoubtedly will soon be upon us and unless one knows what to measure and how to measure it, a great deal of ambiguous and useless data will be generated and inserted into the literature. Perhaps the time is ripe for SWST to develop a liaison committee with ISS and coordinate a means of transferring the techniques of stereology to wood scientists.

Whereas the stereology meeting was concerned with material microstructure, the other conference, ICM-II, was concerned primarily with the mechanical behavior of materials. ICM-II was held under the auspices of the Federation of Materials Societies. The American Society for Metals served as the conference secretariat and published a proceedings[2] of "short" papers—those presented at the meeting. A postconference publication of invited papers will appear at a later date. The avowed objectives of the meeting were: 1. To provide an international forum where researchers from many diverse disciplines could share with each other various concepts and methodologies; and 2. To promote and encourage closer international interaction and cooperation among the various disciplines of materials science. It was encouraging to see a wood scientist on the organizing committee and a specific call for papers dealing with wood and wood based materials being made. However, only five papers of some 400 were about wood or paper. Consequently, the call was either not heard or went unheeded, or the rejection rate of wood papers was high.

Topics covered at the meeting are best summarized by the titles of the seven sessions: elastic, plastic, and viscoelastic properties; creep; fatigue; fracture; testing; structure/property relationships and design. Since it was impossible to attend all sessions, I will not try to review even parts of the conference. Suffice it to say that although I did a lot of session jumping, I left the meeting with the feeling that the similarities in mechanical behavior ex-

[2] Anon. 1976. *Proceedings of the Second International Conference on Mechanical Behavior of Materials held in Boston, MA, August 16–20, 1976.* American Society for Metals, Metals Park, OH. 2051 pp.

hibited by different materials are greater than what one might expect from the divergence of their microstructures. A prime example is fracture. Regardless of the material, fracture toughness appears to have attained universal acceptance as a measure of strength just as Young's modulus, for some time now, has been accepted as a universal measure of stiffness. In a plenary lecture, the concept of a material life cycle was discussed by the director of the Office of Technology Assessment, U. S. Congress. The fact that the utilization of materials can be evaluated by a single concept is also evidence of the similarity between materials.

Both the ISS and the Federation of Materials Societies are planning future conferences. Wood and fiber scientists could and should be active participants in these coming meetings.

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