



Donald O. Thompson

DONALD O. THOMPSON

1927–2013

Elected in 1991

“For major contributions to placing quantitative nondestructive evaluation on a firm foundation of interdisciplinary science and engineering.”

BY LEONARD J. BOND

SUBMITTED BY THE NAE HOME SECRETARY

DONALD OSCAR THOMPSON was a creative force who recognized that there was not an adequate science base for non-destructive testing (NDT) to be more quantitative and went on to establish the field of quantitative nondestructive evaluation (QNDE). He died on July 29, 2013, at the age of 86. A week before he died he achieved his goal of attending the 40th QNDE meeting in Baltimore, where he was recognized as a leader in the development of the global NDE community and the founder of the *Review of Progress in Quantitative Nondestructive Evaluation*.

Don was born on February 27, 1927, in Clear Lake, Iowa, a rural vacation community midway between Minneapolis and Des Moines. He enjoyed his high school years there—he participated in three sports and band, and was dedicated to academics. He also worked during his school years, delivering groceries and newspapers and at a meat packing facility in nearby Mason City. He played trumpet and won a national championship in a band contest.

He was drafted into the Navy in the summer of 1945. During boot camp, the Navy determined that he should attend NROTC at the University of Idaho, where he met and fell in love with Barbara Newell. They married and moved back to Iowa, where he attended the University of Iowa, graduating summa cum laude with a bachelor’s degree in physics, a

master's, and in 1953 a PhD. He became a member of Phi Beta Kappa.

After university he switched branches of service and became a commissioned officer in the US Air Force; he worked at the Air Force Cambridge Research Center, Hanscom Field (Bedford, Massachusetts), in the Atomic Effects Directorate research facility for two years. He was then transferred to Tennessee as part of the Atomic Energy Commission and in 1954 was assigned to Oak Ridge National Laboratory, where he worked in the Solid State Physics Division.

In 1963 he returned to civilian life and for 15 years worked in a variety of positions for Rockwell International Science Center in Thousand Oaks, California. While there he recognized that to be able to effectively perform fracture mechanics, a field that was emerging in the 1970s, a quantitative basis was needed for NDT. His goal was to provide the science, and then technology, needed to determine the significance of a crack or defect in service, to reliably detect it, and to provide its characteristics, including size.

Don's vision was to establish unified lifecycle engineering (ULCE) and the tools needed in addition to QNDE. The ULCE concept itself is not his—it emerged in USAF parlance—but he had a strong view of QNDE as a critical component of ULCE. He advocated for QNDE being integrated into lifecycle system design activities. By doing so he promoted NDE from an in-service-oriented reactive function to a science-based, proactive, reliability assurance function. He wanted to see design tools that could enable NDE (and stress) analysis, in a parts design process that would allow the full impact and benefits of a fracture mechanics approach.

The path to develop QNDE began with a program of the Defense Advanced Research Projects Agency (DARPA), a funding source noted for visionary and enabling research, the culmination of which was an understanding of the role of QNDE in supplying the defect properties for an effective implementation of a fracture mechanics design philosophy. A key feature of the program was the Annual Review of Progress in QNDE, which became a conference series under the same

title; the proceedings of these meetings, which he edited (with Dale Chimenti), now represent 40 years of the progress literature for QNDE.

In 1979 Don and Barbara moved to Ames when he joined the Department of Energy Ames Laboratory and Iowa State University (ISU), where he became Anson Marston Distinguished Professor in the Aerospace Engineering Department. He initiated the creation of, and was the founding director for, the Center for Nondestructive Evaluation (CNDE), an NSF Industry-University Cooperative Research Center (I/UCRC) devoted to researching, teaching, and practicing NDE, moving NDT to a more quantitative and science-based approach for analyzing the condition of materials and safe life for structures.

Founded in 1985, CNDE is one of only a few of the 150 centers that have prospered through three full terms of this NSF program. Don did much to leverage the model, which is unique in that these NSF I/UCRCs involve a core of research professionals and faculty and enable them to build larger funded programs. At CNDE this included a NIST program for integrating NDE with the design process (design for inspectability)—part of a pioneering effort to raise the status of NDE as an important part of lifecycle engineering and damage-tolerant design and—major Federal Aviation Authority (FAA)—funded programs, which added a Center for Aviation Systems Reliability (CASR), an Aging Aircraft Center of Excellence (AAACE), and the Engine Titanium Consortium (ETC). The latter two were large multidisciplinary and multi-institutional R&D programs that had important benefits for the aerospace engineering community nationally and internationally. For example, the ETC resulted in advances that reduced the numbers of uncontained engine failures by 80 percent. A number of other programs for which Don was in large part responsible engaged almost every US federal agency with interests in advanced NDE.

Through a collaboration between CNDE and ISU's College of Engineering, Don helped develop a fully accredited minor in NDE at the college, a first-of-its-kind program. He also worked to establish NDE both nationally and internationally.

Together with his colleagues and staff, they developed the CNDE into a world-class scientific organization and hub for the World Federation of NDE Centers, which Don created.

Don was honored for his distinguished contributions to engineering and science by election in 1991 to the National Academy of Engineering. He served on the NAE Panel on Non-Destructive Inspection (1980–1983) and on the NRC Committee on Aging of US Air Force Aircraft (1996–1997). In 2002 he was one of only 19 foreign scientists elected to India's National Academy of Engineering. He was also a fellow of the American Physical Society, Institute of Electrical and Electronics Engineers, and Rockwell International Science Center. He was honored by Iowa State University as one of 150 Visionaries that shaped the institution.

He began phased retirement in early 1997. In 1999 he accepted a position as scientific advisor to the director of ISU's Institute for Physical Research and Technology. He remained active in the organization of the Annual Reviews of Progress in QNDE, and was president of QNDE Programs, a nonprofit he had founded to sponsor the meeting.

Don Thompson was a tenacious fighter for what he believed in, and his vision and perseverance did much to establish NDE in both the US and global R&D community. His legacy includes a 52,000-square-foot center with faculty, staff, students, and alumni who form a network of national and international connections. The center, a global resource, has seen more than 120 graduate students successfully complete its programs and they now practice NDE on at least six continents.

At the July 2013 Annual Reviews meeting one of Don's long-time colleagues commented in his speech, "Don ruled with an iron hand, but was compassionate and the best boss I have ever known." He will be greatly missed by his many friends and colleagues in the NDE community.

Besides his professional science and engineering life, Don was an accomplished trumpet player and played in several bands in his spare time. As a young man he parlayed this into a money-making effort as part of a traveling musical ensemble that played at clubs and roadhouses in the Midwest and

the West! In his later years he played with the Non-Semble, a Clear Lake band of retirees who gathered once a week to enjoy music and friendship and to share their joy in performances at community events.

Don was very much a family-focused, faith-based man. Summers would find him on Clear Lake with family and friends or cruising the Mississippi River with his boys. He enjoyed sharing his time and passion for boats, including one that he built. And his dogs were regular companions.

Don is survived by Barbara, his wife of 67 years; sons Jim, Steve, and John and their spouses; 9 grandchildren, and 15 great-grandchildren.