EIVIND HOGNESTAD

1921–2000

BY IVAN M. VIEST

EIVAND HOGNESTAD, an internationally recognized leader of structural development, died in Evanston, Illinois, on February 16, 2000. Before his retirement in 1989, he devoted his entire professional career to the planning and execution of research and development in the field of reinforced concrete structures. For most of that time he worked for the Portland Cement Association and its latter-day creation, the Construction Technology Laboratories, Inc., where he attained the position of the director of technical and scientific development.

Born at the Hognestad farm in Time parish in Norway on July 17, 1921, Eivind was raised in a country house located on Gandsfjord about five miles from the city of Stavanger. He received his early schooling in a little country grade school and his religious upbringing in a one-room country church. From there he went to the Cathedral School in Stavanger and graduated in 1940. During the "country years" Eivind developed a great love of music and the ocean. The first led to his learning to play the violin and to a life-long interest in concerts and the opera. The second led to craving for a boat. After learning to swim and demonstrating it was to his parents by swimming across the fjord, Eivind was permitted to use a small boat that he built with his own hands. In later life, he became the "Mr. Fix-it" for his family and friends, and an ingenious experimenter in the research laboratories. Sailing taught him how to use a map and a compass. A

few years later when he was fleeing German-occupied Norway for Sweden, this skill saved his life.

From Sweden he was sent to England. Following a thorough British Naval training, he served in the Royal Norwegian Navy as a quartermaster radar mechanic for the remainder of the war. Upon completion of the military service, Hognestad entered the Norwegian Institute of Technology (NIT) at Trondheim, Norway, to continue studies that had been interrupted by the war. He received the civil engineer diploma (Sivilingeniør) in 1947 and departed shortly thereafter for the University of Illinois at Urbana-Champaign. As a research assistant to Professor Frank E. Richart, he was first involved in the nearly completed series of tests of reinforced concrete column footings. He also continued his studies, obtaining an M.S. degree in theoretical and applied mechanics in 1949. He then embarked on an extensive investigation of reinforced concrete columns subjected to combined bending and axial load. Hognestad submitted the results of the investigation to NIT as a doctoral dissertation and later made a trip to Norway to defend it. Upon a successful defense, he was awarded the D.Sc. degree in 1952. When Professor Richart suffered a disabling stroke, Hognestad was assigned most of Richart's research projects and shortly attained the rank of assistant professor. Later, he was promoted to associate professor.

Dr. Hognestad's dissertation made a major contribution to the understanding of the behavior of reinforced concrete. It provided a basic interaction relationship for determining the short-time strength of reinforced concrete columns. As a part of the defense of the dissertation, his attention was directed also to the problem of the strength of long reinforced concrete columns. Even earlier, he had studied the problem of the shear strength of reinforced concrete beams. Furthermore, an extension of Dr. Hognestad's dissertation was concerned with the effect of time on the strength of columns. All these investigations were sponsored by the Reinforced Concrete Research Council (RCRC) with the goal of establishing a scientific base for improvements in the design of reinforced concrete structures.

In 1953, the Portland Cement Association offered Dr. Hognestad the position of the manager of their structural devel

opment section. His assignment was to design, staff and manage a new state-of-the-art structural laboratory. He first visited leading structural testing laboratories in North America and Europe, then went ahead with the design and construction of the facility near Skokie, Illinois, on the grounds shared with the main office building of the association. Just about that time, there was a national epidemic of failures caused by the lack of knowledge of the shear strength of reinforced concrete. Dr. Hognestad saw to it that several investigations of this problem were carried out. He served as chairman of a national committee that correlated all investigations and developed a solution to the failure problem. The results of these efforts continue to be used today in the design of reinforced concrete structures for shear.

The publication in 1956 of the American Concrete Institute's (ACI) *Building Code Requirements for Reinforced Concrete* was a major milestone in Dr. Hognestad's work. The code contained an appendix titled, *"Abstract of Report of American Concrete Institute-American Society of Civil Engineers Joint Committee on Ultimate Strength Design"*. This six-page document was the predecessor of the strength design that is today in universal use for the design of reinforced concrete structures in the United States. The acceptance of the strength method by the profession was in no small measure due to the Dr. Hognestad's steadfast, effective leadership. Other major contributions by Dr. Hognestad were his studies of high strength reinforcement, prestressed concrete and high strength concrete. Although his studies were aimed at implementing even higher levels of the strength of the reinforcing bars, the minimum yield strength of 60,000 psi used universally today represents a 50 percent increase from the levels in general use prior to Dr. Hognestad's investigations. These advancements were among the keys to enormous increases in the maximum height of modern reinforced concrete buildings and in the maximum length of spans of modern concrete bridges.

In addition to directing major research programs in reinforced and prestressed concrete, Dr. Hognestad served as consultant on several pioneering construction projects. In the early stages of the development of the oil fields in the North Sea, the application of reinforced concrete to off-shore structures ap

peared to offer potential economies. However, no accepted design procedures were available. Dr. Hognestad was retained to work with the designers and regulators from Norway and the European community to develop suitable methods of design. As a result of this effort, reinforced concrete offshore structures are now in common use throughout the world. His other major consultations involved the designs of nuclear power plants and of silo structures for ballistic missiles, and an investigation of reinforcement corrosion in marine structures.

Dr. Hognestad was elected a member of the National Academy of Engineering in 1973. He was also elected a member of the Royal Norwegian Academy of Science and an honorary member of the ACI. He was the recipient of many professional awards. His first and last awards were the 1955 Walter L. Huber Research Prize of the American Society of Civil Engineers (ASCE) and the 1990 University of Illinois Alumni Award for Distinguished Engineering Service. Among those received in-between the two were such coveted honors as the Alfred E. Lindau Award of the ACI and the Arthur J. Boase Award bestowed by the RCRC.

Dr. Hognestad was a leading participant in the work of many technical and administrative committees. He was a member of the ACI Committee 318 during the development of the 1956, 1963 and 1971 B*uilding Code Requirements for Reinforced Concrete* and was chairman of the ACI Committee on Offshore Concrete Structures. In the ASCE he chaired the Administrative Committee on Masonry and Reinforced Concrete, and served as a member of the RCRC. He chaired the Technical Activities Committee of the Prestressed Concrete Institute, and participated in the work of the European Concrete Committee and of the International Prestressing Federation.

Dr. Hognestad became active in national society work at a time of major progress in the basic understanding of the behavior of civil engineering structures. His charismatic personality, his facility with the spoken word, and his deep understanding of the appropriate roles of science and experience in practice helped him to inspire the post-war code writers to adopt rapidly the latest scientific advancements in developing the rules for the design of reinforced concrete.

A prolific writer, Dr. Hognestad authored and co-authored well over 100 papers and reports published in technical journals on subjects dealing with structural engineering and construction. Perhaps his most significant publication was the *University of Illinois Engineering Experiment Station Bulletin 399, "A Study of Combined Bending and Axial Load in Reinforced Concrete Members",* issued in 1951. This was the subject submitted to NIT as his doctoral dissertation. His other papers of particular note covered such topics as the ultimate strength design; shear strength of beams, slabs and walls; rigid frame failures; and high strength reinforcing bars.

Dr. Hognestad was a talented linguist. He was fluent in five languages and had limited working knowledge of another two. This proved especially useful in his studies of technical literature in his extensive contacts with the engineering community abroad.

Since 1560 the Hognestads have been buried in the same little country churchyard near Dr. Hognestad's home in Norway. In accord with Dr., Hognestad's last wish, his ashes were buried alongside the graves of his ancestors. He is survived by his wife, the former Andreé Stryker; daughter, Kirsten (Mrs. David J. Gordon); son, Hans; six grandchildren; and a sister, Bolette Lea.