



Jack W. Nelson

Jack N. Nielsen

1918-1990

By Dean R. Chapman

JACK N. NIELSEN, a pioneering developer of engineering methods for analyzing the aerodynamic characteristics and interference effects of various aerospace configurations, died in his sleep on October 31, 1990, at age approaching seventy-two.

During his forty-nine-year professional career, Jack contributed extensively to both government service and the aerospace industry. Early in his career he served for thirteen years as a research engineer with the National Advisory Committee for Aeronautics (NACA), and near the end of his career served for six years as chief scientist at the Ames Research Center of the National Aeronautics and Space Administration (NASA). In the private sector, he was first a cofounder and director of research of Vidya, Inc., and later the president and founder of Nielsen Engineering and Research, Inc. In his professional activities, in both government and private industry, Jack's main technical contributions were to research and development of advanced methods for the aerodynamic engineering of aerospace vehicles.

Jack was born on November 21, 1918, in Carnarvon, Wales, the son of a captain of a merchant marine ship. Although born in Great Britain, Jack's family moved to the United States when he was young, enabling him to become a naturalized U.S. citizen at age twelve. He graduated from the University of California, Berkeley, in 1941 with a B.S. in mechanical engineering, but

soon thereafter served with the U.S. Army Engineers during World War II. Following military service, Jack studied aeronautics and mathematics at the California Institute of Technology, receiving an M.S. in 1949, and two years later his Ph.D.

Jack Nielsen is internationally renowned in aerospace engineering, especially for his highly original contributions to missile aerodynamics. These began with his Ph.D. thesis research wherein he developed a special set of transcendental mathematical functions that could be applied to analyze the effects of wing-body-tail interference. In the 1950s relatively little was known about missile aerodynamics except that the then existing body of knowledge about aircraft aerodynamics could not be applied to the greatly different shapes of missiles. Jack conducted many aerodynamic research investigations during his years with the NACA Ames Aeronautical Laboratory, leading to publication of his book *Missile Aerodynamics* in 1960. Although published decades ago, this book is still used regularly and is deemed a classic. It has been translated into foreign languages, including Russian, and has become a standard in the field.

During his years in private industry, Jack's research contributions continued and extended to a variety of other areas of supersonic and subsonic aerodynamics. He made fundamental contributions in the 1960s to methods of computing separated flows on aircraft and missiles, and in the 1970s to methods of computing vortex flows behind bodies and aircraft. He then developed new methods for computing trajectories of store separation from their carrier aircraft. Beginning in the 1970s before the subject became popular, Jack pioneered in developing engineering methods for analyzing the nonlinear aerodynamics of vehicles such as modern fighter aircraft that must operate at very high angles of attack. He also contributed several key papers on orbital mechanics and atmosphere entry. Altogether, Jack published nearly two hundred technical papers between 1943 and 1984, some on quite different subjects including parawings, sail rotors, dispersion in estuaries, and wake turbulence.

In recognition of his many fundamental contributions to aerodynamics engineering, and to his status as the leading

authority on missile aerodynamics in the United States, Jack was selected in 1979 to present the distinguished Wright Brothers Lecture of the American Institute of Aeronautics and Astronautics. His subject was missile aerodynamics. Jack was a fellow of the Royal Aeronautical Society and of the American Institute of Aeronautics and Astronautics. He was elected to the National Academy of Engineering in 1985.

Jack did not confine his work to research accomplishments or corporate entrepreneurship. The breadth of his professional work is reflected in the various national committees he served on: AIAA technical committees of fluid dynamics, of atmosphere flight mechanics, and of missile systems; NASA committees for aerodynamics stability and control, and for configurations and aerodynamics; and U.S. Navy panels for gas dynamics and for missile stability and performance.

In personal character, Jack Nielsen was a man very tolerant of those whose life-styles and beliefs were far from his own. He was always sympathetic to people less fortunate than most, and invariably exhibited professional integrity without facade or pretense. Very direct and forthright in his demeanor Jack would state clearly if something appeared good, and would not hesitate to exclaim even more clearly, sometimes in deep stentorian voice, if it did not.

His integrity and strong feelings about what he believed was right were revealed early. United States participation in World War II started shortly after his professional career began as a young graduate mechanical engineer engaged in research at NACA's Langley Field, Virginia. Jack felt strongly about his country's war effort. Believing that he could contribute more directly and effectively by being in the military service, Jack resigned his comfortably secure research position with NACA, and enlisted as a private in the U.S. Army. It was while serving with the armed forces in Germany that he met Gisele, who became his wife of more than four decades.

Individuals of the personal character, integrity, and professional capability of Jack Nielsen are not common. He is indeed missed by his family, friends, professional colleagues, and employees of the company he founded.