

## MEMORIAL RESOLUTION

### NICHOLAS J. HOFF

(1906 - 1997)

Nicholas J. Hoff, Professor Emeritus of Aeronautics and Astronautics, died at his home on the Stanford campus on August 4, 1997 at the age of 91. In his career of almost 60 years, he contributed significantly to the rapid growth of present-day aviation. He was an outstanding - even great - aeronautical engineer, an exceptional teacher and educator, a fine gentleman, and a devoted friend and husband. In his research career from the 1940s through the 1960s, he pioneered the study of elastic stability of reinforced thin-walled structures such as those used for fuselages of today's commercial aircraft.

Nicholas was born in Magyarovar, Hungary on January 3, 1906, the son of Miklos and Lenke Hoff. He grew up from the age of eight in Budapest, where he graduated from the same school as Eugene Wigner, Leo Szilard, and John von Neumann, all fellow members (along with Edward Teller, Theodore von Kármán, and others) of the remarkable migration of Hungarian scientists and engineers to the United States in the period between World Wars I and II. In his school years, Nicholas was an avid reader, especially of books on history and geography and also of Hungarian and German literature. Private lessons in English and French also helped him cultivate his gift for languages. In preparatory school, he pursued another of his talents by playing the violin in the school orchestra and in a string quartet with his classmate Antal Dorati, the later-prominent symphony conductor.

Following preparatory school, Nicholas entered the Swiss Federal Institute of Technology in Zurich, where he studied under the famed mechanical engineer Aurel Stodola and received the Dipl. Ing. in 1928. Sometime during his schooling, he suffered a skiing accident that left him for the rest of his life with little feeling in his right arm and leg. This circumstance will surprise even most of his friends, since he rarely spoke of it. In 1929, as a member of the Hungarian Soaring Society, he achieved the rating of instructor in the newly developing sport of soaring flight. From an accident in this activity, he suffered a broken neck from which he was fortunate to survive. Also in 1929, he took a position as an aircraft stress analyst and designer with the Manfred Weiss Aircraft & Motor Works in Budapest, where he worked until leaving for the

United States in the autumn of 1938. In his days at Stanford, he liked to tell how, when choosing a propeller for a new design in far off Hungary, he depended on test data taken by Profs. William Durand and Everett Lesley in their classic wind-tunnel research on propellers at Stanford in the years 1916-26.

Nicholas's purpose in coming to Stanford was to study with the renowned authority on solid mechanics, Stephen Timoshenko. He intended eventually to return to Hungary, but matters did not work out that way. In 1939, with the start of World War II, his funds from Hungary were cut off. He therefore took a year's employment in Stanford's vibration and earthquake laboratory, assisting Prof. Lydik Jacobsen in his innovative experiments on the response of steel-frame buildings to earthquake shock. He left Stanford in the late summer of 1940, finishing his dissertation after leaving and receiving the Ph.D. in 1942. The dissertation was entitled "Stresses in a Space Curved Bar Reinforcing the Edge of a Cut-Out in a Monocoque Fuselage" and started him down the road he would follow for the rest of his career. On July 20, 1940, before leaving Stanford, Nicholas married Vivian Church, well-known on the campus as the efficient secretary and all-around administrative assistant to Dean of Men George Culver. The marriage continued until her death 29 years later.

In the fall of 1940, Nicholas joined the Polytechnic Institute of Brooklyn as instructor in aeronautical engineering. He rose rapidly through the ranks, becoming a full professor in 1946 and head of the Department of Aeronautical Engineering and Applied Mechanics in 1950. At Brooklyn, he became known as an outstanding lecturer and teacher, and the department prospered under his direction. In his research, Nicholas and his graduate students, with whom he had a strong relation, pursued his interests in airplane structural analysis. In recognition of this work, he was invited in 1953 to deliver the prestigious Wilbur Wright Memorial Lecture to the Royal Aeronautical Society in London. His widely used textbook *The Analysis of Structures*, which derived from his teaching and research at Brooklyn, was published in 1956.

In that same year, Frederick Terman, then Stanford's Provost as well as Dean of Engineering, proposed removing the existing small activity in aeronautics from the Department of Mechanical Engineering and expanding it into a graduate department of its own. The story goes that he sought advice about a suitable person to head the new department from Theodore von Kármán, internationally known director of the Guggenheim Aeronautical Laboratory at the California Institute of Technology. Kármán replied, "Nicholas Hoff - who else?" Upon Terman's invitation, Nicholas

returned to Stanford in the fall of 1957 to set up the new Department of Aeronautics, with the charge to make it among the best in the land. In October of that year, Sputnik was launched and, with government urging and support, growth proceeded faster than anyone had expected. The faculty, chosen carefully by Hoff, expanded rapidly, and in a few years the Department's research budget was one of the largest in its field in the United States. In recognition of the department's broadening concerns, its name was changed in 1962 to Department of Aeronautics and Astronautics. The Hoffes, meanwhile, built a house on the campus and became a gracious part of the Stanford community. Vivian, who had enjoyed their return to Stanford, died in April 1969.

At Stanford, as at Brooklyn, Nicholas and his students explored both theoretically and experimentally the stability of reinforced thin-walled structures being adopted for aircraft beginning in the mid-1930's. He and his students were first to identify a serious instability called inward-bulge buckling and devise ways to prevent it. Nicholas also studied the buckling of the aluminum sandwich materials widely used in today's aircraft. He also investigated the effects of supersonic aerodynamic heating on the stability of aircraft wings and fuselages. These investigations, as well as Nicholas' research on monocoque structures and shells are characterized by depth of physical understanding, thoroughness of execution, and balance between theoretical development and practical application. Nicholas's body of publications includes six books and more than 200 papers. His work on thin-walled structures has found application in submarines as well as aircraft.

Nicholas continued his leadership of the Department of Aeronautics and Astronautics until his Stanford retirement in 1971. In the event, he more than fulfilled Terman's charge. Under Nicholas, and continued by his successors, the department became recognized as one of the top three in its field in the United States. Its growing international notice was evidenced in the summer of 1968 when the department hosted the 12th International Congress of Applied Mechanics, with Nicholas as chief organizer and President. In the latter capacity, he greeted the participants at the initial session in the Frost Amphitheater in four languages besides English. This did not surprise his friends, since his gift for languages was well known to them; besides Hungarian and English and the Greek and Latin that were mandatory in Hungarian schools, he was fluent in French and German (and Swiss German) and able to at least communicate in two or three other tongues.

After his retirement at Stanford, Nicholas applied his considerable energy on an international scale. Teaching appointments included Monash University (Australia, 1971), Georgia Institute of Technology (1973), Cranfield Institute of Technology (England, 1974-75), Federal Institute of Technology (Zurich, 1975), and Rensselaer Polytechnic Institute (1976-81). Invited to lecture in Japan, he studied hard and pleased his hosts by giving his lectures in Japanese. On November 17, 1972 - the year following his retirement - Nicholas married Ruth Kleczewski. The Hoffes were noted for their warm hospitality when at home at Stanford.

Nicholas received virtually every major award in his field. Besides the British Wilbur Wright Lectureship previously mentioned, these included (but were not limited to) the Daniel Guggenheim Medal, the von Kármán Lectureship of the American Institute of Aeronautics and Astronautics, the Worcester Reed Warner Medal of the American Society of Mechanical Engineers, the Theodore von Kármán Medal of the American Society of Civil Engineers, and the Theodore von Kármán Memorial Lectureship of the Israel Society of Aeronautical Sciences. He was also elected to the U.S. National Academy of Engineering and made an honorary member or awarded a medal by aeronautical societies in Hungary, Belgium, Sweden, France, Japan, and India. In addition to his connections with professional societies, he kept in close touch with his field by serving as consultant to industry and government and on advisory boards for NATO, the U.S. Air Force and Navy, and NASA and its predecessor, NACA.

Nicholas brought intelligence, energy, and friendliness to everything he did. He could work readily with almost anyone and encouraged those who worked with him. Taking up his duties at Stanford, he quickly set a tone of collegiality and mutual assistance in his group that is not always present in academic departments and that persists to this day. His remarkable excellence in teaching is evidenced by the achievements of his many students. Regarding his recognized talents as an expositor, Nicholas sometimes told how, after presenting a talk to a general professional audience in New York, he was approached by von Kármán, who said, "That was a fine job. Everyone seemed to understand it. I'm not saying they really *did* understand it - but you made them *think* they did." Nicholas, though, did not teach just engineering. His students became devoted friends, who kept in touch with him and came to visit him in his final days.

Nicholas lived his life with gusto. In addition to his talents for languages, violin playing, soaring flight, and skiing already mentioned, he swam several times a week

until a few months before his death. After retirement, he also continued participation in departmental meetings and consulted with colleagues. When the damage from a hip injury in his youth was limiting his activities, he traveled to Switzerland to take advantage of the newly developed hip-replacement surgery not yet available in the U.S. He subsequently returned to skiing and other activities so vigorously that he eventually wore out the first prosthesis and had it replaced. After his death, he left an almost finished manuscript on the history of the technical development of aviation that he had labored on for years. Steps are being taken to edit and publish this lengthy work.

Nicholas is survived by his wife Ruth, step-daughter Karen Brandt of Palo Alto, and brother George Hoff of Santa Barbara. Notwithstanding his many talents and accomplishments, Ruth characterizes him as "a simple person - easy to get along with." We shall miss him.

George Springer  
Stephen Tsai  
Walter Vincenti