

## **MEMORIAL RESOLUTION**

### **ERNEST GUNTHER CHILTON (1919 – 1985)**

Ernest Gunther Chilton, Professor of Mechanical Engineering, Emeritus 1984, died at the age of 65, on January 22, 1985. He had lived with cancer for more than 10 years, and was able to come to terms with it in a rather extraordinary way. By his example of serene courage, and by his willingness to share his experience openly in his last several years, Ernie was able to offer his last and perhaps most profound teachings to his family, friends, students, and colleagues.

Ernie was born on May 3, 1919, in the Rhineland city of München-Gladbach. His father was born Felix Cohen, his mother Alice Goldschmidt of a well-known Köln family of jewelers. His family owned and operated a large textile plant, one of the principal commercial enterprises in the region. As a youngster, Ernie was introduced by his older sister to the pleasures of skiing and hiking, and under her influence developed his lifelong love of the outdoors. Through his mother, a pianist, he developed his intense feelings for music. Ernie early showed himself to be a brilliant and creative student, attending public and private schools in Germany and Switzerland. The themes of mathematics, mechanics, music, and mountains ran strongly throughout his life.

When the Nazis came to power in Germany, Ernie's parents and younger brother (Werner Chilton, B.S.E.E. Stanford, 1942) moved to the Netherlands. Ernie was sent to boarding school in England. His story was that he disliked it so much that he mastered English sufficiently in one term to enter London University's Imperial College of Science and Technology, at age 17. During three summers he worked as a mechanic at Amsterdam's Schiphol airport, and "fell in love with the Dutch." The family moved to California in the late 1930's, and in 1939 Ernie left Imperial College with a record of first class honors. He completed a Bachelor of Science degree in aeronautical engineering at Massachusetts Institute of Technology in 1940, and a Master of Science degree in aeronautics at California Institute of Technology in 1941.

Ernie taught mathematics and completed further studies at Illinois Institute of Technology in the early 1940's. During that period he married Elizabeth Myers. At the University of Akron, Ernie taught mathematics for two years, and simultaneously did classified research at the Daniel Guggenheim Airship Institute. Shortly before Ernie had completed his five-year residency requirement, his first son, Lance, was born, creating a long-standing family joke that Lance preceded his father in gaining U.S. citizenship. Lance now practices pediatrics in Albuquerque and consults at University of New Mexico School of Medicine.

In 1945 Ernie moved his family to his parents' ranch in Saratoga, and entered Stanford in 1946 as the last doctoral candidate under the School of Engineering's legendary Stephen Timoshenko. His dissertation topic was "Large Deformations of an Elastic Solid." Ernie was awarded the Royal Victor Fellowship, instructed in the Department of Civil Engineering, and received the Ph.D. degree in 1947. During his doctoral studies, his second son, Jan, was born.

After graduation, Ernie turned down Stanford's offer of a \$3500-per-year assistant professorship, and joined research laboratories of Shell Development Company in Emeryville.

Much of his early work at Shell was concerned with the transmission of fluids over great distances. He contributed particularly to the solution of problems arising from the unsteady nature of fluid flow in long pipelines. He also worked on diverse mechanical problems unique to the well drilling industry, including a study of the use of torque converters to operate mud pumps. The range of his interests at Shell is reflected in the diverse nature of the patents that were issued in his name.

During his career at Shell, Ernie was consultant to the parent company, and returned frequently to the Netherlands. He lived with his family in Berkeley, and later in Orinda. In 1958, Ernie and his first wife were divorced. His youngest son, Tony, born in Berkeley, returned to school in 1984 and is pursuing a career in engineering and physics.

In 1959, Ernie left Shell to accept an appointment as Manager of Mechanics Research at Stanford Research Institute in Menlo Park; ten years later he was appointed Director of S.R.I.'s Research and Development Office. Ernie worked on a wide variety of problems while at S.R.I., including vehicle technology for urban transportation, air pollution abatement, hypervelocity rocket sleds, multi-phase flow, and high-g linear accelerators. He was particularly proud of his extensive studies for the Bay Area Rapid Transit District which led to the adoption of the 516" rail gage (in contrast to the U.S. standard 415 1/2" gage) that permits BART cars to be considerably lighter than railroad cars, thus conserving material for construction and power during acceleration.

During the early 1960's, Ernie completed a major independent project, translating, from German, Walter Kaufmann's classic 'Technische Hydro- und Aeromechanik,' published as 'Fluid Mechanics,' McGraw-Hill, 1963. Also in 1963, while pursuing his hobby of woodworking in an adult education course at Menlo-Atherton High School, Ernie met Nancy Daveler Bishop, whom he married in 1964. In 1969 they moved to Tempe where Ernie had accepted an appointment as Professor of Mechanical Engineering at Arizona State University. It was there that he developed a great interest in motivation of learning and a love for experimenting with teaching methods. He was especially attracted to techniques that enabled students to become autonomous learners. By encouraging his engineering design students to discover what they needed to know and to learn it when they needed it, he was extremely successful in helping them to release their creative energies; his freshman design class won the American Society of Engineering Educators' National Design Competition three out of the five years that he taught it. He introduced his students to professional responsibilities for public service, researching with them a series of problems in air pollution control and coaching them in presentations to the state legislature. While teaching in Arizona, Ernie also co-authored, with G. C. Beakley, two widely regarded textbooks: 'Introduction to Engineering Design and Graphics,' Macmillan, 1973, and 'Design: Serving the Needs of Man,' Macmillan, 1974.

Ernie returned to Stanford in 1973, this time as Professor of Mechanical Engineering in the Design Division. Here he further deepened his commitment to teaching undergraduate students to teach themselves, learning and borrowing from such pioneers as Fred Keller and Carl Rogers. Along the lines of this interest, he also developed and taught a graduate seminar on engineering education for aspiring teachers. He worked intensively with local and national industrial associates, eliciting a steady flow of technical problems to challenge his students and to broaden the scope of their interactions in the engineering professional community. He built

on his broad background in industry and research, and never regretted having traded traditional management for the close interpersonal relationships he forged in the classroom.

Outside of Stanford, Ernie cultivated a growing professional involvement in the legal and technical issues of product liability. He was soon widely sought as an expert witness in investigations of injuries allegedly due to unsafe design or manufacture of products. Ernie considered this involvement in product liability litigation to be another form of engineering design education, with lawyers, judges, and jurors as his students as well as his teachers. Out of these courtroom experiences, he created at Stanford a course on product liability that was popular with graduate students in law as well as in engineering. His active participation in the product liability arena provided Ernie with the additional satisfaction of interacting with his son, Jan, who practices law in San Francisco and teaches in programs of continuing education for the Bar.

During his recent Stanford years, Ernie again traveled extensively abroad, lecturing and researching engineering education methods at a number of European universities great and small. During an around-the-world sabbatical in the early 1980's, he consulted for extended periods with faculties in The Netherlands, India, and Australia. He presented his last seminars and papers in Sweden, Austria, and Denmark in the summer of 1983, having outlived all prior medical prognoses.

A hallmark of Ernie's career at Stanford was his open door policy. He enjoyed being in his office all day, every day, so that he could be fully available to the many students who sought his counsel. In recognition of his exceptional contributions to students, he was honored in 1984 for years of service as a general advisor, and was totally surprised and pleased to receive the first School of Engineering Distinguished Advisor Award.

Over the course of his career, Ernie served in many capacities in professional organizations including Sigma Xi, American Society for the Advance of Science, American Society for Engineering Education, and Internationale Gesellschaft fur Ingenieurpaedagogik. A member of the American Society of Mechanical Engineers since 1947, he served the San Francisco Section as Chairman, Professional Divisions (1958-59), Section Vice Chairman (1959-60), and Section Chairman (1960-61). He also served the Santa Clara Section as a member of the Executive Committee (1961-63). He served the national ASME organization as a member of the Fluids Meters Research Committee, and as Chairman of the Pulsating Flow Subcommittee for more than ten years. He also served as a member of ASME's Design Division, Process Industries Division, Urban Technology Committee, and Honors and Awards Committee. In recognition of his significant contributions to his profession and to society, Ernest Chilton was honored with the designation of Fellow of the American Society of Mechanical Engineers in 1969.

In the spring of 1984, in considerable pain and with his health failing rapidly, Ernie insisted on completing his last teaching assignment, a large and demanding senior course in engineering design. His perseverance under the most trying of circumstances was a deeply moving demonstration of his inner strength and his total commitment to teaching and to his students.

Ernie's wife, Nancy, comforted and nurtured him during the final seven months of his illness, during which time he was to a large extent dependent on her loving care. During this

period, the many friends who visited them were touched deeply by the gentleness and compassion that they showed for each other, and by Ernie's continuing genuine enthusiasm for life. Ernest Chilton died peacefully in his home with Nancy and a small circle of friends at his side, and with Brahms' Ein Deutsches Requiem playing softly nearby.

Ernie's magnificent spirit and his ongoing influence are being commemorated through the Ernest G. Chilton Memorial Fund, administered by his Design Division colleagues.

Robert McKim, Chair  
Philip Barkan  
Henry Fuchs  
Bernard Roth