

In Memoriam Jacob Pieter Den Hartog

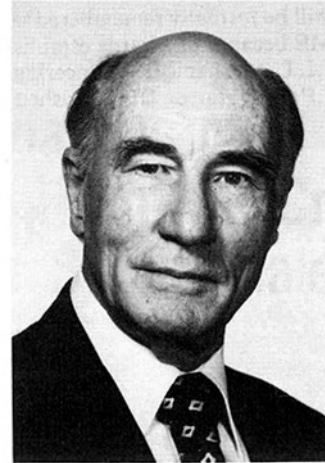
Jacob Pieter Den Hartog, internationally famous vibration consultant, author, and teacher, died on Mar. 17, 1989 after a long illness. He was the author of the best known textbook on vibrations and was widely acclaimed for his skill in identifying the underlying mechanisms responsible for unexpected vibration problems in machines and structures.

Den Hartog had been active in the Applied Mechanics Division of The ASME since its inception in 1927. Volume 50 (1927-1928) of The ASME Transactions was the first volume to contain papers contributed by the fledgling division. Three of Den Hartog's papers appear in this volume. When the Journal of Applied Mechanics began separate publication in 1933, it contained at least one Den Hartog contribution each year for the first seven years. Den Hartog served as Chairman of the Division in 1940 and 1941 and was honored with the Timoshenko medal in 1972. He returned to address the Division as the featured speaker during the celebration of the 50th anniversary of the founding of the Division in 1977.

Den Hartog was born on July 23, 1901 in The Netherlands East Indies (now Indonesia) where he lived until the family returned to Holland in 1916. He received his engineering training at Delft Polytechnical Institute in Holland, graduating with an E.E. degree in 1924. Because of poor economic conditions in Holland at that time, he emigrated immediately to the United States. Through a series of fortunate accidents he soon found himself in Pittsburgh working for Westinghouse as the assistant to a Russian emigré, Stephen P. Timoshenko, 20 years his senior. At that time American industry was growing rapidly and there were many opportunities to apply the more sophisticated techniques of European engineers. Timoshenko assigned the young Den Hartog a variety of vibration problems associated with electric motors and generators. Den Hartog worked at Westinghouse during the day and studied mathematics at the University of Pittsburgh in the evenings. He completed a Ph.D. program in 1929, with a thesis on nonlinear vibration. In 1931 he spent a sabbatical year in Göttingen, in the laboratory of Professor Prandtl. On his return in 1932 he joined the faculty of Harvard University and began his teaching career. He started lecturing on vibrations and assembling an extensive collection of vibration demonstration models. His lectures had such a reputation that professors from nearby M.I.T. would take the trolley across town to sit in with the Harvard students. Here he published the first edition of his famous text *Mechanical Vibrations* in 1934.

When the storm clouds of impending war began to gather, Den Hartog decided he could serve his adopted country better in the military than as a civilian. He was called to active duty in the Navy in 1941 and spent the war working on ship vibration problems for the Bureau of Ships. When the war was over, in 1945, Captain Den Hartog returned to civilian life and to a new post as Professor of Mechanical Engineering at M.I.T.

At M.I.T. he enthusiastically took up his teaching and consulting work. He was endowed with great energy. In addition to revised editions of *Mechanical Vibrations*, he published three distinctive textbooks (*Mechanics* in 1948, *Strength of Materials* in 1949, and *Advanced Strength of Materials* in 1952) which are still maintained in print by Dover Publications. He spent four months in 1955 as a Fulbright Visiting Lecturer in Japan and was invited to give the Thomas Hawksley Lecture in London in 1957, the first American to be so honored. Den Hartog served briefly as Department Head (1954-1958), but administration was not his strong suit. He



J. P. Den Hartog

loved to lecture and he loved to tackle challenging consulting problems. He loved music, was a good amateur violinist and a marvelous raconteur. He and his wife Beppie also loved to act as unofficial ambassadors to foreign students and scientists. They owned an island in the middle of Lake Winnepesaukee which they used to entertain visitors. For many foreign scientists their most vivid memory of America is of being bundled into a car, driven up to New Hampshire, seated in a canoe and paddled across the lake to spend an idyllic weekend on the island. In 1967 Den Hartog became Emeritus Professor but he continued consulting and part-time teaching until 1980 when arthritic joints finally deprived him of his mobility.

In his research publications Den Hartog made major contributions to the problems of nonlinear vibrations, Coulomb friction damping, galloping of electrical transmission lines, vibrations of electrical machinery, dynamic vibration absorbers, and torsional vibration dampers. The essential ideas and practical results of many of these investigations were incorporated in subsequent editions of *Mechanical Vibrations*. There were four editions in English: 1934, 1940, 1947, and 1956. There were also 15 foreign editions in 11 different languages. The style is simple and direct. The reader is skillfully led to the essential heart of each problem by means of simplified models. Sketches and diagrams are used in place of mathematical equations wherever possible.

Den Hartog's talents were widely recognized and he received many honors from his fellow engineers, from universities, and from prestigious academies. From The ASME, in addition to the Timoshenko medal, he received the Richards medal, the Worcester Reed Warner medal, and The ASME medal. The American Society of Engineering Education awarded him the Lamme medal and the Acoustical Society of America awarded him the Trent-Crede medal. He was an Honorary Member of The ASME and the Japan Society of Mechanical Engineers, and a Fellow of the British Institution of Mechanical Engineers. He was awarded honorary doctorates from Carnegie Institute of Technology, the University of Ghent, the Technical University of Delft, Salford University, and the University of Newcastle-Upon-Tyne. He was elected to both the U.S. National Academy of Science and the U.S. National Academy of Engineering, and to the American

Academy of Arts and Sciences and the Royal Dutch Academy of Arts and Sciences. At the end of his career he received three major awards during his 80th year: the James Watt medal from the British Institution of Mechanical Engineers, the Founders medal from the U.S. National Academy of Engineers, and the Order of the Rising Sun from the Emperor of Japan.

Den Hartog will be formally remembered within M.I.T. and within The ASME because of awards established in his name. In 1981, the M.I.T. Mechanical Engineering Department inaugurated the J.P. Den Hartog Distinguished Educator award

to recognize "excellence . . . in the tradition of Den Hartog." In 1987 The ASME Design Engineering Division established the Jacob P. Den Hartog award for "sustained meritorious contributions to vibration engineering" and presented the first medal to Den Hartog. Those of us who were fortunate enough to know him in his active days will always remember his uncanny physical insight and the energetic enthusiasm with which he made it all seem so simple.

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