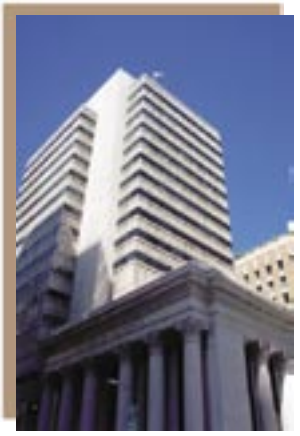
Henry J. Degenkolb: Earthquake Mastermind

By Richard G. Weingardt

Still only a young University of California (at Berkeley) engineering student when the devastating Long Beach (California) Earthquake struck in 1933, it captured Henry John Degenkolb's attention in a major way and set the direction of his life's work. This disaster, coupled with what was learned from previous horrendous earthquakes such as the 1906 San Francisco earthquake, exemplified the destruction nature's forces could have on structures if not properly designed. By the time Degenkolb graduated from California in civil engineering in 1936, he was anxious to become involved in engineering structural solutions that would mitigate the damage to life and property caused by earthquakes.



Bank of California, San Francisco, CA (1964)

Throughout his career, Degenkolb's devotion to–and leadership in–improving earthquake-resistive structural design standards and seismic public policy would become legendary around the world. He served on countless committees and panels, public and professional, to accomplish this. More than any other engineer of his time, he improved the rational basis for earthquake resistive design for all types of structures. Stronger collaboration between design engineers and seismologists also resulted from his unrelenting efforts.

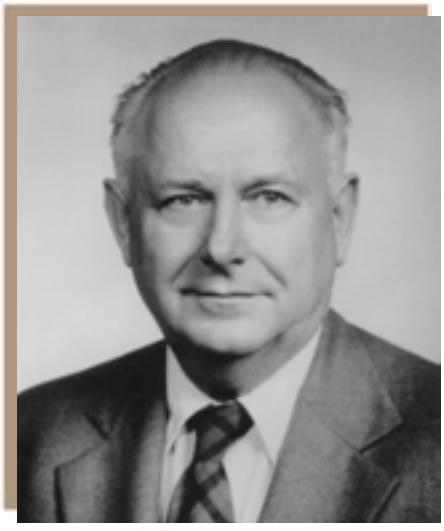
When he passed away on December 9, 1989, at age 76, Degenkolb was considered one of America's most world-renowned seismic authorities. His writings about the structural performance of buildings during earthquakes had been published in several languages and were being used as design standards around the globe. Many of his published writings dealing with seismic design for structures, such as *Earthquake Resistive Design of Small Buildings* (1960 *Proceedings of the Fourth World Conference on Earthquake Engineering*) became "bibles for design" in the structural engineering and construction industries.

Born on July 13, 1913, in Peoria, Illinois, Henry was the oldest of three sons of Gustav and Alice (Emmert) Degenkolb. His grandfather was a farmer in Wisconsin and his father a minister. But Henry and his two younger brothers chose not to follow in their footsteps. Instead, all three became engineers. Said Degenkolb, "I always liked mechanical things. Becoming an engineer was not a conscious thing. I just knew I was going to be an engineer since I was three or four years old."

His structural engineering career began with the San Francisco Bay Exposition Company, designing various buildings for the Golden Gate International Exposition of 1939-40. During this time, two people who would have great influence on his career came into his life. First was his wife Anna Alma Nygren, whom he married on September 9, 1939. She became his steady companion, accompanying him on his many visits to earthquake sites around the world. The couple would have five children: Virginia, Joan, Marion, Patricia and Paul.

The other person was John Gould, chief structural engineer for the Exposition Company and Degenkolb's boss and mentor. Once Gould, a highly respected and legendary figure in California engineering circles at the time, founded his own company, he hired Degenkolb as his star employee (1946). After several years as Gould's chief engineer, Degenkolb became a partner in the firm, renamed Gould and Degenkolb. Said Gould, "Even before he became a partner, Henry was the most valuable person in my firm, bar none, including me."

After Gould's death in 1961, Degenkolb continued as president and eventually renamed the firm H.J. Degenkolb Associates, Engineers. Today, it is simply called Degenkolb Engineers, Inc. During Degenkolb's leadership, the firm designed numerous multi-story structures around the country, many in the San Francisco Bay area. Among those incorporating the latest leading-edge seismic design concepts were (1) International Building, 1961, (2) Bank of California, 1965, and (3) Moffit Hospital Addition and Modifications, 1977-82. Extending



Henry Degenkolb (c.1960s)

International Building, San Francisco, CA (1961)

Union Bank of Portland, OR (1969)

beyond California, the Degenkolb firm also designed many other noteworthy seismically resistive projects along the West Coast including the Portland, Oregon, Union Bank highrise, completed in 1969.

The 22-story International Building featured a 12,600-square-foot floor plate on a 10,000-square-foot site. The feat was accomplished by cutting out the buildings corners and cantilevering floors out 16-feet on all four sides, after the building owners purchased the air rights from adjoining property owners. The corner cutouts reaped an additional dividend–eight instead of the usual four desirable corner offices on each floor.

The $16-million Bank of California was the March 2, 1967 cover story of *Engineering News-Record* as much for its unusual foundation system as its seismic innovations. The 21-story Bank rests on a five-story-deep combination structural steel and concrete foundation, built watertight like the hull of a ship to deal with the site's high water table and to "float" the building over poor soils. Built next to the Bank's historic 1908 building, the new structure was designed so as not to disturb the existing building during construction and in the future, when both structures would move differently during earthquakes.

Renovation of the existing H.C. Moffitt Hospital (now known as Long Hospital and constructed in the early 1950s) and construction of a new 16-story addition increased the hospital size from 320,000-square-feet to 730,000-square-feet. Part of the University of California (San Francisco) Medical Center Complex, the new addition was the first highrise hospital designed to comply with the then newly enacted California Hospital Regulations with ultra-demanding seismic criteria. Schematic designs began in 1972, final plans completed in 1974 and construction started in the fall of 1977. The project was completed in 1982 at a cost of $45.8 million.

What particularly set Degenkolb apart from his peers was his hunger to investigate all notable structures damaged by earthquakes, and to find ways to strengthen buildings against future occurrences. Because of his outspokenness about the devastating ramifications of earthquakes, in-depth seismic investigating and analyzing came to the forefront as an important branch of the civil/structural engineering profession.

Degenkolb constantly emphasized that good engineering judgment was critically important in earthquake design; that simply relying on codes was *not* sufficient to ensure seismic safety. He said, "One central reason is that engineering, especially earthquake engineering, is a learned profession, as much as medicine, law or theology, or even teaching. You could not, for example, write a code of medical practice that gave every detail and would govern everything a doctor does." Often, codes take ten years to write and a lot of important improvements can occur in that amount of time.

Degenkolb's first in-depth, "hands-on" site investigation of the effects of an earthquake occurred in 1952 with the Kern County, California, earthquake. After designing for earthquakes for years, he finally had the opportunity to visit a site immediately after an earthquake had occurred and to study its damages fresh. He said, "John (Gould) and I went down to Tehachapi on our own, over a weekend. The government didn't pay our way in those days. We were impressed and concerned enough that we also sent several of our designers to see the destruction." They thought their engineers could learn valuable lessons and be better structural designers if they personally had the visual experience themselves.

Later, and over the rest of his career, Degenkolb visited and was involved with analyzing major earthquake sites around the world, including Anchorage, Alaska (1964), Caracas, Venezuela (1967), San Fernando, California (1971), Managua, Nicaragua (1972), Guatemala (1976) and Mexico City (1985).

Degenkolb was instrumental in founding the Earthquake Engineering Research Institute (EERI) and organizing its First World Conference on Earthquake Engineering. From 1974 to 1977, he served as EERI's president and, over the years, presented several papers at its conferences.

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Moffit (Long) Hospital Addition and Modifications, San Francisco, CA (1977-1982)

Degenkolb in Caracas, Venezuela, inspecting after-effects of the Caracas Earthquake of 1967

He also contributed to many industry seismic design codes. For example, he was largely responsible for the development of the Applied Technology Council's Document ATC 3-06 *Tentative Provisions for the Development of Seismic Regulations for Buildings* (1972-78).

Long-time acquaintances of Degenkolb said: "To most of us, earthquakes are frightening events, but to Henry, they were his laboratory." In addition to the earthquake mastermind's structural engineering and design talents were his skills with the camera, which allowed him to carefully record intricate details of structural failures.

Said Stanley Scott, who interviewed Degenkolb in 1984-86 for EERI's Oral History Series, "All of his life, Henry took photographs–photographs of construction, of earthquake damage, of family vacations, of everything. He often had two or more types of cameras draped around his neck as he inspected earthquake and construction sites." His photographic archives numbered more than 30,000 slides, prints and negatives, that documented all major earthquakes between 1936 and 1986.

Throughout his career, Degenkolb was involved in leadership roles in a wide array of activities. He was the structural engineering consultant-of-record to the University of California, assessing seismic hazards for new and existing buildings. From 1970 to 1977, he was on the Bay Area Conservation and Development Commission and a founding member of the California Seismic Safety Commission.

Degenkolb was also a member of the California State Building Standards Commission (1971–1985) and an advisor to the California Joint Legislative Committee on Seismic Safety (1969–1974). Nationally, he was part of the President's Task Force on Earthquake Hazard Reduction, Office of Science and Technology, in both 1970 and 1978. From 1973 to 1985, he was the associate editor of the *Bulletin of the Seismological Society of America*.

Degenkolb's many professional honors included induction into the National Academy of Engineering and election as Honorary Member in ASCE. In 1967, he was recipient of ASCE's Ernest Howard Award for his preeminence in earthquake engineering.▪

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Photos courtesy of Degenkolb Engineering, Inc.