A Tribute to Jack E. Cermak

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At the 11th International Conference on Wind Engineering at Lubbock Texas in June this year a tribute was paid to the "father of wind engineering," Jack E. Cermak, for his many valuable and pioneering contributions to the subject by Ahsan Kareem, Robert M. Professor of Engineering, University of Notre Dame. This article presents a summary of that presentation which highlighted 50 years of wind engineering contributions by Dr. Jack E. Cermak, University Distinguished Professor, emeritus, Colorado State University, Colorado (Fig. 1).

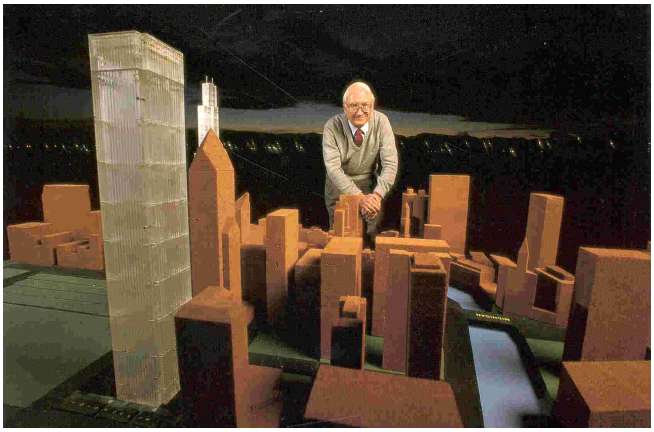

Fig. 1 J. E. Cermak in the wind tunnel with building models

Throughout the world, Dr. Cermak is considered the "father of wind engineering." In 1959, he founded the Fluid Dynamics Laboratory at Colorado State University (Fig. 2) where he pioneered the physical modeling of wind-structure interactions in boundary layer wind tunnels. The technique Cermak pioneered has now become a quintessential part of the overall design procedure for the design of structures to withstand wind gusts, which is today applied to projects from low-rise and high-rise buildings, long-span bridges, roofs, chimneys and towers to offshore structures, defense/aerospace installations and even sports apparel and arenas. Dr. Cermak has since served as a consultant and principal investigator for wind tunnel tests on over 500 new building projects. These projects include some of the signature structures around the globe, including his work in 1963, on the World Trade Center Towers. In 1999, the laboratory founded by Dr. Cermak was recognized by the *Engineering News-Record* as one of the 125 engineering innovations in the 125 years between 1874 and 1999.

Dr. Cermak has a distinguished career as an engineering educator as well; he has advised over forty doctoral students, who in turn are contributing to the fields of structural and

environmental engineering. This has led to generations of students influenced by him, e.g., several of his great-grand students have completed their doctoral studies and are beginning their careers in academia and industry.

Dr. Cermak has chaired many of ASCE's key technical committees earlier in his career and lately has done it again as a second round of his service to the profession. He also served as chair of the Committee on Natural Disasters for the National Research Council, which drew the agenda for post disaster investigations of natural disasters and their impact on built and social infrastructures. He has served as the Regional Editor (USA) of the *Journal of Wind Engineering and Industrial Aerodynamics*, Elsevier since its initial publication in 1973. This journal serves as a major source of research findings and design information for the effects of wind on structures. He has authored or co-authored more than 650 papers and reports.

In 1973, Dr. Cermak's pioneering research led to his election to the National Academy of Engineering. He was also selected to be among one of the twelve University Distinguished Professors at Colorado State in 1986 and in 1990 and was elected as an honorary member of the American Society of Civil Engineers. Chi Epsilon, the Civil Engineering Honor Society, also elected him as National Honor member in 1994. Through the contributions of his friends, ASCE last year instituted Jack E. Cermak Medal, administered by the Engineering Mechanics Division and the Structural Engineering Institute, for outstanding contributions to the area of wind effects on structures. The author is humbled by the honor of being the initial recipient of this award.

Dr. Cermak founded the Wind Engineering Research Council, which is renamed now as the American Association for Wind Engineering, serving also as its first President. He also was one of the lead organizers of the first United States meeting on the effects of wind on structures at Cal Tech in the early seventies. This meeting has grown to a major quadrennial conference serving those interested in the recent developments in wind effects on structures.

Dr. Cermak's "tour of duty" netted numerous prestigious awards and honors. A sampling of these includes awards from Sigma Xi, ASCE Aerospace Division, Structural Engineering Institute, ASME Distinguished Lecturer, Senior Research Award from ASEE, ASCE's Ernest E. Howard Award, and a citation from the National Society of Professional Engineers.

Cermak "Father of Wind Engineering"

The author is sure that most of you would agree with William Shakespeare that "there is something in the wind." However, while Shakespeare's fascination with wind was mostly poetic, Cermak's interest is primarily pragmatic. Initially Cermak's efforts in this field were confined to basic research concerning the development of scaling laws for physically simulating boundary layer flows in long test section wind tunnels. In the early sixties, it became apparent to him that an atmosphere simulated in laboratory could be applied to a host of practical problems. The first such example involved the investigation of the cause and recommended treatment for the 20 mph gusts wreaking havoc on the playing field of San Francisco's then new Candlestick Park. Known as "the cave of wind" in 1961 All Star game, baseball's best players committed seven errors and the relief ace was nearly thrown off the mound. This was all blamed on the capricious winds. The wind tunnel study showed that the geographic features and the stadium itself created this perilous condition and presented remedial solutions to revamp the Candlestick Park. It was also noted that

if the park had been built one playing field length to the north, much of the problems would have been avoided.

Wind Engineering came of age during the mid-1960s with a study of the then to-be-built World Trade Center Towers (WTC) in New York City (Fig. 2). This study by Cermak of the twin towers would be the first comprehensive study of the wind loading on a structure that could take a large variety of atmospheric variables into account. Colorado State received this project because, at that time, it was the only institution in the world with a boundary layer wind tunnel. Cermak gleaned personal and professional satisfaction from that project, as he believed that his group created something that was useful to society in general. However, Cermak attributed the subsequent mushrooming of wind tunnel studies only in part to the greater confidence in their predictive capabilities and recognized another contributing factor: in spite of all the mathematical and engineering sophistication possible with analytical modeling and computational tools, wind analysis still managed to evade the quantification essential for design. The demand further escalated with the advent of taller, slimmer, thinner-skinned buildings, which are more sensitive to the dynamics of wind actions unlike the masonry edifices built earlier. As the Boston Hancock Tower's difficulties became known, the issues of wind effects on tall buildings came to the forefront of engineering practice. As a result, the problems of Boston's John Hancock have been viewed by some as the tall building community's Tacoma Narrows, though others still blame it on structural issues.

In summary, Cermak's contributions in the scaling of atmospheric flows served were pivotal in the emergence of a once obscure science that has now secured an important role in the design of structures, as wind tunnels are now a customary design tool in Civil Engineering akin to their aerospace counterparts used in the development of aircrafts and aerospace structures. In recognition of this monumental pioneering contribution, the design and research communities are indebted to Cermak for his vision, drive and certitude that led to these developments. The writer would like to express his gratitude for the support, guidance, advice and above all the freedom of exploration Cermak provided during author's graduate studies, which has since then served as a catalyst for promoting creativity in his professional career.

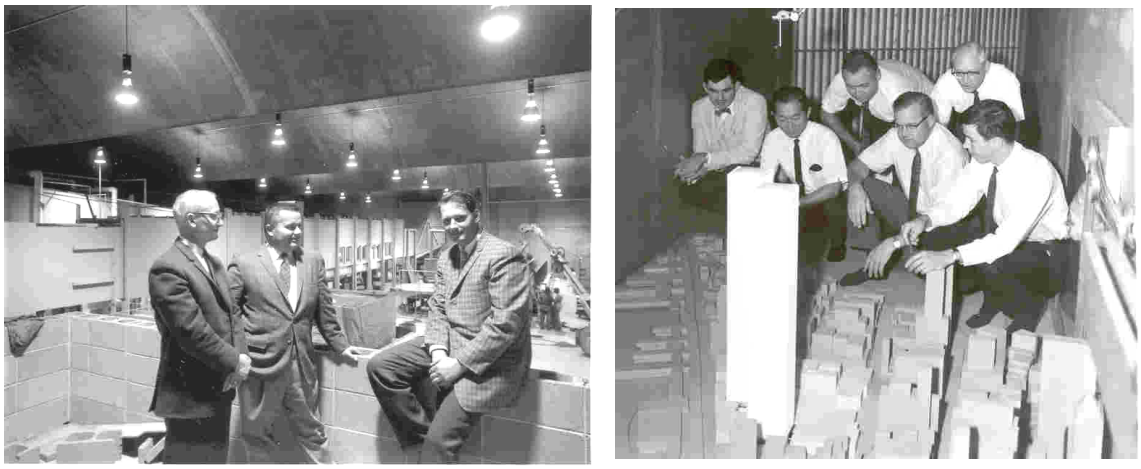

Fig. 2. (left) Design and construction of wind tunnel – J. E. Cermak, H. Maynard and E. Plate (right) WTC model in the wind tunnel --- Front row: A. Davenport, M. Yamasaki, J. Skilling, L. Robertson; Back row: M. Levy and J. E. Cermak