CIVIL ENGINEERING AND SEMICONDUCTOR CHIPS MANUFACTURING IN HIGH TECH ERA

The application of semiconductor chips continuously brings forth improved technology and science, global economy, and quality of human life. To facilitate semiconductor chips manufacturing, fabrication plant (fab) is a part of and prerequisite to the chips manufacturing &R&D on which civil engineer plays important roles.

In semiconductor chips manufacturing, high performance tools and ultrapure utilities are used. Its process must be performed in a stringently controlled environment for mitigating the vibration and contamination as well as assuring biological-environmental protection with carbon reduction and energy saving. These are highly related with civil engineering professional.

The presentation will begin with a brief introduction of high-tech, semiconductor, integrated circuit and various generations of semiconductor chips with different type of chips and size of wafers sample demonstration. Then, the advanced semiconductor chips manufacturing fab will be used to exemplified its stringently controlled facilities. Moreover, the advantages of scaling down, high yielding rate, massive production will be highlighted following by pointing out the roles of civil engineering can play.

LUH-MAAN CHANG

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Professor Emeritus Luh-Maan Chang got his BS degree from Department of Civil Engineering, National Cheng-Kung University in 1971. In 1974-77, Professor Chang worked as a project engineer for Industry Technology Research Institute (ITRI) at Hsing-Chu, the Silicon Valley of Taiwan where he helped design and build the 1st Integrated Circuit Demonstration Plant of Taiwan.After getting his MS and PhD degrees from the University of Texas at Austin, he taught in the School of Building Construction, University of Florida from 1983 to 1985. From 1986 to 2009, Professor Chang taught in the School of Civil Engineering, Purdue University. After he took early retirement from Purdue, he was invited by National Taiwan University (NTU) for connecting civil engineering to high-tech semiconductor chips manufacturing and teaching in NTU Civil Engineering Department till 2016. Presently, he is an Endowed Chair for High-Tech Fab Engineering in Engineering College of National Taiwan University, adjunct professor and the Director of High-Tech Facility Research Center of NTU Civil Engineering Department. His current research interests are in Mitigation of Vibration (Micro-vibration & Electromagnetic Interference) & Contamination Control for below 2nm Semiconductor Fabrication (Fab) process, 4D Construction Project Scheduling through Fab/Facility Information Modeling (FIM), and Artificial Intelligence (AI) for improving fab construction and operation productivity.

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