



UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Memorial Tribute to

RICHARD LINE HUMMEL

**Professor Emeritus
Department of Chemical Engineering
and Applied Chemistry**

February 28, 2020

Be it resolved –

THAT the Council of the Faculty of Applied Science & Engineering record with sincere regret the death on February 10, 2020 of Professor Emeritus Richard Line Hummel at the age of 91.

Professor Hummel graduated from Purdue University with a Bachelor's degree in Chemical Engineering in 1950. After graduation he was employed by DuPont to work on several topics including the development of photographic paper followed by working at General Electric on uranium—platinum separation issues. Richard then went on to be an instructor at the University of Michigan. Professor Hummel completed his Ph.D. degree in Quantum Mechanics at the Iowa State University of Science and Technology in 1961 while working at the Institute for Atomic Energy. Dr. Hummel joined the Department of Chemical Engineering and Applied Chemistry at the University of Toronto as an Assistant Professor in 1961. He was promoted to Full Professor in 1972 and retired in 1991.

Professor Hummel was known for his many interesting, ambitious and exciting research ideas. While several of these were too difficult or expensive to implement, others did come to fruition. Richard's ingenuity was a delightful example of what the human mind is capable of, sometimes seemingly close to science fiction but then seen as doable today.

One of Professor Hummel's early ideas, presented at a United Nations Conference on New Sources of Energy in 1961, dealt with large scale collection of solar energy for seawater conversion to drinking water. The concept is still awaiting full-scale application as small model tests have been successful. Another idea led to dramatic improvements in nucleate boiling heat transfer rates, an innovation that was implemented in industry for enhancing evaporation and steam generation. The innovation involved adding tiny Teflon spots to the heat transfer surfaces, making them non-wetting so that virtually no superheat was required for bubble formation.

In the early 1960's, the production of heavy water was important as a moderating material for the development of the CANDU nuclear reactor. Richard was involved as a consultant at the Glace Bay D2O generating facility, making an important contribution to this Canadian technology.

Perhaps Richard's most successful invention involved visualizing fluid flow using a photochromic dye technique. With appropriate tracers, a pulsing laser beam could create a streak of colour in a flowing liquid within a few nanoseconds. These could then be followed with high speed photography. The early application involved a study of the viscous sublayer in turbulent flow. Those first-ever results established a more certain basis for modelling momentum, heat and mass transfer at such surfaces. Subsequently, the technique has been applied to other, mainly turbulent flow conditions, in part thanks to some of Richard's capable graduate students who popularized the technique. Richard also contributed to the idea of reciprocating flow ion exchange for the treatment of contaminated process waters on which Eco-Tec, a very successful spin-off company from the University of Toronto, was founded.

Professor Hummel was also among some of the early visitors to China following the Cultural Revolution. He encouraged and helped Universities in China recover from the revolution and maintained connections both in Wuhan and Beijing where our Faculty had collaboration agreements.

Professor Hummel was among the early adaptors of cycling as a mode of commuting in Toronto and was regularly seen using his bicycle all year round to get to and from the University. Unfortunately, a traffic accident after his retirement reduced his mobility; regardless, he continued to have many creative ideas and an interest in implementing them. One of the ideas included developing a method to recover oil after a marine accident with created and controlled surface flows to collect the oil from a broad area.

Professor Hummel leaves an inspiring legacy of how a resourceful mind and lateral thinking can lead to good ideas to solve important problems. He provided many pleasant memories to his friends, colleagues and associates.

Be it further resolved –

THAT this tribute to Professor Emeritus Richard Line Hummel be inscribed in the minutes of this Council meeting, and that copies be sent to his family as an expression of the respect and gratitude of the members of Council.

Prepared by Professor Emeritus Olev Trass