Merrell Robert Fenske

1904-1971

By Nunzio J. Palladino

The profession of engineering and the Pennsylvania State University lost a special friend and proponent with the death of Merrell Fenske, who was born on June 5, 1904, and who died on September 28, 1971.

Most of Merrell Fenske's friends and associates were familiar with his accomplishments. What his formal biography does not, and can not, speak of was Merrell Fenske's contributions to the lives of his students and associates, as well as his contributions to his profession, which extended far beyond the mere reciting of publications, patents, honorary society memberships, and technical society memberships with the rank of Fellow.

Professor Fenske was educated at DePauw University and the Massachusetts Institute of Technology. In 1928 he received the degree of Doctor of Philosophy from the latter, where he had worked with P. K. Frolich on catalysts for the formation of methanol from carbon monoxide. He went to the Pennsylvania State University shortly thereafter as an Assistant Professor and in due course became that rare combination of Professor of Chemistry and Professor of Chemical Engineering.

In 1929 he was made Director of the Petroleum Refining Laboratory, and his early work was devoted to research for the Pennsylvania Grade Crude Oil Association. From this, three major research interests developed-separations, hydrocarbon chemistry, and lubrication. It was while studying the compositions of Pennsylvania crudes that he built the first fractionating columns with 100

and more theoretical plates and also developed the classical equation that bears his name for columns operating under total reflux. His work on the composition of Pennsylvania gasoline constituted pioneering studies in which the individual compounds were identified and separated, and his equipment and techniques opened up the field for similar studies at other laboratories. The research aided materially in the design of commercial installations for the production of high performance aircraft fuels in World War II.

Distillation was a separation by molecular size, and Professor Fenske needed a more powerful means for separating the constituents of Pennsylvania crudes-the separation by molecular type. He and his associates turned to liquid extraction and elevated that process from an underdeveloped art to a useful unit operation by the development of techniques, equipment, calculation methods, and understanding. He was also responsible later for a similar development in the area of extractive distillation. His research in liquid extraction was applied by him in devising processes and apparatus for metal separations and purifications in the Manhattan Project (now Atomic Energy Commission).

Merrell Fenske's undergraduate training was in chemistry, and chemistry was most dear to him. His early work was on the catalytic formation of alcohols from carbon monoxide and hydrogen, later on the oxidation of Pennsylvania kerosenes, pure hydrocarbons, naphthas, and hydrocarbon gases. From these studies evolved many additional studies on the chemistry of oxidation and the chemistry of the oxidation products.

Work on Pennsylvania crudes could hardly have been conducted without touching on the preparation of lubricants. Fenske's early development, with Professor Cannon, of the viscometer that bears their names revolutionized viscosity measurement and specification in the petroleum industry. Later he was instrumental in the development of new hydraulic fluids, recoil oils, and lubricants for the Air Force, Navy, and Army. He standardized the specifications and helped in the initiation of the commercial production of these fluids in World War II. Today these materials are used by all services in aircraft, missiles, and in land and water ordnance. He also devised and obtained commercial production of jet engine

lubricants for military aircraft and for the hydraulic systems of missiles and new supersonic aircraft.

During the forty years that Professor Fenske carried out and directed work on the science of petroleum refining and the application of fundamental knowledge to the practical problems of technology, he and his colleagues and students produced and published a truly remarkable volume of important work, both on theory and practice. Noted were distillation, viscosity and rheology, and oxidation, but the list extends far beyond this to thermodynamics, phase equilibria, hydrogenation, catalysis, refining processes, Raman spectra, heat pumps, fluidization of particulate solids, microorganisms and their behavior, fuels, analytical methods, and many more.

With a vigor and a breadth of interest that seem amazing, Professor Fenske's work touched an almost unbelievable spectrum of engineering problems. As a research director he was without peer. He was amazingly creative and could keep a wide variety of projects going. The key to the vast number of achievements was undoubtedly his capacity for continued hard work. And he expected a comparable diligence from his students and colleagues. He was never a forty-hour-a-week engineer, nor did he expect as little from his associates.

Those of us who worked with him will always remember his ability to get to the heart of a problem. If it involved research, he could identify the important factors. If it were a conference, he could sum up the important facts, bring the discussion back from irrelevances to the basic problem, and put it on a straight course again.

His lasting claim to public recognition undoubtedly lies in his research work, an area we can evaluate with statistics-numbers of publications, patents, and other tangible evidences of a productive professional life. But foremost, Merrell Fenske was a teacher. He taught in the classroom for only a little more than a dozen years, but in that time he developed a reputation for his clarity of presentation, his stress of fundamentals, and his emphasis on true understanding of the subject matter. His later students knew him only outside the classroom-as their research director or as a

member of their thesis committee. But every contact they had with him was a real educational exercise. He professed in the very best tradition of the true professor.

Merrell Fenske's colleagues will long remember him as a strong stimulus. His comments were always direct, his evaluations reliable, and his advice dependable. The entire engineering community has lost a true friend and faithful worker in its behalf.