FOUNDERS OF THERMODYNAMICS-Evolution of Science of Thermodynamics

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EXPERIMENTAL ANALYSIS OF THE GASKETED-PLATE HEAT EXCHANGERS

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Biography

Dr. Kakaç was born in 1932 in Çorum. He graduated from the Technical University of Istanbul, faculty of Mechanical Engineering in 1955. He received SM degrees from Mechanical and Nuclear engineering departments at MIT in 1960 then he joined the Middle East Technical University, department of Mechanical Engineering, in 1960. He received his Ph.D from the Victoria University of Manchester, England. He became Professor in 1971. He has been in various governmental positions as the General Secretary of the Turkish Atomic Energy Authority, and TUBITAK (Scientific and Technological Research Counsel) and the acting General Secretary of TUBİTAK. He was a board member of the TUBİTAK. He represented Turkey in several international organizations. He joined the University of Miami in 1980, and then joined to the TOBB-ETÜ in 2007. Because of his scientific contributions in the field of heat transfer, research, and education, Dr. Kakaç received many prestigious science awards and received honorary doctorates from various institutions in Europe. Recently, Dr. Kakaç received LUİKOV Medal from the International Center of Heat and Mass transfer for his valuable contributions to the field.

He is the author of very popular text books on Heat Conduction, Convective Heat Transfer, and Heat Exchangers. He edited more than 20 books in the field of thermal and fluid sciences.

Summary of an Experimental Facility to Test the Performances of Gasketed-Plate Heat Exchangers:

Gasketed-plate heat exchangers became very popular in applications under specific and appropriate conditions, which overlaps and successfully competes with the popular of tubular heat exchangers. The design of gasketed-plate heat exchangers is highly specialized in nature and design data and the methods are not easily available since the design of this kind of plate heat exchanger continues to be proprietary in nature. Manufacturers have developed their own computerized design procedures applicable to the heat exchangers they market. In Turkey, there are various companies which import various types of gasketed–plates from different manufacturers, then pay considerable amount of money to pay know how for computer programs that provided by the manufacturers.

At the Technology Center of TOBB –ETÜ, an experimental set up has been designed and tested for various types of gasketed-plates, in different sizes and Chevron angles to obtain thermal and hydraulic design information of such heat exchangers. For this purpose, expressions for Nusselt number correlations for heat transfer calculations, and the friction factors for pressure drop calculations and pumping power are obtained to develop a computer program for a company so that to increase the capability of the company concerned. Available set up is capable to perform analysis for any design of gasketed- plate heat exchangers.

Summary of Founders of Thermodynamics:Evolution of Science of Thermodynamics

In this presentation, it will be shown how today's science of thermodynamic evolved starting from the Sadi Carnot's heat engine studies in which heat was seen as a weightless fluid called "caloric". In Carnot's heat engine fluid analogy was suggested by the flow of heat from a high temperature to a low temperature and producing work in heat engine to produce useful work output. Concerning heat which was rejected in the 1840s by Robert Mayer, James Joule, Hermann Helmholz, William Thomson, Rankine,Rodolf Clausius and Willard Gibbs in 1850s. Then, how the energy, entropy and absolute temperature concepts are introduced in the development of science of thermodynamics, second law of thermodynamics by Planck- Kelvin, and Clausius, Gibbs's "free energy" maximum free energy available for the performance of work are shown. Then how Joseph Keenan introduced in his book of thermodynamics, in 1941 the importance of the Second law analysis (Availability analysis) which is important in the thermal design and optimization of the power plant operation, refrigeration, heat exchangers and heat pumps will be indicated. It is important to note that the force of Thermodynamic teaching in engineering is Joseph H. Keenan at MIT, and continued by Adrian Bejan who is the from same ecole introducing the third law of thermodynamics.