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Education in Industrial Engineering in Slovakia

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Abstract

Industrial engineers have played and play a decisive role as transmitters and introducers of progress. The balanced combination of a solid scientific and technical education, different applied technologies and disciplines within the economic-business and social-humanistic areas, the understanding that comes from reality of the industrial sector and the ability to interrelate various disciplines involved in complex system, makes these studies a current and innovative model, applied by many European universities. The focus is to present the education in Industrial engineering in the worldwide. Different approaches in education in Industrial engineering are compared. The best universities in Industrial engineering are listed. The main attention, in this article, is paid to Department of Industrial Engineering and management of Technical University of Košice. There are described history, study and research activities, and graduate profiles.

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1. Introduction

Industrial engineers use principles of engineering, mass production and technology to help companies find ways to offer services or create a product efficiently. This field requires knowledge of economics, workplace safety standards and industrial practices. Read on to learn if industrial engineering is right.

Industrial engineering is a branch of engineering dealing with the optimization of complex processes or systems. It is concerned with the development, improvement, implementation and evaluation of integrated systems of people, money, knowledge, information, equipment, energy, materials, analysis and synthesis, as well as the mathematical,

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physical and social sciences together with the principles and methods of engineering design to specify, predict, and evaluate the results to be obtained from such systems or processes. Its underlying concepts overlap considerably with certain business-oriented disciplines such as operations management.

The various topics concerning industrial engineers include management science, work-study, financial engineering, engineering management, supply chain management, process engineering, operations research, systems engineering, ergonomics / safety engineering, cost and value engineering, quality engineering, facilities planning, and the engineering design process. Traditionally, a major aspect of industrial engineering was planning the layouts of factories and designing assembly lines and other manufacturing paradigms. And now, in so-called lean manufacturing systems, industrial engineers work to eliminate wastes of time, money, materials, energy, and other resources.

Modern Industrial Engineers typically use Predetermined motion time system, computer simulation (especially discrete event simulation), along with extensive mathematical tools and modeling and computational methods for system analysis, evaluation, and optimization.

2. History of the education in industrial engineering

Efforts to apply science to the design of processes and of production systems were made by many people in the 18th and 19th centuries. They took some time to evolve and to be synthesized into disciplines that we would label with names such as industrial engineering, production engineering, or systems engineering. For example, precursors to industrial engineering included some aspects of military science; the quest to develop manufacturing using interchangeable parts; the development of the armory system of manufacturing; the work of Henri Fayol and colleagues (which grew into a larger movement called Fayolism); and the work of Frederick Winslow Taylor and colleagues (which grew into a larger movement called scientific management). In the late 19th century, such efforts began to inform consultancy and higher education. The idea of consulting with experts about process engineering naturally evolved into the idea of teaching the concepts as curriculum.

Industrial engineering courses were taught by multiple universities in Europe at the end of the 19th century, including in Germany, France, the United Kingdom, and Spain.http://en.wikipedia.org/wiki/Industrial_engineering_-_cite_note-1 In the United States, the first department of industrial and manufacturing engineering was established in 1909 at the Pennsylvania State University. The first doctoral degree in industrial engineering was awarded in the 1930s by Cornell University.

In general it can be said that the foundations of industrial engineering as it looks today, began to be built in the twentieth century. The first half of the century was characterized by an emphasis on increasing efficiency and reducing industrial organizations their costs.

In 1909, Frederick Taylor published his theory of scientific management, which included accurate analysis of human labor, systematic definition of methods, tools and training for employees. Taylor dealt in time using timers, set standard times and managed to increase productivity while reducing labor costs and increasing the wages and salaries of the employees. In 1912 Henry Laurence Gantt developed the Gantt chart which outlines actions the organization along with their relationships. This chart opens later form familiar to us today by Wallace Clark. Assembly lines: moving car factory of Henry Ford (1913) accounted for a significant leap forward in the field. Ford reduced the assembly time of a car more than 700 hours to 1.5 hours. In addition, he was a pioneer of the economy of the capitalist welfare ("welfare capitalism") and the flag of providing financial incentives for employees to increase productivity. Comprehensive quality management system (TQM) developed in the forties was gaining momentum after World War II and was part of the recovery of Japan after the war. In 1960 to 1975, with the development of decision support systems in supply such as the MRP, you can emphasize the timing issue (inventory, production, compounding, transportation, etc.) of industrial organization. Israeli scientist Dr. Jacob Rubinovitz installed the CMMS program developed in IAI and Control-Data (Israel) in 1976 in South Africa and worldwide. In the seventies, with the penetration of Japanese management theories such as Kaizen and Kanban West, was transferred to highlight issues of quality, delivery time, and flexibility. In the nineties, following the global industry globalization process, the emphasis was on supply chain management, and customer-oriented business process design. Theory of Constraints developed by an Israeli scientist Eliyahu M. Goldratt (1985) is also a significant milestone in the field.

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