

# A Matter of Disciplines

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F.W. Taylor could not have anticipated the revolution he was unleashing when he conducted his pioneering Time Study investigations at the turn of the 19th century.

Taylor was essentially a mechanical engineer. But, his work led to the recognition of Production Engineering as an important subset of *Mechanical Engineering*. Subsequently, in the UK, *Production Engineering* (which mainly focused on technology at the machine level in manufacturing shops) emerged as a distinct discipline. The culmination of this trend was in the establishment of the Institution of Production Engineers (I. Prod. E.) in the UK

Taylor's work was later extended into Motion Study by the Gilbreths in the USA. These works laid the foundation to modern *Industrial Engineering* which is now recognized as a distinct discipline worldwide. Industrial engineering professionals today work in diverse industrial sectors including manufacturing, utilities, transportation, construction, communications and banking.

**“Industrial Engineering** is the engineering discipline concerned with the planning, organizing and operation of industrial facilities and processes for the economic, safe and effective use of physical and human resources. Industrial Engineering is applied design for the integration of material, human and financial resources, and of production sequences and methods, optimal flows and layouts, and of work methods and procedures, labor organization, and in economic evaluation of facilities, processes or techniques. Specific expertise areas include, Industrial engineering practices, Material handling engineering, Operations research, Safety and environmental engineering, Manufacturing process engineering, and Quality assurance and control.” [National Competency Standards for Professional Engineers, Institution of Engineers, Australia, ACT, March, 1993.]

In time, several tertiary institutions in the UK and some in Hong Kong started offering programs in Production and Industrial Engineering. However, the growing trend towards computer integrated manufacturing in the industry since the '70s made it clear that machine level issues could no longer be addressed in isolation from manufacturing system level issues and requirements. This led to the creation of Manufacturing Engineering as a

**Manufacturing Engineering** is that speciality of professional engineering which requires such education and experience as is necessary to understand, apply and control engineering procedures in manufacturing processes and methods of production of industrial commodities and products, thus requiring the ability to plan the practices of manufacture, to research and develop the tools, processes, machines and equipment and to integrate the facilities and systems by which products may be manufactured economically.” [Society of Manufacturing Engineers, USA]

discipline which integrates Production Engineering and industrial Engineering. As a consequence, in the UK, the Institution of Production Engineers re-titled itself as the Institution of Manufacturing Engineers.

Meanwhile, the technologies underlying traditionally mechanical products had been quietly undergoing a transformation owing to rapid developments in electronic and computer technologies. Today, most engineering equipment and many consumer products incorporate a host of electronic devices and circuits, and microprocessors. Consumer products are increasingly becoming 'smarter' by virtue of the computer-based intelligence embedded in them. This trend has led to the new discipline of Mechatronic Engineering. Interestingly, it was exactly during this time that the Institution of Manufacturing Engineers was amalgamated with the Institution of Electrical Engineers in the UK

**Mechatronic Engineering** is “a synergistic combination of precision mechanical engineering, electronic control and systems thinking in the design of products and manufacturing processes.” [Industrial Research and Development Advisory Committee (IRDAC), the European Community (EC)]

Returning to Taylor, note that his time study investigations involved humans. He also proposed that manufacturing activities should be planned and controlled not by the workers themselves but by trained professionals who are outside the shop floor and can take an objective view of it. In time, these professionals started being called 'managers'. These Tayloristic concepts have now penetrated all walks of life, including business and commerce. Thus, Taylor is now recognized as the 'father of scientific management'. Mechanical engineers should take pride in this fact — a fact which is often glossed over by the 'business' management profession today.

**Engineering Management** is “... the discipline addressed to making and implementing decisions for strategic and operational leadership in current and emerging technologies and their impacts on interrelated systems.” [Kocoglu, G., *IEEE Transactions on Engineering Management*, vol. 37, no. 3, August, 1990.]

The traditional involvement mechanical and manufacturing engineers have had with 'management' issues has culminated in recent times into the discipline of Engineering Management. Owing to the tremendous and continual penetration of modern technology into all enterprises (both manufacturing or business oriented), this new discipline is being increasingly recognized around the world as a complement to the discipline of Business Management.

The Department of Manufacturing Engineering has been particularly responsive to the trends discussed above. Thus, today, it has separate Honors Degree programs devoted to Manufacturing Engineering, Mechatronic Engineering, and Industrial Engineering and Engineering Management.

