

IMPROVEMENTS IN VALUES IN ENGINEERING PROFESSION

Bharat Ratna Sir M. Visvesvaraya---A Role Model

Engineering

Engineering is the profession in which knowledge of mathematical and natural science gained by study, experience and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the benefit of mankind.

Engineering has always been concerned with the economical use of limited sources for the benefit of people. Engineering activities determine how physical factors may be altered to create the most utility for the least cost, in terms of product cost, product service cost and social cost.

Who is an Engineer

1. One who is trained or professionally engaged in a branch of engineering.
2. One who skillfully or shrewdly manages an enterprise.

Role of Engineer

Some of the Roles of Engineer are as follows:

1. Engineer has professional obligations towards clients and society. Engineers are called on to seek solutions to problems that have a far reaching impact on society. It is necessary for the engineer to address problems professionally in a manner that will ensure that broader issues and aspects of a problem are properly treated and considered.
2. Engineers have a professional commitment to seeking solutions to a broad spectrum of problem that are identified. The involvement on the part of engineer may range from addressing problem with large systems of inter-actioning facilities to those that may be considered as a small component of a much larger entity. In all cases it is important that the engineer approach each problem in such a way that it is cost effective and economical.
3. Engineer is involved in a continuous and cyclic interaction with society in which new needs arise and are identified, the range of technical solutions are formulated and feasible alterations identified, and the preferred alternative is selected, engineered and implemented.

Bharat Ratna Sir M. Visvesvaraya

An Engineer by profession, he was one of the founders of modern India who combined vision with achievement, and conviction with a fierce sense of purpose. He was an educationist, statesman and administrator.

His message was "Industrialize or Perish". His much celebrated credo for development was translated in to the agenda for new, independent India in the form of first Five-Year Plan.

He was the architect of Krishnarajasagara Dam – one of the biggest dams in India that irrigates about 120,000 acres. He exhibited his foresight for industrialization and educational enterprise by starting several institutions, including the University of Mysore and State Bank of Mysore

and industries like Bhadravati Iron and Steel Works, the Mysore Sandal Oil Factory and the Mysore Soap Factory.

From the above, we observe that he was involved in following major fields.

- A) Construction
- B) Manufacturing
- C) Education
- D) Banking

If we analyze his involvement and vision, we find his involvement in following areas:

1. Construction – Generation of Employment opportunities during construction and subsequently availability of water resources for irrigation and agriculture to make India self-sufficient.
 - The concept of Rural Development.
2. Manufacturing – Starting of Heavy Engineering and Consumer Goods Industries.
 - The concept of Industrialization.
3. Education –
 - The concept of knowledge
4. Banking
 - The concept of commerce/investment

His concept and strategy of overall development earned the country's highest honour, the Bharat Ratna, in 1955.

Considering the concept, vision and strategy adapted by Visvesvaraya as a model or representation that depicts the role of an Engineer, we also an Engineer, can follow his path and engineering principles.

Values in Engineering Profession

Basically we can identify two major categories of values in engineering profession. These are

- 1) Behavioural (Ethical)
- 2) Technological

Improvement in Values

1) **Behavioural**

There is no specific benchmark or a point of reference by which the performance of engineering profession is judged or measured.

Visvesvaraya's search for precision and excellence is best manifest in one of his famous quotes "Remember, your work may be only to sweep a railway crossing, but it is your duty to keep it clean that no other crossing in the world is as clean as yours".

The above quote refers to the ethical importance towards executing the duties.

He achieved all this because of his hard work and commitment to the growth of society. His life style was simple.

In order to follow his principles and improve upon our performance in engineering we have to adapt/practice certain code of ethics such as

- 1) Practice engineering with integrity, conscience, dignity and honour.
- 2) Reject bribery in all its forms.
- 3) Treat fairly all persons regardless of such factors as race, religion, gender, disability, age and shall not perform and act against the interest of the nation.
- 4) Avoid injuring others, their property, reputation, or employment by false or malicious action.
- 5) To be honest and realistic in stating claims or estimate based on available data.
- 6) To seek, accept and offer honest criticism at technical work, to acknowledge and correct errors and to credit properly the contribution of others.
- 7) Assist colleagues and sub-ordinates in their professional development.

2) **Technological**

Technological growth and change is occurring continuously which obligates to perform outgoing activities in a more effective and efficient manner. With introduction of free market, free trade, free competition, creation of WTO, Globalization and continuing trend in technological advances has created responsibilities on the part of engineer to analyze and adapt certain technical specialization which will become absolute with time.

In recent decades, advances in science and engineering have made space travel possible, transformed our transportation systems, revolutionised the practice of medicine and miniaturized electronic circuits so that a computer can be placed on a semiconductor chip.

Based on above and to be consistent with technological growth, we have to practice following codes:

- 1) Accept responsibility in making engineering decisions consistent with the safety, health and welfare of the public and to disclose promptly factors that might endanger the public or environment.
- 2) Improve the understanding of technology, its appropriate application, and potential sequences.

Viewed in this context, engineering must be practiced in an expanded way, with engineering of the system placed ahead of concern for components thereof.

Some of the measures are listed below to improve upon in various fields.

A) **Rural Development/Construction**

1. Promotion and dissemination of appropriate rural technologies and upgrading of irrigation and water management system.
2. Application of Systems Engineering to Construction Projects in order to make the project most qualitative, competitive and economically viable by conveniently managing the process of construction.

B) **Manufacturing / Industrialization**

1. Improving methods for defining product and system requirements as they relate to true custom needs.
2. Addressing the total system with all of its elements from a life-cycle perspective, and from the product or prime equipments to its elements of support.
3. Organizing and integrating the necessary engineering and related disciplines.

4. Establishing a disciplined approach with appropriate review, evaluation and feed back provisions to insure orderly and efficient progress from the initial identification need through phase out and disposal.
5. To be sensitive to utilization outcome during the early stages of system design and development.
6. Application of total quality management system, which covers managerial, statistical and technological concepts and techniques to achieve quality objectives throughout an organization.
7. Application of Design of Experiments (DOE) and other techniques to determine the optimum values of product and process parameters to minimize variation.
8. Application of Value Engineering Techniques
9. Application of Operations and Management to improve productivity in the business by:
 - a) Effectively consolidating the operations resulting from mergers.
 - b) Developing flexible supply chains to enable mass customization of products and services.
 - c) Managing global supplier, production and distribution networks.

C) Education

Education means new knowledge, which help development. To make the product development more competitive in the world economy, we have to utilize new and emerging technologies and apply them to ensure economical usage of resources. It is advisable to introduce Engineering Economy and Information Technology courses at higher level to make the product more competitive.

Application of Information Technology which may result in following benefits:

- a) Information can appear simultaneously in as many places as it is needed.
- b) A generalist can do the work of an expert.
- c) Business can simultaneously reap the benefit of centralization and decentralization.
- d) Data base technology can help field personal to send and receive information wherever they are.

D) Commerce

Electronic Commerce i.e. use of computer applications communicating computer networks, to be adapted in all business activities.

Finally, Engineer should be ready to manage new technology, innovation and R&D which is occurring due to the shift from the Industrial Age to the Knowledge Age.