WHAT IS GOOD ENGINEERING PRACTICE? (*)

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We think it would be helpful to delve into the often-used concept of “Good Engineering Practices” that we encounter among engineering circles in the texts of documents such as regulations, technical specifications and standards.

An example to the directives in which this concept is cited would be “COUNCIL DIRECTIVE of 1 February 1973 on the harmonization of the lows of Member States relating to electrical equipment designed for use within certain voltage limits (73/23/EEC)”. The text in Article 2 of that directive is quoted below:

The Member States shall take all appropriate measures to ensure that electrical equipment may be placed on the market only if, having been constracted in accordance with good engineering practice in safety matters in force in the Comm nity, it does not endanger the safety of persons, domestic animals or property when properly installed and maintained and sed in applications for which it was made.

Let’s try to make sense of this phrase that at first sight appears a bit obscure.

“Engineering” as described by ABET (Accreditation Board for Engineering and Technology, Inc.) circumscribes the subject we wish to discuss in following terms:

"Engineering is the profession in which a knowledge of mathematics and natural sciences 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."

Taking above definition as the starting point, we can arrive at the following basic requisite principles for engineering applications:

1- It is necessary to have work performed by employing theoretical and applied methods so as to assimilate information on mathematical and natural sciences.
2- It is necessary to employ rationally the information gathered.
3- The objective is to develop methods by using such information for the utilization of materials and forces in ways other than found in their original state in nature.
4- It is essential that findings attained by the use of such methods convey benefit to mankind.
5- It is required to have the developed methods economically viable.

Having ascribed the requisite attributes for implementation, loyalty to the application process and identification of moral values, we may commence on the ultimate definition of “good engineering” practices.

The Institute of Electricity, Electronics and Computer Engineering (IEEE) in USA, before granting membership to candidate engineers, requires their undertaking certain ethical rules to be observed in the execution of their profession. Those rules are:

1. to 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 the environment;
2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;
3. to be honest and realistic in stating claims or estimates based on available data;
4. to reject bribery in all its forms;
5. to improve the understanding of technology, its appropriate application, and potential consequences;
6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;
7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;
8. to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;
9. to avoid injuring others, their property, reputation, or employment by false or malicious action;
10. 10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

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The idea that constitutes the foundation of good engineering is good science. In fact, there is no conflict of concepts between good science and good engineering. What is scientifically good is also good for engineering. No example can be cited in the history of science where a scientifically sound idea has failed in engineering practice.

Good science reveals itself in the disclosure of the secrets of nature, and in turn, those revelations are used in resolving engineering problems. Science and engineering may be developed through empiricism. New discoveries generally originate from empiricism and experimentation.

Standards that are nothing more than good engineering practices put in writing regulate the concept of “good engineering”. Certain standards may not always represent the good engineering practice in its entirety. It should also be kept in mind that what is mandatory at all times is not the standards, but good engineering rules.

Good engineering practices, just like the doctrinal precedents in law, are capable of setting the foundations of an unshakable case through the good offices of arbitration boards or expertise teams, and may be also cited by commercial organizations, chambers of engineers and quoted in technical agreements.

Now that we have touched upon theory and basics of the subject, let's turn to its implementation in everyday life. Good engineering is initiated by a good description of anticipated problems/requirements. This is half of the entire work. Identification, analysis and solution of the problems and have those expressed in the best possible manner in writing are elements that help the realization of good engineering practices.

As the subject here is engineering practice, it would be negligent to pass without a word of analysis on the human factor executing that practice, namely the engineer.

Engineers and engineering profession have always been controversial subjects, and will continue to be so. Therefore, both positive and negative sides of the person and the profession have to be discussed. This subject has always been vehemently debated in the lift industry. There will always be engineers in the lift industry who perform engineering profession well or poorly, even if under the responsibility of others, but also who show an allergic reaction to the word "engineer", and actually identify themselves as craftsmen.

When you ask such a person what an engineer is, his response would be, "a person we have to keep on the payroll so as to build lifts, but other than that, has no contribution to the firm". In view of the realities we have to acknowledge in life, this definition may well be correct.

There are, in literature, other definitions of engineering put forth by thinkers,academicians and other professionals. Some such definitions regard engineering as an craft, and others as a profession.

In the western world that regards engineering as a profession, there is an acceptance of two types of engineers. One type are those who have received a "diploma" at the end of formal engineering training, and the latter are self-taught, "risen from the ranks" engineers, who, after demonstrating certain abilities and skills, have had themselves registered as members in the chambers of engineers.

There is a valid approach in the West that strives to gather the '*de facto*" engineers under a certain roof discipline, and have their shortcomings eliminated so as to prevent their indulging in dangerous ventures. It could be said that this tendency is among the unwritten prerequisites of compliance with EU regulations. The most significant difference that poses a basic obstacle for conformity of Turkey with such guidelines in Europe lies in the fact that while compulsory primary education until the last few years in Turkey had been 5 years, the vast majority of European population, having received a formal basic education ranging between 8 to 11 years, are taught

basic physics, chemistry, biology and particularly mathematics way beyond the four calculations and simple ratio.

In conclusion, under the light of above explanations, good engineering practice may be defined in following terms: “Good engineering practices are engineering works performed in conformance with rules based on demonstrated basic scientific facts or experiences that, as a result, create products that would not be detrimental to mankind.”

When conformity with the definition of engineering quoted in the beginning of this article and basic principles and ethical rules origination from that definition are attained, engineering practices will be “good” whether we like it or not.

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references :

[1] ABET 1982 www.abet.org

[2] IEEE Code of Ethics, Approved by the IEEE Board of Directors, August 1990. http://www.ieee.org/portal/index.jsp?

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