TenStep, Inc.

TenStep Supplemental Paper

15 April 2004

Genichi Taguchi – The Father of the Quality Revolution

The industrial revolution in Japan after the Second World War brought many new and innovative concepts. These concepts focused on fueling operational excellence and solving major problems in the industrial sector. Some names that come to mind instantly when discussing the advancements of this time are Edward Deming, Armand Feigenbaum, Claus Moller, Juran, Peter Drucker, etc. One more name that can grace this prestigious list is Genichi Taguchi.

Genichi Taguchi – A flawless journey

Genichi Taguchi stressed quality right from the design stage and not just as an inspection. In short, he believed quality was related to process design.

Dr Genichi Taguchi was born in 1924 in Japan. Initially, he served the Astronomical Department of the Navigation Institute of the Imperial Japanese Navy during the Second World War. Later, he joined the Ministry of Public Health and Welfare and the Institute of Statistical Mathematics. It was here that he worked with the eminent Japanese statistician Matosaburo Masuyama and gained vital insights into statistical analysis.

His expertise in statistics garnered him an opportunity to work with reputed pharmaceutical company Morinaga Seika and its sister company, Morinaga Pharmaceuticals.

Taguchi then joined the Nippon Telegraph Electrical Communications Laboratory. Here, he was entrusted with the task of enhancing the productivity of the Research and Development (R & D) department. To achieve this objective, Taguchi trained the engineers to improve productivity through effective and simple techniques.

Initially, Taguchi visited many Japanese companies to study different operating procedures. He would later educate the engineers on what he had learned. Eventually, he developed his own techniques, and his visits to companies helped him propagate his techniques. He stayed at the Nippon Telegraph Electrical Communications Laboratory for over 12 years

Taguchi influence

Soon, Japanese companies like Toyota adopted Taguchi's techniques because they foresaw its great advantages. In 1951, he published a book that introduced the concept of orthogonal arrays.

In his quest for a methodology for high quality, he met two legendary statisticians at the Indian Statistical Institute - R. A. Fisher and Walter A. Shewhart. After his interactions with them, he published a book on Design of Experiments in 1957.

In the West

In 1962, Taguchi was invited to visit Princeton University USA as a Visiting Research Associate. Here, eminent statistician John Tukey arranged a meeting between Taguchi

and the statisticians of AT&T Bell Laboratories. He also presented his views and expertise on Design on Experiments. Despite his visit to USA, the Western world remained largely unaware of Taguchi's methodologies.

Taguchi – The Researcher

For the next 18 years, from 1964 to 1982, he was a Professor at Aoyama Gakuin University in Tokyo. In 1966, along with other statisticians, Taguchi published *Management by Total Results*.

Quality loss function

In 1970, Taguchi devised a new concept in quality called the Quality Loss Function. He published two more books this year, along with the third edition of *Design of Experiments*.

Taguchi – Achievements

The popularity of his books and his pioneering work earned him the Deming application prize in 1960. Taguchi was also a two-time winner of the Deming award for literature on quality (1951 and 1953). In 1980, Bell Laboratories invited him to visit again. He helped Bell Laboratories incorporate his methodologies, this time triggering great interest in Taguchi methodologies throughout the Western Community. Companies like Xerox and Ford USA soon incorporated his methodology.

Taguchi's message to the World

Taguchi detested the idea of quality as an inspection after manufacture and pushed quality as emergent from the design stage. His concept of Design of Experiments (DOE) allows engineers to design product/process tests through simple calculations. DOE can also be used as a troubleshooting technique.

Quality loss

Unlike the western definition of quality, Taguchi defined quality loss, as "loss imparted by the product to society from the time the product is shipped."

The loss factor encompasses two losses:

1. Loss at the company end due to financial set-up, time, man-hours, productivity, rework, scrap, warranty cost, equipment downtime cost and loss of customer trust.
2. Loss at the customer end due to substandard product delivery, financial setbacks, distrust of customers, shared value deprecation, wasted time and project delays.

Taguchi Loss Function was developed on the premise that the greater the variation of a value from the standard, the greater the costs incurred. Taguchi Loss Function suggests that organizations must settle for options that cost the least. Organizations should thus make decisions after conducting a cost analysis and understanding all implications. It also suggests that the lowest cost decision is not always the best one for the organization. This decision depends on organizational priorities.