

8 June 2005

### **Statistical Sampling is Unnecessary – Shigeo Shingo**

Boeing's famous manufacturing plant at Everett, Washington has been churning out planes for almost half a century. Originally built in 1947, it holds the Guinness record as the largest building by volume. Today, it rolls out three planes – the Jumbo 747, the 767 and the 777.

Enter Boeing's testing facility and encounter huge noises thanks to the large thrust forces being applied to the wings and the plane structure. The 777 went through two years of rigorous testing. Its wings were tested to withstand a 24 feet vertical bent. So, even if they are bent to 24 feet from their horizontal position they would still remain intact, thereby keeping the plane airborne. Such stern quality checks have allowed Boeing to reach the pinnacle of aviation technology. Boeing owes its success story to its quality control methodologies.

Many aeroplane-manufacturing companies have come and gone with time. The most talk though is about the British jet airliner - Comet. Comets used thrust/jet engines as opposed to the conventional propeller engines. After two years of safe and uneventful travel, a flight from London vanished from the radar screen over the Atlantic Ocean. Later it was learned that the plane disintegrated in mid air. Material fatigue and improper testing caused the fatal crash.

This is where Boeing scores over other companies. Quality control has been Boeing's trump card.

Quality, thanks to value-driven customers and years of research, is widely regarded as the key to business excellence. Armed with innovative concepts/methodologies developed by visionary researchers, companies like Boeing have achieved unparalleled success.

Dr. Shigeo Shingo was one such researcher. He is well known for his concepts like "Poka Yoke", "Inspection at Source" and "Single Minute Exchange of Dies (SMED)".

#### **Dr. Shingo – the cover story**

Shingo was born in Saga City, Japan in 1909. In 1930 he graduated as a Mechanical Engineer from Yamanashi Technical College. Subsequently, he joined the Taipei Railway Factory in Taiwan. Later as a head of the Education Department, he visited around 300 companies. These trips helped him gain an in-depth knowledge about manufacturing and operation procedures. In 1955 Toyota Motor Co appointed him as in charge of industrial engineering and factory improvement training.

#### **Dr. Shingo – Blaze of Glory**

One of his assignments at Mitsubishi Heavy Industries in Nagasaki was to investigate slow setup times. He then successfully reduced the set up time from 4 months to 2



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months for a hull assembly of 65,000 tons super-tanker. The system became popular and soon every shipyard in Japan implemented it.

During the mid 60s and early 70s Shingo devised pioneering methodologies like Just in Time, SMED, Poka Yoke and Source Inspection. These concepts helped shape the Toyota Production System.

### **Error Detection at Source**

According to Shingo eliminating defects at source was critical. This he believed could be achieved by checking for errors.

#### **What is error detection?**

When errors appear, stop the production process, correct the error and then resume production. Another option is to adjust the process so as to prevent errors from turning into defects. This according to Shingo must be carried out at every stage of the process.

Shingo believed that error detection was the gateway to zero defects. Defects can be eliminated only if identified and tackled at source. In short, he believed that statistical sampling was unnecessary.

However, for “error detection” and “source inspection” to be effective, a feedback loop to adjust and rectify future proceedings is critical. Further, he suggested the use of technology over human perception to act as the feedback loop. This he believed would reduce variances caused due to operator switching or due to the mood of the operator.

### **Mistake proofing/Poka Yoke**

In 1961, Yamada Electric invited Shingo to investigate its production processes. He observed that operator inefficiency led to frequent errors. Further investigation revealed that operators often forgot assembling specific sub parts. This in turn resulted in defective end products.

To solve this problem he installed simple and reliable, mechanical devices into assembly lines. Whenever an operator committed an error, the devices immediately signaled a fault. Consequently, operators could take corrective actions. This act of mistake proofing was called Poka Yoke.

#### **What is Poka Yoke?**

Poka Yoke or “mistake proofing” preaches the need to avoid non-conformities from entering into processes. It is based on the principle of defect detection and elimination at the source. Poka Yoke can also be used as a continuous improvement tool to achieve high quality. Hence, it ensures functionality of Quality Management Systems (QMS).



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### **Dr. Shingo's message**

In Poka Yoke any operation that fuels nonconformity, must be corrected or eliminated. If organisations envision a world-class status then they must not just preach but practice the idea of zero defects. Best practices like Poka Yoke become imperative. Since Poka Yoke focuses on enhanced performance through continuous improvement, it is also referred to as “Good Kaizen” or “superior continual improvement”.

After extensive research Shingo developed improved Poka Yoke systems by 1967. These systems not only prevented errors but also prevented the operator from repeating them. They avoided statistical sampling and allowed operators to focus on error elimination.