

## Discussion of Lean Manufacturing and Related Topics

- Corporate culture affects business in a profound way. It dictates (often unconsciously) how employees behave, interact, make decisions, and do their job.
- Improving upon “old” practices requires cultural change – not easy
- Many individuals and corporation have been involved with improving quality and reducing costs in almost all industries.
- Various “philosophies” are known by various names.
- William Deming is one of the better known and most influential individuals responsible for much of the changes during the 20th century.
- Many companies have successfully changed (or created within) this “new” environment, others are still “struggling.”

(Thanks Wikipedia, for help with the following):

### William Edwards Deming

- American statistician, professor, author, lecturer, and consultant.
- Improved production in the United States during World War II
- Best known for his work in Japan (from 1950 onward)
- Taught top management how to improve design (and thus service), product quality, testing and sales through various methods, including the application of statistical methods.
- He is regarded as having had more impact upon Japanese manufacturing and business than any other individual not of Japanese heritage.

Fourteen key principles for management for transforming business effectiveness (Deming, W. E. (1986) *Out of the Crisis*, MIT Press):

1. **Create constancy of purpose toward improvement of product and service**, with the aim to become competitive and stay in business, and to provide jobs.
2. Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.
3. **Cease dependence on inspection to achieve quality**. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.
4. End the practice of awarding business on the basis of price tag. Instead, minimize total cost. **Move towards a single supplier for any one item, on a long-term relationship of loyalty and trust.**
5. **Improve constantly and forever the system of production and service**, to improve quality and productivity, and thus constantly decrease cost.
6. Institute training on the job.
7. **Institute leadership**. The aim of supervision should be to help people and machines and gadgets to do a better job. Supervision of management is in need of overhaul, as well as supervision of production workers.
8. **Drive out fear**, so that everyone may work effectively for the company.

9. **Break down barriers between departments.** People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.
10. Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, as the **bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the work force.**
11. Eliminate work standards (quotas) on the factory floor. Substitute leadership. Eliminate management by objective. Eliminate management by numbers, numerical goals. Substitute workmanship.
12. **Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality.** Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means, *inter alia* (among other things), abolishment of the annual or merit rating and of management by objective.
13. Institute a vigorous program of education and self-improvement.
14. **Put everybody in the company to work to accomplish the transformation. The transformation is everybody's work.**

The Seven Deadly Diseases (also known as the "Seven Wastes"):

1. Lack of constancy of purpose.
2. Emphasis on short-term profits.
3. Evaluation by performance, merit rating, or annual review of performance.
4. Mobility of management.
5. Running a company on visible figures alone.
6. Excessive medical costs.
7. Excessive costs of warranty, fueled by lawyers who work for contingency fees.

A Lesser Category of Obstacles:

1. Neglecting long-range planning.
2. Relying on technology to solve problems.
3. Seeking examples to follow rather than developing solutions.
4. Excuses, such as "Our problems are different."

### **Lean manufacturing or lean production, or simply "Lean"**

- The practice of a theory of production that considers the expenditure of resources for any means other than the creation of value for the presumed customer to be wasteful, and thus a target for elimination.
- Not an invention of the 20<sup>th</sup> century – it is common sense.
- Applications to large industrial companies is relatively new
- Numerous approaches to achieve "Lean".
- Companies adopt this philosophy and modify it to meet their individual requirements.

- The primary focus of “Lean” is to deliver value to the customer. Every employee, from top management onward, should be to produce a product or service that is of value to the customer – all other activity is waste.

### **Toyota Production System (TPS)**

- Developed many of the concepts in Lean to grow from small Japanese company to become a world leader.
  - Emphasis has been on improving the “flow” of work. Interrupted flow (uneven flow) exposes waste.
  - Focus on understanding and improving their **processes**
  - Identified “Seven Wastes” (*muda* is the Japanese term for “waste”):
1. **Defects:** Quality defects prevent the customers from accepting the defected product. The effort to create these defects is wasted. New waste management processes must be added in an effort to reclaim some value for the otherwise scrap product.
  2. **Overproduction:** Overproduction is the production or acquisition that hides production problems. Overproduction must be stored, managed and protected.
  3. **Conveyance:** Each time a product is moved it stands the risk of being damaged, lost, delayed, etc. as well as being a cost for no added value. Transportation does not make any transformation to the product that the consumer is supposed to pay for.
  4. **Waiting:** Refers to both the time spent by the workers waiting for resources to arrive, the queue for their products to empty as well as the capital sunk in goods and services that are not yet delivered to the customer. It is often the case that there are processes to manage this waiting.
  5. **Inventory:** Inventory, be it in the form of raw materials, work-in-progress (WIP), or finished goods, represents a capital outlay that has not yet produced an income either by the producer or for the consumer. Any of these three items not being actively processed to add value is waste.
  6. **Motion:** As compared to Conveyance, Motion refers to the producer or worker or equipment. This has significance to damage, wear, safety. It also includes the fixed assets, and expenses incurred in the production process.
  7. **Over-processing:** Using a more expensive or otherwise valuable resource than is needed for the task or adding features that are designed in but unneeded by the customer. There is a particular problem with this item as regarding people. People may need to perform tasks that they are over qualified for so as to maintain their competency. This training cost can be used to offset the waste associated with over-processing.