A Tribute to the Father of Total Productive Maintenance

Total Productive Maintenance (TPM) was first developed in 1969 at Nippondenso (Denso) of the Toyota group in Japan under the leadership of Seiichi Nakajima of the Japan Institute of Plant Maintenance (JIPM). During the 1970s, TPM was further developed and refined in Japan. TPM reached America on March 13, 1986, in an article in *Plant Engineering Magazine*.

Nakajima, the “father of TPM” who brought his passionate vision and methods to us, passed away on April 11, 2015. He was 96 years old. I would like to use this column to pay tribute to him by sharing some of his life and wisdom as my TPM sensei.

**Seiichi Nakajima**

Nakajima worked for more than half a century as a maintenance and TPM consultant and teacher. During the rebuilding of Japan after World War II, Mr. Nakajima visited the United States to study maintenance methods. After studying American-style preventive maintenance, he introduced Productive Maintenance, the predecessor of TPM to Japan in 1951.

I first met Nakajima in October 1990 at his intensive “Introduction to TPM” workshop. While his bilingual method of teaching with the aid of a simultaneous interpreter seemed a bit cumbersome at first, it afforded plenty of time to make copious notes. These original notes and learning from Nakajima’s lectures over the next five years provided me with many insights to what TPM was intended to be and do—well beyond the TPM books bearing his name.

In a press release about Nakajima’s death, the JMA Consultants, Inc. (affiliated with the JIPM) stated, “Without his remarkable effort, TPM and manufacturing industry would not have been what it is today.”

The press release continued:

One of the most significant achievements of his lifetime was establishing the PM Awards (current TPM Awards). The first PM Award winner with TPM methodology was Denso in 1971 and that year would later be the birth year of TPM. Over 50 years of committed effort Mr. Nakajima was a genuine and valuable dedication to not only the Japanese manufacturing industries but also for manufacturing industries all over the world. Also his achievement can be seen in receiving Ranju Ho-sho or Medal with Blue Ribbon, which is awarded to individuals with significant lifetime achievements, presented by the Emperor to show gratitude for the dedication to improving the manufacturing industry through TPM.

**Toyota Production System**

Taiichi Ohno is credited as being the father of the Toyota Production System (TPS) and Kanban in the 1970s. Shigeo Shingo, Toyota Industrial Engineer in the 1960s and 1970s, is credited as a major contributor to TPS, just-in-time, pull scheduling production system, and the setup reduction techniques known as SMED (single minute exchange of dies). Shingo published the first comprehensive documentation of TPS in 1981 (Japanese) and in 1989 (English) *A Study of the Toyota Production System* (Productivity Press).
Both Ohno and Shingo discuss the importance of eliminating equipment breakdowns and cite Nakajima for his foundational work in that area.

Shingo stated, “There are three strategies that must be pursued to approach the ideal of non-stock production (single piece flow): 2. Eliminate (equipment) breakdowns and defects by detecting and responding to their causes.” (Shingo, A Study of the Toyota Production System, 1981 Japan, 1989 Productivity Press)

Ohno said, “Toyota’s strength does not come from its healing process – it comes from preventive maintenance.” (Ohno, Toyota Production System, Japan 1978, Productivity Press 1988)

TPM was the answer to eliminating equipment-related wastes (or losses) and achieving the goals of uninterrupted production flow that could not be addressed by the traditional maintenance approaches. Seiichi Nakajima proved over and over again that TPM is the equipment side of TPS (and lean manufacturing). Unfortunately, he and his TPM principles have been mostly overlooked by today’s “lean thinkers” as they adapted the principles of the TPS to their journeys of continuous improvement.

Nakajima’s words of wisdom
During my steep TPM learning curve in the late 1980s and early 1990s, Nakajima provided some memorable words (better termed nuggets of wisdom) worth sharing here:

• “Just-in-time manufacturing, Toyota’s production system, could not exist without TPM. Trouble-free equipment leads to uninterrupted flow, improved quality, reduced waste, and lower costs.”
• “According to its creator, Taiichi Ohno, the Toyota Production System is based on absolute elimination of waste. The purpose of TPM is to eliminate the six big losses. This corresponds to the absolute elimination of waste in the Toyota Production System. In striving for zero breakdowns, TPM promotes defect-free production, just-in-time production, and automation. It is safe to say that without TPM, the Toyota Production System could not function.”
• “Maximizing equipment effectiveness requires complete elimination of failures, defects, and other negative phenomena—in other words, the wastes and losses incurred in equipment operation.”
• “TPM grew out of the principles of American-style preventive maintenance from the 1950s, with Japanese-style productive maintenance of the 1960s, and the principles of Total Quality Management and small group problem solving, also from the 1960s.”
• “TPM is not a maintenance program. Rather, TPM was a company-wide program for improving equipment effectiveness—something that maintenance alone could not do. When TPM came to America, we realized we probably made a mistake calling it Total Productive Maintenance. Probably should have been Total Productive Manufacturing.”
• “Americans will struggle with TPM because you expect equipment to break down and then the maintenance group will fix it. The goal of zero equipment breakdowns is being received with significant skepticism and even denial in many companies. And yet, these same companies have goals of zero defects and zero accidents.”
• “The word total in TPM has these meanings: Total effectiveness: pursuit of economic efficiency or profitability. Total PM: Maintenance prevention and activity to improve maintainability as well as preventive maintenance. Total participation: Autonomous maintenance by operators and small group activities in every department at every level.”

• Regarding the pillars of TPM: “Culturally, Japanese and Americans were very different: Japan has always been a highly interdependent country and culture while we (America) are highly independent. The pillars of TPM are interdependent in that they rely on each other rather than standing alone.”

• “Overall Equipment Effectiveness (OEE) percentages should only be used to compare equipment to itself over time. Never to compare different equipment, or equipment running different products.”

Thank you, Mr. Nakajima, for building the foundation for what should be the most strategically important equipment maintenance approach today and well into the foreseeable future. It is an honor to have known you.

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