Chapter 9
Total Quality Assurance Networking Model for New Defect Prevention Techniques

ABSTRACT

In order to survive globalization and worldwide quality competition, Japanese manufacturing must work towards the simultaneous achievement of quality, cost, and delivery (QCD) in order to shorten development times, ensure high quality, and lower production costs. Therefore, in this chapter, the author creates the Total Quality Assurance Networking Model (TQA-NM) for the new defect prevention that uses the product quality assurance tools for the new manufacturing management. This model focuses on integrated quality assurance spanning different departments from design to production in automobile manufacturing companies and extending further to part manufacturers. TQA-NM is developed, and its effectiveness is verified at Toyota and its suppliers.

INTRODUCTION

In order to survive globalization and worldwide quality competition, Japanese manufacturing must work towards the simultaneous achievement of quality, cost and delivery (QCD) in order to shorten development times, ensure high quality and lower production costs (Amasaka, 2007).

At the concrete stage of implementation until now, there are many tools, such as Quality Function Deployment (QFD) that can be used to ensure manufacturing quality, but they do not always produce sufficient results. As for the actual situation, there are three key technological components needed to take product quality assurance to the next level: (1) the experience and skill of technical personnel, (2) the combined use of methods that take a scientific approach, such as Failure Mode and Effect Analysis (FMEA) and Fault Tree Analysis (FTA), and (3) partnerships—both internal partnerships that extend from design through production and external partnerships built with suppliers.

Therefore, the author has created the Total Qualty Assurance Networking Model (TQA-NM) includes the above key technological components as the new manufacturing management of the product

DOI: 10.4018/978-1-7998-8746-1.ch009

quality assurance, and is introduced for the new defect prevention (Amasaka, 2004a,b, 2015; Kojima and Amasaka, 2011; Amasaka, Ed., 2012). This model focus on integrated quality assurance spanning different departments from design to production in manufacturing companies and extending further to part manufacturers by employing Total Task Management Team (TTMT). The TQA-NM for preventing defects is then outlined and its effectiveness verified at the leading corporation Toyota and its suppliers (Amasaka, 2004a,b, 2015, 2017a,b, 2022; Kojima and Amasaka, 2011).

BACKGROUND

Manufacturing in Japan Today

Product lifecycles are getting shorter as customers present more sophisticated and diverse needs. Japanese manufacturing needs to address these issues by shortening lead times throughout development, production and sales (Amasaka, 2004a,b; Yamaji and Amasaka, 2008). However, recent quality issues such as the large-scale recalls of the markets and manufacturing quality problems have raised social concerns, and the number of incidents as well as the number of vehicles recalled is on the rise (Ministry of Land, 2009a,b).

These quality issues have naturally compromised user trust in addition to a loss in social standing for the companies themselves (Ministry of Economy, 2009). Quality issues are not limited simply to manufacturing quality issues or manufacturing reliability—it has become increasingly important to treat them as corporate organizational issues as well (Amasaka, K. 2004a,b; Amasaka et al., 2008).

Necessity of Preventing Defects

In order to grasp actual quality assurance conditions, the researchers conducted 204 interviews and surveys at the quality assurance departments of ten manufacturing companies (assembly manufacturers and suppliers), which included some major corporations. The investigation revealed that while many manufacturing companies are looking to shorten development times, they are also spending a great deal of their defect prevention efforts on preventing outflow rather than preventing occurrence itself (Amasaka, 2007).

It was discovered that one reason for this is that developers believe that focusing on preventing outflow contributed more to shortening development times than focusing on occurrence prevention. Occurrence prevention uses quality assurance tools like QFD or FMEA to predict what underlying factors are causing defects. But research indicated that these tools are currently not being sufficiently implemented. By putting effort into outflow prevention rather than occurrence prevention, fundamental solutions for reducing defects are never reached. Instead, it is critical that companies make the transition from quality assurance measures that prevent outflow to those that prevent occurrence as shown in Figure 1 (Kojima et al., 2011; Amasaka, 2015, 2017b, 2020).