Chapter 20
Body Auto Fitting Model "BAFM": Developing NJ-GPM

ABSTRACT

In this chapter, the author has established the Body Auto Fitting Model (BAFM) developing NJ-GPM (New Japan Global Production Model) based on the innovative deployment of Advanced TPS, Strategic Production Management Model. Therefore, the author has realized innovative unmanning of the fitting line by integrating the technologies utilizing BAFM, a model designed to achieve worldwide uniform quality and production at optimal locations. The keys to successful global production such as robotics, vision systems, bolt tightening, product quality management, and the ability to automatically fit and fasten door, hood, and luggage compartment panels to the car body was achieved. This study shows the development of the following three items: (1) panel fitting accuracy, (2) automatic bolt tightening, and (3) integration into flexible assembly line at an advanced car manufacturer Toyota.

INTRODUCTION

The leading Japanese management technology that has contributed most to worldwide manufacturing from the second half of the 20th century is the Japanese Production System, which is typified by the Toyota Production System (Ohno, 1977). This system has been further developed and spread in the form of internationally shared global production systems.

With this in mind, the author has created the "New Japan Global Production Model, NJ-GPM" to enable the strategic development based on the innovative deployment of "Advanced TPS, Strategic Production Management Model" employing NJM (New Japan Model) (Amasaka, 2007a,b,c: Amasaka and Sakai, 2011) (Refer to Chapter 5, 6 and 7).

The aim of this model is to realize a highly reliable production system suitable for global production by reviewing the production process from production planning and preparation through production itself and process management. The newly-created NJ-GPM is fundamental to the strategic development of global production (Amasaka and Sakai, 2010).

DOI: 10.4018/978-1-7998-8746-1.ch020

Therefore, the author has established the "Body Auto Fitting Model" (BAFM) developing NJ-GPM, and has verified the effectiveness of this research through example application (Sakai and Amasaka, 2013). Specifically, this study focuses on the fitting line by integrating the technologies using BAFM at an advanced car manufacturer Toyota.

BACKGROUND

The Current Condition and Problems of Conventional Production System

Today's manufacturers in Japan are globally expanding their operations at a full speed to be price competitive and need to establish a new production system to suit their global strategies. Conventionally, well-experienced and highly-skilled trainers go to local production sites and provide local production operators hands-on training one-on-one.

The quality of trainings for production operators greatly rely on personal capabilities of the highly-skilled trainers. Different trainers would give different trainings, which may confuse trainees and result in unevenness in production operators' skill acquisition processes. Production operators in Japan also have experienced the same problems while passing down the Japanese manufacturing technology.

Ideas for Three Important Points for Global Production

The author has proposed that there are three important points to assure high quality and high efficiency, and shorten lead time: (1) Production equipment using industrial robots, (2) Skilled workers who operate the equipment (production operators), and (3) Production systems including production data systems to activate the equipment and workers

The main factors for global production are to build a linkage among individual processes in production planning, production preparation, actual production and process control, to make those processes as perfect as possible, and to raise reliability in the manufacturing technology for global production (Sakai and Amasaka, 2007b,c).

DEVELOPING THE "NEW GLOBAL PRODUCTION MODEL" (NJ-GPM), STRATEGIC DEVELOPMENT OF ADVANCED TPS

Global production must be developed in such a way as to establish the kind of manufacturing that is required to gain the trust of customers around the world. It must achieve a high level of quality assurance and efficiency and shortening lead times to reinforce the simultaneous achievement of QCD requirements. The vital key to achieving this is the introduction of a production system that incorporates production machinery automated with robots, skilled and experienced workers (production operators) to operate the machinery, and production information to organically combine them (Brooks, 1986; Raibert, 1986).

Having recognized the need for a new production system suitable for global production, the author has created the "NJ-GPM" (New Japan Global Production Model) to realize the strategic development of the "Advanced TPS, Strategic Production Management Model" (Amasaka and Sakai, 2011). This model eradicates ambiguities at each stage of the production process not only from production planning