how we do it

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NUMMI uses a production method based on Toyota's "lean" production system, which is at the heart of everything we do. Patterned after the Toyota Production System (TPS), it is an integrated approach that uses machinery, material and labor as efficiently as possible.

NUMMI's production system is designed to meet the company's goal of building the highest quality products at the most competitive cost. The philosophy is that quality should be ensured in the production process itself so that defects are not passed on or overlooked.

To be effective and efficient, three concepts are emphasized: "just-in-time production," the quality principle of *jidoka*, and full utilization of team members' abilities.

"Just-in-Time" Production

The philosophy behind "just-in-time" is not to sell products produced, but to produce products to replenish those that have been sold. Just-in-time production supplies the *right* parts at the *right* time and in the *right* amount at every step in the process. The system also exposes problems that may not be apparent by excess inventories.

The Quality Principle of *Jidoka*

One of NUMMI's basic concepts is that quality should be ensured in the production process itself. This concept, known as *jidoka*, means not allowing problems to pass from one work station to the next.

Jidoka can refer to equipment automatically stopping under abnormal conditions, such as when a machine breaks or problems arise. *Jidoka* is also used when a team member encounters a problem in his or her work station. Team

members are responsible for correcting the problem by pulling an andon cord, which can stop the line.

The objective of jidoka can be summed up as:

- Ensuring quality 100% of the time.
- Preventing equipment breakdowns.
- Working efficiently.

Full Utilization of Team Members' Abilities

A key factor in the production system is treating team members with trust and respect. They are expected to help solve problems and make decisions that affect them or their group. They are also held accountable for their work.

To the extent possible, operations that are dangerous, require hard physical labor or are monotonous and repetitive become automated. In addition, team members routinely rotate jobs within their team. Numerous internal and external training opportunities are also available, including a joint program with Ohlone College that allows full-time employees to earn an Associates degree in two years.

Techniques and Methods

The NUMMI production system comprises many different techniques and methods to produce high-quality vehicles. These include *kanban, heijunka,* standardized work, *kaizen, poka-yoke*, visual control and the team concept.

Kanban

Kanban is a parts tracking/ordering card designed to prevent overproduction. Parts are taken only when needed and in the right amount. The preceding process produces only enough parts to replace those used by the next process.

Heijunka

Variations in production volume can lead to waste. *Heijunka* keeps production costs down by leveling the workload. It creates a consistent production volume by averaging the highest and lowest variations in orders.

Variations can then be removed from the production schedule so that parts and production labor can be used most efficiently. Heijunka is not just based on total volume but also on the types of vehicles produced and the various options. Therefore, heijunka is the overall averaging in the schedule of the variety and volume of vehicles produced in a given time

period.

Standardized Work

Each job is organized so that it is always done in the most efficient way possible, ensuring quality no matter who does the work. At NUMMI, this technique is called standardized work. It is defined as:

- Achieving high productivity.
- Achieving line balance throughout the production process.
- Eliminating excessive in-process inventories.
- Easily identifying opportunities to reduce waste and improve efficiency.

In standardizing each job, several factors are taken into consideration. These include the time necessary to finish a given amount of work, the order in which job steps are performed, the parts on hand, and the location of machinery.

Kaizen

Kaizen means the search for continuous improvement for finding waste in machinery, material, labor and production methods. At NUMMI, each team member is responsible for increasing his or her efficiency and productivity. Team members are taught to *kaizen* their jobs to achieve higher efficiency, better quality and lower costs. Team members can use the company's Suggestion program to receive cash for their *kaizen* ideas.

Poka-yoke

Poka-yoke is the term for devices on machines that act as sensors to identify malfunctions and to ensure foolproof production. These devices are just another way to improve in-process quality. *Poka-yoke* is also used as a backup in the event of human error. The devices identify missing parts and improper assembly by rejecting the parts, causing conveyors or machines to stop automatically.

Visual Control

Visual control can be defined as knowing at a glance whether or not production activities are proceeding normally. Visual controls monitor work done at each station.

One tool used for this purpose is the "andon" board, which lights up to communicate manufacturing status. If a problem occurs, the board will light up to signal to the supervisor which work station is in trouble. A melody is

used in conjunction with the andon board to provide an audible signal to help the supervisor realize there is a problem in his or her area. Once the supervisor assesses the situation, he or she can take appropriate steps to correct the problem.

The andon board can be triggered by a machine malfunction, pulling the andon cord or pushing a button in the work station.

Other forms of visual control are used in the plant to communicate a variety of information. Some examples of visual control include charts that display current status of quality, efficiency, attendance, safety and training.

Team Concept

In applying the team concept, each team is responsible for meeting company objectives in areas such as quality, production and safety. Teams generally consist of six to eight team members.

Members are led by an hourly team leader. The team concept uses only three job classifications: - production, skilled trades such as general maintenance, and tool and die in Stamping.