



Toyota Global Production Center

New Facility Efficiently Trains Experts to Support Toyota's Expanding Scale of Global Manufacturing



Instilling professional excellence at Toyota's Global Production Center

Toyota established the Global Production Center in July 2003 to efficiently train large numbers of shop-floor experts to support an increasing number of production sites worldwide. Key to this effort is the wholesale conversion of implicit knowledge into explicit "standardized knowledge," using digital technology to create visual training materials.

Toyota's Global Production Center (GPC) opened with the mission of rapidly instructing large numbers of mid-level plant managers from overseas and Japan in best practices. Located in Toyota City, Aichi Prefecture, Japan, the 42,000m² GPC has the capacity to train about 800 people per year and employs about 230 personnel drawn from Toyota plants. In addition to skill instruction, GPC provides facilities for V-comm* digital engineering, global pilot production, and project preparation.

As Toyota continues to expand manufacturing worldwide, GPC will play an essential role in maintaining high efficiency and high quality, as well as smoothing preparation for model changes at far-flung factories.

Toyota sees increased self-reliance for overseas affiliates as essential to successful worldwide expansion. With over 50 manufacturing sites in 26 countries and locations worldwide, Toyota's traditional "mother plant" system of support has been stretched. Toyota's overseas vehicle production posted a year-on-year increase of 18.7% in CY2003 and is on course to rise another 20% in CY2004. "We must advance our competitiveness by developing more efficient training to support overseas manufacturing efficiency and quality," explains Toyota Executive Vice President Kosuke Shiramizu.

The training facility is within the Motomachi plant in buildings previously used for assembly of the Mark II, RAV4, Ipsum and, most recently, Prius.

* V-comm: Digital engineering technology that enables engineers in Japan and overseas to work together to optimize production processes.

Beyond Traditional "Mother Plant" Support

Facing this challenge, Toyota applied *kaizen** to its traditional "mother plant" support system. A hard-nosed review of the traditional system revealed plenty of room for improvement. Not only was it personnel-intensive, it was also non-continuous and inconsistent, and did not transplant readily to overseas facilities, thereby delaying self-sufficiency. Skill levels and range of expertise differed depending on the coordinator or trainer, and each plant had its own variations.

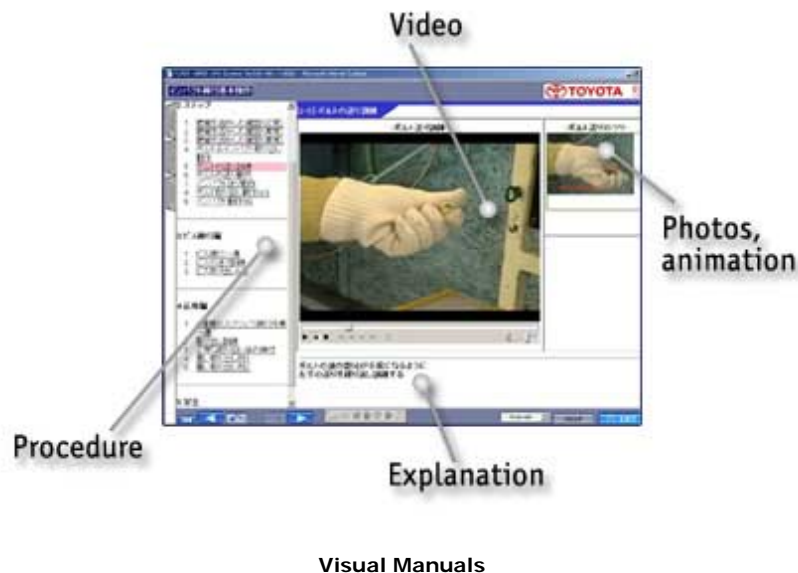
Though the "mother plant" system will continue to serve Toyota as a supplement to the new GPC approach, GPC will also standardize methods across the mother plants.

* *kaizen*: Continuous improvement, Toyota's formula for maximizing efficiency and value.

Visual Manuals Teach a "Common Base" for Manufacturing

While permitting flexibility at the application level within each plant, Toyota sought a "common base" for manufacturing at Toyota plants worldwide. That meant finding the best practices and eliminating individual methods. Since Toyota traditionally taught skills on a person-to-person basis, knowledge was implicit and -- because *kaizen* meant continuous improvement -- rarely written down.

Drawing upon the vast experience of its experts, Toyota selected and organized the best practices for each skill. Toyota applied digital technology to compile these methods into "visual manuals," keeping text to a minimum, while using photos along with short animation and video clips to facilitate rapid comprehension. Slow-motion videos enable trainees to grasp skills that tend to be demonstrated too rapidly by seasoned human experts. Such skills can be as basic as the knack of rolling a bolt from palm to fingertips. In all, GPC has about 2,000 visual manuals in stock, covering a vast repertoire of automotive assembly processes.



From Visual Manuals to Standardized Work

For efficient and effective skills training, personnel pass through four stages at GPC: (1) Trainees acquire basic knowledge using visual manuals. (2) They practice fundamental skills -- such as how to tighten screws so they are not too loose or too tight -- at specially designed work tables. (3) They progress to "element work" training, such as joining a door lock rod and door handle. (4) They learn the basics of standardized work, including how to start and end an operation, the *kanban* system of just-in-time parts ordering and how to use the *andon* system to halt the line if there is a problem



Features of Personnel Training at GPC

Action Training and Image Training

The GPC "best skill training area" is 8,000m². Here, up to 130 trainees hone their skills on approximately 400 specially developed work tables and pieces of simulation equipment. In practicing "element work," trainees gain the ability to perform each task within a standardized timeframe, which is essential to maintaining takt time* to keep an assembly line flowing smoothly.

The German word *takt* means rhythm or musical meter, and a rhythmical approach to movement is key to achieving proficiency in these jobs. In car-body painting, for example, precise yet rhythmical body motion not only improves efficiency, it also helps assure complete and consistent paint coverage.

Image training is also important, particularly for assembly stages that require operations outside the worker's field of vision -- behind a door panel, for instance. To rapidly gain proficiency, the trainee uses visual manuals and off-line or "static" skill practice to develop a mental image of what his or her hands will be doing during "dynamic" assembly on a moving line.

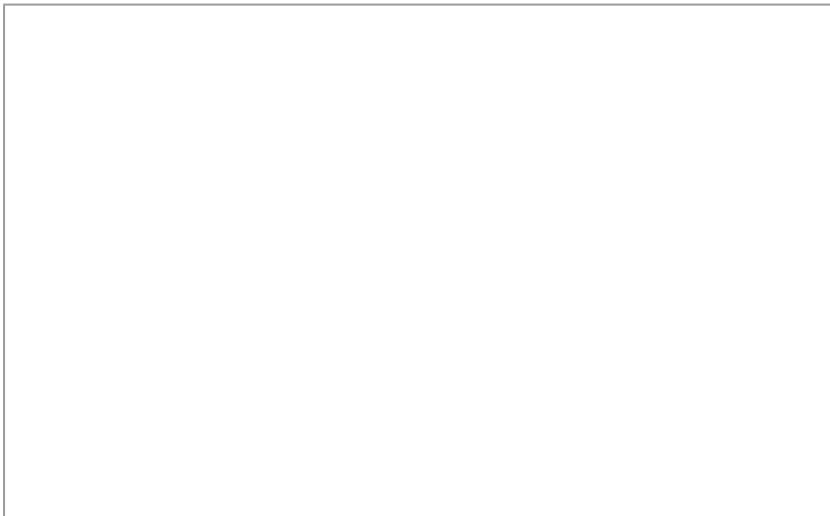
"Best practices" are selected and refined based on ergonomics. They contribute to worker safety and avoidance of physical strain in addition to enhancing manufacturing efficiency and quality.

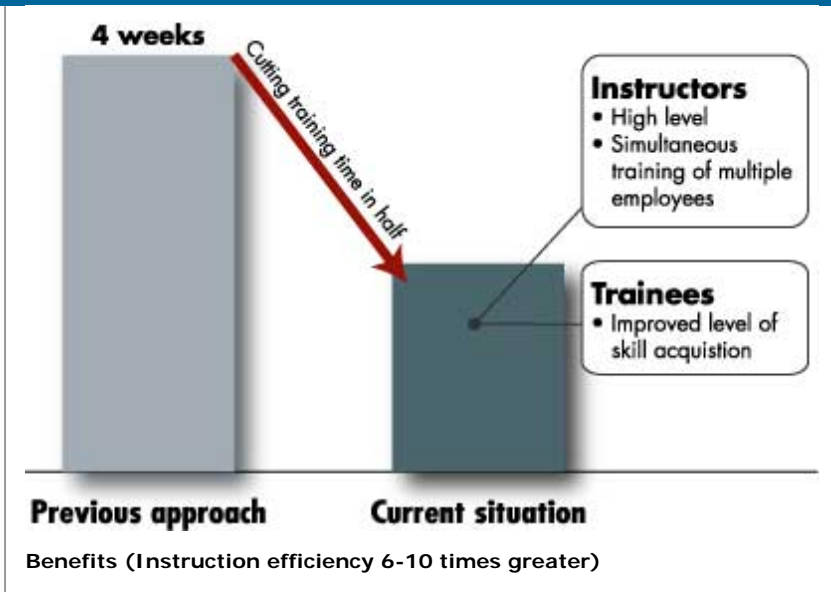
* *takt time*: The time it takes for each worker to complete his or her job cycle, therefore the rate at which vehicles are produced by the line.



Training Time Halved, Skills Acquisition Improved

By providing high-level consistent training to multiple employees simultaneously, Toyota has cut training time in half while raising the level of skill acquisition. Toyota estimates that GPC multiplies instruction efficiency by a factor of 6 to 10. Besides assembly skills, GPC training packages include instruction in automotive knowledge, safety, and Toyota's management values — based on *kaizen* and "respect people" — known as the Toyota Way. A seven-week package is offered for shop-floor managers and a 5-day program for plant managers.





Self-Reliant Preparation for Model Changes

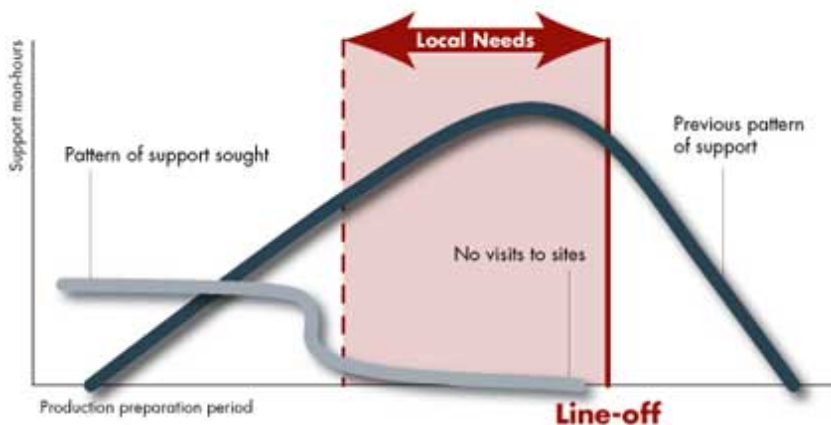
Beginning about a decade ago, Toyota has applied its digital engineering technology, known as V-comm, to help enable nearly simultaneous model changes at widely dispersed plants around the world. Now, GPC is augmenting this capability to reduce preparation time and minimize the need to send personnel to overseas sites to supervise training for new-model assembly.

GPC offers not only a dedicated V-comm room, but also offices for project preparation and a global pilot production area.

In the global pilot production area, workers from overseas plants can practice assembling the new model so they will be optimally prepared to instruct their teams back home. This cuts preparation time to a fraction of the up to 1-year period previously needed to reach full-scale mass-production for same-platform model changes. It also aims to reduce support man-hours by one half, thereby easing the burden on factories in Japan.



Aiming to reduce support man-hours by one-half

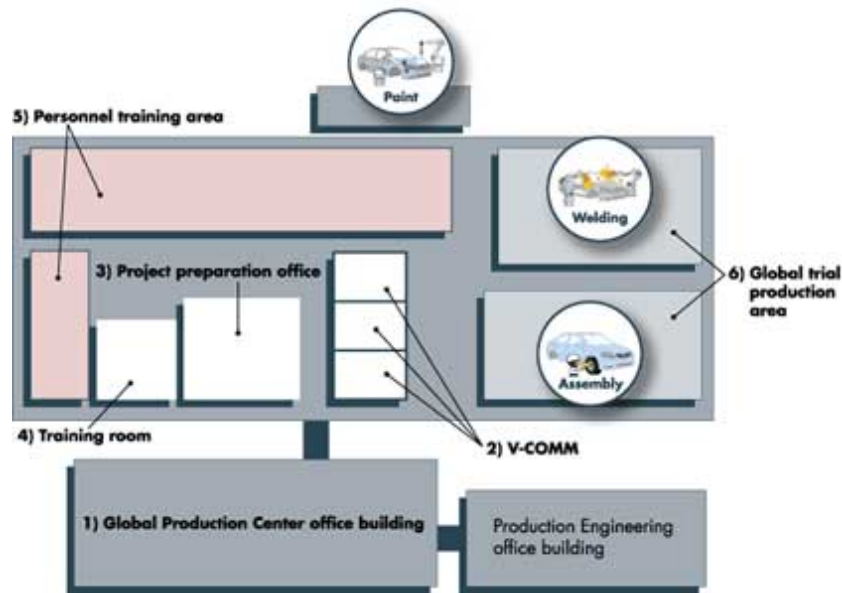


Global Pilot Production

About 22,000m² or over half of the total GPC area is dedicated to global pilot production, with specialized sections for welding, paint and assembly. New dynamic functionality goes beyond what is offered at any other plant or training facility operated by Toyota.

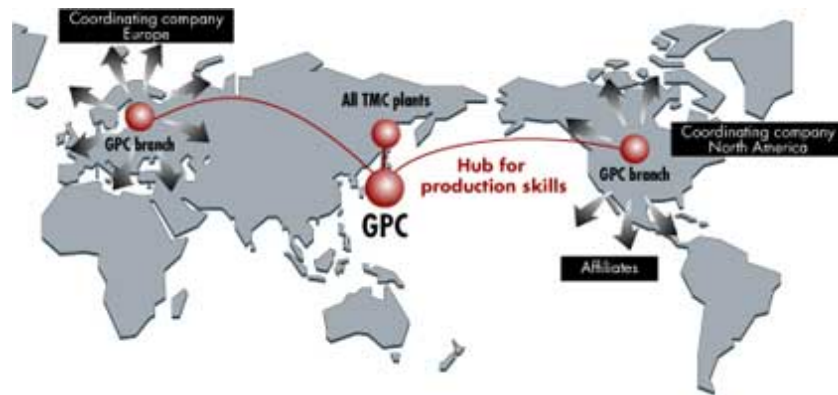
The welding section is unique in offering not only a static trial area, but also a dynamic trial — working on a moving line — and a

manual-welding trial area. The paint section includes static trial area, paint booth (under preparation) and oven. The assembly area also uniquely offers a dynamic trial area in addition to static trial facilities.



Local Global Production Center Branches Planned

Now that the Global Production Center in Toyota City has proven its effectiveness, Toyota is building similar facilities around the world. Currently, GPC branches are scheduled for North America (Kentucky) and Europe (Belgium). With these, Toyota plans to outpace globalization by training even larger numbers of personnel in a short period of time. Each area is free to customize and create visual manuals to suit unique assembly conditions for particular skills.



2,400 Employees to be Trained in the First Three Years

In its first three years of operation, the Global Production Center aims to train 2,400 employees, according to Toyota Managing Officer Koichi Ina, general manager of the facility. The center is also enhancing the specialized skills of overseas personnel by deepening their understanding of the Toyota Way, to enable them to pass down professional know-how to managers and subordinates at local production sites.

Looking ahead, Toyota plans to further enhance the curriculum, expand the facilities at the center, and increase its intake of trainees.

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