TECHNOLOGY AND IIOT

# Scaling Brilliance on the Shop Floor

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Computer vision and AI can identify takumi--the brilliant outlier--on a production line and incorporate his or her creativity into

standardized work.

Prasad Akella

Craftsmanship. By definition, it means portraying skill at something—carving wood, sculpting clay, welding metal. But craftsmanship implies something more than skill; it implies care, mastery, accountability for the item being created. It's about the spirit with which something is created. When you have a craftsman-like mentality, you have pride in your work—and the quality of your output will likely be high.

Modern manufacturing isn't typically defined by craftsmanship. The shift to mass assembly lines took ownership away from the individual operator, and rather than seeing a product through from start to finish, operators became component contributors—adding screws, affixing adhesives, fastening wires—rather than producing an entire object.

Talk about killing the craftsmanship mentality.

## Why Craftsmanship Matters

Unfortunately, the trend from artisan craftsmanship to mass manufacturing adversely impacted the worker's passion. Delivering craftsman quality at scale

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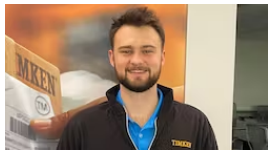

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is a challenge, because the pace at which the product is being built doesn't mesh with the obsessive care and mastery that a craftsman approach often requires.

The issues that mass production created—for example, excessive waste, high defect rates—led to the rise of the Toyota Production System (TPS). One of TPS's 14 principles hinges on the idea of standards-driven production paired with employee empowerment: "Allow creative and individual expression to improve upon the standard; then incorporate it into the new standard so that when a person moves on you can hand off the learning to the next person."

In essence, TPS (more generally referred to as lean manufacturing) attempts to take the passion inherent in craftsmanship from the individual item and transfer it to the process. In that way, the operator reclaims ownership and feels a sense of pride. Here's how.

### The Philosophy of *Monozukuri*

With TPS comes the concept of *monozukuri*, a term from the Japanese culture which literally translates to "the way to make things." *Monozukuri* asserts that there's a spirit with which something should be done, a "right way" to proceed with a process.

In the manufacturing world, it assumes that there's more than simply an order for assembling a finished product; there's a passion for the process, an

element of self-reflection and self-criticism for the work that drives the assembler to seek continuous improvement (*kaizen),* to do something exceptionally well.

Historically, this focus on the process has led manufacturers to scrutinize machines, but the notion of *monozukuri* should extend to manual processes – in fact, it should supercede the machine focus. But manufacturers have had difficulty evaluating manual processes from a *monozukuri* perspective because the means of measuring and analyzing manual processes has been limited.

So why does *monozukuri,* or craftsmanship, matter today? With massive factories producing items at scale, don't the principles of pride and continuous improvement seem quaint?

The short answer is, craftsmanship improves quality, and that builds trust with customers. Customers want to work with suppliers who have their best interest in mind. Imagine if you're Toyota, and you have two Tier 1 suppliers responsible for providing cylinder heads for Lexus engines. One supplier talks about volumes and quantities and defect rates. The other supplier does that, as well, but deepens the conversation to the spirit of improving products to build on the end user experience, and has a deep understanding of how their production processes impact that relationship.

Who are you more likely to invest in long term?

*Monozukuri* forces manufacturers to look beyond their immediate circle. They're genuinely committed to developing a quality product they can be proud of. Now that's craftsmanship.

## Scaling Craftsmanship in Modern Factories

The idea of craftsmanship is great in principle, but how can manufacturers scale that mentality across stations, lines, even factories?

There's another important concept in Japanese: *takumi*. It means "artisan." Traditionally, the *takumi* master craftsman passes skills on to his apprentices; to the next generation. That craftsmanship still exists in line associates, but it's hard to identify them.

Why? Because they're invisible. There are no analytics on manual tasks, and without data one line associate looks like the next.

At Drishti, we have a related term: the brilliant outlier.

New technology, such as computer vision and AI, allows manufacturers to identify the brilliant outlier – the *takumi*, if you will – on the assembly line. This technology augments the creativity of that person and, by incorporating his or her creativity into the standardized work instructions, allows him or her to set the standard for the rest of the team and company globally.

And that becomes the training model. The electronic *takumi* allows a company to recognize and scale this person's brilliance worldwide, and use new technology to distribute this new standard on a massive scale.

Production has scaled exponentially since the time of the village craftsman. Paul Revere, the storied American silversmith who was immortalized by Longfellow, would never be able to satisfy demand for his wares in today's global marketplace.

New technology celebrates and allows Revere-level craftsmanship to be harnessed in the manufacturing process, ensuring quality and a superior end user experience that can be shared and incorporated across organizations at scale.

*Prasad Akella led the industry/university team that built the world's first collaborative robots at GM ("cobots", projected to be a $12B market by 2025). He's the founder and CEO of* Drishti*, a company deploying AI to collaborate with and enhance humans on the factory floor.*

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