

SURVEY REPORT:
MANUFACTURING DEPENDS
ON THE ADAPTABILITY OF
PEOPLE

In a post-COVID world, are manufacturers making the right investments to increase their adaptability to change?

It's been one heck of a ride in the manufacturing world these past 18+ months, and as it looks right now, this period of turmoil and uncertainty is likely to continue. Even before the coronavirus pandemic upended the entire globe, manufacturers were experiencing significant external threats and internal challenges at a faster rate than ever before.

For many manufacturers, lean manufacturing — embracing the core tenets of the Toyota Production System (TPS) — provides a path to stabilize, then optimize production, even when companies are buffeted by forces beyond their control. But as important as it is to maintain efficient production operations, there's a growing importance for manufacturers to be not only stable and efficient, but also adaptable in these times of uncertainty.

There are really only two ways to improve factory operations: automate, or optimize the performance of people. Manufacturers have automated as much as they can over the last several decades, but the reality is that many tasks aren't yet automatable. The machines don't exist to do the precise or complex tasks that humans perform.

So what's the key to a more adaptable factory, particularly when the specific challenges on the horizon are largely unknown?

People.

As you'll see in the following report, manufacturers largely believe that people are the key to greater adaptability, because they're less rigid and more flexible than automation.

But manufacturers have long believed that people are optimized; that the productivity of humans in the factory has peaked. People are more flexible, but with that flexibility comes unreliability and variability. People are hard to find, harder to keep and they introduce risk into assembly operations.

In short, people threaten all those efficiency gains that lean and TPS have brought to the floor.

But maybe there's a way to double down on people without doubling down on the risk. New technology like Drishti can help augment the performance of people, providing manufacturers with the superior adaptability of humans without the typical compromises in risk and efficiency.

We wanted to explore adaptability and efficiency in lean operations, so we asked 400 senior manufacturing executives from North America and Europe for their opinions on everything from their own lean initiatives, the impact of the coronavirus, future threats and challenges to the role of people. I hope you'll find it as enlightening as I do.

Dr. Prasad Akella

Founder and chairman, Drishti

1. External Threats to Manufacturing <i>42% cite supply chain disruptions as the greatest threat</i>	04-06
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Part I: It's a mad mad mad mad world

Manufacturers need to be more resilient now than ever before. In March 2020, the novel coronavirus pandemic threw every industry into uncharted territory and presented different challenges to manufacturers around the globe.

But Covid-19 is far from the only threat on the manufacturing horizon: Natural disasters, political instability, supply disruptions, raw materials shortages, labor changes and economic uncertainty are just a few of the potential disruptors manufacturers face. The World Economic Forum notes that natural disasters in every category — hydrological, climatological, meteorological and geophysical — have steadily increased over the past 20 years.

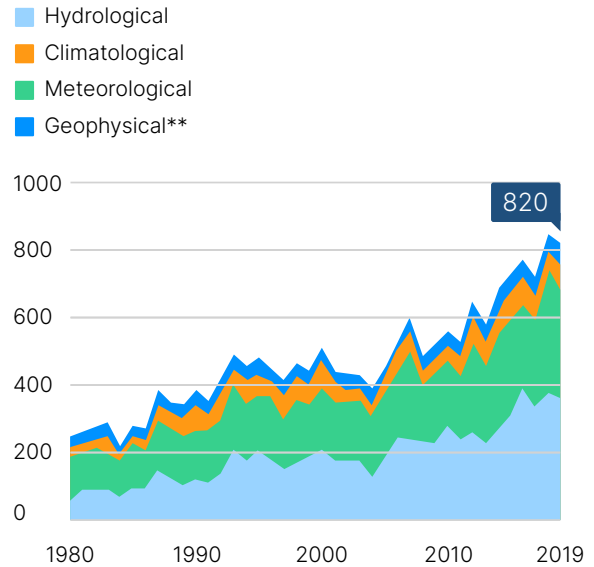
In 2020, a [McKinsey survey report](#) noted that industry disruptions lasting more than a month are occurring once every 3.7 years, with many interruptions of a shorter duration occurring even more frequently.

Even a [giant container ship lodged in the Suez Canal](#) can upend the entire supply chain for weeks. How does one anticipate a disruption of that nature?!

To better understand how manufacturers are thinking about the impact of external disruptions on their organizations, we asked them to rank their top three concerns. Responses varied slightly by industry. Industrial and consumer goods manufacturers both said supply chain disruptions, inflation or economic uncertainty and supplier price increases. Automakers cited demand for new products as number one, while the medical device sector included natural disasters in its top three. Electronics manufacturers placed two labor-related concerns, wage increases and labor shortages in the top three.

Natural Disasters on the Rise Around the Globe

Number of natural disasters* by the type of event (1980-2019)



* Registered as relevant loss events by MunichRe

** Volcanic/tectonic activity

Source: [World Economic Forum](#)

No matter which threats were identified by manufacturers, it was almost universally believed that a significant incident is likely to occur in the next 12 months.

In fact, only 8% of manufacturers said an imminent threat was very unlikely, with 60% assuming a threat was very likely or almost certain.

Meanwhile, 56% of respondents said they felt confident they were prepared for some threats, but not others, from a production standpoint; 6% said they were unprepared for threats at all.

What steps have you taken to prepare for the next big threat?



41%
Installing more automation because it's less risky than people



40%
Improving physical factory infrastructure



29%
Hiring more people because they're more adaptable than automation



28%
Moving production from high-risk areas

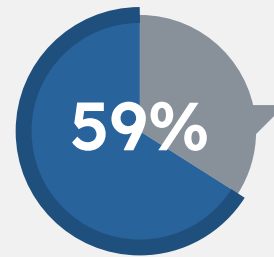


25%
Robust disaster planning

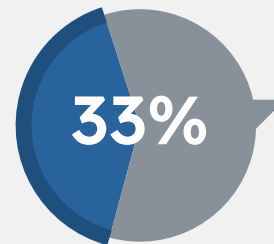
INDUSTRY VOICES

Not all industries see the future the same way. Automakers had the most uncertain outlook on the future, with 75% saying a major disruption was very likely or almost certain. Meanwhile, consumer goods manufacturers felt much more confident, with only 49% feeling that same pressure.

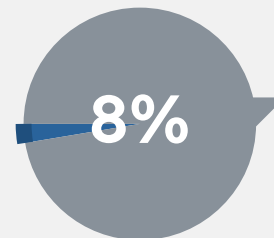
How certain are you about the future of your industry?



Our industry will change significantly in the next few years



I feel certain that our industry will generally remain static



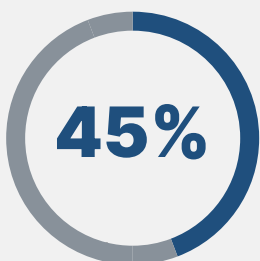
I feel uncertain about the future of our industry

So why do most companies feel confident they can weather uncertainty? We asked what preparedness measures they've taken to counter any unanticipated threats. Across industries, 41% said they've installed more automation, while 40% focused on updating physical plant infrastructure. Others (29%) took the approach of hiring more human workers to tap into the adaptability of humans. Companies in Europe were slightly more likely (28%) to move production away from high risk areas than those in North America.

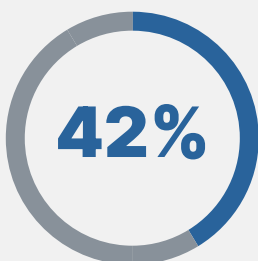
At the end of the day, the vast majority of manufacturers (59%) know that significant change is coming to their industry, even if they aren't completely clear on what that change will be. And their adaptability to external threats is slow in many cases; while 41% of manufacturers said, in the event of a major industry change, they could shift production within a few weeks or less, a substantial majority (59%) of companies see production shifts taking a few weeks or even several months.

Notably, medical device manufacturers lag behind other industries, with only 23% feeling confident they could shift production in days or hours.

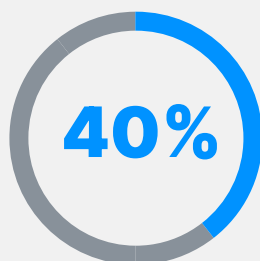
What are the top three external threats to your organization?



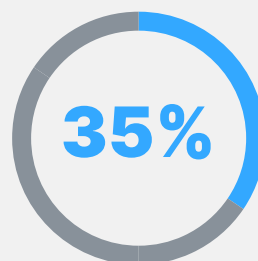
Supplier price increases



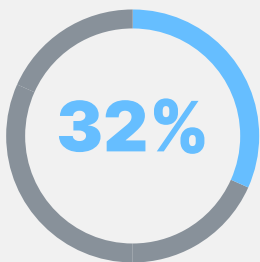
Supply chain disruptions



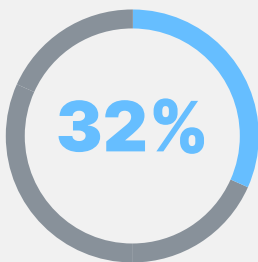
Inflation or economic uncertainty



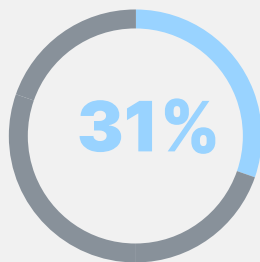
Labor shortages



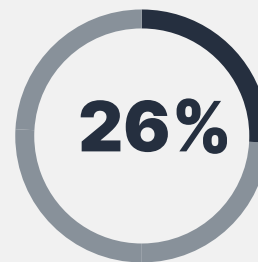
Natural disasters / climate change



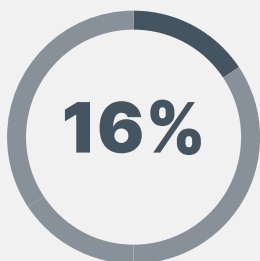
Demand for new products



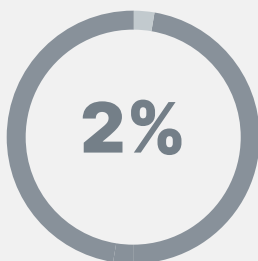
Wage increases



Geopolitical uncertainty



Industry disruption



Other

THE DRISHTI PERSPECTIVE:

People may seem riskier, but automation is not risk free

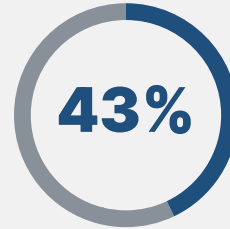
It's true that people introduce variability into processes. In a previous survey from 2018, Drishti found that 69% of variability on the line is caused by humans at work. However, humans have cognition. They can quickly understand a process change without retooling or reprogramming. And they're flexible: Humans can perform precision movements and large sweeping tasks with little to no delay in between.

The key is to marry humans and automation on the line to get the best of both worlds. Like a spell checker running in the background while you type an email, Drishti runs undetected in the background until the system notes an anomaly worth human attention. With the spell checker, you don't have to reread every word; just the ones underlined in red. Similarly, Drishti minimizes the variability of humans, allowing them to work efficiently with the confidence that any concerns will be flagged. Humans are the basis for what Dr. Jeffrey Liker, author of the Toyota Way, refers to as "The Thinking Production System," this notion that humans are key to observing patterns, identifying abnormalities and determining solutions that machines would be challenged to make happen.

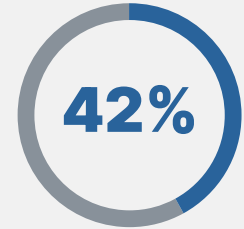
The call is coming from inside the house

External threats aren't the only roadblocks for manufacturers. Sometimes the biggest challenges arise from right inside your own organization. When polled about the top three internal challenges to operations, productivity (56%), quality (54%) and training (48%) were at the top.

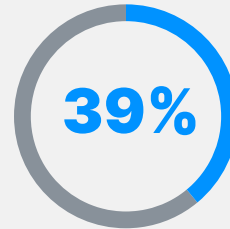
What data do you use to support your lean improvements?



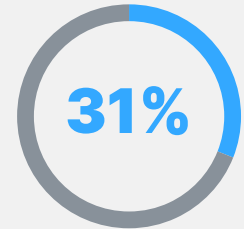
Quality metrics



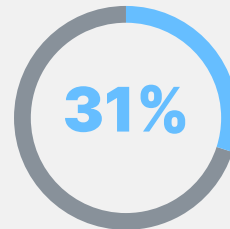
Productivity metrics



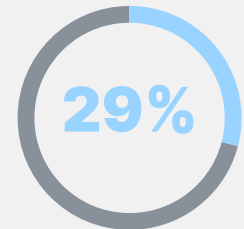
Profit & loss statements



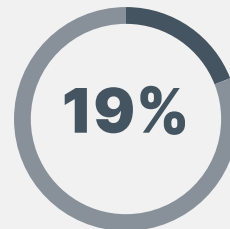
HR and training data



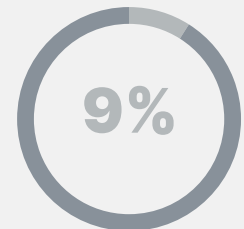
Time & motion data



Line analytics



Feedback/suggestions from production associates



OEE

THE DRISHTI PERSPECTIVE:

In manual assembly, process adherence drives productivity and quality

In manual assembly, productivity and quality are dependent on people following processes that they ideally helped create. Deviations from processes adversely impact these domains, and it has long been believed that the ability for people to be more consistent is maxed out — that people will always have a certain level of variability and unreliability. Thus the frequent turn to less variable automation.

To be fair, manufacturers have done an excellent job of optimizing these domains without the assistance of technology like Drishti. For example, in many industries, defect rates are less than .01%. Without augmentation from AI, additional gains are nearly impossible, but even a few tenths of a percent of improvements can translate to hundreds of thousands of dollars per year.

But here's another thing to think about: **Productivity and quality will only be as good as the worst performing line associate.** So training and retention have to be top priorities for manufacturers.

And that's the key: Drishti helps provide video-based training so line associates perform at their most efficient with the fewest number of defects. This on-the-job, in-context training is more effective than the usual written manuals and photos with captions. And with video-based standardized work instructions, best practices are captured and disseminated anywhere in the world.

“

Everything starts with training so that people are equipped to get [productivity and quality] right.

- Global director of engineering, consumer goods manufacturer

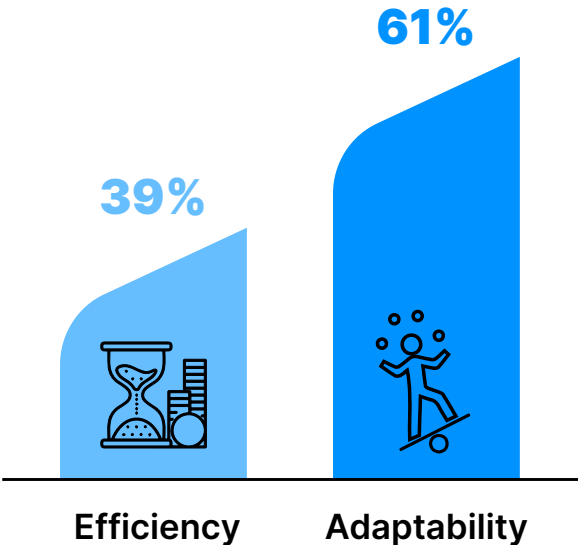
Part II: The key to adaptability: people

People still perform a vast number of assembly tasks. We know from our past research that at least [70% of manual assembly tasks are performed by people](#). And 49% of this survey's respondents said that the coronavirus pandemic made them value people more because of this adaptability (while another 21% were unchanged in their views on people in the factory).

An overwhelming majority, 73%, agreed with the statement, "The more manual you are, the more adaptable you are."

Manufacturers know they're living in a world where external threats and internal challenges are going to impact their businesses. They understand that adaptability is a more valuable asset than efficiency (61% to 39%, to be exact).

What is more important to your survival, adaptability or efficiency?



But in a major misalignment, **62% of technology investments are focused on improving efficiency**, not adaptability.

We saw earlier in this report that the bulk of investments are going toward automation, factory infrastructure for machine-to-machine communication and other non-people improvements. In fact, technology to augment people was the lowest investment category across regions and geographies.

It all comes back to the belief structure that the productivity limit of people has been reached. If that's the case, it makes sense that manufacturers would invest in technology to improve machine performance, because under that erroneous construct, machines are where the opportunities lie. And even though people are key to more adaptable plant operations, since they're theoretically "maxed out," the investments go elsewhere.

And hiring people comes with its own set of considerations. The coronavirus pandemic highlighted and exacerbated existing staffing challenges. Respondents cited finding enough line associates to staff shifts as the number one post-pandemic concern (19%), followed by knowing what's happening on the floor when travel is not possible and keeping employees healthy (both 16%).

Even when broken down by industry, every single group said finding enough associates was a top three concern.

An infographic titled "Since the coronavirus pandemic, what is your biggest concern when it comes to staffing?". It features an illustration of two people, a woman and a man, both wearing face masks and holding a laptop. Below the illustration is a list of concerns with corresponding percentages in blue bars.

Percentage	Concern
19%	Finding enough line associates to fill my shifts
16%	Knowing what's happening on the floor when I can't be
16%	Keeping my employees healthy
15%	Keeping nonessential personnel away from the line
13%	Absenteeism

But the “people have reached peak efficiency” construct simply doesn’t reflect reality. We’ve seen massive improvements in productivity rates on manual assembly lines with the introduction of Drishti, an AI-powered technology that augments and empowers humans to perform to a greater degree than they could alone.

And it isn’t a trade-off for quality; defect rates stay the same or drop as people become more efficient.

THE DRISHTI PERSPECTIVE:

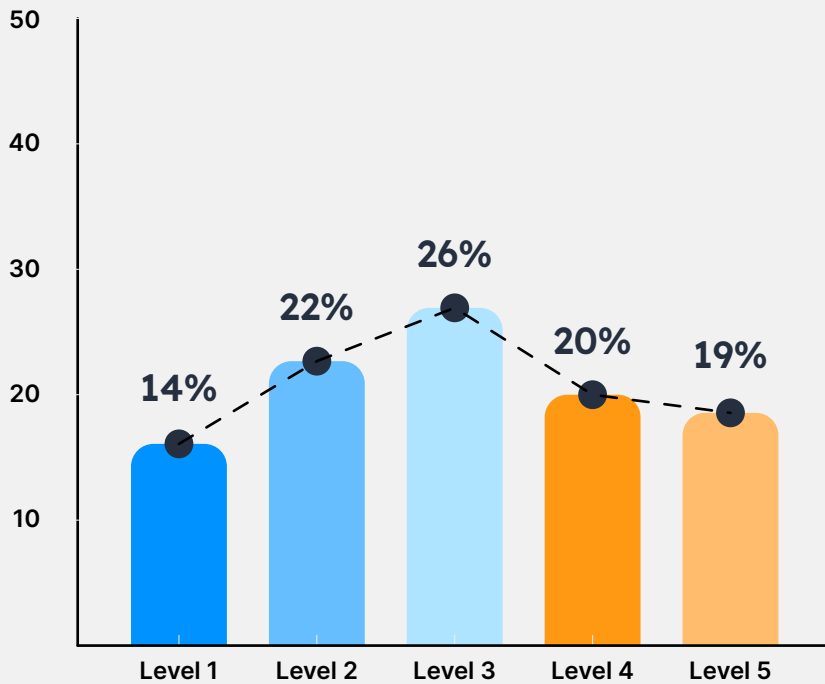
The missing component to Industry 4.0

Industry 4.0 tells manufacturers that technology can solve their problems. Plug a robot into that line, add sensors to that one, and suddenly you’re seeing massive improvements everywhere. But Industry 4.0 misses a huge component of manufacturing: people. And it does nothing to improve the way decisions in factories are made, or to help manufacturers prevent the problem from recurring.

Truly elite manufacturers know that technology will never solve all the problems in a factory, so they create the conditions by which people are most empowered to make changes and solve problems using their human brains. That’s why they marry technology like AI, which sheds light on the problems that exist, and humans, who use their massive capacity to think and solve problems, to get the best of both worlds.

Part III: How lean are you really?

What is your level of lean maturity?



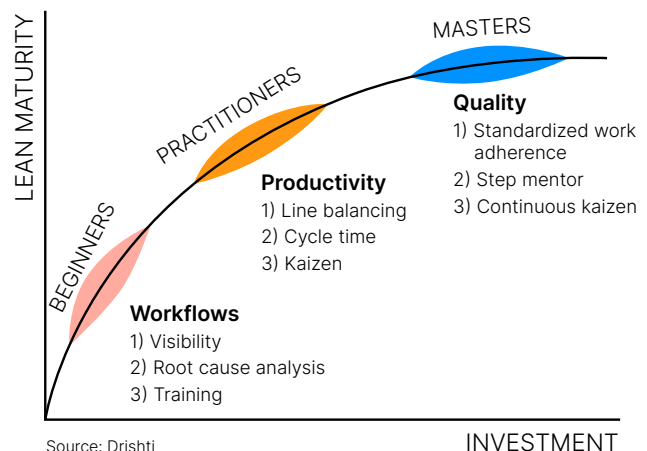
- Level 1:** Some awareness of this practice; sporadic improvement activities may exist
- Level 2:** General awareness; informal approach deployed in a few areas with varying degrees of effectiveness and sustainment
- Level 3:** A systematic approach / methodology deployed in varying stages across most areas facilitated with metrics; good sustainment
- Level 4:** On-going refinement and continuous improvement across the enterprise improvement gains are sustained
- Level 5:** Exceptional, well-defined, innovative approach is fully deployed across the extended enterprise (across internal and external value streams); recognized as best practice

This report assumes that manufacturers who responded practice, or at least aspire to, lean. Manufacturers know that lean, and the Toyota Production System (TPS), are the epitome of best manufacturing practices today. Lean methodologies are built around the principle of reducing waste, which boosts productivity, and since they were first implemented in the 1950s (in the case of TPS) and 1990s (in the case of broader lean), they've been the gold standard for manufacturing.

Companies that are more lean tend to be more efficient. Lean is a journey; different companies are at various points of the lean maturity curve depending on where and how much they have invested and committed. Ideally, they continuously improve operations in pursuit of peak lean. The figure below depicts the typical lean maturity curve.

Lean Maturity Curve

Standardized work is the basis of the journey



Source: Drishti

To determine generally where companies landed on the lean maturity curve, we asked manufacturers to take an introspective look at their operations and share their lean level. The standard definitions came from the Lean Advancement Initiative's Enterprise Self Assessment Tool (LESAT), a program at MIT.

Unfortunately, unconscious bias can make it difficult for manufacturers to truly assess their lean progress. While more than 38% of respondents claim to be at level 4 or 5 when it comes to lean practices, the reality is much lower, according to Dr. Jeffrey Liker, lean expert and author of "The Toyota Way."



I have visited hundreds of organizations that claim to be advanced practitioners of lean methods. They proudly show off their pet lean project. And they have done good work, no doubt. But having studied Toyota for twenty years it is clear to me that in comparison they are rank amateurs. It took Toyota decades of creating a lean culture to get to where they are and they still believe they are just learning to understand "the Toyota Way." What percent of companies outside of Toyota and their close knit group of suppliers get an A or even a B+ on lean? I cannot say precisely but it is far less than 1%.

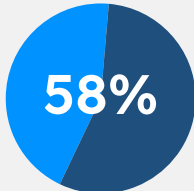
Excerpt from "The Toyota Way" by Dr. Jeffrey Liker

REGIONAL VOICES

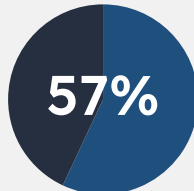
It's worth noting that lean self-assessments varied significantly between North America and Europe. More than 49% of North American respondents claimed to be level 4 or 5 lean, while just under 34% of European manufacturers said the same. While most manufacturers may have been generous in their lean self-assessments, they were clear on the roadblocks that prevent lean from really taking root in their organizations.

More than 58% of respondents noted that lean principles aren't well understood or prioritized among the management team, while almost as many shared that the costs of implementing lean are too high. The third highest ranked roadblock to lean implementation is one that deserves a closer look: the belief that the productivity limit of people has been reached.

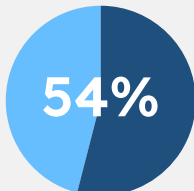
What do you consider to be the three biggest obstacles to lean at your company?



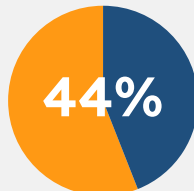
Lean isn't well understood or prioritized among the management team



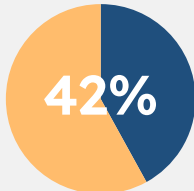
The costs of implementing lean principles are too high



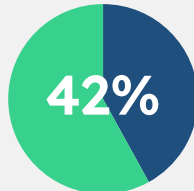
We have hit the productivity limit of people



The benefits of lean aren't clear



We don't have enough data on our operations



Resistance to change

Because of this belief in people being maxed out lean-wise, manufacturers are investing in other types of technology to help them on their lean journeys, including factory infrastructure like cloud, edge, 5G (58%); automation (cobots, robots, etc.) (41%); and IoT / connected factory technology like ERPs and digital twins (38%). In fact, only 33% of respondents were investing in human-centric technology like virtual or augmented reality and sensors. So is the idea that people are maxed out when it comes to lean a reality, or just a misconception that's holding manufacturers around the globe back when it comes to lean advancement?

MANUFACTURER VOICES

 one of the world's leading lean automotive suppliers, deployed 12 Drishti cameras on an automotive component assembly line in Guanajuato, Mexico. The selected assembly line was already high performing, but HELLA wanted to see what Drishti could do on an optimized line. Over a 10-week period, the HELLA team and Drishti jointly identified a number of potential improvements. In some instances, HELLA engineers were able to verify standardized work adherence and improve the standardized work instructions to reduce process delays and microstops. "Standardized work is the foundation of our assembly operations, and finding opportunities to improve adherence has the potential to significantly boost our productivity," said Marcos Aurelio Alves Junior, operational excellence and industrial engineering manager at HELLA Mexico.

Alves and his team used the AI-generated data from Drishti to pinpoint statistical outliers, cycles that took significantly more or less time than the others. Because of the sheer volume of cycle time data Drishti provides — a statistically significant dataset — the outliers stood away from the majority of cycles as unusually long or short, sending the message to line supervisors that attention was required in the form of training or other corrective action. At the conclusion of the 10-week deployment, HELLA saw a significant improvement (exact data confidential) in productivity on the assembly line on a previously assumed optimized line.

Read more about the HELLA experience with Drishti at drishti.com/hella

THE DRISHTI PERSPECTIVE:

People are the key to leaner manufacturing

Manufacturers have spent more than a century using the same methods to measure the performance of people: stopwatches and clipboards. The data that comes out of these approaches is episodic, biased and incomplete. It doesn't provide enough context for manufacturers to identify hidden areas for improvement, so it's not surprising that manufacturers have assumed the people who work on manual assembly lines aren't capable of better performance.

Drishti has developed the world's first AI-powered video analytics technology for manual assembly lines that is purpose-built to identify areas where individuals are already performing above expectations and translate that to standardized work. It can review processes at a systems level and determine where people need more help, whether that comes in the form of a process change, a materials feed, spot training or another effort. We've seen an efficiency increase of 11% and a 30% reduction in defects on lines where Drishti is deployed.

People certainly haven't reached their peak performance; they simply need manufacturers to invest in new technology that augments their efforts and helps them truly shine.

The times they are a'changin

If there's one constant in life, it's change. The novel coronavirus showed just how massively the world can be upended in a short period of time. No one can anticipate the future, but you can stay on top of external threats and internal challenges by investing wisely. In the case of manufacturing, it's people who are the secret weapon to adaptability and manufacturing resiliency. With AI-generated data and insights, people can be superhuman.

“

“This volume and quality of data is valuable as Toyota embraces AI-powered production for a data-driven world. We see Drishti's technology as a way to help everyone in the factory.”

- Akiharu Engo, head of powertrain quality worldwide at Toyota

More about Drishti and AI-powered production

Drishti provides video analytics and video traceability at scale for manual assembly lines. Our discrete manufacturing customers stream video from every station on the line into the cloud, where our software creates incredible volumes of lean production data. Engineers, supervisors, trainers and line associates use this systems level data to make better decisions, at the right time, faster — with each data point backed by video. Forget incremental, step-by-step improvement: Drishti's purpose is to improve the entire system all at once. Our customers make giant leaps in productivity, quality and training.

It all happens on the backbone of our proprietary neural networks: Without AI, there would be no Drishti. Our breakthrough “action recognition” technology uses AI to parse video streams and produce data on manual actions from every station on the factory floor.

That data and insights then populate a series of dashboards that help direct production staff on where to focus their attention, highlighting bottleneck locations and, more importantly, why they exist. For the first time in manufacturing history, insights from significant volumes of actionable data on manual activities are guiding production decisions, thanks to AI and Drishti.

That's why so many multi-billion dollar, global manufacturing companies have already contracted with Drishti and deployed our cameras on their factory floors. They understand the critical need for manual assembly data and insights, but have always been limited by traditional data-gathering methods like time and motion studies.

Because of Drishti's focus on using AI to extend human potential in an increasingly automated world, in 2019, Drishti was recognized as a World Economic Forum Technology Pioneer. The recognition was attributed to Drishti “demonstrating a clear potential to transform its industry and improve society for years to come.”

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