# Manufacturing's Next Act

## Disruptive technology is changing how companies make things. Don't get left behind

**FLOUR. EGGS. YEAST.** They may not sound like the ingredients that would drive a company to embrace the bleeding edge, but for King's Hawaiian, they are. "Raw materials are where manufacturers love to cut, but there's a consequence," says John Linehan, who heads strategy at the 66-year-old breadmaker. "You get a nice margin hit for a quarter or a year, and then you pay for the lower quality with consumers later."

Instead, the Torrance, California, baker doubled down on technology, injecting the same data-gobbling sensors and sophisticated computers into its manufacturing line that you might expect at a tech lab. In the past, supervisors had relied on hand-written information from people working on the floor to flag maintenance issues or adjust line speeds. Today, much of King's Hawaiian's production is automated, more accurate, and less dependent on oversight. The $300 million company has enjoyed

**PROOF OF CONCEPT**
Local Motors' Strati is the first car ever produced using 3-D-printed parts.

**IN THE BLINK OF AN EYE**
Local Motors printed and assembled the Strati in 44 hours. The company wants to reduce that production time to 12 hours.

**PRINT RUN**
Seventy-five percent of the car is made by 3-D printing.

**THE ROAD LESS TRAVELED**
Most cars have 20,000 parts; the Strati has only 50.

COURTESY LOCAL MOTORS

### Automation Nation

Manufacturers get bullish on next-gen technology

**23%**

The increased annual revenue companies expect to see from the use of technologies like advanced robots, 3-D printing, and Wi-Fi-enabled smart sensors.

**35 Percent**

of manufacturers already use smart sensors to collect and analyze data from factory equipment. Another 17 percent plan to implement the technology by 2018.

more than a decade of sustained growth, almost tripling its capacity in the past six years—all while the food industry has generally stayed flat.

Welcome to today's manufacturing. Factories of all sizes and sectors are now deploying 3-D printing, augmented reality (AR), smart sensors, and lightweight, collaborative robots to create faster, leaner, more cost-effective systems—without putting a dent in product quality.

Interactive 3-D-tech company Ngrain is one of several bringing AR to factories.

**"AR sounds like science fiction, but small manufacturers are finding it's not as inaccessible as many people think."**

Workers aim smart eyeglasses or a specialized tablet enabled with Ngrain software at a piece of equipment and instantly see an overlay of data, including maintenance records and assembly instructions. The system automatically reports glitches or a need for repairs and, according to the company, has let manufacturers slash inspection times from days to minutes. "Most equipment inspections are still done completely by hand, with a clipboard and pen and paper, and someone saying, 'Hey, that looks like a scratch,'" says Barry Po, director of product management at the Vancouver, British Columbia–based company. "But AR takes all the subjectivity out of it."

Now Ngrain is partnering with Boeing in a project to test its AR on tablets at a factory where the aircraft maker is producing a component for the 787 Dreamliner. Manufacturers often put off quality inspections until products go through the whole assembly line; when something goes wrong, they're left with the problem of figuring out where on the line the error occurred. At Boeing, the AR tablets will instantly flag dips in quality along the line, so technicians can make adjustments before any subpar parts are churned out. "AR sounds like science fiction," says Po, "but the tech is here, and small manufacturers are finding it's not as inaccessible as many people think."

As more manufacturers move new technology onto their factory floors, they're also finding creative ways to use it. Three-dimensional printing was once dismissed as a fad, but Phoenix-based Local Motors is using it to manufacture parts for the Strati, a new, two-passenger electric car. A giant printer spins out car pieces—its main body and chassis—from layers of black plastic reinforced with carbon fiber. While the average car has about 20,000 parts, the Strati has only 50. "Now is the time to rethink how things get made," says CEO John B. Rogers, who built the Strati to prove that 3-D printing can be a much faster way to produce a car. "Manufacturing is ready for a revolution."

—KATE ROCKWOOD

JOSEPH ARMARIO/COURTESY DAQRI

## Upgrading the Factory Floor

Modern manufacturers share tips for navigating your next tech investment

**TECHNOLOGY SHOULD SIMPLIFY** "Our most successful customers are the ones who pick something that's simple and intuitive for workers," says Brian Mullins, CEO of Daqri, a Los Angeles–based AR developer whose Smart Helmet (above) integrates augmented reality, sensors, and recording devices into a hard hat, letting workers see data overlaid on their physical surroundings.

**HUMANS LEAD THE WAY** A treasure trove for determining which tech to invest in: on-the-ground workers. Breadmaker King's Hawaiian may have partnerships with Georgia Tech and University of Georgia to help direct its manufacturing strategy, but nothing replaces real dialogue with its factory workers. Every year, executives take six of them to dinner—for enlightenment. "I always walk away with new ideas and learn new things," says King's Hawaiian executive VP John Linehan.

**ISOLATE, AND THEN TEST** The more tech tools you introduce at one time, the harder it is to determine what's working and what's not. Local Motors CEO John B. Rogers recommends staggering the testing of new technologies, so you don't invest in the wrong problem solver.

**5.6M**

3-D printers expected to be shipped worldwide in 2019.

**4 Percent**

The estimated cost savings manufacturers enjoy when they bring 3-D printers into their supply chain.

**48%**

of manufacturers feel well prepared for the latest tech revolution hitting their industry.

SOURCES: MCKINSEY, PWC, GARTNER, ROBOTIC INDUSTRIES ASSOCIATION