



Metalworking

A Change Will Do You Good: Why Machine Shops Can't Afford to Play Catchup

Kip Hanson | Nov 19, 2024

Kai and Zen. Put the two words together and their synergy delivers far more than a catchy term bandied about at lean manufacturing conferences.

Kaizen, a.k.a. continuous improvement, represents a fundamental approach to business operations, whether you're painting automotive bodies in white or ***machining critical aerospace components***.

Translated from Japanese, Kaizen means "change good," which is ironic considering that most people would rather avoid change. They'll tell you that change is uncomfortable, change is costly, and change is unnecessary because current systems are already efficient and well understood.

Each of these statements may contain a nugget of truth, but businesses still must accept a Darwinian reality: Change is necessary for their survival.

Without good change, manufacturers gradually miss out on opportunities to become more competitive: Margins get skinnier while attracting new talent grows even more difficult than it already is.

Wait too long before investing in new technologies, and eventually, machine shops reach a point at which any kind of improvement—continuous or otherwise—becomes problematic, if not impossible.

Metrology: From Dial to Digital

One of the most obvious changes in industry today is the rapid move from ***analog to digital***. Nowhere is this truer than on the production floor. From digital twins and artificial intelligence to vision-equipped robots and the Industrial Internet of Things, the opportunities for continuous improvement—or Kaizen—are seemingly endless.

The decision by Mahr Inc., a maker of metrology equipment, to embrace the digital revolution offers one example.

"As you can imagine, dial indicators and calipers and other analog measuring devices have lots and lots of precision parts to them, and it takes a great deal of skill to manufacture and assemble them," says Director of Precision Gages George Schuetz. "But as everyone knows, finding the people to perform

these tasks is increasingly difficult, while the cost of making them continues to go up.”

Digital versions of such tools are much less complex and are, therefore, easier to produce. Best of all, there’s no loss of functionality with digital devices; in fact, they offer far more features than their analog alternatives (including the ability to transmit data), often at a lower cost to the consumer.

Because of that, Mahr is gradually shifting away from certain models of analog amplifiers and dial indicators, a move that Schuetz suggests could take a couple of years. “For these reasons and others, I expect the industry overall will continue in this direction,” he says.

Simplifying Metrology Equipment Setup

Mitutoyo America Corp. is introducing similar innovations. Patrick Sullivan, a strategic distribution sales specialist, points to a new bidirectional communication platform for its digital indicators, micrometers and other next-generation products, which is called S1.

“The S1 protocol provides enhanced communications that simplify the setup and use of these tools,” he says. “Instead of scrolling through a bunch of menus, you can use a computer and software to enter device parameters, set tolerances, input the operator name, part number, calibration date and so on.”

Since S1 uses a hard-wired, two-way connection, he adds, users can not only send those values to the device but also include them in inspection reports and other forms of documentation.

Together with the company’s Bluetooth and UWave wireless data transmission system, as well as its SPC software MeasurLink, which helps users gather and analyze measurement data, S1 illustrates how digital technology is altering every aspect of manufacturing.

State-of-the-Art Cutting Tools

Metrology providers aren’t the only ones innovating. Cutting tool suppliers continually provide new coatings, substrates and geometries that increase productivity and tool life alike.

Recent examples include Sandvik Coromant’s CoroCut with RF geometry for “secure chip control and achieving a superior surface finish” in grooving operations, Kennametal’s KCU25B Universal Turning Grade and TopSwiss MBS micro boring tools, and Iscar’s QUICKDRILL replaceable head drilling system for unstable applications.

And that’s just a sampling of the advanced cutting tool technologies available to metalworkers today, all of which provide greater performance, part quality, and process stability. Advances in material-specific grades have been particularly significant.

Kyocera’s PR1535 grade, for instance, is said to deliver 23% higher fracture toughness than previous grades when ***machining heat-resistant superalloys (HRSA)***, just as Seco Tools’ MP2050 promises to “make easy work” of austenitic stainless steels and titanium.

Unfortunately, these tools often come with a higher price tag, and penny-conscious machine shops might look at the cost and quickly put on the brakes. It’s an old argument: “You want to spend how much on that tool?” But as with high-speed steel drills, hand-sharpened tool bits and many other legacy metalcutting technologies, saving a couple of bucks on tooling inevitably costs more in the long run.

Keeping Cutting Fluids Clean

Even the highest-performing tools deliver greater productivity when used with a properly mixed, ***well-maintained cutting fluid*** (preferably applied under high pressure). Fortunately, the suppliers of these important machining components are also on a path of continuous improvement.

Joe Snyder, principal scientist responsible for the development of Master Fluid Solutions' TRIM HyperSol 888NXT machining fluid, notes that the novel fluid is specifically designed for challenging metals like titanium, Inconel and nickel-based HRSA, but also works quite well in softer metals such as aluminum.

Biocompatibility is increasingly a priority in cutting fluids.

"Many manufacturers are trying to get away from petroleum-based products without sacrificing performance," Snyder says. "HyperSol 888NXT meets both of these requirements."

Dean Richmond likes to drive home the importance of good cutting-fluid maintenance.

The global aerospace sales manager for Master Fluid Solutions, he says aerospace companies even go so far as to audit their suppliers' ***cutting-fluid hygiene***.

"They're constantly auditing their Tier 1 and Tier 2 providers, looking at what fluid they're using, concentration levels, water quality and the like," says Richmond. "They know how important cutting fluids are to the stability of metalcutting processes, which is why we also place such an emphasis on fluid maintenance with our customers. Properly maintained, modern cutting fluids can have a profoundly positive impact on machining productivity and part quality."

Which machining innovations are most useful to your business? Tell us in the comments below.

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