

## Smart industry

# Kaizen & kanso in advanced manufacturing

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Kaizen—a guiding principle in the Japanese culture that translates to “constantly improving” our lives and processes. Kaizen entails gradual, constant improvements that, collectively, are impactful.

Similarly, Zen Buddhists practice the art of kanso—simplicity, clearing one’s space to think clearly while elevating generating awareness. Albert Einstein stated, “If you can’t explain it simply you don’t understand it enough.” Leonardo DaVinci said, “Simplicity is the ultimate application.” And in that same vein, Apple’s Steve Job’s was an exceptional communicator best known for products that simply connected with users.

Simply communicating complex solutions is an artform (often misunderstood or discounted) that can be developed with proper focus. And as advanced manufacturing technologies are being delivered at warp speed, we users are bombarded with increased complexity and noise. Billions of sensing devices are being deployed in the world, from our toasters to our plant floors. Data rates are doubling every 11 months.

So as technologists and designers, it’s even more critical now to be reminded of kaizen and kanso—delivering technical solutions simply.

Simple enough, right?

Cloud computing and cloud-based technologies address both kaizen and kanso—offering efficiency and simplicity at the architectural level. Cloud computing reduces the number of boxes on the plant floor, which reduces CapEx and OpEx. And, programming software-as-a-service solutions in the cloud can be customized, designed and delivered rapidly at lower costs.

Cloud computing almost takes on an ethereal, angelic resonance compared with common descriptions of today’s plant environments of “smokestacks of data orphaned on the plant floor.” Hardware gateways provide the necessary connection, bridging the IT and OT domains across the DMZ. Architecturally, as we deliver the IIoT, the industry has made great strides in kaizen, and we continue to do so as we build software-as-a-service (rapidly) in the cloud. Designers understand that it is easy to create a different thing, but it is hard to create an impactful thing. As we continue to focus on delivering “constantly improving” solutions that advance manufacturing, perhaps nowhere does the concept of kanso (simplicity) become more imperative than at the human-machine interface (HMI).

Why? Because if we are unable to visualize data in a recognizable/reliable/repeatable format, then we have failed to deliver value from that data. As such, creating simple, navigable HMIs is critical to achieving kaizen—the constant improvement that is at the heart of all of these efforts.

The [ISA 101 HMI standard committee](#) has taken great care to address the design, implementation, operation and maintenance of HMIs for process-automation systems including multiple work processes. Starting in 2015, the initial working groups focused on delivering the HMI philosophy, style guide and design guide; addressing HMI usability and performance, and; HMI for mobile platforms concerns important for designers, integrators and operators. The ISA 101 standard, recently adopted by ANSI, has addressed human engineering factors such as the use of consistent colors, and process objects from a common toolkit and context of data.

Taking a more holistic perspective, the ISA 101 committee included a discussion of an HMI lifecycle approach much like the work done in [ISA 84](#) for safety systems and [ISA 18.2](#) for alarm management. Very kaizen-like in approach, the HMI style guide focuses on small changes that increase HMI effectiveness, such as color usage, navigation and object animation.

For example, it is recommended to use a gray background that minimizes glare while providing a low-contrast depiction of the data. Or, as suggested, bright colors should be used only to highlight alarm and abnormal conditions.

As the industry designs and delivers the next generation HMI, we must do so thoughtfully and remind ourselves of kaizen and kanso, focusing on how we can make technically challenging improvements while communicating these solutions simply.

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