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Which New Technology Will Be the Next Game Changer for Concrete Bridges?

William N. Nickas, *Editor-in-Chief*

During the course of our days, we are exposed to a myriad of thoughts, concepts, and ideas. New products and processes seem to hit the marketplace daily.

When I was a kid, my brother and I would rush to the driveway on Sunday mornings, trying to beat each other to the Sunday paper. We were after the “in-full-color” comics section, where Dick Tracy, everyone’s favorite rugged police detective, was on a case. I loved that he had a super-cool two-way wrist radio (circa 1946), which was upgraded to a two-way wrist TV in 1964. It’s funny how life imitates art: Apple released the Apple Watch—a variation on the two-way wrist radio—in 2014. By the way, I don’t find the Sunday paper on my driveway anymore; it’s been digitized.

I recently read an article on e-fuels. While synthetic fuels have been around for decades, e-fuels, which are developed or created using a recycling process, are a relatively new fuel source. The process is scientifically based, with a heavy emphasis on chemistry, and uses carbon dioxide and hydrogen to make methanol, which is then converted to gasoline. E-fuel production levels are currently relatively low, and the energy required for production is immense, but the concept is intriguing and gaining momentum. Is a sustainable fuel source for the internal combustion engine very far off?

It seems like every time I watch the nightly news, there’s another story on artificial intelligence (AI). Even the name makes me a bit uneasy. Artificial refers to something created or produced by humans rather than occurring naturally, and a Google search provides this definition of intelligence: “the ability to acquire and apply knowledge and skills.”


Engineers are all about applying knowledge and skills, and we create “stuff” that doesn’t occur naturally in nature. Yikes! Are we AI-ers? I don’t believe we are, but it does make you wonder.

So, how does AI impact our business? Does it influence firms’ decisions about hiring, or what equipment contractors use to build a bridge? How does AI affect engineering training programs and

college coursework? There are more questions than answers, but my gut tells me we need to get smart on this quickly, as we’re already behind. The AI train has left the station and is heading for concrete designers, producers, design/construction firms, and departments of transportation near you. We can benefit from AI, but we must not become complacent.

In the Winter 2016 issue of *ASPIRE*[®], I penned the editorial “Make a New Year’s Resolution: ‘Stay in Touch with Suppliers.’” Today seems like the right time to revive that resolution, as there are critical questions we need to ask ourselves and our suppliers. What is the next new thing, process, or product for our bridge construction community? Who drives it? Who delivers it to the market? What new applications or construction methods improve our industry?

Three-dimensional (3-D) scanning is a powerful tool already being used to create as-built models (that’s right, models, not drawings). In just minutes, it can be used to gather data to fully describe and model an intricate railing, bearing, or other element. Additive manufacturing (3-D printing) can then be used to fabricate a replacement or the form for the element based on the model. Can additive manufacturing be used to produce complex reinforcement, whatever the material?

Some have suggested that the concrete bridge community will undergo a renaissance as we deploy new technologies—such as new types of prestressing strands, new types of coating or materials for reinforcing bars, new post-tensioning (PT) hardware, or even ultra-high-performance concrete—combined with additive manufacturing techniques like 3-D printing and scanning. To make this renaissance a success, we all need to get back in touch with our vendors (suppliers of software, equipment, coated reinforcement, PT, and raw materials) and investigate potentially cost-effective ways to use AI, 3-D printing and scanning, and more to improve the ways we design, manufacture, deliver, construct, and inspect resilient, long-lasting concrete bridges in the United States. 

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Cover

The sweeping alignment of the Los Angeles International Airport’s new automated people mover provides travelers with a one-of-a-kind view of the iconic Theme Building. Photo: HDR Inc.

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