The Next Transformation

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Every so often manufacturing is jolted out of its inertia by a transformative technology – one that fundamentally changes not only the way products are made, but also the economics of the business. What used to be too expensive is now affordable. What used to require multiple machines can now be accomplished with just one. The gear industry, like all manufacturing industries, has seen its share of transformations.

A hundred years ago, factories were just beginning to shift from steam-powered line shafts to individual machines powered by electric motors. Nowhere was this change more evident than in the development of the assembly line. Machine tools no longer had to be placed near a belt-driven line shaft. Instead, they could be arranged logically according to work flow. Henry Ford first started mass producing automobiles this way in 1913, but he couldn't have done it in factories powered by line shafts.

Of course, entrenched technologies are not often replaced overnight, and it wasn't until about 1950 that the line shaft was gone completely from American factories.

The development of numerical controls – and CNC machine tools – was another such transformative technology, which took place from the 50s through the 80s. But as with earlier technologies, transformation took time. It wasn't until the mid-1980s that CNC-controlled gear machines were the norm rather than the exception.

In our very first issue, published in May/June 1984, we ran an article about a transformative technology that was sure to take the industry by storm: cutting tools coated with titanium nitride. The article compared test runs between parts cut with regular, high-speed steel hobs and those cut with TiN-coated hobs. The results showed that even though the coated hobs were twice as expensive as non-coated hobs, the increased cost was justified by the increased productivity they allowed. In fact, on a cost-per-part basis, savings of as much as 40% could be achieved because the coated hobs could cut more parts per hob and at faster feeds and speeds. Today, most all types of tools are coated. Even inexpensive tools found in a hardware store have coatings.

In that same issue, we published an article about another transformative technology: CBN grinding. In that article, author Dennis Gimpert (then of American Pfauter) said, "The use of Borazon CBN form grinding represents one of the most significant process developments for soft and hard machining in the last 50 years." That article dealt with electroplated wheels, whose productivity and process advantages at that time were enormous.

But the story of CBN and transformative technology didn't end there. In fact, I believe we may be on the cusp of yet another transformative innovation. In this issue, we feature an article about a much more recent study of grinding productivity. It talks about a new kind of CBN wheels – dressable wheels, this time – with an engineered grain structure that makes them far more productive than previous generations. Instead of abrasively rubbing off the material, the individual grains mill the metal, throwing off heat with the chips. The article is written by Jeremy Erdmann, an engineer at Brad Foote, and it deals with the Cubitron II wheels manufactured by 3M.

Ordinarily we approach the proprietary claims of individual manufacturers with a healthy measure of skepticism, so we can't just come out and endorse a product. But the fact that Brad Foote was willing to share their research certainly got our attention. Considering that many of you compete with Brad Foote, it should get your attention, too. The article can be found on page 22.

No one can say for sure whether this technology will have a transformative effect on our industry. But I've talked to people familiar with it, and it's been suggested that the kind of productivity gains and cost savings achieved by Brad Foote in this study will likely be replicated at other companies. That means fewer machines will be needed to produce the same kinds of parts. It might mean that parts that used to be cut can now be economically ground from solid. It's possible this could change the way you make gears.

If that's not transformative, I don't know what is.