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What Are the Limits?

Power Transmission components are pretty mundane, right? Gears and bearings can only be arranged so many ways, after all. You'd think by now that we'd have discovered every possible way to make mechanical devices as strong and efficient as possible.

But that's not so. In fact, this issue we have a rare treat for you. It's a technical article that's really more of a think-piece. The article I'm talking about is "Machine Elements – Shaping the Future through continuous Evolution," which you can find on page 30. The article is written by some of the world's top researchers working in the area of mechanical power transmission components.

The authors propose that we still have plenty of gains to be made with those components. In fact, they argue that there's something akin to Moore's Law that can be applied in our industry. Moore's Law famously predicted the doubling of semiconductor capacity every year since 1965—a prediction that has largely held true.

And although there's no evidence of anything approaching anywhere near an annual doubling of capacity in any of the capabilities of mechanical components, the authors have demonstrated that there *have* been significant increases in certain areas every year.

For example, the toque densities of wind turbine gearboxes have increased by about 5% per year since the 1990s. Similarly, the authors have shown how frictional losses in tapered roller bearings have decreased by about 4% per year since 2011. And while those improvements are more in the range of 4-5% per year, they're still improvements, built on the previous year's improvements.

A skeptic might argue that these researchers are simply promoting their work in order to secure the next round of funding and projects. But the gains are real, and they're being implemented in products you use every day.

Better designs produce better efficiencies. Better materials provide better strength. Improved manufacturing technologies create tighter tolerances.

Perhaps most importantly, components are no longer considered as just components. They're part of a system, and the system is being investigated as a whole. Computer modeling has advanced to the point where those systems can be analyzed and optimized in ways that were never before possible. Sensors and electronics add new data that continues to feed the progress.

So what does this mean for those of us who work in mechanical power transmission components? To me, it means the future is bright. New products and technologies continue to be introduced every day. Some of it comes from academic research. Some of it comes from industrial R&D. But some of it comes from good old-fashioned creative engineering—something our readers have in abundance.

We'll keep bringing you information about the latest advances, no matter where they originate. You keep reading, and creating, and advancing the capabilities of power transmission components.

Just like with Moore's Law and computer chips, there probably are physical limits to what's possible. But we haven't reached them yet.