

### Where are the gear technology and industry advancements that may be needed for a bright gear industry future?

Is the gear industry on a plateau? Has the world market for gearing reached a peak? Do we need more research and development to accelerate the industry? What technology breakthroughs are needed to make the future gear power transmission a growth industry? These are among the many questions people in the gear industry continue to ask. About 10 years ago I listed some reflections and needs that developed from observing manufacturers during the process of developing industry standards. Here are some reflections on gear technology development in the world:

- Eventually everyone that designs, manufactures, or uses a given type of gear will have the same experience.
- A technological development by a private corporation will be kept secret until it is reinvented by others, usually before total payback.
- The one best design or manufacturing method for any application does not exist.
- Success depends upon the ability to eliminate the unknowns in calculation methods, materials, manufacturing variability, and application loading.
- The company that bases its future on short-term financial success, above customer service or improved products and process, has the best chance of not succeeding.

We constantly move in the direction of rapid change, shorter product life, quicker concept to product lead time, flexible manufacturing methods, and more power in a smaller package. This direction puts greater demands on engineering and manufacturing

### “AT THE GEAR INDUSTRY VISION WORKSHOP, EXPERTS GATHERED TO DISCUSS THE DIRECTION OF THE INDUSTRY OVER THE COMING TWO DECADES.”

to do it properly the first time. There are economical limits to amounts of testing as the best method of product qualification.

In the gear industry, where should the efforts for R&D or advancing technology be placed? Looking at the trends leads me to four areas that were on my list for advancement:

- Materials with properties and controlled consistency for predictable service life.
- Lubrication effects upon load-carrying capabilities and the prevention of wear.
- Accuracy of manufacturing methods for the control of quality, geometry, and assembly.
- Design optimization and flexibility for efficient economical product application.

Where are we today? Is it still the desire to advance the items above? The challenges to find answers led to the Gear Industry Vision Workshop, held on March 10, 2004, in Detroit. At this workshop, more than 40 experts from the gear industry, end-user companies, academia, and the government gathered to discuss the direction of the industry over the coming two

decades. The event was organized by the Gear Research Institute with eight industrial sponsors supporting the effort:

- Aviation Applied Technology Directorate/U.S. Army
- AGMA Foundation
- ASME Center for Research and Technology Development
- Ben Franklin Technology Center
- Boeing
- Gleason Foundation
- GM Powertrain
- John Deere

The result of this work is now published in a Gear Industry Vision. The purpose of this document is to state the collected observations and set the goals that support them. The vision and goals should be used to drive R&D efforts among gear manufacturers, material suppliers, end users, universities, and the government to develop the technologies needed in the coming decades. The major items reviewed include establishing gear design and development improvements, the enhancement of gear materials, innovative manufacturing processes and automation, and increased collaboration within the industry.

The next step could be to have a workshop to roadmap the ways to achieve the goals envisioned. However, the information contained within the Gear Industry Vision will help many to focus their ideas on the future of the gear industry. A copy of the report is available from AGMA and is provided on the organization's Web site at [www.agma.org]. Send e-mail inquiries to [tech@agma.org](mailto:tech@agma.org).

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