

Globalization Brings AGMA, ISO Standards Closer

“The gear marketplace is a global marketplace.”

Bill Bradley says it easily, with no special emphasis. The vice president of AGMA's technical division sees the statement as an obvious fact.

And he's acted on that idea, spending more than 15 years helping AGMA develop ISO standards for the global marketplace.

Today, U.S. gear manufacturers sell their gears to customers around the world, sending the gears across borders and oceans to customers in Brazil, Germany and South Korea now much like they could across state lines to customers in Michigan and Ohio in past decades.

In those years, U.S. gear manufacturers could expect customers in Michigan, Ohio and other states to specify gears according to AGMA standards.

Now, though, global customers may specify gears using any of a number of standards used around the world, including AGMA, BSI, DIN, ISO, JIS.

“We will manufacture in the same way for all standards and measure to what the customer requires,” says Roger Bailey, vice president of supply chain management for Textron Fluid & Power Systems.

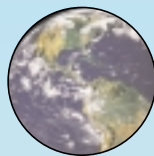
Located in Huddersfield, England, U.K., this Textron Power Transmission division uses AGMA, British and DIN standards.

“We will continue to do what our customers want,” says John Windl, production supervisor in the gear department of Ontario Drive & Gear Ltd., located in New Hamburg, Ontario, Canada. “We will still study the other standards so we can change as our customers' demands change.”

Like those British and Canadian com-



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AGMA

panies, U.S. gear manufacturers have to be familiar with as many widely-used standards as possible to have as many global customers as possible.

But familiarity with three, four, five or more sets of standards—that's no small feat.

Making Standards More Alike?

Another approach, though, would have those standards become more alike, making it easier for gear manufacturers to move from one set of standards to another, like from AGMA to DIN.

This converging of standards would be welcomed by Chuck Awot, engineering supervisor for Andrews Products Inc. The U.S. company, located in Mount Prospect, Illinois, uses AGMA, DIN, ISO and JIS standards in manufacturing gears.

“The more standardization that occurs, the easier it is for us. Historically, AGMA, DIN and ISO quality classifications could not convert directly,” Awot says. “It created a lot of additional work for us to clearly define the requirements for our people on the shop floor in order to conform to the customer's specifications. A single standard would eliminate all of that work and confusion.”

AGMA can't bring about the convergence of most widely-used standards, though. Germany, Japan, the United Kingdom and other countries will adopt what standards they want.

AGMA can, though, make its standards converge with ISO standards and has been making them more alike for years.

“This trend would be convenient and would bring the AGMA standards more in line with the international ones,” says Tony J. Bannan, engineering director for Holroyd, located in Milnrow, England, U.K.

AGMA INFLUENCE ON ISO STANDARDS, VICE VERSA

AGMA and ISO standards are becoming more and more alike, but which is changing more?

"It's not a quick and easy answer. The ISO standards are influencing the AGMA standards and vice versa," says Bill Bradley, vice president of AGMA's technical division. "But to say which is changing more is hard."

Gear accuracy and calibration standards serve as an example of how AGMA and ISO influence each other's standards.

Bradley describes AGMA and ISO inspection standards as becoming "very close to each other." This increasing similarity is because AGMA is replacing its gear accuracy standard, 2000-A88, with a new standard based largely on ISO 1328-1:1995.

Bradley says the new AGMA standard and the ISO standard approach similar topics in similar ways, so they give similar results.

But, if the standards provide similar results, then their underlying calibration methods would have to be similar.

"The methods are just about identical," Bradley says.

The process that made them similar, though, was the reverse of the one for the accuracy standards.

In this case, AGMA offered its calibration methods to ISO. The association has had a calibration standard for more than 10 years. ISO had no calibration standard—until December.

That month, ISO published its first standard for calibrating a gear measuring instrument for inspecting spur and helical gears.

According to Bradley, the standard includes most of the calibration methods from three AGMA standards on spur and helical gears. The three standards cover calibrating and measuring 1.) involute 2.) pitch and runout, and 3.) lead/helix.

This type of situation has occurred previously because AGMA has more gear standards than ISO and the association targets those topics it covers that ISO doesn't.

According to Bradley, AGMA looks at topics covered in its standards but not in ISO standards, then takes specific standards and suggests ISO consider them while developing its standards on those topics.

Bradley cites the ISO temper etch inspection standard as an example.

In the early 1990s, ISO had no standard for inspecting gear teeth for grinding temper. AGMA offered its 2007-B92 standard as an ISO standard. The resulting ISO standard, 14104:1995, was based on the AGMA standard. Bradley says that the two standards were nearly identical.

Five years later, AGMA adopted the ISO standard.

The process hasn't been so neat and clean with the two organizations' gear rating standards. AGMA has adopted some ISO rating principles for spur and helical gears, but the actual rating methods are still different. So AGMA and ISO ratings can be compared, but not directly (see the article in this issue on pages 56-63).

"The differences aren't consistent," Bradley says.

In one case, a gear may receive a higher load carrying capacity using the AGMA system than it does using the ISO system. In another case, a second gear may receive a higher capacity using the ISO system than it does using the AGMA system.

This inconsistency extends to gear drive sizes and calculated lifetimes.

So, for comparison, a person needs either a comprehensive knowledge of both rating systems or the right software.

In Bradley's opinion, AGMA and ISO standards are probably changing at the same rate: "I wouldn't say that either is making substantially more changes than the other."

"We would welcome this in our business," Bannon says of the trend.

At this time, ISO standards don't appear to be as widely used as other standards, such as DIN. But, in time, they may be.

"ISO standards are still gaining acceptance," Bradley says.

And this acceptance is being noticed by some gear manufacturing companies, such as Holroyd. The U.K. company uses AGMA, DIN and ISO standards. In his work, Bannan says use of DIN and ISO are increasing, while use of AGMA is decreasing.

Munish Nalwa is noticing greater ISO acceptance at his company, Ingersoll-Rand Wadco Tools, located in Sahibabad, India.

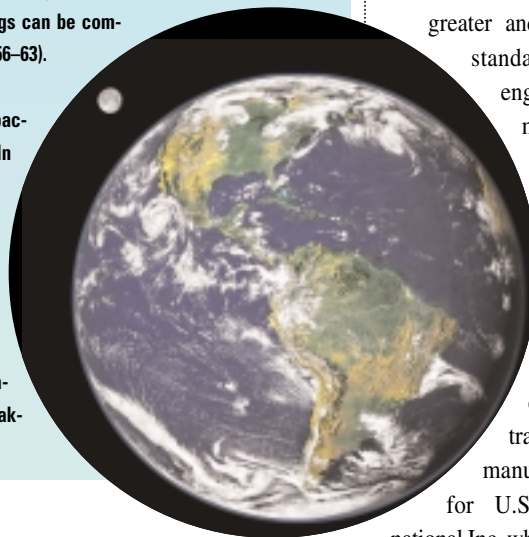
"We see a shift towards ISO because of global sourcing," says IRWT's deputy manager of engineering. "However, it will take some time to reach a significant number of users."

With ISO standards more widely accepted, U.S. gear manufacturers would more and more need the ability to use ISO standards. Making achievement of this ability as easy as possible is AGMA's considerable activity in developing ISO standards.

The association sees the increased similarity between AGMA and ISO standards as an opportunity for U.S. gear manufacturers to increase their number of potential global customers.

Those manufacturers using the latest AGMA standards would find them in greater and greater accord with ISO standards, making it easier to engage in international commerce, says Edward Lawson, chairman of the AGMA Technical Division Executive Committee.

"Standardizing gear measurements and controls will make the process of moving from one [standard] to the other an easy transition," says Doug Webb, a manufacturing/process engineer for U.S.-based Honeywell International Inc. who works in Phoenix, Arizona.



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STANDARDS



AGMA in ISO

The decision that AGMA should become more active in ISO started with the association's executive members: the board of directors and its executive committee. In the 1980s, the members realized the gear marketplace was becoming an international marketplace. If ISO standards became widely accepted, U.S. gear manufacturers would have an easier time using them if they were based on principles and procedures familiar to the manufacturers, like those contained in the manufacturers' own national standards.

Before the executive members' decision, AGMA participation in ISO amounted to one observer, who attended meetings of the ISO group responsible for gear rating standards.

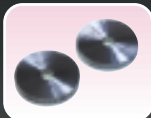
"There wasn't any active participation," Bradley says.

Today, AGMA participation is considerable. The association has 10 committees with ISO delegates. The 10 delegates represent U.S. positions to ISO Technical Committee 60, which is responsible for



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AGMA INFLUENCE ON ISO STANDARDS

"All AGMA standards committee work is expected to proceed with an objective of leading standards development in ISO working groups," says Edward Lawson, "as well as producing AGMA standards that are in harmony with ISO documents."

Lawson is chairman of the AGMA Technical Division Executive Committee. TDEC sets policy for AGMA standards committees.

To achieve this objective, TDEC uses five guidelines for overseeing AGMA standards committees. Lawson explains these guidelines:

- 1.) Each AGMA standards committee is expected to develop the U.S. positions on its standards topic—for example, gear accuracy. The committee's positions are then presented by its ISO delegate to the ISO working group responsible for the same topic.
- 2.) When creating or revising an AGMA standard, each committee is expected to consider whether an existing ISO document would be acceptable as the AGMA standard.
- 3.) If no ISO document exists, then the committee is encouraged to create or revise its AGMA standard with an eye to later presenting it to the corresponding ISO working group to use as a starting point for creating the ISO standard.
- 4.) If an ISO document exists and would be acceptable with minor changes, then the committee is encouraged to use the document as its starting point. Even then, the committee is expected to develop its standard with an eye to later presenting it to the corresponding ISO working group to consider as a possible update to the existing ISO document.
- 5.) Each AGMA committee is expected to develop standards that use the metric system, as ISO standards do. Each committee, however, is allowed to also provide standards that use inches and feet.



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ISO gear-related standards. Each delegate belongs to a TC 60 subcommittee, called a working group. These groups cover acceptance testing, accuracy, bevel gears, cutting tools, gear rating, high speed units, lubricant testing, metallurgy, nomenclature, and worm gears. AGMA also has an 11th ISO delegate, who presents U.S. positions to TC 14, which covers couplings, keys, shafts and splines.

AGMA participation also extends beyond its committees' work.

AGMA is the secretariat for TC 60, meaning the association does the administrative work for all ISO gear-related standards. This secretariat consists of Bradley and technical division manager Charles Fischer.

Also, the association is in charge of two TC 60 subcommittees, Working Groups 2

and 9. WG 2 develops ISO standards for measuring gears, WG 9 for acceptance testing of gears, including sound and vibration testing. WG 2 is led by Lawson, WG 9 by Bradley.

**"The ultimate goal is to have ISO standards that are acceptable in the U.S."
—Bill Bradley,
AGMA**

Given all this participation, it may not surprise anyone that AGMA and ISO standards are becoming more alike. This increased similarity will make it easier for U.S. gear manufacturers to use both AGMA and ISO standards in the global gear marketplace.

But AGMA is aiming for more than ease of use for U.S. gear manufacturers. It's aiming for acceptance from them.

"The ultimate goal," Bradley says, "is to have ISO standards that are acceptable in the U.S." ⚙️

To help develop AGMA and ISO standards, contact the American Gear Manufacturers Association at:

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