# AGMA Standards Committees Keep the Industry "In Gear" for 2021

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**Since publication of the first AGMA gear rating standard in 1919, shortly after the association's founding, AGMA standards development has always been driven by the needs of the industry it serves.** The AGMA Board of Directors, in keeping with the increasingly global nature of the gearing marketplace, constantly reiterates the association's long-term commitment in promoting technical excellence through its leadership and active engagement on both national and international standards development.

Standards development requires dedicated individuals with proven subject matter expertise, consensus building, and many meetings. The end results are documents with benefits beyond the gear industry, such as ensuring interchangeability, creating a common language, and saving on R&D. Standards also benefit consumers by ensuring safer, cheaper and higher quality products.

The first 60 years of standards development at AGMA saw rapid industry adoption of standards and a surge in topics covered that mirrored the surge in American manufacturing. In the 1980s, the American National Standards Institute (ANSI) took notice and approved AGMA as the accredited national standards development body for gear related standards. Almost simultaneously, AGMA was approved as the administrator of the ANSI Technical Advisory Group to ISO TC 60 (International Standardization Organization- Technical committee 60)—beginning a relationship that continues to today to represent U.S. gearing interests on the international stage as a full Participant member.

In 1993 AGMA, through ANSI, was granted the role of Secretary of Technical Committee 60 (TC 60), Gears, by the International Standards Organization (ISO) in Geneva, Switzerland. The designation has provided the AGMA, and by extension, its members, a permanent seat at the table and the leading role in the development of standards used by the global gearing industry.

Today AGMA boasts a catalog of 103 standards and information sheets, developed over the years in various technical committees. AGMA has also helped create the current catalog of 59 ISO documents developed by 11 ISO working groups. Currently 362 volunteer industry experts from 203 AGMA member companies worldwide are members of at least one AGMA committee. These experts come from not only gear manufacturers, but also users of power transmission equipment, suppliers to the industry, academia, and government.

In 2020, despite the limitations imposed due to the spread of COVID-19, through 121 meetings, held virtually, members of AGMA technical committees managed to publish the following seven updated Standards and Information Sheets:

- ANSI/AGMA 9009-E20, *Flexible Couplings – Nomenclature for Flexible Couplings*
- ANSI/AGMA 6002-D20, *Design Guide for Vehicle Spur and Helical Gears*
- ANSI/AGMA 6102-D20, *Design Guide for Vehicle Spur and Helical Gears (Metric Edition)*
- ANSI/AGMA 6006-B20, *Standard for Design and Specification of Gearboxes for Wind Turbines*
- AGMA 915-2-B20, *Inspection Practices - Part 2: Cylindrical Gears - Radial Measurements*
- AGMA 945-1-B20, *Splines - Design and Applications*
- AGMA 945-2-B20, *Splines - Design and Applications (Inch Edition)*

Though at a slower pace, imposed by the different time zones its members come from, ISO TC 60 also employed virtual meetings to continue their projects and managed to publish three new documents.

- ISO 1328-2:2020, *Cylindrical gears — ISO system of flank tolerance classification — Part 2: Definitions and allowable values of double flank radial composite deviations*
- ISO 4468:2020, *Gear hobs — Accuracy requirements*
- ISO/TS 14521:2020, *Gears — Calculation of load capacity of worm gears*

Looking ahead to 2021, AGMA technical committees will continue 17 new or revised projects while ISO TC 60 will carry on with 8 ongoing projects. Here are the highlights on some of AGMA's projects:

- AGMA Aerospace committee will continue with their new revision of AGMA 911, *Guidelines for Aerospace Gearing*. Leaders in the aerospace industry, including Boeing, GE, Honeywell, Sikorsky, Rolls-Royce and others have been collaborating to rewrite and reorganize the 1994 edition to include the latest innovations in materials, manufacturing processes and other aerospace specific developments over the last 26 years.
- The widely referenced AGMA 923, *Metallurgical Specifications for Steel Gearing*, is currently under complete review and revision by industry experts within AGMA Metallurgy and Materials committee. The new version will be congruent with ISO 6336-5: 2016. It will expand the reduction ratio calculation. The metallurgical tables have been expanded to include gray cast iron, ductile iron, and austempered ductile iron. Chemistry and cleanliness requirements have also been added. An indication of the significance, and value, the industry perceives in this project can be found in the regular attendance of, and active participation by, some of the major stakeholders such as Timken, Scot Forge, Ellwood City Forge, GE, Boeing, John Deere, Caterpillar, Ferry Capitan and many others. The committee plans to publish the new version by mid-2021.
- A new revision of AGMA 925, Effect of Lubrication on Gear Surface Distress is being developed by a subgroup of the helical gear rating committee. This second edition of the information sheet will update the initial 2003 version to include information on surface roughness and gear mesh lubrication, updated calculations for gear mesh

temperature to assist with surface distress calculations for micropitting and scuffing, central film thickness calculation has been updated to include a thermal reduction factor, and the discussion of micropitting now includes a description and parameters for risk evaluation. Once completed, the new information sheet will provide the industry an alternate view and prediction methodology for one of the most important issues within the global gearing industry. The participation and collaboration on this project is amongst the largest in the AGMA standards development history, bringing together global experts from manufacturing, user, and academic stakeholders.

- AGMA Gear Accuracy committee will continue their development of a new information sheet on racks titled AGMA 943, *Tolerances for Spur and Helical Racks.* As is the case for almost all new projects within AGMA, this project is a "member initiated" project to standardize rack tolerances throughout industry and fill a gap in the AGMA publications catalog created with the withdrawal of AGMA 390.03a (the last AGMA tolerance document to include rack tolerances).
- After 5 years in development, 2021 should see the publication of the next edition of ANSI/AGMA 1012, *Gear Nomenclature, Definitions of Terms with Symbols.* Members of the gear industry should be very familiar with this standard because it is the go-to source to define all gear nomenclature. This new edition will add more definitions and align better with international standards. Standards such as this help the industry by giving everyone the common language to define various gear elements and related attributes.

In addition to the projects noted above, the following projects will see continued progress in 2021;

- ANSI/AGMA 2101, *Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth (Metric Edition)*
- ANSI/AGMA 1106, *Tooth Proportions for Plastic Gears*
- ANSI/AGMA 6008, *Specifications for Powder Metallurgy Gears*
- ANSI/AGMA 6034, *Practice for Enclosed Cylindrical Wormgear Speed Reducers and Gearmotors*
- A new revision of ANSI/AGMA 1103, *Tooth Proportions for Fine-Pitch Spur and Helical Gearing,* to update formatting, clarify the language, and include the latest practices.
- AGMA 929, *Calculation of Bevel Gear Top Land and Guidance on Cutter Edge Radius* AGMA 946, *Test Methods for Plastics Gears*
- AGMA 947, *Gear Reducers - Thermal Capacity Based on ISO/TR 14179-1*
- AGMA 955, *Information sheet on gear lubrication*
- Adoption of ISO 10064-1, *Code of inspection practice — Part 1: Measurement of cylindrical gear tooth flanks*

ISO currently has 8 documents under development. Important highlights include:

- A new edition of ISO/WD 21771-1, *Gears — Cylindrical involute gears and gear pairs — Concepts and geometry.* This new document will update equations and nomenclature to the latest practices, and will be heavily based on AGMA's standard on the subject, ANSI/AGMA 2002
- After receiving over eleven hundred comments on the draft version of IEC/AWI 61400-4, Wind turbines — Part 4: Design requirements for wind turbine gearboxes, 2021 should see the new edition published. Wind turbine gearbox design has been a hot area to standardize ever since the rise in green energy and realization of how expensive and difficult the gearboxes are to service. The number of comments received showcase the interest in this standard internationally.
- Working Group 6, which deals with gear calculations, plans to continue work on their current projects which include a new document on TFF Example calculations, Pitch vs. Reference Circle, Method B for determining K_Hbeta, and Form Grinding, Y_F

A full listing of AGMA technical committees, including a scope of their activities, can be found in the *Technical Committees* section of the AGMA website, *www.agma.org.* For additional information about AGMA technical committees, standards, and information sheets, please contact the AGMA Technical Division at *tech@agma.org.*

On behalf of the U.S. as well as the Global Gear Industry Gear Users everywhere, AGMA wishes to thank everyone who through their dedicated participation and indispensable contributions have helped and will continue to help develop these standards that have benefited our industry for more than 100 years. Looking forward to the next 100.

Thank you.
Cheers.
Your team at AGMA Technical Division

## AGMA Welcomes Non-Members to Join AGMA and Drive The Future

AGMA encourages all gear companies to join and actively participate in the standards development process. Aside from having a seat at the table when AGMA standards are developed, all members receive, annually, a complementary set of all active (published) standards; a value of $3,750 for non-members who pay for the standards via www.agma.org.

Moreover, joining AGMA means you are standing up for the industry and help ensure another 100 years of technical excellence and advancement for the gear industry. Consensus-driven standards are the most important tool that AGMA delivers to the industry, and we look forward to continuing that tradition with our current members, and future members helping to add value.

Visit the AGMA website here: https://connect.agma.org/dtable to see the complete list of open AGMA documents, and the ISO website here: *www.iso.org/committee/49212/x/catalogue/p/1/u/0/w/0/d/0* to see the complete list of open ISO documents.

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