BRIAN DENGEL
GENERAL MANAGER • KHK-USA

What is a standard anyway?

Gear standards are technical documents that are developed by governing bodies in order to set rules, guidelines, and definitions for the production, assembly, and inspection of gears — but they can vary depending on where you are.

There is an old adage that goes: "Everything old is new again." This is commonly used when a fad — like bell-bottom blue jeans — comes back into favor after a period of time. Conversely, there are constants, like Friday night football, that become more of a tradition and never go out of style. These traditions lend themselves to a certain standard. These standards lead to an expectation of the experience. In the United States, the standard measurement for liquids like cow's milk and gasoline is the gallon. However, the standard for soda is the liter. The United States standard for driving distances is miles, but the standard for running distances is the kilometer. The standard for children's medication 30 years ago was the teaspoon, but today it is the milliliter.

Gear standards are technical documents that are developed by governing bodies in order to set rules, guidelines, and definitions for the production, assembly, and inspection of gears. They are typically developed over a period of years by bringing together many of the interested parties including gear manufacturers, end-users, and academia. As the standards are put into use, the governing bodies reconvene their standards committees periodically in order to review community feedback for each standard so that the committee can evaluate any deficiencies in the standard.

In regard to the question of whether diametral pitch gearing or metric gearing are the default or standard system of gearing in industry, the answer depends on who you ask. Although known as the British Imperial Units, inch dimensions were replaced by metric units in 1965. All other countries in the world have adopted metric units for all of industry, except the United States. Estimates of gearing consumption in North America have concluded that in 2000, the percentage of gears was 95 percent inch and 5 percent metric. By 2010, the ratio had changed to 82 percent inch and 18 percent metric. It is estimated that the use of metric dimensioned products in 2020 has risen to 25 percent.

In the United States, the governing body for gear standards is the American Gear Manufacturers Association (AGMA). They have set standards for both inch and metric gears. When specifying a gear standard, the current AGMA standard for inch pitch spur gearing is AISI/AGMA 2015-1-A01. This standard is similar to the metric pitch standard ISO 1328-1:2013.

One of the more complicated issues regarding gearing standards internationally are the numerous local governing body standards. In the European Union, the two main standards for spur gearing are ISO 53 and ISO 1328-1:2013. However, in Germany, spur gearing is standardized by DIN 780, DIN 867, DIN 3961, DIN 3962, DIN 3962, DIN 3963, DIN 3964, DIN 3966, and DIN 3967. In the United Kingdom, standard BS 436 is specific to inch pitch spur gearing, and the standard BS 4582 is specific to metric pitch spur gearing. In Japan, the spur gearing standard is JIS B 1702-1:2016. Japan also has a standard set by JGMA (Japanese Gear Manufacturers Association). Detailed in Figure 1 is a table showing a relative comparison of various international gear quality standards.

Standard	Accuracy Class Approximate Equivalency												
AGMA 2000-A88				Q15	Q14	Q12	Q10	Q9	Q8				
AGMA 2015-1-A01					A3	A5	A7	A8	A9				
BS (UK)						A1	A2	B	C	D			
DIN		1	2	3	4	5	6	7	8	9	10	11	12
ISO (International)	0	1	2	3	4	5	6	7	8	9	10	11	12
JGMA					1	2	3	4	5	6	7	8	
JIS B 1702:1998					0	1	2	3	4	5	6	7	8
JIS B 1702:2016	N0	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12

Figure 1

Over the past 25 years, the major governing standards bodies for gearing have been revisiting their standards and modifying them toward the goal of a single unified international standard. The creation of a series of universal standards for gearing will help gear designers, gear manufacturers, and gear production equipment builders by creating a singular cost-effective standard for all.

When designing gearing, the end-user has an expectation that the gear manufacturer will supply gears that are produced to a certain standard. The use of designing to a standard allows for gears produced by different companies, at different times, on different equipment, to all meet the same performance specifications.

ABOUT THE AUTHOR Brian Dengel is general manager of KHK-USA, which is based in Mineola, New York. Go online to www.khkgears.us