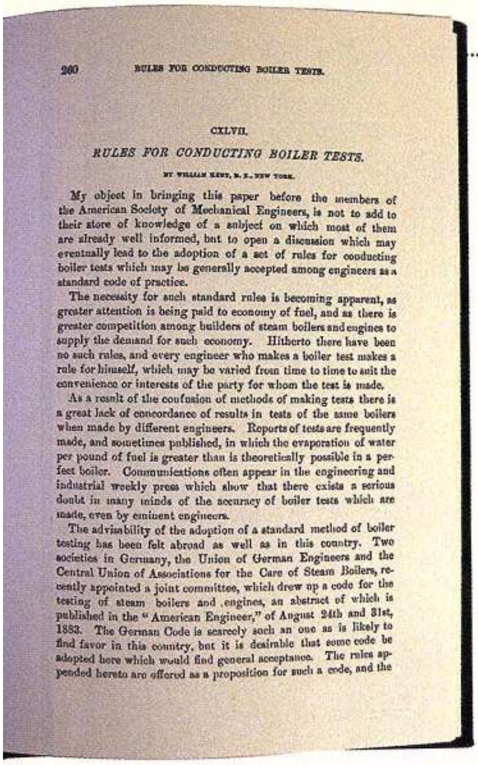


260 RULES FOR CONDUCTING BOILER TESTS.

CXLVII.

RULES FOR CONDUCTING BOILER TESTS.

BY WILLIAM KENT, M. E., NEW YORK.

My object in bringing this paper before the members of the American Society of Mechanical Engineers, is not to add to their store of knowledge of a subject on which most of them are already well informed, but to open a discussion which may eventually lead to the adoption of a set of rules for conducting boiler tests which may be generally accepted among engineers as a standard code of practice.

The necessity for such standard rules is becoming apparent, as greater attention is being paid to economy of fuel, and as there is greater competition among builders of steam boilers and engines to supply the demand for such economy. Hitherto there have been no such rules, and every engineer who makes a boiler test makes a rule for himself, which may be varied from time to time to suit the convenience or interests of the party for whom the test is made.

As a result of the confusion of methods of making tests there is a great lack of concordance of results in tests of the same boilers when made by different engineers. Reports of tests are frequently made, and sometimes published, in which the evaporation of water per pound of fuel is greater than is theoretically possible in a perfect boiler. Communications often appear in the engineering and industrial weekly press which show that there exists a serious doubt in many minds of the accuracy of boiler tests which are made, even by eminent engineers.

The advisability of the adoption of a standard method of boiler testing has been felt abroad as well as in this country. Two societies in Germany, the Union of German Engineers and the Central Union of Associations for the Care of Steam Boilers, recently appointed a joint committee, which drew up a code for the testing of steam boilers and engines, an abstract of which is published in the "American Engineer," of August 24th and 31st, 1883. The German Code is scarcely such an one as is likely to find favor in this country, but it is desirable that some code be adopted here which would find general acceptance. The rules appended hereto are offered as a proposition for such a code, and the

125 Years
ASME Codes & Standards

to Protect *and* Serve

It was a paper heard 'round the world, as ASME launched a codes and standards program that would come to span the globe.

By John Varrasi

It is hard to say now if anyone back in 1884 guessed what a single paper would put into motion.

ASME was meeting in Pittsburgh in May that year, at the invitation of the Engineers' Society of Western Pennsylvania. At some time after 8 p.m. on Wednesday the twenty third, William Kent of Babcock & Wilcox delivered a paper, "Rules for Conducting Boiler Tests."

His opening statement began this way: "My object in bringing this paper before the members of the American Society of Mechanical Engineers is not to add to their store of knowledge of a subject on which most of them are already well informed, but to open a discussion which may eventually lead to the adoption of a set of rules for conducting boiler tests which may be generally accepted among engineers as a standard code of practice."

Kent's paper set off a discussion, as most papers did. Various members—including Nathaniel Pratt, who would become president of Babcock & Wilcox; William Barnet Le Van, an inventor and author of *Useful Information for Engineers, Boiler Makers, and Firemen, with Facts and Figures*; and Charles E. Emery, chief engineer of the New York Steam Co.—contributed comments and observations.

They disagreed with some of the details in Kent's proposal—issues like temperatures, or the recommended way to start and stop the boiler. But they tended to agree with Kent that some set of rules to be followed by everyone would improve the reliability of boiler testing.

ASME a short time later formed a committee to develop the idea to a point at which all could agree on the soundness of the rules. Kent, who was an engineer and manager for Babcock & Wilcox, chaired the committee, which eventually would issue ASME's first standard, *Code for the Conduct of Trials of Steam Boilers*.

It was ASME's first code. And Kent's paper of 125 years ago didn't just start a development program that would eventually grow to involve 4,000 volunteers overseeing more than 500 codes and standards. It also set off the process by which ASME's codes and standards are developed—by achieving consensus among outstanding practitioners of the art.

This year ASME is celebrating the 125th anniversary of its codes and standards activity, with events planned over the next six months that recognize volunteerism and service. The current members of ASME Codes and Standards committees, subcommittees, and working groups are players in what is today a far-reaching global enterprise, and this year they are honored for continuing a tradition of public service and professional responsibility that dates to the late nineteenth century industrial age.

▲ The 1884 volume of the society's *Transactions* published the initial draft of what would become ASME's first industrial code.

John Varrasi is a senior writer in the Corporate Communications Department of ASME in New York.

Industrial Progress

William Kent's paper was presented in a time of heightened industrial activity and mechanical engineering invention and ingenuity in the United States, particularly in the areas of transportation and factory-based mass production. Despite the many benefits and opportunities brought by industrialization, including greater economic wealth and increased access to goods for many Americans, there were problems. Industrial development in those years progressed at a frenetic pace, with nary an eye toward uniform engineering practices or public safety.

Four years prior to the initial debate over standards for boiler tests, ASME's founding members discussed another problem: mismatched screws and other fasteners in engineered systems. Speaking at the society's first annual meeting held in New York City in 1880, G.R. Stetson brought to light a situation in which "sizes in screw threads are infinite and the number of threads to each size are infinite, too." Listening to Stetson's paper, the founders—including Henry R. Worthington, Alexander Lyman Holley, and other prominent machine builders and technical innovators of the day—agreed that some level of scientific precision was needed in screws and other fasteners to ensure a rational order in the emerging industrial society.

Other papers followed Stetson's, and the ASME founders placed standards for screw threads, flanges, pipe fittings, and related hardware high on the list of priorities for the fledgling organization. The importance of standards for screw threads was brought to public attention in 1904, when a fire

▲ Because their hose fittings were incompatible, many firefighters could only stand and watch Baltimore burn in 1904.

erupted in Baltimore and spread unchecked through much of the city's business district. As buildings became engulfed in flames, firefighting units summoned from other towns to assist could only watch helplessly, because their hose couplings would not fit the Baltimore hydrants.

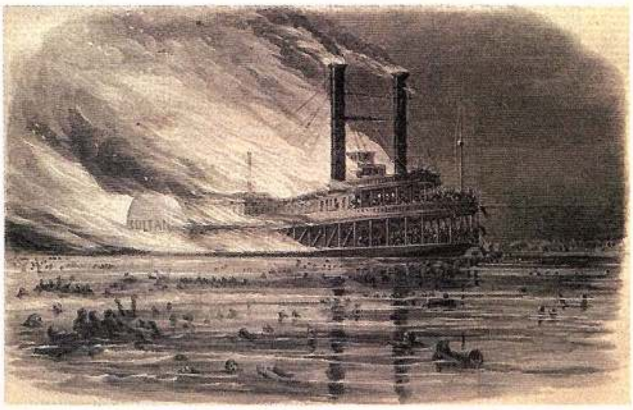
Beginning with *Standard for the Diameter and Overall Dimensions of Pipe and Its Threaded Ends* in 1887, ASME has developed 29 standards for pipe and screw threads that address every engineering consideration from nomenclature and definitions to allowable tolerance and gauge.

Another topic of discussion among the founders regarded the problem of unsafe boilers.

The American Society of Mechanical Engineers is founded. **April 7, 1880**
First performance test code: Code for the Conduct of Trials of Steam Boilers. **1884**
Standard for the Diameter and Overall Dimensions of Pipe and Its Threaded Ends. **1887**
Method of Conducting Duty Trials of Pumping Engines. **1892**
Committee formed to prepare a proposed Standard for Divergences in Flange Diameter. **1892**
Standard Method of Conducting Efficiency Tests of Locomotives. **1893**
First revision of an ASME standard, Standard Method of Conducting Steam Boiler Tests. **1900**
Standard for Divergences in Flange Diameters. **1899**
Standard for Direct-Connected Generating Sets. **1901**
Standard for Pipe Unions. **1902**
Proposed Standard for Machine Screw Thread Sizes. **1902**
Standard for Proportions for Machine Screws. **1905**
Issuance of the first Boiler Code. **1914**
Standards for Engineering Drawings. **1915**
Code of Safety Standards for Cranes. **1916**
Code of Safety Standards for Industrial Ladders. **1917**
American Engineering Standards Committee (later known as ANSI) formed. **1918**
Standards of Carburetor Performance. **1919**
Formulation of Committee on Power Test Codes. **1919**
National Board of Boiler and Pressure Vessel Inspectors formed. **1919**
First Elevator Code. **1921**
Code for Displacement Compressors and Blowers. **1922**
Test Code for Hydraulic Power Plants and Their Equipment. **1922**
Test Code for Locomotives (preliminary). **1923**
Test Code for Internal Combustion Engines. **1923**
Code for Unfired Pressure Vessels. **1924**
ASME publishes two American Engineering Standards Committee standards—Machinery Shafting and Transmission Shafting. **1925**
Proposed Standard for Spur Gear Tooth Form. **1926**
Tentative American Standard for Steel Pipe Flanges and Flange Fittings. **1926**
Tentative Standards for Round Unslotted Head Bolts. **1927**
Committee for Standard for Integrally Forged Flanges for Hydroelectric Units. **1928**
Test Code for Liquid Fuels. **1929**
Test Code of Complete Steam-Electric Power Plants. **1930**
Proposed ASME Standard for Integrally Forged Flanges for Hydroelectric Units. **1931**
New Standards for Gear Materials and Blanks, Shafting, and Stock Keys. **1933**
Pressure Piping Code. **1935**
Turbine Generator Standards. **1939**
First publication of Code Interpretations—Safety Codes for Elevators. **1946**
The International Organization for Standardization (ISO) formed. **1947**
ISO adopts first standard, screw threads. **1947**
Committee established for ASME Pressure Vessel Code for Nuclear Age. **1956**
Section III (Nuclear Power) of ASME Boiler and Pressure Vessel Code. **1963**
ASME Nuclear Power Certificate of Authorization Program commences. **1968**
Proposed Performance Test Code for Nuclear Reactor Fuel. **1968**
First piping shipped that is certified by company accredited under the Nuclear Power Piping Code. **1969**
International Standards Organization adopts uniform, worldwide rating point for gas turbines using ASME's Gas Turbine Performance Test Code. **1969**
ASME expands its certification program worldwide; first ASME manufacturer certification issued outside of North America. **1972**
Issuance of guide for the evacuation of passengers from stalled elevator cars. **1973**
First ASME publication of Boiler and Pressure Vessel Committee interpretations. **1978**
ASME Boiler and Pressure Vessel Code published in both conventional and metric units. **1983**
ASME celebrates 100 years of Codes and Standards activities—A Century of Progress Through Voluntary Action. **1984**
Nuclear Air and Gas Treatment Systems Standard. **1985**
ASME began accreditation programs for elevator inspector certification institutes. **1986**

Boilers were enablers of industrial progress in the nineteenth century, providing steam power for ships and rail locomotives, and serving as prime movers in steel mills, factories, and woodworking shops. Boiler installations occurred at a fast pace in the middle to late 1800s, as profit-seeking steamship operators and industrialists exploited the benefits of steam power, some even demanding larger and more powerful systems to increase mechanical output. By 1890, there were some 100,000 commercial boilers in service in the United States.

Rules and guidelines attending both the manufacture and operation of steam boilers were non-existent at the time, compromising safety and leading to hundreds of failures and problems, including boiler explosions. One of the worst maritime disasters in the nation's history—the steamboat *Sultana* incident on April 27, 1865—was caused by a boiler explosion. The *Sultana* was transporting 2,200 people, most of them Union soldiers who had been released from Confederate prisons in the aftermath of the nation's Civil War, north on the Mississippi, when the overloaded steamer's twin boilers began leaking water. The leaky boilers exploded with a tremendous crash, setting off a violent fire that burned the ship to the waterline. More than 1,500 passengers and crew died on that fateful day, roughly the same number of souls that perished on the *Titanic*.



▲ In the United States' worst maritime disaster, more than 1,500 died when a boiler exploded on the overloaded steamboat *Sultana*.

More than 2,000 boilers exploded during ASME's first decade, from 1880 to 1890. The accidents increased the urgency for boiler standards among the society's early leaders. It was appropriate, and an act of public service, then, that *Code for the Conduct of Trials of Steam Boilers* was ASME's first standard, and set in motion 125 years of codes and standards development.

A Call for Action

Although that first code represented a step in the direction of safety and industrial order and rationality, boiler mishaps did not cease. On March 10, 1905, a fire-tube boiler in a Brockton, Mass., shoe factory exploded, killing 58 people and causing property damage exceeding $250,000. The disaster sparked a public outcry. On December 6, 1906, another serious explosion rocked a factory in Lynn, Mass. The toll in lives was low compared with the earlier disaster, with one person reported killed, but the incident in Lynn motivated the governor of Massachusetts to demand prompt action. ASME, which already was discussing engineering standards for boilers, convened the Board of Boiler Rules for deliberation and debate.

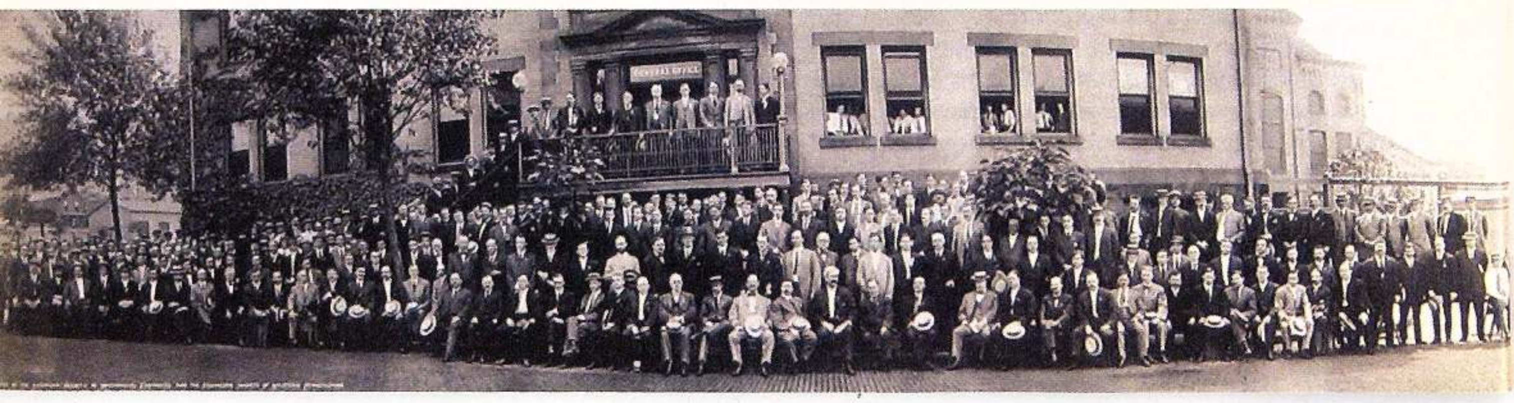
The Massachusetts legislature endorsed ASME's rules, which specified pressure limits on boilers and also included guidelines for the performance characteristics of plugs, rivets, and other critical system components. The Board of Boiler Rules was the precursor to the ASME Boiler Code Committee formed in 1911, which laid the groundwork for the first edition of the ASME Boiler Code, *Rules for the Construction of Stationary Boilers and for Allowable Working Pressure*, issued in 1914 and published in 1915.

The publication, known as the 1914 Edition, evolved into the Boiler and Pressure Vessel Code, which today covers industrial and residential boilers as well as nuclear reactor components, transport tanks, and other types of pressure vessels. Through the decades, the BPVC has become virtually synonymous with ASME and contributed to the organization's stature in the global standards-setting community. The Boiler and Pressure Vessel Code has been incorporated into the laws of all 50 United States and throughout the provinces of Canada. More than 92,000 copies of the BPVC are in use in 100 countries around the world.

The first edition of the Boiler Code brought together manufacturers, users, steel fabricators, utilities, insurance companies, state inspection authorities, technical schools, and the general public—indeed, every group that had a stake in boilers and boiler safety. This spirit of coöperation and consensus displayed early on in the organization's history would underscore the numerous other codes, standards, and conformity assessment programs developed in the following decades.

The original practice of applying ASME's codes was

▼ Members of ASME and the Engineers' Society of Western Pennsylvania visited Mesta Machine Co. during a 1911 joint meeting.



to have independent inspectors verify manufacturers compliance with the rules. The states applying the code, however, were doing so with a wide range of differences. By 1919 the Boiler Code Committee decided that code enforcement needed conformity among inspectors.

The solution came in February 1919, when the National Board of Boiler and Pressure Vessel Inspectors was formed. Then as now, the National Board provided a uniform basis for commissioning authorized code inspectors that play a vital role in supporting ASME's Boiler and Pressure Vessel certification program.

Heavy Lifting

The use of cranes and other types of mechanical lifting equipment grew in step with the growth in freight railroading and shipping at the beginning of the twentieth century. Guidelines for the safe design and operation of cranes were not yet in place, and the high incidence of injuries to dockworkers, railroad yardmen, and factory workers was of concern to a variety of organizations, including the Locomotive Crane Manufacturers Association and the Association of Iron and Steel Electrical Engineers, as well as to the U.S. Department of the Navy, and other government agencies, including the U.S. Department of Labor, which was formed in 1913. By 1920, these groups were pressing hard for worker protection and safety.

ASME was a key player in the discussion. The society formed the ASME Safety Code Correlating Committee to expand on an eight-page document, *Code of Safety Standards for Cranes*, developed in 1916. ASME also helped coordinate the input of 29 national organizations with a vested interest in crane safety. The effort led to *Safety Code for Cranes, Derricks, and Hoists,* ASA B30.2, which gained national acceptance in 1943. B30 evolved into a series of volumes addressing the various types of equipment within the committee's scope, and would grow through the ensuing decades as one of the society's most important activities.

While the ASME Safety Code Correlating Committee was at work on crane safety in the years following World War I, a building boom was under way in America's urban centers. As buildings became taller, the need for a device to move people and material goods to upper floors became apparent. Elevators already had been in service for several years, but the public was not entirely convinced of their safety. Although Elijah Otis invented a safety brake in 1853, which prevented the fall of the elevator platform in the event that its hoisting rope broke, the public generally feared elevators and were keenly aware of the need for safety.

As with boilers and cranes before ASME addressed them, little regulation and few design and operating guidelines existed to ensure safety in elevators. Code writing for elevators initially fell to the Elevator Manufacturers Association, then shifted to ASME in the post-

First certificate issued to an organization certifying elevator inspectors. **1987**
Boiler and Pressure Vessel Code published on CD-ROM. **1989**
ASME completed criteria and validated examinations for certifying resource facility operators. **1991**
First binational elevator and escalator electrical equipment standard issued in conjunction with the Canadian Standards Association. **1991**
First personnel certification certificate issued (resource recovery facilitator operator). **1992**
First Authorized Inspection Agency accredited. **1992**
ASME established certification programs for operators of medical and hazardous waste incinerators. **1996**
Codes and Standards Medal renamed Melvin R. Green Codes and Standards Medal, for ASME's managing director for codes and standards during the late 1960s through 1995. **1996**
Risk technology introduced into the Boiler and Pressure Vessel Code. **1996**
Bioprocessing Equipment Standard. **1997**
High Pressure Vessel Code. **1997**
Waste Transport Packaging Code. **1997**
ASME's codes and standards voted one of 10 engineering feats that advanced the quality of life over the last 100 years. **1999**
C&S Connect (on-line balloting and tracking system) launched for Boiler and Pressure Vessel Committees. **2000**
ASME and Canadian Standards Association sign an agreement for the harmonizing of plumbing standards. **2001**
Normative referencing of ASME B31.3 Process Piping Code in ISO Piping Standard. **2001**
Standard on Managing System Integrity of Gas Pipelines. **2002**
Performance Test Code for Fuel Cell Power Systems Performance. **2002**
C&S Connect launched for use by all ASME committees. **2002**
Standard for Probabilistic Risk Assessment for Nuclear Power Plants. **2002**
First operator certifed under QFO— Certification of High Capacity Fossil Fuel Fired Plant (Boiler) Operators. **2002**
Standard on Digital Product Definition Data Practices. **2003**
ASME Standards Technology LLC established. **2004**
Consortium for Standards and Conformity Assessment formed with ASME, American Petroleum Institute, ASTM International, and CSA America to open an office in Beijing, China, with the support of the U.S. Department of Commerce and its counterpart in China, AQSIQ. **2004**
Transport Tanks Code. **2004**
Code on Steam Turbines in Combined Cycles. **2004**
First International delegate appointed to an ASME standards development committee. **2006**
ASME Asia Pacific LLC established. **2006**
Guide for Verification and Validation in Computational Solid Mechanics. **2006**
Asia Pacific LLC Beijing Representative Office opened. **2007**
Fitness-For-Service Standard. **2007**
ISO TC11 Standard 16528—Boilers and Pressure Vessels published, establishing performance requirements for the construction of boilers and pressure vessels and facilitating registration of BPV Codes to this standard. **2007**
Performance Test Code on Waste Combustors with Energy Recovery. **2007**
New Standards Committee on Industrial System Energy Assessment formed. **2007**
First binational Safety Code for Elevators and Escalators (ASME A 17.1/CSA B44.1) and first performance-based product design code (ASME A17.7/CSA B44.7). **2007**
Over 5,000 ASME certified manufacturers in 75 nations. **2008**
Standards Committee on Verification and Validation formed. **2008**
Polyethylene plastic pipe introduced into the Boiler and Pressure Vessel Code, Section III. **2008**
ASME Boiler and Pressure Vessel Committee reorganized from one consensus body to ten consensus bodies. **2009**
ASME celebrates 125 years of codes and standards activities. **2009**

war period. In 1921, ASME issued A17, *Safety Code for Elevators*, containing safety provisions for switches, door locking mechanisms, and speed.

A17, *Safety Code for Elevators* was a 25-page publication. Today's ASME A17.1/CSA B44, *Safety Code for Elevators and Escalators* is a binational code, jointly developed by ASME and the Canadian Standards Association, contains more than 350 pages, and includes rules and guidelines for technologies that were not around ninety years ago, like relay control equipment and solid state computerized components. A key milestone in the development of the code occurred in 2007, when ASME, jointly with the Canadian Standards Association, published the first performance-based safety code, ASME A17.7/CSA B44.7.

The Nuclear Era

Perhaps no other power source in history made itself known the way nuclear fission did. In a matter of hours after the first atomic bomb exploded over Hiroshima, the world knew that an event without precedent had taken place. Days later, a second bomb fell, forcing an end to World War II.

The emotions created by the close of the world's largest conflict shortly gave way to the political angst of the Cold War, and the public dread caused by the nuclear arms race between East and West. As an antidote to fear, a new phrase came into the world, "Atoms for Peace."

▲ The Boiler Code Committee at the Biltmore Hotel in Los Angeles in 1947. Much of the paper has been replaced by laptop computers.

The U.S. Navy was able to demonstrate that a controlled nuclear reaction could be used to power its vessels. The first nuclear-powered vessel, the submarine *Nautilus*, was launched in January 1954, commissioned in September that year, and put out to sea the following January.

The first commercial nuclear power plant came less than two years later. The Calder Hall nuclear reactor began operating in the United Kingdom in May 1956. In October of the following year, the Vallecitos boiling water reactor, an ASME Landmark, became the first privately owned nuclear plant to operate in the U.S. The Vallecitos reactor, in Pleasanton, Calif., was a pilot plant and tested technology that would be used in another nuclear plant built in Illinois a few years later.

Although Vallecitos contributed electricity to the grid, it was the Shippingport Atomic Power Station in Pennsylvania that ASME has landmarked as "the first commercial central electric-generating station in the United States to use nuclear energy." Shippingport began generating electricity in December 1957.

In *The Code: An Authorized History of the ASME Boiler and Pressure Vessel Code* (ASME Press, 1990), author Wilbur Cross quoted Frank Williams, an active participant in ASME's early nuclear standards activities. "We all conceded that nuclear power and the process of its generation implied a sufficient number of side dangers to merit broad consideration," Williams said. Williams and his ASME colleagues realized that great care would have to be invested in the design of nuclear equipment, and also that a high level of training and skill would be required of plant operators to identify and respond to possible failure and malfunction.

ASME created Section III of the Boiler and Pressure Vessel Code, *Rules for the Construction of Nuclear Power Plant Components*. Section III addressed materials, design, and construction of components that would stand up to the high pressures and temperatures in a nuclear power plant. The development of nuclear power technology promoted such new design approaches as use of heavy-wall forgings, large-size piping, and more sophisticated heat exchangers.

All on the Same Page

Public safety was the impetus behind Section III, and safety has motivated many of the society's codes and standards development activities through the decades. ASME also has created standards that provide a common language and uniform set of principles that engineers can apply to product and systems design, enabling quality and manufacturability. One such standard is ASME Y14.5.

The history of ASME Y14.5 dates to 1915. As auto assembly plants and other types of manufacturing facilities proliferated in the years before the U.S. entered World War I, ASME would recognize the need for common terminologies to be used among engineers, particularly between parts suppliers and product producers.

In 1915, ASME produced the organization's first standards for engineering drawings, which would be the precursor to Y14.5. ASME Y14.5 presents the design language of geometric dimensioning and tolerancing, or GD&T, providing uniform guidelines for stating and interpreting that information in engineering documents.

Engineers working in the domain of GD&T and following the guidelines in Y14.5 are able to communicate design intent along the entire supply and production line, and are assured that parts from technical drawings feature a desired form, fit, and function.

ASME Y14.5 is the most widely used among the society's more than 500 technical codes and standards and serves as the basis for one of ASME's personnel certification programs. More than 100,000 copies of Y14.5 have been distributed worldwide in the last fifteen years, making the circuit among designers, manufacturers, procurement specialists, and other users. Like many other ASME standards, the content of Y14.5 has been revised and updated to reflect changes in industrial processes and engineering practices. In 1982, ASME adapted the standard for industrial users of metric measuring units, and in 2003 announced Y14.41 for computer-aided design applications, allowing engineers to organize and interpret three-dimensional digital product images. ASME Y14.5-2009, the latest edition, includes composite position tolerances, datum references and degrees of freedom, and axis methods of interpretation, among other changes.

Global Initiatives

Y14.5 represented an early foray into the international arena for ASME. The standard proved useful in promoting the spread of U.S. industry abroad, particularly in the years following World War II, when many domestic manufacturing firms opened plants in western Europe and other places overseas.

In recent years, ASME has increased its initiatives to extend the international reach of codes and standards. In February 2007, the society established ASME Asia Pacific, LLC, and opened an office in Beijing, which has allowed the codes and standards activity to achieve an on-the-ground presence in the rapidly industrializing country of China.

The society's global strategies for codes and standards go well beyond China. ASME delegates have crisscrossed Europe, Asia, and Africa to organize training workshops and to forge collaborations in Japan, the Czech Republic, the Republic of Korea, Romania, France, South Africa, Nigeria, India, and many other countries.

The society's globally focused initiatives have aimed to place ASME's codes and standards front and center in the international marketplace, which includes many other standards development bodies with oftentimes competing interests and goals. Local laws and regional trade agreements also make global standards-setting extremely complicated. However, ASME has made strong inroads in international markets, notably in China and India. A prime reason has been that ASME's consensus standards development process includes openness, transparency, due process, and balance of interest, and is consistent with the principles of the World Trade Organization's Technical Barriers to Trade Agreement. ASME codes and standards development committees, made up of technical experts from around the world, meet regularly to consider revisions based on technological advances, new data, and changing environmental and industry needs.

In 2007 and 2008, the Shanghai Power Equipment Research Institute, working in agreement with ASME, translated Sections III and XI of the ASME Boiler and Pressure Vessel Code into the Chinese language, in response to the growing interest in China to use the standards for both new plant construction and for operations and maintenance at established nuclear facilities.

In India, city and local regulators now reference ASME B31.8, *Gas Transmission and Distribution Piping Systems*, along with other ASME codes and standards related to pressure technology. Today, ASME's codes and standards are accepted within the regulatory structures in some form in more than 100 countries, a testament to the recognition and respect accorded ASME by the worldwide engineering community.

Change and adaptation have been key factors in codes and standards development through the years. This year's 125th anniversary celebration also is a tribute to service, for at the heart of ASME Codes and Standards are more than 4,000 individuals who have contributed—and will continue to contribute—very significantly to engineering progress, public safety, and industrial development around the world. ■