The American Society of Mechanical Engineers

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Founded in 1880, The American Society of Mechanical Engineers (ASME) is a non-profit organisation that facilitates collaboration, career development and upskilling across all engineering disciplines. Now representing more than 130,000 members in 151 countries, the Society's mission is to advance, disseminate and apply engineering knowledge to benefit people's lives and livelihoods. In this exclusive interview, we had the pleasure of speaking with Dr Charla Wise, ASME's President. Here, she discusses ASME's history, and how the Society achieves its goals through facilitating collaboration, influencing policy, recognising outstanding achievements and inspiring the next generation of engineers.

To begin, please tell us a little about the history of ASME.

This is such an exciting time for ASME! This year we are celebrating our 138th birthday and the Society is stronger than ever as we serve members and society well into our second century. One of the constants across all these years is our focus on safety. In the early years of our existence, ASME led the way in developing standards on boilers to end a significant danger to public safety of the time – the devastating and lethal explosions of steam boilers. Thanks to the early work of ASME, that public threat has now diminished.

The Society's founders were concerned citizens of that time, prominent machine builders and technical innovators of the late 19th century who saw how standardised design and production could increase safety and prosperity for everybody. Alexander Lyman Holley, one of the foremost steelmakers of the day, was one of our founders; so was Robert H. Thurston, the first professor of Mechanical Engineering at Stevens Institute of Technology. Thurston served as the Society's first president. We're also proud that Thomas Edison and Henry Ford were members of ASME in those early days too. The organisation they were a part of helped develop standardised tools, easily replaceable machine parts, and uniform work practices to ensure the reliability and safety of machines and industrial production.

What's the Society's mission, and how do you work towards realising it?

As president of today's ASME, I feel so fortunate to work with leaders and volunteers at all levels of a now modern, global organisation that supports ASME's continuing mission: to serve diverse global communities by advancing, disseminating and applying engineering knowledge to improve the quality of life and to keep our work going by communicating the excitement of engineering to inspire the next generation to join the effort.

We focus on making sure today's engineering workforce is well equipped to solve today's and tomorrow's technical challenges. We share with young people how rewarding it can be both professionally and personally to take part in creating solutions that truly benefit humankind.

What do you see as the most important areas of technological innovation for mechanical engineers now and in the future?

We live in an amazing time for engineers and technology professionals around the world – after all, the importance and impact of technology innovation are increasing each day in every area of modern life. Just think, 'Big Data', the 'Internet of Things' and artificial intelligence – the technologies of tomorrow are already here! But to answer your question specifically, ASME recently named five core technologies that we find central to engineers of today and tomorrow. They are: manufacturing (including advanced and additive technologies), pressure vessel technologies, clean energy, bioengineering, and robotics.

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The future is bright with innovation in every one of these areas of engineering. I get excited when I think of all the areas in which ASME is involved and the solutions our members have been a part of. Just think how engineers are creating and using drones to do safety inspections or building robotic exoskeletons to allow people who might never have walked again to do just that. Technologies like these and many more are already in use and will surely be improved, expanded, added to, and made more easily accessible to more people with each passing day and year. Think about it: if ‘it’ is a machine and ‘it’ moves, mechanical engineers have a role to play in its future!

Please tell us a bit about the resources you provide that can enhance and develop your members’ careers and promote collaboration.

Becoming a part of globally-recognised and respected community of professionals is empowering to each individual involved. ASME has a vast and diverse membership of 110,000 mechanical engineers and tech professionals from around the world. ASME offers tools, events, programs and publications, just to name a few, to enable collaboration and technical cooperation with the world’s most distinguished and recognised engineers.

Our community is a global network that connects members in so many regions, working together in every area of the Society, including codes and standards development, continuing engineering education, research, professional conferences, peer-reviewed publications, public policy and advocacy. These are just some of the topics within the amazing range of disciplines that ASME addresses on a daily basis. ASME offers so much – professional community, resources, deep subject-matter expertise in every engineering discipline, opportunities for learning, service, professional development and fellowship and a chance to serve a worthy mission in a community devoted to excellence.

As an example, one of ASME’s chief aims is to help the next generation of engineers find their professional way forward. To do this, we offer our 32,000 student members an array of opportunities for career preparation. One new and very exciting program we launched in 2017 is called E-Fests. E-Fests are regional events held at universities around the world that provide engineering students a chance to come together, showcase their skills and abilities through various design competitions, learn from professionals and from one another, and to have a great time. E-Fests are true Engineering Festivals as their name implies. You can see a video at https://efests.asme.org/.

ASME also produces a wide range of programs for engineers who are already in the workforce. ASME’s Learning & Development area offers both online and classroom-style training pertaining to many of ASME’s more than 500 codes and standards. Classes scheduled in 2018 will cover piping, pressure vessels, and verification and validation. This means that the ASME Code, the best and most reliable engineering code in the world, also comes with extensive training in how to make sure engineers are using it in the most skilful way possible.

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Another wonderful new program is based on the amazing developments, growth, and interdisciplinary nature of the biomedical engineering field. ASME is ‘parenting’ a new professional organisation called the Alliance for Advanced Biomedical Engineering (AABME) https://aabme.asme.org/categories/wearables-embedded-bioprinted-sensors. The AABME brings together a broad interdisciplinary community of technical professionals to catalyse the development of life-enhancing applications in the areas of tissue engineering, organ manufacturing, and cell therapy.

We are so proud of all these efforts. And we’re just scratching the surface here!

Does ASME advise the US Government on engineering related policy?

ASME has a Government Relations (GR) team, which is recognised throughout Washington for its outstanding capabilities! The GR Team is sought out to lead policy related issues by policymakers as well as fellow Associations and industries. ASME’s Government Relations team, which consists of staff and volunteers, offers policymakers access to technical expertise, knowledge and advice to help them make the decisions that affect everyone. This work includes the creation of formal position statements and white papers to support US federal investment in the work of the nation’s science and technology agencies, congressional visits, and convening forums and events in Washington, D.C. for the engineering community.

We also work closely with distinguished ASME members from industry and academia to provide briefings to Congressional staffers as a way to keep them current with the technical public policy issues currently under consideration in Congress. For example, two recent briefings focused on ‘Connected & Autonomous Vehicles: Incorporating AVs into our Transportation Infrastructure’ and ‘Department of Defense’s New Manufacturing Engineering Education Grant Program’.

One of the longstanding ways ASME helps advise policymakers is through the ASME Federal Government Fellowship Program. This program was established in 1973 and selects highly accomplished ASME members to serve a year working in the Congress or the Executive Branch to provide objective, non-partisan engineering expertise to US policymakers. ASME has sponsored 120 Federal Fellows over the past 44 years. We’re very proud of the ASME Federal Fellows program and its continuing commitment to provide engineering expertise to government. It’s a great and unique opportunity for an engineer to grow as well.

Tell us about ASME’s awards to recognise outstanding achievements in mechanical engineering?

ASME offers hundreds of awards and scholarships to recognise and celebrate the extraordinary achievements of engineers! We believe that recognising these outstanding achievements and contributions of our professionals and students serves two purposes: it disseminates and spreads knowledge for the advancement of engineering and technical solutions and it serves to inspire professionals and to excite our engineers of the future!

ASME presents many different awards every year to recognise distinguished achievement in and contributions to engineering as well as dedicated service to the Society itself. The highest award bestowed is the ASME Medal. Established in 1920, the ASME Medal is given annually to recognise exceptionally distinguished achievement and contributions by an engineer

over the course of his or her full career. The list of ASME Medal recipients includes renowned figures such as Igor Sikorsky, Dean Kamen, and Norman Augustine. The 2017 ASME Medallist was Professor Zdeněk P. Bažant of Northwestern University, recognised for his singular contributions to the probabilistic theory of materials and structures. A world-leading scholar and the author of seven books, we thank Dr Bažant for increased safety in bridges, dams, buildings, aircraft, ships and nuclear containments.

Tell us about some of your upcoming conferences. In what ways do these meetings promote innovation?

Over 25 conferences and hundreds of committee meetings are planned in 2018 at the national, international and local levels. The Society is offering a full schedule of technical conferences around the world including Turbo Expo, to be held in Oslo (Norway) in June; ASME's Power & Energy Conference in Orlando, FL (USA), also in June; the Pressure Vessels & Piping Conference in Prague (Czech Republic) in July, and the Nano Engineering for Medicine and Biology Conference (NEMB) in Anaheim, CA in August. Our biggest conference of the year, the International Mechanical Engineering Congress and Exposition (IMECE), will be held in Pittsburgh, PA in November. IMECE offers the broadest range of technical sessions, with topics from aerospace and energy to materials science to medical devices all happening over the course of a week.

ASME conferences bring together thought leaders, academics, and leading practitioners from every corner of the globe to discuss the very latest advances in technology and new product applications, to meet, talk, network, connect, and collaborate. These gatherings are some of the world's largest gatherings of mechanical engineering expertise in every area and naturally serve as essential vehicles for communication and information exchange.

Please describe the Society's role in developing codes of practice and standards for the mechanical engineering industry. Why is this work still so important?

ASME is recognised worldwide for developing and producing some of the most detailed, accurate and consensus-built standards in the world! Codes and standards have played a central role in the Society's history and growth. In its early years, ASME led the way in this activity, creating standards for screw threads, pump and valve dimensions, and other mechanical components needed to empower the rising productivity of factories, machine works, and even farms. In 1914, a major milestone in Society history occurred with publication of the first edition of the ASME Boiler and Pressure Vessel Code: *Rules for the Construction of Stationary Boilers and for Allowable Working Pressures*. Ever since then, professionals have come together to develop engineering standards for use in many technical areas including

pipeline production, elevators and escalators, cranes and other lifting devices, gas turbines, and commercial nuclear power.

Why is this work still so vital? Standards are indispensable to modern industries of every kind – they allow safe and uniform design approaches in engineered systems, which is what makes those systems reliable, interoperable, and safe. As engineering continues to cross borders and manufacturers establish operations across the globe, widely accepted standards are critical to making

products manufactured in one part of the world safe and useful in markets in other parts of the world. Standards may not always be considered 'glamorous', but there's no denying that strong and reliable standards are foundational to the health of the world economy.

What is the ASME Foundation, and how does it support young engineers in their education and career development?

The ASME Foundation Goal's is to move the needle forward and make a difference in inspiring current and next generation engineers! The ASME Foundation does wonderful work on behalf of the mechanical engineering profession, including sponsoring and supporting programs in STEM education and career development and providing scholarships.

One program made possible by the ASME Foundation is *Future Engineers*, a STEM education program that ASME has now produced for several years in collaboration with NASA. *Future Engineers* challenges have included a contest in which K-12 students were asked to dream up and design objects for 3D printing on the International Space Station and then for use by real astronauts.

A second very popular and quite ambitious initiative of The ASME Foundation is the ISHOW (short for *Innovation Showcase*), in which young engineer-entrepreneurs working on hardware projects to support sustainable development can enter their designs in three different global competitions to earn seed money and how-to advice from professional firms to help their start-up enterprises succeed.

Finally, what do you see as the biggest challenges facing mechanical engineers in the next ten years? How will ASME support its members to tackle these challenges?

One of the biggest challenges we will have is educating and training sufficient numbers of engineers to help create the future and solve upcoming technical challenges. Our increasingly data-driven world economy is putting a premium on engineers' ability to create sophisticated computer code and develop algorithms to allow companies to manage their supply chains, internal operations, product development timetables, and other essential business functions. We need to help more engineers master those particular challenges.

Another major task engineers must tackle is maintaining the safety and reliability of the advanced technologies flooding the marketplace: autonomous robots, self-driving cars and trucks, and 3D-based product fabrication. These are all important new areas of the economy and they will all surely mature over time. In the case of 3D fabrication, for example, while it is an amazing boon to aerospace and automotive companies to be able to 3D-print needed components on demand, we still need standards of quality control, rigor and oversight to insure the

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safety of those components. ASME standards-creators have begun to address this need, for example in our December 2017 publication of *Product Definition for Additive Manufacturing,* which applies to parts and assemblies designed in additive manufacturing environments.

Another challenge for engineers – as well as policymakers – is finding practical and cost-effective technical solutions to the global problems of water management, energy supply, and health assessment. ASME's aforementioned ISHOW brings engineers to the forefront of addressing those challenges, with three global competitions each year showcasing products and systems created to help developing countries around the world. Another emerging industry trend is the growth of advanced and additive manufacturing techniques. There are many new and unmet needs in the additive manufacturing space, particularly in the area of materials characterisation.

As we move into the future, ASME will continue to assess the changing world environment of the engineer and organise specialised conferences, workshops, and other forums to help our members gain a competitive edge. When it comes to bringing the benefits of technology to the world and helping the amazing engineering and technology professionals who are doing it, ASME will be right there with them making it happen. We are helping to create the future, safely!

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