

Portrait of an Industry:

Mechanical Engineering Today and Beyond

Our detailed survey of MEs nationwide reveals a profession in the midst of an exciting—and pivotal—cultural shift.

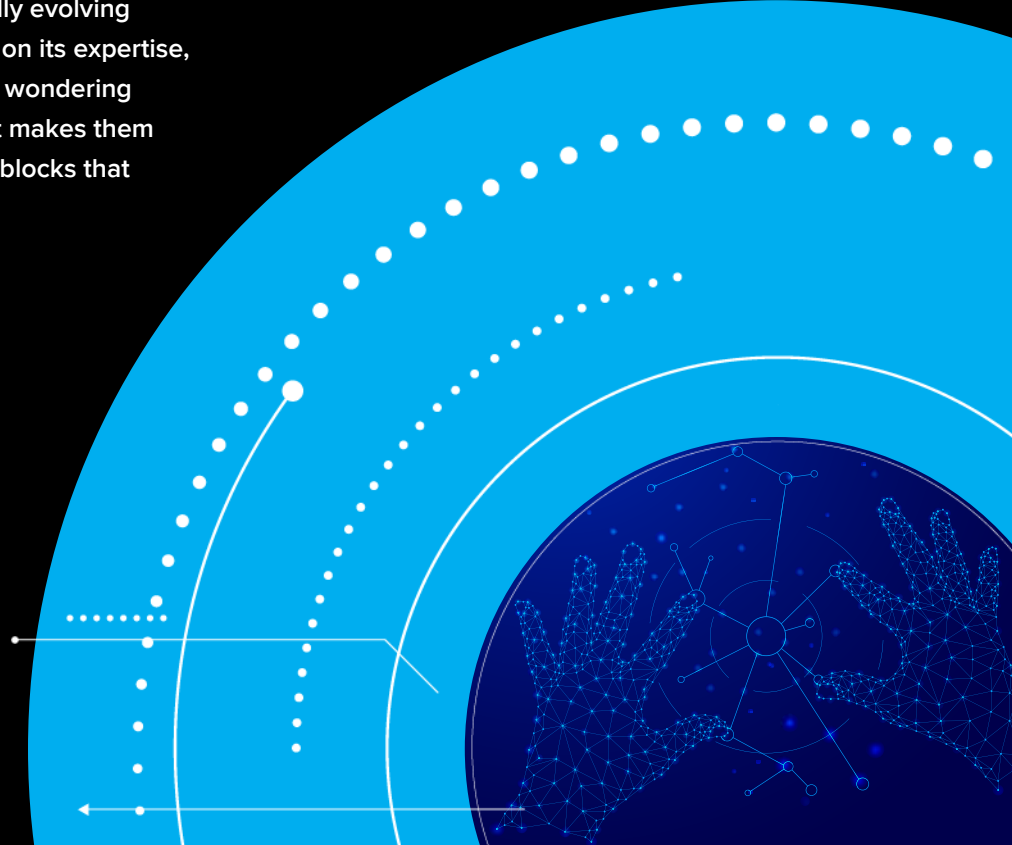
ME SURVEY



What does it mean to be a mechanical engineer today—and what might it mean tomorrow?

That is the question at the heart of the American Society of Mechanical Engineers' (ASME) large-scale survey conducted last year. The undertaking was designed to clarify the perspectives, desires, and goals of the professionals in the industry as well as the challenges and trends they're currently experiencing.

As the profession finds its stride amid rapidly evolving technological advances and new demands on its expertise, what are today's MEs feeling, thinking, and wondering about? What are they finding helpful? What makes them most hopeful? And what are the stumbling blocks that are tripping them up?

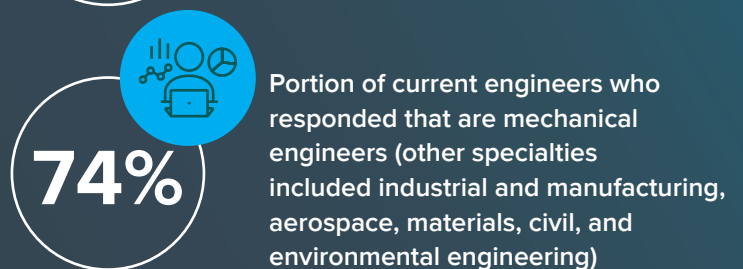
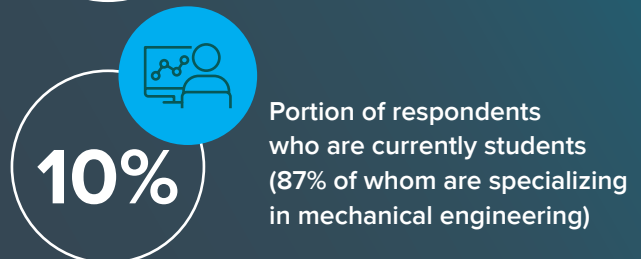
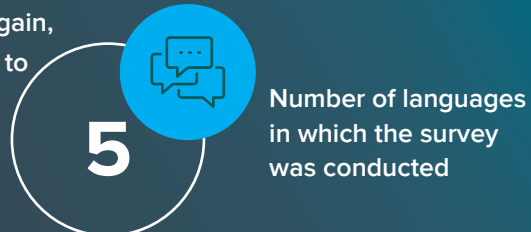


It's no exaggeration to say that the responses we received were both heartening and illuminating.

As the needs of the world seem to shift on a dime, the role of the ME continues to take on new importance—and yet again and again, these survey answers indicated that the industry is more ready to step up to the plate and get the job done, whatever it may be.

Who We Asked

Our survey pool,
by the numbers:



How Engineers View the Industry—and Themselves Within It

The engineering discipline requires intense study, rigorous intellectual engagement, a sense of inventiveness and vision, and a commitment to continued scholarship to keep pace with new advancements. As such, those who take on this profession tend to be deeply motivated by the desire to scale new heights of creativity and ingenuity, and to stay abreast of fresh developments in an ever-changing landscape.



Engineers also see value in belonging to a global community of fellow engineers, with 85% of current engineering professionals ranking such a community as “important.”

(In addition, 96% of students and 91% of academics agreed with this assessment.) Their preferred method of remaining connected with fellow industry pros is via membership in professional societies—as well as attending events that these societies sponsor, visiting trade shows and conferences, and volunteering for professional groups.

Perhaps this emphasis on connection and community is why a vast majority of engineers rank so-called soft skills as invaluable to their career success. Of current engineers,

This ethos of perpetual discovery and continued learning was one expressed repeatedly in the survey results. In fact, 98% of current engineers and 99% of both students and academics (such as professors or teaching graduate students) agreed with the statement,

“*Being an engineer requires that I continue to learn new things.*”

The survey also revealed that 67% of respondents engage in their own self-led training and education, while 27% have utilized training courses provided by their place of work and 24% have made use of training courses sponsored by third parties.

Their favorite resources for learning about new technologies?



96% said “better communication skills” were critical for mechanical engineering, and 92% said that “collaboration with other engineering disciplines” was equally important.

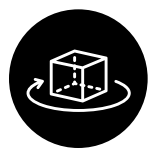
As for the driving reason why many of these professionals chose to become engineers to begin with, most feel the role meshes with their personal strengths. An overwhelming majority say they view their chosen profession as an extension of who they are. In fact, a full 94% of each of the three groups surveyed agreed with the statement,

“*Being an engineer is an important part of my identity.*”

Perhaps it's this personal pride in the profession that explains why most respondents indicated that they would recommend engineering as a career choice to both kids and young adults—a heartening bit of intel as the industry eyes the future.

Which Technologies Do Today's Engineers Find Most Critical to Their Work?

A rundown of essential areas of study, from most to least important as chosen by respondents:



1. Modeling and Simulation



2. Design for Manufacturing



3. Data and Analytics



4. New Technologies Related to Digital Transformation



5. PLM/PDM



6. Cybersecurity



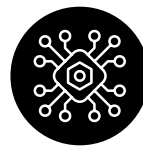
7. Industrial Automation and "Smart" Manufacturing



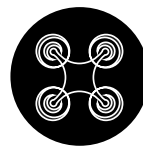
8. Addressing Climate Change



9. Digitalization of Manufacturing Processes



10. Artificial intelligence (AI) or Machine Learning (ML)



11. Robotics



12. Digital Twin Technology



How Engineering Students and Their Professors View the Industry

The data we gathered from students and professors in the engineering field tells a fascinating story about subtle differences in the industry's academic settings and its on-the-job contexts. For example, while students share more established engineers' appreciation for continuous learning, their desire to solve "problems that haven't been solved before" ranks higher for why they chose the engineering profession (94% said this, versus 90% of current mechanical engineers).

94%

Student desire to solve "problems that haven't been solved before" ranks higher for why they chose the engineering profession

versus 90%

current mechanical engineers

In addition, these future members of the industry appear to take a different approach to gleaming new knowledge than current engineers do, favoring academic institutions over professional associations as their resource of choice. Which is natural, given that they're still in school—and which explains why 72% of these student respondents say they use academic journals and conference papers to keep abreast of new tech. Yet an equally preferred mode of receiving new information among engineering students is online videos and tutorials, such as YouTube; a go to resource for 72% of engineering students.

72%

Student respondents use academic journals and conference papers

72%

Online videos and tutorials, such as Youtube



There's also evidence to suggest that the future of engineering may be a more deeply connected and communal one.



85%

Practicing engineers think being part of a worldwide community is

41%

very important

44%

somewhat important

96%

Student engineers think being part of a worldwide community is

66%

very important

30%

somewhat important

The Top 10 Skills That Professors Believe Engineers Need Most

Skillsets that professors believe are most critical to thrive in the industry, starting with the most frequently noted.



1.

Better communications skills



2.

Modeling and simulation skills



3.

Creative problem-solving skills



4.

Programming skills



5.

Understanding materials properties



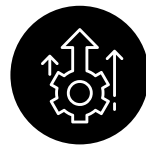
6.

Better collaboration with other engineering disciplines



7.

Use of CAM & CAD software



8.

Knowledge of systems engineering principles



9.

Understanding geometrics and tolerance



10.

Practice design for sustainability and “circular design”

In Conclusion: Looking Toward the Future

The data we gathered on methods of transferring knowledge between the current engineering establishment and the rising generation of MEs reveals a significant shortfall in on-the-job training.

Only 47% of current engineers report that their companies

“*regularly infuse new/ junior engineers into more senior engineering teams.*”

And a mere 39% say they employ a formal mentoring/ training program at work while just 33% have a formal internship program in place.

One takeaway?

Industry associations and academic settings still have a major role to play in bringing up the next generation of professionals.

But here's a telling, and heartening, tidbit:

When asked to evaluate their own relationship to risk, evolution and experimentation versus time-tested solutions, current engineers portrayed themselves as significantly more likely to eschew risk, favor “evolutionary” advances over “revolutionary” advances, and “pursue what is probable” rather than “seek what is possible.” And yet students and academics swung quite far in the other direction, saying they're more likely to “experiment with the latest technology and newest vendors” rather than sticking with what's worked in the past.

That tells a compelling story about future innovations—and a coming wave of more outside-the-box thinking.



