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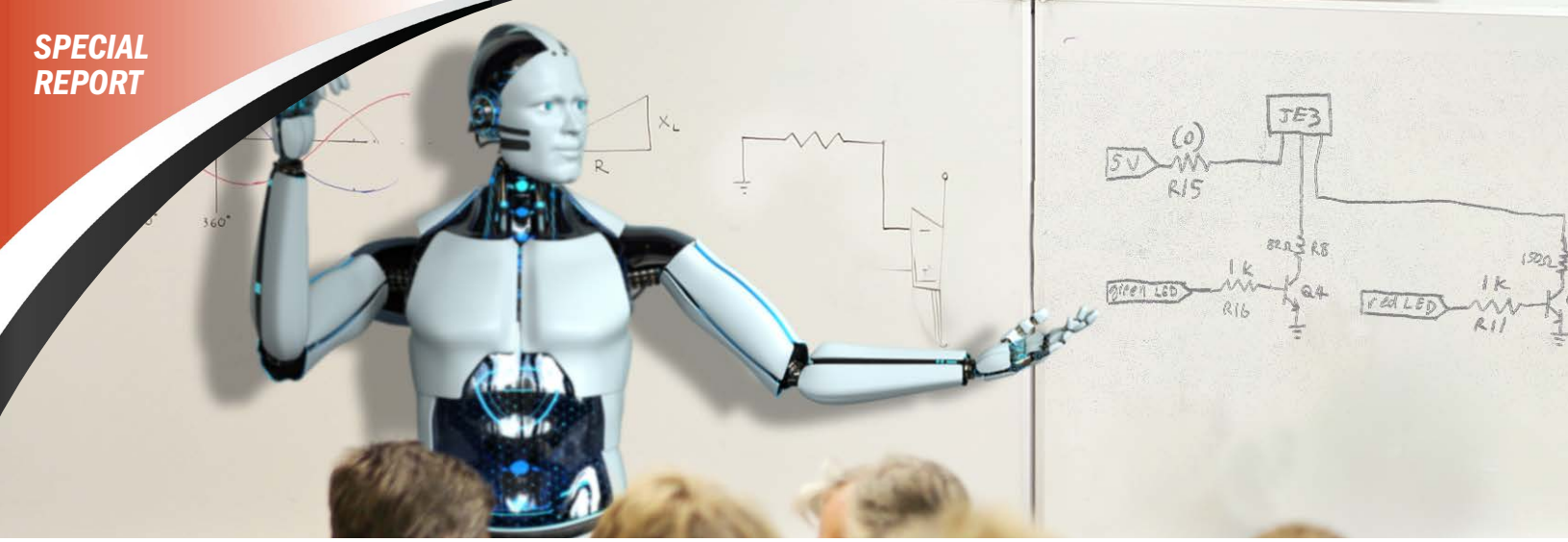
SPECIAL REPORT

AI, EDUCATION, AND CAREERS

SPECIAL REPORT



SALARY & CAREER SURVEY

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AI, Education, and Careers

William G. Wong,
Senior Content Director
Electronic Design & Microwaves & RF

OUR 2025 SALARY & CAREER SURVEY was sent out to a wide variety of engineers and developers. It provided interesting results across the board as well as within focused areas, where engineers are working on designs from fluid mechanics to AI accelerators. The articles in this special report come from different EndeavorB2B publications.

Each article is definitely worth reading, with our editors offering perspectives on their area of focus as well as the more general engineering community. Likewise, there are many common areas of agreement, such as high job satisfaction and the specter of engineering shortages.

Furthermore, the rise of artificial intelligence (AI) is making an impact on engineering and programming jobs, but smart managers are working with their group and peers to improve overall performance rather than trying to replace workers.

CHAPTER 1

Engineer Feedback on Careers and AI

Some results from our annual salary survey regarding the impact of artificial intelligence raised some eyebrows.

WILLIAM G. WONG, Senior Content Director - *Electronic Design* and *Microwaves & RF*

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Our 2025 Salary and Career Survey results are in, with the surveyed engineers and designers having a background focus spanning from electrical to mechanical to automation. You can check out our Electronic Design Salary Comparison Tool if you're so inclined.

Like everyone else, for years, we've been tracking the migration of machine learning (ML) and artificial intelligence (AI) on engineers and their careers. It's affected everything from the development process to AI education.

Large language models (LLMs) and chatbots continue to improve the coding credentials. Still, AI slop from vibe coding can cause major problems, adding to the technical debt that needs to fixed in the future. This is especially true for safety and security applications.

How AI is Impacting Engineers

Search and research remain the primary use of AI and chatbots, as indicated by 43% of engineer and programmer respondents *(Fig. 1)*. This use keeps the engineer in the loop. AI search results tend to be better and more interactive compared to basic search engine results.

Of course, part of the challenge is determining if the response is valid, as chatbots are known to bend the truth and even make up results. Asking for references to source material and then checking them should be part of anyone's best practices these days.

A step down from the research responses is the use of AI assistants at about 39%. We didn't delve into the details, but this would include everything from code completion to code generation, which is becoming more common. Likewise, the quality of the generated code is improving.

Test and documentation currently represent a smaller percentage. However, I suspect that this will grow significantly in the future as documentation is something chatbots can do well. It's also a task that few enjoy. Moreover, it's invaluable for both people and AI assistants.

Of course, we asked what engineers and programmers thought about these AI/ML tools *(Fig. 2)*. The results tend to align with what the general public thinks these days — it's up from 38% last year. How AI regulation might be done is a discussion for another time. It's very important for the kinds of embedded applications developed by our readers, though, because safety and

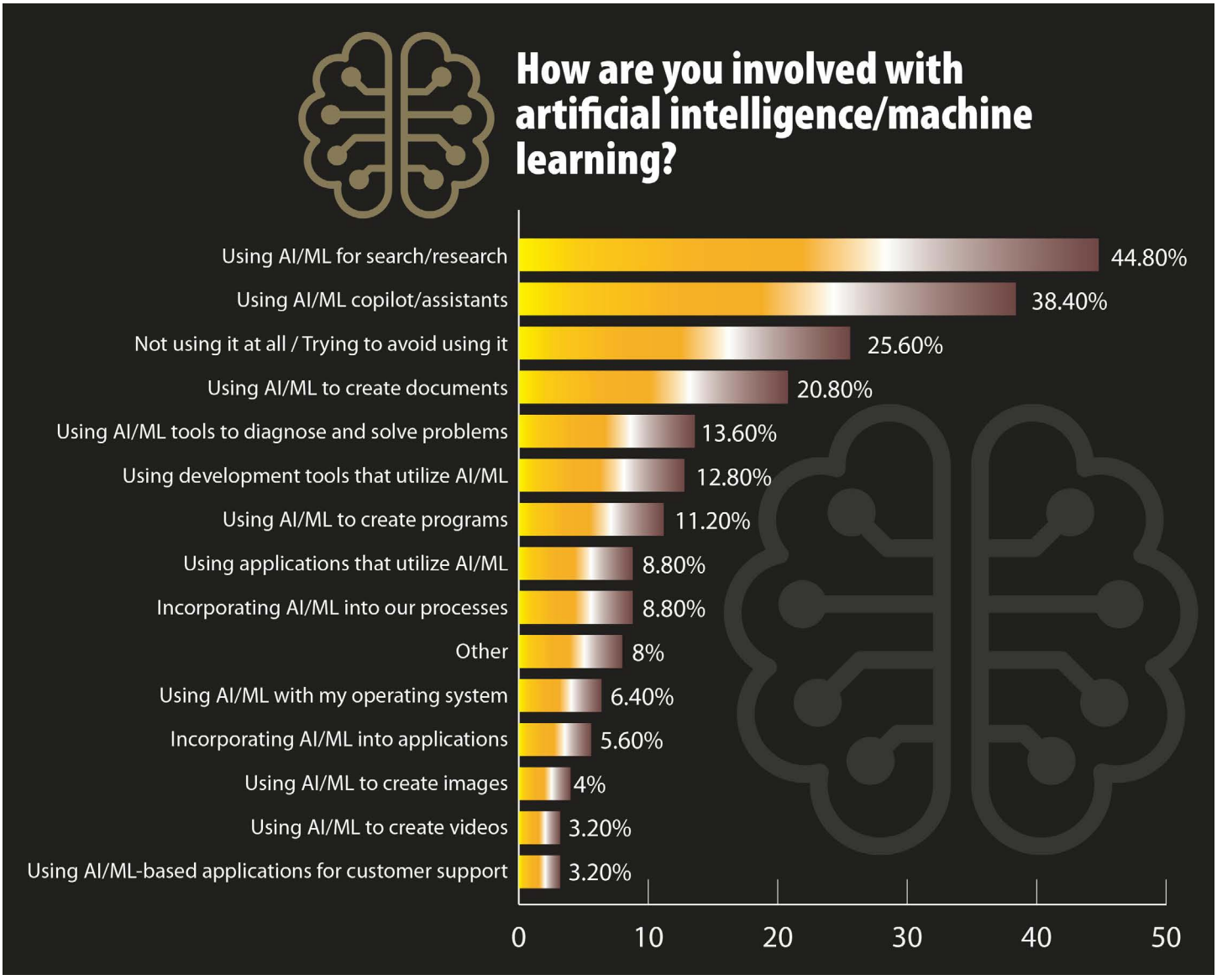
security are often top requirements.

After looking at the results, we should probably have asked whether AI/ML tools had a negative effect rather than just asking the affirmative. The 65% who didn't select a positive effect will be a mix of little or no effect (which is what I would expect), an unknown effect, or a negative effect. A small fraction indicated that AI was causing a problem. But we don't have results that indicate the type of problem, which could range from chatbots giving the wrong answer to causing a loss of some sort.

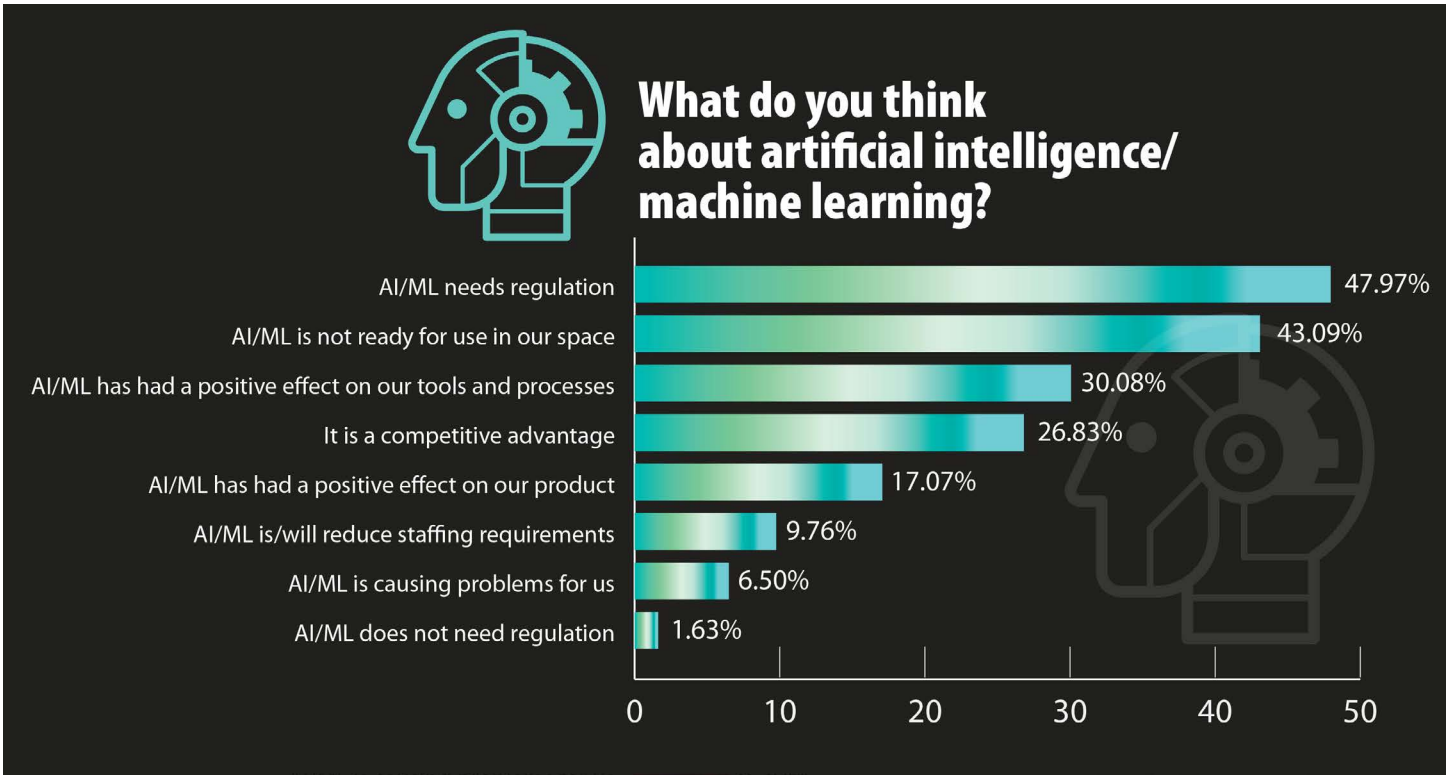
The percentage of people who didn't think AI was ready for their space dropped overall. However, it actually went up for *Electronic Design* responders (32% for all, as shown in the chart, versus 43% for *Electronic Design* readers).

AI's Impact on Designs

There was very little change regarding the impact of technologies since last year *(Fig. 3)*. AI/ML remain one of the major items in the list. Yet there's more concern about conventional engineering issues, from sensor



1. How are you involved with artificial intelligence/machine learning? (multiple selections were allowed) EndeavorB2B



2. What do you think about artificial intelligence/machine learning? (multiple selections were allowed) EndeavorB2B

integration to simulation and analysis. This may change as AI/ML improves and becomes more integrated into tools and middleware being used in embedded designs. However, the process may be more gradual than many pushing these technologies may like.

The amount of change with respect to specialties *(Fig. 4)* was low as well, with some notable exceptions. Overall, analog rose across the board for all of our publications, but there was a significant jump from *Electronic Design* and *Microwave & RF* readers. While the overall numbers rose to 30%, it was more like 50% for electrical and electronic designers.

Similar but smaller differences were notable in power, embedded design, and RF. These differences aren't surprising given the focus of those readers. Engineers and developers for publications like *Control Design* are utilizing systems that already address many of the challenges for handling power and analog sensors.

Effects of AI on Engineering Careers

Over 60% of respondents aren't looking to change careers and over 90% would recommend engineering as a profession. For those considering a move, the results compared to last year are about the same *(Fig. 5)*.

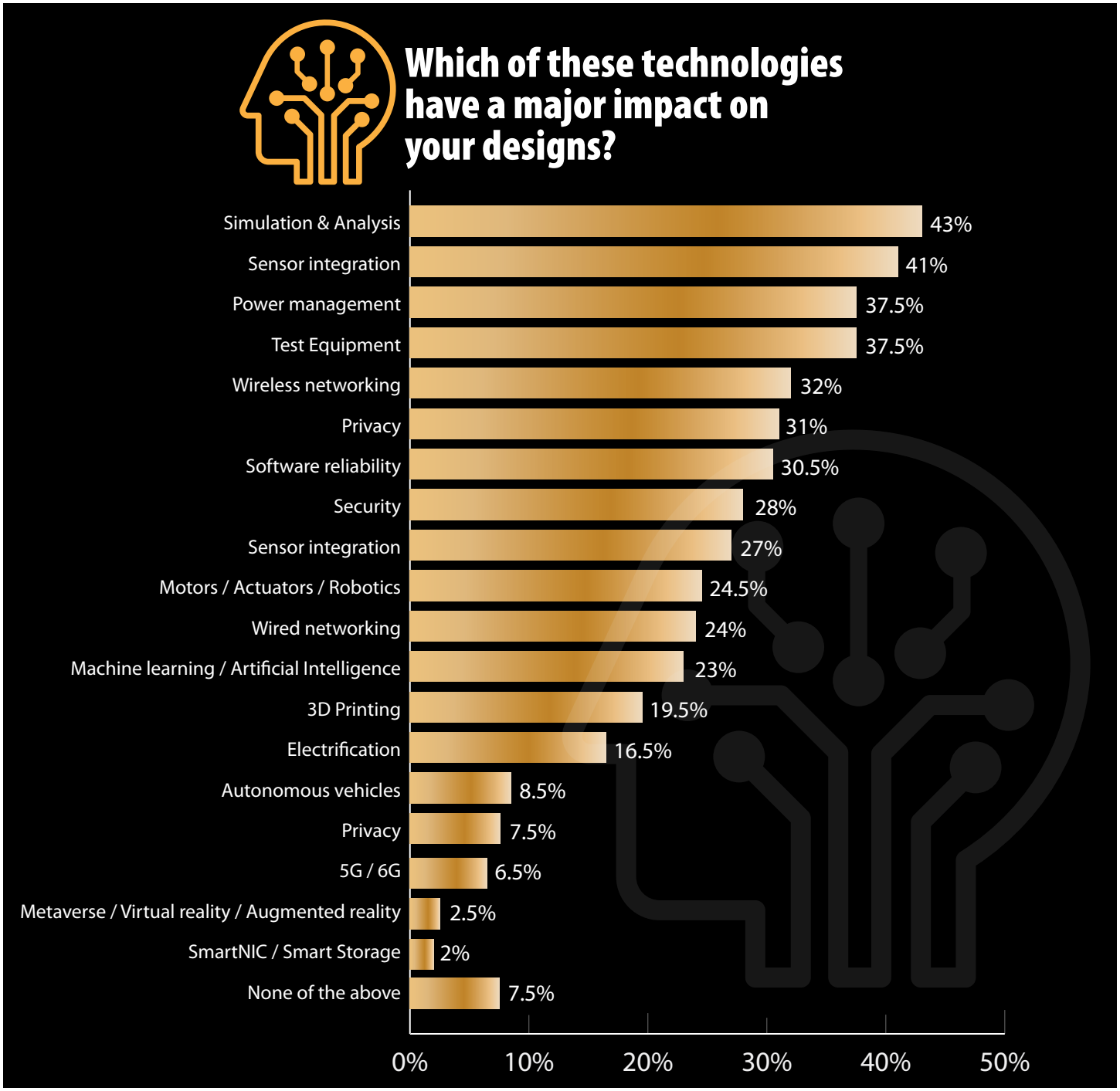
Burnout is still high on the list, but "trying something different," "making more money," and "doing something more fulfilling" are more popular responses. At this point, AI/ML issues tend to be less important.

When we looked specifically at AI/ML and the job, some changes were notable *(Fig. 6)*. Those not using AI/ML dropped by almost 10%, to the point where we can probably say that AI/ML is being used everywhere but can't indicate to what degree. We will need another survey for that.

The answer, "We are replacing staff using AI," was new this year. We're happy to note that the numbers are very low at this point, at least from an engineering perspective.

Thoughts on AI and Engineering Careers

AI may be having some major negative repercussions for some jobs. However, for engineering and embedded programming jobs it appears to have less of a negative impact, at least with respect to salary and careers. I suspect that other issues such as wars, tariffs, and political issues will have a more direct impact than AI in the near term.



3. Which of these technologies have a major impact on your designs? (multiple selections were allowed) EndeavorB2B

In the long term, the ways in which AI will help and how engineers, developers, and programmers adapt to the support or distraction that AI can deliver is still unclear. This is especially true given the financial nature of AI at this point, with a considerable number of people using subsidized AI support at least when it comes to LLMs via chatbots. It's dangerous to assume that this support will continue or low-cost options will be able to replace this support.

The cost of AI, as well as its effectiveness, will impinge on engineering and embedded designers' careers more over time. but that's for next year's survey.

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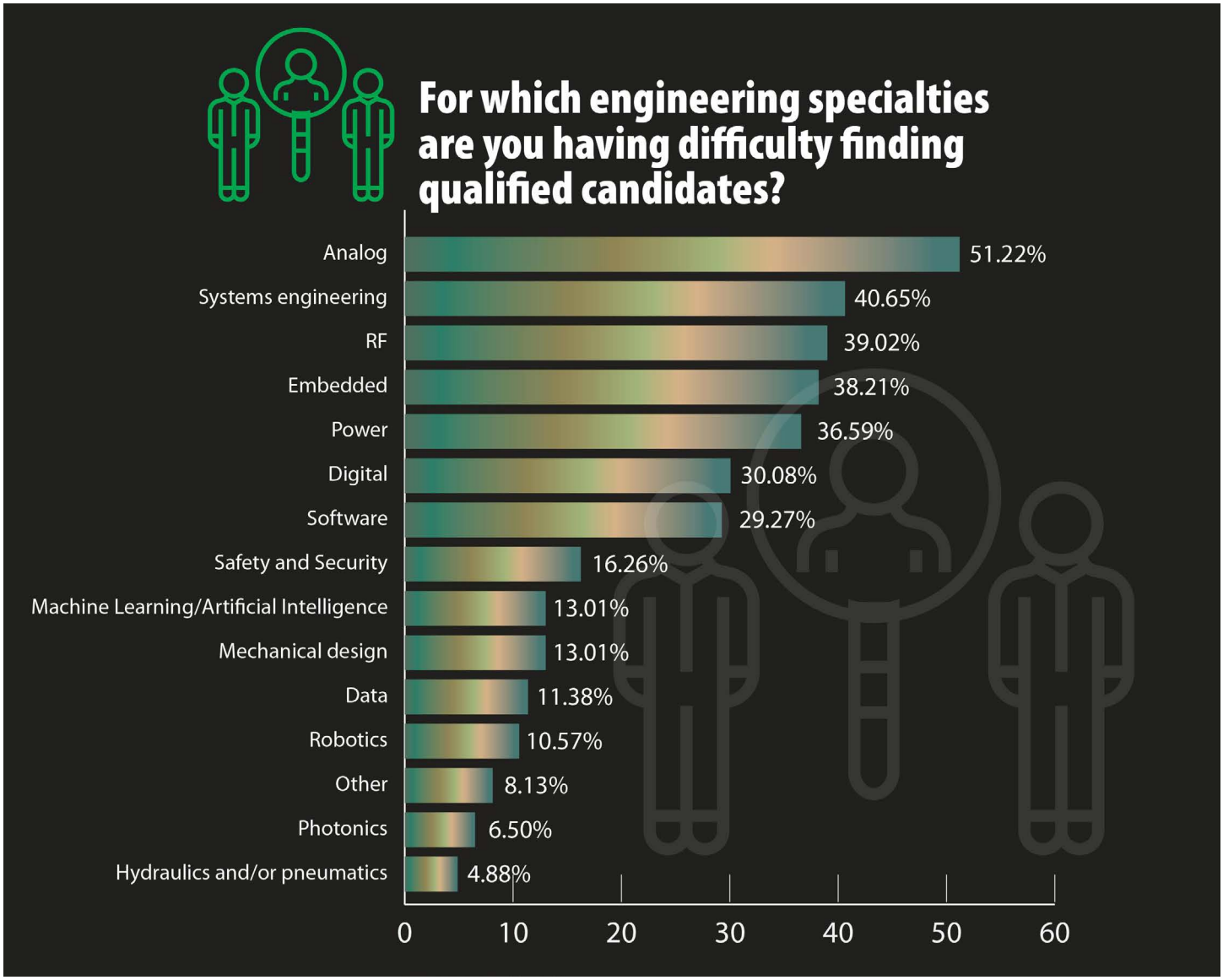
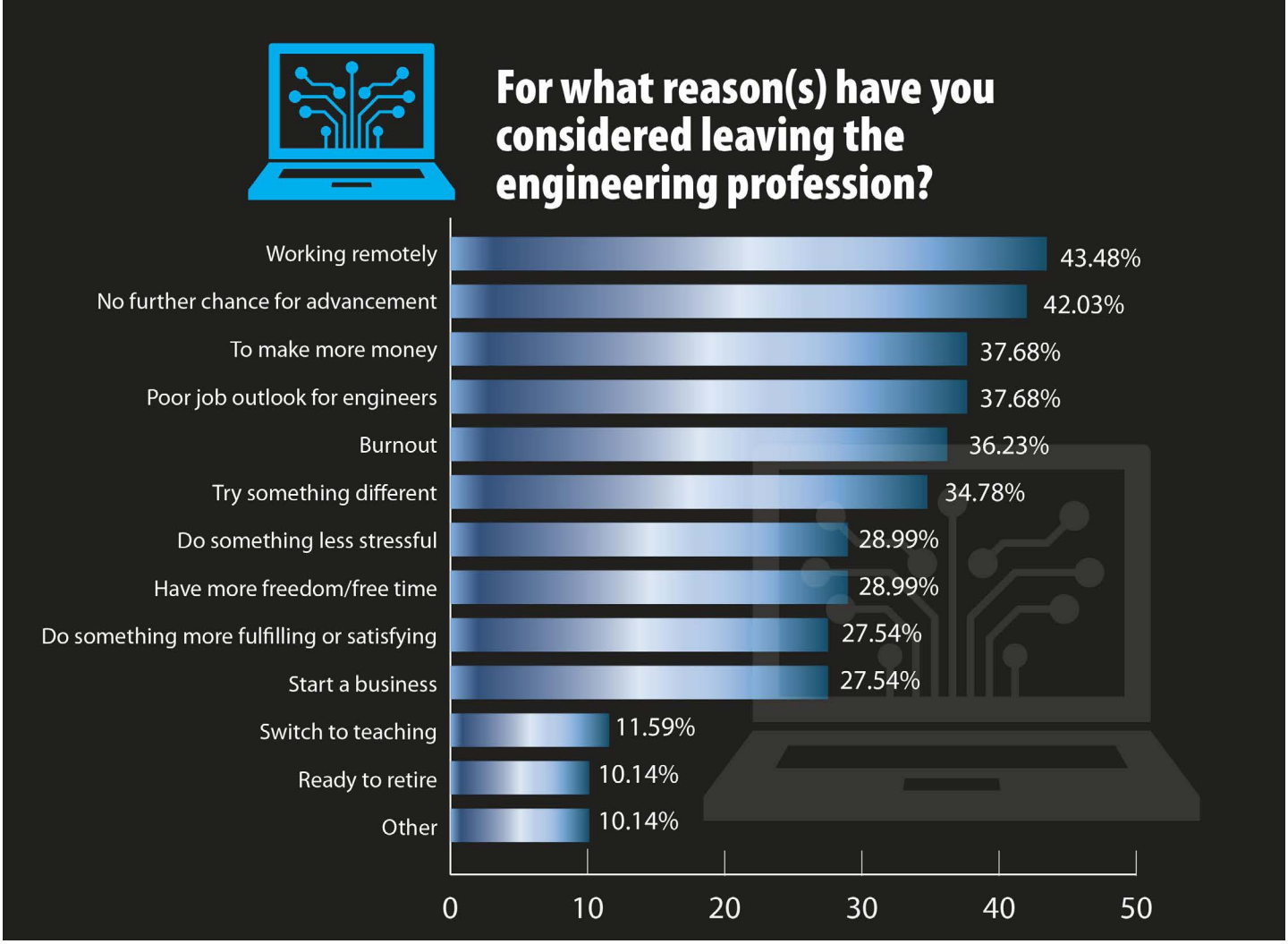
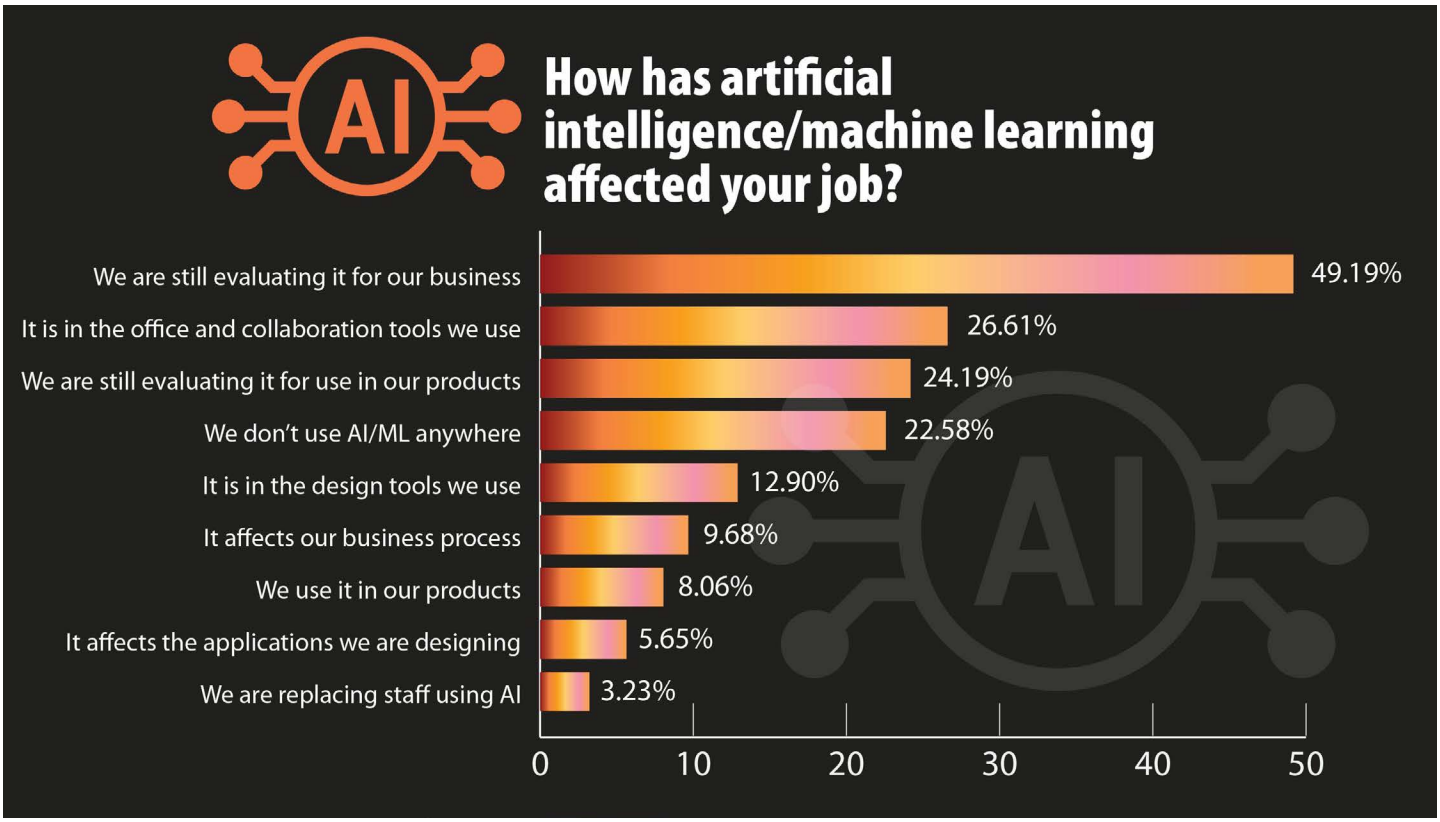


4. For which engineering specialties are you having difficulty finding qualified candidates? (multiple selections were allowed)

EndeavorB2B



5. For what reason(s) have you considered leaving the engineering profession? (multiple selections were allowed) EndeavorB2B



6. How has artificial intelligence/machine learning affected your job? (multiple selections were allowed) EndeavorB2B

CHAPTER 2

2026 Prediction: Engineers Ramp Up Learning in the AI Era

As AI reshapes engineering work, continuous education is becoming the clearest path to staying relevant and indispensable.

CABE ATWELL, Technology Editor, *Electronic Design*

It's like a big drop on a rollercoaster. You grit your teeth to the wind. Your eyes are watering. You squint. You feel the intense pressure of the air. It's movement you can't stop. That's what technological advancement feels like to me these days. It's been AI (artificial intelligence) in its many forms that's been a catalyst to rapid progress in technology.

Every company everywhere is adopting AI. We need to advance along with it.

We focus our education from general to hyper-specific. We go from grade school to college. Bachelor's degree to master's, to PhD. I think for 2026, 2027, 2028 — maybe even for the next decade — we need to keep sharpening our skills and knowledge. I predict a massive return to school calling for every engineer out there.

We're engineers. We're in the business of creativity, progress, advancement, and innovation. It's what we do. To paraphrase my favorite reporter: We bought the ticket, we take the ride.

1. GitHub used Copilot to deploy a JavaScript HTTP server task. GitHub

What AI is Doing to Us Right Now

Workplaces are using AI to automate tasks that humans have worked on forever. AI performs code generation, data analysis, system design, and testing more precisely, quickly, and efficiently than humans. We all know this. In a 2023 GitHub study, developers using Copilot implemented a JavaScript HTTP server task 55.8% faster (1 hour 11 minutes vs. 2 hours 41 minutes), with a higher completion rate (78% vs. 70%) *(Fig. 1)*.

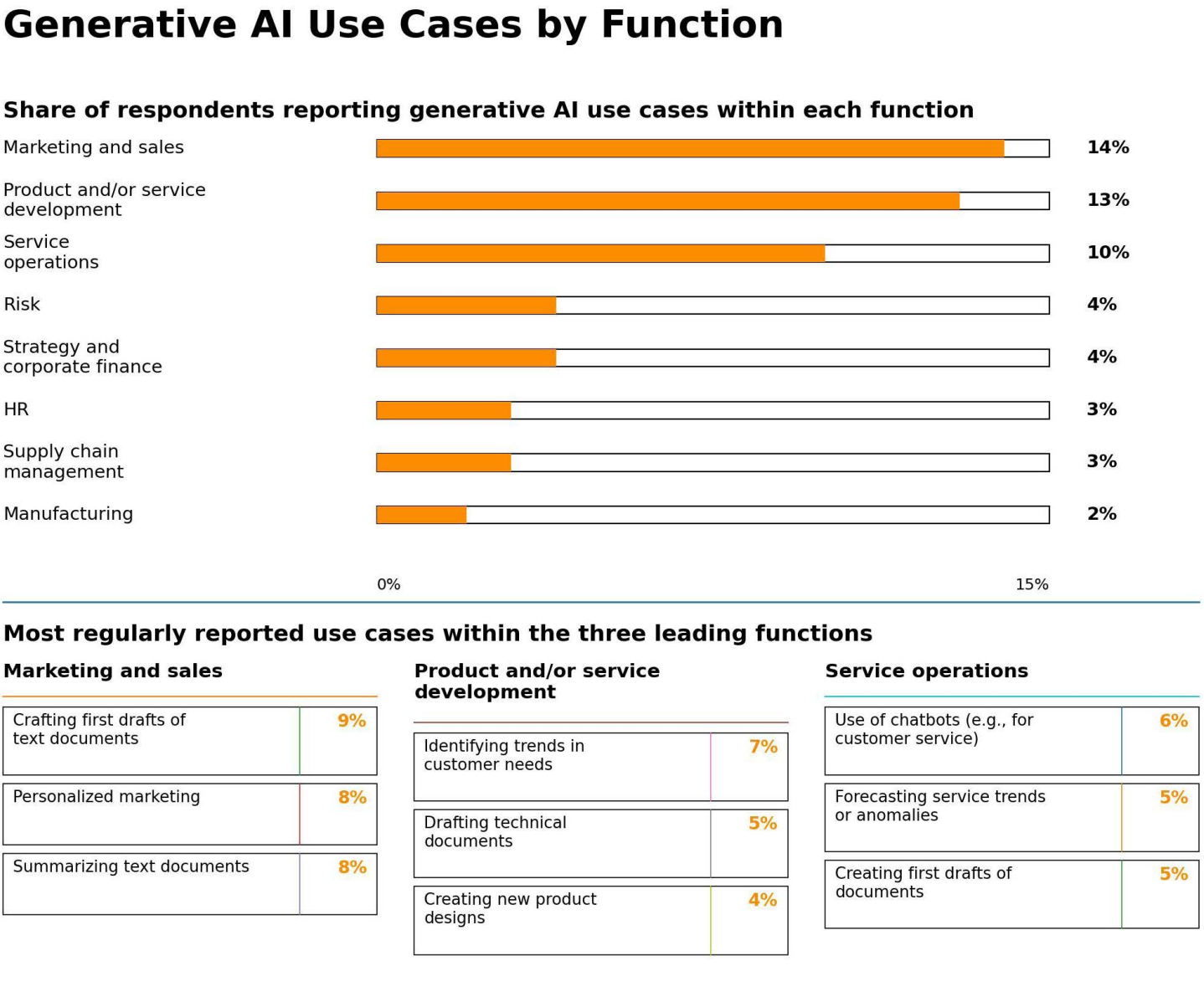
We've already seen AI integrated in software development. Tools like IBM watsonx Code Assistant suggest snippets, generate code, and predict bugs. Programmers can then focus on AI output review and ensure workflow matches objectives. IBM internal tests show time savings of up to 90% on code explanation and 38% on code

generation/testing. Code documentation time also decreased by 59%.

We Need to be More Than What AI Could Ever Become

For workers to excel at their jobs, they need to perform better than AI rather than remain a generalist. Good enough simply won't pass the mark. Engineers should welcome hyper-specialization. McKinsey notes engineers must refine their skills to capture value, which involves a niche requiring human creativity, judgment, and insight *(Fig. 2)*. Sure, machines may be able to handle the task, but we should also aim to do it better and differently.

AI is on the minds of engineers everywhere. In the 2025 Electronic Design Salary Survey, 36.11% of respondents are concerned about staying current with the latest technologies. The biggest of all is AI, of course. The same salary survey shows



Data preserved from the source graphic. Lower labels are wrapped and confined to their own column sections.

2. Representation of data about AI use cases according to McKinsey. Cabe Atwell (data from McKinsey)

that **42.52%** are worried about some aspect of incorporating AI into their design or workflow. These are significant jumps in percentage versus even one year prior.

With hyper-specialization, workers expand their skills even further so that AI can't replicate them. An aerospace engineer doesn't know how to just design a wing. They understand the slight interplay between aerodynamics, material science, and climate resilience, which comes from years of experience with study, experimentation, and problem-solving.

In addition, software engineers don't solely focus on writing code. They also perfect algorithms, allowing them to create new architectures or optimize systems better than AI.

To stay ahead of the game and in the loop, engineers must continuously learn more and refine their intuition. In 2026, 2027, 2028, and I even say beyond that, being relevant is the only way engineers can remain indispensable.

School is Changing

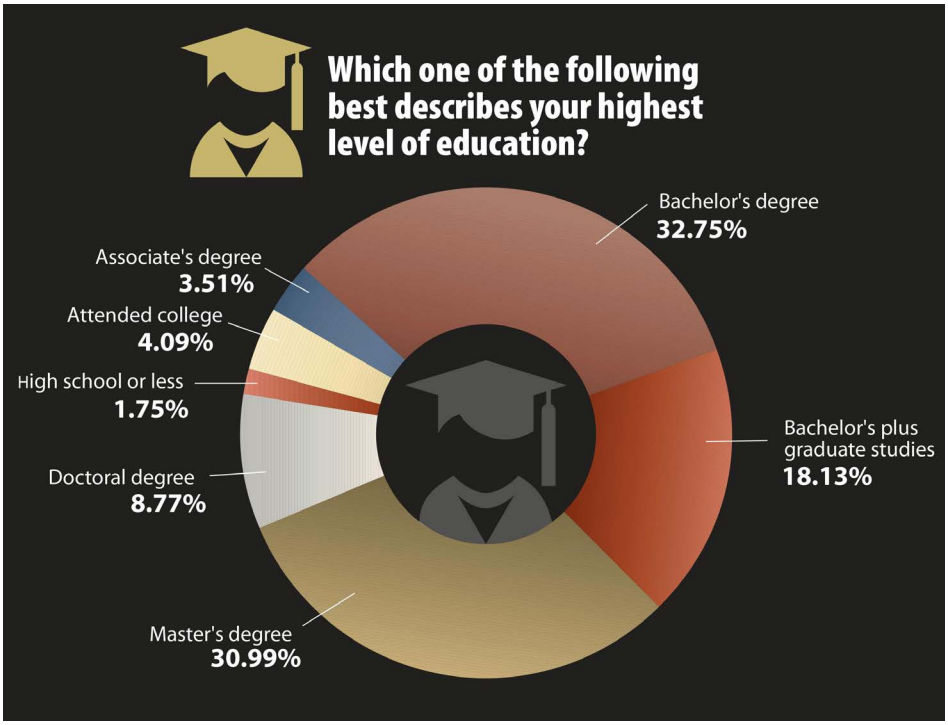
Recently, the University of California experienced a decline in computer science class enrollment across all campuses. According to a report by the *San Francisco Chronicle*, it saw a 6% drop in 2025 after a 3% drop in 2024. Although the United States saw a 2% increase in college enrollment, students have chosen not to pursue traditional CS degrees. Even then, UC San Diego is taking a different approach as it added an AI major.

This may be a preview of what the future looks like with AI, too. China has embraced AI usage. Based on an MIT Review report, Chinese universities have welcomed AI literacy, regarding it as essential infrastructure. The majority of Chinese students and educators turn to AI tools several times a day. Universities are starting to formalize that shift. Zhejiang University made AI-focused study mandatory, while Tsinghua launched interdisciplinary colleges focusing entirely on artificial intelligence.

U.S.-based campuses are attempting to keep pace. In the past few years, universities rolled out degree tracks and departments centered around AI.

At MIT, the "AI and Decision-Making" major grew into one of the school's most popular programs. University of South Florida drew over 3,000 students into its college focused on AI and cybersecurity during the fall term. Meanwhile, the University at Buffalo introduced an "AI and Society" department last summer, revealing seven specialized undergraduate degrees that attracted over 200 applicants before classes started.

Enrollment patterns tell a different story. According to a survey from the nonprofit Computing Research Association, 62% of respondents saw undergraduate enrollment in traditional computing programs drop this



4. Legacy programmers are still in demand, with 70% of companies struggling to find multi-skilled talents. Cabe Atwell (data from Kyndryl)

fall. At the same time, students have gained more interest in AI-focused pathways.

Universities like the University of Southern California, Columbia University, Rice University, and New Mexico State University are introducing dedicated AI degrees in the coming academic year. Instead of signaling a retreat from technology fields, the data reveals that students are leaning toward AI-centered programs they believe offer better employment opportunities.

How More Education Affects Engineers

A bachelor's degree serves as the starting point for engineers setting foot in the workforce for roles like mathematics, physics, and systematic problem-solving. More are pursuing their master's degrees to become specialized in high-growth subfields, including robotics, data modeling, autonomous systems, quantum computation, electrical systems, and sustainable materials.

A master's degree teaches engineers how to learn iteratively, rapidly, and critically. Those skills are essential in this field where the half-life of technical knowledge is approximately five years.

PhDs are necessary for research and development or highly intensive roles in aerospace, energy systems, and pharmaceutical manufacturing. This involves new materials development and complex simulations.

Depending on the field and location, an entry-level bachelor's degree in engineering typically has a salary ranging from $60,000-$80,000 per year. Beyond that, a master's degree can raise earnings to $90,000-$110,000 for mid-level roles. Those brandishing a PhD in specialized areas like aerospace or research often surpass $120,000 with experience. I've seen beyond that.

What About Just Having Certificates?

People aren't limited to degrees in terms of pursuing education. They also gain expertise and increase earning potential through technical certificates and professional licenses. Cloud certifications from AWS, GCP, or Azure, and AI-focused credentials like Google's AI engineering certificate, serve as recognized markers of professional value. Industry surveys verify 10% to 30% salary increases. AWS Solutions Architect averages $155K (associate)/$200K+ (professional), GCP Cloud Architect $190K, with certificates adding $30K on average.

Professional engineers, for example, require the ability to master industry standards, ethics, and technical know-how. This leads to higher competition among engineers and higher salaries. Other than that, certifications in cybersecurity, project management, advanced software certificates, or advanced design tools are very valuable.

Employees and clients often view these credentials as a bonus since they demonstrate an engineer has special knowledge augmented by AI, but humans set standards. Certificates are what make a practitioner an expert, and this knowledge depth creates a long-standing professional value.

By pursuing higher education in terms of degrees and certifications, engineers will more likely stay up-to-date with emerging technologies. This also applies to understanding complex systems and new tools and techniques. They can leverage AI as a powerful collaborator while handling the innovation, decision-making, and problem-solving skills in that role. I think we all know that more degrees, more certificates, and the like do nothing but increase our usefulness and salary as a byproduct.

AI Still Needs You

Even in code generation, engineers must grasp logic, security, and architecture to catch AI's flawed outputs. AI excels at patterns but can't weigh tradeoffs or predict what may happen next. That's only possible with humans, through judgment and real-world knowledge. Otherwise, it's risky as AI could output a flawed, inefficient solution.

Of course, workers must do their jobs, like high-level design and architecture, without AI as well. Relying too heavily on automated systems can lead to unintended consequences, such as

overlooking critical errors. In such cases, machines are well-known for producing errors or suggestions that appear correct statistically, but they don't work well in practice.

According to a study, 62% of AI-generated code had design flaws or security vulnerabilities, especially when using the latest AI models *(Fig. 3)*. If engineers don't have, or acquire, the skills to tackle the tasks, they won't be able to effectively verify or change AI outputs.

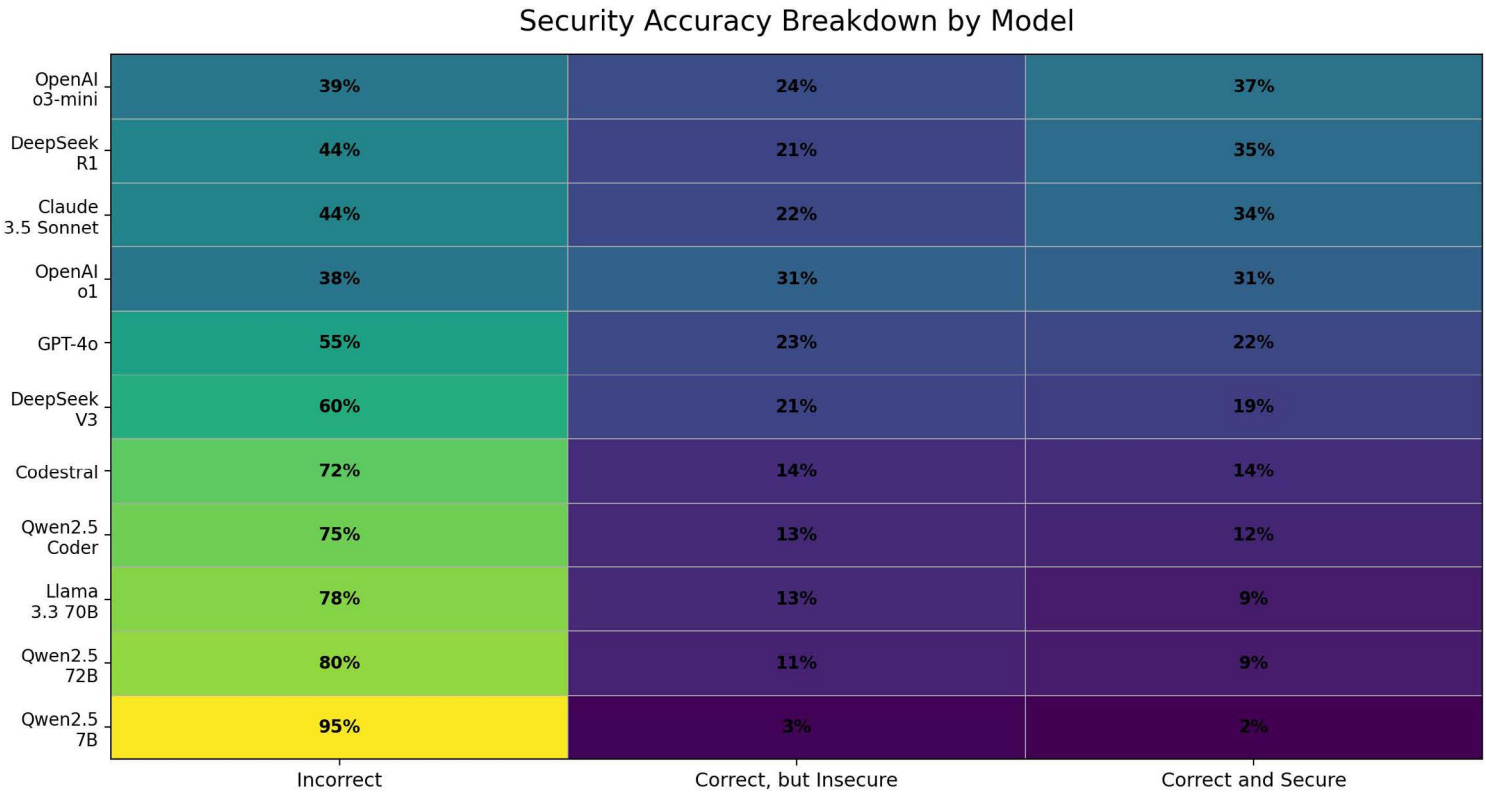
The best workaround is to further develop and refine expertise alongside AI literacy. By understanding the theoretical and practical aspects of their work, engineers can guide AI the right way, ensuring precise, meaningful outputs. Becoming an expert in the field while achieving competency in AI tools enables professionals to leverage the technology without depending on it.

Civil engineers, for example, could use AI to suggest a structural design based on simulations. For now, only humans can factor in materials limitations, environmental factors, or regulatory requirements. This ensures that while the AI provides options, humans determine what's feasible and responsible.

You're Already an Expert — Time to be a Better Expert

You may already be an expert in your field. But technology and methods always change, which means that expertise won't stay the same. According to The World Economic Forum's "Future of Jobs Report 2025," employers expect 39% of workers' core skills to change by 2030.

Staying relevant in this context requires engineers to go beyond what they already know. This doesn't just involve mastering your skills and new tools, it's also about being more innovative and applying better problem-solving skills. Often, you'll see



* Qwen2.5 7B secure/insecure split is inferred from the source image because only the 5% total was labeled.

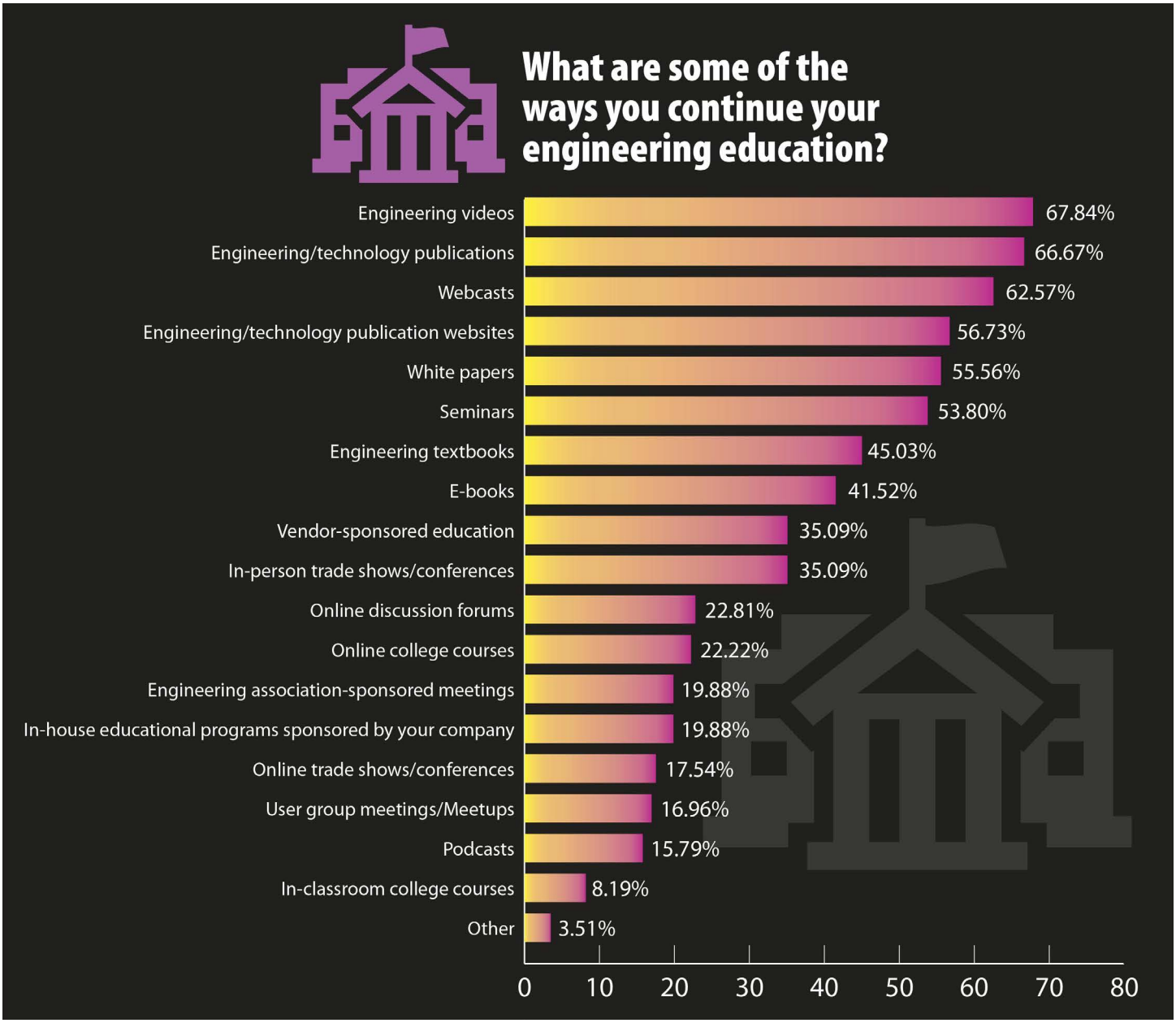
3. Data from the study shows how AI can produce incorrect outputs. Cabe Atwell (data from BaxBench)

that top engineers push themselves to improve, even with experimentation and curiosity.

Where You Can Start This Education for Free

Opportunities to improve don't always come with a price tag. These days, free resources are available to engineers to advance their skills. Free online college courses are becoming more accessible, offering training in subjects like machine learning and advanced engineering.

Platforms like edX, Khan Academy, and Harvard Online allow engineers to study at their own pace, offering theoretical understanding and practical exercises. Seminars, workshops, and certification programs provide valuable knowledge that can strengthen



From the 2025 Electronic Design Salary Survey. There are too few coming from higher education. PhD is a must, in my opinion.

your expertise. Even attending a professional workshop introduces new techniques, insights, and networking opportunities to advance your career.

These may seem like small steps. But combined together, they create a strong foundation of knowledge to help you compete with AI-augmented workflows.

Traditional Schooling is the Way, if You Can Get It

The easiest path for those who want to continue to stand out can do so through traditional schooling, especially if their company helps pay for it. Maybe you're lucky. Organizations like Boeing, Google, and Siemens offer tuition assistance as part of technical career tracks. They recognize that continuous education strengthens their workforce. Employers tend to notice and reward those who keep learning. Google reimburses tuition, rewarding elite projects and leadership roles.

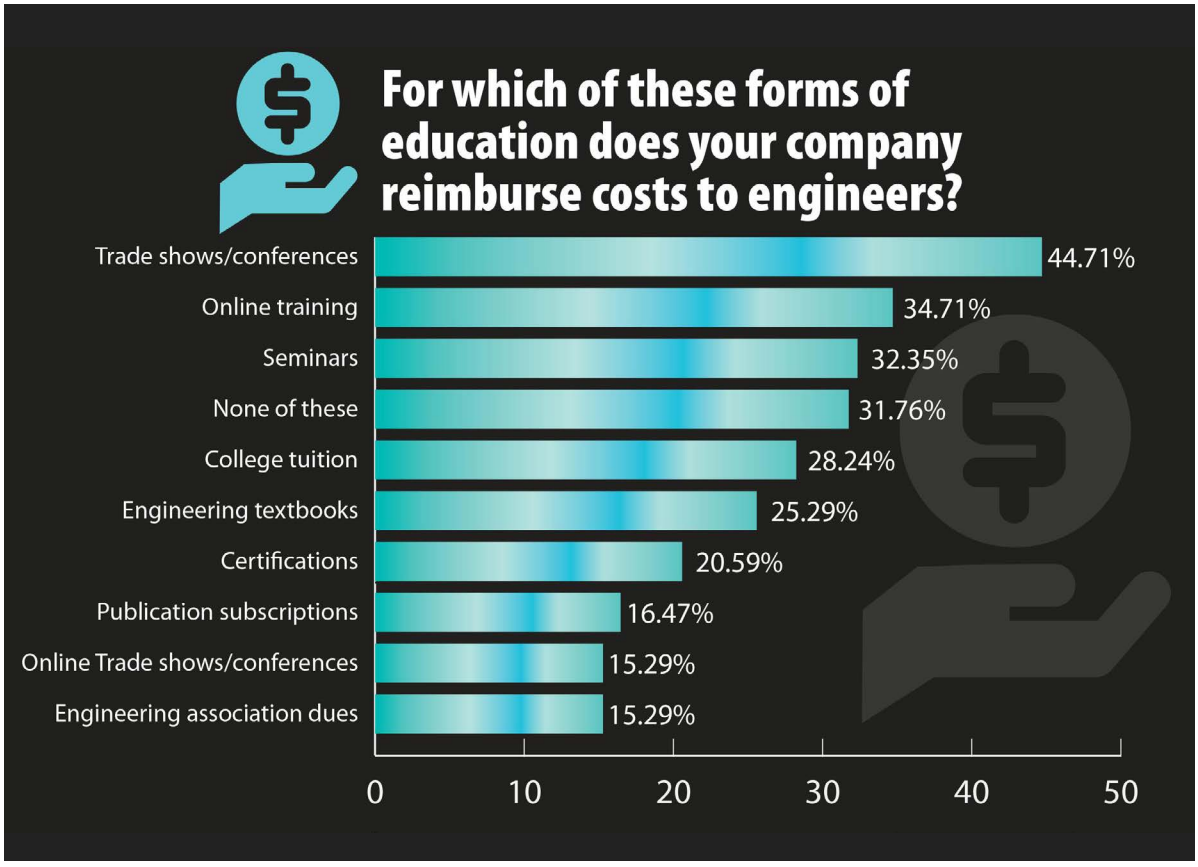
Time Passes, Things Change

Time for a quick story. At an expo I attended, I met the founders of a software company. They make sites, apps, whatever for clients. For a long time, they were just hardcore programmers.

After a while, one programmer rose to the top as their best. I'll call that person the Wizard. AI entered this company's door. The founders made all of the novice programmers use it. The Wizard refused. For some time, the Wizard outperformed the novices. But AI helped augment the novices into producing quite a bit of code.

The founders then asked the Wizard to adopt AI. The Wizard refused again, knowing they were the best. The founders fired the Wizard. Now the company is 100% novices augmented by AI.

At first that story angered me. Even though the Wizard still outperformed the typical novice, the collective novices outdid the Wizard. Typical corporate "what about the bottom line" response. However, a bit later I thought, what if the Wizard used AI.



From the 2025 *Electronic Design Salary Survey*. Many are taking advantage of all the free education out there. You can too. Or, just go back to school. Either way, you need more.

How much more powerful would the Wizard have become?

I don't think the Wizard should work for that company anymore, but I do hope they're exploring AI with their natural talent. I'm sure they're doing great.

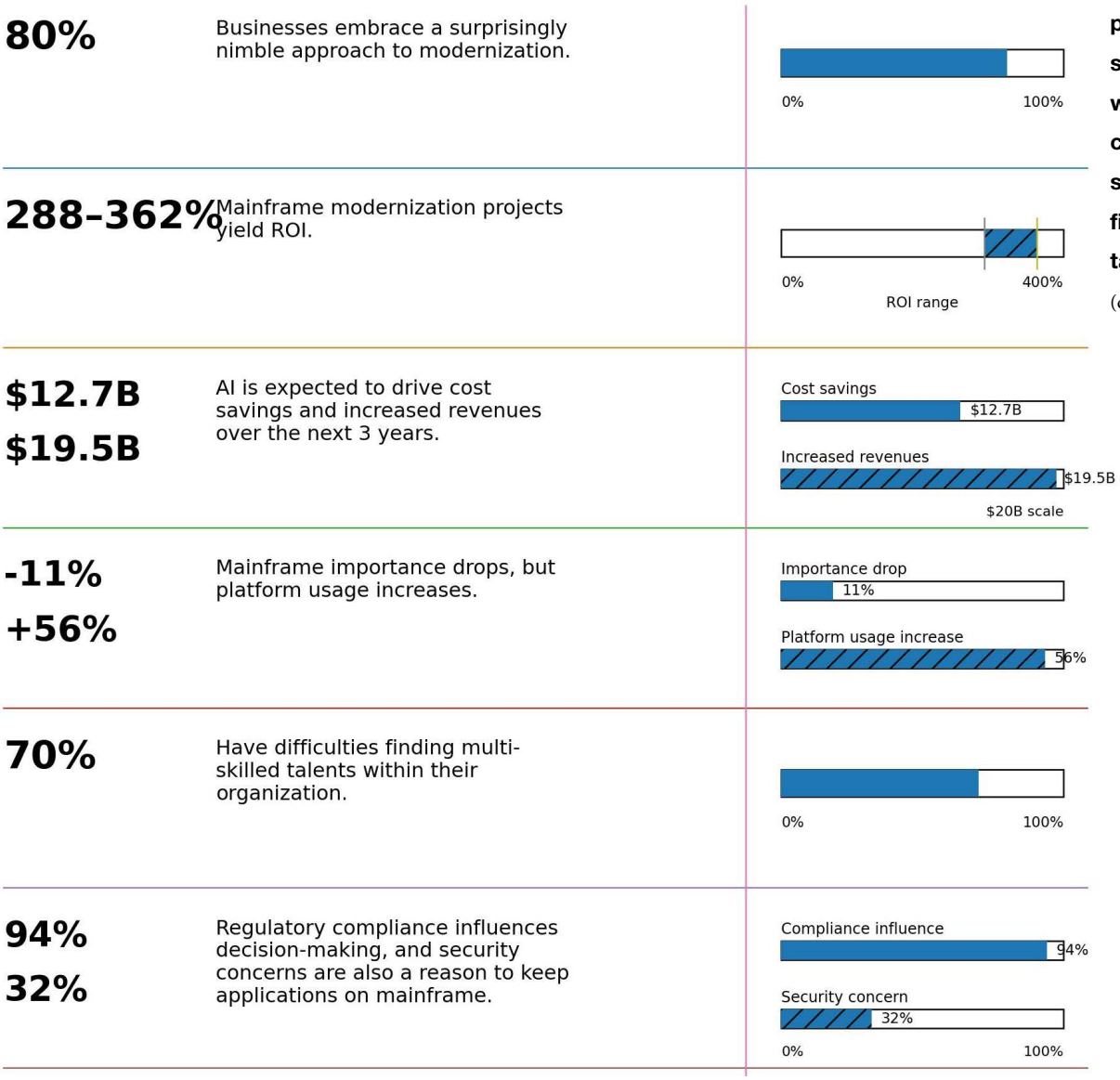
Failing to Evolve

Failing to evolve means obsolescence. This isn't hypothetical. It's already happening, like legacy programmers sidelined by cloud/DevOps in the 2010s. COBOL/mainframe programmers suddenly couldn't pivot. Banks rewrote legacy code with AWS juniors at one-third the cost. Without growth, small tasks get automated.

Nowadays, companies pay more attention to those who evolve with technology and not to those stuck using past methods. Fail to grow, and you'll be sidelined permanently.

Of course, old-school programmers

2025 Top Findings



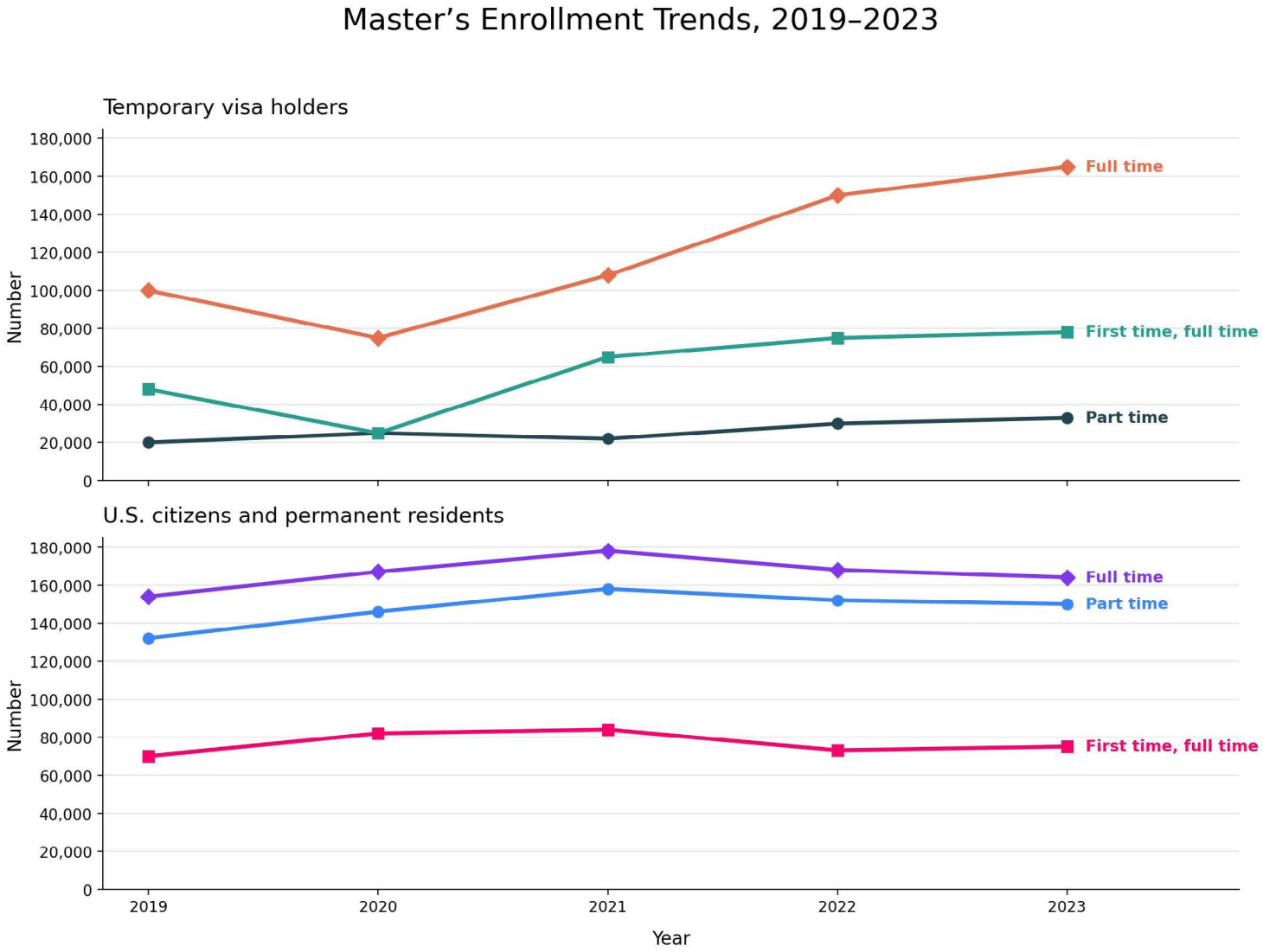
4. Legacy programmers are still in demand, with 70% of companies struggling to find multi-skilled talents. Cabe Atwell (data from Kyndryl)

are still in demand *(Fig. 4)*. A very small group of companies seek workers who can handle roles like server mainframe programmers, systems engineers, Ruby coders, COBOL coders, and even Fortran coders. And they usually pay a high salary.

However, there's an important catch. Those who possess the right skills for a specific job have a focused and deep expertise in that field. Their knowledge is esoteric and not something AI can easily replicate. Even if your field focuses on AI integration, robotics, embedded systems, cloud architecture, or another specialty, the deep focus and mastery give you a competitive edge that machines can't touch.

AI is a Really Good Pencil

AI isn't a thinker or innovator. Rather, it's a powerful tool — a productivity booster for engineers, not a replacement. Similar to a pencil, it allows creativity and expression, like putting thoughts on paper. That also means AI won't do the thinking for skilled workers and can help them push out ideas faster and correct any mistakes.



5. Master's enrollment exceeds PhD enrollment, but there's a sharp rise in master's candidates. Cabe Atwell (data from National Center for Science and Engineering Statistics)

Engineers may even find it challenging to use AI without it doing all of the work and thinking for them. Of course, this means they'll need to understand that it's an extension of human expertise. And these skilled workers must be able to do their work, such as designing systems, coding, data analysis, etc., before using AI in any capacity.

With certain skills, AI works as a force multiplier. Software engineers can prompt AI to write boilerplate code, debug errors, or suggest optimizations. Despite that, engineers still need to figure out how to install the generated solution within a larger system.

Another example deals with mechanical engineers. They run AI-driven simulations for design parameter testing. However, their job still involves interpreting and adjusting the results and considering practical constraints. Human insight and AI efficiency working together enable engineers to produce more high-quality work and give them more time to focus on the creative side of their projects.

We need the right resources and practices to effectively work with AI, especially in the workforce. Online platforms offer courses, workshops, AI documentation, and tutorials tailored for engineers. Some of the best choices in 2026 include:

- Learning Tree's AI for Software Engineers
- KodeKloud's AI-Assisted Engineering
- AWS AI

They cover a wide range of topics, from introductory AI applications in engineering to advanced machine-learning techniques. Webinars and technical seminars focus on industry-specific AI tools. Engineers using these resources will most likely be more proficient in AI without losing their expertise. Doing so allows them to remain in control of the process.

AI skills as we use them now will eventually become obsolete as better tools emerge. But keep learning — mastering each framework builds adaptability muscles, ensuring engineers evolve faster than the tools do.

Don't Chase Trends… Rather, Chase Focused Knowledge

With each education level, the knowledge focus narrows. Traditional paths narrow from basics (bachelor's) to PhD precision. But AI/cloud eras demand agility and targeted depth. NSF's 2023 GSS shows master's enrollment (329k) exceeding PhD (268k) in S&E fields *(Fig. 5)*. But PhDs remain the rarest at ~3% of advanced degrees.

Today is different, though. AI, cloud, and cross-disciplinary technology make that model feel dated. Engineers now require targeted depth and scope, mixing generalist agility with ninja-like specialization. The old-school path still exists and works, but the real edge comes from customizing your own trajectory.

The Self-Taught Accelerator

Even self-taught engineers rise to become stars in their field. Like ninjas in training, they zero in on their natural strengths, interests, and skills, refining them with laser focus rather than scattering effort across every trend.

Historically, ninja apprentices started training as young as 7 or 8, selected and molded based on aptitudes. Agility for strength missions, strength for combat, or sharp strategy for espionage. Their path didn't involve mastering every weapon or tactic equally. Instead, it focused on targeted perfection of what they did best. All of this was achieved through endless repetition, adaptation, and real-world testing.

Self-taught engineers mirror this ninja-like discipline. They experiment, embrace failures as feedback, and iteratively sharpen their edge, even if it's AI integration, deep systems architecture, or creative problem-solving. Focused honing like this pushes them to challenge or surpass formally educated individuals. And this produces agile, adaptive professionals who stand out because they've improved what makes them unique.

For example, self-taught engineers have developed research-grade projects on their own, using cloud GPUs, open-source hardware, and collaborative platforms. Successful engineers in the 2020s contributed to open projects, built reputations through community

credibility, and learned in public.

What I'm getting at is, you can teach yourself this approach. Use AI, but focus on what you excel at and pump that aspect up to superhuman with AI learning.

Rewatch the Movie "Hackers"

Anyone can be an engineer. Think about the 1995 cult classic *Hackers* movie. Elite teens had their clunky computers perform some crazy stuff like hijacking TV broadcasts, cracking bank networks, stealing corporate secrets, and unleashing garbage truck viruses. And yes, Hollywood gave it a more magical feel with physics-defying visuals. However, the whole idea was realistic.

Those kids gained their elite status from raw know-how as they learned how to bend code, networks, and systems through constant tinkering and problem-solving. Compared to today's technology, theirs was slower than a smartwatch. Yet, the principle still applies. Engineering mastery comes from focused application, not privilege or mystery. Curious and gritty people can replicate it today, using free tools and countless resources, proving it's a skill they can build.

Use that AI to garner "whoas" from those around you. Don't let the distaste for AI slop repel you; remember that AI is a really good pencil. It's a tool. AI will build upon your shoulders, then you turn around and build yourself up on its shoulders.

Onward.

P.S.

I thought I would share what I want to do.

I want to do back to school, but I have no way to pay for it.

So, it will have to be freebie options for me. In my journey down the free path, I will share my experiences with you all here. See you soon.

P.P.S.

I just wanted to use a P.P.S. No, I wanted to say I rewatched *Hackers* after seeing it in the theaters back in the day. I barely remembered a thing from it. It's a joyous basking in old tech. I would argue it's all stuff still viable today. Certain "hacking scenes" are surprisingly realistic. Something glossed over in most tech-centric movies today. Rewatch it for the first time today, this weekend. "Hack the Gibson." You won't regret it.

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CHAPTER 3

The Endless Quest for Engineering Knowledge

When it comes to design engineering, the need to know more is ever-present. How has our audience fared in terms of staying current? Find out from our 2025 Annual Salary and Career Report survey results.

DAVID MALINIAK, Executive Editor, *Microwaves & RF*

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While many fields of endeavor discourage resting on one's laurels, electronic engineering might be at (or at least near) the top of the list. An engineering education is hard enough the first time around, especially if the student leans heavily into analog technologies. But if you want to stay ahead of the curve and challenge yourself as you advance in your engineering career, it'll require continuous learning.

New technologies are always coming to the fore, and many come with steep learning curves. Meanwhile, there's no rules against being innovative in your implementations of tried-and-true mature technologies.

The pressures of outpacing the competition demand that engineers retain the curious mindset that made many of you want to be engineers in the first place. There are always real-world problems to be solved, and technologies like artificial intelligence (AI), machine learning, and virtual twins can often be part of the answers to those problems. However, before they can be applied, they must be well understood, and that's why we've asked you how you stay up to date.

But according to respondents to our 2025 Salary & Career Report survey, challenges abound for engineers seeking to learn. As always, many cite time and/or cost as a barrier. There's the issue of sorting through a near-constant bombardment of information. And when it comes to cutting-edge technologies like AI, it can be hard to discern between what's truly useful and what's hype.

Our survey asked about your current level of education and your preferred means of learning new tricks. We wanted to know whether your employer pays for continuing education, and if so, in what modes?

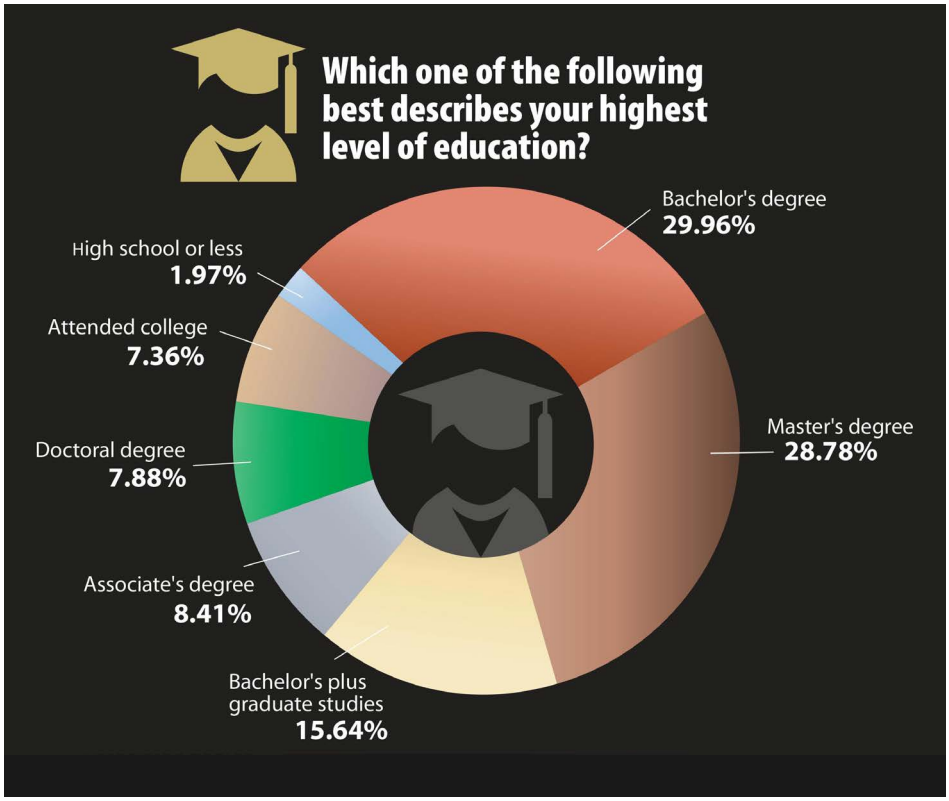
In this article, we'll look at these topics with facts, figures, and representative anecdotal responses. Bear in mind that for most questions, we asked you to "select all that apply," so results won't necessarily add up to 100%. And, importantly, the statistics will reflect responses to our survey across our brands here at EndeavorB2B's Engineering Design & Automation (EDA) Group, which includes, among others, our sister publication, *Electronic Design*. If the stats

specific to *Microwaves & RF's (MWRF)* responses diverge significantly, we'll point that out along the way.

Higher Education Levels Continue to Drop Off

How well are engineers educated, and how do this year's results compare with the 2024 survey *(Fig. 1)*? In a shift from 2024's survey, holders of bachelor's degrees (about 30%) outnumber masters' degrees (<29%). For *MWRF*, the disparity is much greater, with 37% holding BSs and just 26% holding MSs. Respondents with a bachelor's degree plus some graduate studies are at about 15.5% this year, a slight increase from last year.

For our overall EDA group, doctorates are also well down from 2024 levels: they're at about 8% vs. 12% last year. But among MWRF's readers, the number is significantly higher at almost 17.5% of respondents. We already knew that RF engineers are a smart group, but here's proof.



1. Which one best describes your highest level of education? EndeavorB2B

Still an Abundance of Continuing Education Options

If you've managed to find time and resources with which to further your education in 2025, you had quite a few options to choose from. What were the ways in which you collectively refreshed your engineering knowledge base *(Fig. 2)*?

As usual, we've asked about your use of various modes of education. In this year's survey, the most popular was engineering videos; nearly 60% of you use these educational tools, while about 58% take advantage of in-person seminars. For *MWRF's* audience, engineering videos were even more popular, coming in at almost 72%. Seminars were also hot among *MWRF* fans at over 65%.

More than 56% read engineering/technology publications and a similar amount follow webcasts. Just shy of 52% of respondents visit websites associated with such publications (no change from last year). The business-to-business (B2B) media industry, including Microwaves & RF and its parent company Endeavor Business Media, produce quite a few print and/or online publications with a large amount of technical content that addresses a wide range of industries, including the electronics OEM.

Almost 50% of respondents make use of industry-generated white papers, a perennial source of information. Then there are engineering textbooks, an option that obviously comes at a cost, but still popular at nearly 41%.

That leads into the next tier of preferences in continuing-education options, led by in-person trade shows and conferences at about 38%. Vendor-sponsored education and eBooks came in at about 37% and near 34%, respectively. It's worth noting that eBooks are often free of charge. A selection of

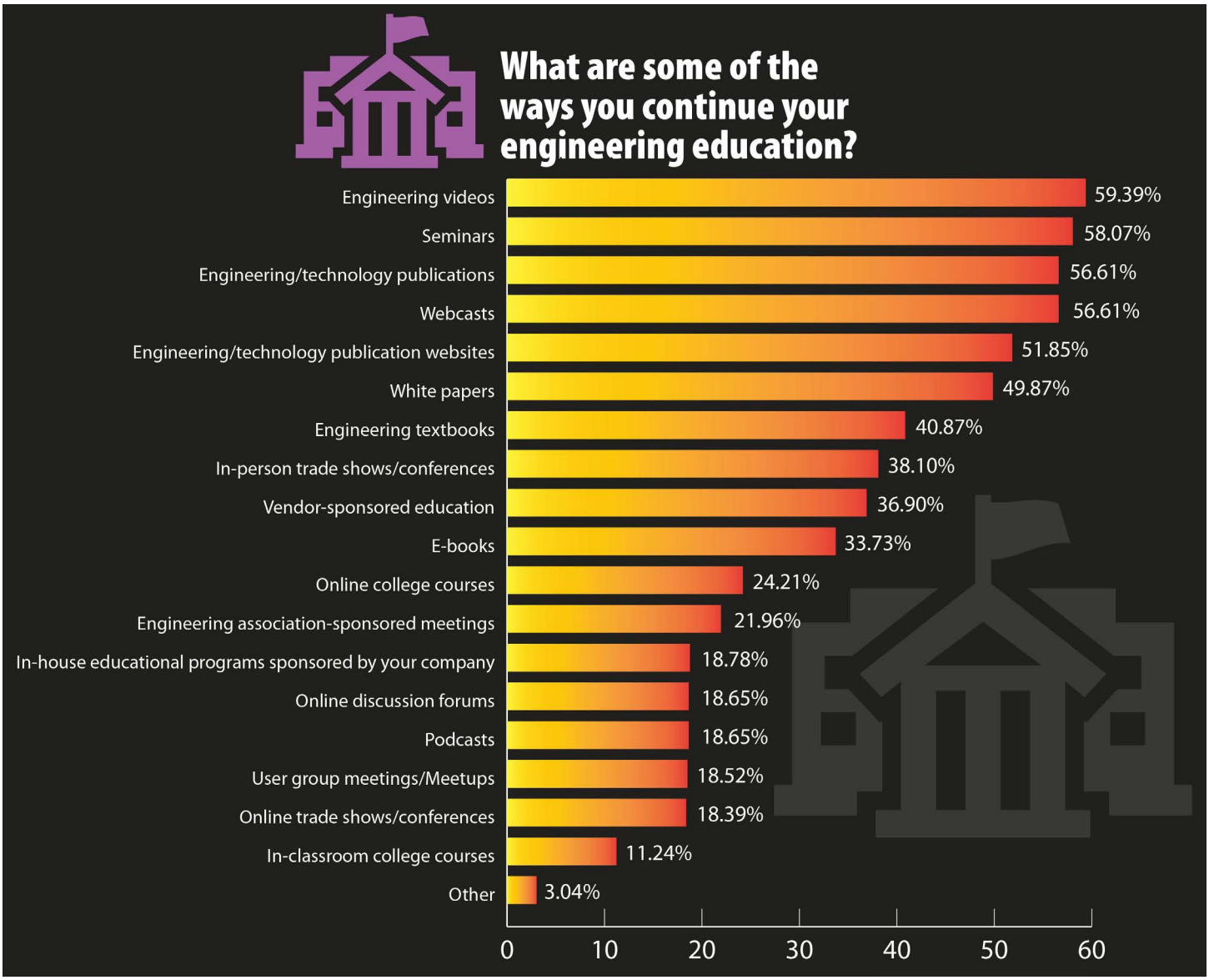
those, as well as a great deal of exclusive and free content, can be found on MWRF's Members Only page (requires site registration).

The bottom tier of preferences in continuing education spans online college courses (~24%), meetings sponsored by engineering associations (~22%), and a raft of options in the 18% ballpark. The latter includes employer-sponsored in-house meetings, online discussion forums, podcasts, user group meetings, online trade shows, and in-classroom college courses. The low ranking of podcasts is surprising, given that they're typically free for the asking (or registering on the hosting site).

Tepid Interest in In-Person Learning Options

With the exceptions of seminars and trade shows/conferences, the overall popularity of in-person education options is generally low. One might think that in an age of fewer job opportunities, such gatherings represent prime venues for networking.

Nonetheless, events like user group meetings fall into that lower tier of education options. These informal meetups can be great for exchanging ideas, making those elusive career connections, or fostering working relation-

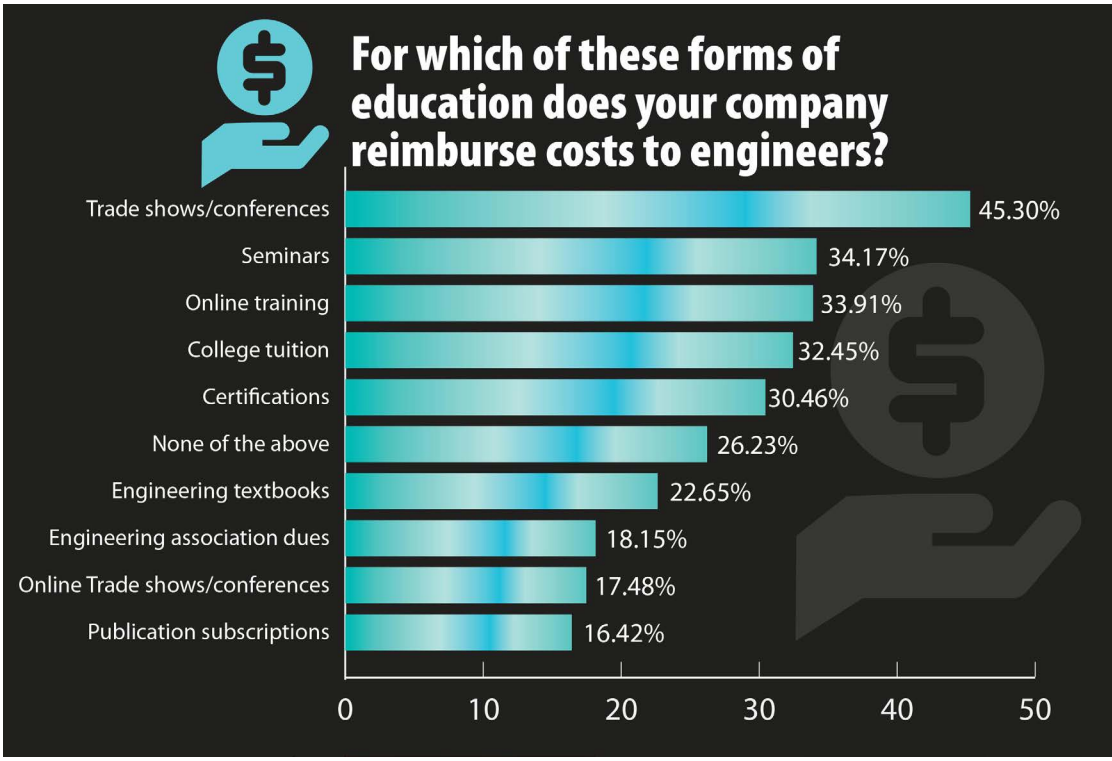


2. What are some of the ways you continue your engineering education? EndeavorB2B

ships. In-person college courses have dropped to 11% this year vs. over 12% last year. That might help explain the slight rise in attendance for online courses, which rose to 24% in 2025 from 22% in 2024.

How Employers Reimburse Learning Costs

While many educational options are free of charge, others are not. We would like to hope that our employers might at least help with those costs; after all, they stand to reap the benefits of better-educated employees. Alas, over 26% of you say you get nothing for your efforts *(Fig. 3)*. That's up slightly over 2024's ~25%. For MWRF's audience, the picture is even worse — almost 32% checked off "no reimbursements for continuing education."



3. What forms of education does your company reimburse costs to engineers? EndeavorB2B

When employers are inclined to reimburse for continuing-education costs, their preferences are trade shows/conferences (over 45%), seminars (~34%), and online training (~34%). College tuition and professional certifications are both in the 30% to 32% range. For other education options, the picture is, unfortunately, dismal.

Time is the Enemy of Education

In each year's Salary & Careers survey, we ask for written responses on the topic of challenges in staying up to date with technology advances. The perennial problem is time, or the lack thereof. For some, the lack of time for education is compounded by the sheer volume of information to be sorted through.

There's a new stumbling block to get over: This year's survey is the first in which artificial intelligence (AI) has been cited as a hindrance. One respondent mentioned "staying away from idiotic AI," while another believes that the torrent of new information is AI-driven. "I wish when they say, 'learn about AI/machine learning (ML),' they were generic in what they were going to cover, not about how a new AI/ML product is the best."

As always, the pace of technology developments is simply too much for some to stay abreast of. "It's a constantly changing environment," said one respondent. "The newest thing only lasts a couple of weeks before the next new thing appears." For another, it's the evolution of technologies and related standards that is daunting. "You must work constantly to stay in the loop."

It's never been easy to keep up with the state of the art in electronic engineering, and perhaps it's never been harder than it is now. Here's hoping you're able to maintain and expand your knowledge base sufficiently in 2026 to stay current.

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CHAPTER 4

Job Satisfaction Remains High for Fluid Power Engineers

Results from *Power & Motion*'s annual Salary & Career Survey show fluid power engineers remain positive about their careers but continue to face several industry challenges.

SARA JENSEN, Executive Editor, *Power & Motion*

Overall, respondents to *Power & Motion's* Salary & Career survey expressed a high level of satisfaction with their current jobs and see long-term potential in engineering as a valuable career path. 290910102 © Aleksei Gorodenkov | Dreamstime.com

Each year, *Power & Motion* surveys its audience to gauge the current state of engineering careers within the hydraulics and pneumatics industry. This annual Salary & Career Survey provide insight into hiring expectations, job satisfaction, challenges fluid power engineers are facing, and more that we then share with our readers to help them gain a better understanding of the industry in which they work.

Results from our 2025 Salary & Career Survey show that in general fluid power engineers continue to have a positive outlook on careers in the industry. However, as in years past, they face challenges related to component availability, keeping up with the pace of technology change, and attracting new talent.

Fluid Power Engineers Have High Level of Job Satisfaction

Results from our 2025 survey show that overall, engineers working in the fluid power industry are satisfied with their current jobs.

The majority of respondents to our survey, 98%, said they are in the same job as 2024, and most have worked at their present company for at least 5 years or longer, with several surpassing the 20-year mark — all indicators fluid power engineers are happy with their current employment.

When asked how satisfied respondents are in their current positions, 62% said they are either very satisfied or satisfied with 17% noting they are extremely satisfied. About 20% indicated some level of dissatisfaction with their current positions.

These figures are similar to the results from our 2024 and 2023 surveys, helping demonstrate the continued satisfaction many have with their careers in the hydraulics and pneumatics sector.

SALARY & CAREER SURVEY

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Just 7% of survey respondents said they are actively seeking new employment, and most at 40% said they cannot envision changing jobs in the foreseeable future, further demonstrating the satisfaction of many within the fluid power industry.

However, almost 60% did say that while not actively seeking new employment they would follow up if they heard about an interesting opportunity or were personally approached with an interesting opportunity.

Compensation and Other Factors Contribute to Career Satisfaction

There are a wide range of factors survey respondents said contribute to their job satisfaction. As to be expected, a large percentage of respondents indicated factors related to the job of engineering, such as researching potential design solutions and the challenges that accompany the design of new products, as either important or very important to their satisfaction.

Company culture and values, learning and advancement possibilities, and the opportunity to design products that can benefit society were also factors highly ranked by many as important to their job satisfaction.

Compensation was indicated as a top factor that contributes to job satisfaction as well. Just over half of respondents, 60%, said they feel their company adequately compensates them for the work they do.

For those who feel a pay increase would bring them to a fair compensation level, most said that pay increase would need to be in the range of 11-25%.

A large percentage of respondents to *Power & Motion's* 2025 Salary & Career Survey said factors related to the job of engineering, such as researching potential design solutions, contribute to their career satisfaction.

212233365 © Auremar | Dreamstime.com

Compared to other engineering employers, most respondents felt the compensation packages at their current employer is either equally competitive or somewhat less competitive.

Component Availability and Keeping Up with New Technologies Remain Top Industry Challenges

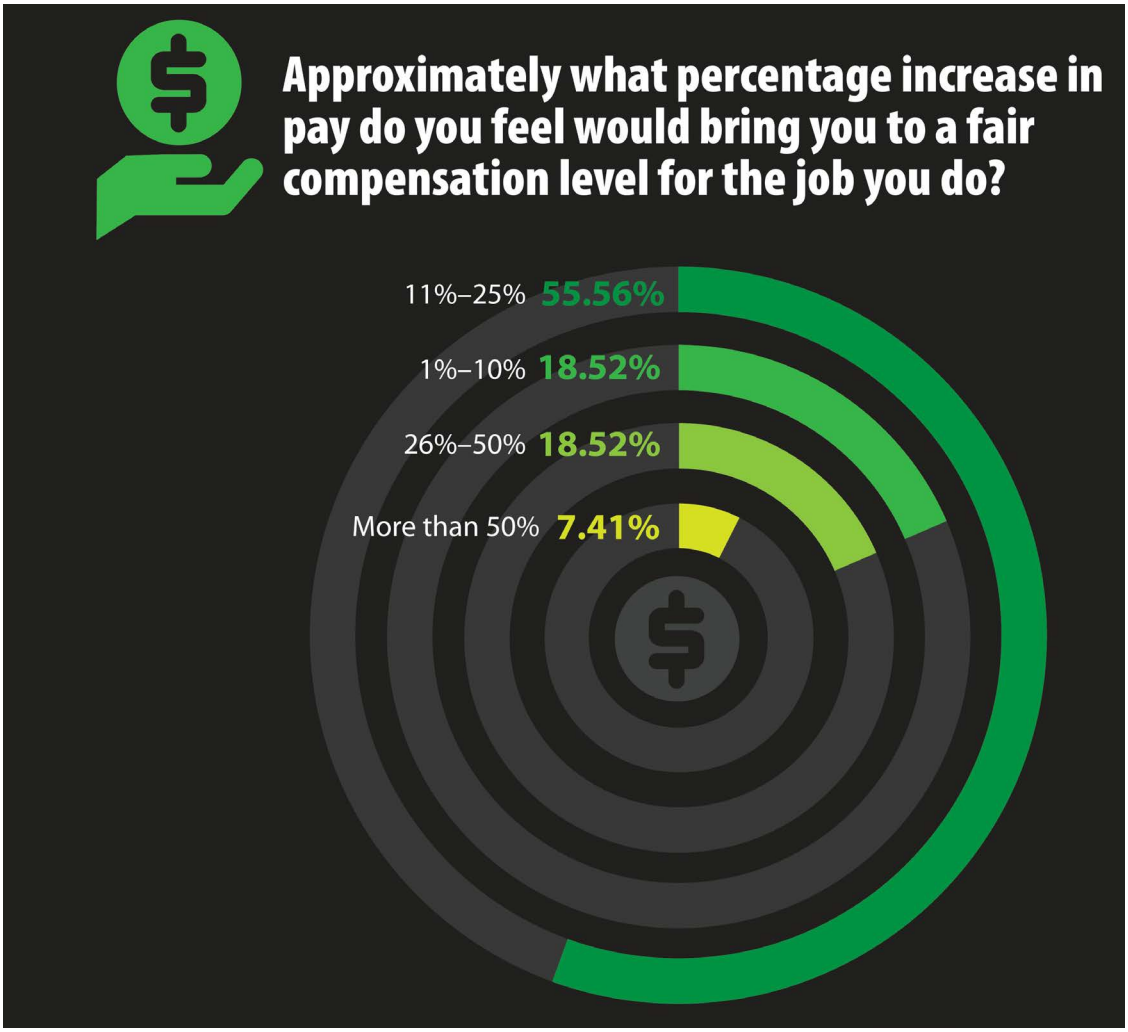
Despite high levels of job satisfaction, our engineering audience still faces many challenges.

As the graphic on page 26 shows, there are a wide range of professional issues that respondents said keep them up at night. Staying current with new and emerging technologies as well as component availability were the top two issues indicated, followed closely by product reliability issues and concerns about general health of the economy.

Component availability issues have been highly ranked in our survey over the last several years, which is not surprising given the many market challenges the fluid power sector has experienced. The COVID-19 pandemic in 2020 created a number of supply chain challenges. Although some easing of these supply chain pressures has occurred in recent years, tariffs and high interest rates have presented new challenges for the industry and its customer markets — contributing to both component availability and general

CHAPTER 4: Job Satisfaction Remains High for Fluid Power Engineers

While many respondents to *Power & Motion's* survey said they feel fairly compensated by their companies, for those who did not, most said a pay increase in the range of 11-25% would make them feel better compensated for the work they do. © Endeavor Business Media



economic health concerns.

And now, the U.S.'s war with Iran has the potential to upend the global economy and supply chains once again which will likely continue presenting challenges for the fluid power and broader engineering community.

Staying current with new and emerging technologies was highly ranked again this year which is not surprising given the vast number of technologies that can now be used with hydraulics and pneumatics.

The graphic on page 27 shows those technologies survey respondents said are having a major impact on their designs, demonstrating the breadth of topics engineers need to keep up on.

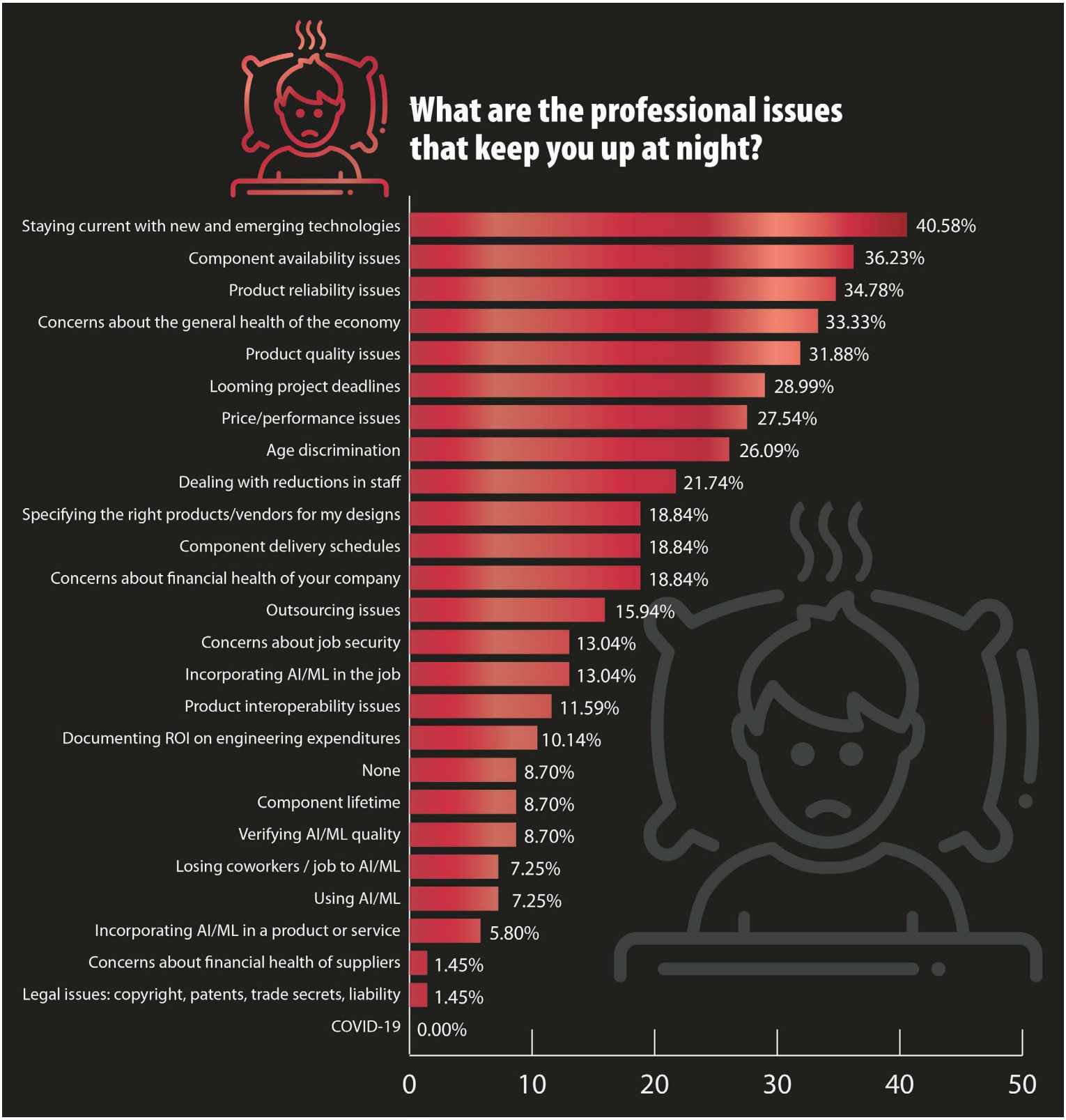
In conjunction with this, 50% of respondents said they are being given tasks outside their main expertise, further stressing the need to stay on top of technological developments in the market.

When asked about the challenges they face with trying to stay current with engineering information relevant to their work, not having enough time was the most common answer.

Other challenges noted include:

- there being too much information available and the difficulty in knowing what may be applicable,
- determining which topics are the most important to stay on top of,
- lack of company investment and reimbursement for training,
- finding good sources of information,
- colleagues being afraid of change and adopting new technology.

CHAPTER 4: Job Satisfaction Remains High for Fluid Power Engineers



Once again this year, component availability issues and staying current with new technologies topped the list of items that keep fluid power engineers up at night.

SALARY & CAREER SURVEY

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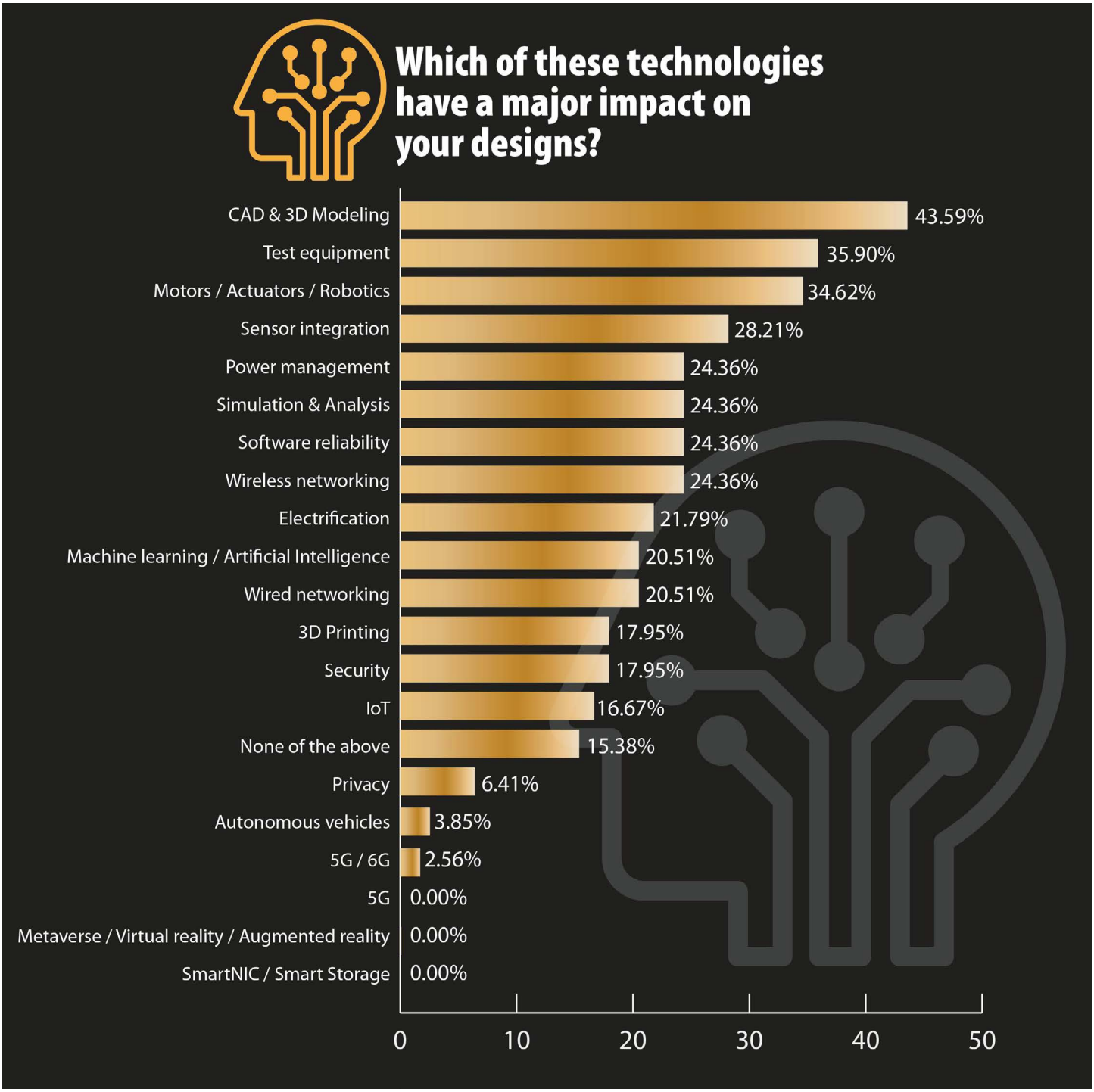
One respondent probably surmised best what many respondents indicated, "Staying current in engineering is a bit like trying to drink from a firehose — exciting, but overwhelming if you don't have a strategy."

Engineering Continues to be a Promising Career Choice

The majority of respondents, 63%,



Engineers in the hydraulics and pneumatics industry need to stay current on a wide range of technologies that are impacting their designs, as shown in these results from *Power & Motion's* 2025 Salary & Career Survey.

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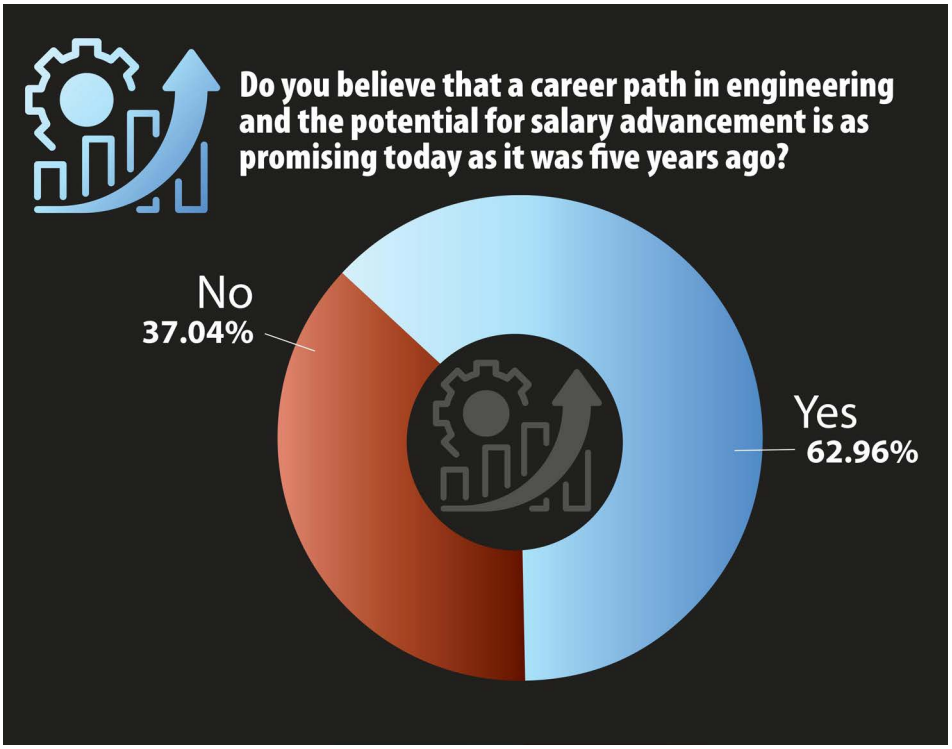
continue to see engineering as a promising career in the years ahead.

Many respondents who see continued promise in engineering careers noted it is because there remains a need to improve or invent technologies, and that it is a satisfying career with good earning potential. While some noted the increasing use of artificial intelligence (AI) for engineering work, many said humans will still be required for much of the work.

However, several respondents did indicate their concern about AI potentially displacing some engineering roles, particularly for entry-level jobs.

That said, the majority of survey respondents, 86%, said they would recommend engineering as a career path. A reason many gave for recommending it as a career is the fact engineering will always be needed and that it is interesting and creative work. Several also noted it is a rewarding and challenging career, with one respondent also adding there is "continual exposure to new things. At least once a year, there is a need/opportunity to do something you have never done before."

The belief that engineering is a good career path is evident from the length of time survey respondents indicated they've been in the industry. As the graphic below shows, most respondents have worked in engineering for over 10 years.



Just over half of respondents to *Power & Motion's* survey said they see continued potential in engineering as a career path, with many noting the need for improving and inventing technologies as a key reason for this. © Endeavor Business Media

Sixty-two percent of respondents said they do not ever consider leaving the engineering profession, further signifying their enjoyment of this career path.

For those who have considered leaving the engineering profession, top reasons include making more money, burnout, and wanting to try something different.

Difficulty in Attracting Engineering Talent Persists

Ready to retire was another highly ranked reason survey respondents said they would consider leaving the industry, which is not surprising given the number of years many indicated they have been in the industry. This means there will be a need to attract more engineers to help fill the gap left by those leaving the fluid power sector.

However, once again this year most survey respondents, 63%, said they believe there is an engineering shortage, with 70% saying their organization is having difficulty finding qualified candidates for open engineering positions.

Mechanical design, systems engineering, and hydraulics and pneumatics were the engineering specialties for which most respondents noted difficulty in finding qualified candidates.

While attracting talent is not necessarily unique to just the fluid power industry, it has been noted by many

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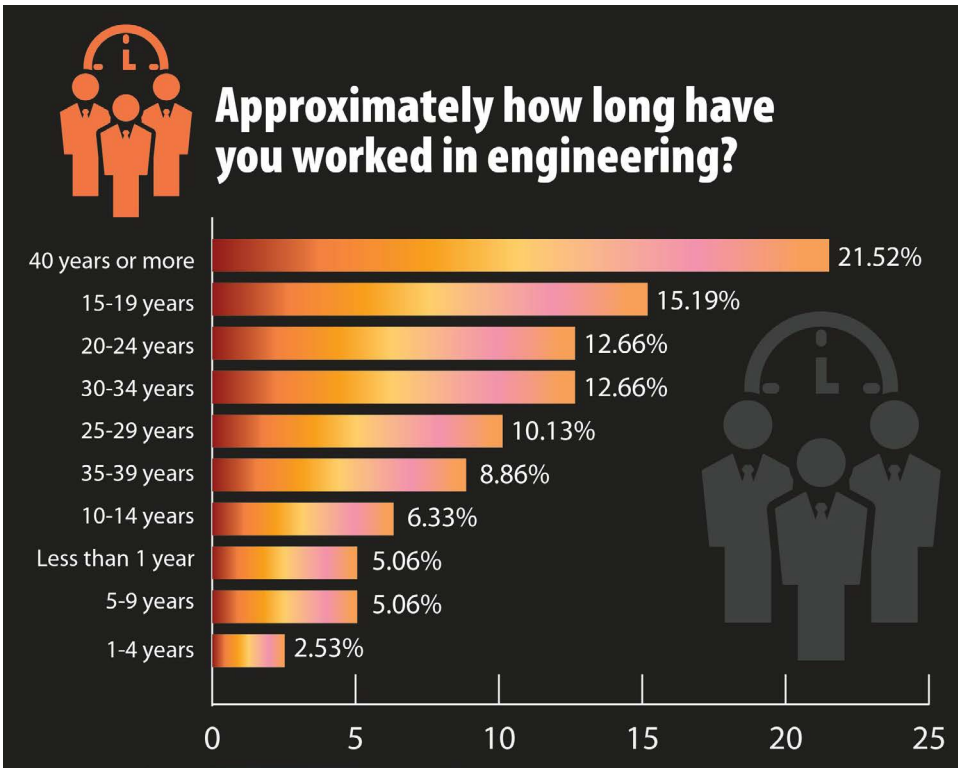


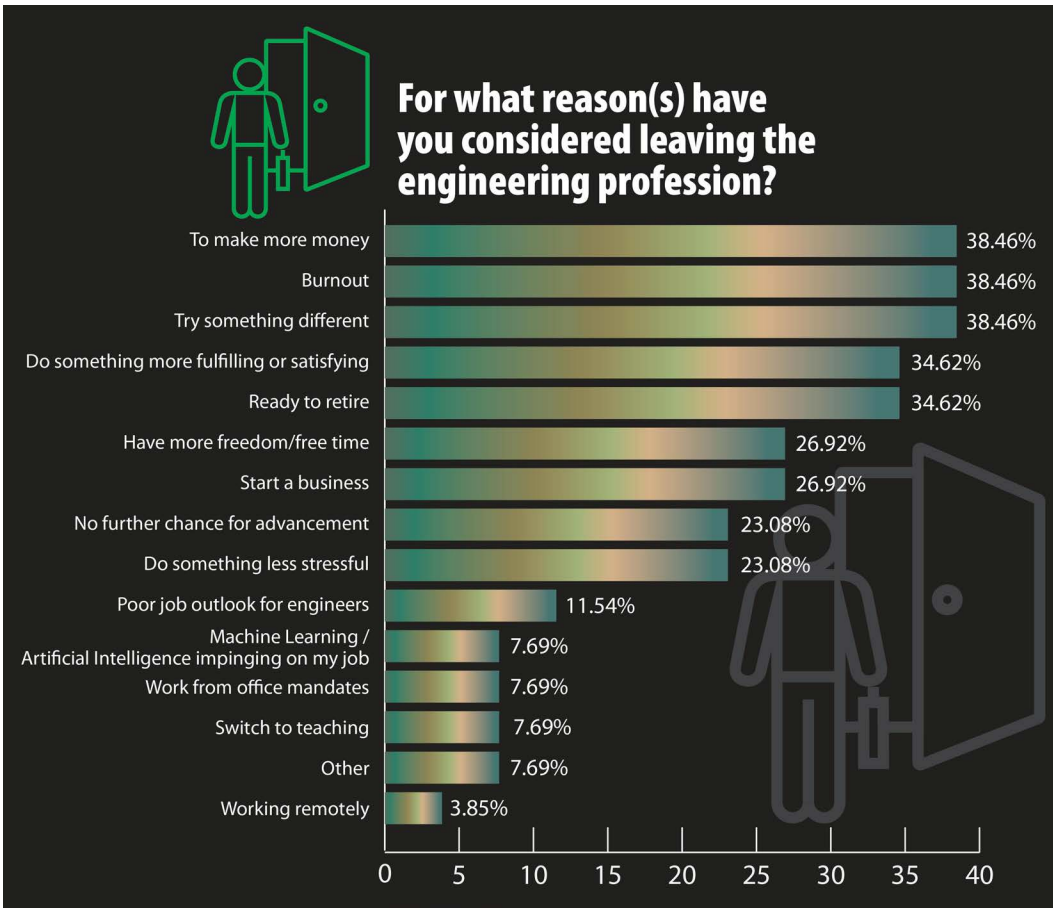
As this graph shows, many respondents to *Power & Motion's* survey have been in the engineering field for several years, demonstrating the longevity that can be achieved in this career. © Endeavor Business Media

over the years that it is not necessarily a sector young engineers consider when going to school. There are also only so many schools with fluid power-specific curriculums, further adding to the challenge of attracting engineers into the industry.

But organizations like the National Fluid Power Association (NFPA) and companies within the industry are working to address this through various programs that introduce fluid power to students at various ages and demonstrate all the interesting work being done in the industry.

Hiring Outlook Mixed for Fluid Power Engineers

The outlook for engineering jobs in the hydraulics and pneumatics industry appears to be mixed at the moment. When asked about the status of hiring and budgeting at their companies, most respondents to our survey were evenly split between those who said hiring for new positions have



Burnout, making more money, and trying something different were top reasons survey respondents noted for reasons they have considered leaving the engineering industry. © Endeavor Business Media

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been put on hold and those who said there is an increase in hiring.

For those that are hiring new employees, 46% of respondents said they are looking for engineers with an average of at least 5 years' experience and 45% said they are looking for those with an average of 3 years' experience, demonstrating the desire for those early on in their careers. Just a handful said they wanted candidates with 10 or more years of experience.

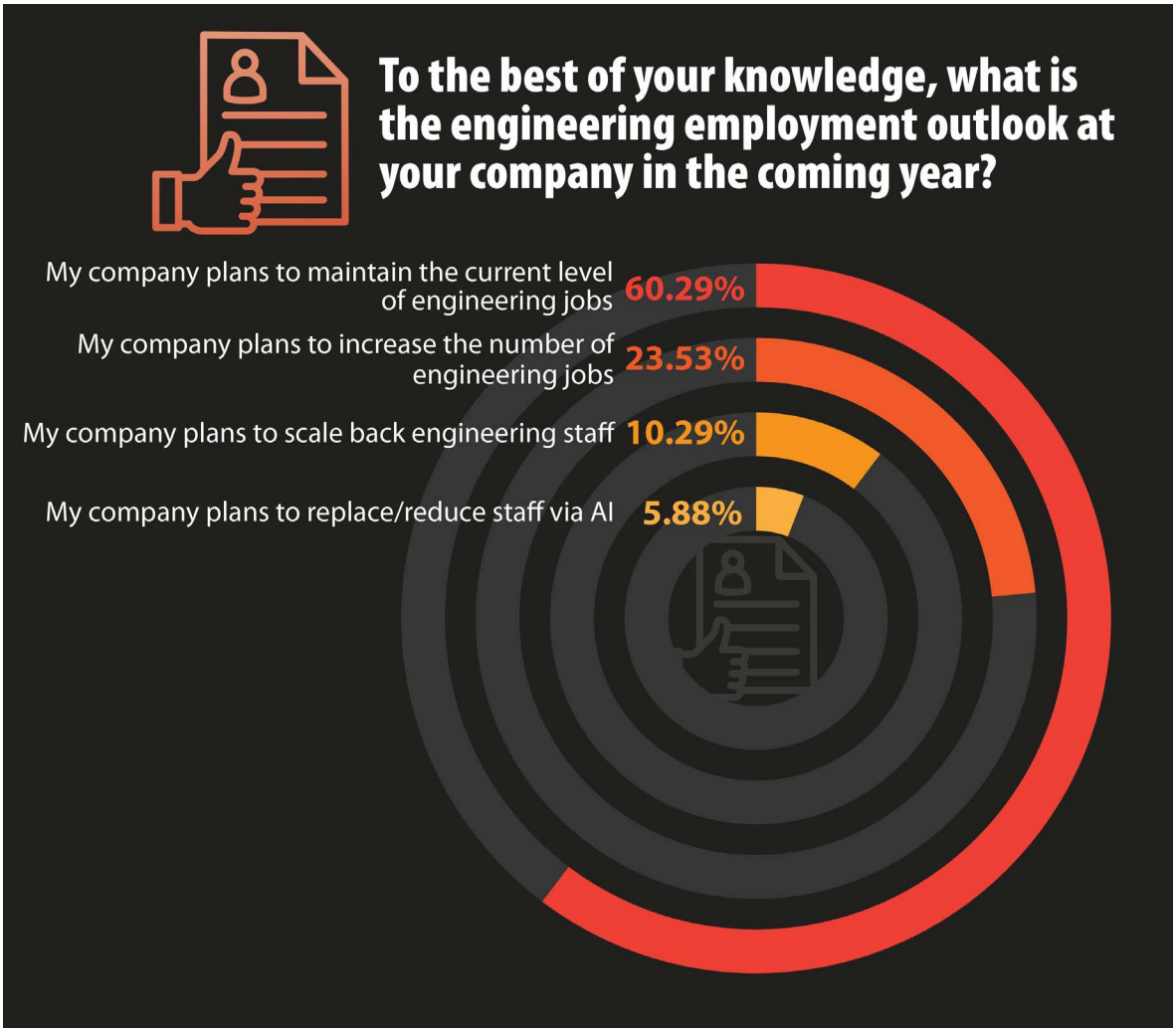
Although some respondents noted there are budget cuts to the engineering department and workforce reductions occurring at their companies, most survey respondents, 60%, expect their companies to maintain the current level of engineering jobs this year.

Given the many market challenges still facing the fluid power industry and its customer sectors, it is a good sign that respondents feel engineering jobs will be maintained.

Related to this, over 65% believe their company is as focused on employee retention as they were last year, further signifying their belief that engineering jobs remain important at their companies.

In terms of compensation, while some survey respondents noted salary cuts, cancelled bonuses and freezes on raises, most respondents were evenly split between those who said there are no changes in their compensation (42%) and those whose salary increased (41%).

This again shows a fairly positive environment for engineers in the hydraulics and pneumatics industry., which most seemed to feel would



Most respondents to *Power & Motion's* survey believe the current level of engineering jobs at their company will be maintained this year, a signal of continued positivity for the fluid power engineering market.

CHAPTER 4: Job Satisfaction Remains High for Fluid Power Engineers

remain though there will continue to be challenges to face in the years ahead, particularly as AI becomes more prevalent.

Overall, results of our 2025 Salary & Career Survey indicate that a large portion of the fluid power engineering community remains satisfied with their careers and believe there will continue to be opportunities in this industry. However, the growing prevalence of AI and the need to attract more engineers into the industry as the number of people retiring from it increases are likely to be persistent challenges for the sector.

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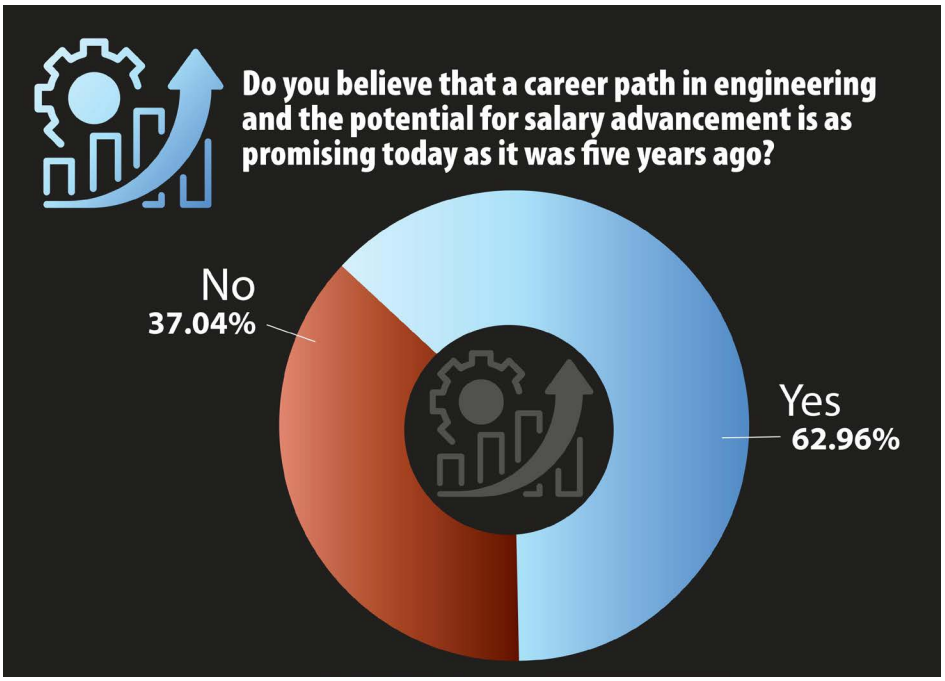

Most respondents to *Power & Motion's* survey believe their company is as focused on employee retention as last year, helping to give them a positive outlook on their jobs in the year ahead.