

For Engineers, Facing New Challenges in a Changing Industry

- SALARY RANKINGS ACROSS THE NATION
- ARE ENGINEERS SATISFIED WITH THEIR JOBS?
- WHAT ROLE DOES OUTSOURCING PLAY?
- THE CHALLENGES OF STAYING CURRENT
- WHERE ARE TOMORROW'S ENGINEERS?

Sponsored by



machine
design



**Digi-Key EDA
& Design Tools**

think it... analyze it... design it...

DIGIKEY.COM/DESIGNTOOLS



Editorial

NANCY K. FRIEDRICH
Content Director
nancy.friedrich@penton.com



How Do You Stack Up?

Welcome to this year's annual compensation survey. In surveying our audience across our family of brands, we found similar findings from *Electronic Design* to *Microwaves & RF*, *Machine Design*, *Hydraulics & Pneumatics*, and *Global Purchasing*. Among the major trends were more focus and interest on the Internet of Things (IoT) and Industrial Internet of Things (IIoT)/Industry 4.0. Engineers are increasingly working on products and solutions for the IoT, while they and procurement professionals and management are also looking at how the IoT will impact the way they do their jobs.

Job satisfaction is currently very high. Engineers, for example, feel well compensated for their work and are generally happy with their career paths. They also feel optimistic about the state of the engineering industry, although some concerns remain about the economy, outsourcing, and IoT adoption. Among our Machine Design and Hydraulics & Pneumatics audiences, for example, there is some concern over manufacturing jobs being minimized or even phased out with IoT adoption.

For engineers, one of the biggest challenges remains staying up to date on the latest technologies. To accomplish this goal, our audience cites many online resources, ranging from white papers and e-books to webcasts and videos. They of course contend with time-to-market challenges and other job pressures, but by and large, they get a lot of satisfaction from overcoming those challenges. Interestingly, when they need to take

a break and clear their heads, they most commonly shared that they go for a walk.

Across the industries we reach, more individuals are relying on smartphones to tie up business at the end of the day or prepare for what faces them in the morning. They also are paying more attention to social-media outlets like LinkedIn, Twitter, and Facebook. Some cite that they use Twitter (and Facebook, but to a lesser extent) to stay updated, while LinkedIn continues to reign as the career-networking resource.

What about the future? Across the board, we continue to see the majority of responses pointing to concern over the next generation. The consensus is that, despite today's efforts to bring more students into technology fields of study and careers, we're facing an engineering shortage. It follows that specialized areas, like the microwave and radio-frequency (RF) market, are facing an even bigger chasm as companies look to the next generation. Many of the people that laid the groundwork for today's technical breakthroughs have retired or are nearing retirement. While they brought in talent behind them, most do not think it is enough to bridge the gap.

Hopefully, all of today's technical-outreach efforts will increasingly produce interest from the next generation. In the meantime, don't forget to evangelize engineering and technology-related fields in your own circles. The majority of survey respondents said that they would recommend their professions, so why not start if you haven't already? And don't forget to take a deeper look at how people in your industry are compensated to see where you stand. **md**

Sponsored by





2015 MACHINE DESIGN SALARY SURVEY

The numbers are in and we take a look at what they mean for the industry — and the engineers who work in it.

The engineering field is an ever-changing environment. To better understand the world our readers live in—and to help you better understand the state of the industry—*Machine Design* presents its 2015 Salary Survey. More than 2,000 engineers responded to the annual survey regarding salary, work environment, benefits, and their views on where the field of engineering is going next.

THE TYPICAL ENGINEER

According to our survey, 54.3% of our readers are 55 years old or over and predominantly male. Just over three-quarters are college graduates with a bachelor's degree or higher. The most common principal job function is in design and developmental engineering at 61.7%, and a much smaller percentage (11.8%) work in engineering management. The most common job title is design/project/R&D engineer at 24.7%. Others include manufacturing/product engineer and chief/senior/lead/principal engineer at 6.0% and 12.9%, respectively.

THE CURRENT WORKPLACE ENVIRONMENT

Our readers ranked their most pressing concerns on a scale of 1 to 10, and the majority of their concerns focus on design resources. Finding optimal components scored an average of 6.72, while insufficient funding for design projects scored an average of 6.28. Dealings with management also affect the engineering work environment, such as compromising of design approaches and the “politics” of the workplace. When asked what would cause them to consider leaving their position, 39.3% said it would be to pursue other interests—whether it was to become an independent inventor, teach, or explore a different industry.

Free time is a major factor in continuing education and 55% said that finding the balance of work and free time hinders their ability toward educational pursuits. Some ways to pursue continuing education are in the forms of engineering/technology websites, white papers, webcasts, and seminars.

Staying current with new and emerging technologies is one of the main concerns engineers have, cited by 27.8% of respondents. According to one of the respondents, they “... need to benchmark to stay competitive, but innovation is what allows us to create new markets and products. We have to look outside our industry and there is an awful lot outside our industry.”

THE ENGINEERING OUTLOOK

Outsourcing of engineering talent, while a concern, was cited by only 14.8% of respondents. The most common engineering work outsourced is design work at 49.1%, with manufacturing and assembly work coming in second at 38.1%. Most of the outsourcing work occurs within the United States, with 61.9% of the outsourced work sent to external contracting firms or engineering workhouses. China and India are the second and third most common outsource locations, at 20.6% and 15.9% respectively.

While some engineers feel that outsourcing diminishes morale and hurts efficiency, for small facilities and testing purposes, outsourcing could be an asset. For testing, it “is crucial as the capital expense for specialized equipment is prohibitive and specialized expertise speeds the process up,” said one respondent. Smaller firms “outsource work to machine shops since we don’t have the capabilities in-house beyond 3D printing.”

Perhaps most telling is that the current engineer still recommends it as a profession. An impressive 92.1% would recommend engineering to the next generation of students entering college. In addition, 69% believe salary advancement is still as promising today as it was five years ago. When asked why, many engineers believe that engineering offers solid employment and, as one respondent noted, offers “broad opportunities for advancing in technical or business management roles.” **md**

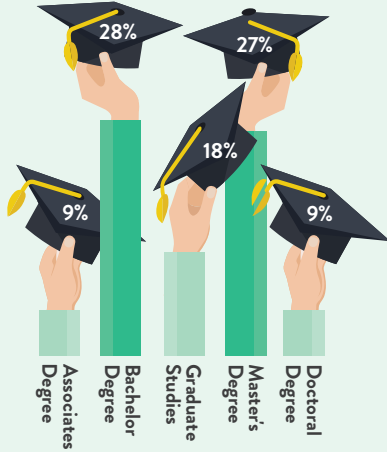
TECHNICAL EDITOR Carlos M. Gonzalez wrote this report. Survey conducted and data compiled by Jay McSherry.

Sponsored by



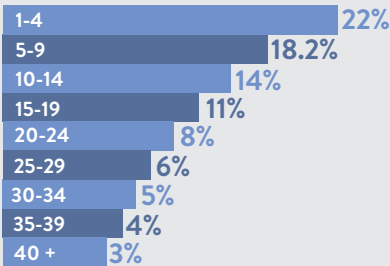
THE TYPICAL ENGINEER

Highest education level

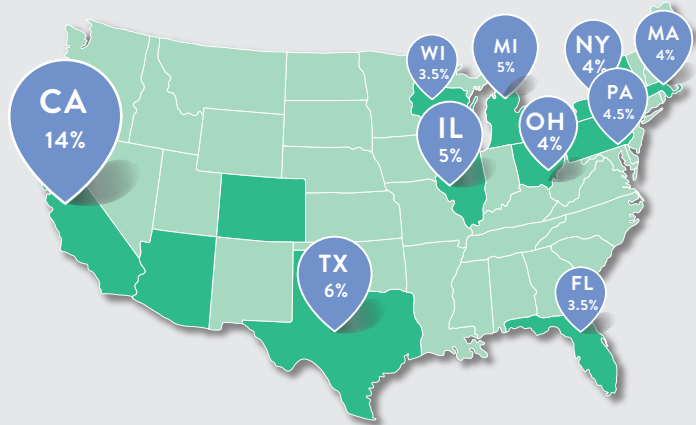


“More people going back to school have graduated or taken a position with an employer based on certification of skills. Jobs are harder to come by that don't require a BA/BS degree in Engineering.”

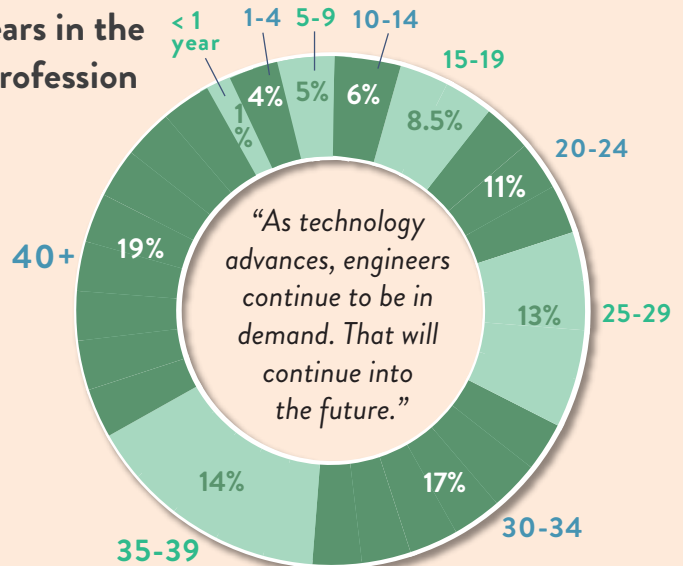
Years at present company



Work locations



Years in the profession



“As technology advances, engineers continue to be in demand. That will continue into the future.”

Age

The average engineer age has gone up from last year. This is a rising concern for those currently in the industry. As one respondent stated, “With the graying of engineering staff and the benefits cost associated with our years of experience, 50 has become the new retirement age. My students are receiving employment opportunities through their internships, but my peers and I are no longer considered for the same opportunities.”

25-34



6.5%

35-44



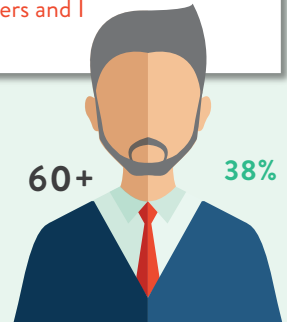
11%

45-59



45%

60+



38%



Average Compensation

97,530

Average compensation increase



COMPENSATION

How competitive is the average engineer's compensation?



MORE



EQUALLY



LESS



Average bonus

Cash \$3,951

Stocks/options \$2,336

Other \$2,491



Engineers have a wide range of salaries earned; 43.5% earned between \$60,000 to \$99,999 and 20.4% earn between \$100,000 to \$125,000 per year. The other forms of compensation come from matching 401ks and health benefits. Many engineers worry about the rising cost of health insurance, and how that will affect their salaries in the future.

30% SAY HIRING WILL GROW

60% SAY HIRING WILL REDUCE



While many engineers still believe that engineering is still as promising a career as it was five years ago, many note the stagnant state of engineering. More than 60% state that their companies have no plans to either hire or reduce the amount of engineers working at their firms. Another 67.8% feel that their organization is not as focused on employee retention as it once was.

EMPLOYMENT OUTLOOK

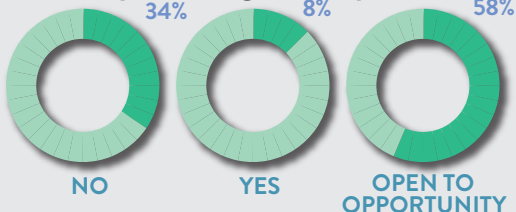
10% SAY HIRING WILL MAINTAIN

Is an engineering career as promising today as it was five years ago?

62% SAY YES

"Technology continues to advance and engineers are always needed to implement and manage systems."

Actively seeking a new position



Is your organization more focused on employee retention this year?



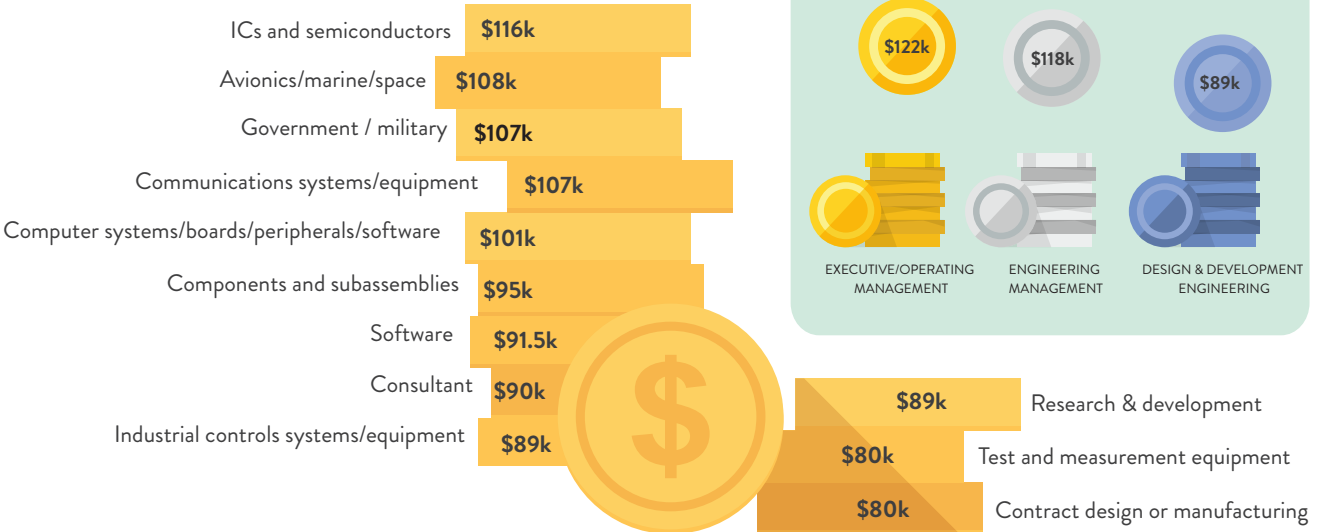
Sponsored by





COMPENSATION BREAKDOWN

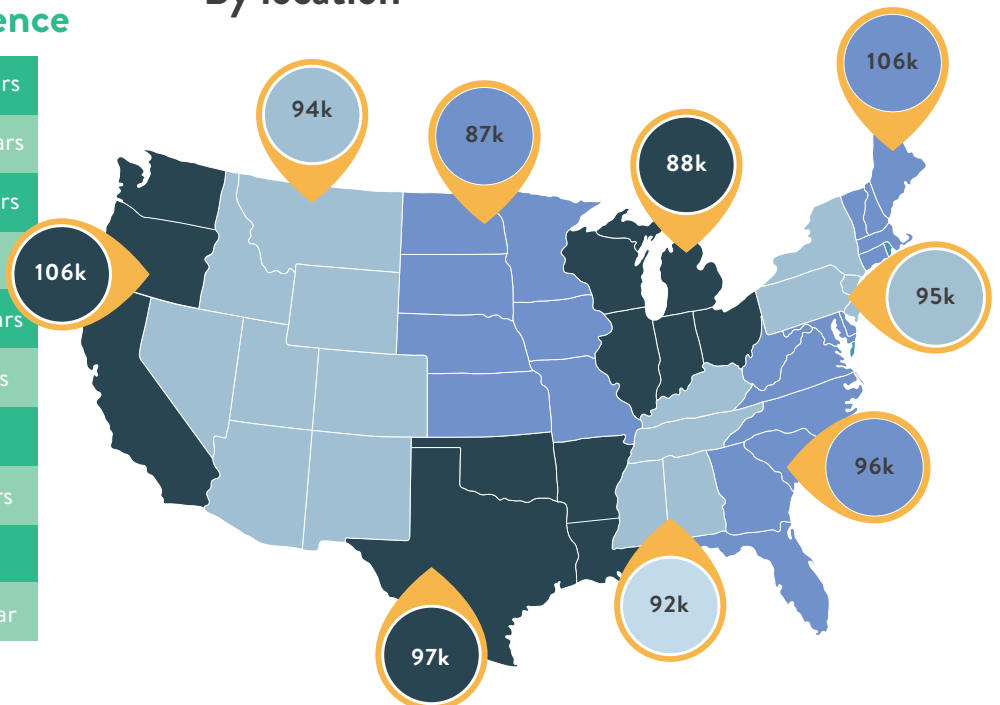
By industry



By years of engineering experience

\$103,414	35-39 years
\$102,806	30-34 years
\$100,654	25-29 years
\$97,142	40+ years
\$93,085	20-24 years
\$92,819	15-19 years
\$74,629	5-9 years
\$72,155	10-14 years
\$64,082	1-4 years
\$46,666	Less than 1 year

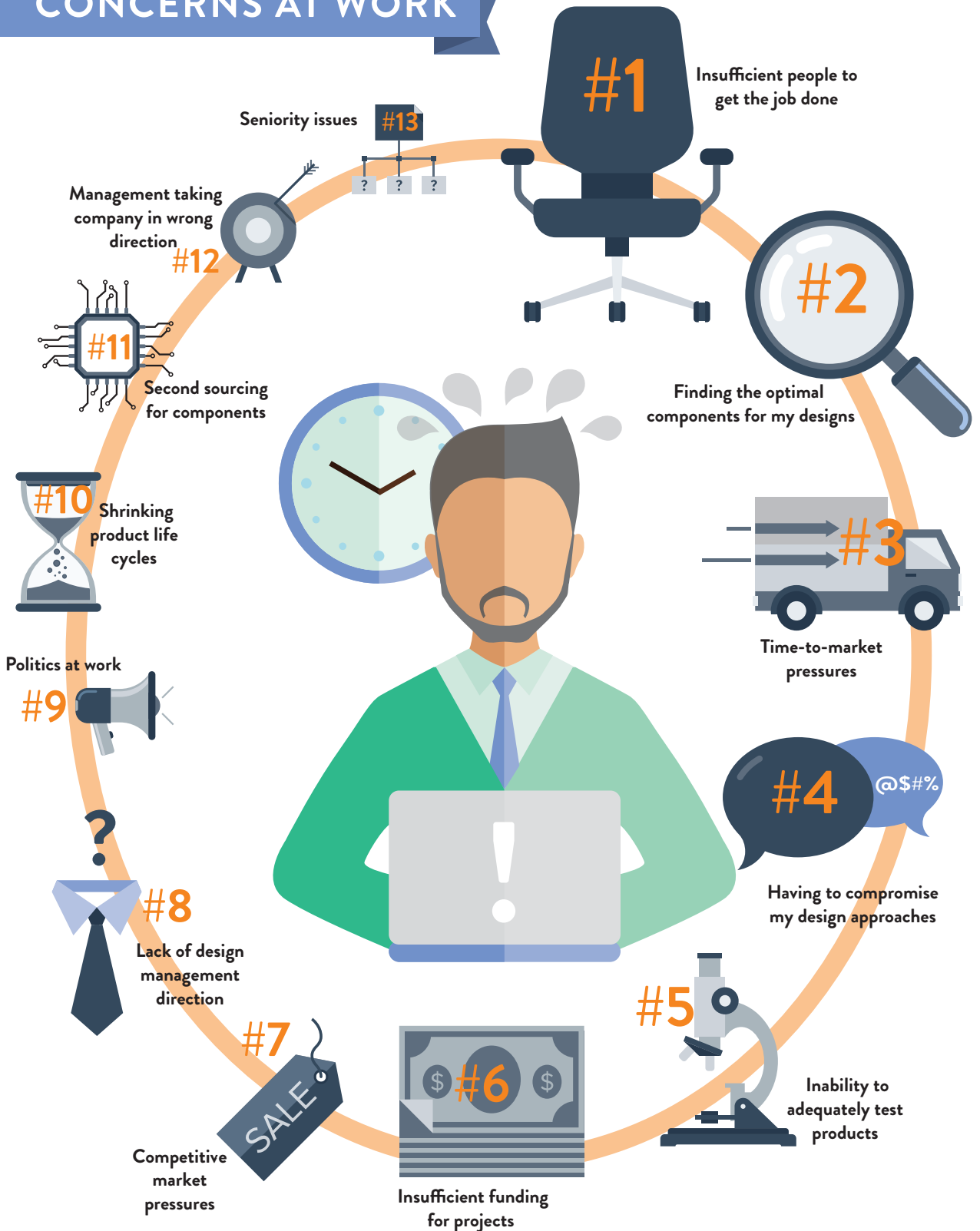
By location



Sponsored by



CONCERNS AT WORK



Sponsored by





JOB SATISFACTION

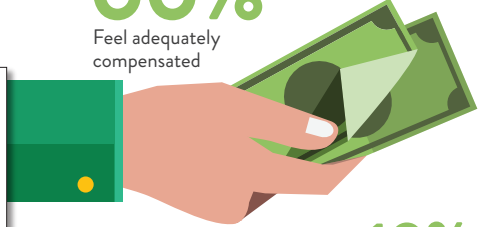


The majority of engineers worked 41 to 45 hours per week (34.8%) and are satisfied with their jobs. Most work stays at the office, with only 31.7% working 1 to 5 hours at home. When it comes to travel, most engineers stay put, with 66.6% of engineers working in one primary location and 69.4% having no work responsibilities during non-business hours. Their current job satisfaction is high with 90% feeling satisfied to extremely satisfied at their current jobs. They acknowledge the challenge engineering brings and how it provides them several job opportunities in engineering and beyond.

The average engineer works **41 hrs/week** at the office and at home and other locations

66%

Feel adequately compensated



Feel compensation should increase on average by

19%

Job Satisfaction	
Extremely satisfied	21%
Very satisfied	32%
Satisfied	35%
Not very satisfied	10%
Not at all satisfied	2%
Have considered leaving the profession	34%

Reasons engineers would leave the profession

Pursue other interests or opportunities	33%
Try something different	33%
To make more money	24%
Do something more fulfilling or satisfying	24%
Do something less stressful	23%
Start a business	23%
Burnout	22%
Have more freedom/free time	22%

“An engineering education, I think, serves as a good background for many future careers. One can remain an engineer and be employed, or the experience gained can be readily leveraged into any other occupation if they discover that engineering is not for them.”

Most important factors in job satisfaction

1. Challenges that accompany the design of new products
2. Researching potential design solutions
3. Opportunity to design products that can benefit society
4. The compensation you receive for the work you do
5. Working in team situations with peers
6. Pressures associated with solving design problems
7. Working independently of others
8. The recognition you get from others for the work you do



ENGINEERS TALKING FROM THE PULPIT

“The U.S. is falling behind in the field of engineering due to a lack of skilled engineers. As the current crop of engineers retires, the lack of skilled replacements should open the way for skilled and talented engineers to advance. Quality of work is still important at the end of the day. Companies usually want to hire those that they trust have the skills and will use them for the company’s benefit.”

“My 13-year-old son wanted to do the same thing that I do—embedded engineering. I told him that is fine, but the engineering field is much larger than this. Design of any type is only limited by your imagination.”

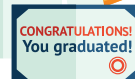
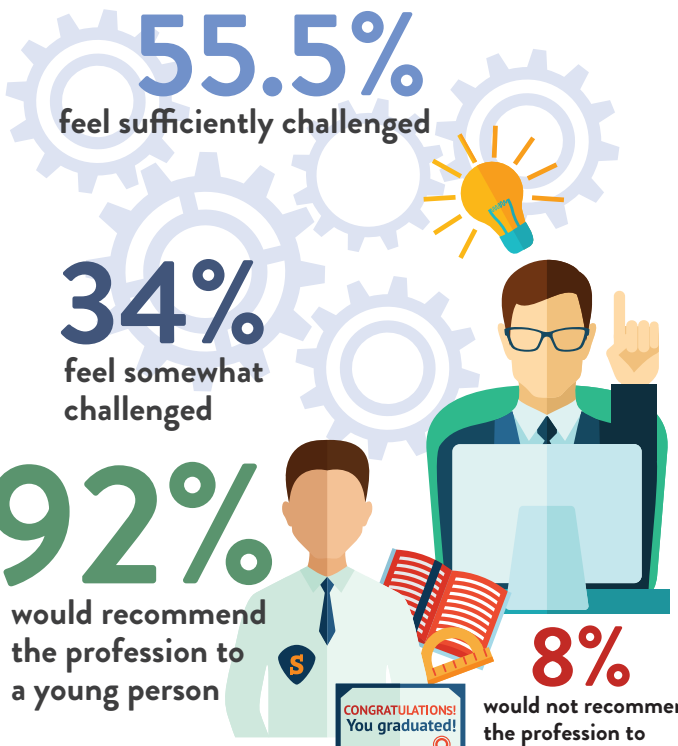
55.5%
feel sufficiently challenged

34%
feel somewhat challenged

92%
would recommend the profession to a young person

8%

would not recommend the profession to a young person



Sponsored by



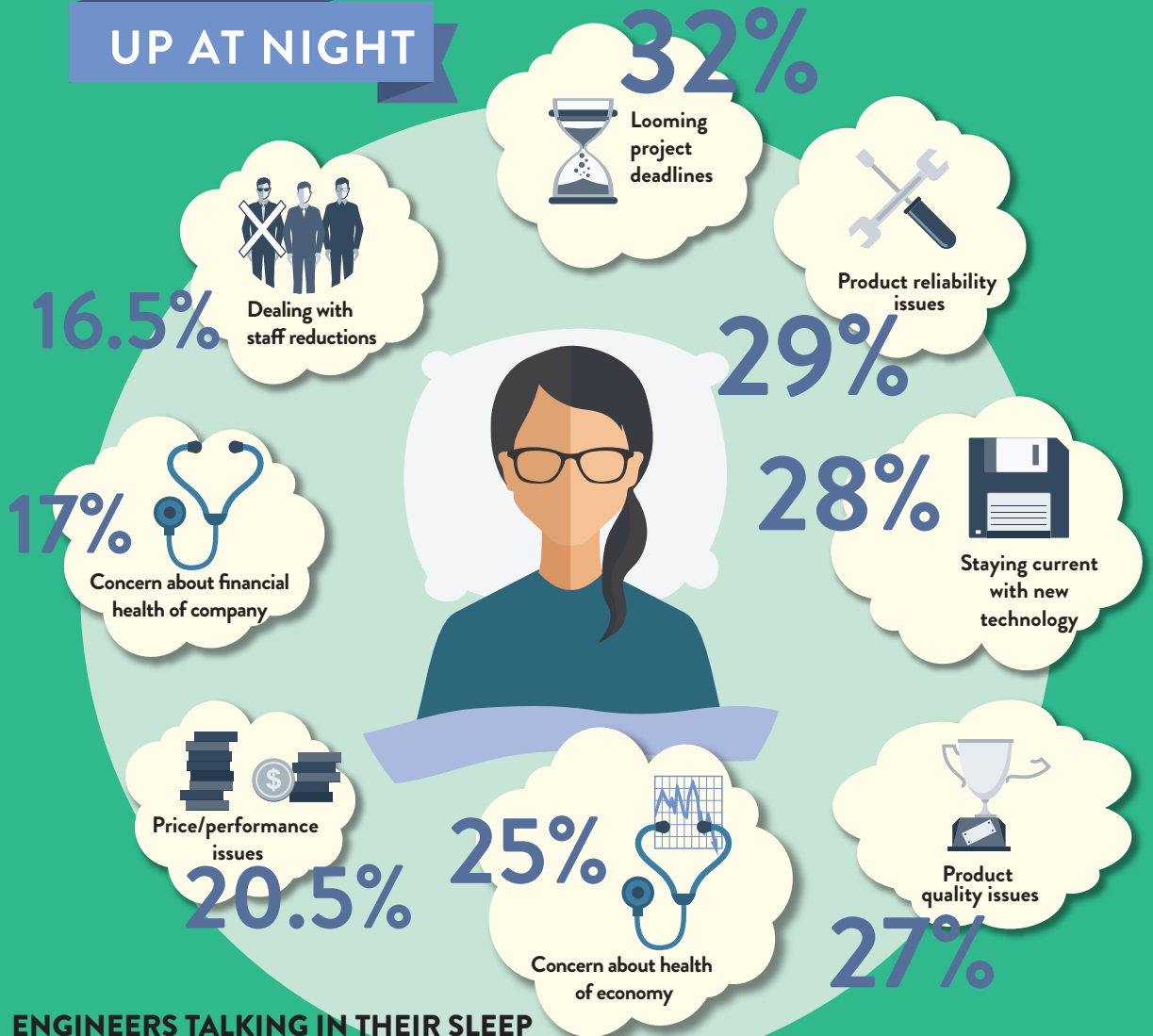


ISSUES KEEPING

ENGINEERS

UP AT NIGHT

In the long term, almost a quarter of engineers are concerned with the overall health of the economy—and its impact on not just their company, but also their suppliers. Reductions in staff and job security are factors as well. The biggest professional issue that “keeps them up at night” is project deadlines, at 32%. This relates to other concerns that deal with projects and their timelines, such as product quality/testing issues and reliability.



ENGINEERS TALKING IN THEIR SLEEP

“There’s a greater need for engineers in today’s society. Additionally, it appears as though the engineering workforce is aging, which creates a great opportunity for young engineers.”

“Testing design to prove that products will do what we want them to do over the long term.”

“Management making financial decisions on technical issues that they have little knowledge of that will have long-term effects on the company.”

“It’s not necessarily that my staff has been ‘reduced,’ it is more that other departmental staffs have been increased, which has put more requests into my folks for support work that I can’t keep up with adequately.”

Sponsored by



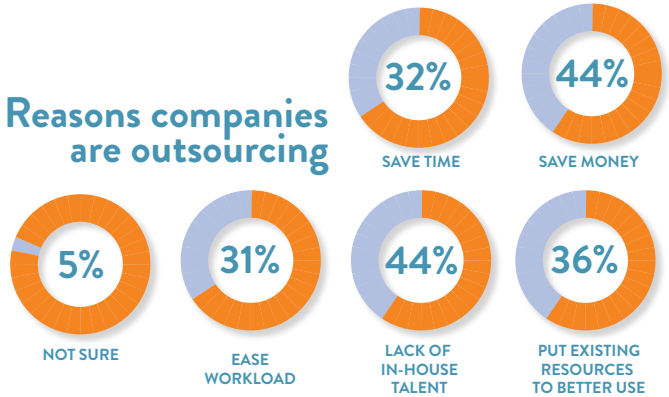


THE NECESSARY EVIL OF OUTSOURCING

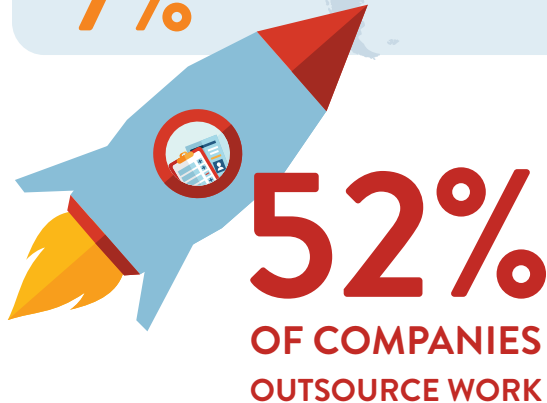
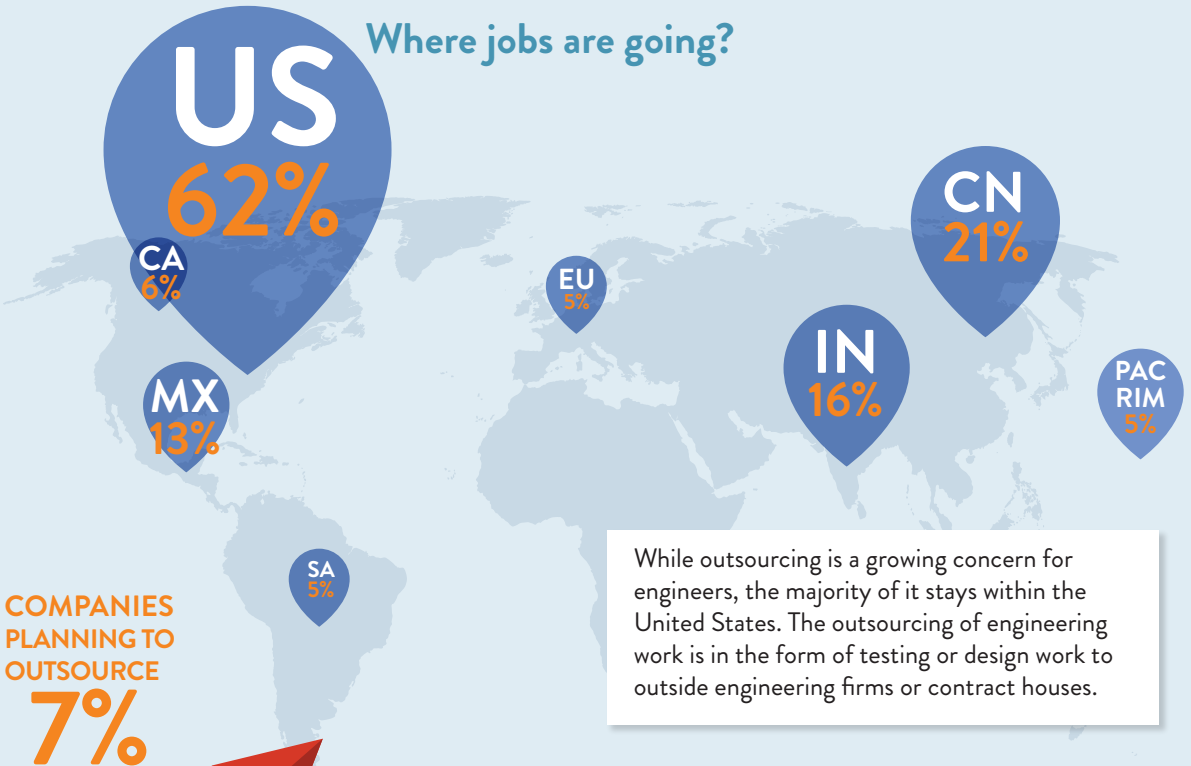
OPINIONS ON OUTSOURCING

LOWER EMPLOYEE MORALE	40%
FEWER ENGINEERING JOBS AVAILABLE	37%
FEWER OPPORTUNITIES FOR ADVANCEMENT	34%
NEW HIRES AT REDUCED SALARIES	34%
OPPORTUNITY FOR MORE INNOVATIVE PROJECTS	23%
SKILLS VALUED LESS	30%
SALARY REDUCTIONS FOR EMPLOYEES	20%
IMPORTANT ASPECT TO BUSINESS GROWTH	13%
SKILLS VALUED MORE	12%
NEW HIRES TO SUPPORT OUTSOURCING EFFORTS	11%

Reasons companies are outsourcing



Where jobs are going?



JOBS BEING OUTSOURCED

DESIGN	49%
MANUFACTURING/ASSEMBLY	38%
SOFTWARE ENGINEERING/DEVELOPMENT	33%
CAD/CAE	32%
DRAFTING	29%
R&D	16.5%
DESIGN VERIFICATION	15%
PCB LAYOUT	14.5%
SOFTWARE VERIFICATION/TEST	11%
FINAL TEST	9%
INCOMING INSPECTION	3.5%

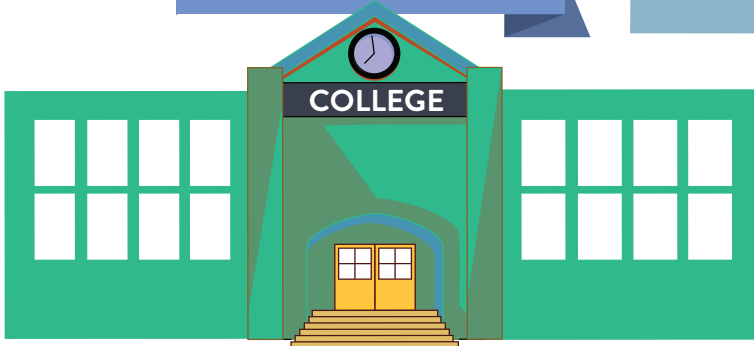
Sponsored by





CONTINUING

EDUCATION



Finding the time to continue their education is the number one challenge faced by engineers today. The balancing act between their work and personal lives leaves little time to continue with the current trends in the world of engineering. Engineers have turned to online based methods of continuing their education. Online seminars, webcasts, electronic white papers, and technology focused websites are the main methods they stay up to date.

#1 obstacle to staying current with information:

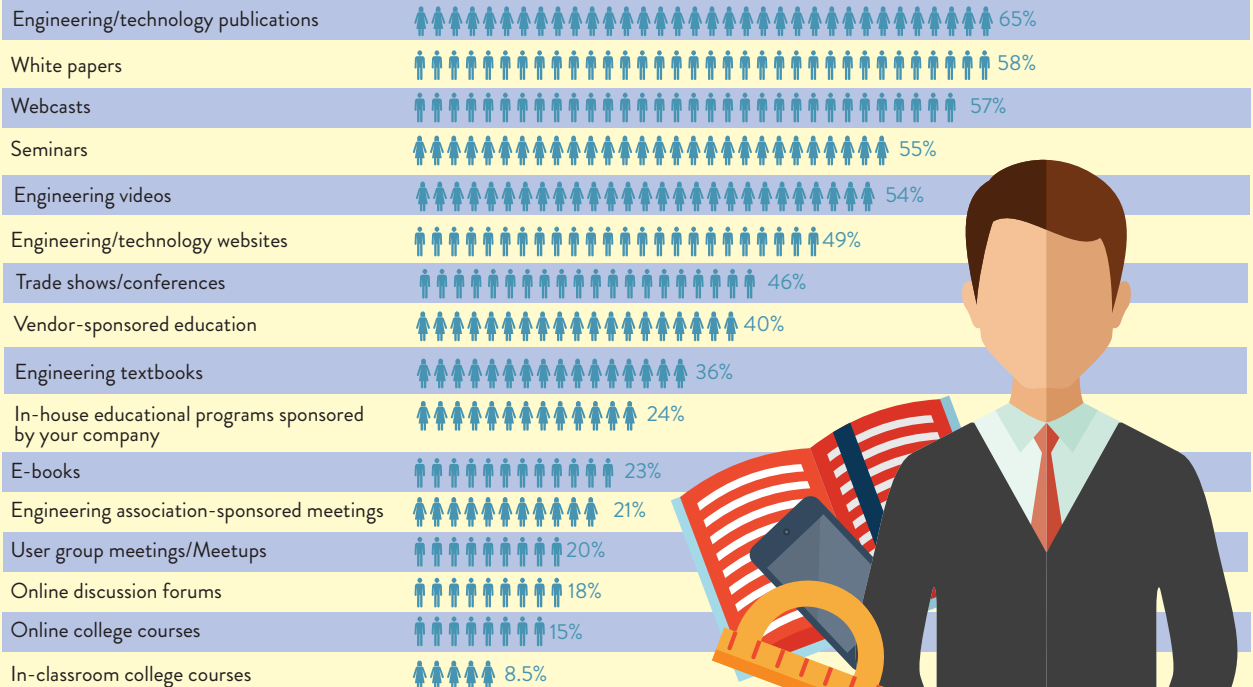


Finding the time.

Which forms of education does your company reimburse you for?

Trade shows/conferences	60%
Seminars	55%
College tuition	49%
Certifications	35%
Online training	32%
Engineering association dues	31%
Engineering textbooks	30%
Publication subscriptions	23%

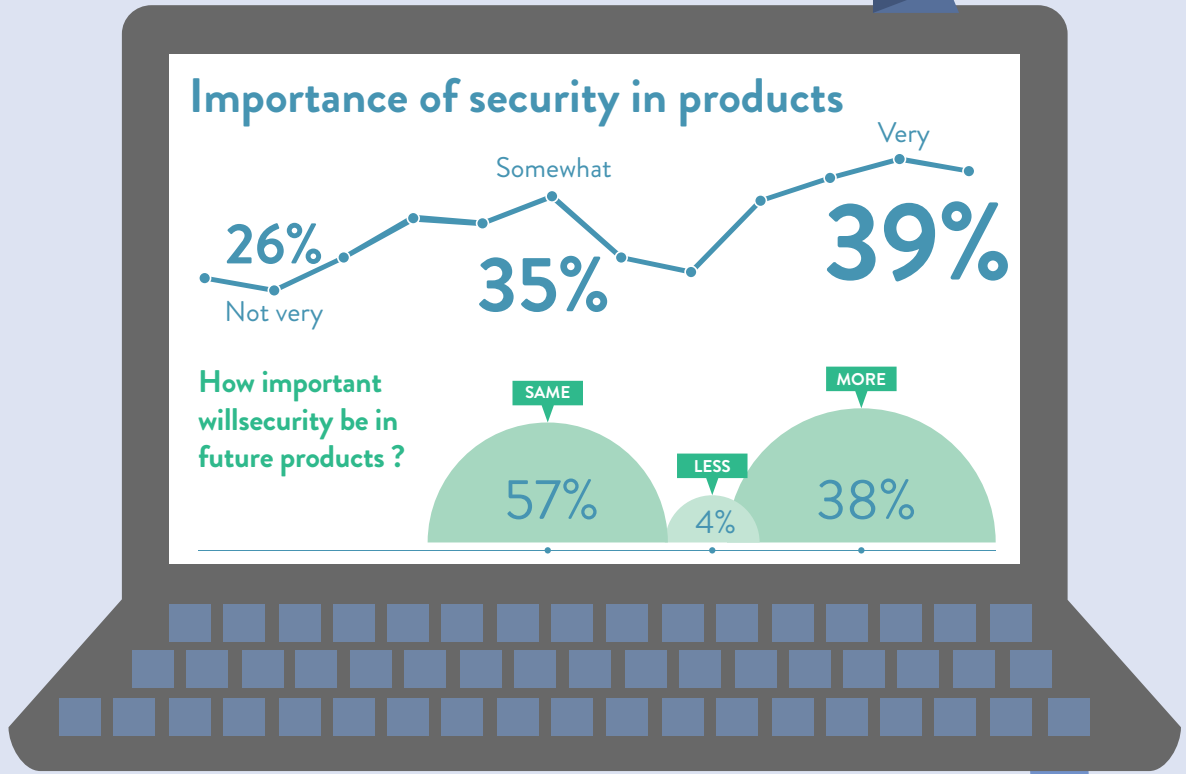
How engineers are keeping up



Sponsored by



PREPARING FOR THE INTERNET OF THINGS



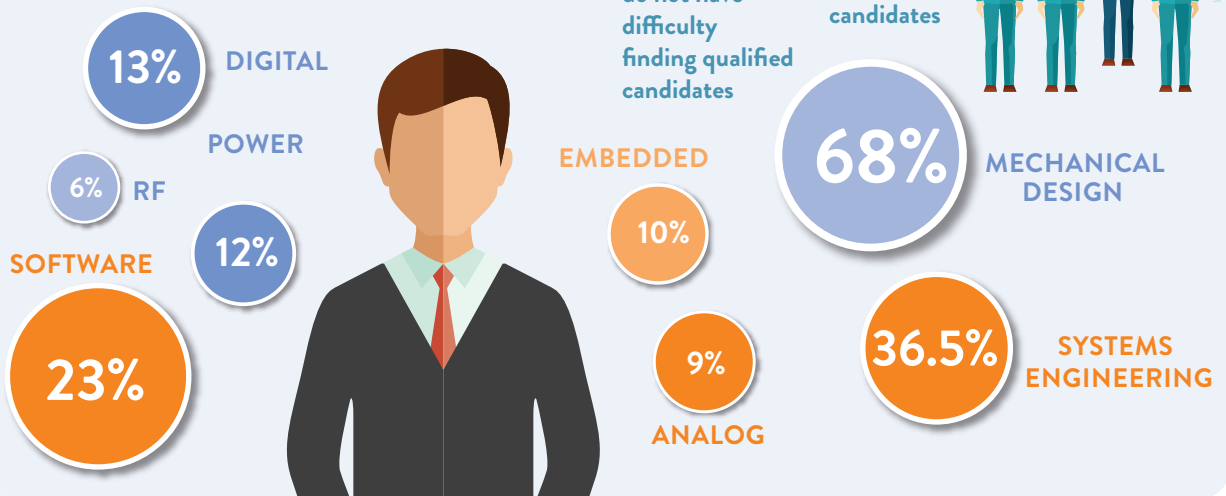
The Internet of Things is ushering a new wave of technology. As devices become wireless and interconnected, many new jobs will open up for engineers as well new devices such as smartphones and tablets becoming common place on the engineering floor. Engineers will continue to be in high demand as the technology expands.

51%

of organizations have difficulty finding qualified candidates



If yes, which engineering specialties?



48%

do not have difficulty finding qualified candidates

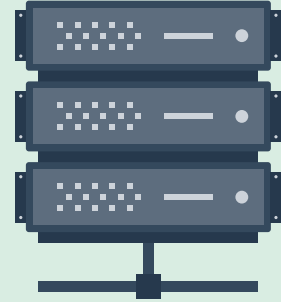


TEST AND MEASUREMENT



61%

Think their company invests sufficiently in test equipment



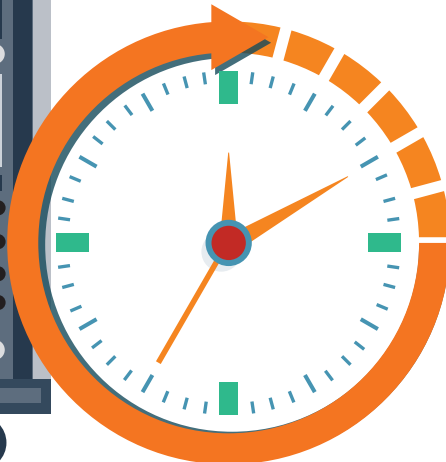
9%

Companies that have replaced box test instruments with modular solutions



60%

Think their company offers sufficient training and documentation



55%

Think testing is a significant challenge in terms of time consumption

Sponsored by



Subscribe to MACHINE DESIGN | 12 | GO TO MACHINEDESIGN.COM / SUBSCRIBE