

A LOOK AT GLOBAL COMPENSATION AND JOB SATISFACTION

By Rick Nelson, Editor-in-Chief

Engineers contend with technical challenges as salaries pace inflation.

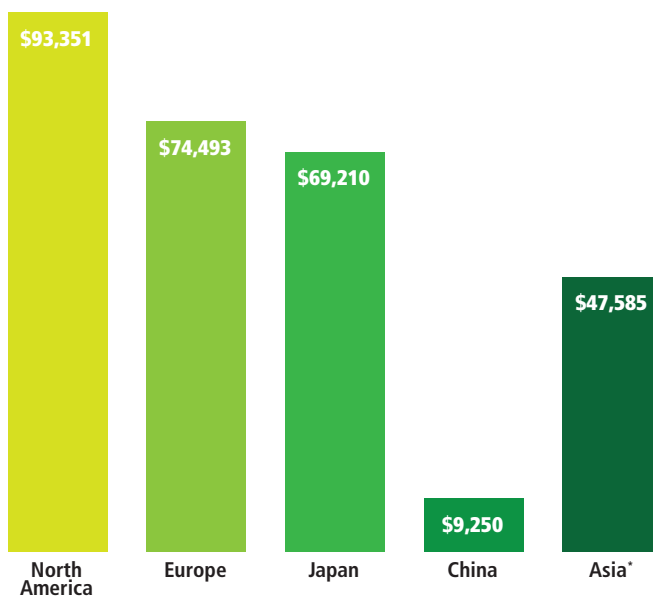
Engineers worldwide reported varying levels of job satisfaction as their salaries struggle to keep pace with inflation, according to a comprehensive study of career trends among electronics engineers. In addition to tracking salary trends, the survey asked questions on topics such as respondents' educational background, how they communicate with global-design teams, what skills they believe are critical in today's work environment, how outsourcing affects them, what concerns they have as they pursue their careers, and their outlook for the future.

Salaries were up in all regions surveyed, with US readers reporting a 4% average increase, which lags behind the recently reported 5.6% inflation rate (Figure 1). European readers reported an average 6% increase, which contrasts with a 3.6% inflation rate reported in August for the area using the euro currency and a 4.7% rate reported in August for the United Kingdom.

Readers in Japan reported an average 2% increase, not quite matching the 2.1% inflation rate reported for August, although the Japanese inflation rate reached as low as 0.7% in January. Readers in China reported the highest salary increase, at 9%, which outpaces inflation rates that have ranged during 2008 from a high of 8.7% in February to a low of 4.9% in August.

EDN Asia readers reported an average salary increase of 7.4%. Note that EDN Asia serves readers in Hong Kong, India, Korea,

FIGURE 1: AVERAGE ANNUAL BASE SALARY



* Editions of EDN Asia, whose readers were surveyed to obtain these results, serve Hong Kong, India, Korea, Malaysia, Singapore, Taiwan, and Thailand. See www.edn.com/global08 for data broken down by region.

Malaysia, Singapore, Taiwan, and Thailand. The online version of this report (www.edn.com/global08) provides salary breakdowns by city and country. Reported average salaries for EDN Asia readers ranged from a high of \$57,272 in Hong Kong to a low of just under \$42,500 in Malaysia and Thailand.

Education worldwide

As for educational background, a bachelor's degree in engineering represents the most commonly obtained educational level, with the exception of EDN Europe readers, for whom 35% of respondents reported having a master's degree in engineering, versus 33% who reported having a bachelor's degree in an engineering discipline;

15% of the EDN Europe respondents reported having doctoral degrees in engineering, versus 5% of North American respondents (Table 1). EDN Asia readers appear to have the strongest engineering educational credentials, with 91.2% of respondents having a bachelor's degree or higher in an engineering discipline. The corresponding figures are 86% for US respondents, 83% for EDN Europe respondents, 77% for EDN China respondents, and 71% for EDN Asia readers. In North America, 25% of respondents reported having degrees in nonengineering fields or having no college degree at all; the corresponding figures are 23% for EDN Europe, 20% for EDN China, 8% for EDN Asia, and 33.4% for EDN Japan, with 25% of EDN Japan respondents

EDN's second global compensation and job-satisfaction survey was conducted by Rhonda McGee, director of research, Boston Division, Reed Business Information, with assistance from Wai Chun Chen, publisher, EDN Asia, in Singapore; William Zhang, publisher and editorial director, EDN China, in Beijing; Martin Savery, publishing director, EDN Europe, in Paris; and Katsuya Watanabe, publisher, EDN Japan, in Tokyo. The complete research, including a description of methodology, is available at www.edn.com/global08.

reporting having no college degree.

In addition to having the highest engineering education credentials, *EDN Asia* respondents are among the youngest, reporting an average age of 36. Only *EDN China* respondents were younger, reporting an average age of 30. North American respondents are the oldest, reporting an average age of 50, and *EDN Europe* and *EDN Japan* reported average ages of 45 and 43, respectively.

The reported ages roughly traces the average number of years respondents reported having worked as engineers: 18 for North American respondents, 15 for European respondents, 16 for Japanese respondents, five for *EDN China* respondents, and nine for *EDN Asia* respondents. Japanese respondents reported the most stable careers, having spent an average of 15 years with their current employer. In contrast, North American and European respondents have spent an average of eight years with their current employer.

Perhaps reflecting their relative youth, *EDN China* and *EDN Asia* respondents reported having spent only four and five years, respectively, with their current employers. Job change is most prevalent in China, however, with 24% of *EDN China* respondents reporting having changed jobs within the last year. That figure is 11% for North American respondents, 15% for European respondents, 10% for *EDN Asia* respondents, and only 4% for Japanese respondents.

Job security—or lack thereof

Layoffs seem to be a fact of engineering life across all regions surveyed. Japan saw the fewest, with 21% of Japanese respondents saying their company had laid off engineers within the past 12 months; North American respondents reported the highest layoff figures, with 31% saying their company had laid off engineers within the preceding year.

The good news is that companies have also added engineers—European respondents reported the lowest figure, saying 65% of their companies have hired engineers within the last year; *EDN Asia* readers reported the highest figure, with 80.5% of respondents saying that their company has hired engineers within the last year. The hired engineers aren't always in the respondents' locations, however:

30% of North American respondents reported that at least some new hires have been located offshore, with India, China, and Western Europe being the top three offshore locations. Further, 14% of Chinese respondents say their companies have located at least some new hires in other countries, including the United States, the rest of Asia, and Western Europe.

The global scope of engineering projects today mandates effective communications strategies (**Table 2**). An *EDN China* respondent puts it this way: "It is difficult to find an effective

TABLE 1: EDUCATIONAL BACKGROUND

	North America	Europe	Japan	China	Asia*
» Bachelor's degree in engineering	55%	33%	47%	48%	54.9%
» Master's degree in engineering	26%	35%	26%	20%	32.3%
» PhD in engineering	5%	15%	4%	3%	4.0%
» Two-year associate's degree in technical field	14%	6%	4%	11%	5.9%
» Bachelor's degree in nonengineering field	8%	4%	3%	0%	1.7%
» Advanced degree in nonengineering field	4%	4%	2%	2%	0.8%
» Master's degree in business administration	6%	5%	0.4%	3%	3.6%
» Current student	2%	2%	0.3%	3%	0.4%
» No college degree	5%	8%	25%	12%	1.5%

TABLE 2: HOW ENGINEERS COMMUNICATE WITH THEIR GLOBAL DESIGN TEAMS

	North America	Europe	Japan	China	Asia*
» E-mail	91%	94%	93%	63%	92.5%
» Phone	67%	61%	54%	67%	64.2%
» Company intranet	44%	46%	24%	53%	42.0%
» Online forum	10%	14%	5%	12%	9.2%
» Company correspondent	5%	4%	2%	10%	12.4%
» Other	9%	8%	7%	11%	4.7%

TABLE 3: SKILLS ENGINEERS NEED TO GET AHEAD IN THEIR PROFESSION TODAY

	North America	Europe	Japan	China	Asia*
» Digital-design skills	74%	56%	55%	70%	63%
» Software-development skills	68%	66%	50%	60%	57%
» Analog-design skills	66%	53%	71%	65%	53%
» Microprocessor-based skills	61%	52%	40%	54%	48%
» Test-engineering skills	54%	50%	40%	44%	46%
» Control-engineering skills	37%	44%	34%	36%	30%
» Mechatronics skills	30%	38%	25%	27%	22%
» IC-design skills	21%	16%	19%	25%	27%
» Other	15%	15%	9%	3%	11%

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method to shorten the distance between Chinese engineers and international ones,” adding that communication difficulties hinder global cooperation.

Not surprisingly, more than 90% of respondents in North America, Europe, and Japan rely heavily on e-mail as a key communications medium. In China, however, 67% of respondents listed the phone, versus only 63% listing e-mail. Chinese respondents, at 53%, favored company intranets more than respondents from other regions, where the figure ranged from a high of 46% in Europe to a low of 24% in Japan. A smattering of respondents reported using a variety of other communications mechanisms, including VOIP (voice-over-Internet protocol), videoconferencing, and Web-seminar applications; some even reported that the fax remains important to them. Of course, communications technologies aren’t currently helpful in breaking down language barriers, a concern that one *EDN* China respondent cited.

Key skill sets

Across all regions, respondents value digital-, analog-, and software-design skills (Table 3). In North America, 74% of respondents say digital-design skills are necessary to get ahead in their profession today. Similarly, a majority of respondents in all regions value analog-design skills. Software skills are necessary for only 50% of Japanese respondents, but the topic scores strong majorities in other regions. Test engineering is valued most in North America, with 54% of respondents citing that discipline. In contrast, among Japanese respondents, only 40% cited the importance of test engineering. Across all regions, motion-control skills are important to a sizable slice of respondents, ranging from a high of 38% in Europe to a low of 22% reported by *EDN* Asia respondents. Whatever skills respondents are applying, they are applying them for 44 to 52 hours per week (Figure 2).

In pursuit of skills not available in-house or that companies judge too expensive to afford to bring in-house, companies are outsourcing engineering tasks. North American respondents reported that their companies outsource 14% of engineering work; that’s closely matched by the 13% figure that *EDN* Europe and *EDN* China respondents reported. *EDN* Japan and *EDN* Asia respondents say their companies outsource 20 and 19% of engineering work, respectively (Table 4). Outsourcing can negatively impact even employees who retain their jobs. Reports

FIGURE 2:
AVERAGE NUMBER OF HOURS WORKED PER WEEK

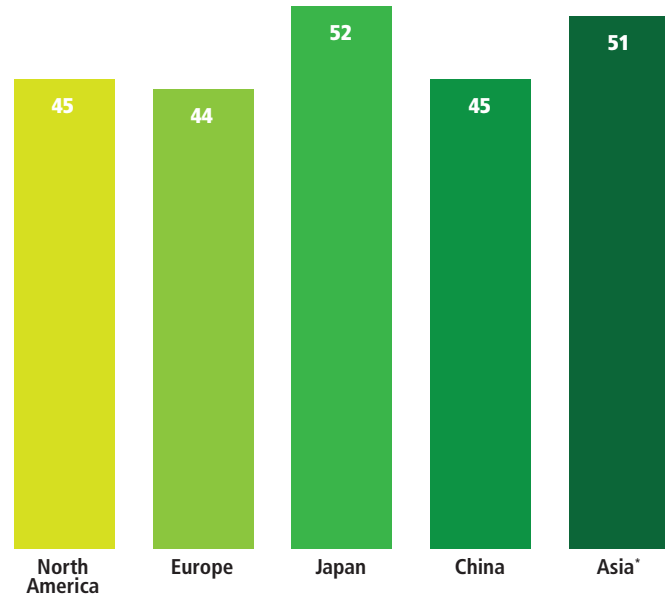


TABLE 4: SPECIFIC ENGINEERING WORK BEING OUTSOURCED

	North America	Europe	Japan	China	Asia*
» Board-based design	32%	41%	33%	19%	30.6%
» Test engineering	26%	36%	29%	21%	25.0%
» Power-systems design	20%	19%	8%	21%	21.0%
» IC design	18%	12%	22%	17%	15.9%
» Processor-based design	18%	16%	28%	19%	14.0%
» Analog design	17%	19%	26%	20%	18.5%
» Communications-systems design	14%	11%	9%	16%	15.6%
» Consumer-products design	12%	15%	10%	14%	14.0%
» Other	29%	21%	10%	12%	20.2%

TABLE 5: MAIN AREA OF CONCERN

	North America	Europe	Japan	China	Asia*
» Keeping current on technology	29%	28%	35%	50%	38.1%
» Job security	27%	20%	24%	21%	33.3%
» Management support	13%	19%	13%	15%	11.0%
» Sufficient operating budget	11%	9%	12%	8%	6.4%
» International outsourcing	6%	5%	2%	0.2%	1.7%
» Company merger or acquisition	5%	11%	6%	4%	3.2%
» Outsourcing	4%	5%	2%	0.5%	1.7%
» Other (client retention, time management)	5%	4%	7%	1%	4.7%

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TABLE 6: PRIMARY DISCIPLINE

	North America	Europe	Japan	China	Asia*
» Test engineering	14%	7%	32%	13%	13.2%
» Analog design	11%	7%	45%	9%	8.3%
» Processor-based design	11%	13%	28%	17%	10.2%
» Communications-systems design	9%	10%	14%	12%	9.1%
» Board-based design	8%	8%	24%	10%	8.9%
» Mechanical engineering	8%	7%	11%	5%	5.7%
» Consumer-products design	5%	8%	12%	11%	10.2%
» Power-systems design	5%	5%	14%	8%	4.7%
» IC design	3%	1%	15%	8%	10.4%
» Other	27%	33%	21%	8%	19.3%

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one EDN Japan respondent, “Due to the prevalence of outsourcing, we are beginning to be evaluated by the success of outsourcing and not by our achievement as engineers.”

Outsourcing per se is not something that respondents worry about—5% or fewer cited outsourcing as their main area of concern (Table 5). Job security is a worry, however. European engineers appear most secure; only 20% of EDN Europe respondents reported that job security is their top concern. The figure rises to 38% for EDN Asia respondents.

But the top area of concern across all regions is the challenge related to maintaining or growing technical skills; 50% of EDN China respondents, for example, cited “keeping current on technology” as their major concern. One EDN China respondent cited too much on-the-job pressure; another said, “Competition is intense, and the technology is changing too fast.”

The need to develop multidisciplinary skills might be in part driving such concern. Table 6 shows respondents’ primary discipline by region, but substantial numbers are working in multiple disciplines. And many have recently added new areas of expertise. For example, 68% of EDN China respondents say they are working on more disciplines now than they were 12 months ago. Japanese respondents reported the lowest figure, with a still-significant 36% saying they have added new disciplines within the past year.

Engineers may be adding new disciplines, but survey results suggest that they don’t often advance or transfer laterally within their companies. For example, North American and European readers, who have spent an average of eight years with their current employers, have spent an average of seven years in their current jobs. The most opportunity for job changes within a company appears to be in Japan, where respondents who reported an average of 15 years with their current employers also reported spending just over half that time—eight years—in their current jobs.

The lack of movement within companies may suit engineers just fine. Majorities or pluralities across all regions want to

remain on a technical-engineering-career track. For example, 67% of North American respondents and 75% of Japanese respondents wish to do so. The corresponding figures for EDN Europe, EDN China, and EDN respondents are 38%, 26%, and 39%, respectively. Across all regions, becoming a technical consultant is in second place, with moving into engineering management in third place. Joining a start-up in an engineering function takes fourth place. Few—5% of respondents in North America to 11% of respondents in Europe—wish to move into marketing or sales.

Job satisfaction varies widely by region, with 64% of North American respondents and 65% of EDN China

respondents reporting that they are very or somewhat satisfied with their engineering career. Only 44% of EDN Europe respondents reported a similar level of satisfaction, and the figure drops further, to 35% for EDN Asia respondents and to 25% for EDN Japan respondents. EDN Japan respondents reported a variety of reasons for dissatisfaction, ranging from time management to gender discrimination. One reported too little work; another reported not being able to find time for continuing education. Still another writes, “Discrimination against women has meant that my skills are not positively appraised. Compared to the male engineers working at the same level, my salary is extremely low.” EDN Asia respondents cited long hours, heavy workload, poor pay, lack of growth opportunities, and lack of recognition as reasons for dissatisfaction.

To be sure, many EDN Japan and EDN Asia readers did report high levels of satisfaction. Says one EDN Japan respondent, “I’ve been given job themes that are rewarding and have received appropriate evaluation.” EDN Asia respondents reported deriving satisfaction from challenging work and from having the ability to innovate and be creative. In fact, across all regions, those who are satisfied cited technical challenges and the feelings of accomplishment that come with meeting those challenges as key contributors to the levels of satisfaction they feel. Respondents in North America and Europe also value relationships with colleagues more than salary and benefits; salary is more important than relationships to EDN Japan, EDN China, and EDN Asia respondents.

Engineers across all regions also value being recognized for their work. Reports an EDN Japan respondent, “I have been given awards by academic societies and have been commercializing the technology I’ve worked on.” But the challenge itself and resulting feeling of accomplishment dominate. A European reader cites the freedom to create as key to job satisfaction. Reports a North American respondent, “I get paid to do what I like.” An EDN China reader sums up the profession at its best: “Being an engineer brings reputation and respect. And I can have freedom to transform my idea into a design.”