近20年来，我们追踪了印刷电路板设计人员和设计工程师的工资和福利。本文说明了哪里有设计工作的机会以及哪里的工资最高。最重要的是，读者在读完本文后，可能有机会增加工资。

The 2005 Designer and Design Engineer SALARY SURVEY

Salaries hold firm overall. But location is everything, and some areas of the U.S. are far behind the average. **by ANDY SHAUGHNESSY**

The results of the 2005 *PCD&M* Salary Survey are in, and there's plenty of good news, as well as some not-so-good news.

This year, 71% of respondents (designers and design engineers) reported an increase in their base salaries in the past 12 months. But even as the percentage of respondents who said they were laid off in the last year dropped to 3.5%, the amount of time laid off rose from nine weeks in 2003 to 22 weeks in 2005. So, not many of you reported being laid off, but your time spent in the unemploy-ment line in 2005 was often measured in double-digit weeks.

PCB designers and engineers face a raft of challenges – a growing economy that's still too unpredictable, cutthroat global competition in the electronics industry, and an energy market in disar-ray after two Gulf Coast hurricanes crip-pled U.S. refineries. Despite these obsta-cles, most PCB designers and design engineers seem to like what they're doing, if not their particular management team.

There's reason for optimism. The EDA Consortium reported that EDA tool sales were down overall for the sec-ond quarter of 2005, but PCB/MCM tool sales rose. Sure, it was only a 3% gain over Q2 2004, (to $86 million), out of an EDA industry worth $1.1 bil-lion. But it's a growing segment.
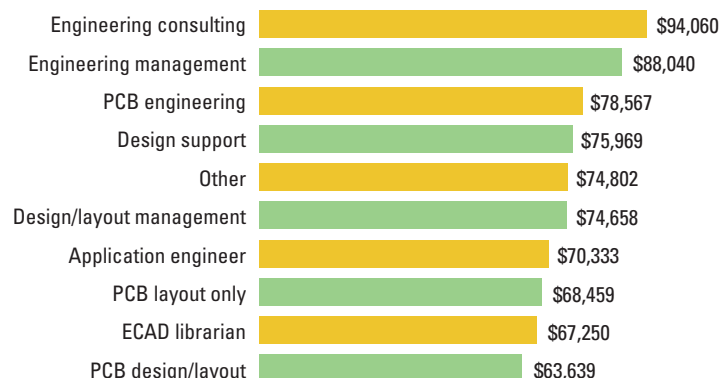
And manufacturing keeps expand-ing. The Institute for Supply Manage-ment recently polled America's supply executives in 16 industries, including Electronic Components & Equipment, and Industrial and Commercial Equip-ment and Computers. ISM reported that the manufacturing sector grew in September for the 28th consecutive month, with the overall economy grow-ing for the 47th consecutive month.

Despite ongoing outsourcing wor-ries, the sky hasn't fallen for most PCB design professionals, and salaries are moving slowly upward.

Readers' salaries have been creep-ing northward for the past decade. The average base salary for the PCB design and layout job function rose slightly over the same period, from $61,123 in

TABLE 1. Averages at a glance

Overall age of respondents – 45
Male age – 45
Female age – 46
U.S. male base salary– $70,460
U.S. female base salary– $69,254
U.S. base salary – $70,317
Canadian base salary – CAN$63,202
Ontario base salary – CAN$65,770
Nova Scotia base salary – CAN$49,326
Paid vacation days offered – 18.3
Actual vacation days – 14
Holidays – 9
Other paid days off – 5
Percentage laid off in last 12 months – 3.5%
Weeks unemployed if laid off – 22

Job function	Average U.S. base salary
Engineering consulting	$94,060
Engineering management	$88,040
PCB engineering	$78,567
Design support	$75,969
Other	$74,802
Design/layout management	$74,658
Application engineer	$70,333
PCB layout only	$68,459
ECAD librarian	$67,250
PCB design/layout	$63,639

FIGURE 1. Average U.S. base salary by job function.

TABLE 2. Average base salaries by city (each city had three or more respondents)

CALIFORNIA	
Santa Clara – $119,000	
San Jose – $106,110	
San Diego – $80, 625	
Sacramento – $63,000	
TEXAS	
Richardson – $69,200	
Houston – $67,180	
Austin – $97,250	
CANADA	
Toronto – CAN$58,500	
Ottawa – CAN$77,233	
Waterloo – CAN$62,000	
MISCELLANEOUS CITIES	
Tampa, FL – $85,000	
Tempe, AZ – $81,096	
Wilmington, MA – $73,000	
Melbourne, Australia – AU$72,566	
Syracuse, NY – $69,400	
Ft. Collins, CO – $69,333	
Peabody, MA – $69,246	
Tucson, AZ – $68,251	
Minneapolis, MN – $63,500	
Milwaukee, WI - $61,300	
Waukesha, WI – $55,000	
Cleveland, OH – $54,500	
Columbus, OH – $42,625	

2003 to $63,639 in 2005. But the average salary for the PCB engineering job function rose from $63,426 in 2003 to $78,567 in 2005.

You've no doubt noticed that we've gone back to surveying PCB designers and design engineers simultaneously. We tried devoting separate salary surveys to PCB designers and design engineers, but it made more sense to survey all of our design-related subscribers at the same time. We need to have the information out to our readers in the fall, preferably in the November issue, when budgets are being drawn up.

On top of that, separate designer and engineer surveys didn't provide any more useful information. With the combined surveys, we've always cross-tabulated the data down through the job functions, which provides the most accurate salary averages.

This year we e-mailed a salary survey link to all *PCD&M* subscribers who indicated on the subscription forms that their job functions were PCB Design/Layout/Circuit Design/Circuit System Packaging Design/Other Design, or Design/System/Electrical Engineering. The survey was live from Aug. 10 to Sept. 10. "Respondents" in this survey were made up of PCB designers and design engineers, except when otherwise specified.

Big City Nights

Every year we try to make the survey more accurate, timely and useful to readers. For this survey, we broke down the average salaries for cities that yielded three or more responses. I was surprised by the wide differences in salaries from city to city, sometimes in the same state.

Location really is everything. In general, the highest-paying designer and design engineer jobs – and some of the most expensive places to live – are in California, with an average base salary of $85,226. Silicon Valley, as usual, has the highest average base salary – $119,000 for Santa Clara and $106,000 for San Jose (**TABLE 2**). But that's a high-rent district, one of the highest in the U.S. Does $100K go very far in the Valley, or are these six-digit-salaried people pulling a two-hour commute one-way?

Registering an average salary of $80,625 this year is San Diego, a city that's been ranked No. 1 in quality of life, but also not the cheapest place to live. We didn't have enough Los Angeles respondents this year to get a real average for that area. But the higher-paying design and engineering jobs tend to be farther north in California. Just don't get too far north of San Francisco, because the pay drops back off, as evidenced by

Sacramento's $63,000 average.

Massachusetts came in second this year (some years the Bay State has been first), with a state average base salary of $76,054. Peabody showed an average base salary of $69,246, and Wilmington hit $73,000. Those were the only Massachusetts cities with enough respondents to give us a useful average.

Colorado ranked third at $74,857, with Ft. Collins yielding an average base of $69,333.

Texas was fourth in terms of base salary averages ($72,552), but second only to California in the number of respondents. In general, Austin is the place to be for PCB designers in Texas, with an average base salary of $97,250. Most of this survey's Austin respondents checked the PCB design and layout job function, but they work for Dell, AMD and HP, companies that pay well.

Houston has been ahead of Dallas in the past, but this year Richardson (we had only one actual Dallas respondent this time) beat out Houston, $69,200 vs. $67,180. These were all PCB designer jobs too.

Base salaries drop steadily from $70K to $50K as we move through Illinois, Minnesota, Arizona, Florida, New York, Wisconsin and Ohio. But Tampa had a higher city average than San Diego ($85,000), followed by Tempe, AZ, registering $81,096. Tucson ($68,251) is statistically tied with the state average.
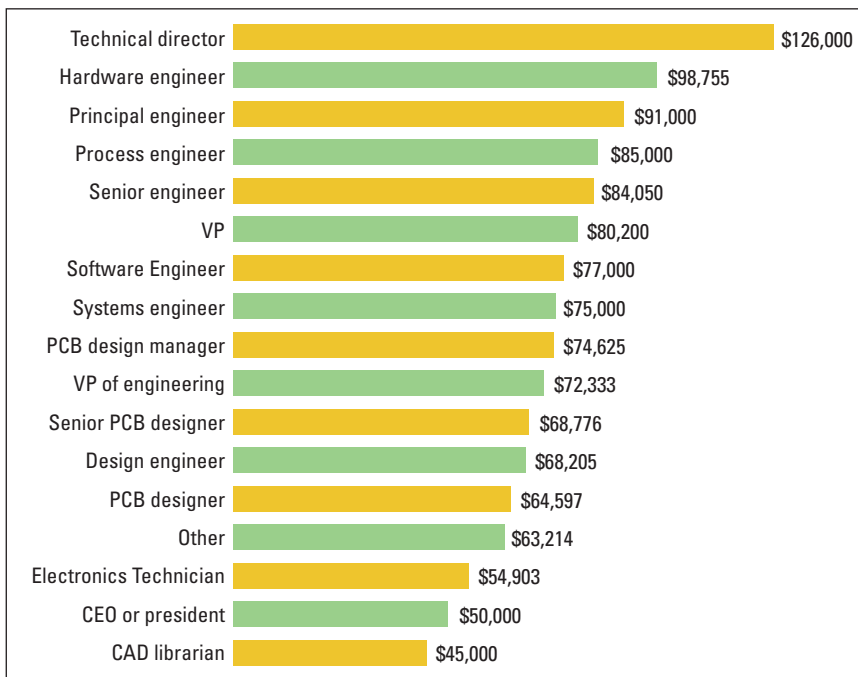
Minneapolis averaged a base salary of $63,500. Milwaukee's $61,300 beat out Waukesha's $55,000. Milwaukee is the hot spot for Wisconsin. (An HR manager working at a company outside metro Milwaukee told me she couldn't go by Milwaukee's average, because most of those employees worked at Big 3 automakers or their contractors, and thus made more than the average PCB designer or engineer. Her company's designer was making about $10,000 less than someone in the same job function in Milwaukee.)

It's not that expensive to live in Columbus, OH, but that fair city brings up the rear at $42,625, almost 25% less than Cleveland's average of $54,500. Is it that cheap to live in Columbus, or even Cleveland?

Canada showed a national base salary average of CAN$63,202, with the provinces of Ontario and Nova Scotia coming in at CAN$65,770 and CAN$49,326, respectively. Ottawa led the cities with CAN$77,233, followed by Waterloo at CAN$62,000 and Toronto at CAN$58,500.

TABLE 3. Average U.S. base salary by state

California – $85,226	
Massachusetts – $76,054	
Colorado – $74,857	
Texas – $72,552	
Illinois – $71,985	
Minnesota – $71,864	
Arizona – $69,163	
Florida – $65,350	
New York – $64,271	
Wisconsin – $57,219	
Ohio – $50,254	

FIGURE 2. Average U.S. base salary by job title.

Melbourne, Australia's average base salary of AU$72,566 is also the country's average, because all of our Australian respondents this year live in Melbourne.
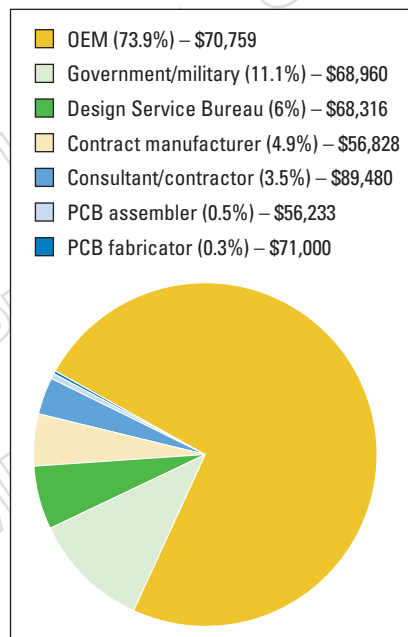
The rest of the countries had only one or two respondents apiece, so we can't provide you with a useful average base salary in Malaysian ringgits, for example.

If you live in one of the many cities not represented here, your city either yielded zero respondents or too few respondents to provide even a passably useful average. But if you live in one of these 11 states in **TABLE 3**, I may have one or two responses from your city, or from a town nearby. E-mail me your job function and city and I'll see if I can find some responses from your area.

FIGURE 3. Average U.S. base salary by company type.

Who Are You?

As with each survey, we learned that most of you are guys, with 89.2% of all respondents checking off male. Most designers and design engineers, 81%, are satisfied or very satisfied with their choice of career. But only 64.7% reported being satisfied or very satisfied with their actual job, and only 50.9% with their company's corporate direction and potential. A decent 49.1% were satisfied or very satisfied with their current compensation, but only 35.1% said the same thing about their advancement potential at that company.
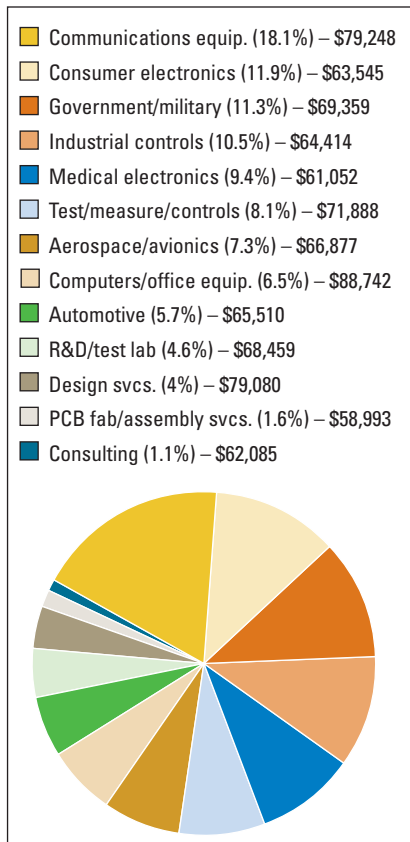
And 47.4% of respondents received a

bonus for personal or company performance within the last year. Apparently, a lot of you are happy with your career, current job and compensation, but you don't expect to be promoted in the future.

As usual, we found that most of you are, well, not young. This survey found the average age of respondents to be 45, with males averaging 45 and females averaging 46.

We've been tracking the "graying of the industry" for years. In this survey, 24.1% of respondents had 21-25 years of experience, while only 5.8% had five

Communications equip. (18.1%) – $79,248
Consumer electronics (11.9%) – $63,545
Government/military (11.3%) – $69,359
Industrial controls (10.5%) – $64,414
Medical electronics (9.4%) – $61,052
Test/measure/controls (8.1%) – $71,888
Aerospace/avionics (7.3%) – $66,877
Computers/office equip. (6.5%) – $88,742
Automotive (5.7%) – $65,510
R&D/test lab (4.6%) – $68,459
Design svcs. (4%) – $79,080
PCB fab/assembly svcs. (1.6%) – $58,993
Consulting (1.1%) – $62,085

FIGURE 4. Average U.S. base salary by end product/service.

years of experience or less. A mind-boggling 65% of respondents had from 16 years to over 30 years of experience. A lot of you senior designers have your eyes on retirement property, and there isn't another big group of designers working its way through the system to take over your jobs (assuming there are still design jobs to be had).

We've been asking about lead-free design for the last few surveys, and the percentages of respondents involved in designing for lead-free manufacture has risen steadily. On this survey, 54.5% of respondents said they'd worked on lead-free designs.

From this survey, it appears that a lot of you (71.7%) would like to know more about IPC standards. Only 28.7% of respondents were CID certified, and only 41% of employers support CID certification.

Function Over Form

Over the years, we've found job function – what you actually do for a living – to be a more accurate way of comparing base salaries than by using job titles. So we'll start by looking at job functions (**FIGURE 1**).

The engineering consulting job function took the top spot, with an average base salary of $94,060, followed by engineering management at $88,040 and PCB engineering at $78,567. Design/layout management brought in $74,658, while PCB design/layout came in at $63,639. Why PCB layout came in ahead of design/layout at $68,459 is a mystery. PCB layout is usually farther down in salary; we may have happened to reach the best-paid layout-only people in the industry.

Going by job title is a bit riskier (**FIGURE 2**). The technical director job title leads the way at $126,000, followed by hardware engineer at $98,755 and assorted engineering titles. The senior PCB designer came in at $68,205, which is an aberration. The PCB designer title hit $64,597, about equal to the design/layout job function. The CEO or president title averaged $50,000, but that's due to the prevalence of designers who own their own service bureaus.

As usual, most respondents (73.9%) work at OEMs (**FIGURE 3**), earning an average base salary of $70,759. Government/military came in second (11.1%), pulling in an average of $68,960, and the rest of the company categories are in single digits.

The largest category of end-products (**FIGURE 4**) produced by respondents was communications equipment (18.1%), whose employees averaged $79,248 per year. Consumer electronics came in at 11.9%, with an average base salary of $63,545, followed by government/military (11.3%) at $69,359.

All in all, 2005 has been full of challenges for the PCB design community, but what else is new? Some of you wouldn't want it any other way, but some of you have just about had it with PCBs. Check out the responses in the respondents' comments box.

As always, we hope the results of this survey help you convince your manager to give you a raise. Even if you're one of the majority who are apparently satisfied with your current income. **PCD&M**

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