

AVIATION WEEK

NETWORK

Aviation Week Executive Intelligence Special Report

Despite concerns about the future, new college grads being hired to fill just 13% of jobs

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Executive Summary

For the past 20 years, Aviation Week has conducted the Workforce Study to answer some basic questions about the aerospace & defense (A&D) industry's ability to meet ever-changing customer requirements through the innovation, ingenuity and capability of its people.

To answer these questions, Aviation Week conducts three different studies:

- A corporate study regarding hiring, demographics and factors important to employees as they make career decisions.
- A survey of students at universities identified as preferred suppliers of new hires to the A&D industry.
- A survey of young professionals at a selection of organizations representing the industry in terms of size, technologies, and geography.

Baseline findings for 2016:

Is the industry hiring and retaining the right people to ensure a talent pipeline for the future?

- The industry hired just over 50,000 people in 2015.
 - 13% were new college graduates
 - 8% were returning active-duty military personnel
 - 15% were hired from other A&D organizations

How well is the industry coping with the aging of the A&D workforce?

- Despite urban myths to the contrary, the percentage of employees over the age of 62 (commonly the age of retirement for individuals who do not have defined pension benefits) remains at less than 10% of the total workforce.
 - If industry hired no one, this would have a compounding effect that would result in the high percentages often cited; however, companies continue to hire and manage through the Baby Boom effect. .
 - The rate of employees eligible for retirement rose to 9.8%, and 27% of those eligible to do so did retire. However, they represented just 2.6% of the total A&D population, well below the rate of other industry categories (see page 19)
 - The average age of employees remains unchanged at 47 years.

Is the industry maintaining its luster as a top choice for the most talented individuals?

- In repeated surveys of employees and students, Aviation Week has identified technological challenge, professional development/learning, and respect for individuals as the top factors affecting career decisions.
 - However, pay also matters, and particularly with students, according to this year's data. A&D companies, on average, awarded pay increases of 4% in 2015, compared to a nationwide base pay increase of 2.9%
 - A&D companies are investing 4% of revenues, on average, into independent research and development and 3%, on average, of total payroll on employee learning (i.e., non-mandated educational/training programs e.g. Sarbanes-Oxley).
 - Respect for individuals is examined and measured using several factors, with voluntary attrition serving as the most observable of data. Voluntary attrition for A&D companies remains at a staggeringly low 5.6%, compared to 9.2% for all industry and 9.7% for high tech.
 - A&D executives are concerned about the loss of specific skills and experts—individuals—as much or more than they are about the quantity of those leaving their companies.

Recommendations

The following pages go into detail about the data gathered for this year's study. As the information was presented to a variety of audiences, recommendations emerged as to what to do with the data—how to move the needle on increasing the number of students pursuing science, technology, engineering and mathematics degrees; how to increase the diversity of the workforce; how to ensure, as an industry, that the talent and expertise needed to solve some of the world's toughest problems is at hand for the future.

Following are the recommendations emanating from those discussions:

- Enact policies to address STEM student loan debt, particularly among Black and Latino students.
- Increase “work-readiness” skills among new generation workers, particularly for non-exempt/hourly manufacturing employees via traditional vocational/technical education programs in the secondary schools.
- Develop a program to identify and make accessible transition programs to assist returning active-duty military personnel in qualifying for A&D employment.
- Better communicate the high-end benefits A&D companies provide, to include education, healthcare, career growth and variety, and importance/relevance of the work.
- Student loan use is lower among current engineering students, but 55% of the young professionals responding to the study indicate they used student loans. Companies are offering a variety of programs to assist their new employees with this cost, including offering an annual education stipend that can be used to offset tuition for advanced degree programs or be applied toward student loan payments.
- Ensure that young people “know someone in A&D.”
 - Continue engagement with students via industry-wide and company-specific initiatives.
 - Develop career guides to share with educational counselors and elementary, middle and high school teachers.

At the Top of Their Game

Aviation Week looks at the data collected and by our nature looked for the headlines or the most important takeaways. And most often those headlines relate to which companies and universities are doing the best job of identifying, developing, and keeping the best people.

For universities identifying the best of the best occurs through three different lenses—those that young professionals believe have the greatest influence on their careers, the preferred suppliers identified by employers on the basis of previous graduates’ success, reputation, and collaboration; and the universities where the most graduates were hired during the previous year.

Top Universities for A&D		
Preferred Supplier Universities	Universities where A&D Hired the Most New Grads	Universities that YPs Indicate Most Influence Careers
Pennsylvania State University	Univ of Central Florida	California Polytechnic / Georgia Institute of Technology
Embry Riddle Aeronautical University	University of Arizona	Embry-Riddle Aeronautical University
Purdue University	University of Washington	University of Michigan
Cal Poly/MIT/Univ of Maryland	Arizona State	Pennsylvania State University
Georgia Institute of Technology	Purdue University	

Source: 2016 Aviation Week Workforce Studies

The study also identifies the companies that meet the requirements identified by Aviation Week readers/users and young professionals in the areas of technological challenge, professional development, and valuing individual. Specifically, the *Companies Where A&D Professionals Want to Work* list was identified by:

Technological Challenge

- What percentage of your workforce is involved in engineering?
- What percentage of your senior leadership has an engineering, science or math degree?
- What percentage of your 2015 revenues was allocated for self-funded R&D?
- What percentage of 2015 revenues was generated by innovations introduced to the market/customers within the past five years?
- What are your hiring plans across engineering categories?
- What is your promotion rate among technical disciplines?
- What is your voluntary attrition rate within technical job disciplines?

Value/Respect for the Individual Questions

- What is the share of healthcare plan paid for by company?
- What is the average number of years of service among employees?
- What percentage of women are in senior leadership roles?
- What percentage of minorities are in senior leadership roles?
- What percentage of women and minorities are in other key business roles?
- What is your percentage of voluntary attrition?
- What is your average yearly base pay increase?

Professional Development/Learning

- What is your yearly percentage of promotions?
- What is your policy for tuition reimbursement?
- What percentage of your revenues is invested in non-mandated training/learning?
- What are your average hours of non-mandated training/education per employee per year?

The data gathered for this index creates a fair reflection for the image of this industry as an employer. Professional development and ongoing learning have been identified as critical factors when employees of all ages are making career decisions. For



instance, 5% of A&D employees are currently enrolled in some type of tuition reimbursement program. In terms of other educational programs, employees spent an average of 23 hours per year on non-mandated coursework, the vast majority of which is now offered via online resources. This contrasts sharply with 2011, when just 30% of the responding companies reported using online courses as a primary resource. The total price tag for this training and education was 3% of the industry’s payroll, with 14% of this used for tuition reimbursement programs.

The learning dollars represent just part of the effort to fulfill employee career plans designed to provide a pathway to long-term employment in the industry. Last year, 5.6% of all employees were promoted and better than 30% of the industry’s young professionals were promoted.

In terms of respecting the individual, potential employees look at a number of factors, according to the Aviation Week research. These include the diversity of the organization, the diversity of the leadership team, voluntary attrition levels, benefits provided and merit pay.

The diversity of the A&D leadership teams remains on par with that of other high-tech companies (see pages 14-15), with significant gains in terms of female leaders and ethnic diversity in the last two years. However, the overall diversity picture for A&D and high-tech remains dismally “the same” as it did 30 years ago. And the current pipeline of engineering students does not appear to be creating a substantially different situation. Nor has the industry tendency toward hiring white males really changed.

Technological challenge remains the top consideration in applying for a job. After that decision is made, then potential employees look at their ability to make a living, to advance their careers, and to have the benefits and flexibility they want and need.

As the list above indicates, the people and companies who are leading the A&D industry makes a difference to potential employees. At the end of 2015, 43% of the industry’s CEOs had engineering/science degrees. Their organizations were investing 4% of revenues into independent research and development, and 11% of those revenues were derived from products and services introduced within the past five years.

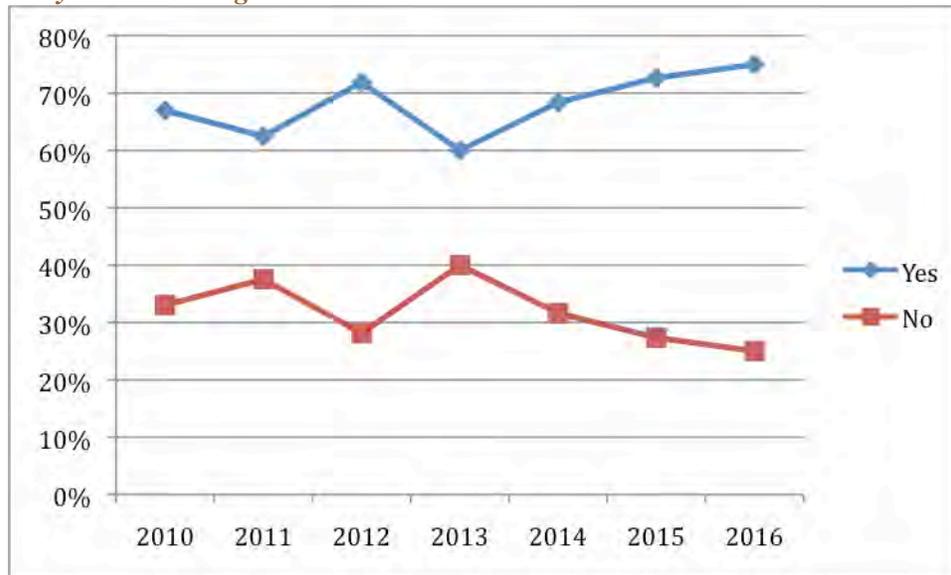
Technological Challenge	Respect/Value for Individuals	Professional Development/Learning
Analytical Graphics Inc. (AGI)	Acutec Precision Machining	The Boeing Co.
The Aerospace Corp.	Aurora Flight Sciences	The Aerospace Corp.
Lockheed Martin Corp.	Kellstrom	Pratt & Whitney

Students Outline Nuances of A&D Perceptions

The 2016 Aviation Week student survey was conducted at Pennsylvania State University, University of Colorado, Purdue University, Georgia Institute of Technology, University of Maryland, University of Central Florida, Iowa State University, California Polytechnic and Embry-Riddle Aeronautical University. Thirteen percent of the students responded to the online survey, well within the norms for a blind survey such as this one. Traditionally response rates have varied from 12-17% for the study.

The question industry most wants these students to answer is whether they are considering careers in A&D. This year, 75% of the students said they are considering A&D careers, up from 2015 and the highest level since the survey was launched in 2010. In turn, their negative responses have been falling since 2013, when 60% of the students responding said they were not interested in A&D as a career choice.

Are you considering a career in A&D?



Source: 2016 Aviation Week Workforce Studies

The number one reason given for interest in an A&D career was the technological challenge and interest in aircraft, defense and space. And the number one reason for not being interested was the environment in which the work occurs.

The Young Professionals Advisory Board crafted the wording of this question four years ago, but what exactly does “environment” mean?

The YPs assisting us with the study indicate there are two dimensions to the question. The first is the physical environment—a desk job, in front of a computer. The second is the mental or emotional environment of creating, building and delivering weapons. “We believe companies should look at changing the message they send about what they actually do,” the YP board advised. “It’s more about security and protecting our military than it is about destruction or conquering the world.”

High among the reasons (tied for fourth) that students cited for not considering careers in A&D is that they have never known anyone working in the industry. While this seems impossible to those who have joined a passionate circle of employees numbering 829,000 at year-end 2015, it is the reality—and a reality YPs believe can be altered.

Corporations already have extensive outreach programs at each level of education, from primary school through universities. The secret “sauce,” according to the young professionals, is in maintaining that contact with the students, their parents, and their teachers/counselors. Just

56% of the responding students said they felt that they had adequate knowledge of what a career in A&D entails.

Turning the Tables – What Students Believe Employers Want

Among the critiques of today's students is that they are not well versed in terms of work readiness, a factor that can be addressed only through experience. However, in the past our study examined what students need, not what industry needs.

This changed with the 2016 study, when the YP Advisory Board recommended asking students what they think the companies are looking for when hiring new graduates.

The results indicate students are in sync with hiring managers: they believe they are evaluated first on the basis of work experience—whether through internships, co-op assignments, or other work. The second-most important thing they believe hiring managers want to see is leadership experience, and finally a high grade-point average. “If these are, in fact, what companies consider most important, then the message is being heard,” the YP board reported.

The YPs also recommended asking about what students consider most important when they receive a job offer. The assumption, at this point, is that this is a job they want and thus attention shifts to which offer is best for that individual. At this point, the number-one concern is base pay, followed by the location, healthcare benefits, and flex time/vacation days.

Finally, the students were asked to identify the job-search tactics they use. Online job application was listed as the most often-used tool, followed by on-campus career fairs and networking.

What's interesting is how the companies have changed their approach to these tactics. Input from AIA's Workforce Policy Council indicates recruiters provide their contact information at job fairs, urging the student to fill out the job application but also to stay in contact. In other instances, recruiters at job fairs held at universities designated “preferred suppliers” go armed with all that is needed to extend a job offer on the spot, pending completion of specific requirements (such as drug testing, ability to obtain a security clearance, or graduation).

“Completing the job application online is one thing, but having the ability to follow up with a real person is the most preferred situation—whether that person provided his/her card at a job fair or is a known individual,” according to the YP board.

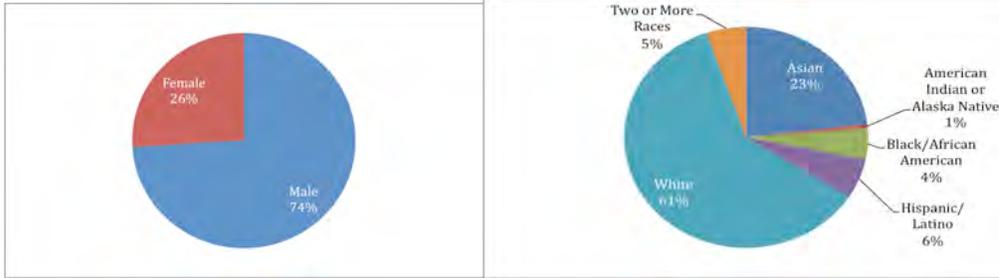
Identifying Additional Student Trends

Another piece of data important in this study is the use of student loans by engineering students. The respondents to our study indicate they are using loans, but the percentage has dropped—from 46% in 2012 to 37% in 2015. Student loan use is highest among Black/African-American students, at 53%, and Hispanics, 44%. Student loan use was lowest among Asian-Americans, 22%.

This contrasts with the young professionals, 55% of whom reported using student loans to pay for college. Of those who used student loans, 39% are still repaying them.

Finally, because the A&D industry continues to struggle with diversity, the study looked at the demographics of the student respondents. There has been no significant change in the gender demographics since the study began in 2010. This year's cohort of Black students actually dropped from last year, a statistic that was verified in conversations with Darryll Pines, dean of the School of Engineering at University of Maryland who referred to accreditation statistics for U.S. engineering schools. “We made some progress, but then two years ago began seeing a slight decline,” Pines explained at the 2016 AIAA SciTech event in San Diego. The percentage of Latino students rose two years ago, and has remained at approximately the same level for the past two years.

Student Respondent Demographics



YPs Look to Career Movements as Means to an End

When Aviation Week, AIA and NASA launched the young professionals' study in 2010 as a companion to the corporate study, the purpose was simple: to determine why so many young professionals were leaving their jobs.

And as with most data points, there was the reality of the data and perceptions. The perception was that A&D companies had inordinately high voluntary attrition among younger employees (those under age 35).

As the use of workforce data analytics began to take hold across the industry, leaders wanted to put perceptions aside and find out what really was going on. What they found is that in fact YPs were voluntarily leaving their jobs more than any other segment of the A&D workforce. The numbers have varied over the years from 21% of employees under age 35 in 2009 (a percentage that was determined by obtaining percentages from all companies, and then averaging them in an unweighted manner), to this year, when 31% of the YPs changed jobs but only one-quarter of those changes involved leaving their company.

The difference can be attributed to two factors. First, that “percent of percentages” was as good as it got at the time, but was not terribly accurate. In the years since, companies have become much more sophisticated in their data-gathering tools and analytics, applying the statistical analysis used in engineering to their strategies to attract talent. The second thing that happened was an explosion of interest in aerospace and defense, attributable in no small part to a new generation of entrepreneurs who cut their chops in Silicon Valley and are now cobbling together an all-new space race. Note that legacy companies are also in the middle of the fray, not just the newcomers, and having to compete with the new upstarts, making for an energy level not seen in the industry in more than two decades.

The YP Advisory Board also weighed in on interpreting this year's data. Job movement, the board said, is “a means to an end, i.e., to obtain the skills necessary for advancement.”

In a common perception, the industry's more senior workers viewed their “younger selves” as team players, going where the company needed them and waiting to be tapped on the shoulder for a plum assignment.

Today's young professionals “want a pathway to greatness.” In other words, they are looking to their organization to define steps and requirements to move from point A to point B and to “not only develop a plan, but stick with it as the YP progresses and meets goals along the way.” Points A and B do not necessarily have to be along a trajectory of promotions either; lateral moves are seen as advantageous as well.

The promotions data was of particular interest when looking at diversity factors. Half the responding YPs who changed jobs last year did so as the result of an internal promotion. However, 40% of the Black YPs responding to our study reported never having been promoted; this figure was 39% for Latino employees. Among white employees the percent that had never been promoted was lower, at 32%.

Also, in the past promotions were a matter of time on the job/experience; “today we are told it is based on responsibilities and skills.” But is it?

In all, 31% of the YP respondents changed jobs last year, but only 25% of those job changes involved moving to a new employer. And an even-smaller percentage—19%— of those who changed companies left the industry. This low percentage was the case despite the numerous stories of A&D engineers being poached by Apple, Facebook, Google and Amazon. In fact, these four companies (known as GAFA) have hired robotics and autonomous-systems engineers—but in this way are operating as part of the A&D and automotive industries, and in many ways merely represent new competitors whose motivations differ but whose capabilities are similar.

Interestingly, that 31% number is lower than what had been anticipated. Of the YPs responding to our survey, 40% thought they were going to make a job change within the year. And 36% of the respondents anticipate their careers will change in 2016.

Young Professionals and Debt

For the past three years, our study has looked at student loan debt carried by YPs and has continued to look at what is going on with the current student population. This year, 37% of the responding YPs are carrying student loans today and 55% used student loans while in school. That's down from 46% in 2012. Some of those loans carry interest rates of up to 8.5%. However, even more startling is the data with regard to Black and Latino YP use of student loans.

Student loan use is highest among Black YPs (53%) and Latinos (44%), and lowest among YPs of Asian heritage (22%). Among today's university students, the data are similar.

Those student loans could grow as young professionals view graduate or additional degrees as important to their career objectives and what their employers expect. For 2015, about 5% of the industry's workforce was in some type of tuition reimbursement program, carrying a high cost for the companies (far beyond the cost of having your dog at work, an on-site concierge or dry cleaners)—representing 3% of the industry's payroll.

But the YPs are clearly concerned about who will be paying for those advanced degrees in the future. Fully 70% plan to return to the classroom, about evenly split between aspirations for an advanced technical degree or an MBA.

The Corporate Workforce Study

Aviation Week, the Aerospace Industries Association and PwC jointly sponsor the annual workforce study, in cooperation with AIAA.

The original intent of this partnership was to ensure that a single source of credible workforce data for the industry is available. Aviation Week has some concern about recent data provided by AIA from a second resource, Information Handling Services (IHS), indicating that we again face a situation of two very different stories for different purposes. The IHS data provides a valuable tool in addressing the economic impact of the industry. However, it is inconsistent with the workforce data developed by this partnership.

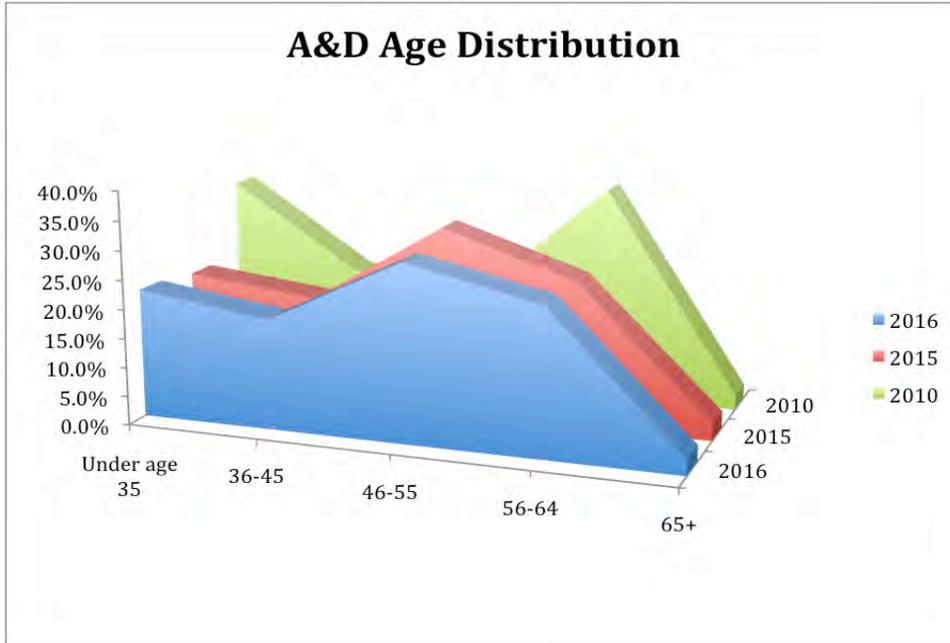
IHS estimates the A&D workforce at 1.7 million. However, this is an all-inclusive number and extends well beyond the population of workers who create, develop, build and sustain the systems and platforms that are the base of the industry to include related support services (for example, facilities management, consulting, tax advisory, etc.). Aviation Week, relying upon both U.S. Census data and NAICS coding, places the base A&D industry employee headcount at 829,000.

2016 Workforce Study Respondents (% of Total)			
Companies with Less Than 1,000 Employees	Companies with 1,000-9,999 Employees	Companies with 10,000-49,999 Employees	Companies with More Than 50,000 Employees
23%	35%	26%	16%

This year the survey instrument was sent to 205 companies in the U.S., with 15% responding. The metric more closely watched than response rate, however, is the employee headcount represented by the responses. For this year, 66% of the industry’s workforce—or 546,186 employees—is represented by the study’s results. Note also that a year ago the 31 companies responding would have been 38 companies, reflecting the pace of mergers and acquisitions in the mid-tier market sector. Also note that one of the largest employers that responded last year did not respond this year.

Demographics: Age

The A&D industry has gone through its middle-age crisis and appears to have managed through it well, using emerging technologies as a basis for hiring new, younger workers while incentivizing veteran employees to take retirements at a manageable rate. Overall, the result has been a smoothing of the age curve to eliminate cliffs and create gradual slopes in the generational distribution of workers.



Source: Aviation Week Workforce Studies, 2010/2015/2016

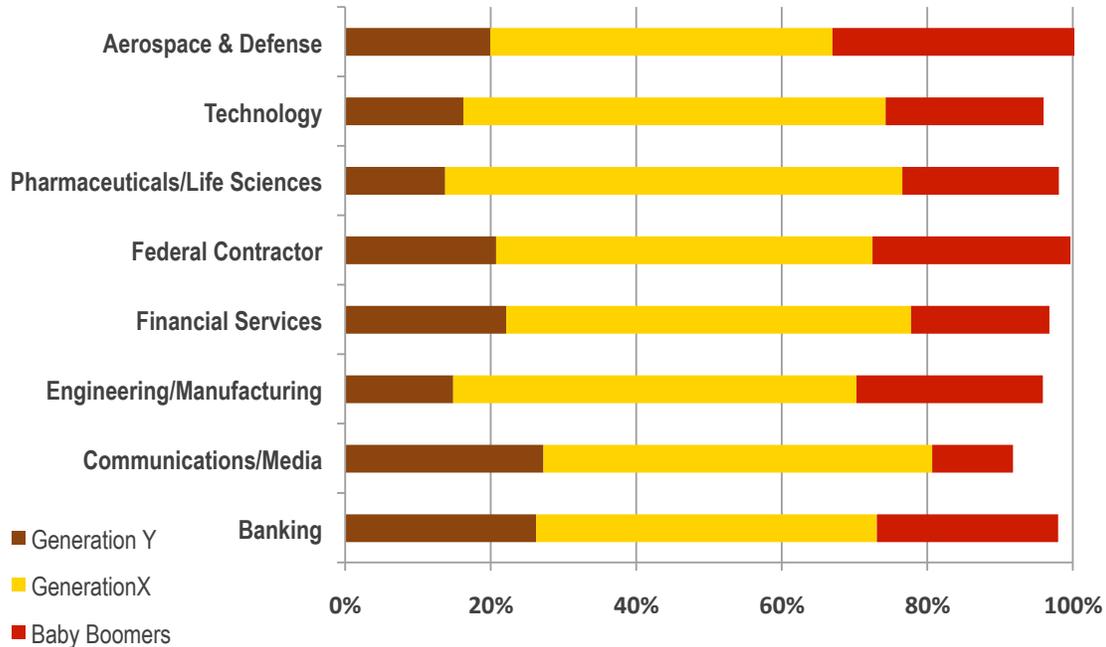
The industry’s average employee age is 47 years, a number that has not changed in four years. This is also the same average age for the engineering profession in the industry. However, for business development/strategy positions (normally a career path for engineers and retired military personnel) it is 52 years of age, and for program management it is 51. In addition, there has been concern about the aging of the manufacturing workforce. For exempt (salaried) manufacturing personnel the average is 51 and among hourly (non-exempt) manufacturing employees, the average age is 50. The average age for the commercial sector is slightly younger than that for the space, defense and “other” sectors.

The study also looked at the age distribution by industry sector—commercial, defense, and other. This is where the difference for the commercial sector is best illustrated, as 24% of the sector’s employees are under 35 and just 2.3% are over age 65.

Industry Age Distribution by Company Size					
	Under age 35	36-45	46-55	56-64	65+
Companies with Less Than 1,000	31.0%	21.1%	24.1%	20.1%	3.8%
Companies with 1,000-9,999	20.3%	20.4%	29.1%	25.6%	4.7%
Companies with 10,000-49,999	21.7%	20.8%	30.1%	24.7%	2.6%
Companies with More than 50,000	22.4%	18.4%	30.8%	25.7%	2.7%

Working with PricewaterhouseCoopers (PwC), we also gained access to age distribution across multiple industry sectors from Generation Y (individuals born in the mid-1970s through mid-2000s) through Baby Boomers, those born between 1945-1964.

Age Distribution by Industry Category



Source: PwC/2015 Saratoga Industry Benchmarks

As this chart indicates, A&D has the most significant population of Baby Boomers still at work. Just 16 years ago, at meetings of A&D engineers, more than a few individuals expressed disappointment in the industry and at one professional meeting held in Albuquerque, New Mexico, more than one engineering executive said he would not encourage his child to go into the industry. That opinion is not as common as it might have been then, as more than a few industry leaders are leaving their current employers as retirees only to land at another company to begin a next phase of work.

It is also worth noting that engineering/manufacturing have a similarly strong Baby Boomer population, but fewer workers in their 30s-40s (Generation Y). Note also the technology sector, which has fewer individuals in the Generation Y category.

Demographics: Ethnicity

There is no workforce metric that has been more stubborn in terms of movement than that of ethnicity. Until this year, Aviation Week has gathered one data point—EEO under-represented minority groups. And throughout the years, this overall number has held relatively steady at 24%. This percentage did not include employees of Asian descent.

However, as with all data, the more specific and granular the data grouping, the more reliable is the data. For 2015, we examined ethnicity by looking at distinct ethnic groups: American Indian, Asian-American, Black, Latino, White and Hawaiian/Pacific Islander. This better aligns industry data with that of the Defense Department, Federal Aviation Administration and NASA.

This review found that the Asian-American workforce accounted for 7.7% of the total, and another 68.5% of employees are white. Again, the remaining ethnicities account for 23.7% of

the population—quite similar to the previous data point—and reflecting little, if any, noticeable change.

This should not be surprising. Of the young professionals responding to our survey, 74% were white and 10% Asian-American—easily setting the dynamic for a workforce that continues to lack ethnic diversity.

Demographics-Ethnicity	% American Indian	% Asian American	% African-American	% Latino/Hispanic	% White	% Hawaiian/Pacific Islander	Other
Overall	0.7%	7.7%	6.7%	6.3%	68.5%	0.4%	9.7%
Companies Under 1,000	0.5%	4.1%	4.8%	11.1%	74.4%	Insufficient Data	5.2%
Companies 1,000-9,999	0.3%	6.7%	6.2%	6.0%	53.2%	1.3%	26.5%
Companies 10,000-49,999	0.4%	6.3%	7.1%	8.3%	56.8%	1.0%	20.2%
Companies 50,000 +	0.8%	9.2%	7.0%	6.5%	71.8%	0.4%	4.3%

We also looked at the specific data for employees in engineering, as this remains the industry’s core competency and most important requirement for innovation and growth. The percentage of employees has essentially remained stagnant for the American Indian and Latino/Hispanic groups since we began looking at this data in 2005.

ENGINEERING Demographics-Ethnicity	% American Indian	% Asian American	% African-American	% Latino/Hispanic	% White	% Hawaiian/ Pacific Islander
Overall	0.5%	10.5%	4.3%	5.5%	75.3%	0.2%
Companies with under 1,000 headcount	ID	10.9%	1.9%	3.7%	72.1%	ID
Companies 1,000-9,999	0.3%	9.7%	2.8%	3.5%	75.5%	ID
Companies 10,000-49,999	0.4%	8.1%	3.2%	3.9%	82.0%	0.1%
Companies with more than 50,000	0.6%	11.2%	4.8%	6.1%	73.4%	0.3%

The smallest of companies, those with fewer than 1,000 employees, continue to struggle with building diversity. However, most surprising is that companies with 10,000-49,999 employees have the greatest challenge, as they continue to be predominately White organizations. The largest companies—those with more than 50,000 employees—have the highest proportion of Black and Latino employees.

We also looked at ethnic diversity among senior business leaders across A&D, based on the input from our advisory boards that when individuals who see people who look like them experiencing success, they are more able to envision that success for themselves. Unfortunately, there has been very little change in the ethnic composition of A&D leadership in the past three years; 9.8% of engineering executives are non-white individuals and 11.8% of industry executive leadership overall is comprised of non-white employees.

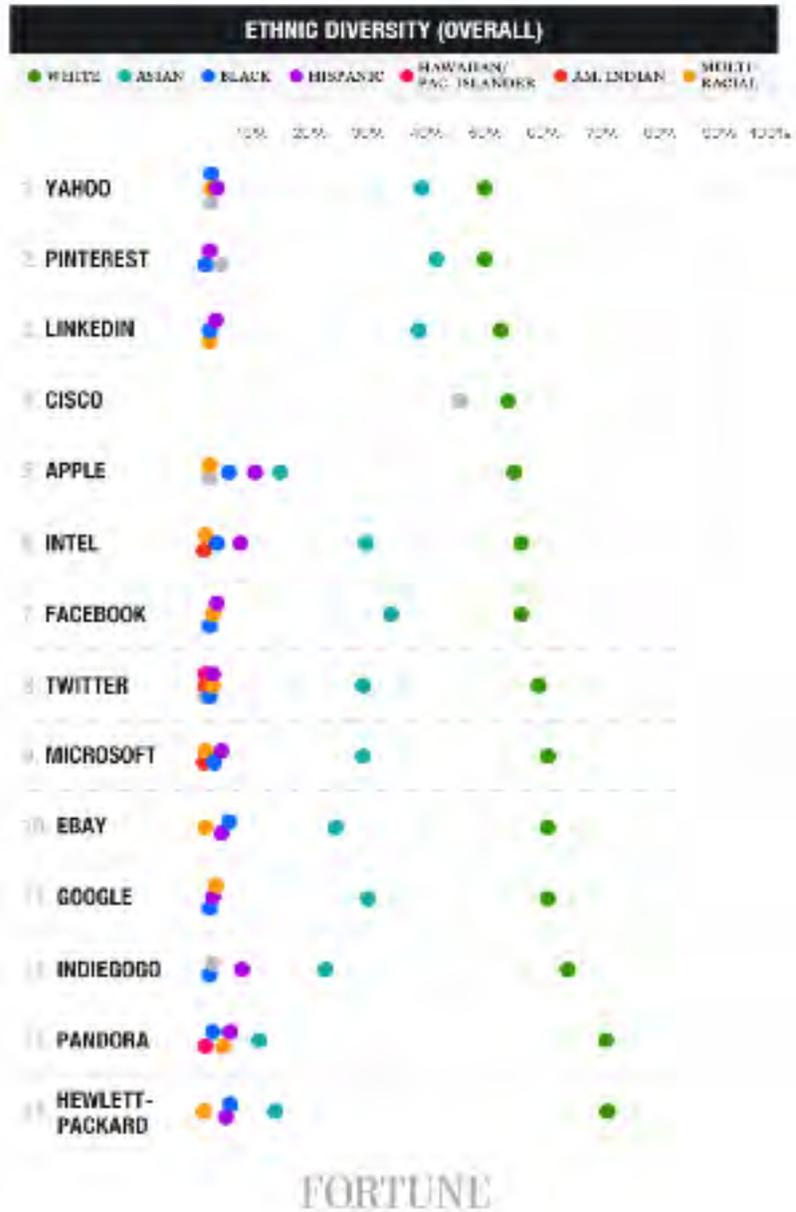
	2016	2015	2014
Women in A&D	21.9%	23.5%	23.7%
Women in Engineering	14.5%	14.6%	11.2%
Female Engineering Executives	10.98%	10.5%	5.1%
Female Executives	20.4%	19.4%	15.5%
Under-Represented Populations in A&D	21.6%	23.6%	12.8%
Under-Represented Populations in Engineering	21.1%	22.9%	20.2%
Under-Represented Populations/Engineering Executives	9.8%	9.7%	9.9%
Under-Represented Populations/Executives	11.8%	11.3%	7.8%



Comparing A&D Ethnicity

While it is easy to fault the performance of A&D companies about a lack of diversity, it is similarly easy to fault other high-tech industry sectors in the same way.

Fortune magazine compiled statistics on ethnic diversity among 14 of the largest high-tech companies and the numbers are equally dismal. Hewlett Packard's workforce is comprised of more than 65% White employees, and right at 15% for employees of Asian descent—much lower than that for Yahoo, Pinterest, or LinkedIn. Apple recorded 55% as its White population, with 15% employees of Asian descent and 11% Latino—the highest Latino percentage in the high-tech sector.



Demographics: Gender

There is no doubt that the presence of women in the executive ranks of A&D companies has increased in a visible way. With women at the helm of organizations ranging from The Aerospace Corp. (Wanda Austin is to retire and is being replaced by a man), to General Dynamics, Boeing Defense Space & Security and Lockheed Martin.

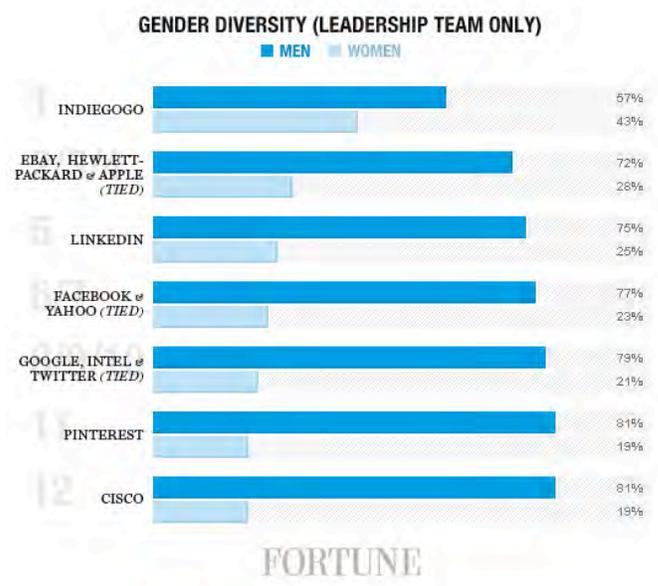
However, the reality is that the presence of women in the A&D workplace—as with ethnic diversity—has not changed much over the past three decades. Notably, the percentage of women in A&D is highest in smaller companies, while larger companies continue to struggle to change the numbers. This is also relevant when considering that in the Young Professionals' study 30% of the respondents were women, indicating that women are leaving the industry at a higher rate than are men.

Demographics-Gender	% Women
Overall	21.9%
Companies with under 1,000 headcount	24.4%
Companies 1,000-9,999	21.3%
Companies 10,000-49,999	19.4%
Companies with more than 50,000	19.9%

We also gathered data relating to the percentages of women in leadership positions. Perceptions in fact are accurate in this case—the percentage of female business executives has increased by 5% over the past three years. And the rate of women executives in engineering has also increased, more than doubling in the same three years.

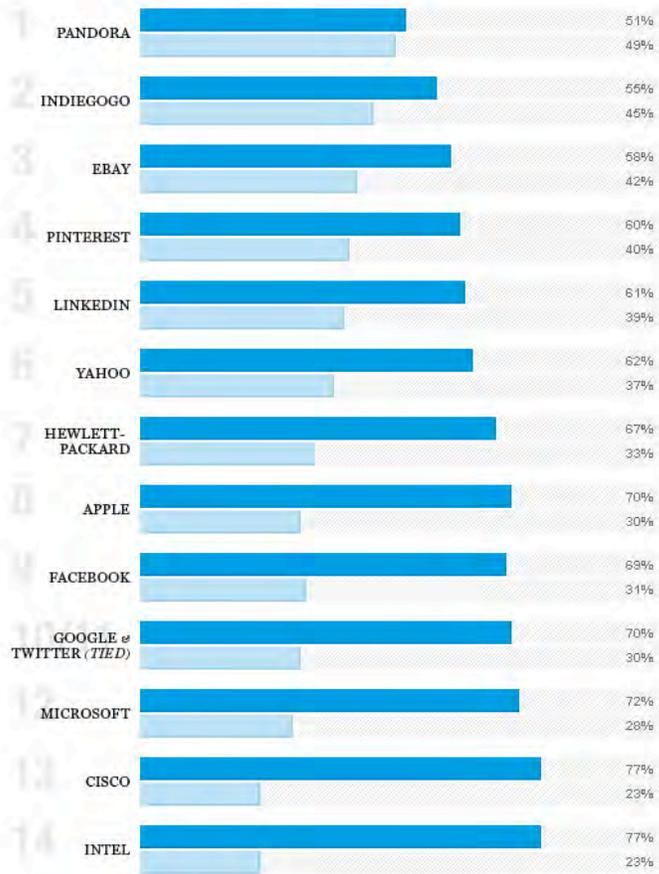
	2016	2015	2014
Women in A&D	21.9%	23.5%	23.7%
Women in Engineering	14.5%	14.6%	11.2%
Female Engineering Executives	10.98%	10.5%	5.1%
Female Executives	20.4%	19.4%	15.5%

So how are other companies and industry sectors doing with regard to diversity—and it does matter as aerospace and defense focus on discrete talent requirements rather than sheer numbers. Pre-breakup Hewlett Packard, Apple and eBay tied with 28% of executive roles occupied by women, compared to A&D at 20.4%. Crowdfunding website Indiegogo is leading the industry category; 43% of its employees are women. Overall, Pandora had the greatest percentage of women, with 49%, followed by Indiegogo at 45% and eBay at 42%. Facebook ranked #9 in its proportion of women in the workplace at 31%, and 23% women in executive roles. Google’s leadership team includes 21% women, and 30% of the company’s 56,000 employees are women.



GENDER DIVERSITY (OVERALL)

■ MEN ■ WOMEN



FORTUNE

Attrition: Voluntary, Involuntary and Retirements

During the review of data on retirements and attrition rates, it became clear that perceptions continue to far exceed the reality of the retirement situation within the A&D industry. In addition, some companies counted buy-out retirement packages as involuntary separations, while others simply recorded it as retirement. However, the granularity of the study’s data continues to improve as such issues are identified, and a much clearer snapshot of this situation is available this year.

Retirement

Of particular note is that despite the aging of the workforce, A&D’s retirement rate continues to be staggeringly low at 2.6% of the total workforce—or 9.8% of those who were eligible. As of year-end 2015, 26.8% of the workforce had qualified for retirement, or 237,094 of the 829,000 people working in aerospace and defense. And just fewer than 23,700 took retirement.

Interestingly, the rate of engineers qualified to retire (which this study defines as those over age 62) was 8.2%, and 24% of those qualified to retire did so. The largest of companies had the highest ratio of those taking retirement, at 28% of those who were eligible. Using as an example a company of 100,000 employees, 8,000 employees qualified to retire and of these, 2,240 actually did so.

Manufacturing, a job category that leaders continue to carefully monitor, had higher rates of retirement. Overall, 10.5% of non-exempt (hourly) manufacturing workers qualified to retire, and of these, 30.8% did so.

Comparisons	2016	2015
Overall % Employees Qualified to Retire	9.8%	8.5%
% of Total Population Retired in 2015	2.6%	1.7%
% of those who Qualified Who Did Retire	27%	20.3%
% Engineers Qualified to Retire	8.2%	8.0%
% All Engineers Who Retired	2.0%	1.3%
% of Engineers Qualified Who Did Retire	24.1%	16.0%

Attrition rates

While retirements are of concern, so too is attrition. The industry has long experienced voluntary attrition as a reflection of the nomadic nature of the work and the rapidly changing needs of the government, not to mention politics and shifting budgets. Individuals follow technological opportunity, which in this case means programs of record. As competitions are won and lost, employees follow—creating the tight sense of community among A&D employees that other industries may not enjoy.

Attrition Overall	% Voluntary	% Involuntary	% Total Separations/Population
Overall	4.3%	insufficient Data	Insufficient Data
20-25 yr olds	13.5%	5.2%	18.7%
26-30	11.6%	3.9%	15.5%
31-35	9.4%	3.6%	13.0%
36-40	7.3%	3.6%	11.0%
41-45	6.0%	3.9%	9.9%
46-50	4.1%	3.9%	8.1%
51-55	2.9%	4.0%	Insufficient Data
56-60	2.5%	5.3%	7.8%
61+	3.4%	9.2%	12.6%

Source: Aviation Week 2016 Workforce Study

For the first time, this year we looked at attrition for all age levels and voluntary as well as involuntary attrition rates. As the data indicates, the percentage of involuntary separations runs much lower than the Jack Welch-touted 10% metric (rank employees in each organization and cut the bottom 10%). Also, HR executives indicate that the high rate among those who are 61 years or older includes buyout packages offered by at least one of the largest companies.

Of most concern, as always, is the voluntary attrition rate among those who are under 35 years of age. And, as could be expected, this is where the highest rate does occur. However, the fact that total separations in this age demographic remain low is a testament to the “passion factor” that attracts people to the industry initially.

And, as our YP study data indicates, the reasons for leaving most often have to do with promotions or new opportunities. In all, 5.6% of the workforce was promoted in 2015, including 8% of the industry’s engineers.

The attrition rate for women across the industry was 7.3%, slightly higher than 6.2% for men. In addition, the voluntary attrition rate for Blacks was 8.7% and 7.8% for Latinos, versus 5.9% for Asian and 6.2% for White employees.

The Young Professionals' Study indicated that the primary reason for leaving was opportunity/salary, but location also plays a role, particularly with Latino and Black employees.

Voluntary separation is lowest in A&D



As the industry comparison illustrates, the attrition rate for A&D is low, with only the chemical industry coming close to a comparable rate. Technology has dipped into the single figures for the first time in the past 15 years.

It's more than the numbers

However, it is not the numbers or percentages in the attrition data that concern A&D leaders. Rather they are concerned about those experts who left Carnegie Mellon and went to Uber. Critical skills and expertise—the individual—represents as much a risk factor as does the quantity of those leaving the industry.

Hiring

There's no doubt that A&D leaders are taking notice of competition for the best and brightest from new quarters. It is easy to say this is a Silicon Valley-based threat, but the fact is that companies such as Facebook, Amazon and Google are entering market space that has—up until recently—belonged to A&D. Autonomous systems and satellite capabilities are now critical to the growth of Amazon's reach, of Facebook's connectivity, and of Google's ability to provide internet services to regions where none is currently available. And all of this explains why Facebook now shows up on the AIA roster of members, and why Uber had to pay its way out of a lawsuit claiming the taxi-like service had lured away the majority of Carnegie Mellon's robotics brain-trust.

What Employees Want

There's no doubt that money talks. However, it is important to note that today's students and YPs know the difference between spiffy—but meaningless and inexpensive—perks and long-term opportunity. Assuming the technological challenge offered is equal and base pay strong, employees are looking for continued learning, great benefits, and flexibility. Concierge services are more common in companies with expectations of employees working 24/7, and candies in barrels and ping-pong tables do not make up for a lack of healthcare benefits. All are programs that A&D leaders continue to work to develop in the aftermath of cancelling defined pension plans for new employees.

In 2015, the average base pay increase for A&D employees was 3%, slightly higher than the 2.8% average across all U.S. companies, according to Mercer's Compensation Planning Survey. The firm forecasts a 2.9% increase in 2016.

Healthcare benefits are listed among the top concerns employees have when considering a job offer, and A&D is outpacing other industries in this category. For 2015, employees were paying, on average, 18% of the total cost of healthcare plans, down from 20% last year. One-quarter of the responding companies reported adjusting the ratio of healthcare plan costs that employees pay during the past year.

Hiring 2015

As in years past, Aviation Week asked companies to report on the previous year's hiring, and to forecast current activity. A year ago, industry leaders said they needed just under 32,000 people to fill positions that included both new jobs and replacement hiring (as a result of attrition and retirements). In fact, the industry hired 53,713 people—compared to just over 50,000 in 2014. In addition, the responding companies reported hiring 7,450 contract workers in 2015.

Of those hired full-time, 7.8% were returning active-duty military personnel and 13% were graduates from universities. The vast majority of the new hires were in engineering and non-exempt (hourly) manufacturing. Together they accounted for close to 23,000 of the total hiring.

The impact of internships is worthy of note in the job recruitment process, and contributes significantly to an industry-wide acceptance rate of 81% to offers extended.

Hiring 2016

Industry leaders anticipate hiring 30,975 individuals in 2016. And if past is prologue, this will translate to about 54,000 total hires for the year.

Among the variables to be considered in the forecast is the number of manufacturing employees required. Our HR advisory board indicates that the growth of job categories does vary by location, and rolling up the exact demand for manufacturing employees at the corporate level does not occur in a consistent manner. To get a better idea of job descriptions, requirements for those jobs, and exact hiring plans, Aviation Week currently is conducting a study of manufacturing hiring in the Southeast region (defined as North Carolina, South Carolina,

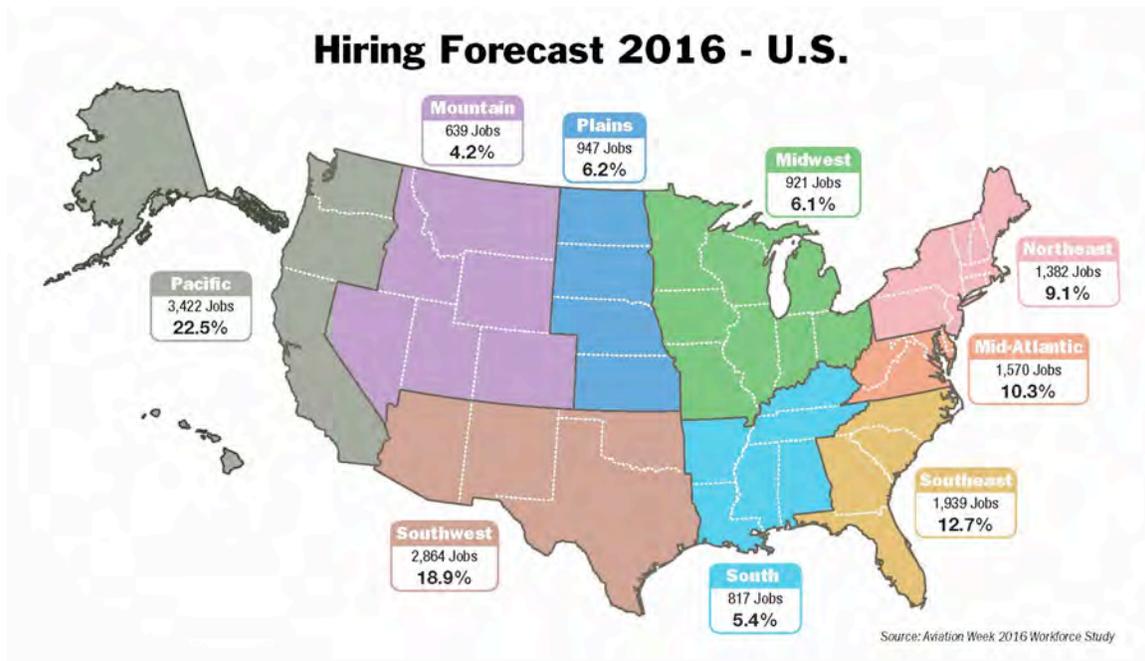
Georgia, Alabama and Florida). This data will be made available to responding companies in September.

Hiring will focus on engineering, but there is also critical demand for enterprise information technology/architecture personnel and for non-salaried manufacturing employees. Corporations also report that they will hire close to 6,000 engineers next year, based on hiring plans for one-third of the responding companies. Three of the five largest companies report plans to hire just over 3,600 engineering new graduates. Disciplines most in demand include, in rank order: software, electrical engineering, mechanical engineering and aerospace engineering.

Campus Hiring Plan 2016	Need to hire
Applied Mathematics	32
Aerospace Engineering	325
Chemical Engineering	27
Civil Engineering	9
Electrical Engineering	636
Industrial Engineering	153
Manufacturing Engineering	147
Materials Engineering	64
Mechanical Engineering	538
Propulsion Engineering	18
Quality Engineering	70
Software Engineering	811
Structures Engineering	173
Systems Engineering	275
Other Engineering	293
Physics	51
Business Development/Strategy	67
Aftermarket Services	Insufficient data

Program/Project Management	80
Finance/Financial Analysis	331
Supply Chain Management	272
Other	812

The highest percentage of hiring will take place in the Southwestern U.S., followed by the Pacific Coast region. A year ago the Southeast region had the highest job growth, but for 2016 this is expected to stall. However, the South—defined as Kentucky, Tennessee, Mississippi, Alabama, Arkansas, Louisiana—is expected to grow by just under 1%. The most significant slow-down in job growth is forecast to occur in the Mountain states, where industry continues to deal with a transition of space-related jobs to Texas, California, Washington and Florida.



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Methodology

The Aviation Week Workforce Study has four components:

- The Corporate Data Survey
- The University Student Survey
- The Young Professionals Survey
- The Young Professionals Longitudinal Survey

Using a base listing of 213 aerospace and defense industry companies and federally funded research centers, Aviation Week solicited voluntary responses from the industry. Data was aggregated for the industry as a whole and within four categories based on employee headcount.

These categories are: 50,000 or more employees; 10,000-49,999 employees; 1,000-9,999 employees; and fewer than 1,000 employees.

Responses were received from 31 companies, representing 546,186 employees. The companies asked to participate in the study are all based in North America, where many of the data points are required reporting for publicly held companies.

The University Student Survey was conducted at universities identified in the 2015 study as those where companies in the A&D industry hired the greatest number of graduates or those listed as preferred suppliers of critical skills. The colleges of engineering at each institution notified a random sample of students about the survey and asked them to participate. It is understood that the students responding to a study from Aviation Week already have indicated some interest in the industry by self-selecting to participate. This year, 13% of the 4,988 students invited to participate did so.

The Young Professionals Survey is conducted via a web link, with invitations going out from participating companies to a 10% random sample of salaried employees ages 35 and younger. These companies volunteer to participate with Aviation Week to ensure geographic distribution, as well as varied size and technological characteristics.

A total of 7,187 young professionals were invited to participate in 2016, with a response rate of 27%. Begun in 2009, the YP study has garnered better than 30% participation each year until this year.

The Longitudinal YP Study is conducted among YPs who have volunteered to participate following participation in the YP Study in prior years. The intent in this study is to determine changes in perceptions by the YPs as their life circumstances change, as well as to track whether job changes represent churn within the industry or an actual loss of talent to other industries.