# Workforce: Winning the War for Talent

By Mike Hirschberg, VFS Executive Director

VFS conducted a workforce study early last year (**www.vtol.org/workforce**) identifying some of the major challenges for the vertical takeoff and landing (VTOL) industry and addressed key points in our commentary, "Looking Back: A Perspective on the Future Vertical Workforce," *Vertiflite*, July/Aug 2020. One of the key findings was that some 10,000 additional vertical flight engineers will be needed over the next decade to meet the simultaneous demands of ramping up development of military rotorcraft plus electric VTOL aircraft.

We are now conducting a more detailed study to help the vertical flight community understand the problem and identify solutions. Importantly, we are also looking at how VFS can help support the needs of the future vertical workforce by promoting diversity through our new DiversiFLY initiative.

**The Talent Crisis**

As noted last year, there is a "war for talent" in vertical flight. Despite the layoffs and engineering workforce reductions in civil aviation — primarily due to the devastating impacts of the global novel coronavirus pandemic on the airline industry — the demand for engineering talent applicable to vertical flight aircraft development has reached crisis proportions for companies depending on aggressive timelines for developing and fielding their advanced vertical flight aircraft in the coming years.

At the same time that electric VTOL companies are each hunting for scores of engineers to hire immediately, traditional helicopter manufacturers are doing the same. The US Army-led Future Vertical Lift (FVL) initiative depends on meeting cost, schedule and technical performance commitments for the Future Attack Reconnaissance Aircraft (FARA) and Future Long Range Assault Aircraft (FLRAA) programs. Both efforts are developing next-generation rotorcraft with capabilities far beyond today's helicopters. Bell and Sikorsky are now advertising for more than 200 open jobs each.

Once FARA and FLRAA transition into Engineering and Manufacturing Development (EMD) next year, the winning teams will have to hire even more engineers — with a particular premium on those who have experience in VTOL aircraft development.

Beyond FARA and FLRAA, the US Navy and Marine Corps are each spooling up their FVL efforts (see "FVL on Four Fronts," pg. 24), and the Army has plans for a future VTOL Advanced Unmanned Aircraft System (AUAS). Each of these programs will need hundreds of engineers. Other military and civil rotorcraft developments and improvement efforts must also be factored into these needs.

In addition to the billions of dollars in investments in FVL, billions more are pouring into the eVTOL industry, including a total of $3.5B announced in February and March this year just to Archer, Joby and Lilium (see "Lilium Goes Big," pg. 50). Together, these three companies have nearly 500 job openings — including 250 engineering positions — seeking top talent to reach their ambitious plans to each field eVTOL air taxis in 2024.

Dozens of other leading eVTOL developers are facing similar talent crunches, driving up the cost of talent. Many eVTOL companies are hiring away top talent from rotorcraft companies — causing a "brain drain" of experienced engineers while they are also trying to staff up for programs like FVL — and even from other eVTOL developers. A notional estimate is that to reach certification of a new, advanced VTOL aircraft, it takes 10 years, $1B and about 1,000 employees, with two-thirds being engineers and technologists (though obviously aircraft size, complexity and management are major influences).

A study on FVL last year by the Center for Strategic & International Studies (CSIS), "Assessing the Industrial Base Implications of the Army's Future Vertical Lift Plans," noted that "The biggest challenge facing the entire rotorcraft industry is the competition for science, technology, engineering, and math (STEM) talent with non-traditional defense firms… which can offer substantially more money. Right now, many of the major rotorcraft primes are undertaking large efforts to hire engineering talent to work on clean sheet designs of new products and lines."

The Army's FVL leaders have frequently mentioned the VTOL workforce as a major area of concern. In the 1990s, the need for software engineers during the dot-com boom caused significant software cost and schedule delays to the ill-fated RAH-66 Comanche program. With the aggressive timelines and leap-ahead technologies that need to be wrung out for robust future weapons systems, FVL can't afford years of delays or major technical problems caused by a talent crisis.

**The Talent Pipeline**

VFS forecasts the need to hire 1,000 additional engineers annually for civil and military VTOL developments for at least the next decade. Where will these additional 10,000 engineers come from?

As discussed in that commentary on workforce last year, the US government needs to dramatically increase the funding for Vertical Lift Research Centers of Excellence (VLRCOEs) to increase the production of newly trained VTOL graduate students. The 16 current US VLRCOEs are funded by the US Army, US Navy and NASA at a paltry $4.5M a year among them all, which is less than when the centers were started nearly 40 years ago with only three schools! A tenfold increase in US government funding would go a long way to

improve and expand the facilities and research programs, and boost the number of engineers graduating with degrees in VTOL research.

Electric VTOL developers in particular are looking for highly skilled engineers. Of course, "it takes a long time for an engineer to gain 10 years of experience," but a graduate degree from a VLRCOE program can provide comparable skills in less time.

If the US Department of Defense and NASA are serious about advancing vertical flight in the United States, increased investments in infrastructure and throughput of trained engineering graduates are needed. The VLRCOE universities invest their own funds in their programs, in some instances 1:1 matching of government funds, and the VLRCOE funding attracts other research, providing as much as 8:1 in vertical lift funding over the government's investment. Industry can help as well by supporting scholarships, endowments, chairs, facilities and/or public-private partnerships to increase throughput.

These efforts will increase the quality of new engineering graduates. But increasing the quantity of potential engineers in the pipeline requires a redoubling of wide-ranging efforts that are underway, but can be improved.

The excitement of electric VTOL has inspired nearly 450 concepts so far — everything from the silly to the serious, as catalogued in the VFS World eVTOL Aircraft Directory (**www.eVTOL.news/aircraft**) — many by innovators and industrial designers with little prior experience in aircraft design. This illustrates the strong allure that vertical flight has in the public imagination, even by those without the talent to realize their visions.

The US Air Force's virtual launch of its Agility Prime program last year was also a hugely inspiring series of events that contrasted with the COVID-19 pandemic and attracted tens of thousands of viewers. The hundreds of small Air Force study contracts that followed gave further momentum to eVTOL.

Events like flying a helicopter on Mars have also been incredibly inspirational (see "Ingenuity Takes Off on Mars," pg. 16) to the public, greatly overshadowing the feats of NASA's fifth, and largest, rover on the Red Planet.

These inspirational visions and accomplishments must be exploited to encourage more students to enter the STEM fields. While this won't help the immediate talent crisis, today's high schoolers will be entering the workforce in five years, when the demand is forecasted to be just as strong.

Harvard University recently made headlines by boasting of an acceptance rate of only 3.4%, which others decried as a sign of failure, not success, in light of its huge endowment. Even public engineering universities promote how exclusive they are, with acceptance rates on the order of 20%. Of course, most students apply to many different schools, but taken on face value, that would mean that 80% of engineering students are rejected.

How can we meet the demands of the future vertical workforce if so many candidates for engineering programs are being turned away? Universities should invest in attracting (and retaining) additional faculty, which drives how many students can be accepted.

**Winning the War for Talent**

- ❏ Increase university funding for VTOL engineering
- ❏ Generate interest in STEM by harnessing excitement of VTOL to increase the pipeline
- ❏ Increase diversity outreach
- ❏ Highlight underrepresented talent to attract potential candidates
- ❏ Improve inclusivity to retain diverse employees
- ❏ All of the above!

Many engineering schools are doing better than in the past, but still have fewer than 30% women in their freshman classes, and even fewer students from "underrepresented racial minorities." This is an issue — but also an opportunity.

Clearly, for 1,000 additional engineers to enter the VTOL workforce every year, something must be done to increase the pipeline. It's not just diverting existing engineers to vertical flight, it's about attracting untapped sources for new students.

A 2018 study published in the *Journal of STEM Outreach* (available on the VFS Workforce page) highlights the potential for developing STEM programs in rural communities. Another key area that may be overlooked for its potential is the American South.

Due to historical discrimination against women and people of color in the US — particularly of African Americans — these groups remain sparce in engineering. Aerospace is one of the least diverse industries, which further discourages underrepresented groups from pursuing a career in aviation. People will not be what they cannot see. Highlighting diverse talent in vertical flight can be a catalyst to spark interest in broader groups that may have previously overlooked VTOL as an unattainable career field.

Government and industry must do more to meet the needs of the future vertical lift industry, specifically in inspiring and supporting less-represented demographics to enter vertical flight. More outreach is needed to encourage and support these potential engineers to follow STEM careers.

Of course, once in the workforce, inclusion and empowerment of women and people of color is essential to retaining diverse talent. However, that's a discussion for next time.

**All of the Above**

Addressing the talent crisis requires an "all-of-the-above" approach. Industry, academia and government must invest more time and money into long-term payoffs of increasing the overall production of engineering talent, as well as taking the steps necessary to foster diversity and inclusion in the workplace. The only way to win the war for talent is if everyone works together to increase the long-term talent pipeline.

*What do you think? Let me know at* **director@vtol.org.**