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Aerospace Engineering Searches for New Talent

As more baby boomers reach retirement, demand for qualified graduates is on the rise

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Hypersonic aircraft—including space vehicles re-entering the atmosphere—routinely rocket along at thrilling but dangerous velocities, well beyond the speed of sound. Back on Earth, working to keep them safe, is an aerospace engineering Ph.D. student named Tom Juliano.

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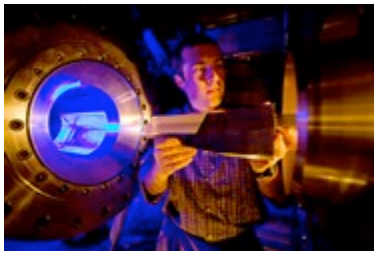

Tom Juliano, an aerospace engineering student working on his Ph.D., installs a Hyper-2000 model onto the sting of the Mach 6 wind tunnel operated by Purdue University in Lafayette, Indiana.

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At a Mach 6 wind tunnel operated by Purdue University, Juliano studies airflows nearest the aircraft surface. Some are laminar, or calm; others, turbulent—and they're the ones that intensify the heat the vehicle is subjected to. Juliano's experiments show when airflows change from laminar to turbulent. If his predictions are too high, the aircraft will be overclad with heavy thermal protection layers, impeding its performance. If they're too low, it will burn up. "This is not trivial," Juliano says of his research.

Indeed. Even for engineers who work on civil aircraft and other less exotic vehicles, safety and performance are paramount. "It's really very much frontier designing. There's no margin for error," explains Wei Shyy, head of the aerospace engineering department at the University of Michigan.

For students of aerospace engineering and its many subgenres, including aerodynamics, propulsion, materials, and avionics, there's no shortage of work, either. "Job prospects are great and growing," says Christopher Hall, aerospace and ocean engineering department head at Virginia Tech. The industry is

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expanding, says the Aerospace Industries Association, or AIA. And Lockheed Martin alone may need to hire 95,000 engineers over the coming decade as baby boomer retirements take their toll.

Also fueling demand are NASA's plan to resume manned missions to the moon by 2020 and the burgeoning commercial space industry. Companies such as Richard Branson's Virgin Galactic expect to send tourists into space, perhaps as early as 2010. Other firms are working on satellite launches and unmanned cargo service to the international space station.

For students with graduate degrees, the payoff is as big as it is quick. A master's-degree holder's annual starting salary will average $62,459; those with doctorates can expect to start at $73,814. "It's because they've specialized," explains Jeremiah Gertler, an AIA assistant vice president. Generally, it takes an engineer with a B.S. degree 10 years to become truly proficient, he says: "For advanced-degree holders, that learning curve is shortened." Demand for the degree is rocketing, too. According to the American Society for Engineering Education, 1,056 master's degrees in the discipline were awarded in 2007, up 44 percent from 2002. Over the same period, doctorates increased 23 percent, to 259.

Flying high. Thomas Farris, head of Purdue's aeronautics school, says the prime motivation for students isn't economic reward but working in a field that's fascinated them since childhood. "For the most part, our students become aerospace engineers because they are following their dreams." Consider Erin Farbar, 28, a Michigan student who expects to finish her doctorate this year or next. Growing up in Toronto, she was set on becoming an astronaut. She put aside that notion when she realized that the training leaves little time for family life. But Farbar is thrilled to be working in the field. "I love being on the front lines."

Farbar's undergraduate degree is also in aerospace engineering, and that's typical of most of those who study the discipline in grad school. But others have backgrounds in mechanical and electrical engineering, mathematics, and physics.

The kinds of multidisciplinary research the schools undertake are as wide reaching as the

field itself. One hot area is the development of autonomous, micro air vehicles—some no wider than 4 to 6 inches, tip to tip. "They're basically flying sensors," says Shyy, and they can be used for environmental research, surveillance in combat zones, and environmental monitoring in disaster areas. On a larger scale, Kyle DeMars, a doctoral student at the University of Texas, is designing a navigation system for an autonomous lunar lander. "It would be a predecessor to future manned lunar or Mars missions."

How about that? DeMars's research may help future astronauts reach the moon; Juliano's may help them return safely to Earth. Decades after the Apollo moon missions, grad students love the idea that they may be involved in a new space race that could land humans back on the moon—and possibly Mars. Says Farbar: "That's mind-boggling to me."

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