

WORKFORCE DEVELOPMENT FOR THE SPACE INDUSTRY

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ABSTRACT

The Astronautics and Space Technology Program (<http://astronautics.usc.edu>) of the University of Southern California (USC) offers a full set of undergraduate and graduate degree programs in Aerospace Engineering with emphasis in Astronautics. The program focuses on the needs of the space industry and government research and development centers. The program classes cover practically all main areas of spacecraft technology and many graduate classes are taught by adjunct faculty who are leading specialists working in the space industry. The Master of Science degree is available through the USC Distance Education Network (DEN), reaching students anywhere in the world through webcasting. The majority of our graduate students work full time as engineers in the space industry and government research and development centers. We describe in detail the program's academic focus, student reach, enrollment dynamics, and structure of program components. The achievements, difficulties, and lessons learned are discussed. The development of the future workforce requires a concerted effort by all stakeholders, including the space industry and government. We outline the areas where such cooperation can make a difference in improving quality of space education.

AEROSPACE WORKFORCE

More than thirty years has passed since the great advances in space technology of the 1960s. Much of the expertise in the space industry and government research and development centers is held today by engineers nearing or past retirement age. One survey pointed out that one-third of the technical workforce of the space industry will reach retirement eligibility within the next few years. The need to improve space-related education has become acute and emerges as a major challenge for the American space enterprise.

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NASA's Associate Administrator for Education described the current situation as a national crisis:¹ "this year [2003], [NASA] potentially may have 200 to 300 engineers and scientists exit the workforce because they will be retirement-eligible. Also, in the next three to five years, roughly 25 to 30% of that skill set also will be retiring, and that's a national crisis."

A magazine of the space industry sounded an alarm² already in the mid-1990s: "There is a growing shortage of engineers available to space-oriented businesses in the U.S. and Canada. The shortage, because of industry predictions of rapid and sustained growth in commercial space activities and low student enrollment rates at engineering schools, is likely to adversely affect the industry for a decade or more." A recent editorial³ in *Aerospace America* chillingly noted that in one survey of aerospace workers "80% said that they would not recommend aerospace careers for their own children."

The workforce problem has been exacerbated by a steady decline in enrollment in nation's engineering schools. In addition, many undergraduate and graduate students are foreign nationals. It was recently reported that 37% of Bachelor of Science technical graduates are non-U.S. citizens, which makes them largely ineligible for defense contractors and the military. According to the American Institute of Physics (AIP), foreign students (52%) outnumbered U.S. students among those beginning graduate studies in physics and astronomy in 1999. The largest single international component is Chinese students (25%) closely followed by Eastern Europeans (22%).

The report (issued in November 2002) of the Commission on the Future of the U.S. Aerospace Industry, chaired by former congressman Robert S. Walker, called to arms⁴ by recommending to "reverse immediately the decline in the scientifically and technologically trained U.S. aerospace workforce and promote its future growth." Whether this alarming assessment of the state of the American space enterprise collects dust on library shelves or translates into changes depends on a concerted effort by all stakeholders, including the space industry, government, academia, and professional societies, especially AIAA.