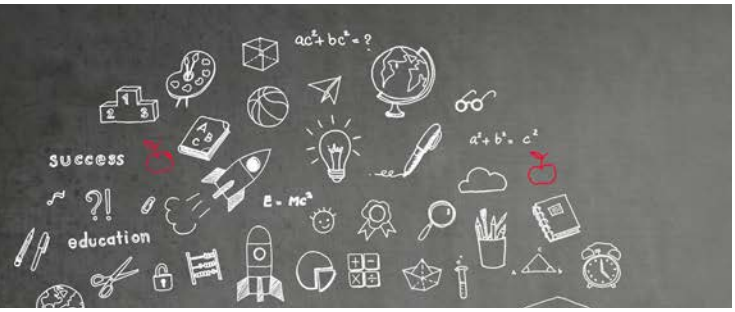
STEM PIPELINE



WHAT IS THE STEM PIPELINE?

The Science, Technology, Engineering, and Mathematics (STEM) pipeline describes the process of preparing individuals for supporting the aerospace and engineering fields. It begins in grade school, advances in middle and high school, becomes specialized in college and graduate school, and also extends to trade schools and military training.

The future of the aerospace and defense (A&D) sector depends on a science-literate population and skilled workforce. These workers form the backbone of an A&D industrial base that the United States and its allies count on to provide sustained innovation, economic growth, global competitiveness, and security. However, there is mounting, widespread concern that the sector faces a skills gap that will threaten the American industry's ability to perform and remain competitive worldwide, potentially leading to a national workforce crisis especially as a large percentage of the current skilled workforce is set to retire.

CURRENT TRENDS

- A&D companies hired more than 51,000 new employees in 2017
- Approximately 10 percent of the overall workforce in the A&D industry reaches retirement age each year
- The number of employees over the age of 55 is approximately equal to the number of employees under the age of 35
- The workforce is predominately Caucasian (73 percent) and male (76 percent)
- Underrepresented minorities, such as African Americans (5 percent of workforce) or Latinos/Hispanics (6 percent of workforce), report becoming interested in STEM much later than those from other populations
- The percentage of women and ethnic minorities working in A&D have not changed significantly for the past four decades despite outreach and policy support

RECOMMENDATIONS

Building the nation's 21st-century A&D workforce demands immediate action at the national level and a commitment on the part of federal, state, and local governments; industry organizations; and companies of all sizes. Stakeholders must:

- Increase diversity and foster inclusion by encouraging women and underrepresented minority group members to pursue careers in the A&D industry.
  - Many members of the A&D industry report interest by third grade, so encouragement must occur in the K-12 educational environment.
  - Students of all populations, regardless of gender, race, or socioeconomic status, should be exposed to STEM education at an early age.
- Transform current education programs so they are more adaptable for a modern and ever-changing workplace.
  - Partnerships between industry and educational institutions, such as internships, apprenticeships, and cooperative education efforts should be encouraged to help nurture interest, expose students to the A&D industry, and create access to educational and career opportunities.
  - Support trade school programs to train highly-skilled workers to enter the A&D industry, even as non-degreed individuals.
- Encourage K-12 educational environments to include more aerospace-relevant topics.
  - Current K-12 education is slowly evolving to include more engineering-type training; however, "aerospace" topics remain vastly ignored.
  - Falling costs of spacecraft hardware (e.g., CubeSats) and a wealth of publicly available educational material (from NASA and on the Internet) can enable teachers to bring aerospace into classrooms, but they currently lack the direction, encouragement, and/or flexibility in their lesson plans.
- Explore federal grants, public/private working groups, and university/K-12 school incentives for preparing a technologically adept and industry-ready workforce.

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