House Subcommittee on Higher Education and Workforce Development

Rayburn House Office Building

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H.R. Hogan

Introduction

Good morning and thank you. Chairman Guthrie, Ranking Member Davis, and distinguished members of the subcommittee on Higher Education and Workforce Development, I am honored to represent Huntington Ingalls Industries in today's discussion. I want to thank the subcommittee for the invitation to share my thoughts with you today about this very important topic.
My name is Rob Hogan. I am the Vice President of Manufacturing and Material Distribution at Newport News Shipbuilding, a division of Huntington Ingalls Industries based in Newport News, Virginia. I am responsible for all shipyard manufactured material and material logistics for all Navy and commercial programs, this includes over:

- 2,800 skilled craftsmen and support personnel
- 2.3 million square feet of manufacturing footprint
- 2.4 million square feet of warehouse space
- 500,000 products and assemblies delivered each year; from washers to 550+ ton modular units

I am proud to say that I am an Apprentice School graduate, a member of The Apprentice School Alumni Association and Master Shipbuilder. The Apprentice School provided me with an education and experience that was unparalleled. It opened doors to a lifetime of experiences, opportunities and advancement that would not have been possible without its very foundation. Currently, I serve on the board of directors for the Commonwealth Center for Advanced Manufacturing and the Virginia Manufacturing Association, where I recently served as Chairman. I am also a recent appointee to the Board of Directors for FIRST Robotics' Chesapeake division. In addition, I am active in the American Welding Society, Society of Manufacturing Engineers, and the Association for Manufacturing Excellence.

Huntington Ingalls Industries

Huntington Ingalls Industries is an American Fortune 500 company with $7.1 billion in annual revenues and a work backlog of more than $20 billion. We employ approximately 37,000 workers at our facilities in Virginia (largest industrial employer), Mississippi (largest private employer), California, Florida, Texas, and Colorado. Among these workers are more than 15,000 craftsmen, 5,000 engineers, 1,600 with advanced degrees and more than 5,000 veterans. Many of our employees are third, fourth, and fifth-generation shipbuilders, and more than 1,000 are "Master Shipbuilders"- employees with 40 or more years of continuous service to the company.
We also provide a wide variety of products and services to the commercial energy industry and other government customers, including the Department of Energy. And, we continuously grow our business in similar marketplaces.

Newport News Shipbuilding

Today, Newport News Shipbuilding (NNS) in Virginia is the sole designer, builder and refueler of U.S. Navy aircraft carriers and one of two providers of U.S. Navy nuclear powered submarines. We build the most advanced ships in the world using our expertise in nuclear propulsion, naval design and manufacturing. We are currently building the new *Gerald R. Ford*-class aircraft carriers and *Virginia*-class submarines, and performing Refueling and Complex Overhaul (RCOH) on *Nimitz*-class aircraft carriers. We provide fleet services for our ships worldwide, and using our nuclear and manufacturing expertise, are expanding into Department of Energy and alternative energy ventures. The ships we build perform some of our country's most important work. Simply put, there is no other place in the world capable of doing the work we do.

It is my privilege and honor to call myself a Newport News Shipbuilder and alumnus of the Apprentice School. NNS is an exciting place to work and every day provides a unique opportunity to learn and grow. It is a place I call home and where I work alongside the finest group of shipbuilders in the world.

Workforce Development

We invest heavily in workforce development, investing over $80 million annually in various types of training. This includes The Apprentice School, Night School, and tuition reimbursement programs that prepare our workforce to be effective in the important job of building, repairing and overhauling our country's Navy ships. We continue to invest precious capital funds to modernize our training facilities with state-of-the-art technology, and with real world, production mock-ups that allow our workers to learn production crafts in a safe, controlled environment.

Through The Apprentice School, we partner with State and local officials and education providers to jointly build a workforce and a community. We are actively involved with workforce investment boards, school districts and community colleges in our area of Virginia. We are focused on bringing world-class Career and Technical Education High Schools to the region.

We annually perform 75,000 training events on the waterfront, excluding The Apprentice School. As shipbuilding technologies advanced, as with the design and construction of the *Ford*-class aircraft carriers, so have our internal training programs. For the USS *Gerald R. Ford* (Commissioned by the U.S. Navy on 7/22/2017), more than 50 new production training courses were developed to provide the needed skills and knowledge to our workforce.

All training at NNS is done with safety in mind. We value our employees above all else and will not compromise on their safety. Maintaining a safe and healthy work environment is our number one priority. It is a significant part of who we are and is

engrained in our culture and core values.

History of The Apprentice School

Apprenticeship is far older than the idea of public education which is a fairly modern notion. From the earliest times, craftsmen in every trade have traditionally taught young apprentices the skills that they had to learn to become master craftsmen themselves, and by the Middle Ages the apprenticeship system was highly organized into craft guilds (just think, where would the world be without the genius of Leonardo da Vinci or Michelangelo, both apprentices to the early masters).

It followed naturally that there would be an apprentice program at Newport News Shipbuilding. In the beginning, it was an informal system of 'over-the shoulder' training in keeping with the prevalent standards of the time. Eight years after the company was organized, and four years after the first ship was launched, the first apprentice was certified in 1894.

In 1911, the company initiated a system whereby apprentices, and other company employees, might attend classes at night in the Newport News public schools. This was a step toward the establishment of education programs on company time and within the premises of the yard. An opportunity for workers to '*learn and earn*.'

More than 400 apprentices had completed their training and been certified by 1919, when the program was formalized and a school started within the yard. By Executive Order Number 24, dated July 1, 1919, the Rules for Apprentices were published. Apprenticeship was offered in more than a score of trades, with applicants from employees' families enjoying a preferred entry status. Minimum age for admission to the program was 16 and all applicants had to pass a physical exam and submit two references, 'certifying to the good moral of character and habits of the candidate.' All apprentices were required to attend class two half-days each week. Students were paid an hourly wage according to a set schedule and received a bonus of $100 at the completion of the program.

Classes started with three instructors and 126 apprentices. Classroom instruction was intended to complement vocational training. "All lessons are designed to eliminate much that is uselessly theoretical, and to present those things which are part and parcel of the boys' trades," according to the company's newsletter. "Thus, the apprentice must not only work every problem offered, but work them correctly before proceeding to the next lesson."

Enrollment in the school was never less than 120 even in the hardest times, and rose to 450 by the late 1930's. The school won recognition as a model of its kind. 'Training by Intention' replaced the former hit-or-miss 'absorption' method of training in 1928, and fulltime instructors were hired as classroom teachers. According to a U.S. Department of

Labor report in 1940, almost all of the instructors had passed through the apprenticeship program themselves; at that time there were approximately 10 apprentices under the supervision of each of the 40 instructors.

In addition to academic classes, there was an athletic program that was extremely popular with the apprentices and the workers in the yard. (The Apprentice football team went undefeated in its 6-game season in 1919.) An athletic building and modern stadium were opened in the 1930's, and a cafeteria, dormitory, and new education building followed. The Apprentice School had more than 1,000 students by World War II, with their own entertainment programs and publications. It was the only institution of its kind with a junior college ranking.

The Apprentice School Today

For 98 years, The Apprentice School has been guided by its mission to recruit and develop men and women for highly technically skilled careers in shipbuilding, and alumni who possess the knowledge, skills, work ethic, and pride of workmanship to fully anticipate and meet current and future needs of the U.S. Navy and shipbuilding industry.

Throughout the school's history, program offerings have continued to evolve to meet customer demands for a highly skilled and innovative workforce. The constant in the evolutionary process is our cohort model, similar to that of the U.S. Naval Academy, used to deliver academic instruction that complements job experiences strategically timed to meet production and innovation demands. The shipbuilding and defense industries have benefited from this comprehensive approach to training and education and the work of alumni who possess extensive knowledge of all aspects of shipbuilding necessary to innovate through the 21st century.

Since 1982, The Apprentice School has been accredited through the Commission of the Council on Occupational Education. Additionally, the school's 19 traditional shipbuilding apprenticeships and eight advanced apprenticeships are registered through the Virginia Department of Labor and Industry (DOLI). Our long-standing accreditation, and the fact that all our programs are registered with DOLI, demonstrates our commitment to offering high quality apprenticeships through an integrated approach that combines on-the-job training, related academic instruction, and leadership development opportunities.

The Apprentice School prides itself on being operationally relevant to NNS. Its programs, enrollment levels, courses, and curricula respond to the current and future needs of the shipbuilding industry and U.S. Navy. The return on investment is evident in the results the more than 10,000 graduates have had on the company and the shipbuilding industry.

Representing 13 percent of NNS's total current workforce, Apprentice School graduates comprise 60 percent of today's general foremen and 45 percent of the production management team. Company loyalty is strong among graduates as evidenced by the

extremely high retention rates. More than 70 percent of graduates are still with the company 15 years after graduation. Apprentice graduates are found at all levels of the organization, and all levels of management. Currently, there are three vice presidents that are members of NNS's senior staff. The more than 3,000 graduates currently employed at the company can be found in more than 230 different occupations.

In addition to the contributions apprentices make to the company, opportunities also exist for apprentices to grow and polish their leadership skills outside of the shipbuilding environment. In an effort to grow personally, and give back to the community, opportunities exist to participate in student government and professional organizations, including Student Chapters of the Society of Naval Architects and Marine Engineers, Society of Manufacturing Engineers, and Jaycees. Apprentices provide ongoing support for many community outreach activities such as Habitat for Humanity, Relay for Life, to name a few.

Current and Future Programs

While traditional shipbuilding trades such as shipfitter, electrician and welder continue to be the foundation for existing programs, The Apprentice School has recognized the impact of advanced technologies on the industry. As a result, the school has added highly-skilled programs such as marine designer, modeling and simulation analyst, and nuclear test technician. The Apprentice School partners with local community colleges and universities to deliver the related academic component of these apprenticeships, which culminates in associate and bachelor degrees. In addition, the school has established articulation agreements with 10 colleges and universities, providing a seamless transfer of credits and continuing education opportunities for graduates.

Key Facts

Admissions:

- Applications received (last 4 year average) 2,800
- Average annual hiring: 230-240
- Selection ratio - 12:1
- 60 percent of those hired have some education beyond high school

Current Enrollment - 750 (as of 7-24-17)

Projected End of Year Enrollment - 825

Current Demographics:

- 33 percent minority
- 16 percent female
- 9 percent veterans
- 28 percent apprentices worked in the company before entering an apprenticeship (i.e. “transfers”)

Provided below is a comparison of apprentice graduates to college graduates:

Apprentice School Graduate	College Graduate
$273,000 Scholarship (includes benefits, earnings while in school, tuition, books and fees)	$33,000 average student loan debt
Earnings of ~ $187,000 for a four-year apprenticeship (includes earnings while in school)	Incidental / Part-time income during college
4-8 years of work experience leading to Associates & Bachelor degrees	Bachelor degrees with little to no work experience

Attracting the Next Generation of Shipbuilders

Integrated Digital Shipbuilding (IDS)

Since we began building ships over 130 years ago, 2-dimensional paper drawings have been the primary method for conveying design data to our shipbuilders. For most of that time span, the same could be said for any manufacturing or construction company across the world.

Today, the use of such drawings is in decline across the industrial landscape. Many companies, including peers in aerospace and defense have done away with the traditional drawings entirely and rely solely on digital work instructions – and have demonstrated large productivity and quality gains by doing so.

Technology has now caught up allowing the potential to make drawings obsolete in shipbuilding over the coming years. Migrating to an integrated digital enterprise, without the need for traditional drawings, will transform the way we build ships and provide NNS the competitive edge necessary to maintain and grow our business over the coming decades. Technology advancements such as this will also aid with NNS’ ability to retract and retain the next generation of shipbuilders.

In 2016, NNS partnered with Old Dominion University (ODU) to offer an elective course in digital shipbuilding including model based definition, model based enterprise, digital

work instructions, laser scanning, PLM/CAD environments, and lifecycle maintenance and modernization.

The success of that pilot course has led us to collaborate with ODU to seek funding to stand up a certificate program in digital shipbuilding. Recognizing that the digital transformation will touch all areas of our business, we are coordinating with community college and university partners to incorporate digital shipbuilding techniques into many fields of study including engineering, design, IT, and trades training. The programs are also being incorporated into classes at the Apprentice School. The same skill sets and competencies that are being developed through the course and certificate programs are also being incorporated into classes at The Apprentice School.

In addition, we are building IDS features including Augmented Reality, additive manufacturing, and other components into our K-12 public school outreach through Career Pathways as we continue to work to counteract outdated stereotypes of manufacturing careers.

Career Pathways
In concert with public schools throughout Hampton Roads, NNS employees mentor students and provide opportunities to experience future careers. This partnership provides a unique opportunity for the business to contribute directly to the school experience of the youth who are just beginning to formulate dreams for the future. A partnership can take many forms and is flexible to accommodate a wide range needs of both the business and the schools.

Teacher / Counselor Internship
NNS offers local Science, Technology, Engineering and Mathematics (STEM) educators and professional counselors the opportunity to take part in a two-week long paid internship during the summer. Designed specifically for educators, participants are exposed to all facets of shipbuilding to include engineering, modeling and simulation, augmented reality and hands-on experience with trades. It provides an opportunity for teachers to witness how the STEM concepts they teach in the classroom are used in real work place applications. Teachers and counselors are also exposed to the vast career options available at NNS and through The Apprentice School.

Job Shadowing
Job shadowing program affords students the opportunity to learn about careers at NNS and more. Paired with mentors from our engineering and information technology divisions, students tour different areas of NNS to learn about ship design/engineering, and ship construction. Job shadowing takes place twice a year and allows students to meet required job shadowing or intern hours.

eSHIP/iSHIP
eSHIP and iSHIP Programs are geared towards high school seniors planning to attend a 2-year or 4-year higher learning institution to major in an ABET accredited engineering program or an IT program. These students learn about engineering through a trades immersion experience as high school seniors and begin a paid internship before they start college. Provided all requirements are met, students will continue to intern every summer, and upon graduation be eligible for full time employment as engineers or engineering technicians.

Girls with Engineering Minds in Shipbuilding (GEMS)
The GEMS program seeks to diversify the talent pipeline in engineering by targeting middle school girls in two middle schools with high at risk populations. Female NNS engineers serve as mentors to the girls at after-school meetings throughout the year. The girls engage in hands-on STEM and engineering activities to expand their horizons and encourage them to pursue careers in these areas. GEMS participants are encouraged to pursue engineering study in high school and beyond.

Engineering Career Day
Career Pathways partners with the Peninsula Engineers Council, Jefferson Lab and NASA to host the annual Engineering Career Day. During this event, students are able to visit engineers and other STEM professionals from NNS, NASA and Jefferson Lab. This event helps provide students with an understanding of the many different STEM careers from local businesses.

Manufacturing Day
National Manufacturing Day (MFG Day) brings manufacturers, educators and community leaders together to address challenges in order to help their communities and future generations thrive. It is a day to address common misperceptions about manufacturing by giving manufacturers an opportunity to open doors and show, in a coordinated effort, what manufacturing is – and what it is not. By working together during and after MFG Day, manufacturers begin to address the skilled labor shortage they face, connect with future generations, take charge of the public image of manufacturing, and ensure the ongoing prosperity of the whole industry.

Youth Career Expo
NNS is the premier sponsor for the Youth Career Expo that is held at the Hampton Roads Convention Center. The Youth Career Expo aims to educate students about local careers and businesses. During this event, students are able to walk around, obtain information from local businesses, participate in human resources related panel discussions and receive feedback on their interviews through the mock interview sessions.

FIRST Robotics
NNS has formed a unique partnership with our regional FIRST Robotics affiliate, FIRST Chesapeake. In addition to providing monetary support to the program, we have worked to place NNS mentors or coaches with each FIRST team in the region to help the students achieve their goals and in so doing to let them know about career paths that are directly applicable to the skills they are developing through FIRST. We also put out displays at many of the competitions in the region so that students, families, and educators can see the innovative work being done at NNS and learn about career options. FIRST Robotics instills in students the type of technical, analytical, and problem-solving skills we want to see in our future employees and apprentices and our involvement reflects the value we place in the program.

National Diversity Conferences
We also participate in several nation-wide diversity conferences to include:

- Society of Women Engineers (SWE) Conference
- Black Engineer of the Year Awards (BEYA) and STEM Conference
- Women of Color STEM Conference
- Society of Hispanic Engineers STEM Conference
- Society of Asian Scientist and Engineers STEM Conference

We recruit onsite during the conferences, and doing this has helped us diversify our workforce.

Summary
These are examples of how we are recruiting and retaining a skilled workforce capable of operating and keeping pace with today's rapidly evolving technology - our top priority. NNS continues to establish robust training and development programs intended to develop and leverage the full potential of the workforce, increase employee engagement and efficiency, drive innovation, quality, productivity and growth. Training and professional development are not only vital for our success but are essential tactics in attracting and retaining Millennial workers who demand ongoing learning and new opportunities.

NNS is in the midst of an exciting revolution in new technologies, ideas and opportunities. A bright new future exists in this industry and by investing in our most valuable asset – our employees – we can improve worker retention, boost productivity, strengthen product quality and ensure their global competitiveness.

Thank you for the opportunity to address you here today and I look forward to any questions you may have.