Holly Cross, Oak Ridge High School staff for General Curriculum, College, Career, and Technical Education, spoke recently at the Oak Ridge Breakfast Rotary Club. She introduced to the audience a program at the Oak Ridge High School that is showing tremendous success and demonstrating even more promise. Advanced Manufacturing and Mechatronics Engineering are the areas of emphasis in this program.

Holly said, "The Oak Ridge community recently assisted our school system in defining Seven Keys to College and Career Readiness. Key number 7 states, 'All students participate in Advanced Placement coursework, dual enrollment, industry certification, or military preparation program by graduation.' One of my top priorities as College, Career, and Technical Education Director is to ensure that our programs of study meet the expectations of this key."

"We want all students to have viable and meaningful paths of study for future careers. Our new programs in Advanced Manufacturing offer students multiple points of entry and exit into the workforce and post-secondary institutions.

"For example, students can pursue Siemens Level I Programmable Logic Controller (PLC) Certification while in high school, Siemens Level II PLC Certification at Roane State Community College, and/or continue with a B.S. degree in Mechatronics Engineering at Middle Tennessee State University. Anywhere along this pathway, students are employable in local industry in well-paying jobs with benefits."

Having served as a judge in the *FIRST Robotics* program since its inception, I immediately recognized the value of this historic program. After the meeting, I asked Holly if she would share the details of this history making program with me so I could include it in an upcoming *Historically Speaking* column. She agreed. What follows is a description of a program that develops skills frequently lacking in our educational system.

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Careers in advanced manufacturing require strong technical skills, mechanical ability, computation, and critical thinking. Critical job skills will include communication, problem solving, decision making, and collaborating in a team environment.

Preparation for these career skills in advanced manufacturing must begin in the elementary grades and continue through high school and post-secondary education, allowing students to gain experience in authentic engineering and manufacturing scenarios.

Building on the foundation of the *Project Lead the Way* pre-engineering courses our students have taken here in Oak Ridge, including *Gateway to Technology, Introduction to Engineering Design,* and *Principles of Engineering,* the Oak Ridge High School's new course of study will provide excellent opportunities for hands-on learning. Preparation pathways provide for satisfying careers in the many manufacturing and engineering facilities in Oak Ridge and neighboring communities.

Students who have enjoyed competitions in *Technology Student Association* (TSA), *VEX Robotics, Lego League, FIRST Robotics,* and *Skills USA* will find increased opportunities to enhance their communication, thinking, teamwork, design, and hands-on technical skills.

In June 2012, Tennessee was selected to join a multi-state consortium, the *Pathways to Prosperity Network*, a multistate initiative aimed to address the "skills gap" that threatens the preparedness of young Americans entering the workforce. Entrance into this consortium led to the founding of Pathways Tennessee.

The mission of *Pathways Tennessee* is to provide Tennessee students rigorous academic/career pathways, which are linked to economic and labor market needs and trends.

According to the 2011 Harvard Graduate School of Education report, *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century*, "Roughly half of all Americans reach their mid-20s without the skills or credentials essential for success in today's increasingly demanding economy."

The vast majority of American young people and their families realize that a high school diploma alone is no longer sufficient to land a family-sustaining job.

If we fail to expand the ways we prepare youth for postsecondary education and the workforce, their quality of life will suffer, our society will lose out on their potential, and the costs to our economy will be severe.

Industry Certification and Dual Enrollment are key aspects of Pathways to Prosperity. Welding courses offer American Welding Society certification and dual enrollment with Tennessee College of Applied Technology in Knoxville. This dual enrollment allows students to gain credit that can be applied to further students' post-secondary welding certifications offered through TCAT—with continuing courses offered to Oak Ridge graduates on our very own campus. We are looking to add OSHA training for certification as an additional pathway in this department.

Mechatronics courses offer Level I Siemens PLC certification and dual enrollment with Roane State Community College. This dual enrollment sequence allows students to get up to 12 hours of college credit on the *Tennessee Transfer Pathway*; that can be credited toward a 2-year AAS degree at RSCC; and continue, if desired, into a 4-year Mechatronics Engineering degree at Middle Tennessee State University.

Oak Ridge High School has been included in RSCC's LEAP grant and is the recipient of additional federal funding through the Perkins Reserve grant. This funding will launch this new program and financially support students who wish to pursue industry certifications.

Dual Enrollment is supported by federal funding as well, allowing all eligible students to participate.

Courses included in the Advanced Manufacturing Pathways program at Oak Ridge High School are: Welding I; Welding II; Advanced Welding; Introduction to Technology and Engineering; Mechatronics Engineering I; Mechatronics Engineering II; and Robotics.

Student organizations aligned with Pathways to Prosperity are: Skills USA; TSA and FIRST Robotics

Here is what a student, Mathew Martin, had to say about the *Pathways to Prosperity* program, "I've always had high goals. At the beginning of Freshman Year I wanted to be an anesthesiologist, but that all changed when I joined FIRST Robotics Team 4265 that December. I joined the team because my father became a mentor and said the program would be more worth his time if he had a child who was involved, so I decided to give it a shot. Engineering wasn't a field I had ever considered, but as soon as I got a grasp on what I could do, I was stuck."

"Ever since, I've been building things in my room, programming apps for my phone, and designing things on CAD software. I'm not interested in Engineering because of what it's done for people in the past, but rather because of the potential it holds for the future.

"I visited Middle Tennessee State University last fall, and I was told all about their new Mechatronics Major. When it came time to register for classes for my Senior Year in high school, I realized there was a new Mechatronics class, so I decided to take it.

"Through the combination of the business and manufacturing experience I have from FIRST Robotics and the new skills I will learn from my Mechatronics class this year, Oak Ridge High School has presented me with opportunities I never thought were available. Now, instead of wanting to be an anesthesiologist, I want to be an aerospace engineer.

"My personal hero is Elon Musk, the founder of SpaceX and Tesla Motors. My thought processes are dictated by a quote from him nowadays: 'I could either watch it happen, or be a part of it.' Because of all the experience I have gotten from Oak Ridge High School, I want to change the world someday."

Matthew Martin Future Engineer

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In one capacity or another I have been involved with young people and their activities for the past 44 years that Fanny and I have lived in Oak Ridge. From Cub Scouts and Boy Scouts, to Youth Groups at church, to judging *FIRST Robotics*, I have found many ways to engage in youth related activities. I have had interns working for me and have watched them grow into the jobs and careers they chose. Recently, I have engaged several University of Tennessee technical editing students to index *Historically Speaking* books,

This historically groundbreaking *Pathway to Prosperity* program excites me. I see an organized and effective program that is mainstreamed in schools which is on target for addressing many of the issues of the workplace that will help prepare young people to better advance in careers of their choice. Just think of multiple students like Matthew Martin!

So, I am proud to be able to bring you information on the program about which Holly is so excited and from which Matthew is receiving such tremendous encouragement. They are both great ambassadors for Oak Ridge High School.



The Siemens Programmable Logic Controllers training stations when they arrived. These were to be assembled and training scheduled to begin for Level I Certification in September



Matthew Martin changed career choices to Engineering because he sees the power to change the world encompassed within the skills and abilities he is attaining in this powerful program



Holly Cross sees *Pathways to Prosperity* as a key element in the education system and she is promoting it with enthusiasm