

Career Pathways for PTEC Students

Machining

The machinist is the person responsible for creating very precise and accurate three-dimensional parts for nearly every manufacturing company on the planet. Machinists use manual and high-tech cutting tools to shape metals, plastics, ceramics, composites, and other materials into precise shapes such as engine parts, machine parts, building materials, and even computer parts. Without precision machining technology and people capable of operating the equipment, it would be impossible to create replacement parts for automobiles, appliances, or anything else that is manufactured cost-effectively.

Students choosing to pursue the machining track will begin by learning proper safety, dress, and workplace protocols. Beginning with manual equipment, the student will learn the fundamentals of measurements, drawings, laying out work, and the use of lathes, mills, saws, and finishing techniques.

In the late 1940s the United States Air Force awarded a contract to John Parsons of Traverse City, Michigan to develop a control system to more accurately machine parts for helicopters. Through the efforts of Parsons in partnership with the Massachusetts Institute of Technology (MIT) the first numerically controlled 3-axis milling machine was born in 1952 (Gizelbach, 2009).

The remaining three-fourths of this track will be dedicated to learning how to program and operate CNC machining centers, understanding the various types of milling cutters, working with turning centers and programming processes. During lab work students will demonstrate mastery by creating increasingly more complex parts that require the use of all types of machines. During the student's senior year, they will work directly with a mentor as an intern in a local business, trade school, or with other students at PTT.

Welding Technology

Welding is the process of joining materials together by heating, applying pressure, or both. The heat and pressure softens the materials sufficiently enough to allow them to bond. The use of welding is present in all aspects of daily life from the cars we drive, the chairs we sit in, the bridges we drive over, and even decorative spiral staircases and ornate chandeliers. Beginning with safety, students in the welding track will learn how to protect themselves and others from burns, dangerous gasses, and damage to the eyes. Welders work in a variety of places including manufacturing, shipbuilding, construction, bridge construction, and specialty welding shops.

Students in the welding track will learn a wide range of skills including different types of welding, cutting processes, grinding and finishing, and some special welding and cutting processes. By the end of the track, students will be capable of passing several methods of welding tests, know the differences in

processes and materials, and understand how to apply the knowledge to workplace situations. In addition to welding, students will learn how to produce drawings using welding symbols, work with lathes & milling machines, and cut and bend metals

The current book of choice for the Welding Technology track is *Welding: Principles and Applications* by Larry Jeffus. This comprehensive textbook includes everything from safety and simple welding processes to welding codes, more difficult welding techniques, and metallurgy.

Electrical Track

The electrical track is primarily designed for students that wish to continue their education and apprenticeship to become a residential wireman or licensed journeyman electrician. Students completing the electrical track will be very qualified to begin as an apprentice electrician with much of the bookwork completed. This track will begin with a thorough description of the physical and mental requirements of becoming an electrician and the need for extreme safety in this trade. Students progressing through this track will spend about half of the time working in a classroom setting and the remaining time in labs.

Although about half of all electricians end up working in the construction industry, other career paths include electrical maintenance, electrical power distribution, electrical products distribution, and electrical products manufacturing. Job opportunities are expected to increase by nearly 12% in the electrical industry by 2018 paving the way for highly qualified individuals to enter the ever-changing field of electricity. Electricians completing an electrical apprenticeship can earn about as much as someone finishing a bachelor's degree (Independent Electrical Contractors Chesapeake and Western Electrical Contractors Association, 2013).

Carpentry Track

The Construction and Carpentry Track is designed for the student that desires a broad knowledge of construction. This track provides the basic knowledge of electrical, plumbing, HVAC, carpentry, and masonry. Students choosing to work in this track may one day want to work in general construction, roofing, concrete, or may choose to one day become jobsite superintendents. Although based most on residential construction, this track is a great starting point for young men or women that would like to pursue a career with a commercial contractor or one day continue their education in construction management.

This track will follow curriculum outlined in the Modern Carpentry textbook, *Essential Skills for the Building Trades*, published by the Goodheart-Willcox Company. This track will begin by exploring the essential components of preparing the jobsite for construction and then move through the process of building a complete home from foundation to finishing. During the final semester of 12th grade, students will complete practical experience with a contractor or an organization like Habitat for Humanity. Students will work diligently through coursework and demonstrate the knowledge through written and lab assessments.

Plumbing

A plumber is a person that uses tools to complete the installation and maintenance of water systems, steam lines, and fitting pipe. Most plumbers work in jobs that consist of maintaining and repairing pipes which provide water to residential and commercial buildings. Understanding how to read mechanical blueprints, using a wide variety of tools, knowledge of mechanical codes, and mechanical skills are a few of the requirements for succeeding in the plumbing trade.

In the plumbing track students will begin by learning the physical and mental requirements of the trade, plumbing & jobsite safety, and then begin exploring the tools of the trade. Although most of the lab work will be geared toward the residential plumbing industry, students will learn many of the introductory skills of commercial and industrial plumbing systems. The textbook that will likely be used will be Modern Plumbing authored by Keith Blankenbaker, also published by by the Goodheart-Willcox Company. Students will explore the plumbing trade, primarily through the context of residential construction, however some commercial mechanical systems will be taught.