

Minnesota PIPELINE Project

Private Investment, Public Education, Labor & Industry Experience

PIPELINE PROJECT
Advanced Manufacturing Industry Council

Advanced Manufacturing Industry Council Selected Occupations and Descriptions

Below are the 4 occupations and Descriptions the Advanced Manufacturing Industry Council selected to begin investigating dual-training models and implementation in Minnesota.

CNC Operator - Milling and Turning

Source: www.onetcodeconnector.org

CNC operator machinists oversee the CNC machines that shape parts from metal or plastic. They must interpret blueprints, manuals and other work instructions. They also study sample parts to determine dimensions of finished work pieces and CNC equipment setup requirements. They then set the machine and load it with the correct cutting tools. CNC operator machinists inspect work pieces throughout a production run. In addition, machinists measure and mark dimensions and reference points on material or work pieces as a guide for subsequent machining.

CNC operator machinists additionally clean and perform basic preventative maintenance functions on machines, tooling and parts. They must work safely to prevent on-the-job injuries, which includes wearing personal protective equipment such as safety glasses. They also inspect cutting tools for sharpness and usability. These professionals additionally detect malfunctions using precision measuring instruments such as micrometers, dial calipers, depth gages, indicators and scales. They have to communicate with supervisors, engineers, production control employees and other personnel for assignments, and to resolve machining or quality issues as well.

Other Duties include:

- Calculate dimensions or tolerances, using instruments such as micrometers or vernier calipers.
- Machine parts to specifications, using machine tools, such as lathes, milling machines, shapers, or grinders.
- Set up, adjust, or operate basic or specialized machine tools used to perform precision machining operations.
- Align and secure holding fixtures, cutting tools, attachments, accessories, or materials onto machines.
- Measure, examine, or test completed units to check for defects and ensure conformance to specifications, using precision instruments, such as micrometers.
- Monitor the feed and speed of machines during the machining process.
- Maintain machine tools in proper operational condition.

- Study sample parts, blueprints, drawings, or engineering information to determine methods or sequences of operations needed to fabricate products.
- Operate equipment to verify operational efficiency.
- Check work pieces to ensure that they are properly lubricated or cooled.

Welders, Cutters, Solderers, and Brazers

Source: www.onetcodeconnector.org

Use hand-welding or flame-cutting equipment to weld or join metal components or to fill holes, indentations, or seams of fabricated metal products. Welders, Cutters, Solderers, and Brazers cut or join metal parts by applying intense heat to metal. Welding is one of the most dependable means of joining metal parts and is used in the building of bridges, buildings, ships, automobiles, pipelines, storage tanks, electronic equipment, and many more.

Other Duties include:

- Examine work pieces for defects and measure work pieces with straightedges or templates to ensure conformance with specifications.
- Chip or grind off excess weld, slag, or spatter, using hand scrapers or power chippers, portable grinders, or arc-cutting equipment.
- Remove rough spots from work pieces, using portable grinders, hand files, or scrapers
- Prepare all material surfaces to be welded, ensuring that there is no loose or thick scale, slag, rust, moisture, grease, or other foreign matter.
- Develop templates and models for welding projects, using mathematical calculations based on blueprint information.
- Guide and direct flames or electrodes on or across work pieces to straighten, bend, melt, or build up metal.
- Cut, contour, and bevel metal plates and structural shapes to dimensions as specified by blueprints, layouts, work orders, and templates, using powered saws, hand shears, or chipping knives.
- Repair products by dismantling, straightening, reshaping, and reassembling parts, using cutting torches, straightening presses, and hand tools.
- Fill holes, and increase the size of metal parts.
- Check grooves, angles, or gap allowances, using micrometers, calipers, and precision measuring instruments.
- Operate metal shaping, straightening, and bending machines, such as brakes and shears.
- Hammer out bulges or bends in metal work pieces.
- Dismantle metal assemblies or cut scrap metal, using thermal-cutting equipment such as flame-cutting torches or plasma-arc equipment.
- Estimate materials needed for production and manufacturing and maintain required stocks of materials.
- Join parts such as beams and steel reinforcing rods in buildings, bridges, and highways, bolting and riveting as necessary.
- Gouge metals, using the air-arc gouging process.
- Mix and apply protective coatings to products.
- Operate brazing and soldering equipment.

Maintenance and Repair Worker

Source: www.onetcodeconnector.org

Perform work involving the skills of two or more maintenance or craft occupations to keep machines, mechanical equipment, or the structure of an establishment in repair. Duties may involve pipe fitting; boiler making; insulating; welding; machining; carpentry; repairing electrical or mechanical equipment; installing, aligning, and balancing new equipment; and repairing buildings, floors, or stairs.

Other Duties include:

- Inspect, operate, or test machinery or equipment to diagnose machine malfunctions.
- Dismantle machines, equipment, or devices to access and remove defective parts, using hoists, cranes, hand tools, or power tools.
- Perform routine maintenance, such as inspecting drives, motors, or belts, checking fluid levels, replacing filters, or doing other preventive maintenance actions.
- Diagnose mechanical problems and determine how to correct them, checking blueprints, repair manuals, or parts catalogs, as necessary.
- Repair machines, equipment, or structures, using tools such as hammers, hoists, saws, drills, wrenches, or equipment such as precision measuring instruments or electrical or electronic testing devices.
- Maintain or repair specialized equipment or machinery located in cafeterias, laundries, hospitals, stores, offices, or factories.
- Assemble, install, or repair wiring, electrical or electronic components, pipe systems, plumbing, machinery, or equipment.
- Clean or lubricate shafts, bearings, gears, or other parts of machinery.
- Adjust functional parts of devices or control instruments, using hand tools, levels, plumb bobs, or straightedges.
- Order parts, supplies, or equipment from catalogs or suppliers.

Mechatronics

Source: www.onetcodeconnector.org

Research, design, develop, or test automation, intelligent systems, smart devices, or industrial systems control. Mechatronic engineers work with the electronic instrumentation and computer control systems which nearly all machinery relies on for efficient and reliable operation. Mechatronic Engineers work with automatic systems monitor process plants for leaks and faults, and keep the plants operating all the year round. Mechatronic engineers build and design these systems and need expertise in computing and electronics, core mechanical engineering knowledge, and the ability to bring these together to make working systems which meet the safety and reliability levels required.

Mechatronic engineers also have roles in project engineering, reliability engineering and power engineering where their cross-disciplinary knowledge gives them an edge on mechanical or electrical engineers. Mechatronic engineers can work with electrical and mechanical systems together and solve problems that cross discipline boundaries. Their strength in IT, computer hardware and networking as well as software also helps them to be very versatile problem solvers. Writing and testing software for specialized computer systems and micro-controllers forms a major part of the work of mechatronics.

Other Duties include:

- Design engineering systems for the automation of industrial tasks.
- Create mechanical design documents for parts, assemblies, or finished products.
- Maintain technical project files.
- Implement or test design solutions.
- Create mechanical models and tolerance analyses to simulate mechatronic design concepts.
- Conduct studies to determine the feasibility, costs, or performance benefits of new mechatronic equipment.
- Publish engineering reports documenting design details or qualification test results.
- Research, select, or apply sensors, communication technologies, or control devices for motion control, position sensing, pressure sensing, or electronic communication.
- Identify and select materials appropriate for mechatronic system designs.
- Apply mechatronic or automated solutions to the transfer of materials, components, or finished goods.