Heavy Equipment Operators (HEOs) use machinery to move construction materials, earth and other heavy materials at construction sites, offshore oil rigs and in the mining industry. Heavy Equipment Operators, HEO is divided into dirt and hook. Dirt work refers to the operation of a variety of specialized equipment to excavate, grade and prepare land for building roads, structures, and bridges or for digging trenches to lay/repair pipelines. Dirt HEOs also spread asphalt and concrete for road construction or for building of foundations.

Hook or Crane work refers to the operation of a variety of specialized equipment capable of lifting hundreds of tons of materials (hanging from a hook) to heights of several hundred feet. Modern cranes are computerized and utilize joysticks to control movement. HEOs must set up and inspect their equipment, make adjustments to improve job safety and machinery performance, and make minor repairs to the equipment at times. The equipment is operated by moving levers, foot pedals, switches or joysticks.

Technology, in the form of computerized controls, improved hydraulics and electronics, requires highly-skilled operators. (As an example, Global Positioning Systems are used for grading and leveling work.) HEOs work outdoors, in all types of climates and conditions. The weather or stage of the project may require equipment operators to work irregular hours (around the clock/very early in morning or late at night).

Some equipment can be noisy, shake, and jolt the operator. Operating the equipment can be dangerous, making the adherence to safety procedures imperative for the operator’s safety as well as all personnel on site.

Working in this field requires a basic knowledge of engine mechanics; courses in science and mechanical drawing are also helpful. HEOs often obtain a commercial driver’s license (CDL) to haul equipment to the various job sites.
NCCER Millwright

Millwrights install, repair, replace and dismantle machinery and heavy equipment used in many industries. Millwrights may work in a variety of manufacturing industries, or in the construction industry, usually for a construction contractor. Millwrights are responsible for machinery from the time it arrives at a jobsite, through the stages of unloading and inspection, through moving it into position for installation. Millwrights use rigging and hoisting devices (pulleys and cables) to lift and move light machinery, or hydraulic lift-trucks or cranes for heavier equipment. Since millwrights often decide which device to use for moving machinery, they must know the load-bearing properties of rope, cables, hoists, and cranes.

Millwrights consult with managers and others to determine the optimal placement of machinery. In cases where a new foundation is needed, millwrights either prepare the foundation themselves, or supervise its construction. Millwrights must know how to read blueprints and work with a variety of building materials. In assembling machinery, millwrights fit bearings, align gears and wheels, attach motors, and connect belts, all according to the manufacturer's blueprints and drawings. Alignment and leveling must be precise in the assembly process, so millwrights measure angles, material thickness, and small distances using squares, calipers and micrometers. When a high degree of precision is required, millwrights use lasers and ultrasonic measuring alignment tools.

Other tools commonly used by the millwright are hand and power tools such as cutting torches, welding machines, hydraulic torque wrenches, and hydraulic stud tensioners, soldering guns, and lathes and grinding machines. As machines become more technologically advanced, millwrights must also continue their training. Courses in science, math, mechanical drawing, computers, machine shop, blueprint reading, hydraulics, electricity and electronics are important in preparing for this career.

AWS Welding

Welding is the most common way of permanently joining metal parts. In this process, heat is applied to metal pieces, melting and fusing them to form a permanent bond. Because of its strength, welding is used in shipbuilding, manufacturing and repair, aerospace applications, construction, and maintenance.

There are several different types of welding, from arc welding to semi-automatic welding to fully-automated welding. Training is necessary, as the welder works with equipment which carries a strong electrical current, and safety is an important issue. In addition, some understanding of the basic concepts of metallurgy, blueprint reading, and specifications are important to know. A welder's work is commonly reviewed by non-destructive testing, as these tests can determine the quality of the weld and the welder's skill and competency level.

NCCER Pipefitting

Pipefitting involves measuring, cutting, bending, and joining lengths of pipe to lay out, assemble, install, and maintain pipe systems, pipe supports, and related hydraulic and pneumatic equipment for steam, hot water, heating, cooling, lubricating, sprinkling, and industrial production and processing systems. Working in this field requires the ability to read blueprints, knowledge of building code requirements, and general construction knowledge so as to prevent obstructions with electrical wiring and insure that the piping systems will operate correctly when construction is complete. Saws, pipe cutters, pipe-bending machines, soldering tools, and pressure gauges are power tools used to create piping systems from plastic, glass, steel, or copper.

Specialty Training Courses

NCCER Construction Site Safety Technician (CSST)

Safety Technology - Provides instruction on how to implement and administer a company's safety program. This manual is designed for field managers, safety directors, safety committees, owner safety representatives, and insurance/loss control representatives.

Field Safety - To help prevent accidents, a safety program must be in place. This five-volume curriculum will provide you with the rules and safeguards you need to work safely on any job site. Safety must be incorporated into all phases of the job and involve all employees at every level, including management. Field Safety is one of three titles in the NCCER Safety Learning Series, covering topics such as Hazard Communication, Fall Protection, and Forklift Safety.