

POWER EQUIPMENT TECHNOLOGY NYS



PURPOSE

To evaluate each contestant's preparation for employment and recognize outstanding students for excellence and professionalism in engine and equipment diagnostics, overhaul and repair of both liquid and air-cooled engines. It will also evaluate the ability to troubleshoot and possibly overhaul the power train components of a piece of powered equipment and/or machinery.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with small air-cooled engine repair or power equipment-related repair programs with that as its occupational objective.

CLOTHING REQUIREMENT

White crew neck short-sleeved T-shirt, work pants, safety glasses with side shields or goggles, leather or steel-toed work shoes, hair must be contained. (Prescription glasses can be used only if they are equipped with side shields. If not, they must be covered with goggles.)

Note: Contestants must wear their official contest clothing to the contest orientation meeting. Also bring #2 pencil, resume, and safety assurance form.

EQUIPMENT AND MATERIALS:

1. Supplied by the NYS chair/committee:
 - a. All necessary engines, engine parts, work stations, test stands, power equipment, gasoline, oil and all basic hand tools as well as necessary specialty tools
 - b. Industry manuals, including service and repair instruction manuals
2. Supplied by the contestant:
 - a. All competitors must create a one-page résumé using a word processor. Resume is to be handed in at the orientation meeting. Failure to do so

will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the NYS SkillsUSA Web site:

<http://www.nysskillsusa.org/>

SCOPE OF CONTEST

The contest assesses understanding of two-cycle and four-cycle engines, 2 through 42 horsepower, and of both L-head and overhead valve design, as well as both single and twin cylinder design, drive train and hydraulic drive trains.

KNOWLEDGE PERFORMANCE

The contest will include a written knowledge exam based on an industry standard test. Additionally, the test could cover manufacturer's engines, parts identification, ordering and/or related equipment. There will also be the possibility of additional written portions during the day of the skill event.

SKILL PERFORMANCE

The contest will include a series of testing stations to assess skill performance.

CONTEST GUIDELINES

1. Contestants should have an understanding of engine theory, engine operation, diagnostic, failure analysis and repair and testing of engines and related power equipment as identified in the Standards and Competencies section following.
2. Contestants will demonstrate their ability to perform skills taken from the following areas:
 - a. Ignition, Charging, Fuel and Governor Systems
 - b. Starter, Cooling and Lubrication Systems

- c. Valves, Exhaust and Engine Block Systems
- d. Diagnostic and Failure Analysis
- e. Shop Procedures
- f. Business Operations
- g. Transmission/Power Train
- h. General Competencies

Standards and Competencies

PET 1.0 — Ignition, Charging, Fuel and Governor Systems

1.1 Ignition and Charging Systems

- 1.1.1 Understand and be able to disassemble ignition system, inspect and test ignition components
- 1.1.2 Show proficiency in testing coil/ignition modules
- 1.1.3 Repair/replace electronic ignition components
- 1.1.4 Test and troubleshoot equipment-related switches and harnesses along with stators, regulators and any related wiring harnesses

1.2 Fuel Systems

- 1.2.1 Explain and be able to inspect, service, repair and adjust carburetors, gaseous fuel regulators and mixers
- 1.2.2 Inspect, clean and replace filters
- 1.2.3 Check fuel tanks and service and repair fuel pumps and solenoids
- 1.2.4 Test equipment-related fuel tanks, lines and related systems and understand the procedures for testing for compliance systems as they are related to emission requirements and standards

1.3 Governor Systems

- 1.3.1 Understand and be able to explain the various governor systems
- 1.3.2 Inspect, service and reassemble governors
- 1.3.3 Understand and be able to explain which components cause engines to increase or decrease in the number of revolutions per minute

PET 2.0 — Starter, Cooling and Lubrication Systems

2.1 Starter Systems

- 2.1.1 Recognize and be able to demonstrate the ability to inspect, service and adjust the various starting systems; use wiring schematics of related equipment systems

2.2 Cooling Systems

- 2.2.1 Recognize, test and troubleshoot both liquid and air-cooled cooling systems of both engines and equipment
- 2.2.2 Understand and recognize signs of heat-related failures or problems

2.3 Lubricating Systems

- 2.3.1 Define and understand the various styles and types of lubrication systems
- 2.3.2 Demonstrate the ability to check oil levels and fuel/oil mixtures
- 2.3.3 Demonstrate the method of checking oil pressurized systems with the use of required tools
- 2.3.4 Understand and explain the various grades of oils and uses in the proper engines/equipment

PET 3.0 — Valves, Exhaust and Engine Block Systems

3.1 Valves

- 3.1.1 Identify and be able to service various types and styles of valve train components; explain why sealing these components is important

3.2 Exhaust Systems

- 3.2.1 Identify the various types of exhaust systems and explain how they relate to the engine and or equipment
- 3.2.2 Inspect and service exhaust and understand the procedures for testing for compliance systems as they are related to emission requirements and standards

3.3 Engine Block Components

- 3.3.1 Understand, identify and provide the necessary service/repair techniques to the various manufacturers within the industry; this could include disassembly, inspection and

measuring of crankshafts,
connecting rod bearings,
journals, cylinders, piston and
rings

- 3.3.2 Complete repairs to correct
torque of critical fasteners and
replace any gaskets and/or
sealants

PET 4.0 — Diagnostic and Failure Analysis

- 4.1 Demonstrate the proper use of the
various specialized tools of the industry.
Be able to test crankcase vacuum,
compression gauge, leak down testers,
voltmeters/multimeters and any other
required tools
- 4.2 Analyze failed engine components to
determine the correct type of failure;
determine best method to repair and
estimate cost of repair

PET 5.0 — Shop Procedures

- 5.1 Demonstrate the proper techniques in
the care and use of tools and equipment
- 5.2 Demonstrate the ability to work
accurately with precision instruments
- 5.3 Use proper safety procedures;
demonstrate ability to use service
manuals and/or bulletins
- 5.4 Perform tasks within assigned time limits
- 5.5 Give a verbal response to a customer and
answer customer-related problematic
questions
- 5.6 Prepare equipment for delivery

PET 6.0 — Business Operation

- 6.1 Demonstrate the ability to look up
proper part numbers by using paper,
microfiche and/or electronic means
available
- 6.2 Prepare both shop repair tickets and
warranty claims
- 6.3 Demonstrate the ability to calculate costs
accurately
- 6.4 Understand and operate equipment
within equipment manufacturer's
guidelines
- 6.5 Understand effective customer interaction
and professional customer
communications and relations

PET 7.0 — Transmission/Power Train

- 7.1 Understand the theory of transmission

and transaxle components

- 7.2 Disassemble power train components,
assemble power train components and
diagnose and correct a potential problem
- 7.3 Understand the different types of
transmissions and what types of
lubrication systems are necessary for
each

PET 8.0 — General Competencies

- 8.1 Basic reading and comprehension
- 8.2 Understand basic two- and four-stroke
theory
- 8.3 Understand electrical theory
- 8.4 Understand carburetion theory and other
related fuel systems
- 8.5 Read and follow schematics for
hydraulics, electrical, etc.
- 8.6 Communicate effectively to others
- 8.7 Demonstrate basic computer skills

Additional Resources and Notes

Additional source material can be found on the
manufacturers' Web sites, through the local
central distributors, dealers or manufacturers
within each state. Those manufacturers are:

- **Briggs & Stratton Corp.**
www.briggsandstratton.com
- **Kohler Engines**
www.kohlerengines.com
www.kohlerplus.com
- **Equipment and Training Council**
www.eetc.org
- **MTD**
www.mtdproducts.com
- **Simplicity**
www.simplicity.com
- **MillerWelders**
www.millerwelds.com
- **JohnDeere**
www.johndeere.com