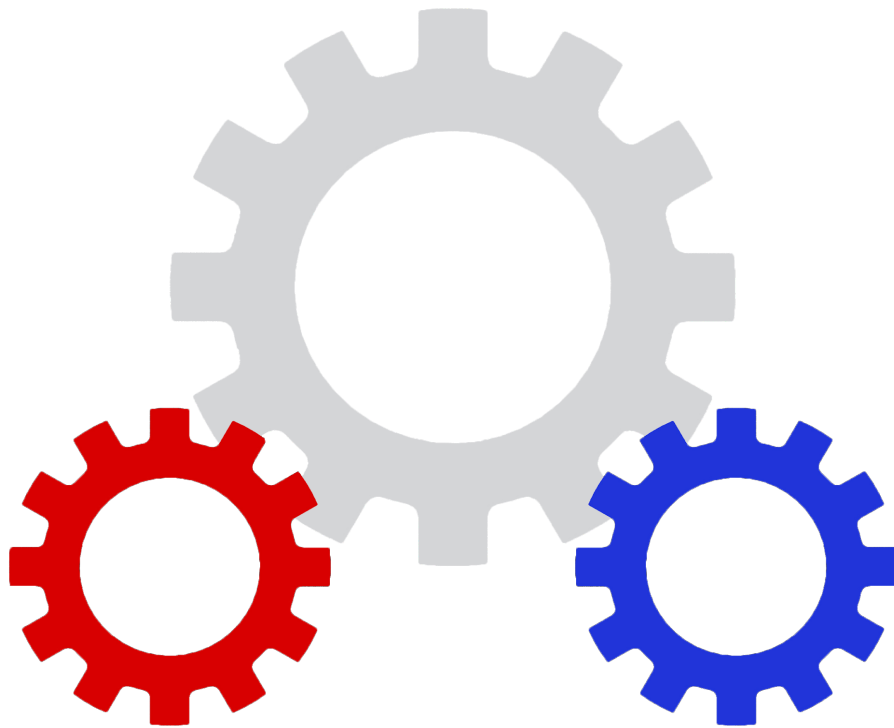


# The WorBots 4145

Intermediate Tool Certification (ITC)



**Cultivating a Culture of STEM in Worthington, Ohio**

*ENGAGE, INSPIRE, IMPACT*

## Introduction

The **WorBots Intermediate Tool Certification (ITC)** is a critical safety and skills certification that provides students with the necessary training to safely operate power tools in the workshop. This certification goes beyond the basic tool safety covered in the Basic Tool Certification (BTC), focusing on more advanced tools, including bandsaws, drill presses, sanders, and other essential powered equipment. However, CNC machines are excluded from this certification, as they require a specialized level of training.

## Why ITC is Important

- ⚙️ **Enhanced Safety Protocols:** Power tools introduce greater risks, and the ITC ensures that students are equipped with the knowledge and techniques to operate these tools safely, reducing the potential for serious accidents.
- ⚙️ **Skill Building for Complex Tasks:** Power tools allow for more precise and efficient work, which is essential in robotics projects. ITC provides students with the skills to use these tools confidently, enabling them to contribute to more complex and high-quality builds.
- ⚙️ **Responsibility and Independence:** Achieving ITC signifies a level of responsibility, allowing certified students to work with less supervision and empowering them to take on advanced roles in the workshop.
- ⚙️ **Quality Assurance:** Proper use of power tools is critical for maintaining the quality and integrity of project components, and ITC-trained students have the expertise to ensure precision and consistency.

## Power Tool Access and Restrictions

The **WorBots Intermediate Tool Certification (ITC)** is mandatory for any student seeking to operate power tools within the shop (Mechanical and Electrical Subteam Members). Without this certification, students are strictly prohibited from using powered equipment, including bandsaws, drill presses, sanders, and similar machinery. This restriction is in place to ensure that only those who have demonstrated safe handling, operational knowledge, and respect for the power of these tools are permitted access.

## Why This Policy is Essential

- ⚙️ **Safety Control:** Power tools present significant risks, and allowing only certified students to use them reduces the likelihood of accidents and injuries, ensuring a safer shop environment.
- ⚙️ **Preparedness and Accountability:** ITC confirms that students understand the precautions and procedures necessary to operate power tools responsibly, preventing misuse and enhancing team accountability.
- ⚙️ **Standard of Proficiency:** Restricting access ensures that all students operating power tools have achieved a standard level of proficiency, maintaining the quality of work across the team and reinforcing best practices.

## ITC Requirements

To achieve **WorBots Intermediate Tool Certification (ITC)**, students must complete a series of requirements, including both hands-on training sessions and a practical project to demonstrate their skills. These requirements are designed to ensure that students have the knowledge and practical experience necessary to safely and effectively operate power tools in the shop.

### 1. Training Sessions

The ITC training consists of structured sessions covering each power tool in detail. Students will receive both theoretical knowledge and hands-on practice under the supervision of a mentor or instructor. Training topics include:

- ⚙ **Safety Procedures:** Tool-specific safety protocols, including personal protective equipment (PPE) and handling precautions.
- ⚙ **Operation and Technique:** Correct techniques for using each tool, focusing on precision, efficiency, and control.
- ⚙ **Maintenance and Cleanup:** Proper methods for cleaning, storing, and maintaining power tools to ensure their longevity and readiness for future use.

Training includes assessments where students demonstrate their ability to operate each tool safely and effectively. Passing these assessments is required before progressing to the project component.

### 2. Practical Project – The MiniBot

After completing training, students will apply their skills to build a small-scale project robot known as the **MiniBot**. This project is designed to test their proficiency with the tools and techniques learned during training.

#### MiniBot Requirements:

- ⚙ **Frame Construction:** Using bandsaws, drill presses, and other power tools, students will create a durable frame for the MiniBot.
- ⚙ **Electrical Component Integration:** Students must apply electrical skills, including using Anderson Power Pole connectors, ferrule pins, and PWM/CAN pins, to wire the MiniBot according to a basic wiring diagram.
- ⚙ **Assembly and Quality Check:** The MiniBot should be assembled with precision and attention to detail, including securing all components and ensuring that wiring is properly routed and insulated.
- ⚙ **Testing and Functionality:** Students will conduct a basic functionality test, demonstrating that the MiniBot's mechanical and electrical systems are fully operational.

Completion of the MiniBot project serves as a practical assessment of each student's ability to use power tools safely and effectively, as well as their capability in assembly and basic wiring skills.

## Certification Completion

Upon successfully completing both the training sessions and the MiniBot project, students will receive their **WorBots Intermediate Tool Certification (ITC)**, authorizing them to work with power tools independently in the workshop. This comprehensive approach ensures that students are well-prepared to contribute to the team's larger robotics projects with confidence and skill.

## WorBots Shop Safety

All shop safety rules must be followed at all times:

### Personal Protective Equipment (PPE):

- ⚙ Safety Goggles: Must be worn at all times when using tools or if machines are running nearby.
- ⚙ Closed-Toed Shoes: Required in the workshop to protect feet from heavy or sharp objects.
- ⚙ Appropriate Clothing: Wear clothing that provides adequate protection, avoiding loose items.
- ⚙ Long Hair Tied Back: To prevent it from getting caught in machines or tools.

### General Workshop Behavior:

- ⚙ No Running: Avoid running to prevent accidents or collisions in the workshop.
- ⚙ Stay Alert: Be mindful and attentive to surroundings, especially when machines are in use.

### Certification and Training:

- ⚙ Safety Certification: Only use tools or machines after completing required safety training and certification.

### Workspace Maintenance:

- ⚙ Clean Workspace Regularly: Ensure the workspace is organized and free from clutter.
- ⚙ Put Away Tools: Store all tools properly after use to prevent tripping hazards and maintain organization.
- ⚙ Unplug Power Tools: Disconnect tools when not in use to prevent accidental activation.
- ⚙ Sweep Workbench/Floor: Clean all surfaces after work to remove debris and hazards.

### Accident Protocol

- ⚙ Report Accidents Immediately: Notify the coaches of any accidents or injuries right away.
- ⚙ Address Medical Issues Promptly: Seek first aid or medical attention as needed.

## Cutting Tools

| Tool Name          | Function                                                           |
|--------------------|--------------------------------------------------------------------|
| Bandsaw            | for cutting straight and curved shapes in wood, plastic, and metal |
| Miter Saw          | for making precise crosscuts and angled cuts, primarily in wood    |
| Scroll Saw         | for intricate and detailed cuts in thin wood, plastic, or metal    |
| Horizontal Bandsaw | for precise, straight cuts at fixed positions in metal             |

## Drilling and Boring Tools

| Tool Name            | Function                                                                                                  |
|----------------------|-----------------------------------------------------------------------------------------------------------|
| Drill Press          | for controlled, precise drilling in various materials, especially useful for creating perpendicular holes |
| Handheld Power Drill | for drilling holes and driving screws with greater speed and control                                      |

## Sanding and Shaping Tools

| Tool Name      | Function                                                                       |
|----------------|--------------------------------------------------------------------------------|
| Belt Sander    | for quickly smoothing and shaping surfaces                                     |
| Disc Sander    | for shaping and finishing edges                                                |
| Orbital Sander | for achieving a smooth finish on surfaces and removing fine layers of material |

## Specialized Electrical Tools

| Tool Name                         | Function                                                                                                                        |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Soldering Iron                    | for creating soldered connections in wiring, circuit boards, and electronic components                                          |
| Multimeter                        | for testing circuits, measuring voltage, current, and resistance to ensure proper connections                                   |
| Battery Charger and Tester        | for charging and assessing the health of the robot's batteries                                                                  |
| Anderson Power Pole Crimping Tool | a specialized crimper designed to securely attach Anderson power pole connectors to wires                                       |
| Ferrule Crimping Tool             | a dedicated crimper for attaching ferrules to wires, creating reliable connections for terminals and control boards             |
| PWM/CAN Crimping Tool             | a specialized tool for crimping small pins used in PWM and CAN connectors, designed to create precise crimps on delicate wiring |

## Miscellaneous Power Tools

| Tool Name    | Function                                                                                                |
|--------------|---------------------------------------------------------------------------------------------------------|
| Rivet Gun    | for setting rivets to join two pieces of material securely                                              |
| Heat Gun     | for heating materials, such as heat-shrink tubing for wiring or bending plastic                         |
| Hot Glue Gun | for quick adhesive work, particularly for temporary or prototype assembly                               |
| Tap          | to cut threads inside a drilled hole, allowing screws or bolts to be fastened securely within materials |