Faculty Research Lab

(Makerspace)

University of South Carolina Aiken

1. WAZER G2 Desktop CNC Waterjet

Description

The WAZER G2 Desktop CNC Waterjet is a compact precision cutting system that uses high-pressure water mixed with abrasive material to cut a wide range of metals, plastics, glass, ceramics, and composites. The system enables precise fabrication of custom parts, prototypes, and experimental components.

Capabilities

- 12” × 18” cutting area
- Kerf width approximately 0.044 inches
- Precision cutting tolerance up to ±0.003 inches
- Abrasive waterjet cutting technology

Applications

- Metal and composite material cutting
- Fabrication of custom machine parts
- Rapid prototyping
- Educational and research fabrication projects

2. Vertical Milling Machine

Description

The vertical milling machine is a precision machining tool used to fabricate components through controlled removal of material. The system supports drilling, milling, slotting, and surface machining for metal and plastic materials.

Capabilities

- 54” × 10” worktable
- 32” longitudinal travel
- 13.75” cross travel
- Spindle speed range: 60–4200 RPM
- Digital Readout (DRO) on X and Y axes
- Power table feeds and drawbar

Applications

- Precision machining of metal components
- Prototype fabrication
- Mechanical engineering research projects
- Tool and fixture fabrication

3. Metalworking Lathe

Description

The metalworking lathe enables turning operations for cylindrical components. It supports cutting, threading, drilling, and finishing operations on a wide variety of materials including aluminum, steel, and plastics.

Capabilities

- 13-inch swing over bed
- 36-inch distance between centers
- 3-jaw and 4-jaw chuck systems
- Steady rests for long workpieces

Applications

- Shaft and cylindrical component fabrication
- Thread cutting and precision turning
- Mechanical prototyping
- Custom mechanical component production

4. Drill Press

Description

The drill press provides precise drilling capability for metals, plastics, and wood materials. The machine allows accurate and repeatable hole creation for fabrication and mechanical assembly tasks.

Capabilities

- 15-inch drill press
- Spindle speed range: 400–5000 RPM
- Compatible with metric and SAE tooling
- Supports tap and die operations

Applications

- Precision hole drilling
- Mechanical component fabrication
- Assembly preparation
- Educational machining exercises

5. Metal Band Saw

Description

The band saw is used for cutting metal bars, rods, and structural components. The system allows angled cuts and can be configured for vertical or horizontal cutting operations.

Capabilities

- 64.5-inch blade
- 4.5-inch throat depth
- Adjustable miter angle up to 55°
- Vertical and horizontal cutting configurations

Applications

- Cutting metal stock
- Fabrication preparation
- Prototyping operations
- Mechanical workshop projects

6. Belt and Disc Grinding Machine

Description

The grinding and sanding machine is designed for finishing, deburring, and surface preparation of metal and wood materials.

Capabilities

- 6” × 48” belt grinding surface
- 12” disc grinder
- 1.5 HP motor
- Adjustable belt positioning

Applications

- Metal finishing
- Deburring machined parts
- Surface preparation for welding or coating
- Woodworking finishing

7. Combination Sheet Metal Brake, Shear, and Roller

Description

The sheet metal fabrication machine allows shearing, bending, and rolling operations using a single integrated system. It supports small-scale sheet metal fabrication.

Capabilities

- 20-gauge sheet metal capacity
- 30-inch maximum working width
- Three-in-one fabrication tool

Applications

- Sheet metal fabrication
- HVAC and enclosure fabrication
- Mechanical prototype development
- Custom metal component production

8. Laser Engraving System – Epilog Fusion Pro 48

Description

The Epilog Fusion Pro 48 laser engraving system is used for high-precision engraving and cutting of various materials including plastics, wood, glass, and coated metals.

Capabilities

- 120-watt CO_2 laser
- 48” × 36” engraving area
- Rotary attachment support
- Computer-controlled engraving

Applications

- Precision engraving
- Prototype labeling
- Manufacturing identification tags
- Design fabrication

9. Electronics Soldering Workstation

Description

The electronics workstation supports soldering and electronic prototyping for circuits and hardware development.

Capabilities

- Variable temperature Hakko soldering iron
- Magnification and lighting
- Desoldering tools

Applications

- Circuit board assembly
- Electronic prototyping
- Hardware development projects
- Electrical engineering education

10. General Hand Tools and Fabrication Equipment

Description

The Makerspace includes a variety of hand tools used for assembly, fabrication, and mechanical adjustments.

Capabilities

- Precision measuring tools
- Wrenches, pliers, and screwdrivers
- layout tools and gauges

Applications

- mechanical assembly
- fabrication support
- repair and maintenance work

11. Welding System – Lincoln Electric 140 Series Welder

Description

The Makerspace welding station includes a Lincoln Electric 140-series wire welder used for metal fabrication and prototyping. The system supports flux-core welding and can be upgraded to MIG welding with the addition of a shielding gas system.

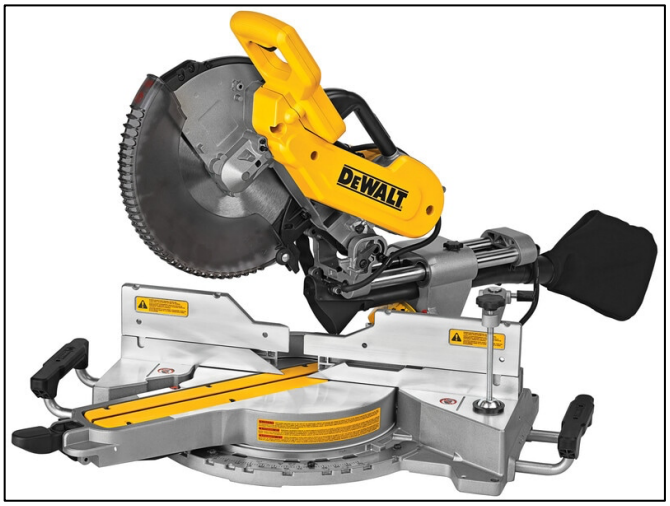
Capabilities

- Lincoln Electric 140-series wire welder
- Flux-core wire welding capability
- Welding bench with clamping fixtures
- Auto-darkening welding helmets
- Welding gloves and protective apron
- Slag hammer and wire brushes
- Ducted exhaust ventilation system

Applications

- Fabrication of metal frames and structures
- Joining steel and aluminum components
- Mechanical prototyping and fabrication projects
- Engineering and manufacturing education

12. Woodworking Equipment – DeWalt Compound Miter Saw System



Description

The Makerspace provides limited woodworking capability through a compound miter saw workstation and supporting portable power tools used for fabrication and prototyping tasks.

Equipment Available

• 12-inch compound miter saw (DeWalt style miter saw system) mounted to a rolling table
• Access to a 10-inch table saw
• DeWalt cordless drill system
• Reciprocating saw

Applications

• Cutting lumber for prototype structures
• Fabrication of wooden fixtures and supports
• Rapid prototyping for engineering projects