Faculty Research Lab

(Engineering)

University of South Carolina Aiken

1. Jet Shear/Brake and Roll Machine – SBR-40M

Description

The Jet SBR-40M Shear/Brake and Roll Machine is a versatile sheet-metal fabrication system that combines shearing, bending, and rolling operations into a single compact unit. This equipment enables students and researchers to fabricate sheet-metal components used in engineering prototypes and laboratory projects.

Capabilities

- Shearing capability for sheet metal up to 20-gauge thickness
- Sheet-metal bending up to 90°
- Rolling capability for forming cylindrical shapes
- Adjustable depth stops for precision bending and cutting
- Heavy-duty steel construction for durability

Applications

- Sheet-metal fabrication
- Prototype development
- Manufacturing of brackets, enclosures, and metal components
- Educational metal fabrication exercises

2. Jet Belt/Disc Bench Grinder – 230/460V 1.5 HP

Description

The Jet Belt/Disc Bench Grinder is a multi-purpose finishing machine used for grinding, sanding, and deburring metal and wood components. It combines a belt sander and disc grinder into one system to support fabrication and finishing operations.

Capabilities

- 1.5 HP motor with 230/460V dual voltage operation
- 12-inch grinding disc and 6 × 48-inch sanding belt
- Adjustable grinding tables for precise finishing angles
- Heavy-duty base to minimize vibration

Applications

- Metal surface finishing
- Deburring machined components
- Preparing materials for welding or coating
- Woodworking and fabrication projects

3. WAZER Desktop CNC Waterjet Cutter

Description

The WAZER Desktop CNC Waterjet Cutter is a compact abrasive waterjet system designed for precision cutting of metals, glass, stone, and composite materials. It uses high-pressure water combined with abrasive particles to cut complex shapes with high accuracy.

Capabilities

- 110V power supply
- Ability to cut materials up to 3/8-inch thick
- CNC-controlled precision cutting
- Closed-loop water system
- User-friendly design software interface

Applications

- Rapid prototyping
- Precision fabrication of mechanical components
- Educational engineering design projects
- Custom material cutting for research

4. Baileigh Metal Lathe – PL-1340E

Description

The Baileigh PL-1340E Metal Lathe is a precision machining tool used for turning cylindrical components. It supports various machining operations including threading, facing, and turning.

Capabilities

- 13-inch swing over bed
- 40-inch distance between centers
- Gearhead speed control for flexible machining
- Precision-ground bedways for smooth operation
- Digital readout for accurate measurements

Applications

- Machining shafts and cylindrical components
- Thread cutting operations
- Mechanical prototype fabrication
- Precision manufacturing experiments

5. Baileigh Variable Speed Vertical Mill – VM-1054E-VS

Description

The Baileigh VM-1054E-VS Vertical Mill is a high-precision milling machine designed for machining metal components. The variable-speed spindle allows precise control for milling, drilling, and tapping operations.

Capabilities

- 10 × 54-inch worktable
- Variable spindle speed from 60–4200 RPM
- R8 spindle compatibility with standard tooling
- Digital readout for precise machining
- Heavy-duty construction for stability

Applications

- Precision machining of metal components
- Mechanical design and prototyping
- Engineering manufacturing experiments
- Fabrication of custom mechanical parts

6. TL-1-EDU Toolroom CNC Lathe

Description

The TL-1-EDU Toolroom CNC Lathe is an educational CNC machining system used for learning and performing automated machining operations. It integrates traditional turning operations with computer numerical control.

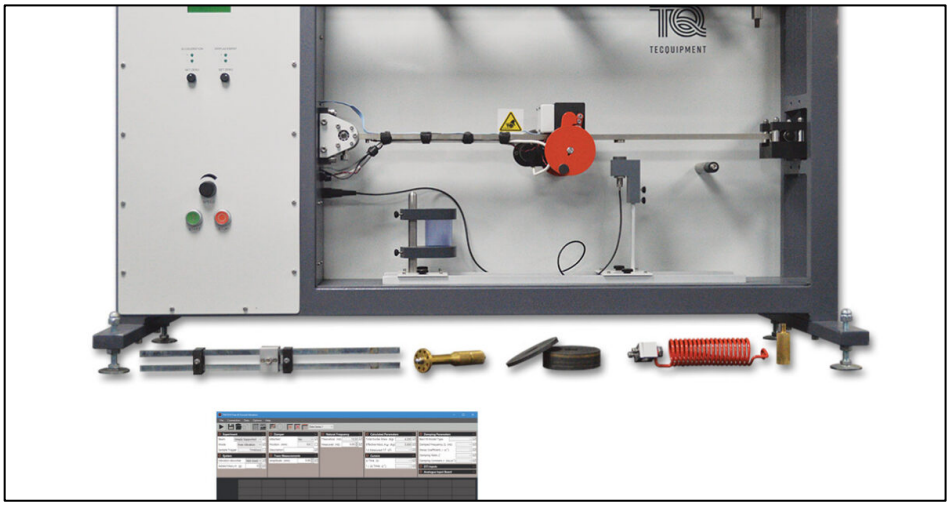
Capabilities

- 16-inch swing over bed
- 30-inch distance between centers
- CNC control interface with manual and automatic modes
- Precision machining capability
- Rigid construction for high accuracy

Applications

- CNC machining training
- Precision component fabrication
- Engineering prototyping
- Manufacturing education

7. Free and Forced Vibrations Machine – TM1016V



Description

The Free and Forced Vibrations Machine is a teaching and research apparatus used to demonstrate the principles of mechanical vibrations in engineering systems.

Capabilities

- Adjustable parameters for different vibration modes
- Sensors and data acquisition for vibration analysis
- Modular system for experimental configuration
- Real-time observation of vibration behavior

Applications

- Mechanical vibration analysis
- Engineering dynamics education
- Experimental research in structural dynamics
- Demonstration of resonance and damping effects

8. Universal Material Testing Machine – Model 34FM-100

Description

The Model 34FM-100 Floor Model Universal Tester is a mechanical testing system used to evaluate material properties under tensile, compressive, and flexural loads.

Capabilities

- Maximum load capacity of 100 kN (22,500 lbf)
- High-precision load cell measurement
- Digital control and data acquisition system
- Interchangeable fixtures for multiple test configurations

Applications

- Tensile strength testing
- Compression testing of engineering materials
- Material characterization and quality control
- Research in mechanical properties of materials

9. Epilog Fusion Pro 48 Laser Engraver

Description

The Epilog Fusion Pro 48 Laser Engraver is a precision laser cutting and engraving system used for fabrication and design applications.

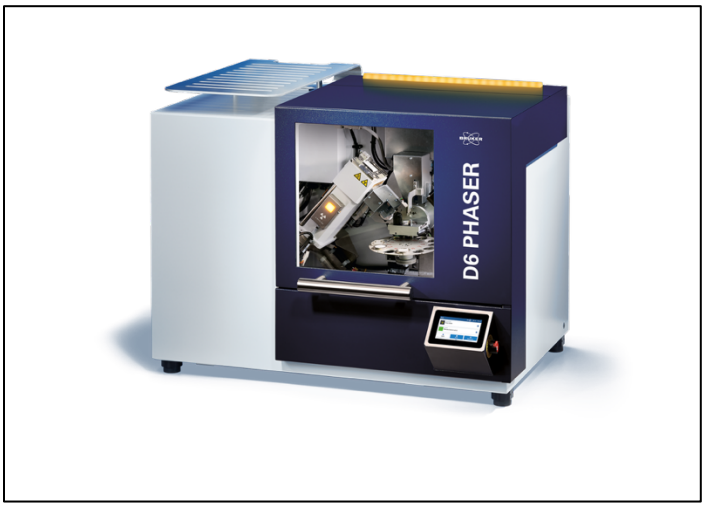
Capabilities

- CO_2 laser engraving system
- 48 × 36-inch work area
- High-speed engraving and cutting capability
- Software-controlled precision processing

Applications

- Laser engraving of materials
- Precision cutting of acrylic, wood, and plastics
- Prototype fabrication
- Design and manufacturing projects

10. X-Ray Diffractometer – Bruker D6 Phaser



Description

The Bruker D6 Phaser is a compact benchtop X-ray diffractometer used for crystallographic analysis and material characterization.

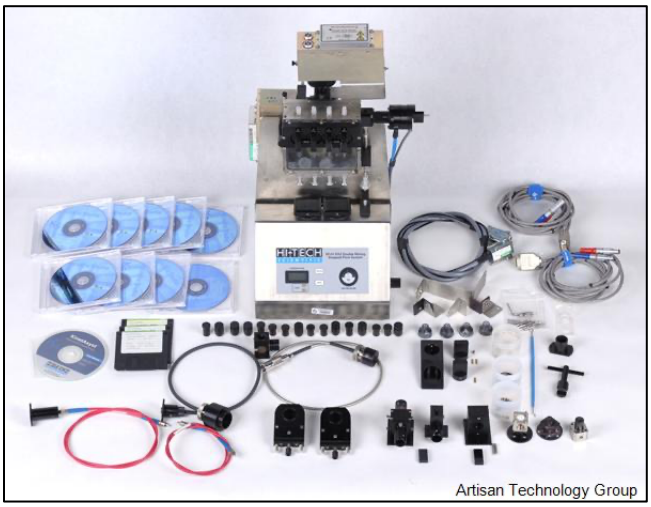
Capabilities

- 600 W copper X-ray source
- Silicon strip detector for high-resolution data
- Angular measurement range from −3° to 152° 2θ
- Variable temperature stage (25°C–500°C)

Applications

- Crystallographic phase identification
- Material structure analysis
- Chemical compound characterization
- Engineering materials research

11. Stopped-Flow Spectrometer – KinetAsyst



Description

The KinetAsyst Stopped-Flow Spectrometer is a high-performance system designed to measure rapid chemical reaction kinetics.

Capabilities

- Dual detection channels for multi-wavelength monitoring
- Rapid mixing technology for millisecond reaction measurements
- Integrated data acquisition software
- Modular configuration for laboratory research

Applications

- Biochemical reaction studies
- Enzyme kinetics analysis
- Pharmaceutical research
- Fast chemical reaction analysis

12. Differential Scanning Calorimeter – TA Instruments DSC2500

Description

The TA Instruments DSC2500 is a high-precision differential scanning calorimeter used for advanced thermal analysis of materials.

Capabilities

- Modulated temperature DSC technology
- Tzero® heat-flow measurement system
- Wide temperature range for heating and cooling experiments
- Automated data analysis software

Applications

- Polymer thermal characterization
- Glass transition and melting studies
- Pharmaceutical stability analysis
- Materials research and development