

# WELDING TECHNOLOGY LAB

## SPACE DESCRIPTION

The Welding Lab is a dedicated space used to train students in the primary discipline of welding. In this lab, students practice techniques and processes at individual welding booths. Welding Labs are ideally designed with welding booths along the perimeter walls and open space in the center of the room for mobile worktables, bandsaws, and other equipment. Ventilation in this area is a design driver, and the equipment should be accounted for early in the design process.

As all programs in the AMEAS field quickly evolve and expand, so too, must the space they occupy. The Lab, the site, and all infrastructure shall be planned with future expansion in mind. Buildings housing Welding Labs are most successful when located at the rear of campus property, with space for future building additions and with the Ventilation system outside of view.

Outdoor facilities include, at minimum, an overhead door for the movement of equipment and welding materials. A loading dock and fenced service yard with covered area may also be advantageous for delivery and storage of materials.

## SUCCESS FACTORS

**Ventilation:** The Welding Lab must have a robust, dedicated ventilation system to remove fumes and odors associated with welding processes. Consider oversizing the system if there is a possibility for future expansion. Each welding booth shall be equipped with a dust and fume extractor.

**Plumbed Gases:** A manifold system for gas distribution is highly preferred for ease of supply and maintenance.

**Safety:** Due to the hazardous nature of this work, Welding Labs must be designed with safety as a top priority. The Labs must be outfitted with safety equipment and must comply with all relevant safety regulations and standards. High-performance ventilation systems are a standard safety feature in the Welding Lab.

**Visibility:** Welding comes with safety risks. Instructors prefer layouts where the entrances to all the booths are open/visible toward the center of the room so they can see all the student simultaneously.

**Maneuvering:** Considering how the instructors will move long and heavy steel stock in and around the lab is critical.

## GENERAL

All perimeter walls shall be full height to deck.

Metal stud walls are preferred for flexibility for expansion and remodeling. CMU walls are not preferred.

Verify the largest raw material sizes used by the program. Some programs may receive materials in 20' lengths. The maneuvering and storage of that material may be a design driver. An overhead crane may be advantageous.

## ADJACENCIES

Separate but adjacent space is required for the following: **Metallurgy/ Non-Destructive Test Lab, Welding Classroom, and Grinding/ Storage Room.**

Ideally, Welding Labs adjoin separate Machine Tool & CNC and Industrial Technology FLEX Labs for movement and cross-training between programs.

## ACOUSTICS

Welding Labs are naturally very loud spaces. Sound absorbent wall panels must be balanced with concerns over sparks/flammability. Maximizing sound absorbance at the ceilings is a good initial strategy. Consider both internal sound reverberation and the transmission to adjacent spaces.

Where Welding Labs border acoustically sensitive spaces, perimeter walls shall have a minimum STC rating of 50.

## MECHANICAL

Consider providing electrical power in overhead bus ducts for future flexibility. Compressed air, and gases are also likely best distributed overhead to allow for future reconfiguration. Verify specific needs on a project-by-project basis while planning for flexibility in the future.

- Provide a dust collection system and additional ventilation.
- Provide emergency exhaust and wall switch at each booth.
- Provide a sink and emergency shower with eye wash in each Lab.

## ELECTRICAL & DATA

- High voltage service is required. Provide flexibility for 120/208V 3-Phase and 480/277V 3-Phase, standard. Verify required voltages with planned and future equipment.
- Emergency shut-off switches are required.

Provide power and data at each welding booth.

## LIGHTING

- In high-bay areas, provide LED lighting in warm, soft white color.
- Task lighting is required at individual welding booths.

## TECHNOLOGY

All utilities shall be provided overhead, including Internet.

- Provide Wireless capability throughout Welding Labs with Wireless Access device.
- Provide telephone service.
- Coordinate with PSEP for camera locations
- Provide card reader/ key fob at entry doors.

## ACCESSORIES AND EQUIPMENT

Equipment needs should be determined on a project-by-project basis while planning for flexibility in the future. At minimum, equipment will include:

- Horizontal bandsaws, Ironworkers, Metal shears and Press brake

- Equipment on rollers for flexibility
- Air compressor
- Fire extinguishers
- Wall-mounted tack boards and marker boards

See space descriptions.

## FURNITURE

Provide the following standard furnishings for Welding Labs:

- Welding booths, 6' x 6' minimum with Lincoln Tables, or pipe stands with tables attached. 16 welding booths will accommodate the preferred teacher to student ratio.
- PPE lockers or open cubbies, minimum 1 per booth. 24"H x 12" W x 12"D, minimum
- Work benches, Tool chests and job boxes on rollers for flexibility and mobility.
- Bandsaws
- Wall shelving and steel storage racks on perimeter walls.

## FINISHES

### Ceilings

Recommended Height: 20' clear with exposed structure for future reconfiguration of unistrut systems to support utility lines. Provide acoustic panels for sound absorption.

### Floors

Sealed or polished concrete slabs work well. Epoxy flooring can be used but must be selected with considerations with damage by sparks and hot metals. Verify specific needs on a project-by-project basis while planning for flexibility in the future.

## DOORS AND WINDOWS

Overhead coiling doors for access to the Loading Dock. 8'W x 10'H, min. for forklift access. The door size will need to be coordinated with raw material sizes and transportation method.

Welding Lab doors shall be minimum STC 30 with 6" x 30" Window Lite preferred.

Clerestory windows with E/W exposure, preferred. Place windows 6'-0" or higher to reduce damage. Consider reinforced glazing/window film.

## METALLURGY AND NON-DESTRUCTIVE TEST LAB

### SPACE DESCRIPTION

The Metallurgy and Non-Destructive Test Lab is a dedicated space where students finish parts for use in manufacturing processes. This is a "clean" space where precision measurements are taken and parts are tested. Depending on program requirements, this could be a combined lab space.

Utilities shall be provided overhead, as required by the program. At minimum, Power, Data and Water.

The Metallurgy and Non-Destructive Test Lab shall have direct access to the Welding Lab and Machine Tool Technology Lab and is used by both programs.

### ACCESSORIES AND EQUIPMENT

- Work Benches and Tool Carts
- Metal Shop Table
- Welding and Machining Table
- Electric or Gas Furnaces
- Fire extinguishers
- Wall-mounted tack boards and marker boards

## GRINDING LAB / STORAGE ROOM

### SPACE DESCRIPTION

Directly adjacent to the Welding Lab, the combined Grinding Room/ Storage Room provides a dedicated place for weld grinding and for receiving and storing materials. The room shall be equipped with a dedicated ventilation system and spark arrestor.

This space should be designed so sparks created during grinding are aimed in a safe direction.

Additional equipment includes tool chests, shelves and cabinets.

An overhead coiling door (8' W x 10' H, minimum) and loading dock for exterior access may be required depending on lab configuration.