ADVANCED AUTOMATION & ROBOTICS FLEX LAB

SPACE DESCRIPTION

The Advanced Automation and Robotics FLEX Lab is a shared space for various programs of study in the AMEAS field. The FLEX Lab is a large room with high ceilings, open floor space, and flexible utilities to accommodate various machinery and systems. Classrooms, CAD Labs, program-specific Labs, and Storage rooms adjoin the FLEX Lab for ease of movement and agile instruction.

The layout shown is illustrative of basic concepts and spatial needs, but should be adjusted according to each campus' specific requirements.

Depending on Service Area needs, the following programs may be served by the FLEX Lab:

- Design Technology
- Electrical Engineering Technology
- Mechanical Engineering Technology
- Motor & Motor Controls
- Process Automation/ Mechatronics
- Robotics Technology (SMART)

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 flexibility and reconfiguration in mind. Buildings housing FLEX Labs are most successful when located at the rear of campus property, outside the common path of travel, and with area for future building additions.

Outdoor facilities should include, at minimum, an overhead door for movement of large equipment. A fenced service yard may also be advantageous for delivery and storage of materials. Consideration should be given to roof-mounted solar panels, which may serve as educational tools, in addition to offsetting some energy use.

SUCCESS FACTORS

Safety: Due to the hazardous nature of this work, FLEX 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. Walkways through the space should be clearly marked, and equipment such as grinders which produce flying debris, should be properly located to prevent harm.

Flexibility: The Lab shall be designed to accommodate a variety of machines and instructional methods. Open floor space, overhead utilities and equipment on rollers all lend to a flexible space for various programmatic uses. Equipment will regularly be changed, rearranged, and upgraded as technology and the type of teaching evolves.

Storage: Storage space is critical for FLEX Labs. Equipment on rollers shall be parked out of the way, in separate storage rooms, when not in use.

Noise Control: FLEX Labs shall be designed to reduce noise levels, as they are loud spaces by nature and the sound quality is poor for instruction. Sound absorption shall be provided on wall and ceiling surfaces, and walls shall be constructed to reduce sound transmission to adjacent spaces. These spaces should be located away from acoustically sensitive spaces.

GENERAL

All perimeter walls shall be full height to deck.

ADJACENCIES

Separate but adjacent space is required for the following: **Pneumatic & Hydraulic Lab, Classrooms/ Computer Labs, Tool Crib, Lab Storage, and Electrical Closet.**

Ideally, Advanced Automation & Robotics FLEX Labs adjoin separate Industrial Technology FLEX Labs for movement and cross-training between programs.

ACOUSTICS

FLEX Labs are naturally very loud spaces due to the activities in the space. Provide absorbent panels on walls and ceilings for noise reduction and to decrease sound transmission to adjacent spaces.

Where Flex labs border acoustically sensitive spaces, exterior walls should have a minimum STC rating of 50.

MECHANICAL

Electrical power shall be provided in overhead bus bars to allow for future flexibility. Compressed Air, Gas, and Water are likely to be best distributed overhead to allow for reconfiguration. Distilled/ Reverse Osmosis water supply may be required. Verify specific needs on a project-by-project basis while planning for flexibility in the future.

- Provide a sink and emergency shower with eye wash in each Lab.
- Provide floor drains in locations as required for certain equipment.

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.
- Provide twist-lock plugs for trainers, similar to Hubbell HBL2511 and HBL2513.
- Emergency shut-off switches are required.

Provide power and data at 6’ intervals along perimeter walls at locations which may be used for desktop computer workstations and/or lab equipment.

LIGHTING

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

TECHNOLOGY

All utilities shall be provided overhead, including Internet.

- Provide Wireless capability throughout FLEX Labs with Wireless Access device.
- Provide telephone service.
- Provide high-speed internet throughout, with each machine connected via CAT-6 cable from bus bar overhead (min. 13’ clear below). Depending on program, each machine may require its own IP address and tablet. Verify specific requirements.

- PSEP cameras are required at high security 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 shall include:

- 3D printers
- Equipment on rollers for flexibility (3 students/ trainer, typical)
- Air compressors
- Fire extinguishers
- Wall-mounted tack boards and marker boards

FURNITURE

Provide the following standard furnishings for FLEX Labs:

- Work benches and job boxes on rollers for flexibility and mobility.
- Stationary computer workstations with integral power and data connections.
- Wall shelving and 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

Polished or sealed concrete slab (6” min. thickness). Verify specific needs on a project-by-project basis while planning for flexibility in the future.

- Some programs and equipment may require thicker slabs. 8” or 12” thick slabs and additional footings may be required for heavy and high precision equipment.
- Some machines may require isolated footbeds to reduce vibration.

DOORS AND WINDOWS

Overhead coiling doors for access to the Loading Dock. 10’W x 12’H, min.

FLEX Lab doors shall be minimum STC 30 with 6” x 30” Window Lite preferred.

Clerestory windows with E/W exposure, preferred. Place windows above 6’-0” high to reduce damage; or provide reinforced glazing/ window film.

PNEUMATIC / HYDRAULIC LAB

SPACE DESCRIPTION

The Pneumatic / Hydraulic Lab is a separate Lab space, adjacent to the FLEX Lab, for (12) students and (1) instructor. Lab equipment shall be on rollers for movement between spaces. Due to the use of

extremely loud equipment, wall construction requires high STC rating and sound isolation. Provide sound absorptive panels on walls and ceilings.

Extend overhead utilities from the FLEX Lab. Provide all utilities as required by the program.

Provide direct access to an adjacent Classroom and Lab Storage room.

ACCESSORIES AND EQUIPMENT

Provide A-frame, hydraulic pumps on rollers for flexibility. These trainers shall be self-contained with pumps, compressed air and power.

Provide drying systems for compressors.

TOOL CRIB

SPACE DESCRIPTION

Directly adjacent to the FLEX Lab, the Tool Crib provides a secure location for the storage of tools and supplies. The crib should be secured by walls, or secure fencing. A workstation with power and data shall be provided for use by a lab technician.

Additional equipment includes tool chests, shelves and cabinets.

Provide double doors with key fob access.