

Archi-take on Laboratory Furniture

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The laboratory environment is the place where creative and practical work takes place. Functionality and safety are the prime concerns to both the user and the facility by itself. The design of the laboratory environment must take into account the purpose of setting a lab, the specific needs of the lab, anticipate future needs and in the end create an environment that is conducive to support the facility's mission.

A well-designed laboratory module coordinates all architectural and engineering systems and allows flexibility and expansion. Flexibility can mean several things, including the ability to expand easily, to readily accommodate reconfigurations and other changes, and to permit a variety of uses.



In this context, the article here will focus mainly on Laboratory Furniture. The selection of laboratory furniture depends mainly on the type and function of the lab and thus the material of case work and worktop has to be classified accordingly. For example-the furniture requirements of a pharma lab are different than those from micro lab. The former has a choice of epoxy, ceramic or granite worktops while later has an option of epoxy or SS worktops.

Material of construction (MOC)

The case work is commonly metallic or wood finish. GI powder coated 'C' frame structure having castors give mobility and flexibility to the furniture. These are finished with work tops which can be of any desired material. Beneath these are the storage cabinets which can be either metallic or wood finish.

- Factors influencing the worktop selection are: chemical resistance, impact resistance, heat resistance, nature of application, durability, aesthetics and cost effectiveness. There are 7 to 8 different materials that can be used for worktops. Those are Epoxy resin, Phenolic resin, Compact laminate, Melamine laminated plywood, Stainless steel, Ceramic tiles, Glass & Natural Stone. In India, it is most commonly seen that the user has a preference to natural stone viz; black granite.



acrylic resin

phenolic resin

epoxy

stainless steel

stoneware

*melamine
laminated*

*compact
laminate*

Modules-the latest trend in Laboratory furniture

Mobile base cabinets or modules on castors make excellent equipment storage units. They add on to the flexibility by way of future expansion or replacing the same space with floor mounted equipments. This is the biggest advantage of mobile cabinets as against fixed furniture.



Mobile Base Cabinets



Cantilevered Base Cabinets-adjustable

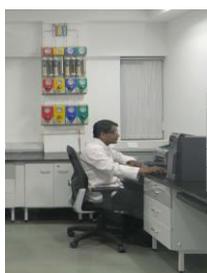


Fixed Base Cabinets

- Alternatively the base cabinets can also be cantilevered just under the worktop and placed on track. The advantage here is you get a clear space above the floor, so it becomes easy in cleaning and maintenance. The storage cabinet can slide on either side of the working length of the worktop again giving flexibility.
- These base cabinets have multiple storage options such as drawers and shutters and the user can select the best based on the usage of the system.

Standard Sizes of the lab furniture:

The size of bench tops & island tables should be such that it is ergonomically suitable to the user as well as the general look of the lab is not congested. The depth and height of a table varies depending upon the usage of lab.

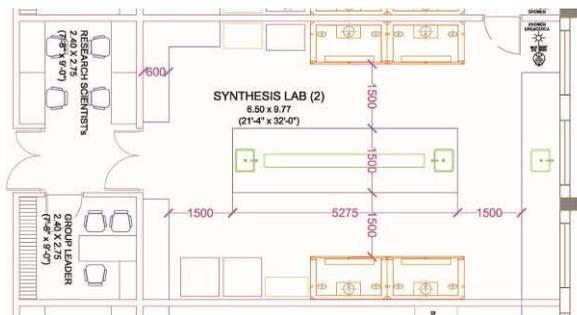


Analytical labs typically have various equipments and instruments placed on table tops and require calibration, monitoring and documentation as a part of on-going process. These equipments are electronically connected and hence the working height required here is 750/800 mm so that the scientist can comfortably be seated and carry out his work. Due to requirement of electrical points for these instruments trunking has to be provided on the table top for which table depth of 900mm is a must.



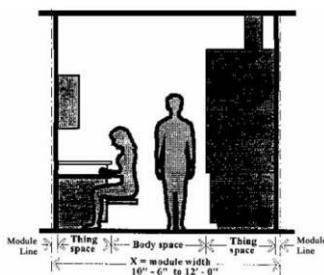
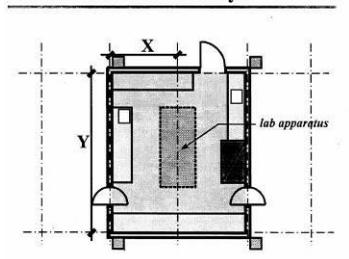
On the other hand, work tops in chemical labs require 900 mm as the height since the user has to carry out experiments in a standing position. The depth of these tables follow a module of 750 + 750 mm totaling to 1500 mm in case of an island table and 750 mm depth in case of wall alignment. These tables require reagent racks above, to store small chemical bottles, as such the overall height of the table along with reagent rack goes to 1500mm. These racks need to have a provision of electrical and utility points at intermediate locations.

Layout and Positioning of furniture inside the lab



The layout of a lab can have any shape or form. It can be linear, square or rectangular. Typically a lab has a width varying from 3000mm to 6000 mm and depth which may vary from 6000 mm to 9000 mm. The depth depends upon the individual requirement of a laboratory. A laboratory should have clearly defined aisles. It is mandatory to have a clear circulation space of 1500 mm between lab tables and other furniture to avoid accidents and also for easy movements and operations. It is also very critical to maintain a clearance of 1500 mm from the main door of the lab.

Two Module Laboratory



Positioning & flexibility are inter related since modules on castors can be moved anywhere in the lab and thus positioning does not become an issue.

Extended Lab furniture:

Other than the lab tables, there are elements like chemical storage cabinets, solvent storage cabinets specifically designed for flammable & combustible liquids, acid/ alkali storage cabinets, personal storage cabinets, anti-vibration tables that form part of lab furniture. Often provision of fire resistant cabinets is also required for storage of samples and vital documents. These may be in the form of compressible racks for maximum utilization of space.

Fume hoods may or may not be considered as lab furniture but are definitely the most important part of lab furniture. Painted carbon steel sheet metal case, fire-resistant interior construction, airfoil design, sash of laminated safety glass, vertical moving sashes counterweighted for easy movement, cup sink on each side wall and shutoff valves in each side wall for plant air, nitrogen, water are the basic characteristics that a fume hood needs to have. Hoods must be provided with exhaust ventilation to minimize exposure of lab personnel to the chemicals used within these hoods. Conventional laboratory hoods are either of the "bench-top" type or the floor mounted "walk-in" or lattice type. However with technology there are other options as well, such as low constant volume and VAV fume hoods which are designed for low energy and high performance.

Fittings & fixtures in lab and on lab tables

Sinks are available in various materials like moulded epoxy resin, polypropylene, stainless steel and ceramic. Of these PP sinks are most suitable for chemical labs and ss for micro labs. These should generally be placed at the centre of the table, having easy accessibility. Sinks should be supplied with peg boards for drying of tubes and small tubular glassware's.

Safety shower & eye wash are among the 'must have' in any lab space. They should never be farther than 75 ft. away from any researcher and should be placed along a clear and unobstructed path and as far as possible in the lab area itself. It should have proper drain and should be visible from any corner of the lab. However care should be taken that they are placed away from any sources of electricity, especially electric panel boxes. These fittings are available with eye wash as well, and should be designed in such a way that they flow at the rate of 30 gallons of water per minute in case of emergency. Alternatively only eye wash can also be accommodated on sinks in case of larger size of lab.

Spot extractors can be provided on island tables or wall tables to take care of small volume of exhaust say 80 to 120 cfm. These have flexible arms covering a diameter of 1000 mm, are circular in shape and available in transparent and attractive colour thus adding as a feature in the lab. However these have to be connected to a duct and eventually a blower.

Utility valves supplying services- various gas and water lines to various equipments should be well secured and sealed to avoid leakages. It is recommended to have acid resistant plastic coating to these fittings and show follow universal colour codes for easy and immediate identification.



Sink with pegboard



eye wash-safety shower



spot extractor



service valves & electrical sockets

Impact of lab furniture on lab design

The choice of casework (metal, wood or plastic) and the color of casework finishes have a significant impact on the quality of the design. Integrating aesthetics with lab furniture will make or destroy the overall look of the lab. Any person entering the lab will be impressed and motivated by his/ her first visual contact with the lab interiors. Hence the selection of colour and finishes of the furniture has to be thoughtfully done.

Standards that should be checked at the time of selection of lab furniture: SEFA-8 (Scientific Equipment & Furniture Association) benchmarks the characteristics required in lab furniture such as chemical resistance, sturdiness, life cycle and quality of surface finish. Along with this it should be ensured that NFPA (National Fire Protection Association) codes are followed. Fume hoods should comply ASHRAE 110:1995 & EN 14175:2003 certification to ensure international quality standards and best practices in lab industry.

Safety in lab furniture

How safe are our labs ergonomically & in terms of fire? This is determined by the material used in the making of lab furniture. It should be seen that the furniture withstands a minimum fire rating of an hour. Metallic furniture –GI powder coated is one of the best for such usage. At the same time care should be taken that the accessories used also possess these qualities or there is a high possibility of things falling & leading to major accidents. The truncing on tables should ensure proper grounding against each equipment to prevent electrical shocks and wherever required rubber matting may be provided as an extra precaution. The shape of furniture should be devoid of sharp edges and sufficient circulation space should be maintained internally.

Simple steps to be followed while selecting your furniture

- Define the purpose of setting the laboratory
- Specify the chemicals /solvents etc that will be used in the lab
- Verify the performance of worktop material as against the usage of chemicals/ solvents
- Check whether the lab furniture comply the standards published by ASTM or SEFA 8 & NFPA. Till date these are the only standards available in India and ensure quality
- Carefully review all specifications prepared by your lab planner or architect. Get clarification on any points that you do not understand completely.
- Avoid using the terms “or equal” and “or equivalent” to prevent possible misunderstandings and do not compromise on the specifications.

To summarize, a lab should have a spacious look, clear circulation paths and uninterrupted visual flow when entered. A well designed and good quality furniture, by material and aesthetics enhances sustainability, is easy to maintain and ensures lab personnel safety.