Laboratory Furniture & Planning Solutions

The role of hygienic furniture and equipment in contamination control

By Michelle Locke, Teknomek

Controlled lab environment

In laboratory settings, maintaining a hygienic and contamination-free environment is of utmost importance. The choice of furniture and equipment plays a critical role in ensuring hygiene, reducing contamination risks, and meeting stringent regulatory standards. From material selection to design considerations, laboratory furniture and equipment must support Good Manufacturing Practices (GMP), facilitate efficient workflow and actively support a hygienic culture.

Laboratories, particularly in the pharmaceutical and biotechnology sectors, must adhere to strict hygiene standards. Any contamination in these environments can compromise research integrity, impact product quality, and pose health risks. Furniture and equipment designed for such environments must not only be durable but must also be easy to clean, resistant to microbial growth, and compliant with industry standards.

We have seen a noticeable increase in the demand for bespoke hygienic laboratory furniture, reflecting a growing trend in the pharmaceutical and cleanroom sectors investing in specialist, customised hygienic furniture. This rise underscores the fact that many businesses are committed to enhancing GMP and ensuring every aspect of their facilities are optimised for contamination control.

Key design considerations for contamination prevention

Non-porous, smooth surfaces

Laboratory and cleanroom furniture must be designed with smooth, non-porous surfaces to prevent the accumulation of dust, bacteria, and chemical residues. Easy-to-clean surfaces reduce the risk of contamination and improve cleaning efficiency, making it easier to tackle biofilms.

Seamless construction

The presence of joints and crevices provide harborage points for bacteria and contaminants. Furniture with seamless construction, such as stainless steel workbenches and cabinets, ensures easier sterilisation and minimises contamination risks.

Ergonomic and space-optimising designs

Laboratories and cleanrooms often have limited space, requiring furniture that maximises functionality while maintaining accessibility. Ergonomic furniture, such as height-adjustable tables, enhances usability and the comfort of team members, as well as workflow efficiency.

Hygienic Bimos Labsit chairs providing ergonomic support – credit Bimos

Customisation

Custom-built furniture is essential for workspaces and people that have particular requirements. Investing in bespoke solutions can result in a marked improvement in workflow as well as supporting hygienic protocols. For example, creation of a seating bench in a changing room or cleanroom that has been designed specifically to provide wheelchair accessibility will make life more straightforward for the user and have a positive impact on productivity.

Laboratory environment filled with Teknomek's hygienically optimised stainless steel and Trespa furniture

Material selection for hygienic laboratory furniture

Stainless steel furniture and equipment is still the industry standard for hygienic environments. Stainless steel's austenitic structure means it has no pores or cracks where microorganisms can gain a foothold. It is inert to most acids and alkali, eliminating the risk of pitting or crevice corrosion.

304L grade stainless steel is widely chosen for hygienic environments such as changing rooms due to its corrosion resistance and hygienic properties. 316-L grade stainless steel is a step up, with improved resistance to chemicals, making it ideal for class B cleanrooms and other ultra-sterile environments where rigorous cleaning protocols are required. Electropolished 316 stainless steel is another alternative that is favoured in grade B cleanroom areas due to its ultra-smooth finish, which further reduces contamination risk.

316-grade stainless steel contains molybdenum, a naturally occurring element that enhances corrosion resistance, reducing the risk of rouging and tiger stripes while improving clean-down productivity. The International Molybdenum Association (IMOA) states that molybdenum significantly increases stainless steel's resistance to chloride-induced pitting corrosion.

Harsh sterilisation chemicals can degrade stainless steel over time, leading to corrosion and contamination. Particularly relevant for cleanrooms, ultra-smooth or electropolished surfaces minimise microscopic grooves where cleaning chemicals can linger and corrode the furniture. Smoother surfaces prevent the accumulation of particles, ensuring compliance with ISO 14644 cleanroom standards.

Whilst the demand for highly durable, hygienic, and customisable stainless steel cleanroom furniture continues, in laboratories white, powder-coated steel furniture is popular. Powder coating steel not only builds a barrier between moisture and humidity, but the white surface reflects light, enhancing visibility in the laboratory and creating a clean, professional appearance. The coating provides resistance to many laboratory chemicals, preventing degradation from spills and ensuring long-term usability.

But mild steel is not appropriate for all environments so hygienic materials such as waterproof construction board and high-pressure laminate panels, sometimes combined with 304-grade stainless steel table frames, provide an effective option. There are several exceptional furniture ranges available that offer durability and flexibility, whilst creating an aesthetically pleasing and bright workspace. Chemical resistant technologies are also incorporated into some materials, making them useful for workspaces where harsher cleaning chemicals are used.

Rather than simply being water-resistant, laboratory furniture made from properly waterproof, PVC materials – whilst also having anti-bacterial protection built in – can be the perfect solution for environments where frequent clean-downs are the norm. The treated surfaces inhibit bacterial growth and reduce odours, making laboratory furniture constructed from this construction board vastly more hygienic and durable than wood-based construction boards.

Furniture design and airflow considerations

Laboratory and cleanroom furniture must support airflow management, particularly in environments that rely on HVAC systems. Solid back panels on furniture can create airflow barriers, allowing particles to settle and microbes to multiply, whereas open-sided workbenches will prevent dead-air spaces.

Even chairs with solid backs, and the staff who use them, can disrupt airflow if not positioned correctly in relation to ventilation systems.

Ease of cleaning

Mobile furniture supports deep-cleaning efficiency by providing cleaning teams with easier access to hard-to-reach areas. For fixed furniture, there should be plenty of clearance between the floor and the bottom of the unit. If a corner is difficult to see or reach, it will be hard to clean.

On any piece of furniture or equipment, hidden ledges, weld ridges, and dirt traps must be eliminated to prevent bacterial harborage points. Unnecessary flat surfaces should be avoided. Not only will a sloping cupboard top not get used as an unplanned storage area, it will not allow cleaning solutions to pool and corrode the surface.

As explained earlier, specifying the correct construction material at the outset will support cleaning protocols and GMP as well as ensuring product longevity.

Efforts to maintain a sterile cleanroom environment

Sustainability considerations in hygienic furniture

Laboratories and cleanrooms are increasingly focusing on sustainability by selecting materials and designs that promote long-term use and minimal environmental impact. Stainless steel is a highly sustainable choice due to its recyclability and long lifespan.

Waterproof construction board also presents businesses with an environmentally responsible option. It is made from PVC which, due to advances in recycling processes, is viewed as one of the greenest materials available because it can be recycled multiple times.

Custom-built, durable furniture reduces waste and replacement frequency, leading to lower resource consumption. Chemical-resistant designs help minimise the need for excessive cleaning chemicals, reducing environmental impact while maintaining hygiene.

Conclusion

The role of hygienic laboratory and cleanroom furniture in contamination control cannot be overstated. Through the right design choices, material selection, and a focus on customisation, laboratories and cleanrooms can create safer, more efficient, and regulation-compliant environments. As industries continue to evolve, the demand for specialised, hygienic furniture is set to grow, reinforcing its critical role in maintaining clean and contamination-free environments.