Pass-Through Autoclaves for Improved Containment

Douglas Watts on behalf of Priorclave Ltd

When Brunel University required a double-door/pass-through autoclave as part of a new CAT III containment laboratory suite it was sourced from laboratory autoclave manufacturer, Priorclave, a British company with many years experience in bespoke design and build of steam sterilisers. A 350l double-door autoclave was supplied and installed within the Heinz Wolf building, a Centre for Infection, Immunity and Disease Mechanisms, and a School of Health Sciences with a CAT II and CAT III Research Facility for secure decontamination of hazardous waste.

Pass-through or Double Entry autoclaves are used in relatively small numbers and require often complicated, building work as part of the installation process. For this reason double entry units are considered bespoke, to satisfy specific application requirements, raising additional points for consideration such as – clean room or containment, direction of workflow, door swing profile, thermocouple entry ports, etc.

It is also important when specifying any large autoclave to have a clear delivery site map since there can be many obstacles just waiting to create delivery difficulties, if these can be anticipated early measures can be taken during manufacture and at the point of delivery to minimise or even eliminate costly and nasty surprises. At Brunel University it was impossible to do a full site survey as the would-be laboratory was a building site with no walls, nevertheless, the Priorclave representative was able to walk the route from entry into the building to the laboratory. The route required the use of a goods lift and passing through single doorways as narrow as 900mm, then through another laboratory whose entrance lay between a sink and a bench.

A Containment Suite

The company contracted to source the autoclave based on the Brunel brief was Cleanroom Design and Construction Limited (CDC) based in Stourbridge. As CDC have considerable experience in the type of laboratories Brunel University require they were chosen as the specialist contractor to design and build the turnkey, laboratory containment facility from start to finish. This included:

- the demolition and alteration to the building structure.
- the selection of the pass-through autoclave and other laboratory capital equipment and furniture.
- the organisation of the full commissioning and validation of all the capital equipment they sourced for the containment suite.

Priorclave's already proven track record with Brunel University had secured them as the preferred supplier of the laboratory autoclave in the new containment suite.

Figure 1: A view of the autoclave from within the containment room.

Performance and Build

Priorclave designed and built the autoclave to the specifications requested by CDC and the end users at Brunel University, supplying a 350l double-ended autoclave with electrical heating, vacuum facility, a printer and an exhaust filtration system for the containment of any hazardous pathogens. The design gave Brunel University a more cost-effective solution, the benefit of a electrically heated machine over one with a steam generator is that it uses less power, only switched on when in use. Also it would streamline the installation of the trough-wall machine since all elements are contained within the actual autoclave design.

Since the Priorclave is used for de-contamination of hazardous material prior to its release from the containment suite it was imperative that the double-door design had both ends of the autoclave isolated, sealed at the point of passing through the wall by means of a bulkhead, interlocks preventing both doors being open at the same time as this would obviously breach the integrity of the site. An interlock prevents the door at the unloading end from being opened until the sterilisation cycle has been successfully completed and the load is safe to pass into the unloading end. It is also standard with Priorclave machines that it is not possible to release the

Figure 2: The service end showing the autoclave and water softener in-situ.

loading door until the unloading door has been opened and subsequently closed and locked. The steriliser supplied to Brunel's Centre for Infection, Immunity and Disease Mechanisms has an added benefit of a programmable key-lock that gives the facility the ability to use the autoclave as a single door autoclave at any end.

As Brunel's autoclave was a containment suite autoclave, most of it was located within the unloading room with just the door section of the autoclave protruding into the containment area. This allows the majority of the maintenance tasks to be completed without the need for an engineer to enter the containment area or for the area to be decontaminated and temporarily disabled. CDC was instructed to install the drains and services at this end, thus minimising the number of pipes and wires that need to pass through the wall or bulkhead.

Figure 3: The service end showing the effluent retention filter protruding from the top and the TACTROL® data print-out record on the right of the facia panel.

A printer was essential to produce a permanent record of each autoclave cycle, whether an integral part of the autoclave system or a separate and independent chart recorder device. It is normally desirable for the operator unloading the autoclave to be able to examine the record before opening the autoclave. For this reason and the fact that it is often not permissible to remove a paper record from a containment area, the printer was put on the non-containment end of the autoclave.

Following installation Priorclave engineers returned to Brunel University to test the autoclave with the actual loads and made adjustments to the autoclave and software to ensure optimum performance. Performance Testing was done to UKAS accreditation and a full report and certification was given to the University on completion.

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