

In the service of **MEDICINE**

IT is the proud boast of our industry that, probably more than any other, it serves mankind literally from the cradle to the grave. With that statement it must follow that the medical field arguably presents the most challenging as well as the most important area of application for refrigeration.

Unfortunately, it is by no means the most lucrative, and it is something of a contradiction that, at a time when Government policy has led to massive cuts in health expenditure, specialist medical refrigeration equipment is becoming more sophisticated, and therefore more expensive in the wake of technical advance and more stringent requirements by standards writers and users.

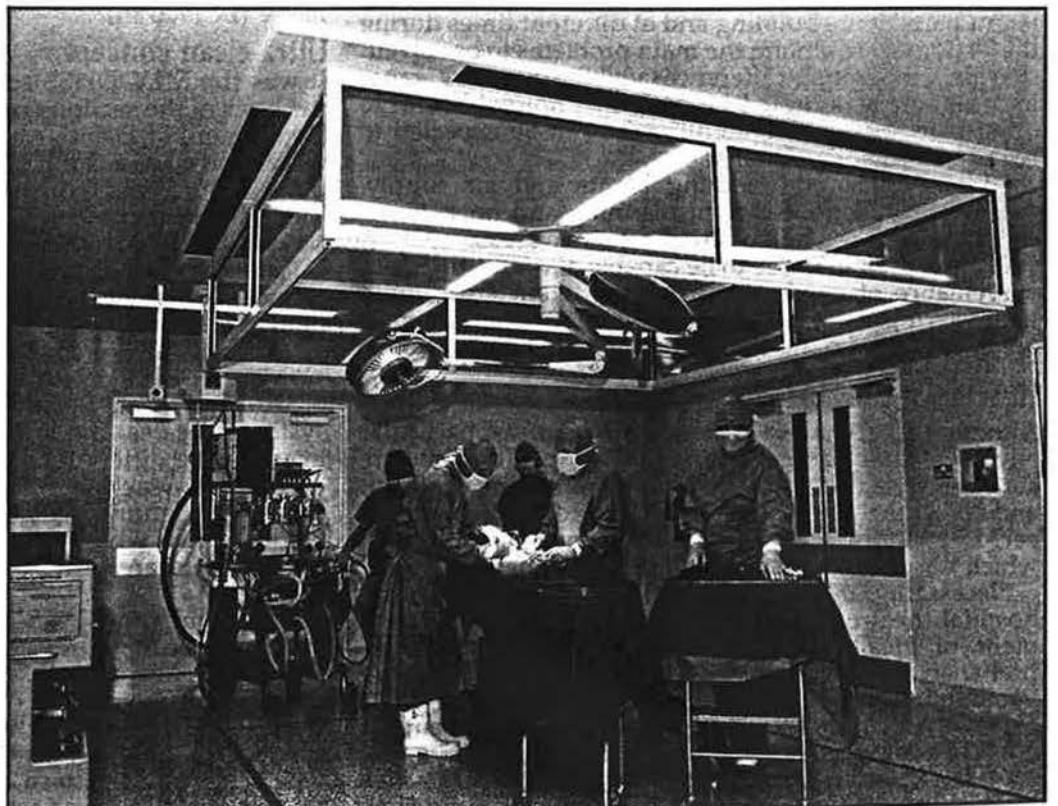
In the light of these changes, users, both public and private, will be turning more and more to specialist equipment manufacturers, rather than relying on the cheaper 'conversions' of standard products.

At the same time, there is increasing concern over hygiene, and most health authorities in the UK must be looking seriously at their facilities, for handling the dead, as well as protecting the living.

In the following pages we present a review of some of the specialist medical and mortuary equipment on the market, but first, we look at another area in which our industry serves the medical sector—with air conditioning.

Air conditioning critical hospital areas

New standards in air conditioning critical hospital areas are rising above the debate on the future of the National Health Service. Eric Ford has been discussing the latest developments with a company specialising in this field. See over



MEDICINE

IN environmental terms, a modern hospital is a complex building where air conditioning requirements range from comfort conditions in reception and public areas, through fume and heat extraction requirements in kitchens and restaurants, to the clean room environment and hazard protection in pathology laboratories and bacterial control in operating suites.

Because of the variety of environments, today's trend is strongly towards the 'one stop shopping' approach when designing and installing a hospital air conditioning system. The advantages are obvious, in terms of simplified specifications, integration of design and contractual procedures and—not least—administrative economies due to dealing with one, instead of many suppliers.

When, in addition to providing the hardware, the single source also offers an integrated design, installation and maintenance service, the benefits of the 'one-head-to-hit' philosophy are greater still.

All this explains the emergence of broad based organisations, capable of offering a complete package covering all the environmental requirements of the largest hospital.

An example is the Willaire Group Plc, which by a carefully structured expansion, through organic growth and acquisition, has evolved into a multi-disciplinary organisation, with particular experience and capabilities in the hospital field.

Typifying the current trend, its member companies extend over the diversity of hospital and medical related fields from cold rooms, fume cupboards and biological and laminar flow cabinets, clean rooms to ultra clean air systems to complete operating theatre packages.

In support is a comprehensive service, described by the group as 'Find out what the client wants, solve the problem cost effectively, and then make certain it continues to work efficiently.'

Almost routine

It is true, of course, that providing air conditioning for large areas of every hospital is almost a routine matter, differing little, if at all, from systems installed in any other large commercial building.

Wide differences in occupancy patterns, both in different parts of the building and at different times during the 24 hours, are among the main problems to be solved.

Wide temperature differences will be necessary, ranging from areas occupied by people in normal health to other places used by patients, who can be expected to require warmer conditions.

Boiler rooms, air handling plants and air supply/extract systems need careful planning and noise levels call for special consideration in sensitive areas.

Control systems have to be capable of round-the-clock surveillance of conditions in the different areas, with their varying environmental requirements, and hospitals are typical candidates for energy management systems.

Heart of the problem

Although every area in a hospital has its particular environmental parameters, it is the operating theatre suite which is the heart of the air conditioning problem, and makes the biggest demands on the consulting engineer, mechanical services contractor and the equipment which translates specification into performance.

Necessarily, the starting point for the design of every hospital theatre air conditioning system is the Department of Health specification, which provides comprehensive data for the design of systems for conventional theatres.

However, here has always been a requirement for what has come to be known as ultra clean air, to reduce the risk of infection in orthopaedic theatres, and this type of clean air system, in which the main distinguishing



A Heparie clean room at the North London Blood Transfusion Centre, Colindale.

features are the much higher air flow rates and the controlled air flow pattern to provide an ultra clean zone, was first introduced in the early 1970s.

A major forward step was taken in 1982, when a study, jointly sponsored by the Medical Research Council and the Department of Health and Social Security (as it was then known) and published in the *Medical Journal*, showed that ultra clean air had a very significant effect on deep sepsis in joints, following hip or knee replacement.

Covering 8,000 operations over a five year period, the study demonstrated that, in a conventional operating theatre, airborne bacteria levels at the wound site varied between 100 and 500 bacteria carrying particles per cubic metre (BCP/cu m).

Ultra clean concept

It was the MRC/DHSS sponsored study which formed the basis of the section on ultra clean theatres in the new Department of Health overall recommendations, which were evolved as a result of work undertaken on an actual ultra clean system, installed in a hospital theatre by Medical Air Technology Ltd, which had pioneered the concept in 1972.

Issued in draft form in 1986, the new ultra clean specification is already accepted as the standard to which the industry is working.

Its basic features cover the dimensions of the canopy surmounting the useful, safe working areas, the velocity of downward air flow, the noise levels at which the system operates, the level of air cleanliness and the air temperature differential.

A canopy, enclosing the air supply arrangements and the theatre lighting, extends over the recommended safe working areas which must be not less than 2.8 m square. Outside this area, the bacteria levels are significantly higher.

Downward air flow is another vital element in the system, since horizontal flow is not as effective in providing the very low bacteria levels necessary to minimise the incidence of wound infection. The downward and outward air flow pattern of the system controls the bacteria shed by the operating team.

To achieve this pattern, air change rates of 500 times/hr are needed, compared with about 20 air changes in the

conventional theatre.

Under the DHSS draft, an exponential downward and outward outflow pattern of the air flow leaving the canopy must be 0.38 m/sec \pm 15 per cent over the entire clean zone.

It is this high air flow velocity which resulted in the elevated noise levels in early ultra clean theatres (as much as 60 to 65 dB(A) in most cases), compared with the more usual 45 dB(A) of conventional theatres.

The draft recommendations specify a maximum level in an ultra clean theatre of 50 dB(A) for a remote air conditioning system, where the air handling unit is outside the theatre, and 55 dB(A) for a self-contained system, with integral motors and fans.

On air cleanliness, the recommendations require that the main bacteria filters must have an efficiency better than 90 per cent (Eurovent 4/4).

Air temperature differential is important because, clearly, incoming air must arrive at a lower temperature than the surrounding air since, otherwise, the warmer, less dense air will not have sufficient velocity to ensure the required air flow at the operating site to remove the bacteria.

Towards a new standard

Laymen may ask why, if the ultra clean theatre is so effective in controlling bacteria levels, the system should not be equally applicable in general surgery where bacteria, if not as serious a hazard as in orthopaedics, must surely be unwelcome?

In the past, surgeons have objected to the unacceptable high noise levels generated by air flow in the ultra clean theatres which, in their considered opinions, outweighed the benefits of lower bacteria levels in their discipline.

On the other hand, orthopaedic surgeons, the success of whose activities so heavily depend on freedom from risks of infection at the wound site, considered that the benefits of an ultra clean theatre more than justified the noise penalty.

Although the cost of an ultra clean theatre exceeds that of a conventional system, this has not been a major factor in the choice between the two. The additional cost of the ultra clean air system, when set against the total cost of a complete theatre suite, is relatively small.

Both these factors—noise and cost—have now lost much of their former relevance, as a result of the development work in recent years by special hospital air conditioning system suppliers.

Noise under control

It will be appreciated that a noise level of 60 to 65 dB(A), as experienced in earlier ultra clean theatres, must always have been a considerable distraction to a surgeon engaged in work which demands the closest concentration.

Medical Air Technology Ltd has undertaken a great deal of work in the area of noise control, and can now provide systems with levels as low as 45 dB(A) which are being achieved with its latest installations.

On the cost front, the modular concept, introduced by MAT as long ago as 1972, has simplified installation procedures and thereby reduced the overall expense of a system.

A typical self-contained ultra clean system is delivered to site in four factory made sections, incorporating such items as silencers, filters, lighting and, where appropriate, medical gases pendants.

It is then only necessary to fit the sections to the ceiling, connect the electrics and services and the system is

MEDICAL CABINETS

The Swan range of equipment includes

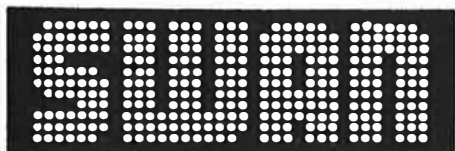
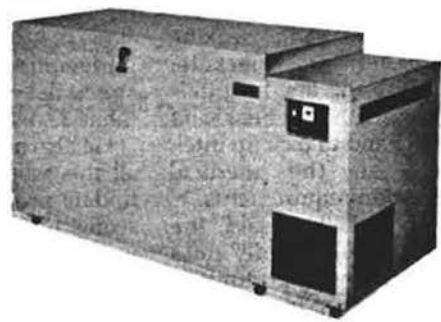
- ★ Ult freezers to -80°C
- ★ Plasma freezers to -40°C
- ★ Cooled incubators
- ★ Pharmacy cabinets
- ★ Chromatography cabinets

Full accessories are available for all units including alarms, glass doors, lighting, humidity and programmable controllers.

Users include hospitals, universities, research laboratories and electronic equipment manufacturers.

The cabinets are all UK built with spares available through most refrigeration wholesalers.

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ready for use. A typical job can be completed in as little as three weeks.

In addition to the self-contained system, MAT has pioneered the use of the remotely located plant, where the main bacteria filters, and supply and return air ducts are in the ceiling above the operating theatre, but linked to the plant room which contains the air handling unit, with motors, fans and pre-filters.

Another alternative is a single remotely sited air handling plant, incorporating full air conditioning, which can serve both the ultra clean canopy in the operating theatre and also provide controlled ventilation in the preparation, anaesthetic and other areas in the theatre suite as a whole.

This approach, successfully adopted in many MAT contracts, reduces both installation and service costs by avoiding duplication of such items as fans, silencers, ductwork filters and control equipment.

The road ahead

Taking all these developments into account, where does the road ahead lead for the hospital theatre suite of the future?

Assuming that the question of high noise levels, the initial objection to the introduction of the ultra clean concept into general surgery, no longer applies, and neither does the cost penalty, how soon will the clean environment become the standard for all hospitals?

It is already on its way, as the benefits of close control of infection at the wound site are recognised in such disciplines as gynaecology, ophthalmology and neurology.

As an indication of the way the tide is running, MAT recently installed its 'Ultraflow' systems in all three theatres at a development where previously only one

would have been considered.

This is a measure of the progress now being made towards a 'standard' theatre which, as a matter of course, will give all surgeons, and their patients, the benefits of the low infection rates (down to 0.59/cu m) which can be achieved.

An environment for all

Although any review of the air conditioning requirements of the hospital must necessarily pay particular attention to the operating theatre suites, there are other departments which also call for special treatment.

Among them is the pathology laboratory, where close control of the environment is required as well as such facilities as safety cabinets to protect staff working with potentially hazardous materials.

These cabinets have their special requirements for efficient control of contamination to protect the user.

Other areas where close control of the environment is essential include intensive care wards and isolation areas.

Nor must it be forgotten that the increasing use of computers and other electronic equipment means that special arrangements must all be made for the environment in these areas.

In fact, a modern hospital makes demands on every aspect of air conditioning practice, and every advance in technology is available to benefit the nation's hospitals.

All these developments are taking place at a time when the current debate on the future of the National Health Service is in progress, and its future is still uncertain in the minds of many.

One thing, however, is certain. The state of the air conditioning industry will ensure that the future of the hospital environment is in good hands.

Sadia — a new name in the medical refrigeration field

SADIA Refrigeration's entry this year into the medical refrigeration sector provided something of a surprise (*writes Terry O'Gorman*). For here was a company with a sound, long standing base in food cabinets, and in Steve Gilbert, an out and out catering man at the helm.

In fact, the move was almost a natural progression. For there was Sadia, seeking to broaden its markets, already supplying hospitals with kitchen equipment, and right on hand to pick up intelligence on the medical refrigeration requirements.

As Steve Gilbert said, the company could hardly miss recognising the opportunities being thrown up in the medical sector. 'We believe we've got into the medical market at exactly the right time. New standards are coming in, and public institutions these days don't have the protection they once had when things start to

go wrong.

'For a start, the revision of the blood storage standard, BS 4376, will lead to a lot of blood banks becoming obsolete.

'New standards, a new outlook, and technical advances will lead to much more sophisticated equipment — as in our new ranges — and we'll be seeing far fewer conversions of standard commercial refrigeration cabinets to meet specialist medical requirements.'

He also made the point that all this was leading to a big update programme — which seems to be at odds with all we read and hear about National Health Service cutbacks.

Sadia unveiled its medical range at the Refrigeration and Air Conditioning Exhibition at Wembley back in February, but the big launch will be this month, at the Lab '89 exhibition — part of British Labora-

tory Week, which includes a number of seminars — to be held at Olympia from September 26 to 28.

Said Steve Gilbert: 'We've done a lot of work on this equipment, and spent a great deal of time with the users to get it right. Laboratory technicians, hospital research institution heads, purchasing officers, you name them, we've seen them. So all the features we've built into our cabinets exactly match the users' requirements.'

This month's launch marks the start of a marketing campaign aimed at getting the Sadia name across to medical industry people. 'It's a new name for them, and we've got to work hard to get them used to it. We know they'll be comfortable with our products, for the reasons I've already mentioned.

'The way we've gone about this business means we've got the detail right, but above all

we've had to ensure reliability, high levels of monitoring and control, safe storage, and no disruption should a breakdown occur.

This equipment must perform to specification for a long time — there's a lot of heat generated in laboratories — and a plus for us is that we can guarantee, through our distributor network, very good service back-up by engineers who know what they're about.

'We'll be selling this range through our existing distributors, but clearly some will want to make a speciality of this business and so get more of it than some of the others. But that's their choice.

'We'll provide specialist training where it's required, but I must stress that we're not looking for new distributors. There's a tremendous replacement market out there for this equipment, and we want to share the benefits of that with the people we've been working so successfully with.'

The Sadia medical range comprises three models designed for the preservation

and incubation of blood, medical and biological samples.

They are a cooled incubator (Model MSC 450), a -40°C freezer (Model V14-40) and a blood bank refrigerator (Model MSB 450).

The cooled incubator provides microprocessor controlled incubation over a wide temperature range (+6 to +40°C, with accuracy of ±1°C) and has a capacity of 392 litres. It is described as ideal for use in microbiology, immunology, bacteriology, cell culture and tissue culture departments, as well as enzyme testing, egg incubation, fruit fly culture and plant growth study.

The cabinet features a microprocessor temperature controller with easy and instant temperature reading, and a high temperature indicator with automatic cabinet shutdown.

An inner door made from Perspex enables the contents to be viewed without incurring a change in temperature.

The cabinet, which includes the benefit of fan assisted cooling, has four removable

and adjustable shelves.

Optional extras are fluorescent lighting, day/night timers, a temperature recorder and a glass external door.

The -40°C freezer has application in the long term storage of blood plasma, vaccine, serum and chemicals. The freezer comprises five individual compartments, each with a Perspex and stainless steel inner door, for indexing and to guard against temperature loss.

This 396 litre capacity cabinet features a mains rechargeable, battery fed audio and visual alarm, to operate immediately if mains or temperature failure occurs. A panel on the front of the cabinet features a mains on indicator, a test facility, a dial thermometer (available in digital form as an optional extra) and the visual failure indicator.

A wide range of optional extras includes a remote alarm contact, a racking/inventory system, and a battery operated chart recorder.

The blood bank is designed for use with blood in both

bottles and bags. It has a capacity of 392 litres, enough to store 120 bags. It has a preset temperature of +4°C, and is fitted with a battery powered (six month battery life) seven day chart recorder, with safe band display charts. A mains rechargeable battery alarm system gives visual and audible indication of mains and temperature failure.

Other features include a double glazed glass door, fan assisted cooling, digital temperature display, an inner light which can be switched

on and off, and removable shelves. Optional extras include drawers for the storage of blood bags, remote alarm contact and a racking/inventory control system built to users' own specification.

All the cabinets are available in white stoved enamel with blue trim, or as an optional extra, in stainless steel. They have lockable castors for easy manoeuvrability and cleaning. Each cabinet is fully tested.

FOR MORE DETAILS ENTER J300

Sock air distribution a hygienic choice

DEAN and Wood recommends its sock cooling system for the medical field, pointing out that it eliminates the problem of condensation generally associated with the flat duct system.

Additionally, it is washable.

The system provides draught free and controlled

air distribution via cylindrical bags made of cotton or polypropylene.

The bags are suspended from the ceiling and fitted to an air circulation system. The permeable weave forms natural air jets which provide even distribution.

FOR MORE DETAILS ENTER J301

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▲ ENTER INQUIRY No J18

MEDICINE

Foster's blood banks meet latest standards

FOR more than 20 years, Foster Refrigerator has designed and manufactured blood banks and other specialist storage cabinets, the latest models being launched in November last year. The specification was drawn up to meet current and anticipated future UK national standards in blood bank design, the result being compliance with the requirements of BS 4376/Din 58371 (Part 1)/Australian MD 1087-478 (draft).

Manufactured in stainless steel and polished aluminium with foamed urethane insulation, the new models feature overall improved styling including a 125 mm quartz operation, seven day recorder using charts with a green printed 'safe' zone. All models have internal fluorescent lighting, and see through Perspex inner doors or drawer fronts for reduced loss of cold

air when doors are opened.

Blood bags are stored in plastic coated wire drawers, mounted on runners.

Foster's Sentinel audio-visual monitoring/alarm system incorporates advanced

facilities to give early notice of any deviation from pre-set storage conditions. There is a facility to wire into a central control room.

Capacities offered are from 42 to 432 450 ml bags. Larger models are available with a standby refrigeration system in case of operational failure. All models are offered with the option of a glass door, or doors. Adjustable legs (150 mm) are fitted as standard,

with castors as an option.

Specialist cabinets are offered for such applications as laboratory storage (refrigerator or freezer) and biological refrigeration.

Foster also produces modular cold rooms and environmental enclosures, modular mortuary chambers (page 36) and ice-flakers for the storage of serums at low temperature.

FOR MORE DETAILS ENTER J302

Barose — a simplified body system

BAR Refrigeration Ltd, which has supplied mortuary chambers all over the world, began to develop its Barose units some 15 years ago, when it was approached by pathologists and morticians to develop a simplified body storage system. The aim was to improve hygiene, provide adjustable tray heights, reduce running costs, save space, and make maintenance easier.

Hygiene — The inbuilt rack-ing system was redesigned to be built into the cold room

walls. With no free standing racking, the whole chamber is easier to clean.

Another development was the removable, solid polypropylene rollers, use of which allows the chamber to be emptied to allow walk-in cleaning operations to be carried out.

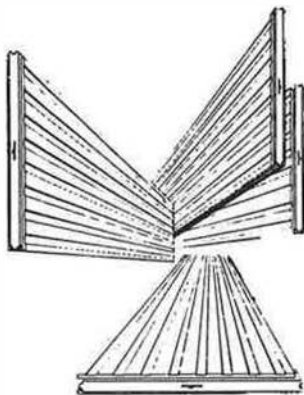
All surfaces, especially on the interior, must of course have non-corrosive finishes, and be resistant to the abrasive chemicals and detergents commonly found in mortuaries.

The floor, where possible, should be fitted with a drainage point so that the interior of the cabinet can be hosed down. The drainage point should provide convenient access for maintenance.

Finally, each bay should be separated from its neighbour by a partition wall, reducing the possibility of transfer of infective agents from one body to another, and making the whole thing easier to clean with a flat surface vertically between each body bay.

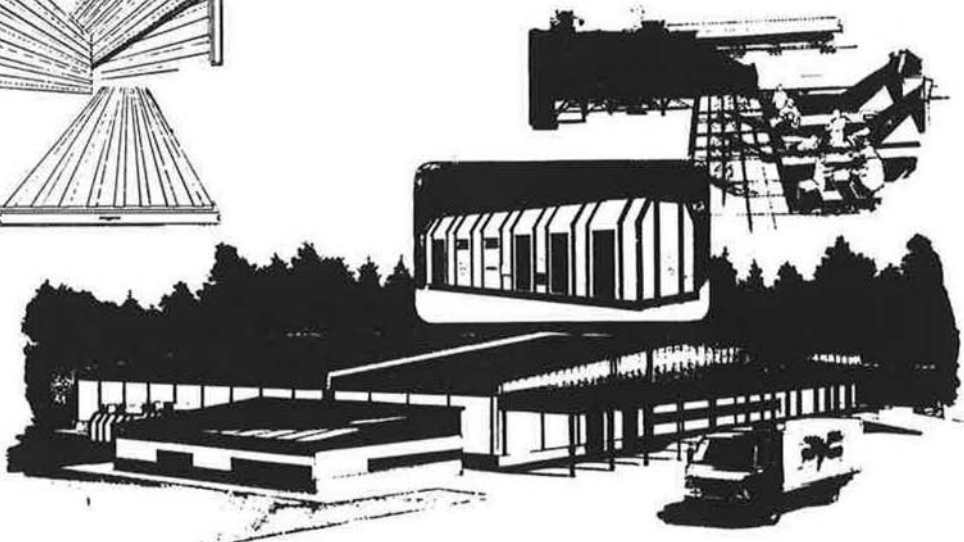
Adjustable tray heights —

ENTER INQUIRY No J59



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▲ ENTER INQUIRY No J19

Mortuary technicians should have the flexibility to adjust the heights in between the trays. This means that at busy periods, he can increase the number of bodies in the bay by one tray, or, store bigger bodies. This is achieved in the Barose mortuary chamber by having the trays stackable at 100 mm increments.

Running costs — To counter higher energy costs, the Barose chamber, as standard, uses 100 mm polyurethane insulation as opposed to the more common 75 mm.

Space saving — With the racking built into the cold room walls, the chamber occupies less floor space than the traditional design. Up to 29 per cent space saving can be achieved over a traditionally built cold room of

identical storage capacity, says Bar.

Ease of maintenance — The packaged unit is manufactured and erected and tested off site in the factory workshop before being dismantled and transported to the installation site as a flat pack. After assembly it is again tested throughout.

Bar Refrigeration also supplies a range of electric or manual hydraulic stacking trolleys and concealment trolleys which are compatible throughout with trays used in the mortuary cold storage system.

Bar also manufactures clinical and pathology cold rooms, constant temperature rooms and incubator rooms.

FOR MORE DETAILS ENTER J303

A specialist range by Finnish company

PORKKA Oy, of Finland, claims to be one of the largest manufacturers of refrigerated medical equipment in Europe, selling mostly in Scandinavia and Western Europe. A UK subsidiary was recently set up in Rickmansworth, Herts.

Specifically designed for the application, the Porkka medical refrigerators provide capacities from 70 to 600 litres.

Finished in sheet steel externally, with in most cases a white plastic interior — two models, the LJK 500 and LJK 700 are finished internally in stainless steel — they provide operating ranges of +2 to +6°C, or +6 to +15°C.

All units come complete with external thermometer, thermostat, power switch and temperature alarm signal lamp as standard, with narcotics locker and digital thermometer available as optional extras.

The Porkka blood banks come in two models, the 230 litre VP 180, and the 520 litre VP 600. The larger model has a dual refrigeration system. A double thermoglaazed door is available for the larger model, which then carries the designation VP 600 GD.

Both models feature a monitoring control and alarm system that can be connected to the general alarm system of

the user establishment.

External finish is white enamelled sheet steel, with stainless steel sheet to the interior.

Stainless steel shelves are available on both models. Options include blood bag baskets, a lock on the VP 600 GD, and a temperature recorder on the VP 180.

The VP 180 measures 850 mm wide, 750 mm deep, and 1,300 mm high; the VP 600 has the same width and depth, and is 2,000 mm high.

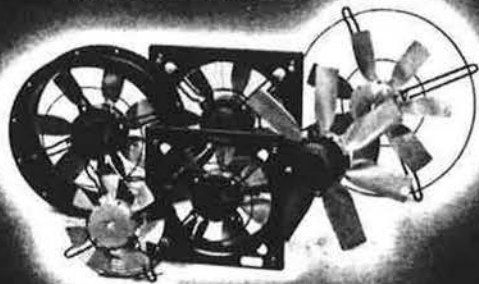
FOR MORE DETAILS ENTER J304



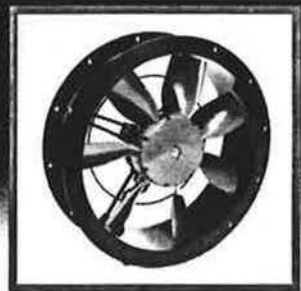
The 520 litre capacity Porkka blood bank

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ENTER INQUIRY No J60

Wide application for ULT

ERNEST West and Beynon Ltd supplies storage freezers of between 2 and 17 cu ft capacity, chest or upright, operating down to -96°C and utilising cascade refrigeration systems.

Their primary use is the storage of human tissue, organisms, viruses etc; at ultra low temperatures such material can be stored for long periods without significant deterioration, so providing an essential research tool.

Similarly, medicines and vaccines can be stored over long periods in perfect condition.

Ultra low temperatures have also been used for many years in material processing, a current example being epoxy resins, which do not cure as long as they are stored below -60°C .

The increased importance of environmental testing has also made a market for these cabinets in high tech industries.

A recent example of a new application for ultra low temperature cabinets is the new technique of genetic fingerprinting. In this, genetic material is 'highlighted' by low output radioactive material, and is then set in a gel and placed against a plate of x-ray film, thus allowing a pattern of the genetic material (its fingerprint) to be transferred to the x-ray plate. Because of the very low output from the radioactive material at normal temperatures the plate could take two to three weeks to develop; however, it was recently discovered that at -79°C there is a 50 fold increase in the sensitivity of x-ray plates, so when placed in an ultra low temperature, the developing time is cut to two to three days.

Ernest West and Beynon has manufactured low temperature cabinets, originally on a one off special basis, since 1962. Subsequently, these cabinets were supplemented by a range imported from the Scientemp Corporation in the United States. In 1978, an agreement was reached with Scientemp to incorporate its cascade technology in a standard range of

West-Beynon designed and manufactured cabinets.

Ernest West and Beynon says that cabinets using the Scientemp cascade system are renowned for their long life. There are cabinets over 16 years old still running on their original compressors.

Cabinets with the Scientemp cascade system are offered with a five year parts

and labour warranty.

In addition to manufacturing ultra low temperature cabinets, the company also specialises in closely controlled environments for laboratory warm and cold rooms. Using solid state proportional controllers, accuracies of 0.5°C can be achieved.

FOR MORE DETAILS ENTER J305

Fermod furniture for use on mortuary systems

COLD storage fixtures and fittings specialist, Fermod Ltd, which has been supplying hinges, handles and door gaskets for mortuaries for many years, points out that specifications for mortuary equipment are usually very high, and more often than not the design brief involves restricted space.

Among the specifications is a requirement for an internal release mechanism, to avoid the possibility of workers who may be inside carrying out maintenance or cleaning tasks, being trapped.

The Fermod 1841 CP fastener is described as ideal for use on mortuary doors. As well as having an internal release mechanism, it has a long handle, and therefore is easy to operate, and helps to provide a secure seal with the door gasket. It also has a very slim profile and can easily accommodate the restricted space found in mortuaries. A typical mullion width (between door space) is 5 in.

Fermod points out that

bodies due to be buried or cremated within about a week are usually stored at about $+5^{\circ}\text{C}$, but when a body has to be preserved, for instance, due to suspicious death, it is stored at -23°C for a typical period of between six and nine months. However, at this temperature a body can be stored indefinitely.

Fermod equipment user G.R. Scott Ltd reports that increasing numbers of undertakers are having small chilled mortuaries installed.

Fermod 621 door handles were supplied to deal with the unnerving problem of rattling mortuary doors in the Nottingham Co-operative Society chapel of rest. It was caused by incorrectly sealed doors being agitated by air turbulence from the cooling equipment.

Fermod equipment is also used in the mortuary at the London Lighthouse Hospital, dedicated to the care of AIDS sufferers.

FOR MORE DETAILS ENTER J306

Mortuary chambers with body trays and racking systems

G.R. SCOTT mortuary chambers are available in three and four tiers, in respective heights of 2,336 and 2,642 mm. Depth from front to back is 2,352 mm, and single bay width is 889 mm. Additional bays are 736 mm wide, with a 76 mm insulated partition.

The chambers are finished in white PVC coated galvanised steel sheet at least 0.55 mm thick.

Door insulation is 60 mm polyurethane. Standard doors — they are unlockable — are hinged, using chromed furniture, with PVC gaskets.

For the GRP body trays, Scott's own racking system is used, with white finished wall uprights, and lift out white side runners with integral nylon wheels.

FOR MORE DETAILS ENTER J307

MEDICINE

A six model ultra low temperature range

HERAEUS Equipment Ltd has launched a new generation of ultra low temperature freezers to store samples in life science and industrial laboratories. The Herafreeze range of deep freeze chests and cabinets has been developed for reliable, high performance operation over long periods of time, and at constant temperatures ranging from -50°C to -140°C . All functions are microprocessor-controlled.

In conjunction with a number of slide-in trays and sample racks, Heraeus's ergonomically designed freezers offer laboratories a complete deep freeze system. Blood, organ, virus, tissue or vaccine samples, for example, can be stored in complete safety. The control system automatically monitors the freezer's temperature, compressors, software, hardware and on-line system.

Herafreeze units are also suited to storing and testing samples produced from a wide variety of scientific fields including metallurgy, electronics and other physical sciences. Heat treatment, viscosity, brittleness and low temperature measurements are typical applications.

Heraeus offers six models in its Herafreeze series — five chest freezers ranging in volume from 193 to 484 litres and a maximum freezing temperature from -50°C to -140°C ; and an upright model with a volume of 487 litres and a maximum freezing tempera-

ture of -85°C .

By pressing a series of touch pads, the operator can select the desired working temperature, the hot and cold alarm points and system check

codes. The temperature of the freezer and all values entered by the operator are clearly visible on a digital display.

In the event of an emergency, such as temperature

fluctuations or power failure, the visual and audio alarms operate, or if fitted, a carbon dioxide or liquid nitrogen cooling system is automatically triggered. A built-in service menu and a separate fault and diagnostics display simplify maintenance and repair.

FOR MORE DETAILS ENTER J309

'Space saver' mortuary chambers

FOSTER modular mortuary chambers are constructed on site from precision-formed insulated panels finished in hygienic white coated steel or stainless steel.

A stub roller system offers ease of access for service, fumigation and cleaning. The rollers accommodate a special convexed GRP body tray which, says Foster, combines strength with light weight and cost economy (stainless steel trays are optional). The racking offers three or four tier body storage.

The stub roller system has been tested to 220 kg loading

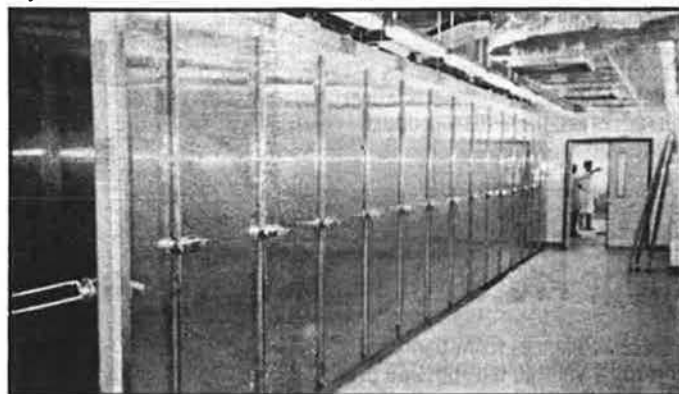
per individual tray.

Refrigeration is by Foster's Solo plug-in refrigeration system.

Foster space saver mortuary chambers are manufac-

tured to BS 5750 and are available from and serviced by Foster distributors worldwide.

FOR MORE DETAILS ENTER J311



A Foster mortuary 'bank' at Hong Kong University

Trane plant 'in operation'

NEW operating theatres at the private Priory Hospital, in Birmingham, are to be air conditioned with Trane equipment costing £20,000.

This will bring the total value of Trane plant installed at the site to £70,000 since building started eight years ago.

FOR MORE DETAILS ENTER J310

Full package from Octaveward

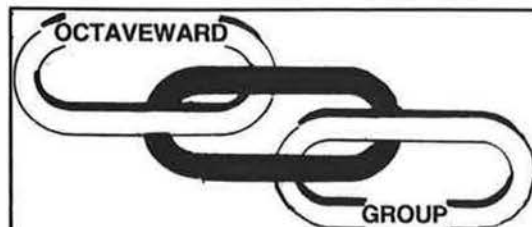
OCTAVEWARD Ltd, which specialises in the design and manufacture of interior fittings for mortuary systems, points to increasing concern for hygienic handling of the dead as causing a number of health authorities to look seriously at what, in many hospitals, are outdated facilities.

Standard items or custom

designed systems are available from Octaveward, which points out that hygiene is a paramount consideration in its fittings design philosophy.

Octaveward also provides a range of ancillary products, from instruments, to trolleys and tables.

FOR MORE DETAILS ENTER J312



CONTACT THE SPECIALISTS:

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▲ ENTER INQUIRY No J22

Fifty years experience adds up to full medical equipment range

ORIGINALLY formed in 1891, Swan Ltd has been involved in the development and manufacture of specialist refrigeration equipment for the medical field since the '30s, when the company designed and manufactured what it says was the first bulk-freeze drier in the UK for use by the Blood Transfusion Service.

The company has since produced an entire range of special cabinets for various applications, including cooled incubators for culture growth, pharmacy refrigerators for drug storage, -40°C freezers for blood plasma and -80°C cabinets for long term sample storage.

The ultra low temperature chest and vertical models run on a cascade refrigeration system, operating over the range -50 to -80°C .

Features include inner sub

doors/flaps to minimise cold loss, door/lid heaters to prevent excessive ice build-up, adjustable shelving on vertical models, and lockable doors. Castors provide mobility.

Standard capacities range from 1 to 30 cu ft, but special size requirements can be satisfied.

Options include fully automatic carbon dioxide and liquid nitrogen safety back up systems, dual refrigeration circuits, temperature recorders, racking/inventory storage systems and digital temperature display.

Exteriors are in treated sheet steel with paint finish, and interiors are stainless steel.

Insulation is 14 cm high density mineral wool and foamed polyurethane.

The chest and vertical plasma storage freezers come

in capacities from 4 to 27 cu ft, with exteriors in white stoved enamel, and interiors in plastic/aluminium.

Features include mains rechargeable battery alarm system with audible and visual indication, and inner doors and lids.

Options are stainless steel construction, and racking/inventory storage systems.

Laboratory refrigerators and freezers provide operating temperature ranges from $+2$ to $+6^{\circ}\text{C}$, down to -18 to -22°C . Seven models cover refrigerators, freezers, combination refrigerator/freezers and service cabinets, while the lowest temperature models are chest freezers ranging from 4 to 28 cu ft.

The medical/pharmacy cabinet range operates from $+2$ to $+10^{\circ}\text{C}$, and features forced air cooling, automatic defrost, adjustable and

removable shelves, lockable door and alarm/mains indicators. Heavy duty castors are fitted.

Options include micro-processor temperature controller, temperature recorder, fluorescent or ultra-violet lighting, and alarm system.

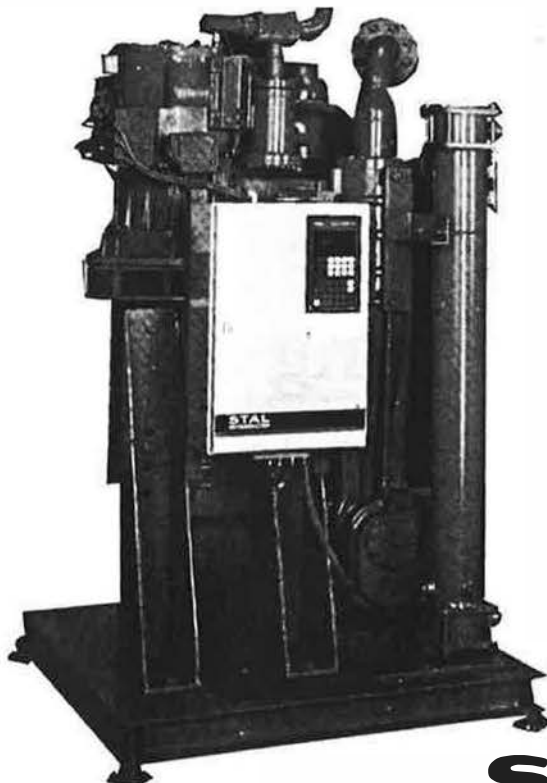
Exterior and internal finish is stainless steel.

Swan's cooled incubators cover from -5 to $+45^{\circ}\text{C}$. The IS range of three cabinets provides capacities of 1.5, 4.5 and 8 cu ft, with exterior finish of white stoved enamel zinc coated steel and a plastic liner interior with stainless steel fan duct.

The SSC range of four models provide capacities of 18, 21, 38 and 45 cu ft, the two smaller models having a single door, the largest models double doors.

FOR MORE DETAILS ENTER J313

THE MIGHTY MINI



STAL Refrigeration was first in the market with screw compressors for the lower capacity range — the STAL-MINI compressor series.

The STAL-MINI compressors with their economizer versions cover the range from 560 kW down to 155 kW in twelve sizes. This allows flexibility in project planning as well as solutions with high dependability.

When it comes to your next refrigeration project, STAL-MINI MK II screw compressors are the obvious choice.

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Back up service is a must

REFRIGERATION in the hospital is literally a matter of life and death, since it is required to serve the needs both of the living, in cold rooms, and the deceased, in the mortuary.

Hospitals are particularly concerned with the close control of conditions in cold room facilities and with their reliability. The failure of the refrigeration system in a blood bank, for example, can have very serious consequences.

This point is made by Lindsell Dewell, which, in addition to supplying an extensive range of window and in-store display, counter and back shelf display cabinets, also designs, installs and maintains cold rooms for all applications, including hospitals.

Temperature ranges covered extend from +7 to -38°C, with recent installations including a large blood transfusion centre.

Its policy is to offer the right products, to provide knowledgeable staff to sell them,



This cold room by Lindsell Dewell is at the Colindale premises of the North London Blood Transfusion Centre

and to possess the capability to provide subsequent service.

Although the modern hospital employs its own qualified and experienced maintenance department, there is always the need for specialist service for particular

items of equipment of which refrigeration plant is an example.

Depending on circumstances, the hospital will look for a maintenance contract which combines a 'mix' of 24 hour emergency breakdown service, scheduled mainten-

ance calls at agreed intervals or maintenance when required, depending on circumstances, such as the nature of the facilities involved.

While close attention is necessarily paid to reliability in hospital refrigeration plant, it is increasingly important today to look for maximum energy savings. Lindsell Dewell says this is a problem which should be approached at the specification stage, with consideration given to such questions as the thermal matching of the plant, compressor efficiency and part load operation.

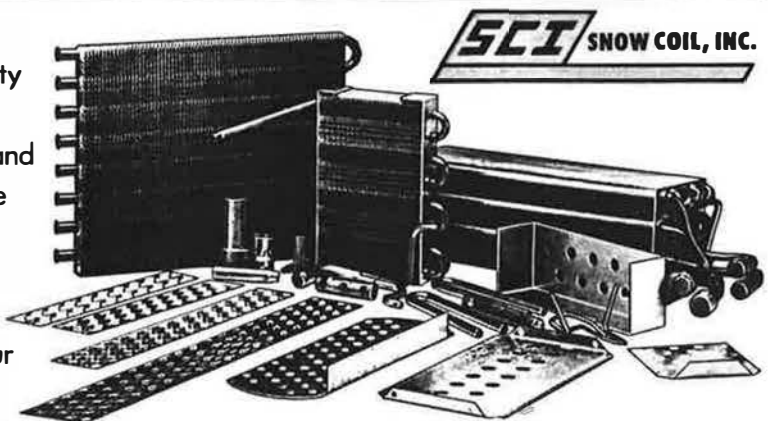
The company points out that cold room installers have acquired wide experience in these and related problems, as well as the plant options available, such as the choice between the use of absorption or vapour compressor cycles, with heat pumps also a possibility.

FOR MORE DETAILS ENTER J314

HIGHER EXCHANGE RATE

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▲ ENTER INQUIRY No J26