

New build and existing hospitals and healthcare centres require meticulous planning and design of all systems for moving patients, staff, visitors and materials as well as non-clinical support services (NCSS). ADRIAN GODWIN, chairman at materials handling specialist Lerch Bates UK reports.

Moving people and materials

NCSS ACCOUNT for up to 45% of a hospital's annual operating budget, yet current planning methods continue to focus on capital cost with NCSS cost containment efforts primarily directed towards either 'fine tuning' or, increasingly, outsourcing various services. Better planning and implementation can create operational efficiencies that have the potential for saving 2.5% to 4.5% of the operating budget.

It is clear then that the focus needs to be on designing a solution that integrates all the NCSS functions, including the necessary building infrastructure, departmental

adjacencies, spatial requirements, lifts and materials handling systems. After all, all clinical functions rely on NCSS's to operate efficiently and effectively.

Delays

To draw a simple analogy, why would you put your hospital pharmacy on the top floor of the facility when that means time and energy will be consumed to move all the incoming supplies to the top floor together with staff and then distribute all the pharmacy downwards throughout the building with its attendant time delays, labour costs and energy consumption.

The role of effective design is to identify which facilities belong where and how their location and departmental adjacencies can be exploited to generate efficiencies of distribution given differing facility configurations. Projects require a detailed review of everything that needs to move and what the means of transportation should be. That list may include; people, medical records, materials, equipment, supplies, food, specimens, medications and waste.

The designer must identify the types of material by volume, size and weight that have to be transferred on a daily

basis. With this information to hand, the lifecycle costing of various materials handling solutions can be tested and their cost and payback analysed.

The various types of systems that can be employed to meet the materials handling needs, range from lifts and dumbwaiters to automated box conveyor systems and guided vehicle systems. When it comes to moving people and vertical transportation in hospitals the traffic can be separated into two distinct categories. Pedestrian traffic consisting of staff, doctors, technicians, volunteers, visitors and walking patients, and traffic made up of patients in beds or wheelchairs, linen trolleys, food trolleys, supply trolleys and portable equipment.

Separating these two types of traffic is by far the best approach. If pedestrians and patients in beds use the same lifts, patients suffer delay and discomfort.

University College Hospital

University College Hospital's (UCLH) high rise complex in London contains an A&E, maternity wing, critical care, a day assessment clinic and multiple specialist departments.

The design, by Llewelyn Davis architects, included a podium block extending five levels from -2 up to level 3 and a high rise tower from level -1 up to level 15.

In establishing the design requirements, it was first necessary to review the Trust's output specifications. These are documents put together individually by all the departments of the existing facility about their present and expected future operating requirements. For example, the space

requirements, opening hours, number of support staff and number of patients are typical base data that are included.

determining the number of bulk and unit movements

This data is then coordinated to understand the servicing requirements of that department in terms of how many and what type of material (medical records, waste, linen, blood samples) and people (staff, patients, visitors) the department is likely to be handling on a daily, weekly and annual basis. The servicing requirements of the facility can then be worked up in detail for all the individual departments to determine the number and frequency of the three types of traffic flow, and the number and frequency of bulk and unit materials movements.

This information is then factored in with other considerations such as location of key departments, staff shift change times, future growth of departments, and culminates in a "statement of understanding" of the type of material and people flows that are anticipated within the facility in the medium to long term.

An analysis is then performed on the base data to get a more accurate idea of what is required in terms of overall 'mechanical movement' of people and materials to ensure the facility operates efficiently. Benchmark or service levels ▶

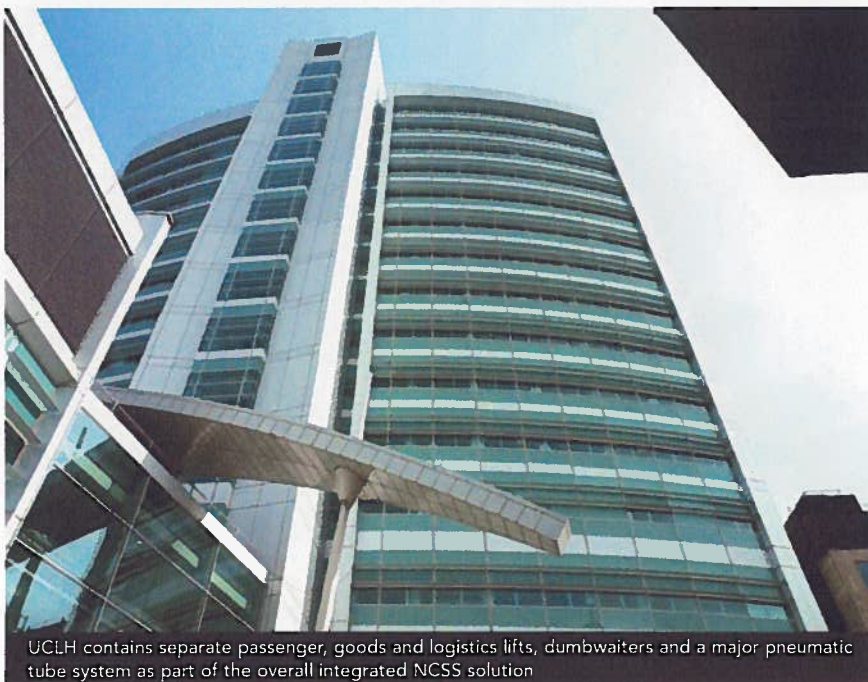


Platform lift allows practice to grow

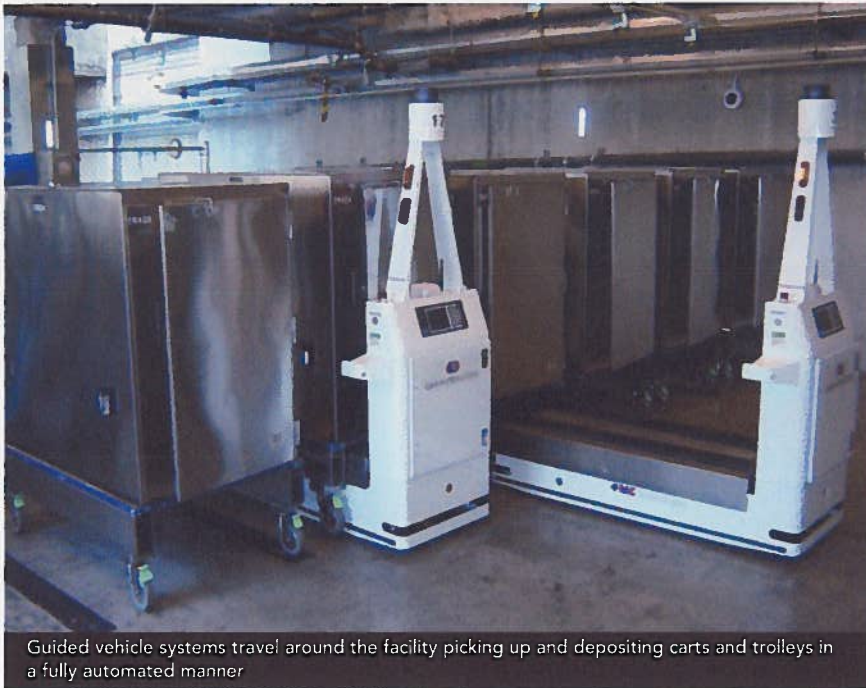
CARRINGTON HOUSE Surgery in High Wycombe is a purpose-built NHS medical practice that has expanded in order to provide more services in the community. The first floor, which once housed administration offices, was converted in 2010 into consulting rooms, thereby necessitating lift access for people with restricted mobility, including wheelchair-users and parents with pushchairs.

Centrally located in the premises, the Midilift XL plus platform lift from Stannah harmonises with the clean, neutral décor. It features clear glass panels to three sides with two half-height mirrors to the right-hand side wall, ranged either side of the control panel. Enclosed in a glass shaft, it offers scenic and convenient travel between the ground-floor reception area and the first-floor consulting rooms.

Supplied in a structure-supported enclosure for swift installation, the platform lift presents a solution for buildings where it is not necessary, practical or possible to install a conventional passenger lift. A new traction drive system ensures a smooth, quiet ride and the XL Plus offers travel to 12m for loads up to 400kg.



UCLH contains separate passenger, goods and logistics lifts, dumbwaiters and a major pneumatic tube system as part of the overall integrated NCSS solution



Guided vehicle systems travel around the facility picking up and depositing carts and trolleys in a fully automated manner

are included in this step of the process and that includes waiting times for lifts.

Lifts

The efficient utilisation of vertical transportation in high rise hospitals is absolutely essential both because the core size required for the lifts impacts directly on the remaining available floor space for departments and by the nature of the high rise building the vertical transportation must provide an acceptable level of service that is at the heart of an efficiently operating facility.

When a facility is large enough and complex enough to require more than three or four lifts there is a definite requirement for the separation of passenger and vehicular traffic as follows:

- Pedestrian/ Passenger: Ambulatory patients, visitors (including patient escorts), wheelchairs, staff and miscellaneous sales/service should use passenger lifts.
- Patient/ Bed Transport: Patient related transport (ie wheelchairs, stretchers, and patient equipment) should use the Patient/ Bed lifts.
- Logistics/ Goods: Hospital trolley movements, waste, heavy equipment, construction material, maintenance staff and equipment, would utilise the FM/Logistics lifts.

It is important to separate these traffic types (where appropriate) to maintain the proper environment for staff, patients and the public and to ensure efficiency.

Each of the traffic types requires different lift configurations. Passenger lifts should be wider than they are deep, which allows quick (and therefore

efficient) transfer of passengers in and out of the lift. If not, then someone at the back of a lift car may need to get past several people to get out, which is very inefficient.

Bed patient lifts clearly need to be of a size to cater for a bed but they should also allow for a trolley with equipment for oxygen and drips. The type of departments within the facility will impact on the size of the lift. For example, within UCLH there is an orthopaedic department and the lifts serving this department need to be larger to cater for a bed with an orthopaedic attachment, ie a traction device for a broken leg, which takes up more space.

Logistics/Goods lifts are usually long and narrow (the opposite to passenger lifts) to accommodate trolleys.

Automation

Once the volume and type of materials to be moved has been established globally, the designer can test out a range of solutions including pneumatic tubes systems, automatic box conveyor systems and automated guided vehicle systems (these travel around the facility picking up and depositing carts and trolleys in a fully automated manner). They even plug themselves into a power outlet when their batteries are running low and are fully interfaced to the good lifts such that they can call, enter and exit lifts automatically as they move around the facility 24/7.

The key to the selection of these systems is in lifecycle costing. What this does is evaluate the number of journeys to be made in a given 24-hour period to deliver and/or retrieve materials around

the facility and equates this to the number of (fte) man hours that would be required to manually move all this material. Dependent upon the volumes and potential usage of different systems the payback on employing automated systems versus manual labour can be calculated for each system type.

The lifecycle costing is done over a typical 25-year period and identifies viable options for automated systems that could reduce manual labour in unit and bulk materials handling, thereby cutting out lift trips and saving ongoing costs and energy consumption generally. During this stage of analysis the relative benefits of relocating departments to cut down the volume and/or duration of unit movements is studied to ensure ▶

Making buildings and grounds accessible

DESIGNED for areas where there isn't the space for a ramp, the Powerstep helps make buildings, gardens and grounds fully accessible to everyone. There are three models of Powerstep – for stand-on, walking frame and wheelchair use – available from Ability Lifting Solutions. The portable platform step helps to overcome significant step heights of up to 60cm (24"). Other uses have been identified, including for access to mini-buses, where step heights can often be a serious obstacle to those with reduced mobility, or as a temporary access solution for those waiting for ramps to be fitted at home.



The wheelchair model of the portable step

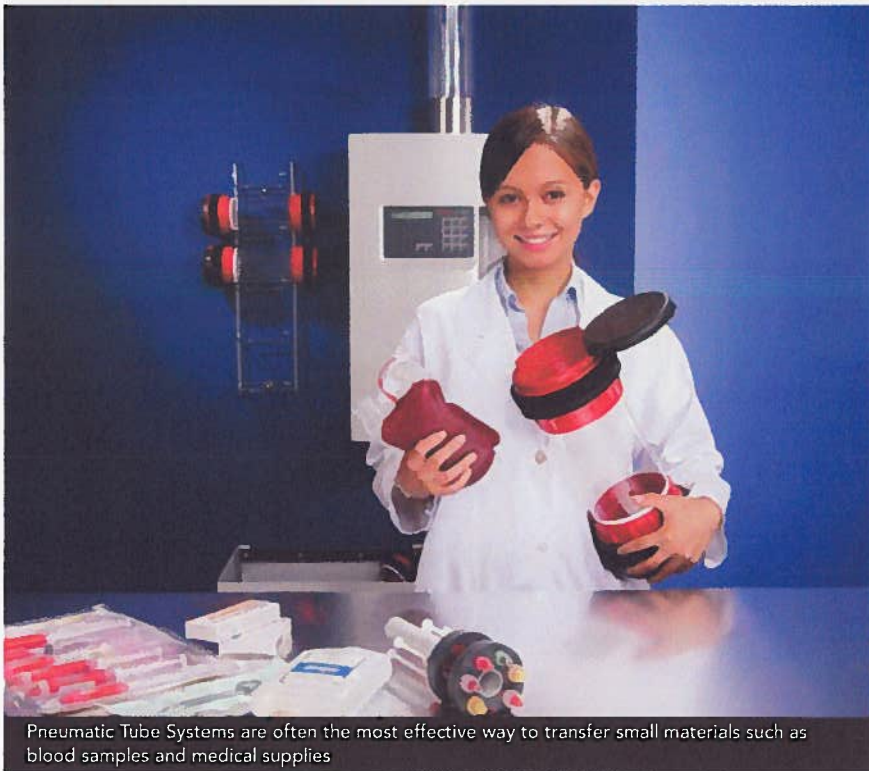


Image: Aerocom uk

Pneumatic Tube Systems are often the most effective way to transfer small materials such as blood samples and medical supplies

that unit movements are minimised and with them material handling system requirements – for example, the number of stations on a pneumatic tube or other system and ongoing energy costs for the next 25 years.



Keeping bed lifts up to date

Two 32-person, traction-drive bed lifts have been renewed at the £39m Terence Lewis building at Derriford Hospital in Plymouth. The two bed lifts have been fully refurbished by Stannah using the newest technology to ensure the safe and efficient movement of patients and staff. The overhaul involved new satin-stainless-steel lift cars, entrances, controllers and slings.

Pneumatic Tube Systems (PTS) often feature in NCSS for modern hospitals facilities because they are very flexible in terms of the type of materials they can handle and often the most effective way to transfer what are termed 'unit materials' - meaning small materials such as medical records, blood samples, nursing supplies and medical supplies. Materials Handling (MH) and Waste Management (WM) cover the movement of what is termed 'bulk material'. Principally, these are linen, waste, general supplies and catering.

More detailed simulations of the performance of pneumatic tube and other unit material handling systems can be done to ensure no 'bottlenecks' occur and to refine station locations relative to their unit material handling capacity. All the NCSS systems can then be designed into the architectural and structural design of the hospital on a generic basis such that a number of qualified companies could bid for each system. The designs of the loading dock and other material storage and intermediate storage facilities can also be addressed.

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Day clinic becomes fully accessible

THE MEMORIAL Hospital in Greenwich is predominantly used as an administration centre but does include Day therapies and Memorial clinic services for older people living in this part of east London. In 2010, Oxleas NHS Foundation Trust completed a major refurbishment of the facility to improve the building environment.

The central core of the building had been fitted with a wooden lift which had been redundant for many years and the shaft 'floored over' to provide storage space. To make all the building fully accessible, a decision was taken to install a new lift to serve the three floors utilising the existing shaft.

Replacement of the passenger lift was undertaken by Kone whilst the Hospital remained fully operational. The MonoSpace lift was selected for its low running costs as well as the ability to install a standard lift car within the existing shaft with only limited structural alterations. The solution reused the existing lifting beams and provided the lift doors so that no structural work was needed to the existing openings on each landing. The finishes include stainless steel panels and handrails, composite stone flooring and low energy lighting.

