

Case story | VLT® Solutions

“Clear the tubes” for rapid transport through the clinic – VLT® HVAC Drives control pneumatic mail system for sensitive samples

The Innsbruck University Clinic extended and modernized an existing system to make it the most modern pneumatic mail system in Europe. The required pressure is provided by more than 100 frequency controlled bellows - controlled by Danfoss VLT® HVAC Drives saving money on energy, maintenance and wear and tear.

More than 4,500 employees of the total 6,500 employees ensure that first class medical care is provided at the site in Innsbruck, Austria. This includes ensuring that blood products,

tissue and blood samples as well as other types of sample find their way across the sizeable site to their correct destination as rapidly as possible. In the past, when the reports also had to be returned to the sender in paper form each time, a pneumatic mail system provided this delivery system. Nowadays, computer networks have taken over this original task from the system. For the samples and blood products it was not quite that simple.

A lot of walking and cycling

Compared to the electronic data, which could whizz from one end of

the site to the other within seconds, things were very different for the sensitive samples and blood products. Up to now, using the pneumatic mail system was not an option. Up to 70 care assistants were kept busy every day, transporting samples and blood products around the campus, on foot and by bicycle, to ensure that patients were cared for and to enable rapid diagnosis during an operation or a treatment. The old pneumatic mail system, which had served so well for a long time, looked set for retirement.



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VLT® HVAC Drives

controlling the pneumatic mail system with a delivery network of more than 30 km



Then in 2000 a new development arrived from Switzerland, which handled the pneumatic mail packets so carefully, that the system could now even be used to transport the sensitive blood samples. The clinic directors decided therefore to modernize the old pneumatic mail system, and to extend it. Today the total pneumatic delivery network covers more than 30 kilometers in length and the bomb-like cylinders complete more than 3,000 trips each day. All containers are fitted with miniature chips to ensure the highest possible security, which instructs them on the route back to their base station. And after between 7,000 and 8,000 trips they are automatically guided to the service station for maintenance. This is a necessity, as the capsules travel at

between 10 and 40 km/h depending on the trip. This means that they can cover the maximum distance within the site within 6 minutes or less - faster than a top-class athlete could cover the same distance. This is made possible by the use of modern robotic systems to manage the containers at junctions, which work more reliably by far than the previous system.

VLT® speed control saves money on energy, maintenance and wear and tear

Overall the total system divides into three subsystems: the pneumatic mail for the central laboratory, who is the prime user, an in-house mail system and then a system for transporting sensitive blood products from the blood-bank to the operating theatre and for moving samples to histology. Extensions to the women's clinic and the head clinic, and a new construction for the children's heart clinic made an extension of the system necessary, because the main user, the central laboratory, also moved. The result was that the operators had to adapt the bellows performance.

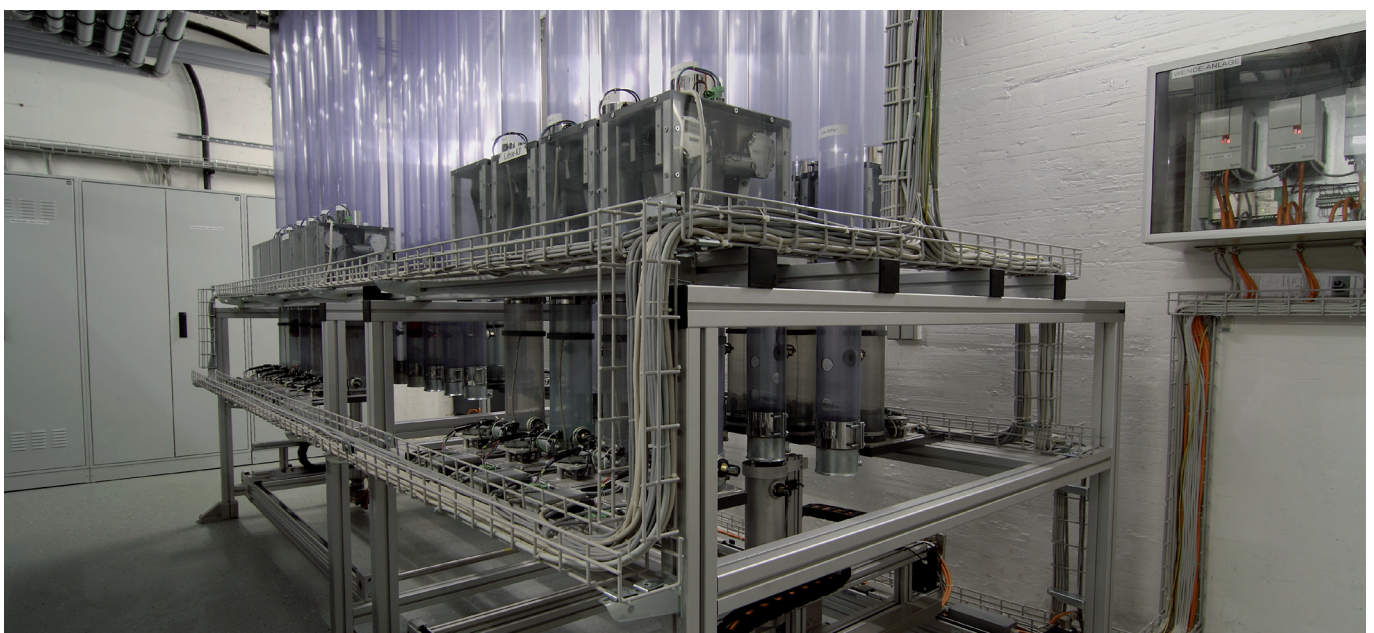
The requirements, which were compiled by qualified engineer Uwe Handrich and his team from the Buildings + Technology Department, included a high level of reliability, a high level of fail-safety, as well as it being simple for the end users to define the settings. And not least, the advice, support and service of the



selected supplier had to be of a high standard, as the systems are working in the medical sector, which sets high safety standards.

They decided to opt for the frequency converter of the modular series VLT® HVAC Drive, whose functions are designed especially to drive pumps, ventilators and also bellows. The Innsbruck specialists already had equipment from Danfoss in use in other building installations such as heating, ventilation and sanitary systems, which have demonstrated reassuring reliability and ease of use.

The VLT® HVAC Drive has multiple slots, which allow optimum adaptation to the current task: It is simple to



order the required extension modules up front or to add them later through simple plug-and-play. Initially the user acquires a fully installed and tested VLT® HVAC Drive. But subsequent additional local installation is carried out very simply, directly on-site. So the user only pays for the functions which they really need.

But even in the base version the VLT® HVAC Drive offers multiple functions for running the bellows. For the major system for transporting blood and samples, Uwe Handrich decided to opt for analog controls for the frequency converters with a 0..10 V signal. This allows the bellows performance to be perfectly adjusted to the weight of the capsule, and ensures the desired velocity of 3.5 m/s for the transport.

The speed control replaces the former throttle control. This delivers a substantial reduction in energy costs, as the systems are now almost always working at optimum operational level. And it is not only TILAK who is saving on costs here - thanks to a reduction in waste heat in the installation, the secondary energy costs for air conditioning and cooling of the operating areas also fell.

Overall the solution excels thanks to its protective system operation. Gentle starting and stopping protects the cylinders. Using data logging, the load on each individual container can be recorded. From the data collected, the control generates signals to the converter to adjust the settings to provide optimum and protective operations. The controls also adapt the bellows strength automatically to the weight of each canister.

And not least, the simple operation using a graphical display which won the iF Design Award for communication interfaces ensures the team is kept content. The display always shows the operating condition of the device. In addition the user can also bring up the settings which matter to him, so that he can see all the important information about the application at a single glance.



Danfoss reliability and service win the day

Uwe Handrich is full of praise for the reliability of the devices. Danfoss adjustable frequency drives have always proved themselves to be very reliable in all applications to date, whether for standard buildings technology or for pneumatic mail systems. And even if a device should fail, the Innsbruck teams appreciate the rapid and reliable service provided by Danfoss and their certified system partners.

But it is not only when there are faults that the Danfoss drive specialists can help. Much earlier during the planning and commissioning phase they are available on request to help customers with their in-depth application knowledge. Because Danfoss works with people in the sector, so that the local point of contact will have a high level of expertise about the relevant area of usage. So by working together with the expert professionals from the user they can define and apply the optimum solution for the propulsion challenge.

Conclusion

In just under a year, Uwe Handrich and his team have got the current solution up and running. Since the modernization and extension of the installation, the system has now handled over 7 million trips. Just 3 years on, the investment costs of 2 million euro have already been amortized, there are savings in terms of personnel time and the problem-free running. Equally positive is the reduction in energy consumption when running the installation and for cooling the operating areas. And the “new” pneumatic mail system represents a considerable reduction in workload for the people working in the central laboratory. So everyone wins - patients, employees and also the technical people. And the Innsbruck people have also created a new attraction for technicians across Europe who want to be inspired by the system to create their own solutions.



Innsbruck Regional Hospital and University Clinic

The Innsbruck Regional Hospital (Landeskrankenhaus or LKI) and the University Clinics together provide the general medical care for the population of the region of Tyrol - and also parts of South Tyrol and Vorarlberg. And here the link between the LKI and the Medical University of Innsbruck guarantees access to the most up-to-date medical procedures. Internationally first class treatment is offered in numerous areas, which also attracts overseas patients. Responsibility for the reliable running of these hospitals and clinics rests with TILAK, a private company created in 1991, but which is owned by the Region of Tyrol, the city of Innsbruck and the local districts.

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