In 10 to 20 years, a baby boom generation in Denmark will reach the age of retirement, leaving comparatively small generations in the workforce. Fewer hands will have to sustain a large population of senior citizens. In the healthcare sector, the demographic development is expected to have a profound impact as the larger number of senior citizens brings about an increased demand on healthcare services. At Gentofte Hospital, situated north of Copenhagen, the capital of Denmark, the preparations to meet these future challenges are already underway. Prior to the global economic crisis, the employment rate in Denmark was very high. During this time, Danish hospitals had difficulty hiring people to work in hospital sterilisation centres. Based on this experience, Gentofte Hospital is now implementing an advanced automated storage and retrieval system (AASRS) in the Hospital Sterilisation Centre. Gentofte Hospital specialises in elective surgery and the reliable access to sterilised surgical instruments is essential.

Though inspired by commercially available storage and retrieval systems as know from industrial production, the AASRS, which is to be fully implemented in February 2011 in the storage area of the Hospital Sterilisation Centre, is a highly specialised version of these off-the-shelf systems.

The contractor developing the system and the Gentofte Hospital project group are collaborating closely to ensure that the system will meet the special demands that the handling of sterile goods requires. Smooth, easy to clean surfaces, mechanical parts approved for use in a sterile environment and RFID tags suitable for going through an autoclave are just a few of the special features in the specifications.

The AASRS will handle storage of containers, packaging of containers onto case carts and most of the transport of the case carts within the storage area. After a container with surgical instruments has passed through the autoclave, has cooled and been through quality control, the AASRS picks up the container and places it on one of the 1980 shelves in the storage area. When instruments are needed for an operation the AASRS transports the containers to a robotic arm that packs them onto a case cart. The case cart is then moved to a small elevator that brings the case cart to the surgical ward.

The AASRS is integrated with the hospital IT-system that handles instrument tracking and with the IT-system that handles operation booking and documentation. The integrations ensure that the AASRS receives information on which containers to put on the case carts for the operations. In this way, the case carts can be packaged with containers adapted especially for, e.g. left-handed surgeons or overweight patients, based on the operation booking information. Combined with RFID chip marking, the integrations ensure complete traceability of the containers.

With the implementation of the AASRS the need for lifting heavy sterilisation containers, which can weigh up to 15 kg (= 33 pounds), is strongly reduced making the Hospital Sterilisation Centre a more attractive place to work, enhancing the chances of recruiting and retaining employees. The AASRS is also programmed to facilitate a balanced packaging of heavy and light instruments in a container to lighten the load for the surgical nurses when lifting the containers from the case carts. Furthermore, the automated system lessens the need for employees to go into the storage area and handle the sterile goods.

As nurses and nursing auxiliaries are often employed in sterilisation centres, these resources can be assigned to jobs focused on patient care instead of surgical instruments.
A further ambition for a future project is to implement assembly lines in the clean area between the washing machines and the autoclaves, to make transport of containers by hand superfluous in this area. On the unclean side of the washing machines, where the used containers arrive in the Hospital Sterilisation Centre by another small elevator, a system to receive and process the used instruments is also on the drawing board. Additionally, Gentofte Hospital is interested in pursuing automated transport of the case carts on the surgical ward by AGV (Automated Guided Vehicles). Today, surgical nurses move the carts by hand to the operating rooms after the carts arrive at the surgical ward by elevator. An automatic distribution of case carts to the operating rooms would free up valuable time for the nurses.

The AASRS project is in part financed by a grant from the ABT-fond (Public Welfare Technology Foundation) under the Danish Ministry of Finance. The Foundation backs projects in the public sector aimed at freeing up resources in the workforce through innovative use of technology. However, the potential of the AASRS project is far from limited to national utilization. Advanced automated storage and retrieval systems could facilitate complete traceability of sterile goods and improve efficiency and work environment in hospital sterilisation centres internationally to the benefit of both patients and employees.