

## CASE STUDY 3 STACKING SHELVES FOR PREFILLED SYRINGES

### BACKGROUND / CUSTOMER OBJECTIVES

This US customer wanted to terminally sterilize a variety of sizes of prefilled syringe. The syringes were a plastic material, and it was important to prevent damage to them or displacement of the stopper during processing. Robotic handling was to be employed, requiring that the placement of the syringes was accurate and repeatable. The syringes should not move during the process.

### KNOWN ISSUES / BASIS OF DESIGN

To prevent water collecting in the syringe barrel (which is then difficult to remove), the syringes should ideally point upwards or slope front-to-back. To optimise use of the chamber space, the syringes should be densely packed. However, for optimal processing, and minimal cycle time, there should be a clear path between them.

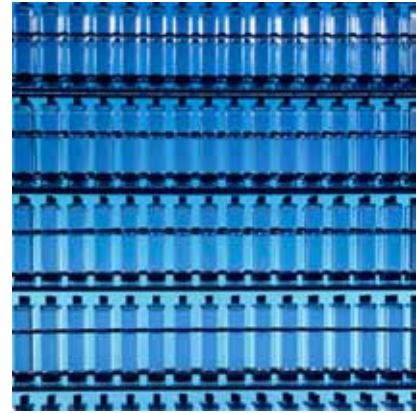
The customer's preference was to use roller conveyors as a means of moving the product around the facility. To meet the capacity requirement, it was necessary to load and unload the product from the chamber as rapidly as possible.

### FIRST STEPS

Samples of the syringes were provided and sent to our Sterilization Technology Center in Getinge, Sweden. The customer visited Getinge to discuss the project and participate in the

testing.

The GEV process was chosen, due to the achievable short cycle time, but with the benefit of a dry, cool product on completion.



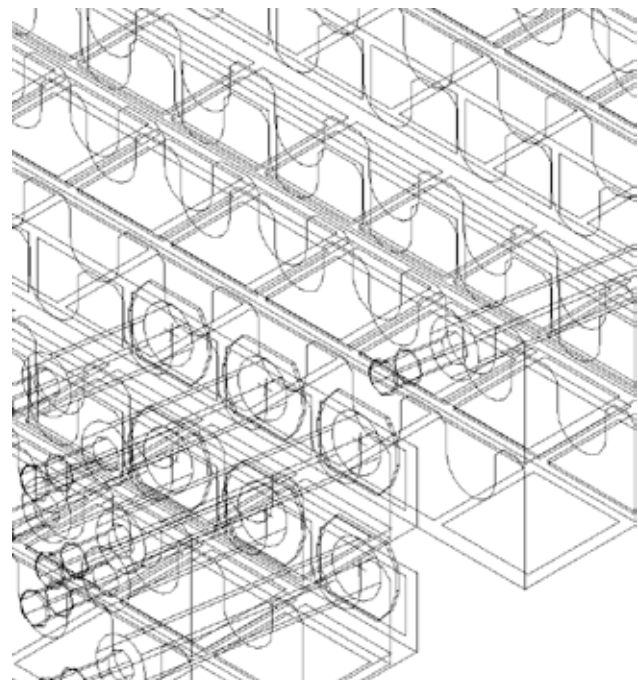
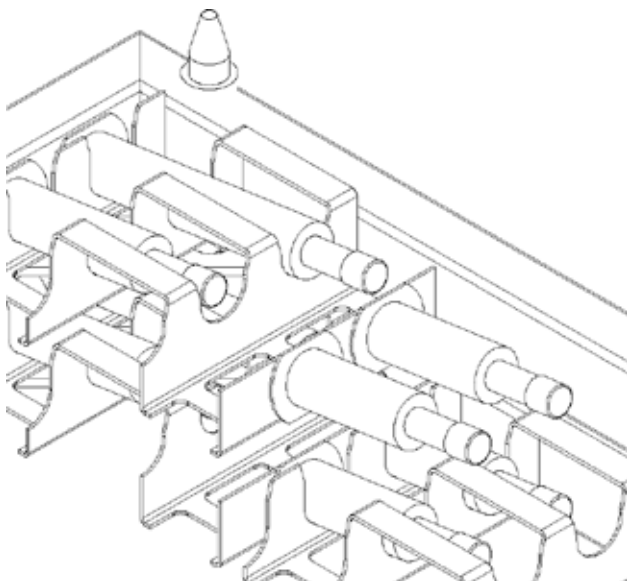
Several designs of this type have subsequently been used.

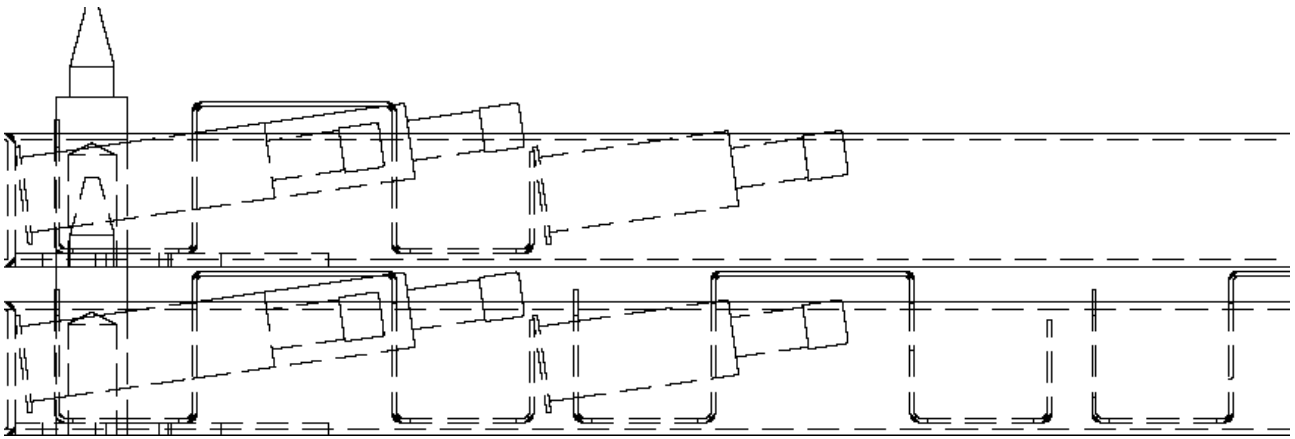
### PROTOTYPE

A prototype shelf system was fabricated. This was based on previous experience. For economy of design and manufacture, a pressed stainless steel fabrication was chosen. A series of tests were performed to check the performance of the shelves and the GEV process with different sizes of syringe - 3 and 5 ml.

Cycle time was very important (in terms of throughput) so all measures were considered to minimise this, including the addition of jacket cooling, though it saved only a few minutes of the total process time of 120 minutes.

To allow use of robotic handling - both for placing and





removing the syringes and also for handling the shelves, stacking shelves were used. These were fabricated with a unique corner pin to prevent jamming and allow minor imprecision of the stacking / unstacking equipment.

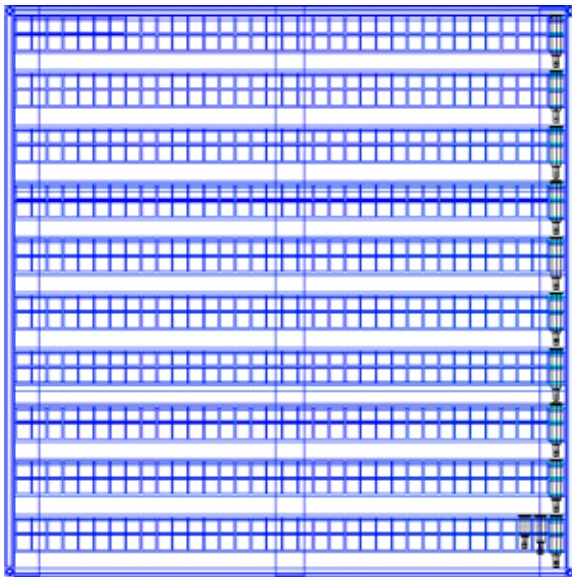
## PHASE II - PRODUCTION SHELVES

Several prototypes were produced during the testing phase, and a final design was ultimately produced to accommodate both sizes of the syringe, while allowing easy handling.

The customer's preference was to use roller conveyors for handling the product within the factory. Accordingly, the shelves were designed to be identical and not require use of a special base pallet.

They were designed to be stacked, requiring a rigid design to avoid flexing and distortion.

The shelves were designed such that each successive shelf would hold the syringes in the shelf below in place during processing. The top shelf would be empty.



## RESULT

This project was for the second of two large production sterilizers. On conclusion of the testing, the client ordered a GEV 141837, with a capacity of 9.5 cu.m, in addition to several hundred trays.

**GETINGE**  
GETINGE GROUP

[www.getinge.com](http://www.getinge.com)

GETINGE GROUP is a leading global provider of products and systems that contribute to quality enhancement and cost efficiency within healthcare and life sciences. We operate under the three brands of ArjoHuntleigh, GETINGE and MAQUET. ArjoHuntleigh focuses on patient mobility and wound management solutions. GETINGE provides solutions for infection control within healthcare and contamination prevention within life sciences. MAQUET specializes in solutions, therapies and products for surgical interventions and intensive care.