vötschoven

Case Study

vötschoven industry ovens
curing of filament winding forms

WHY
Heat treatment of cylindrical fiber composites under rotation

HOW
Hot-air chamber oven with rotation device

WHAT
VTU 87/215/350 convection oven with pull-out drawer for up to 12 mandrels

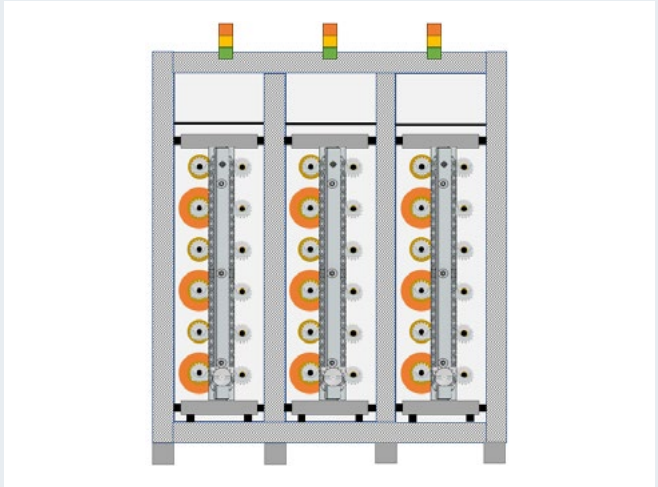
WHY | **The Challenge.**

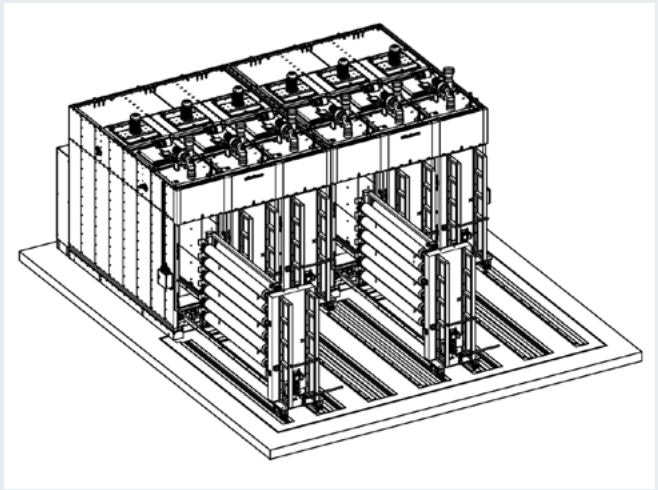
Freshly wound fiber composite forms must be cured in precisely defined batches and according to a specified heat treatment program. In this application, three wound forms are removed simultaneously from the winding machine using a lifting device transferred directly to the curing process without rearrangement. Four of these sets must then be combined into a batch of twelve forms.
A key requirement is that the wound bodies continue to rotate throughout the entire heat treatment but also transfers. Continuous rotation is essential to ensure uniform material properties and to prevent gravimetric displacement of the matrix material during curing. At the same time, the complete heat treatment process must be documented individually for each form. This includes reliable batch logging as well as barcode-based identification of the individual products, with seamless integration into the existing ERP system.
The challenge, therefore, was to combine gentle handling, controlled rotation during curing, and comprehensive data acquisition within a single, efficient oven concept.

HOW | **The Idea.**

To meet these requirements, a vertical drawer oven with a front pull-out was developed. This design allows mandrels to be loaded directly using the existing lifting device, without intermediate handling or rearrangement. The drawer can be loaded on both sides with winding bodies, enabling the complete batch to be positioned efficiently in a single operation.
The wound forms are mounted in such a way that they can rotate freely. Each mandrel is equipped with a pinion that engages with a circulating rotation chain. The rotary drive is integrated into the drawer front and implemented via a chain drive, including continuous monitoring of chain movement and rotation.
For ease of handling, the drawer is guided on floor rails and can be pulled out smoothly. The opening and closing sequence are already prepared for future automation. In parallel, the concept includes batch logging via the SIMPATI system as well as barcode-based product identification. Communication with the customer's ERP lemented via an OPC/UA interface, ensuring consistent and traceable documentation of the curing process:







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WHAT | **The Solution.**

Drawer oven with vertical pull-out; drawer pull-out is adjustable in 3 stages

The resulting solution is a hot-air convection chamber oven with an integrated rotation device, specifically designed for the heat treatment of cylindrical fiber composite components under continuous rotation. The system is based on the VTU 87/215/350 convection oven and features a vertically pull-out drawer with three adjustable pull-out stages.
Each drawer accommodates up to twelve mandrels, which are mechanically secured to ensure safe handling during operation. The winding bodies are rotated via a duplex chain with an external drive, with continuous rotation monitoring to ensure reliable and reproducible process conditions. The rotation speed can be adjusted stepless to match process requirements.
The drawer is manually operated on rails recessed into the floor and is fully prepared for future automation. Special design measures protect the system against carbon fiber filaments, preventing short circuits and ensuring safe, long-term operation.
All product-related process data is recorded via SIMPATI. Barcode scanning and OPC/UA connectivity enable seamless integration into the customer's ERP system, ensuring complete traceability and reliable documentation of each curing batch.



Your advantages at a glance:

- Operating temperature range 80°C – 300°C
- Spatial temperature distribution < +/- 5°C at 250°C
- Space for 12 mandrels with a total mass of up to 1500 kg
- Stepless adjustable rotation speed between 5 min^{-1} and 15 min^{-1}
- OPC/UA interface and barcode scanner for product-related data acquisition and storage
- Protection against fiber filament short circuits

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