

# Drying in a Cleanroom

The manufacture of human life critical electro-mechanical components must meet extremely high standards. Just to give an example, a residual current operated circuit breaker (RCCB) must be perfect. Much so must be the individual process operations including drying to produce it.

GEWISS Deutschland GmbH of Merenburg, Germany, is a company of the international GEWISS Group based in Italy. The company offers solutions for home automation and domotics, protection and distribution of energy, smart lighting and smart mobility. The enterprise was established in 1970 following the revolutionary idea to use technopolymer in electrical systems, and offers a complete electro-technical system comprising more than 20,000 products today. This philosophy of progress pervades every aspect of the enterprise down to the allegedly minor component 'drying'. Following this line, they wanted to install a higher quality and more

efficient drying system as they replaced an obsolete cleaning facility at their German site.

## Extensive Testing to Define Parameters

The contact with drying system manufacturer Harter was made at recommendation of their cleaning system supplier. Harter developed a special solution for use immediately downstream the cleaning station. The system met the specified requirements, namely compliance with cleanroom standards and complete dryness of any and all items of GEWISS' large product portfolio.

Harter set out to run drying tests of GEWISS items in their in-house test station, such as solenoids, solenoid bodies, plastic housings and also rivets used in RCCBs. All these items, whether in bulk or separate, are cleaned in baskets and are also supposed to be dried therein. Following extensive testing in the HARTER test station all drying parameters were determined so that the system could be designed and built to blend in well with the cleaning system.

## Efficient In-basket Drying

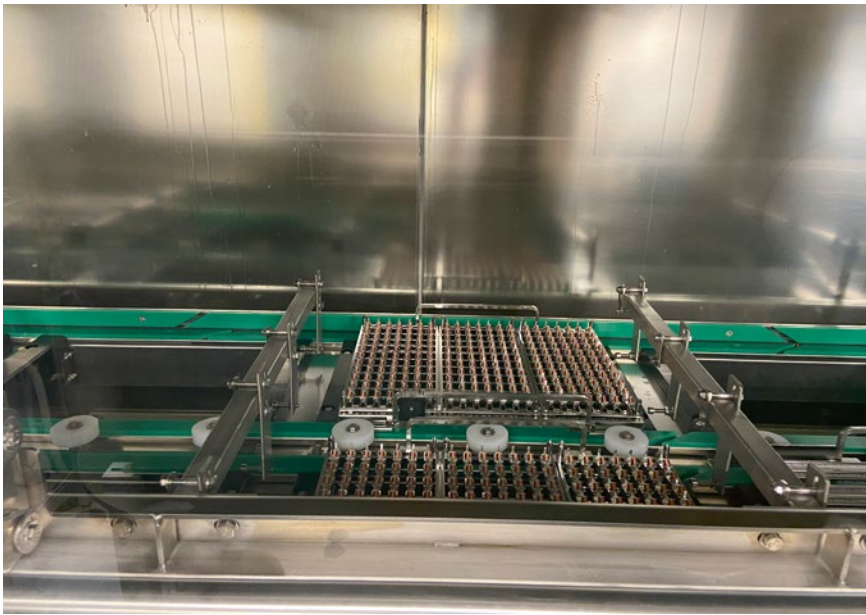
Upon completion of the cleaning operation, one basket per minute is automatically conveyed to the dryer. As the dryer has a push-in mechanism for two baskets side by side the drying process starts once two baskets have arrived. The basket dryer features a total of ten internal stations. At the first station, the baskets and the items contained therein have much of their water load removed by non-compressed air blowing.

The baskets then undergo drying proper at stations 2 through 10. The cycle time is two minutes resulting in a total in-dryer time of 20 minutes, as specified by GEWISS. „We know from our preliminary tests that the items could well be dried in shorter time“, says Harter's owner and director Reinhold Specht. „After the system was installed, it became apparent that some of the items do not necessarily need to have water removed by blowing off. Yet, the station is needed to get the most complex items perfectly dry.“ The gentle drying temperature of 60 °C is much below the customer specified 75 °C



Items in bulk or separate electrical components are fully dried at 60 °C under cleanroom conditions.

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The parameters for product specific drying are stored as individual programmes in the system control.



There is a signal by a traffic light. All eight baskets can be moved forward, one after another, at the push of a button so that the worker may carry them off with ease.

maximum. So, the temperature might be raised to obtain a higher throughput.

### Customized to the Product Portfolio

To meet the specific needs of GEWISS's large product portfolio the baskets used have varied inlays and include one chip each. The drying systems reads from this chip which items are contained in the basket to launch the appropriate programme. The product specific programme controls the air blowing process using a nozzle which may be both moved longitudinally and inclined. The air flowrate is also controlled to meet the requirement of the individual product. Housings, for example, have air directed onto them at oblique angles while bulk material tolerates only much less air and requires a different airstream angle.

The customer wanted to have an optical indication installed to signal that eight finish dried baskets are waiting on the outlet conveyor. The responsible worker then removes the baskets from the conveyor just outside the cleanroom. To meet class 5 cleanroom requirements the dryer has class H13 HEPA filters included.

The dryer features an entry and exit lifting door each opening only as baskets enter or leave the system. This is to contain the heat inside the system. Another feature to ensure energy efficiency is the in-built heat pump. The power rating of the whole system in production operation is 15.6 kW. „The fact that we may now get all our various products completely dry in the baskets means great progress to us. The low temperature process is gentle and energy-saving.“ concludes GEWISS' plant manager Hesmert contentedly. //

### Closed Air Circuit

A Harter drying system basically consists of the dryer proper and an Airgenex® dehumidification module which conditions the required process air - extremely dry and unsaturated air passed at customized high speed over the surfaces of the items to be dried. By its very nature, the dry air quickly absorbs any moisture present. Once returned to the dehumidification module this air is cooled and the moisture condenses to form water. The air is then reheated and recirculated to the dryer. The dryer proper always has an integrated air recirculation system providing specific air routing.

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