



# Lacquered glasses from smart ovens

Whether with straw or without – sipped, swallowed or sucked – drinking is existential for people. And colored drinking glasses are particularly popular. They get their color sprayed on in a painting line and burned in. The first kilns in Oberlahr are now smart: they collect status data and send it to the cloud.



COPY — Roger Homrich

One last critical look. Another light wipe and the perfectly lacquered fine cocktail bowl ends up back in the box. Like another 20,000 or so drinking glasses that day. Here in the deepest Westerwald, somewhere between Bonn and Frankfurt, sits one of these typical German hidden champions: successful for decades with a niche product, but known only to a few insiders. Sometimes even truck drivers are not sure whether their sensitive goods are heading for the right destination at all. The first Hirsch GmbH plant is located inconspicuously at the end of a traffic-calmed zone on the outskirts of Oberlahr, a small town with less than 800 inhabitants. The glass refiner's clientele is international. Even glass manufacturers from the USA send their products by ship and truck to the Westerwald, where they are given the desired color with the desired pattern.

However, for Heinz Hirsch the concept of a hidden champion does not mean that much. "If you think so, that's fine. But I don't know whether we really are," says the managing director of Hirsch GmbH, who runs the small company together with his wife in the second generation. It is obviously not important to him whether he is a champion or not. Much more important to him is the quality with which his machines and some 50 employees burn the right color onto the customer's glass.

#### DIY – SCREWDRIVING, WELDING, ASSEMBLING

35 years ago, his father devised a lot of things here in Oberlahr himself and later developed them further over decades together with plant manufacturers and paint manufacturers. Heinz Hirsch also never gives up, always turning the quality screw. "When we started, there were no finished kilns on the market that we could simply install. We sat down, defined our requirements and then screwed, welded and assembled," says Hirsch, looking back on the founding phase.

And the lacquers? They are also part of our success. For seven years, Hirsch has been purchasing the paint from the same manufacturer who produces the paints exclusively for the glass refiner. Hirsch: "We only use the respective coatings for one customer. In this respect, it gives them a unique selling proposition that helps them to distinguish themselves from others on the market." Important, because his clients include top brands whose glasses are not quite inexpensive. Heinz Hirsch does not reveal who these customers are. This is a matter of honor and remains his professional secret. "Our customers simply don't want it to



Hans-Jürgen Hirsch, Managing Director of Hirsch GmbH, trusts in experience for the quality check and will rely on IoT in the future.



Up to 200,000 glasses varnishes Hirsch per day.  
With an IoT solution, the company controls the production process.

become public that they don't paint their glasses themselves. We respect that. In return most of our customers don't depend on the price. First of all they care for always get the same top quality. And that's what we guarantee them," says Hirsch.

#### QUALITY SECURES BUSINESS

Quality. This is the clue when the glass refiner talks about new technologies in his production. Until today, Heinz Hirsch has never been satisfied with the quality of his products. He has to stick to it, explains the business economist: "The competition doesn't sleep". As a small medium-sized company, he can only survive through top quality. Glassworks would try to enter the paint business themselves. Which could also make sense. Because if they paint the glass directly at the place of manufacture, that saves many work steps. On instead goes to the Westerwald needs to care for "pack, transport, unpack, paint, repack and return. Nevertheless, most customers still come to us. They know that there is hardly anyone else who can do this almost as well as we can," says Hirsch confidently.

The lacquering of the glasses in the desired color and the selected color gradient is one thing. The other is the durability of the color. "Appropriate for dishwashers" is one criterion for the glasses. "Dishwasher safe" is better and self-evident for Hirsch. "There is no direct industrial standard for lacquered glasses," explains Hirsch. However, porcelain are used for orientation: according to the German DIN standard 50275, plates, cups and terrines with colored decoration are "dishwasher-safe" if they can withstand more than 1,000 washes. "We had glasses tested and they survived 3,000 washes without damage. If we didn't guarantee this, we wouldn't get any more orders," says Hirsch.

For even better quality, he does everything in his power, for example he has been using the Internet of Things for several months now. He is gradually networking his kilns with measuring devices that record the internal temperatures of the kilns every ten seconds and send them to the cloud, or to be more precise, to the cloud of things from T-Systems. Here, the data is processed and the results displayed in an app. "We have already discovered so many new things about our ovens that we can use them to further improve our quality. And we can prove to customers that everything was fine during the burning process," explains Hirsch.



## From welder to hidden champion

After the war, the father of the current managing director founded the first company. The trained welder built fire trucks, wagons or potato peeling machines. Hirsch painted handles for the garden tool manufacturer Wolf PVS. Then a manufacturer of teacups came up with the idea of painting the handles. For this there was a huge tub in which up to 400,000 glasses could have been painted. The cleaning of these tubs was laborious and Hirsch began to varnish the paints with spray guns. 35 years ago, the founder built his own fully automatic spraying machines, as there was no plant constructor for them. Today Hirsch produces up to 200,000 glasses a day in its two factories with seven ovens.

## EXTERNAL IOT DEVICES SEND TEMPERATURE DATA

Equipped with up to seven sensors, a networked IoT device measures the temperature at several points in the furnace. The correct and constant heat is decisive for the quality of the baked coatings: whether they survive dishwashers, do not soften during transport or retain their brilliance for decades. "The lacquers must be bonded to the glass in the kiln within a defined temperature range of around 360 °F. If the temperature falls below a threshold value or exceeds the maximum temperature, the quality suffers. Or even worse, we can throw away an entire batch," is how Heinz Hirsch describes the firing process. So far, the furnaces have only displayed a single temperature value for the entire distance of around ten meters. The principle is simple: If the temperature falls below the specified threshold value, the kiln heats up again to the upper limit. "The measurement results from the sensors have now enabled us to determine that the temperature in the ovens fluctuates far more than expected. And we can now find out directly where a burner has failed. Previously it had happened that the lacquered glasses came out of the oven and the paint was not properly burnt in," says Hirsch.

The measurement data also helps the glass refiner as proof. It rarely happens that a customer complains about the quality of a batch. Then troubleshooting is called for. Was it the firing process or the varnish? The IoT values from the kiln now provide indications of possible production errors. Since the sensors measure the temperature at seven points, it can be traced over any period of time whether everything was OK during the firing process. Hirsch is also considering giving customers access to the measurement data in the future. "I can read the measurement data in an app on my smartphone. Our customers would then also be able to view the measurement results for their batches. That would be a special service with which we could further increase customer confidence," believes Hirsch.

## PREDICTIVE MAINTENANCE FOR KILNS

As in every manufacturing industry, the machines are also the heart of the company at Hirsch GmbH. And they fail every now and then. Then production comes to a standstill, the fault has to be found and a spare part needs to be found. "This can take several hours and in the worst case even days," says Hirsch, "Our machines are unique specimens from a plant manufacturer. If something goes wrong,

the right spare part is usually not immediately available." With the values of the sensors on the IoT device, the medium-sized company hopes to be able to detect irregularities in the kiln earlier. "If a certain section in the kiln is too cold, this indicates a fault or even an impending failure of the entire kiln. Then, thanks to predictive maintenance, we can repair the kiln in a targeted manner and reduce downtimes," hopes Hirsch.

# Cloud of Things

The cloud of things is Telekom's IoT cloud platform, which customers can use to remotely monitor, manage and control networked devices and machines. The Cloud of Things collects and stores the sensor data and status messages of all connected devices, evaluates them and prepares them clearly for the user, who can display them via the Internet. The collected information is evaluated approximately in real time. If limit values for individual sensors or complex events are exceeded, a message is triggered. Maintenance technicians can then see the reason for the error message via the online user interface and react as quickly as possible.

Heinz Hirsch already has ideas on how to use IoT solutions for transport, too. Tracking and tracing is the key word. Years ago, the glass refiner returned a shipping container full of processed top glasses to the USA for an American customer. When the customer took the goods out of the cartons on site, the color had partly run off and almost stuck to the hands. The experts puzzled over what had happened. In Oberlahr, the glasses had been individually inspected and put into the cartons in top quality. "We then found out that our container on the transport

ship was exposed to the blazing sun for practically days. The heat in the container got so high that the paints began to soften. Although the batch was partially unusable, we now know what to look out for during transport," says Hirsch. He sees a solution in tracking and tracing the transport. Hirsch: "When we equip the containers with an IoT device with GPS transmitter and sensors, we always know where our goods are, and we can monitor conditions such as the so-called crypto climate inside a container during transport. We also find out whether the container has hit the ground too violently somewhere."

Thanks to IoT, Heinz Hirsch can now sleep longer. Until now, the glass refiner set the alarm very early in the morning for the control call at the plant. An employee drives up the furnaces there in good time so that the early shift can start work on time. "If I can't reach the employee, I had to get out of bed and cheer on the ovens myself," says Hirsch. He won't have to set an alarm in the future. The sensors take control and the app only sounds the alarm if the ovens remain cold at a defined time. Otherwise, Heinz Hirsch continues to sleep without interruption, turns around in bed again and dreams of the advantages of digitization.



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