Kraft Curing Systems GmbH, Lindern, Germany

# Russell Roof Tiles Modernises Roof Tile Manufacturing with Advanced Curing Technology

April Kraft, Kraft Curing Systems GmbH, Germany

**As concrete product manufacturers across Europe continue investing in more efficient and sustainable production technologies, the curing process is becoming an increasingly important focus area. In concrete roof tile production especially, curing consistency directly influences product strength, dimensional stability, colour uniformity, surface quality, and long-term durability. For Russell Roof Tiles, one of the United Kingdom's leading concrete roof tile manufacturers, modernising the curing process formed a major component of the company's wider investment strategy at its Burton on Trent manufacturing facility. As part of an £18.5 million expansion project, the company commissioned a new state-of-the-art curing system from Kraft Curing Systems GmbH, Germany, centred around the Quadrix® Ultra single-atmosphere curing chamber technology. The installation represents one of the most advanced controlled-environmentel roof tile curing systems currently operating within the UK concrete roofing sector.**

Russell Roof Tiles has spent more than a decade investing in operational efficiency improvements and sustainability initiatives across its manufacturing operations. In 2022, the company formally announced its NetZero roadmap, outlining long-term objectives focused on reducing fossil fuel consumption, improving energy efficiency, increasing renewable energy usage, and lowering overall emissions across its production facilities. The Burton upon Trent expansion project was developed to support both increased production capacity and modernised manufacturing processes. A central element of the investment was the construction of a new 1,600 m² production building housing a highly advanced curing chamber system specifically engineered for concrete roof tile production.

For Kraft Curing Systems, the project represented another major roof tile curing installation utilising the company's controlled-environment curing philosophy developed over

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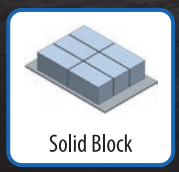
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decades of experience within the global concrete products industry.

## Why Roof Tile Curing Requires Precision Climate Control

Concrete roof tile curing presents unique technical challenges compared to many other concrete products. Roof tiles combine relatively thin cross-sections with high aesthetic requirements, making them particularly sensitive to environmental variations during early hydration. Inconsistent curing temperatures, rapid moisture evaporation, uneven airflow, or uncontrolled humidity can negatively affect surface quality, colour consistency, edge strength, dimensional stability, hydration uniformity, and long-term durability.

Traditional curing systems often experience temperature stratification, uneven humidity distribution, condensation formation, and inconsistent airflow patterns throughout the chamber. Variations between rack positions or between the upper and lower portions of curing chambers can lead to product inconsistency and operational inefficiencies. Kraft Curing Systems designed the Quadrix Ultra curing technology specifically to address these challenges through tightly controlled climate management and highly engineered airflow distribution.

## Quadrix Ultra Single-Atmosphere Curing Technology

The curing system supplied to Russell Roof Tiles consists of a large insulated curing enclosure containing one main curing chamber together with two independently operated pre-cure chambers. The entire curing process is based on Kraft's single-atmosphere curing philosophy, which utilises high air volumes circulated at very low air velocities to create a highly stable and uniform curing environment throughout the chamber.

Freshly produced roof tiles first enter the pre-cure chambers, where the curing climate is gradually increased in carefully controlled stages before the products enter the main curing chamber. This staged curing process allows the concrete temperature and humidity conditions to increase slowly and evenly, preventing thermal shock and uncontrolled surface drying.

According to the project design parameters, the pre-cure chambers operate at humidity levels between 90% and 95%, while the main curing chamber maintains curing temperatures between 45 °C and 50 °C with relative humidity levels between 80% and 95%. The gradual transition between curing zones allows the concrete hydration process to develop under highly controlled environmental conditions.

## High-Volume, Low-Velocity Airflow Engineering

At the core of the Quadrix Ultra system is Kraft's highly engineered air circulation and distribution technology. Unlike conventional curing systems that often rely on higher air velocities, the Quadrix Ultra system circulates large volumes of conditioned air at very low flow rates. This approach ensures that heat and humidity are distributed evenly throughout the curing chamber while avoiding excessive airflow directly across the fresh concrete surfaces.


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The curing chamber installed at Russell Roof Tiles incorporates a sophisticated arrangement of supply ducts, return ducts, transfer ducts, adjustable air outlets, automated dampers, and controlled exhaust systems. The main curing chamber includes more than 200 individually adjustable air outlets engineered specifically to optimise airflow distribution throughout the entire curing environment. Air is supplied primarily from floor level and circulated upward through the roof tile racks in a carefully balanced pattern designed to prevent temperature and humidity stratification.

According to the project specification, the system maintains temperature consistency within approximately ±1 °C from top to bottom of the curing chamber while operating with air velocities below 0.5 m/s over the product surfaces. For roof tile production, maintaining low air velocities is particularly important because excessive airflow can accelerate evapora-

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tion from the concrete surface and negatively affect hydration consistency.

The carefully controlled airflow concept allows the tiles to cure under stable environmental conditions while maintaining a gentle and consistent climate throughout the entire curing chamber.

## Managing Humidity Without Condensation

One of the major operational challenges in high-humidity curing systems is condensation control. In many conventional curing chambers, moisture condenses on ceilings, walls, ducting, and structural steelwork, creating corrosion risks and maintenance issues over time. Kraft designed the Quad-

*To regulate humidity precisely, Kraft integrated its AutoFog moisture addition system into the curing chamber.*

*The controlled curing environment also contributes to more consistent hydration and strength development.*

rix Ultra system at Russell Roof Tiles to maintain high humidity levels while minimising condensation formation throughout the chamber.

The highly insulated curing enclosure, controlled airflow patterns, and automated exhaust management system work together to maintain a stable curing climate without excessive moisture accumulation on chamber surfaces. To regulate humidity precisely, Kraft integrated its AutoFog® moisture addition system into the curing chamber. The system introduces finely atomised moisture into the circulated airflow, maintaining humidity levels without the dripping, standing water, or nozzle clogging often associated with conventional misting systems.

Maintaining stable humidity conditions without condensation helps improve both curing consistency and long-term chamber durability.

## AutoCure Intelligent Climate Control

The entire curing operation is controlled and monitored through Kraft's AutoCure® intelligent curing control platform. The AutoCure system continuously measures and regulates curing temperature, humidity, airflow, exhaust operation, and moisture addition throughout all curing zones. Multiple sensors distributed throughout the chambers provide real-time environmental data to the control system, allowing automatic adjustment of operating parameters as production conditions change.

Operators can monitor all curing parameters through an integrated touchscreen interface displaying curing temperatures, humidity levels, airflow status, trend curves, historical curing data, and system operating conditions in real time. The system also supports data logging and process tracking, allowing curing performance to be monitored and optimised over time.

By automating the curing process, AutoCure reduces operator dependency while improving repeatability and consistency throughout production.

## Supporting Energy Efficiency and Sustainability

Energy efficiency formed a major consideration in the overall system design. The insulated curing enclosure reduces thermal losses while the recirculated airflow concept minimises unnecessary heating demand. Automated exhaust management helps retain heat and humidity whenever possible, improving overall system efficiency. The controlled curing environment also contributes to more consistent hydration and strength development, reducing variability and improving operational efficiency throughout production.

For Russell Roof Tiles, the investment supports the company's wider sustainability and NetZero objectives while modernising one of the most critical stages of roof tile manufacturing.

## Kraft Curing Systems Continues Expansion in Roof Tile Curing Technology

Kraft Curing Systems has specialised in accelerated concrete curing technologies since the early 1990s, supplying curing systems throughout the precast, drycast, pipe, paver, block, and roof tile industries worldwide. The company's Quadrix technology has become increasingly recognised within architectural and high-quality concrete applications where curing consistency and environmental control are critical.

The Russell Roof Tiles project demonstrates the growing importance of precision-controlled curing environments within modern concrete roof tile manufacturing. By combining advanced airflow engineering, automated climate control, humidity management, and highly insulated chamber construction, the Quadrix Ultra system provides manufacturers with a curing solution focused on consistency, efficiency, and long-term operational reliability.

With the Burton upon Trent facility now in full production, the installation represents another significant reference project for Kraft Curing Systems within the European concrete roof tile industry. ■

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### FURTHER INFORMATION

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