

Building & Industry

**NOVENCO**

SCHAKO Group

# Unilever, Danfoss and NOVENCO joined forces to deliver efficient cooling and energy performance

## The project

Unilever's Caivano production facility in Italy, is Unilever's flagship site for industrial-scale ice-cream production, under the Algida and Magnum brands.

The facility produces approximately one billion ice-cream units per year and is distinguished by its highly vertical production from cookie wafers and nut roasting to final frozen product packaging.

The facility produces more than 800 distinct product formats using over 270 different ingredients and has invested in digitalization and sustainability with projects to become a zero-emission, digitally advanced factory by 2030.



ZerAx being installed – a combination of human skills with advanced fan technology



ZerAx axial fans – reliable at -43 °C and energy savings of 38%

## The challenge

The previous system relied on outdated, inefficient fans with fixed impellers, mounted directly on the fan wall and driven by basic asynchronous motors.

While sufficient to operate the ice cream hardening tunnel, the system added no real value. Even with frequency drives, the fans ran constantly at full speed (50 Hz), wasting energy and limiting performance potential.

Although a visual site survey was possible, harsh conditions - including temperatures of -43°C, outdated documentation, and limited access during production - made data collection difficult. By analyzing comparable fans in similar tunnels onsite, however, we were able to gather enough performance data to specify the optimal retrofit solution.



Worn-out fans – inefficient and outdated

*"The Unilever sustainability target is to reduce greenhouse gases by 100% on the 2015 baseline."*

*Alfonso Iozzino,  
Utilities Coordinator, Unilever Caivano*



ZerAx fan retrofit close-up

## The solution

Based on detailed analysis and precise performance calculations, six outdated fans were replaced with six NOVENCO ZerAx axial flow fans (type AZL 900), each powered by a 15 kW Nidec permanent magnet (PM) motor. PM motors deliver exceptional efficiency at full load and also under variable-load conditions, which makes them ideal for critical applications.

To ensure uncompromised reliability in the extreme cold of the ice cream hardening tunnel, the motors were equipped with

- Hybrid bearings for 4x - 8x longer lifetime
- Adapted seals and low-temperature grease for stable operation down to -67°C
- No bearing currents, no pitting - just smooth, consistent performance

The retrofit eliminated the excessive tip clearance of the previous fans. With ZerAx blades operating at just 1 mm clearance, efficiency was maximised. However, the tight tolerances raised a new risk - blade freezing during standstill.

The solution was to install 200 W heating bands around the rotor casing. These prevent frost buildup, and ensure the fans are ready to operate, even after weekly maintenance stops of the ice cream tunnel. Condensation can damage motors, particularly during temperature swings. Traditionally, this problem is solved with costly space heaters mounted inside the motor casing. However, with the Danfoss FC-102 drive, such heaters are no longer needed. Its built-in DC preheat function delivers a small current to warm the motor from the inside out without any additional hardware or cost.

## Facts:

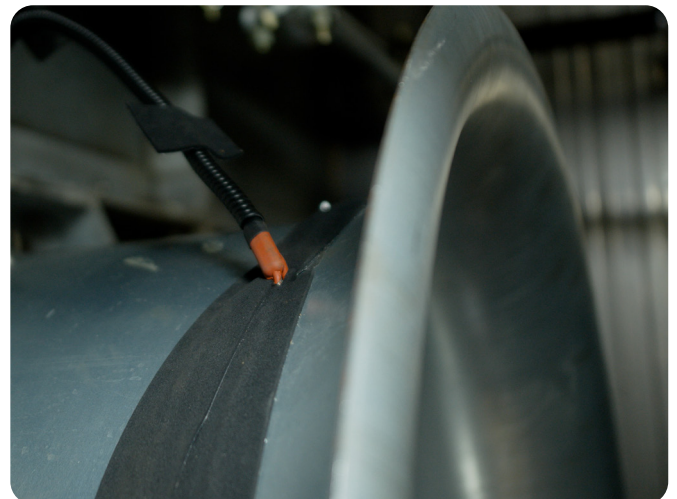
- 38% energy savings
- Increased system reliability
- Longer service intervals
- Enhanced equipment safety
- Demand-based operation for smarter energy use

## The results

Following the retrofit, the performance data clearly showed the improvements. The previous fans provided an airflow of 22,100 m<sup>3</sup>/h at 50 Hz, consuming 12.3 kW of input power. The airflow of the new NOVENCO ZerAx fans provided 25,426 m<sup>3</sup>/h at just 40 Hz, consuming only 11.5 kW of input power.

Using fan affinity laws, delivering the same 22,100 m<sup>3</sup>/h requires just 7.56 kW - achieving 38% energy saving compared to a one-to-one replacement.

Originally projected at 27%, the higher actual savings reduced the payback period from 2.5 to just 2 years.



Heating bands prevent ice buildup, ensuring reliable start-up