Driving decarbonization in modern papermaking

How advanced vacuum technology is helping Magnera slash energy use, cut emissions, and modernize papermaking

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INTRODUCTION:

In the German town of Gernsbach, papermaking is more than an industry — it is part of the town's identity. For more than 140 years, paper has been produced here, with generations of workers shaping a tradition that helped turn the region into one of Germany's recognized centers for papermaking expertise. But today, inside the historic mill operated by Magnera, another transformation is underway: the push toward decarbonization.

Image 1: Nearly 150 years ago, industrial paper production began in Gernsbach, helping shape the town's development. Today, innovation is helping reduce energy consumption. ©Raphael Zubler / Everllence

A major source of that energy demand comes from vacuum systems used during the dewatering stage of paper production. Traditionally, paper mills rely on water-ring pumps to create the vacuum needed to remove moisture from the paper web. These systems consume large amounts of water and electricity while also generating heat that must later be cooled before discharge.

Recognizing the inefficiency, Magnera began searching for a more sustainable solution.

Faced with rising energy costs, mounting environmental pressures, and the need to modernize operations, Magnera recently retrofitted two of its paper machines with advanced TURBAIR® vacuum blowers from Everllence. The results have been dramatic — electricity consumption has been cut in half, while water and gas usage have fallen significantly as well.

"We've long placed great importance on energy saving," says Paul Stangenberg, Project Manager at Magnera. "But in recent years, especially with increasing electricity and gas prices, the urgency has grown even more."

Image 2: By replacing water-ring pumps, the twin TURBAIR® units help reduce energy, water, and maintenance needs. ©Andrin Winteler / Everllence

A High-Energy Industry Under Pressure

Papermaking is one of the world's most energy-intensive industrial processes. Producing specialty papers such as tea bags, coffee filters, automotive papers, and technical grades requires vast amounts of electricity, heat, and water.

At the Gernsbach mill, the scale of consumption is immense. According to Stangenberg, the site is among the largest industrial gas consumers in Baden-Württemberg, while its electricity demand rivals that of a small city.

Image 3: TURBAIR® systems use air and high-speed impellers – instead of water – to create vacuum and remove moisture from the paper web. © Andrin Winteler / Everllence

Image 4: At the Gernsbach mill, waste heat from the TURBAIR® system is reused to preheat air and warm process water. ©Raphael Zubler / Everllence

Cutting Energy Consumption in Half

The answer came in the form of Everllence's next-generation TURBAIR® vacuum blowers.

Unlike conventional water-ring pumps, TURBAIR® systems use air and high-speed impellers to generate vacuum pressure. With fewer moving parts and no dependence on water seals, the systems are significantly more energy efficient while also reducing maintenance requirements.

The impact at Gernsbach was immediate

Each retrofitted paper machine now saves approximately €440,000 annually in electricity costs alone. When reductions in gas and water consumption are included, the total annual savings rise to between €500,000 and €600,000 per machine.

"Each machine saves some €440,000 per year in electricity consumption alone," says Stangenberg.

The environmental benefits are equally significant. By halving electricity demand and reducing water consumption, the new systems are helping Magnera lower both operational costs and carbon emissions at the same time.

Turning Waste Heat Into Opportunity

The modernization project extended beyond vacuum technology itself.

Engineers also introduced heat recovery systems designed to capture waste heat generated during production. On one paper machine, a heat-to-heat air exchanger recovers 130°C air from the TURBAIR® blower and uses it to preheat fresh air entering the drying process. On another machine, an air-to-water exchanger transfers waste heat into process water used elsewhere in production.

The result is a highly integrated efficiency system where energy that would once have been lost is now reused inside the mill.

For an industry under growing pressure to decarbonize, these types of circular energy solutions are becoming increasingly important.

Retrofitting a 140-Year-Old Mill

Modernizing a historic industrial site is rarely straightforward.

At Gernsbach, limited installation space inside the mill's basement created major logistical challenges. The TURBAIR® units were first assembled at Everllence's facility in Zurich, then dismantled, transported, and reassembled inside the paper mill itself.

Production teams were initially cautious about the transition, concerned that replacing core vacuum systems could disrupt operations. Instead, the switchover proved remarkably smooth.

The first installation took just one day, while the second required only two and a half days. Production interruptions were minimal, and operators quickly noticed improved dewatering performance thanks to the system's more stable vacuum conditions.

"We were able to integrate a state-of-the-art system into a company with over 140 years of tradition without interrupting production," says Rudi Ewert, Senior Sales Manager at Everllence.

"Each machine saves some €440,000 per year in electricity consumption alone," Paul Stangenberg, Project Manager at Magnera.

The improvements soon translated into production records. In October, one of the mill's specialized inclined wire paper machines achieved more than 24 hours of uninterrupted operation at 605 meters per minute — a new world record for its category. According to Stangenberg, the performance would not have been possible without the TURBAIR® system.

A Wider Shift Across the Industry

Magnera's investment reflects a broader transformation taking place across the global paper sector.

According to Everllence, around 1,000 TURBAIR® systems have already been installed in paper mills worldwide. The technology is now being applied not only in traditional paper manufacturing but also in emerging sustainable materials, including biodegradable molded fiber products made from grass.

"The paper industry is one of the biggest energy consumers alongside cement," says Manfred Dobler, Head of Paper Industry at Everllence. "Vacuum systems alone can account for up to a quarter of a paper machine's total energy use. If we can cut that consumption in half, that's a major step forward."

With global demand for packaging, tissue, and specialty paper continuing to grow, improving efficiency has become both an economic and environmental necessity.

For Magnera, the project represents more than a technology upgrade. It is part of a wider commitment to reducing resource consumption across the business.

"Decarbonization is a big priority for us," says Stangenberg. "We're trying to minimize gas, electricity, and resource consumption at every corner of the company."

Image 5: The RT-type TURBAIR® vacuum blowers were manufactured at Everllence Switzerland' Zurich factory ©Andrin Winteler / Everllence

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Image 6: In Magnera's factory, where the TURBAIR® system is integrated into the existing infrastructure. © Raphael Zubler / Everllence