

ANDRITZ INNOVATION: AT THE HEART OF SUSTAINABLE HYDROPOWER

Hydropower may well be the longest-lived energy asset class but that doesn't mean it is a static industry. In fact, innovation flows through the whole sector as it responds to changing needs and demands.

ANDRITZ, a leader in sustainable hydropower for over 180 years, stands as a testament to the ongoing commitment to innovation and environmental protection within the hydropower industry. Throughout its long history, ANDRITZ has always prioritized innovation and the fundamental research that drives it, positioning itself at the forefront of the industry's transformation.

REDUCING ENVIRONMENTAL IMPACT

A major focus of ANDRITZ innovation efforts is to reduce the environmental impact of hydraulic machines, particularly on fish migration. Various mechanisms, both direct and indirect, can harm aquatic life passing through turbines. Direct impacts may include extreme changes in hydraulic pressure, turbulence-induced shear stress, crushing, and collisions. Indirect effects encompass disorientation and stress, which can increase downstream predation rates even if the fish remain uninjured. Recognizing the importance of sustainable operations, ANDRITZ actively researches methods to enhance fish survival during turbine passage. This research aims to understand the complex interplay of forces and geometries within turbines, and to model these characteristics to

enable iterative design improvements that ensure the safety of aquatic life and maximize the operational performance of the power plant.

SUSTAINABLE HYDROPOWER

Furthermore, ANDRITZ extends its commitment to sustainability beyond mitigating fish survivability. By developing and deploying machines with innovative features such as oil-free runners, the company aims to reduce pollution and minimize the environmental footprint associated with operating hydro turbines. Additionally, advancements in turbine blade technology, such as novel abrasion-resistant coatings, contribute to enhanced machine longevity and efficiency, thereby, reducing the need for costly repairs and replacements.

The company's dedication to innovation is demonstrated by the construction of the world's most powerful test rig in Linz, Austria. This investment represents a significant milestone and underlines ANDRITZ' ongoing commitment to technological excellence and sustainability. The newly developed test rig is characterized by its exceptional application possibilities and the flexibility of turbine models. This enables ANDRITZ to test and further optimize the performance

and reliability of hydraulic developments under the most demanding conditions. This investment sets new standards in the development of state-of-the-art solutions tailored to the specific needs and challenges of customers.

ANDRITZ' commitment to sustainability also extends to the collaboration with leading research institutions, facilitating the rapid development and deployment of environmentally friendly turbine technology with minimal impact on natural resources. By integrating protocols for fish survival assessment into turbine design phases, ANDRITZ ensures that its technology meets today's needs without compromising the ability of future generations to meet their own needs. This holistic approach underscores ANDRITZ' long-term dedication to sustainable energy solutions and the protection of precious natural resources, ensuring a brighter, more sustainable future for generations to come.

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"Water is among the most precious of the earth's resources. ANDRITZ innovation means all those who use and need water can continue to benefit from it - from the fish swimming in it to the people who are powering their homes with it."