



**Global
Hydro**

HydroxSediSense

Sediment Detection for Hydropower Plants

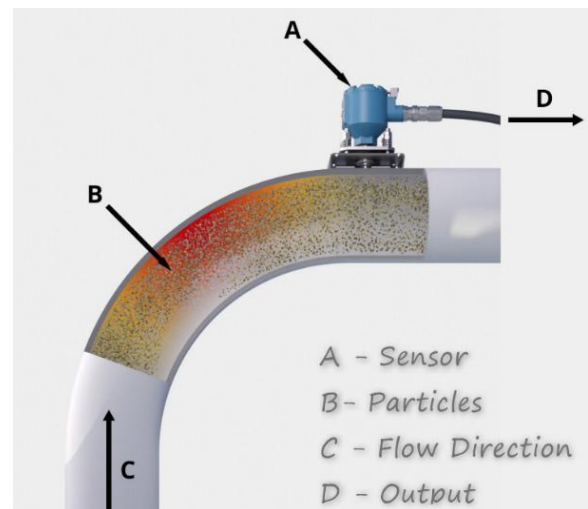
Proactive sediment management for maximum performance and minimal wear

HydroxSediSense is an innovative system for sediment detection and management, specifically designed for **high-pressure hydropower environments**. Using **ultrasonic acoustic sensors and AI-powered analysis**, the system detects harmful sediment loads in real time - right where erosion occurs: at the turbine components.

Unlike traditional turbidity sensors, HydroxSediSense provides actionable insights directly from the powerhouse, enabling **proactive management** that prevents wear, extends equipment lifespan, and improves economic efficiency - especially in sediment-rich regions such as **alpine or glacial catchments**.

Scientific Background

The structure-borne acoustic measurement used by HydroxSediSense is well-established in oil and gas industries, where similar techniques monitor pipelines and equipment for early signs of wear and damage. HydroxSediSense is the first system to apply this proven principle to hydropower.



Application Areas

Hydropower plants with **high sediment loads** (e.g. alpine or glacial catchments)

Direct monitoring of turbine components to detect erosion processes early

Optimization of operational strategies to reduce wear and increase efficiency

Detection of coating breakthrough: For metallic components with elastic internal coatings, the system can detect when sediment abrasion damages the coating



Your Technology & Functionality

Ultrasonic acoustic sensors

capture structure-borne sound signals caused by sediment impact and erosion

AI analysis

A learning model is trained over 6–8 months using operational data and continuously optimized for precise sediment detection

Direct integration

Sensors are installed on critical components and connected to Hydrox platform

Data evaluation & recommendations

Collected data is analysed with the operator to define operational strategies for various sediment flow scenarios

Training & enablement:

Plant personnel are trained to interpret data and take independent action

System integration:

Communication and usage are managed via the **HydroxConnect** platform. Alerts, damage signals, or control interventions can be sent directly to the control system or accessed via HydroxConnect

Project Workflow

1 Workshop & problem definition

Joint analysis of the initial situation and customer requirements

2 Identification

and definition of suitable sensor locations together with customer

3 Programming & commissioning

Custom configuration, sensor installation, AI model training

4 Support & training

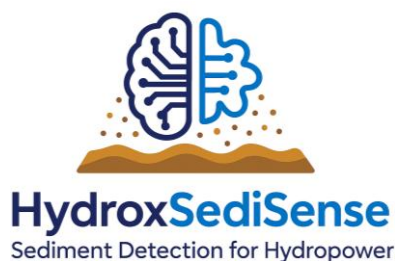
Joint evaluation of operational data, development of operational strategies, staff training

5 Finalization & operational phase

Final report, transition to independent operation, continued use via HydroxConnect

6 Further steps

Depending on customer's needs further steps are possible (e.g. longterm advice or support, system upgrades, etc.)



Advantages in Comparison to other systems

No exposure to debris or biofilm

Unlike intake-mounted sensors that suffer from algae, debris, and biofilm buildup, HydroxSediSense operates inside the powerhouse - ensuring reliable measurements without constant cleaning.

Independent of particle size distribution

Turbidity sensors require calibration based on particle size, which is highly variable and often unknown. HydroxSediSense uses acoustic signals, eliminating this dependency for consistent accuracy.

No false positives from air bubbles or organic matter

Traditional sensors misinterpret bubbles or soft organic particles as sediment. HydroxSediSense detects actual impact signals on turbine components, preventing misleading readings.

Captures coarse fractions accurately

Turbidity sensors underestimate larger particles that cause the most wear. HydroxSediSense directly measures erosion potential, including coarse sediment fractions.

Easy access and integration

Intake sensors are hard to maintain and costly to retrofit. HydroxSediSense installs on accessible turbine components, reducing integration complexity and maintenance effort.

Direct wear monitoring

Conventional sensors only provide indirect indicators of sediment load. HydroxSediSense measures real erosion risk at the point of impact - enabling proactive protection of critical assets.

Cavitation detection

An additional benefit

Cavitation Detection

SediSense enables straightforward detection of cavitation, which is often closely linked to sediment erosion in hydraulic machinery.

Interaction Awareness

There are strong interactions between sediment erosion and cavitation—abrasive particles can intensify cavitation damage and vice versa.

Acoustic Feedback

Optional sensors can convert ultrasonic signals into audible sound, allowing operators to hear typical cavitation noises and the impact of coarser particles.

Limitation

Even the best sediment monitoring can reach its limits, which may require design adjustments or component coatings.

Metal parts with **elastic internal coatings**

Data evaluation and results are only possible **when the machine is running**

Accessibility for attaching external sensors must be ensured



For further information and inquiries about sediment optimization for your plant, please contact:

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