StreamDiver™
Utilizing Untapped Potential

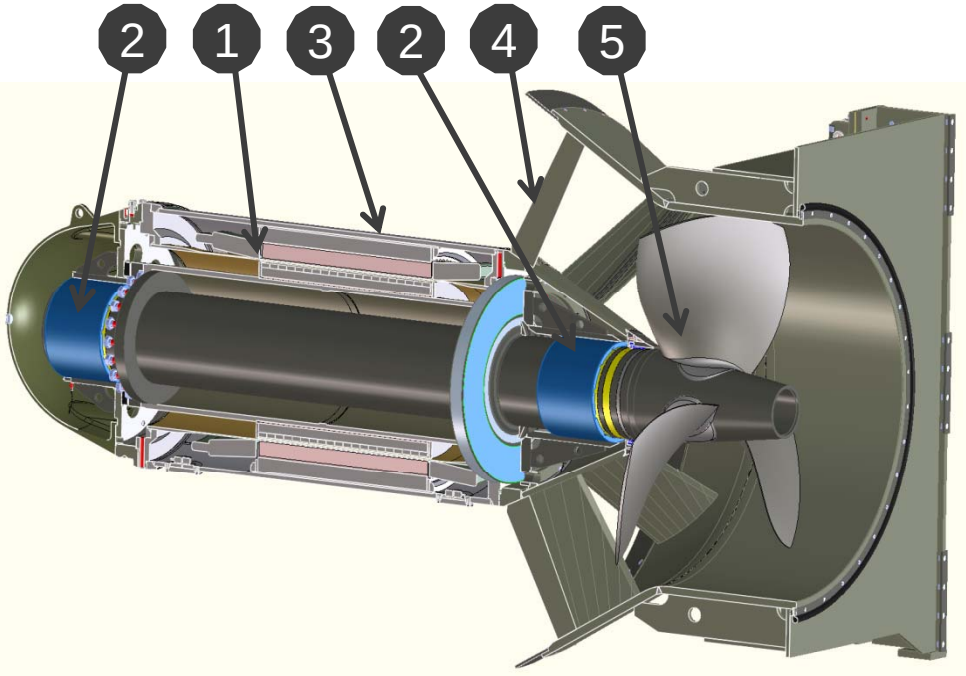


Commercial Benefits Through Easy Technology



- Economical solutions utilizing easy and proven technology
- Eco-friendly due to oil-free operation
- Reduced technical complexity and low maintenance
- Standardized modular design
- Versatile applications with minimum installation requirements

The StreamDiver Concept



1 Permanent magnet generator
- Water-floated

2 Thrust and guide bearings
- Water-lubricated

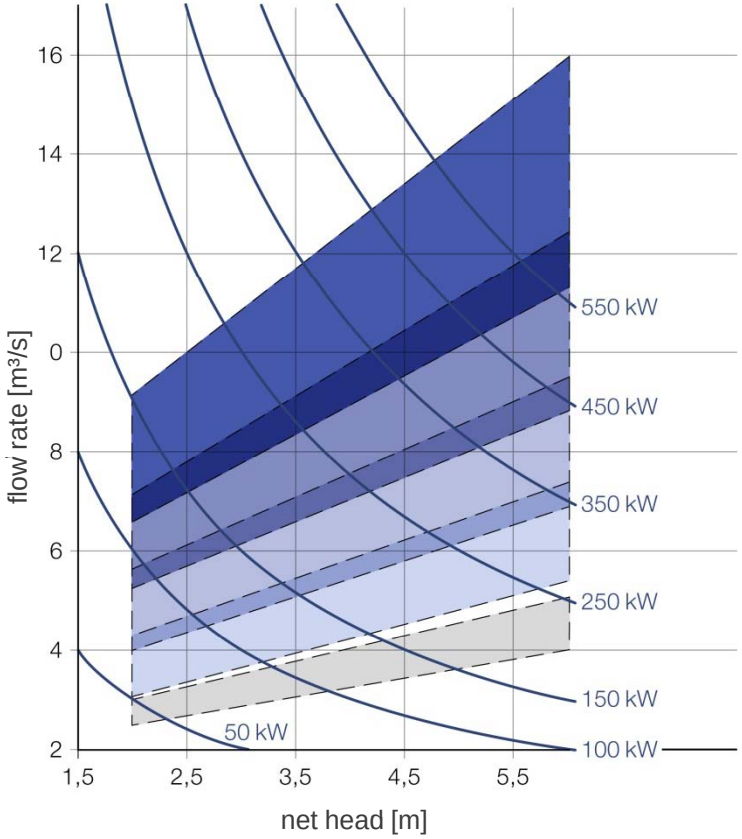
3 Turbine bulb
- Water-filled
- no dynamic seals

4 Turbine housing with fixed guide vanes

5 Propeller runner

Safe low-maintenance due to absence of dynamic seals and peripheral systems

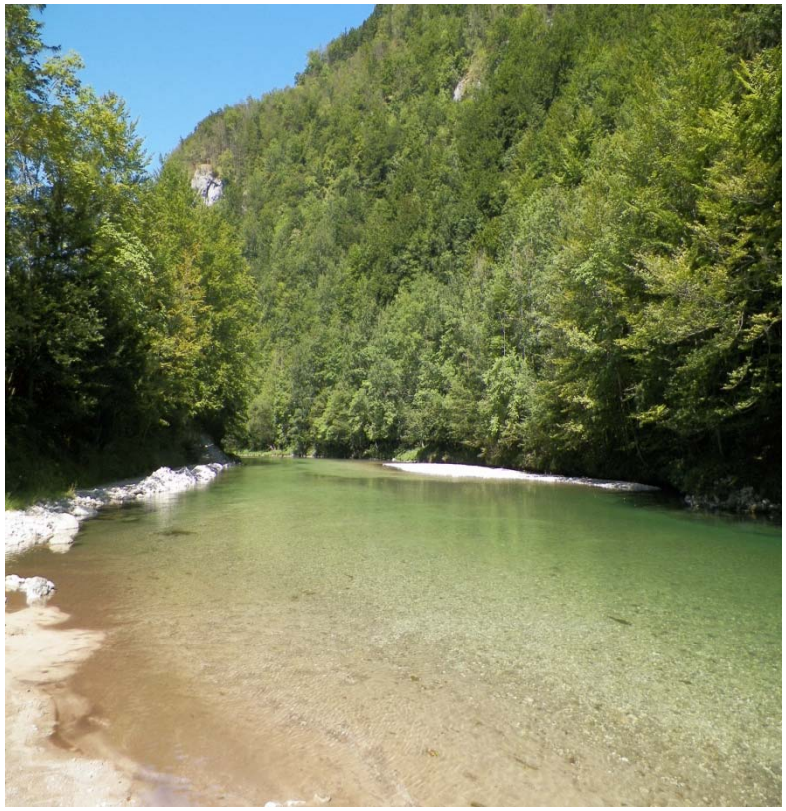
Application Range



Preferred site criteria

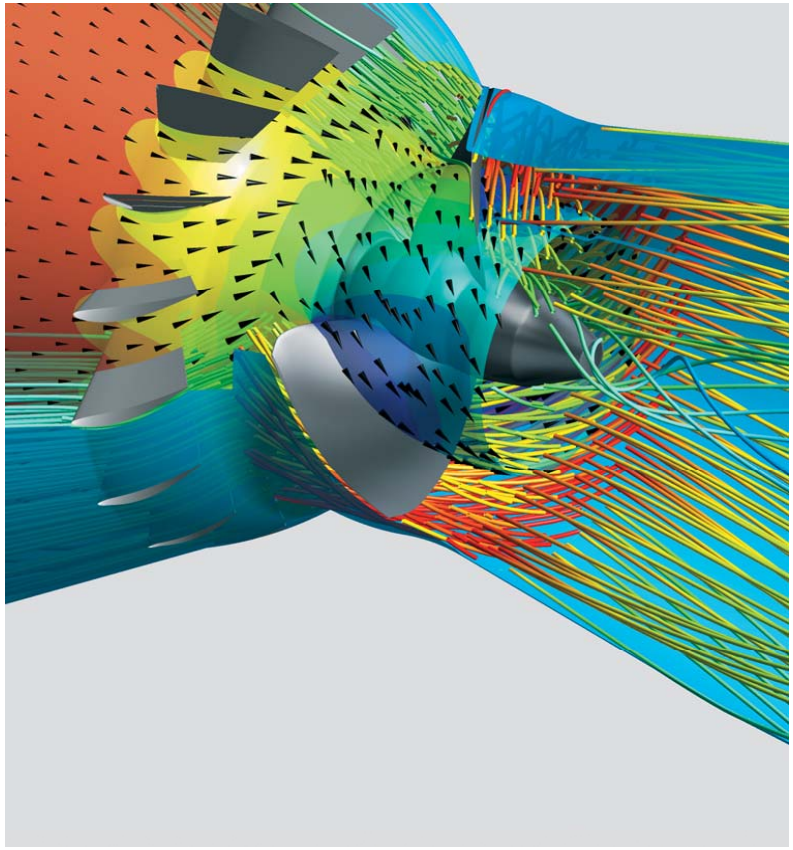
- Existing structures (dam or weirs)
- Conventional power plant concept not commercially feasible or unsuitable for official approval
- In case of fluctuating flow rates, the water volume should be sufficient for arranging several StreamDiver units in parallel

Ecological Benefits



- Easy implementation in existing weir structures while modification due to the EU Water Framework Directive (WFD)
- Ongoing development for various ecological powerhouse concepts under consideration of fish protection requirements
- Reduction and prevention of emissions (noise, vibration, contamination, waste oil etc.)
- No need for classical power house design, compatible integration in ecological sensitive areas

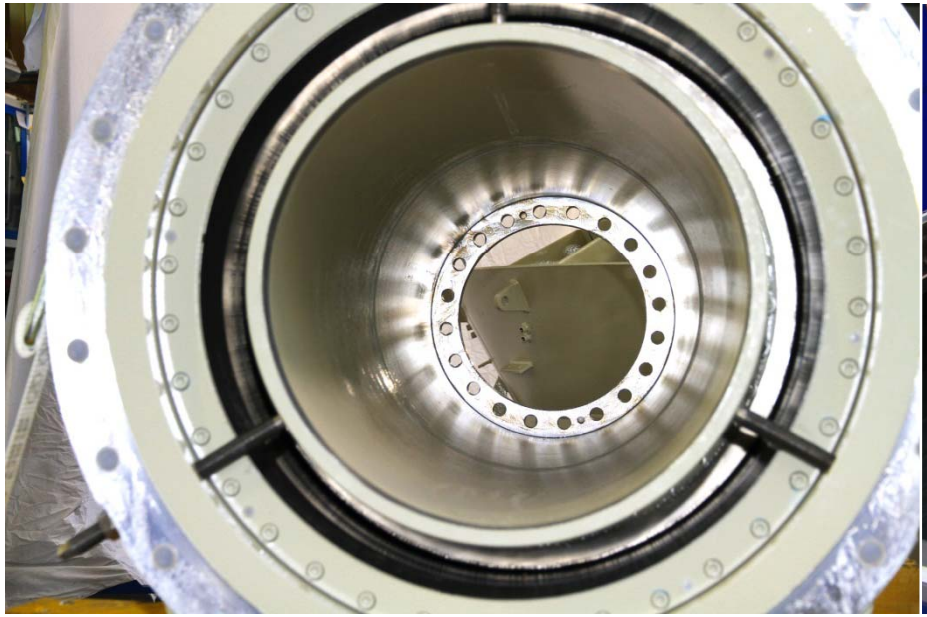
Environmentally Friendly Design

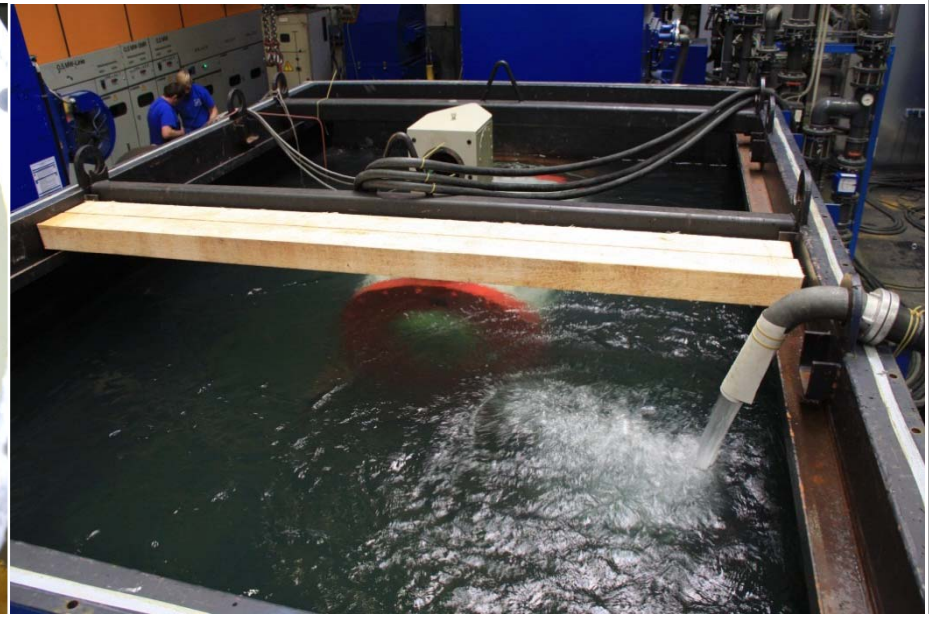


- Absolute free of oil, grease lubricants or other substances hazardous to water for the overall lifetime of the turbine
- Minimized maintenance activities due to simplified turbine design, i.e. permanent water flow enabled
- Prevention of inner runner blade gap because of propeller runner – fish friendly design
- Standardized spare part packages enables easy and fast replacement

Water-Floated Permanent-Magnet Generator

- The air gap is water-floated
- Due to the application of high-performance magnets there is no need for active rotor cooling
- Rotor and stator are static-sealed





Water-Lubricated Sleeve Bearings

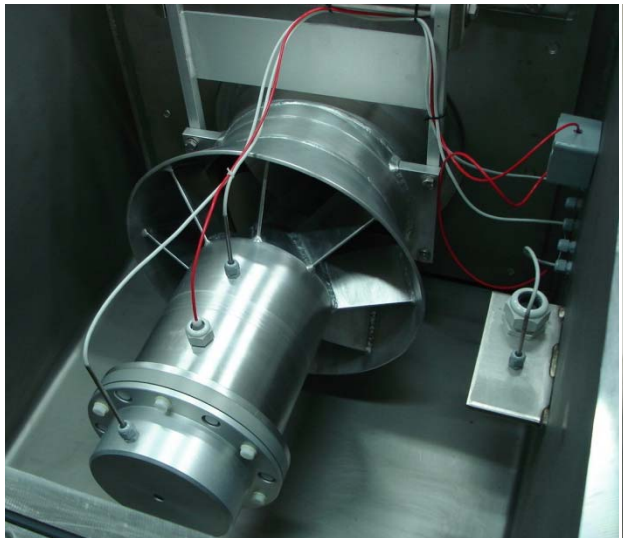


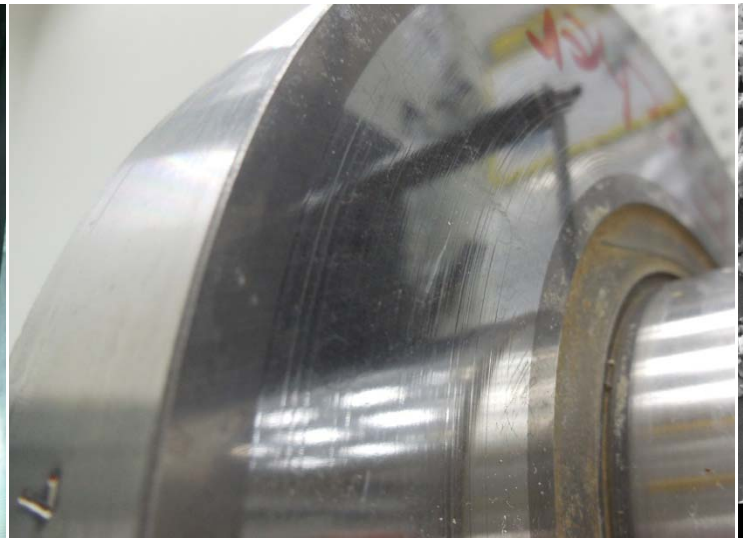


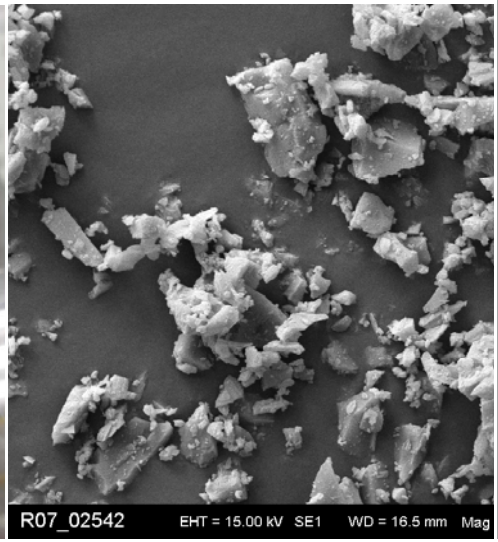
- Process water-lubricated bearings, 100% oil-free design
- Bearing design based on hard-soft pairing principle. Synthetic bearing pads and shells with high-strength abrasion surface
- Bearing concept has proven itself in other Voith products, e. g. tidal flow turbines, HyTide and Voith Inline Thruster
- Wear resistance of bearings has been tested and analyzed in bench tests

References – Bearing Test Rig

- Examination of operating behavior of water-lubricated bearings under real-time conditions with identification of wearing curves
- Robustness of bearings has been proven after one year of continuous operation with river water
- Wearing behavior with extreme amounts of sediments is currently tested (2 grams of quartz per liter of river water)







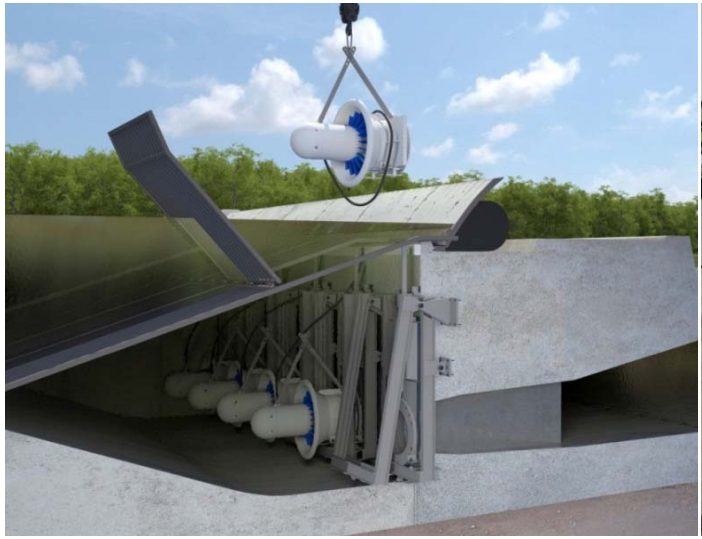
Assembly Sequence

- Low requirements regarding assembly and disassembly in terms of tools and other equipment
- Easy alignment of bearings and turbine shaft
- The rotor is fixed by positioning devices, in order to ensure safe assembly in the event of high magnetic forces
- Low sensoric needs – only temperature sensor and stator leakage sensor required



Assembly – Operation – Service

- The shutdown of the turbine occurs via an automatic shut-off device (gate valve)
- The turbine is embedded in a guide frame and can be retrieved via a mobile crane without draining the water
- Turbine maintenance occurs outside the power station in a workshop







References – Prototype Nussdorf

- Research cooperation between Kössler, Verbund, EVN and Wienstrom
- Exchange of existing 500 kW turbine by a StreamDiver (runner diameter 1310 mm, speed 333 rpm)
- Operating experience since August 2012 with direct grid connection and frequency converter application





Installation Type ‘River Power Station’

- Flooded power station with angular trash rack
- Flap gate positioned on top; injector effect can be utilized in the event of overflow
- Portal crane or passable/navigable weir system

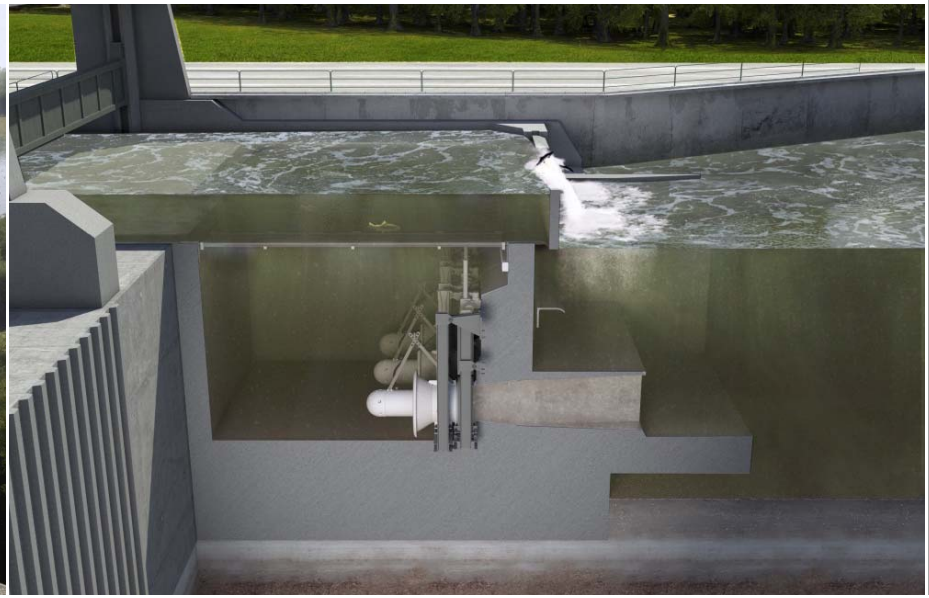




Installation Type ‘Shaft Power Plant’

- Concept patented by Munich Technical University with horizontally arranged trash racks
- Cleaning of trash racks by opening the weir flap
- Fish-friendly power plant concept





Upgrading of Shut-Down Facilities

- Due to its compact design, the StreamDiver can be integrated in old shut-down power plants without extensive construction measures
- Generator, gear and peripheral systems are removed from the power house





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