VGB-Workshop - Demonstration Day, 26 April 2019

Digital hydropower plant Rabenstein

The hydropower plant Rabenstein of VERBUND was chosen as a pilot plant to test different digital technologies. The range of the tested systems is diverse: IoT-platforms, new sensor concepts, mobile assistance systems, anomaly detection and forecast models as well as innovative, autonomous technologies for measurements and inspections. The aim is to further improve processes and enhance the safety in hydropower plants.

General information and technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>run-of-river plant</th>
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<tbody>
<tr>
<td>Beginning of operation</td>
<td>1987</td>
</tr>
<tr>
<td>Capacity</td>
<td>13,900 kW</td>
</tr>
<tr>
<td>Annual generation</td>
<td>65.8 GWh</td>
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<tr>
<td>Design head</td>
<td>8.4 m</td>
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<tr>
<td>Design capacity</td>
<td>180 m³/s</td>
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<tr>
<td>Fish pass</td>
<td>since 2003</td>
</tr>
<tr>
<td>Turbines</td>
<td>2x Kaplan-bulb turbines (5° inclined)</td>
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<tr>
<td>Nominal speed / runner-Ø</td>
<td>150 U/min / 3.5 m</td>
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<tr>
<td>Generator</td>
<td>2x 3-phase synchronous generator</td>
</tr>
<tr>
<td>Rated power / voltage</td>
<td>7,600 kVA / 4.5 kV</td>
</tr>
<tr>
<td>Weir field / width</td>
<td>3 x 15.5 m</td>
</tr>
<tr>
<td>Length of backwater area</td>
<td>4.0 km</td>
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Timetable – Friday, 26 APRIL 2019

09.00 Arrival at Rabenstein power plant and grouping of participants

Guided Station Tours (Demonstrations)

09.30 Round 1
10.00 Round 2
10.30 Round 3
11.00 Round 4
11.30 Round 5
12.00 Lunch break & networking
Snacks, soft drinks, coffee
13.00 Self-guided Station Tours (Open House)
Visiting stations & know-how exchange with experts
15.00 End of visitation
Free transportation (bus shuttle) to Graz city and Graz airport

Please note:
Sturdy shoes are required for the plant visit!
Appropriate outfit in case of rainy weather.

Renewable energy from Styrian hydropower

In Styria 42 VERBUND hydropower plants generate around 2.7 billion kilowatt hours per year. All power plants run autonomously. They are controlled and monitored by the central control room in Pernegg.
Station plan - Digital hydropower plant Rabenstein

**STATIONS**

**Station 1**
Remotely Operated Vehicle  
Demo: Underwater inspection of hydropower equipment

**Station 2**
Real-time 3D Sonar  
Demo: Trash rack inspection (Echo-scope)

**Station 3**
Fish Monitoring  
Demo: System & Video analysis

**Station 4**
Buckling Visualization System  
Demo: System & Video analysis

**Station 5**
Interactive Troubleshooting  
Demo: Mobile assistance system for troubleshooting (UBIK)

**Station 6**
Virtual 3D-Model  
Demo: Use Cases of the virtual 3D-model of Rabenstein power plant

**Station 7**
Advanced Data Analysis  
Demo: Predictive maintenance model & Monitoring system for large dams

**Station 8**
Digital Workforce Management  
Demo: Status quo of the Digital Workforce Management System

**Station 9**
Brush Monitoring  
Demo: Demonstration model & Failure simulation (i-brush)

**Station 10**
Intelligent Maintenance Optimization System  
Demo: Sensor Data & Physics based Technology Modules (DiOMera)

**Station 11**
Acoustic Monitoring System  
Demo: Intelligent sound analysis (OnCare.Acoustic)

**Station 12**
Digital Twin  
Demo: Real-time model for lifetime-analysis of relevant components

**Special Highlight**
Virtual Bungee Jump  
Virtual bungee jump of VERBUND’s large dam “Kölnbreinsperre”