Hydropower is a key source of renewable electricity and its plants can operate for several decades when maintained efficiently to high standards.

Water storage and fluid handling components comprising of penstock, wicket gates, turbines and inlet valves are vital organs of a hydropower plant. During sudden changes in water flow, these components can suffer from corrosion, erosion and cavitation which hinders their operation.

Replacement of this equipment can lead to extensive downtime and some traditional repair methods may also see the problems reoccur.

Belzona has gathered decades of experience servicing equipment in the hydropower industry through providing a wide range of repair and maintenance solutions that are quick and easy to apply, safe and cost-effective compared to traditional methods, such as welding or the replacement of parts.

Belzona solutions can be applied in situ and solve problems in several areas of a hydropower plant, including but not limited to:

- *Penstock*
- *Wicket gates*
- *Inlet valves*
- *Turbines*
- *Medium-voltage switchgear and high voltage switch gear*
- *Dam, spillway, and stilling basin*
- *Facilities within the plant*

Examples of possible Belzona applications in the Hydropower industry:

PIPES LEAKS SEALED WITH METAL CLAMPS

EROSION PROTECTION ON A TURBINE RUNNER

SF6 LEAKS SEALED

PROTECTED TRASH RACKS

REBUILT AND COATED BUTTERFLY VALVE

EROSION PROTECTION ON A NOZZLE HEAD

REBUILT PROFILE OF A DAM

RESTORED SCROLL TUNNEL CONCRETE

COATED AND PROTECTED PENSTOCK

PROTECTED KAPLAN TURBINE

Belzona 3D Map

Hydropower

Find ways to protect machinery and equipment at hydroelectric plants and solve typical problems including erosion, corrosion, and environmental impact. Use the 3D-map to uncover a range of solutions aimed at offering long-term protection of hydropower plants.

Download Now

from your preferred app store.

For more information, please contact your local Belzona® representative:

ISO 9001:2008
Q 09335
ISO 14001:2004
EMS 509612

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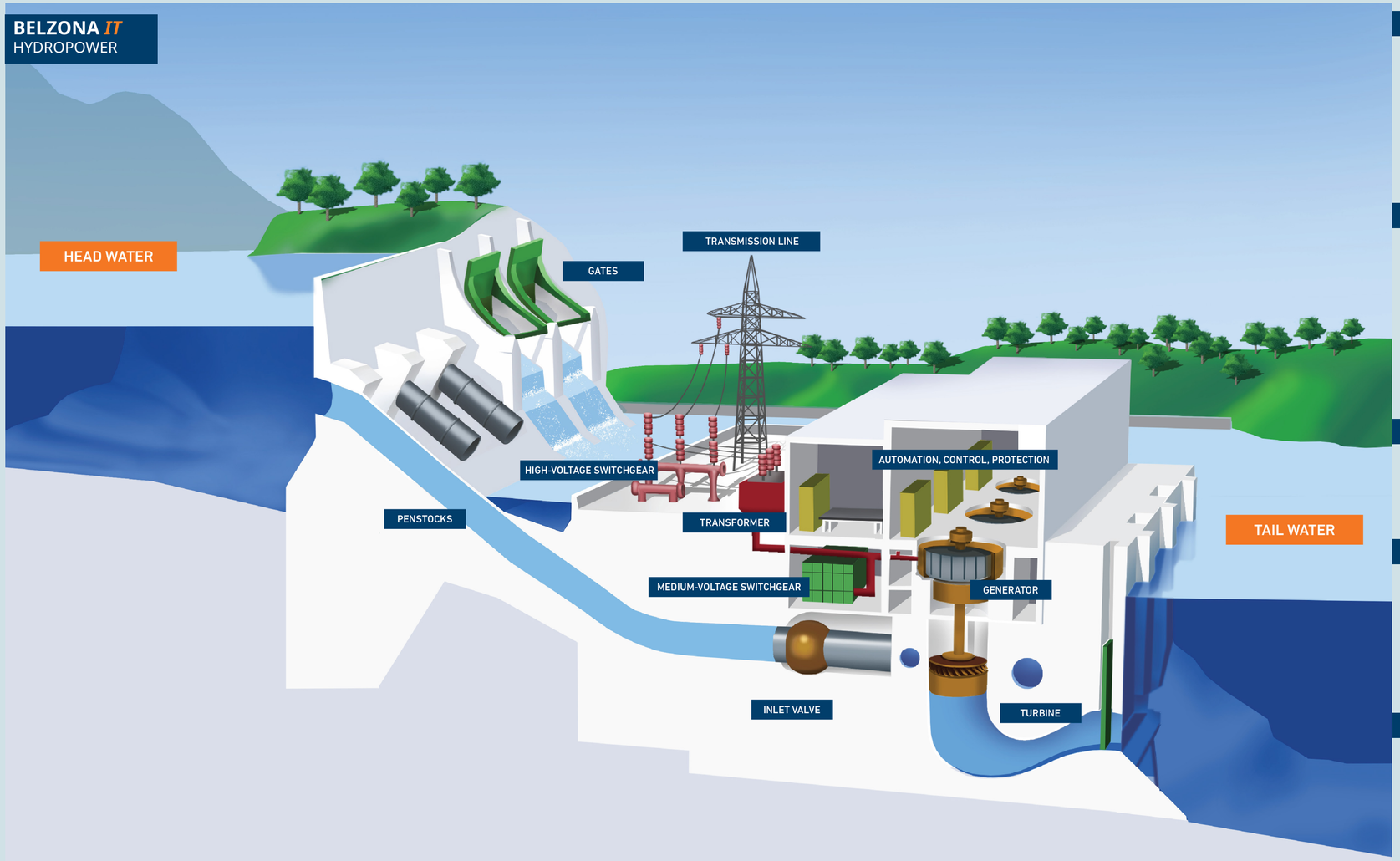
ASSET INTEGRITY AND HIGH PERFORMANCE IN HYDROPOWER

BELZONA *IT*
HYDROPOWER



WICKET GATES

TYPICAL PROBLEMS: Deterioration of wicket gate blades, erosion, and corrosion and cavitation of wicket gates.

POTENTIAL SOLUTIONS: Belzona 1000 series 100% solids to rebuild and coat wicket gates for erosion and corrosion protection. Belzona 2000 series elastomeric solutions to offer abrasion and cavitation resistance.

PENSTOCK

TYPICAL PROBLEMS: Internal and external corrosion of the penstock and spiral casing. Corrosion and wear of the pipe support areas.
POTENTIAL SOLUTIONS: Belzona 1000 series 100% solids can be used to rebuild the penstock to its original profile and dimension with no hot work or distorting the substrate. The cold applied-materials in the 1000 series can also help ensure high adhesion for bonding pipe supports while eliminating metal to metal contact and preventing future corrosion. Belzona 5000 series environmental solutions can offer internal and external protection of metallic surfaces.

INLET VALVES

TYPICAL PROBLEMS: Damage and loss of diameter of valve shaft, erosion and corrosion of the valve body, disc, and gasket.

POTENTIAL SOLUTIONS: Belzona 1000 series 100% solids can be used to rebuild the valve shaft to its original diameter. Belzona 2000 series elastomers can be used to coat the metals where durability, elasticity, high abrasion, and tear resistance are required.

TURBINES

TYPICAL PROBLEMS: Cavitation erosion on Francis and Kaplan Turbine Impellers. Erosion and impact on Pelton Turbine buckets. Corrosion and erosion on the turbine housing. Erosion of the nozzle head of turbines.

POTENTIAL SOLUTIONS: Belzona 1000 series paste- and fluid-grade materials are used to rebuild and protect the equipment, offering excellent erosion protection and increased fluid flow efficiency. Belzona 2000 series 100% solids cold-applied elastomers offer high cavitation resistance and are designed for applications in confined spaces. Belzona 5000 series environmental solutions can offer internal and external protection of metallic surfaces.

MEDIUM-VOLTAGE SWITCHGEAR + HIGH- VOLTAGE SWITCHGEAR

TYPICAL PROBLEMS: Failure of sealant between bolted flanges causing SF6 gas losses.

POTENTIAL SOLUTIONS: Belzona 1000 series 100% solids paste- and fluid-grade surface-tolerant materials can seal joints and flanges while providing corrosion protection. Belzona 2000 series 100% solids cold-applied flexible elastomers can be used to seal equipment leaks.

TRANSFORMERS

TYPICAL PROBLEMS: Oil and SF6 leaks and damage of transformer fins, flanges, gaskets, and insulators.

POTENTIAL SOLUTIONS: Belzona 1000 series 100% solids paste-grade surface-tolerant materials can be used to stop oil and SF6 live leaks and to permanently seal them. Belzona 5000 series fluid-grade environmental barriers can be used to protect from corrosion and chemical attack.

DAM, SPILLWAY AND STILLING BASIN

TYPICAL PROBLEMS: Damage of the bearing surface, cracking, spalling of concrete substrate due to environmental impact, water ingress and freeze thaw cycles.

POTENTIAL SOLUTIONS: Deterioration of concrete surfaces caused by erosion can be repaired using Belzona 4000 series non-porous magma quartz solutions which offer fast and durable repair to damaged concrete, especially for high wear areas such as baffle blocks.

FACILITIES MAINTENANCE

TYPICAL PROBLEMS: Damage and slip hazards on flooring, weathering damage of concrete structures, slippery transit areas, roof leaks.

POTENTIAL SOLUTIONS: Belzona 3000 series flexible membranes for the water- and weatherproofing of roofs and roofing elements. Bezona 4000 series magma quartz materials to provide safety grip and slip resistance in the facility. Belzona 5000 series fluid-grade environmental barries for weather, corrosion and chemicals protection of floors and structures.

This diagram of a typical hydropower plant is designed based upon data retrieved from various sources. It is to be used as general guidance only. It describes the most common repair and maintenance problems found in hydropower plants together with Belzona solutions which could potentially help mitigate such problems. It does not aim to supersede any drafted process flow charts in use at these facilities. It is strongly recommended that each user of this guide contact the local Belzona representative to discuss the specific needs and operation conditions of their hydropower plants.