To ensure profitable and safe hydropower plants, stakeholders need to consider a host of aspects in planning, approval, construction and operation. Compliance with the applicable regulatory acts, manufacturing costs, fitness for service and reliability, servicing and maintenance of technical equipment are only some of the aspects that need to be considered. TÜV SÜD is a third-party expert organisation assisting authorities, power-plant managers and manufacturers by providing long-standing experience, in-depth expertise and a range of useful services. Our technical analyses and evaluations build on state-of-the-art methods. We inspect components that must fulfil strict requirements in terms of operations and safety, and assess whether their availability and reliability is in line with the state of the art.

**How can we help you?**

**Design optimisation**
Optimum design that meets both the specified requirements and the applicable legal regulations is imperative for the profitable and safe operation of hydropower plants. Our experts inspect the design and strength of the components and load-bearing structures of hydroelectric systems according to national and international regulations, and propose design improvements. Applying the latest analysis and calculation tools, we carry out detailed analyses. We test the reliability of components on the basis of functional models, taking into account all specified requirements.

**Optimisation of maintenance**
TÜV SÜD’s suite of services also covers commissioning tests and periodic inspections (e.g. non-destructive testing), component monitoring with state-of-the-art systems (e.g. monitoring of temperature, vibrations, structure-borne sound, deformation and performance), the evaluation of operational experience for optimising the hydropower plant’s mode of operation and the evaluation of identified findings and defects. Fracture mechanics are applied in assessment of existing or postulated incipient cracking.

**Life testing**
As requirements on the electricity market change, hydropower plants are increasingly frequently exposed to alternating loads that may shorten the service life of the plants,
necessitate operational interventions or cause personal hazards. With the help of experimental and numerical analyses, these load-related risks can be analysed on the basis of fracture mechanics to determine and minimise their impact on service life.

**Failure analysis**

Through failure analysis, our experts identify the causes of failures and draw conclusions concerning the components’ performance in operation. Starting from this basis, they can provide information on preventive actions and suitable repair strategies. In the case of disputes concerning technical aspects, we provide witness expert services in arbitration procedures, helping the contracting parties to reach quick, binding and thus cost-effective out-of-court settlements.

**Valuation**

Monetary valuation and expert inspection of plants and components aimed at the protection of financial investments require in-depth technical expertise and comprehensive experience. We assess the technical condition of existing plants and their remaining service life and then determine their fair value, market value or residual value.

**International compliance audit**

Within the scope of approvals, plant and component manufacturers and owners/operators of plants have always relied on our first-class knowledge of national and international rules and standards and our interdisciplinary expertise in plant design and improvement.

**Our services in detail**

- Installation specifications
- Functional analyses and design analyses
- Design calculations, stress and fatigue analyses, fracture-mechanics analyses, multi-body simulation, crash analyses
- Commissioning tests, function tests and target/performance comparisons
- Development of maintenance, testing and inspection strategies
- Water hammer (fluid hammer) analysis
- Periodic inspections, on-site inspections
- Monitoring and diagnosis

- Evaluation of the acceptability of findings and defects
- Failure analyses
- Arbitration and expert-witness services
- Technical and business analyses
- International compliance audits
- Reliability analyses of electrical and control systems
- Certification of grid compatibility
- Lightning protection and electromagnetic compatibility, analyses and concepts

**Your benefits**

- Boost the reliability and availability of your equipment.
- Reduce life-cycle costs.
- Achieve legal compliance.
- Build on impartiality and expertise and ease your workload and that of your staff.

TÜV SÜD Industrie Service GmbH is a type A inspection body accredited according to EN ISO/IEC 17020:2012.

**Calculation programs**

- ANSYS and MSC MARC/Nastran – finite element tool for structural analysis
- ANSYS LS-DYNA – crash simulation
- APROS – process simulation/pressure surge calculation
- DIMY – software for the design of pressure equipment
- KISSsoft – design and optimisation of machine elements
- MSC ADAMS – multi-body simulation
- ROHR2 – structural analysis of piping systems
- RSTAB/RFEM – calculation of 2D and 3D beam or shell structures
- SimulationX – simulation of physical and technical systems and plants
- sisKMR – static calculations of underground pipe systems
- STANET – calculation of gas, water, electricity and district-heat networks
- DigSILENT – power system analysis software
- Matlab/Simulink – simulation of control systems
- PSpice – lightning protection