

HYDROPOWER GENERATION SERVICES



DUE DILIGENCE

TG Advisers, an ENTRUST Solutions Group company, has extensive operations, maintenance, OEM, and hydropower plant design experience, including small and large conventional hydro and pumped storage hydro, with regionally focused resources to deliver convenient, safe, and reliable solutions. Whether you require turbine and generator expertise, outage services, resources for major projects, or design solutions for operational, environmental, or regulatory issues, we are a trusted provider of hydropower generation services. Our expert teams of engineering, testing and design professionals provide a comprehensive range of services, including:

Our teams have the experience and proper risk assessment tools to critically evaluate financials, facilities, projects, and equipment. Our expertise includes:

- Generating station plant equipment health assessments, including hydro turbines, generators, penstocks, inlet valves and BOP equipment
- Using risk assessment tools to assist clients who are evaluating an asset prior to purchase or financing
- Facility and equipment inspections and evaluations
- Support of merger and acquisition activities
- Insurance and risk management evaluations

**ENCONSULTING**

OPERATION & MAINTENANCE

Our highly skilled professionals provide operation and maintenance services for new and existing facilities, capital upgrades, and O&M advisory services. Clients find the following services very useful:

- Asset management
- Strategic and planning studies
- Maintenance and outage planning
- Project feasibility
- Specifications for procurement of power plant equipment
- Generation assessment
- Performance evaluation
- Energy and financial analysis
- Regulatory compliance management
- New and refurbished equipment purchases
- Spare parts inventory assessment
- Health and safety audits
- Emergency action plan preparation, training and exercise
- Third-party design reviews for new or retrofit equipment
- O&M financial projections



ENGINEERING & ANALYSIS

From preparing technical data to applying technology, our experts can provide state-of-the-art engineering analysis to support root cause analysis, equipment life assessments, operational optimizations, and condition-based maintenance of generating station equipment. Specific areas of focus include:

- Upate studies
- Finite element analysis
- Fatigue and fracture mechanics assessments
- Equipment life extensions
- Power plant flexibility optimizations--on/off and load cycling and minimum load
- Operational troubleshooting--vibration, performance deficiencies, and off-design operation
- Root cause analysis of power plant equipment: hydro turbines, generators, and BOP equipment
- Bearing, lubrication and sealing analysis
- Metallurgical analysis
- Manufacturing analysis
- Outage deferral assessments
- Performance optimization
- Operation and maintenance system and procedure refinement
- Expert witness testimony

EXECUTIVE & PROJECT MANAGEMENT

We also have experience that includes managing initiatives across multiple markets and areas within the energy industry, including:

- Project management through complete project lifecycle
- Risk management
- Scheduling and budgeting
- Interface management and coordination
- Engineering and technical support
- Project controls and quality assurance
- Commissioning coordination and support
- Construction observation
- Witnessing equipment tests
- Owner's engineer services



OUTAGE & CONSTRUCTION PLANNING & EXECUTION

We know how critical it is to appropriately scope and execute on major outages within scheduled timeframes and budgets. We help clients with:

- Outage scope and bid development
- Outage project management
- Owner's engineer
- Shop surveillance during equipment repairs
- Field surveillance during construction
- Independent engineering dispositions of outage findings
- QA/QC services
- Health & Safety Audits



ELECTRICAL/POWER SERVICES

- Power system/arc flash modeling and studies
- Protective relaying specification, design, coordination, and commissioning
- Operator NEC, NFPA 71A, electrical safety, and training
- Motor and motor protection specification, design, commissioning, and startup support

NERC COMPLIANCE SERVICES

Kestrel Power, also an ENTRUST Solutions Group Company, has years of experience providing NERC and regional reliability services throughout North America for conventional and inverter-based generation resources. Clients depend on us for:

- NERC MOD modeling standards
- NERC PRC protection and coordination standards
- NERC/RRO VAR standards
- NERC standard related training
- NERC reliability standards (PRC, CIP, etc.), monitoring, and documentation

INSTRUMENTATION & CONTROLS SERVICES

- Generator excitation system specification, commissioning, tuning, troubleshooting, and routine maintenance
- Generator electrical test data review and maintenance recommendations
- Generator rewind engineering support and surveillance
- Instrumentation specification, engineering, design, and commissioning
- SCADA, HMI & PLC control system specification, engineering and design, factory acceptance, commissioning, and startup support for hardware and software upgrades
- Alarm system prioritization, philosophy, and upgrades
- Network switch, fiber optic, ethernet, and system upgrades

PROCESS, MECHANICAL & PIPING SERVICES

- Process flow diagram (PFD) and piping & instrumentation diagrams (P&IDs)
- ASME Power Piping Code B31.1 Pipe Stress Analysis
- Line size--pipe size and schedule, flow velocities, and pressure drops
- Pump sizing and specification--GPM, TDH, and HP calculations
- Heat exchanger sizing and specification--duty and LMTD calculations
- Vessel sizing and specification--D&L, internal, and ASME inspection work

CORROSION SERVICES

- Cathodic protection system inspection, evaluation, and engineering
- Metallurgical analysis
- Soil and water corrosion/resistivity studies, analysis, and surveys
- Corrosion mitigation studies and reports
- AC and DC stray current mitigation evaluation and design solutions



CIVIL/STRUCTURAL SERVICES

- Pipe support/rack specification, modeling, and engineering (STAAD)
- Subsurface utility inspection/engineering
- Powerhouse and building structural design and analysis
- Lifting equipment assessment
- Site survey, environmental analysis, and permitting overview support
- 3D scanning and modeling



TECHNICAL TRAINING (CUSTOM, PLANT-SPECIFIC EQUIPMENT TRAINING)

- Hydro turbine operations, failure modes, and maintenance
- Root cause analysis training
- Power plant outage execution
- Generator controls training for generating station personnel
- Generator controls training for system operators
- Generator controls training for operators
- NERC MOD & PRC training
- Excitation system training, including equipment-specific courses

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