

Pipelines, Pump Stations, and Balance of Plant Systems



Knight Piésold has significant experience in the planning, design, and construction of pipelines, pump stations, and Balance of Plant (BoP) systems across a range of industries, including mining, hydroelectric, pumped storage, and thermal power generation. This experience includes the following areas:

- Dewatering and discharge systems for open pit and underground mines
- Long-distance slurry transport of solids (including tailings) for mining and industrial operations
- Process and plant pipeline systems for water and process media, including raw water, demineralized water, service water, gland seal water, cooling water, wastewater, and other utility streams
- Design of pump stations for water, chemical solutions, slurry, and wastewater
- Large-scale pumping systems, including in-series, parallel, and multi-stage centrifugal pumps, high-pressure positive displacement pumps, and associated auxiliary systems (e.g., gland seal water, flushing, and cooling water systems)
- Closed- and open-loop cooling water systems for thermal and hydroelectric facilities
- Low- and high-pressure compressed air systems, including service air, instrument air, and blowdown systems for hydro turbines and reversible pump-turbines
- Aeration blower systems for various mining and plant process applications
- Fire water supply and distribution systems
- Potable and utility water systems for industrial facilities
- Fuel oil transfer and distribution systems for thermal power applications
- Drainage, sump, and oil-water separation systems
- Hydroelectric penstocks and bulk water conveyance



- Petroleum product transport systems
- Dewatering and discharge systems for open pit and underground mines
- Dewatering systems for low- and high-pressure penstocks in hydroelectric and pumped storage facilities

Knight Piésold offers a comprehensive range of civil, structural, mechanical, and electrical engineering services across all project phases—from concept development through to commissioning and operational support.

Early Stage and Feasibility Services

- Concept development, pre-feasibility, and feasibility studies, including conceptual design and cost estimation
- Technical, economic, financial, and risk assessments for project components
- Environmental studies aligned with applicable national and international standards

Design and Engineering Services

- Evaluation of transport and deposition requirements and alternatives for solids handling using Knight Piésold's proprietary and in-house developed calculation tools
- Pipeline routing, including permitting support and environmental impact evaluation and mitigation
- Optimization of pipeline alignment and profile
- Steady-state and transient hydraulic analyses for long-distance pipelines using software such as AFT Fathom and AFT Impulse
- Pipe flexibility and stress analysis using AutoPIPE, supported by industry-specific expertise and best practices

- CFD modeling of gravity-fed tanks, pump tanks, and vaults using ANSYS to support optimized hydraulic performance
- Preparation of detailed "Issued for Construction" design packages, including:
 - Process flow diagrams (PFDs)
 - Piping and instrumentation diagrams (P&IDs)
 - Pump and piping layouts
 - Structural, electrical, and control system drawings
 - Technical specifications for the supply, installation, and testing of pipelines, pumps, valves, and BoP systems
 - Equipment datasheets and material take-offs
- Pipeline and BoP system design, including pipe, fittings, supports, and structural interfaces
- Multidisciplinary pump station design (civil, structural, mechanical, electrical, and controls)
- 3D modeling and visualization of mechanical systems

Construction and Commissioning Support

- Design review, project management, and quality assurance support
- Procurement support for mechanical, structural, and civil components
- Construction quality control and field supervision through commissioning
- Post-construction services
- Support for operational monitoring and maintenance planning

Post-Construction Services

- Support for operational monitoring and maintenance planning