

OIL AND GAS

Oil & Gas

- ❖ Pipeline route selection
- ❖ Pipeline design
- ❖ Pipeline systems and components – tanks, pump stations, metering, SCADA,
- ❖ Pipeline construction oversight
- ❖ Pipeline operations - advisory
- ❖ Pipeline and facilities maintenance
- ❖ Petroleum station design and operations

Oil & Gas Pipeline Design

At Vex Engineers Ltd., we carry out end-to-end design and execution process of oil and gas pipelines moving from initial concept and route selection through Front-End Engineering Design (FEED), detailed engineering, procurement, construction, and commissioning. This lifecycle ensures structural integrity, economic viability, and strict regulatory compliance.

Conceptual Design & Feasibility

- **Feasibility Studies:** Evaluate economic, technical, and environmental viability.
- **Route Selection:** Map optimal paths using satellite data and surveys to avoid populated areas, unstable ground, and environmental hotspots.
- **Design Basis:** Define fluid composition, expected flow rates, operating pressures, and temperatures.

Front-End Engineering Design (FEED)

- **Hydraulic & Thermal Profiling:** Simulate steady-state and transient flow behavior to determine optimal pipe diameter.
- **P&IDs:** Develop Piping and Instrumentation Diagrams to outline process flow and control configurations.
- **HAZOP Studies:** Conduct Hazard and Operability reviews to mitigate safety risks.
- **Long-Lead Items Identification:** Order specialized materials like heavy-wall line pipes and compressors early.

Detailed Engineering

- **Mechanical Calculations:** Compute required wall thickness, material grades (e.g., API 5L), and anti-corrosion coating specifications per codes like ASME B31.4 (liquid) or ASME B31.8 (gas).
- **Stress Analysis:** Perform buried or subsea pipeline stress analyses for thermal expansion and soil interaction.
- **Crossings & Appurtenances:** Design specialized trenchless road/river crossings (HDD) alongside block valves and pig trap stations.

Procurement & Construction

- **Procurement (Sourcing):** Secure line pipes, valves, welding consumables, and coatings with strict quality control.
- **Right-of-Way (ROW) Preparation:** Clear land, grade the path, and string pipe segments.
- **Welding & NDT:** Assemble segments via field welding followed by non-destructive testing (ultrasonic/radiographic) and joint coating.
- **Lowering-in & Backfilling:** Place the coated pipe into the trench and cover with padding soil.
- **Hydrostatic Testing:** Pressurize segment intervals with water to verify structural integrity and leak tightness.

Commissioning & Handover

- **Cleaning & Drying:** De-water, gauge, and dry the pipeline utilizing specialized pigs and nitrogen purging.
- **SCADA Integration:** Tie field instrumentation and emergency shutdown systems into control rooms.
- **Pre-Startup Safety Review (PSSR):** Perform final audits prior to introducing hydrocarbons

Petroleum Station Design and Operations

At Vex Engineers Ltd., we conduct end-to-end design process of a petroleum station which covers steps from initial site selection and regulatory permitting to detailed civil, structural, and mechanical engineering, followed by seamless retail operations, safety management, and environmental compliance.

Planning and Design Phase

- **Site Selection:** Find a high-traffic location with good visibility and easy vehicle access.
- **Feasibility and Permits:** Conduct market studies, environmental impact assessments, and secure local zoning permits.
- **Civil and Structural Design:** Plan the layout for fuel islands, underground storage tanks, canopies, and convenience stores.
- **Mechanical and Electrical Layout:** Design safe fuel piping, leak detection systems, vapor recovery units, and heavy-duty power supplies.

Construction and Safety Integration

- **Tank Installation:** Place double-walled underground or aboveground fuel storage tanks safely.
- **Fire Safety Systems:** Install emergency shut-off valves, fire extinguishers, and automatic fire suppression systems.
- **Environmental Controls:** Set up oil-water separators and spill-containment catchment basins.

Operations and Management

- **Inventory Control:** Monitor fuel levels daily using automated tank gauges to prevent runouts or leaks.
- **Forecourt Service:** Manage safe fuel dispensing, customer payment processing, and traffic flow.
- **Routine Maintenance:** Test leak detectors, clean fuel filters, and inspect dispensing hoses regularly.

- **Compliance and Audits:** Follow strict environmental and workplace safety laws through routine audit