Pushing the boundaries
In addition to conventional pipeline design and engineering practice Petrofac works to push the boundaries of design and construction to introduce new technologies and techniques to benefit its customers. Be it onshore ‘zig zag’ construction, limit state design, the use of high density polyethylene (HDPE) for production flow-lines and internal liners or the use of light detection and ranging (LIDAR) for large area surveying, Petrofac can develop novel solutions and keep abreast of the latest technologies. This enables Petrofac to offer the best techno-economic solution against the specific parameters and challenges of each particular assignment.

Additional and specialist services
Petrofac’s engineers undertake all aspects of technical procurement, including the preparation of specifications, data sheets and material requisitions as well as technical bid evaluation and supplier management. These roles are undertaken in conjunction with Petrofac’s experienced procurement department.

Petrofac’s engineers prepare specifications and scopes of work for topographical, bathymetric, geotechnical and soil resistivity surveys in addition to survey company management in the field.

These engineering services are augmented by preparing the scope of work and relevant specification, including full engineering, procurement and construction contracts for subsequent phases of a development.

Petrofac’s design office experience extends into the field where it offers both direct and indirect management of the construction, testing and pre-commissioning and commissioning of pipelines and flowlines.

In addition to basic engineering Petrofac’s pipeline experts offer specialist services including:

- development of risk based inspection programmes
- asset evaluation
- pipeline and flowline integrity assessment
- trouble shooting in the field
- remedial works identification and planning
- brownfield upgrades and extensions
- debottlenecking and line looping
- permits and consents assistance
- high level advisory services
- expert witness services
- pigging programming, procedures and field management

Often overlooked in an operational environment, Petrofac understands the key role of pipelines as high CAPEX elements of infrastructure. It also recognises their importance as the arteries of both offshore and onshore oil & gas assets, including production wells, platforms, processing plants and refineries.

Multi-faceted design
Petrofac’s pipeline team is experienced in design through to construction, commissioning and operation, delivering technically robust, fit-for-purpose economic solutions for its customers.

From Arctic climates to tropical rain-forests; from the North Sea to South East Asia, Petrofac provides the core pipeline design skill sets required for the successful execution of oil & gas projects. This expertise includes; mapping, routing, materials selection, mechanical design, stability design, 3D stress analysis, span analysis, crossings design and upheaval buckling analysis.

Regardless of whether the gathering system or pipeline is a discrete project or part of a wider development, Petrofac will deliver all of the ancillary multi-discipline and specialist expertise necessary to deliver a complete pipeline design service.
Pipelines design and engineering in practice
Petrofac has been involved in a variety of projects that include:

**United Arab Emirates:** field development upgrade
Design, procurement and construction of oil, gas and water flowlines and pipelines as part of a major field upgrade which included 30 lines of diameters between 4” and 36” with total length of 700km.

**West Africa:** refinery and import/distribution network
A feasibility study that included a 1,000km in-country white products pipeline distribution network with two subsea loading lines and single point mooring (SPM).

**Oman:** greenfield development
Design, procurement and construction of a gas, greenfield development that included 17 flowlines and pipelines from 6” to 18” diameter with a total length of 247km. This utilised carbon steel, PE (polyethylene) lines, GRE (glass reinforced epoxy) and CRA (corrosion resistant alloy) clad line pipe materials.

**UK North Sea:** subsea completion to a FPSO (floating production storage offloading) facility
Concept, front end engineering design (FEED) and detailed design of a subsea development tied back to a FPSO with subsea pipelines and a multi-functional umbilical. The role included technical procurement for the linepipe and subsea control system.

**Iran:** several medium/large greenfield developments
Discrete projects for a variety of clients at concept and FEED comprising gathering/injection/disposal in-field systems and long gas export pipelines, over 200 lines in total in a variety of materials.

**Algeria:** two adjacent greenfield sites
Conceptual design for two adjacent gas fields, including gathering systems and gas export pipelines totalling 170km. The project challenged the design to avoid the use of CRA for the in-field systems.

**Kazakhstan:** major greenfield onshore development
FEED for a large development with high H₂S and CO₂ including in-field systems and export pipelines of approximately 640km.

**Yemen:** greenfield oil development
Detailed design and procurement for a 100km, 16” OD oil export pipeline complete with pumps, metering and block valve stations.

**Russia:** brownfield development
FEED followed by detailed design, procurement and construction management including a suite of flowlines and an oil export pipeline. The materials included the use of insulated heat traced flowlines.

**Malaysia:** offshore production upgrade project
Conceptual design for the upgrade to an existing offshore facility including new subsea flowlines and a new export pipeline.

**Gabon:** two field upgrade project
Conceptual design followed by FEED of two adjacent and systems inter-connected fields including 38 new flowlines and pipelines.

**Syria:** greenfield gas condensate development
Detailed design, procurement and construction including an array of gathering flowlines and a gas condensate export pipeline.

**Tunisia:** greenfield gas development
Construction completion, commissioning and separation of a new offshore development including production flowlines and a 60km offshore/onshore gas export pipeline.

**Uganda:** greenfield heavy oil development
Pre-FEED studies for a heavy oil development including in-field production and injection flowlines and an 80km long oil export pipeline with skin effect heat tracing (SEHT).

**Global Support**
The Engineering Services business boasts a pipeline centre of excellence. Its experienced pipeline personnel provide consultancy and support from feasibility through to all aspects of operation, maintenance and inspection to its customers around the world as well as to other Petrofac offices in Sharjah, Chennai, Mumbai, Indonesia, London and Aberdeen.