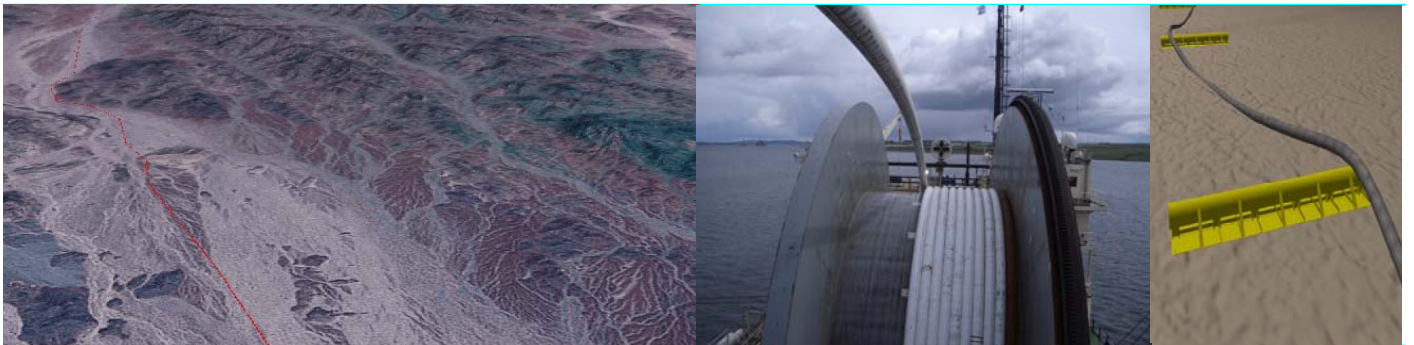


PIPELINE SYSTEM INNOVATIONS

J P Kenny has throughout its history, been at the forefront of advanced engineering techniques and technological innovation developing novel and groundbreaking solutions for the unique challenges presented by remote locations, deep water, high temperature, corrosive well fluids. JPK are able to develop and successfully apply new, cost saving technology to add value throughout all stages of project development and design.



CHALLENGES

There is no such thing as an “off the shelf” pipeline. Every project is individual and each brings its own distinct challenges to the design process. For the majority of these challenges, conventional engineering approaches are suitable. In some cases, more innovative thinking is required to develop a cost effective design, particularly at the limits of industry experience, very high temperature and pressure, deepwater, in areas of special environmental conditions or where access for survey is difficult.

SOLUTIONS

J P Kenny are able to offer a worldwide team of experts capable of driving forward the industry, pioneering new technologies and concepts to continually deliver the most effective solution for our clients.

Industry Leading People

J P Kenny has more than 700 engineers specialising in pipeline and subsea systems. Many staff have postgraduate qualifications and a number have led research programmes. When this capability is combined with the practical exposure that comes from working on some of the worlds largest projects, the result is a distinctive capacity to devise and implement improvements in pipeline technologies and current practice.

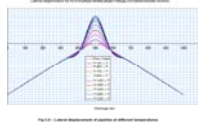
Link With Industry Bodies

J P Kenny is closely involved with many of the industry bodies that define and set pipeline standards and guidelines, including DNV, BSI, API, etc. We also have close relationships with leading research institutes specialising in materials, welding, fluid performance and other core pipeline technologies.

EXPERIENCE (1999 to Present)

Lateral Buckling Design of the 28-inch E8DR-A to E11P-B pipeline- Shell

Development of the unique "Zero-radius" lay technique to assist buckle initiation at buckle locations to control lateral buckling.



Penguins - Shell

Detailed design of the world's longest subsea tieback at 390 barg CITHP and 110 °C. The detailed design developed a probabilistic "No-burst" design when exposed to full CITHP using the SUPERB JIP. Also probabilistic assessment of snake lay buckle development incorporating HOTPIPE calibrations to DNV OS-F101. The design avoided trenching, backfilling and rock dumping 65km of pipe realising millions of pounds in CAPEX savings.



J P Kenny carried out the detailed engineering for the world longest subsea tieback.

Camisea - Paragon

Development of a cryogenic, subsea loading system using pipe in pipe technology, to an offshore berthing facility removing the requirement for a loading jetty, realising significant cost savings.

Rollerskate Upgrade –WAPET

Use of a innovative and successful hybrid plough combining jetting and ploughing capability developed specifically for the Roller-skate field.

Gypsy Field Development - Apache

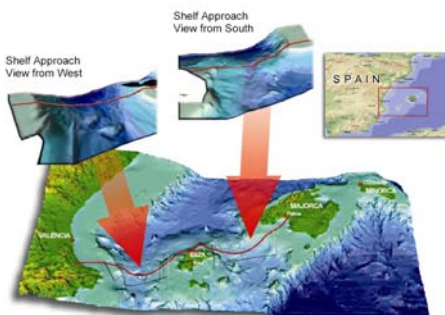
Development of a novel, patented strategic anchor design to control lateral displacements and curvature.



Intermediate midline anchors allow the pipeline to behave as a stiffened catenary.

Malampaya – Shell

Application of limit state design techniques and use of risk based pipeline route assessment to install a pipeline in a deepwater environment with significant seismic geohazards.



Application of GIS techniques with route survey data provides engineers with detailed 3-dimensional models for route development both onshore and offshore.

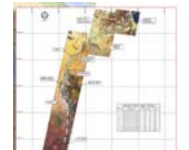
Tweedsmuir - Talisman

Use of an integrated design approach maximising the benefit of Limit state design using DNV OS-F101 to develop a snake laid pipeline with operating pressures of 430 barg and 125 °C.



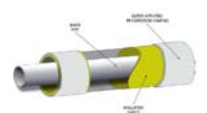
Melut Basin - Petrodar

Use of remote sensing techniques merging satellite imagery with radar and GIS to define geomorphology in remote onshore areas



Rhum - BP

Detailed design of the HIPPS protected high temperature high pressure pipe in pipe system. Maximum well shut in pressure 709 barg and 120°C. Well fluids were corrosive and required the pipeline to be full CRA (25%Cr) construction. Installation was by reeling, requiring detailed finite element analysis. Believed to be the heaviest reeled pipe in pipe system ever installed.



Magnus EOR - BP

Detailed design of the pipelines and retrofit risers for the Enhanced Oil recovery project. J P Kenny engineered a unique two part riser ladder to accommodate driving factors of ease of inspection, an early commitment to future riser decision while the exact scope was still to be confirmed, long lead bulkheads and forgings required for a caisson and installation onto an already well utilised jacket structure.



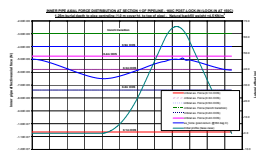
Innovative Riser and Umbilical retrofit ladder maximised design options whilst ensuring a safe, cost effective and robust design.

Erskin Replacement - Texaco

Detailed design of a high temperature pipe in pipe system (design temperature 140 °C), designed to meet rigorous thermo-hydraulic requirements due to potential shut in periods and wax deposition. The design also included a cooling spool to reduce the operating temperature by 20 °C. PIP design included detailed FE analysis of the PIP system behaviour, bulkheads and limit state design of the field joints.

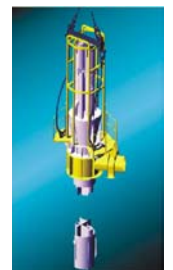
Jade – Phillips via EMC

Detailed design of the snake laid, insulated pipe in pipe to carry production fluids at 160 °C. The pipeline system had a target U-value of 1.75W/m²K. A Novel technique using an annulus filled with an insulating microsphere system was developed to meet the requirements.



Elgin-Franklin - Elf

First full use of DnV96 on a project to engineer a controlled lateral buckling (snake lay) solution using limit state design for a high temperature trunkline manufactured from Corrosion resistant alloy. Other JPK achievements were the longest towed bundle, and the design of a novel riser cooling caisson incorporating a closed circulation system.



Top of Caisson During Installation

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J P Kenny is a Wood Group company. Wood group is an international energy services company with more than \$2.8bn sales, employing more than 16,000 people worldwide and operating in 40 countries. Strategic partners within Wood Group include: Alliance Engineering, Frontier Engineering Solutions, Ionik Consulting and Mustang Engineering.