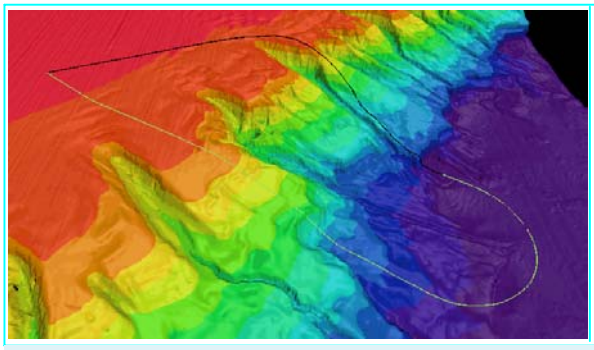
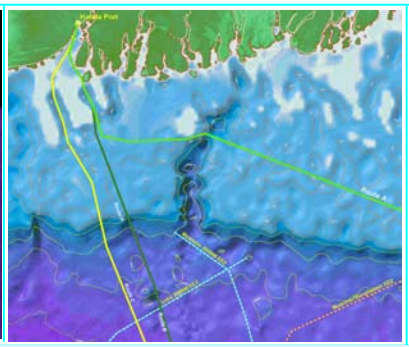
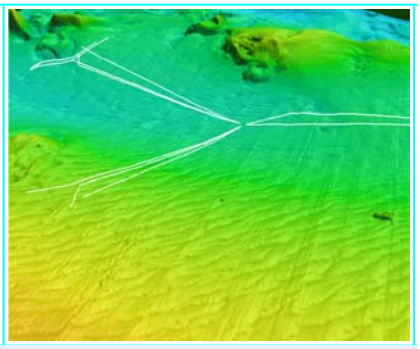
OFFSHORE PIPELINES

Routing and Survey (Offshore)

The routing of subsea oil and gas pipelines and flowlines pose particular challenges. J P Kenny are experienced in the use of subsea routing technologies combining in house, third party specialist software and GIS to maximise the cost benefit to our Client by selecting the optimum route during the initial phases of project and throughout the life of the development:







CHALLENGES

Fast processing of multibeam (MBES) data into a Digital Elevation Model (DEM).
Integration of rectified side scan sonar imagery (mosaics) with the DEM
Quality control of multibeam data sets
Comparison of multibeam or side scan sonar survey data
Optimising route selection
Real-time re-routing
Extraction of route profile in 2d and 3d (xyz)
Offshore to office based processing
Integration of geophysical data in to DEM and GIS
Analysis of data in a geospatial environment
Presentation of geospatial information with clarity in two and 3 dimensions

SOLUTIONS

Routing Technology

- Processing of MBES data using DEM visualisation software.
- Quality control of acoustic survey data using DEM software.
- Optimised route selection using GIS and Fledermaus software.
- Extraction of route profile using GIS and Fledermaus software.
- Analysis of data in a geospatial environment using GIS
- Analysis of DEM and GIS data outputs using finite element analysis

CAPABILITY

Survey

JP Kenny has the capability to provide the management and supervision for all Clients survey requirements. From offshore to nearshore and landfalls and subsequent inspection, maintenance and repair programmes. Expertise includes geodesy and GPS, hydrographic survey, oceanology, geophysics, geotechnical and foundation engineering GIS and remote sensing. Project survey specific requirements typically undertaken include project evaluation and survey definition, budgeting, and cost modelling, the production of tender documentation, technical and commercial evaluation and the management and quality control of the work. This is normally followed by a reporting phase whereby the results of the data are reviewed and any additional quality control undertaken before use by the design teams.

Survey Data Manipulation

The exponential increase in size of subsea data sets, containing perhaps 7–8 million points of data, poses difficulties in processing of the data quickly and efficiently. With the use of Dmagic (Fledermaus) software JP Kenny has the experience and capability to process large data sets, typically 2GB or more. Dmagic can produce rendering by colour maps that are set to elevations, thus producing a Digital Terrain Model that can be visualised and interpreted easily.

Data Quality Control

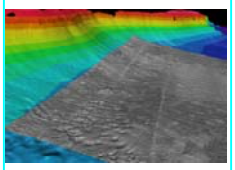
JP Kenny utilises software quality control techniques to ensure survey data conforms to the specified requirements, particularly with the large data sets and differing bin sizes and swaths of surveys typically obtained during route surveys. Using the latest DEM software quality control algorithms within Fledermaus are used to provide statistical analysis for ensuring compliance of the acquired survey data.

Survey Data Interpretation - 3D Visualisation

On completion of data processing and quality control, Fledermaus is used in generating 3D models and visualisations of the data. 3D Visualisation provides significant benefits in understanding the seabed morphology and is the preferred choice for route engineering applications. Cross-sectional profiles of the DTM can be shown easily on the fly giving aid to selecting the optimum route.

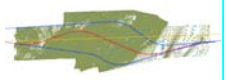
Routing

JPK with the aid of Routeplanner software are able to, on the fly route using a DEM (Digital Elevation Model) and GeoImages (for landfalls) optimising the route prior to span analysis. The rubber banding of the route enables the radii be set whilst moving the tuning points or centre of the bend. As well as profiles being easily extractable the X, Y, Z values with the chainage can be extracted at any interval. This information is then used within Spans (JPK in house software) to analyse for spanning of the pipeline over the seabed.



Example of overlaying data sets of differing bin sizes.

Fledermaus 3D Visualisation of the “Swatch of No Ground”, Bay of Bengal



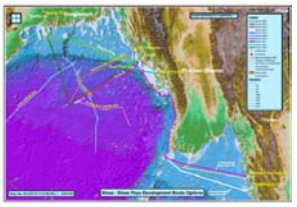
Route Optamisation – Balearics Submarine Gas Pipeline

Forvie bolder route optimised using GIS

EXPERIENCE

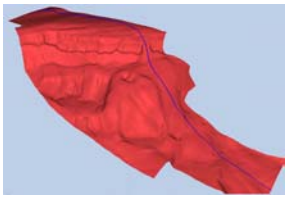
Shwe Shwe Phyu

A feasibility study to define route options from Sittwe, Myanmar to India and South Myanmar, including route option from the Hub platform to two locations on mainland Myanmar. Geosat radar altimeter data merged with Scripps data was utilised to form the basis of the DEM. The shallows were defined using DEM’s created from Admiralty charts. The routing was produced within a Fledermaus and GIS environment.



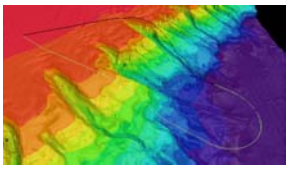
Balearic Submarine Gas Pipeline

Conceptual and detailed design of a 20” gas pipeline from Spain to Mallorca via Ibiza. A routing survey was performed at differing BIN sizes to determine the optimum route taking in to account the met oceanographic and seismic characteristics of the area. Bottom roughness analyses were performed and where necessary local re-routes of the pipeline was undertaken in order to avoid spanning or stress problems.



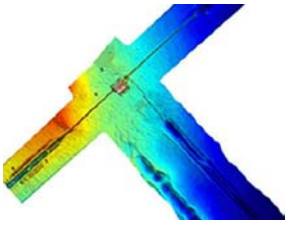
Pluto Gas Project

Slope study on a 25m BIN size data set. A slope colour scalar was derived using Fledermaus. Using the first scalar a rate of change image was derived. This aided in defining of a route from 1000m water depths up on to the continental shelf.



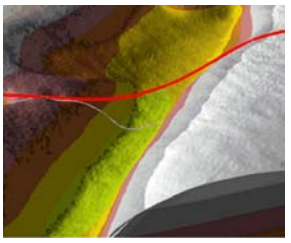
Bord Gais Eireann (BGE)

Detailed design of a 30” interconnector pipeline transporting 35MMSCMD. Definition and implementation of all offshore route survey activities. Initially spanning occurred along the primary route. Through survey and re-routing a final route was selected minimising spanning.



South Pars Gas Field Development

Development of three wellhead platforms via three 32” multiphase pipelines. The routing challenges and criteria included:
Avoiding of subsea obstacles; minimisation of pre-lay, post lay and impact on the environment;
Compliance with snake lay parameters derived in lateral buckling analysis.



J P KENNY

ABERDEEN
+44 1224 347300

HOUSTON
+1 281 675 1000

LONDON
+44 1784 417200

MELBOURNE
+613 9211 6400

NEW DELHI
+91 11 2642 7700

JAKARTA
+62 21 8370 2455

KUALA LUMPUR
+60 3 2162 1266

PERTH
+61 8 9 4818222

NORWAY
+47 5195 1821

www.jpkenny.com