



ADVANCED ENGINEERING FOR HYBRID RISERS

- **Independence**
 - Independent and impartial engineering, without hardware or installation preference
- **Advanced Subsea Engineering**
 - Unique combination of engineering experience, including design, testing, analytical skills and proprietary software solutions
- **Experienced Personnel**
 - Personnel with worldwide experience, all locations, all water depths
 - 25 years in offshore industry
- **Resources**
 - Staff of 150 based in Houston, Galway, Aberdeen, Rio, Perth and Paris
- **Worldwide client base and experience**

SERVICE

- Overall concept design and configuration layout
- Steel pipe and flexible sizing
- Selection/specification of material and coating requirements
- Design; Extreme (storm conditions), Motion fatigue, VIV fatigue, Installation, Towing and Interference
- Specifications; Line pipe, Weld test, Flex joints/Stress joints, Strakes/Fairings, Flexibles, Bending Stiffeners
- Advanced Analysis: Pipe-in-pipe Sections (Central tendons, carrier pipes, bundles)
- Evaluation of alternative materials
- Operator project support
- Technology gap/bridges; HP/HT. Materials, Components, Concepts
- Towing and Installation Support Analysis
- Costings, Schedules

CAPABILITY

- Experience with philosophies of various contractors and operators, e.g. Acergy, BP, Saibos, TOTAL
- Detail Global Design of Rosa Tower
- Extensive Design Support: BP (Greater Plutonio)
- Other Experience: TOTAL (Girassol Field Flexible Jumpers) ChevronTexaco (10,000ft Gulf of Mexico, Generic Evaluation) ExxonMobil and Kerr McGee (West Africa Screening), NDP (Voring Plateau, Tow-out/Installation) Conoco (Deepwater Harsh Enviro.)
- Application of advanced finite element model to determine structural capacities of each pipe component in highly constrained multi-line bundle model
- Determination of layout based on advanced dynamic interference assessments of jumpers
- Detailed fatigue evaluation of sloops and spool configuration design to ensure fit for purpose fatigue capacity
- Extensive submerged and surface tow investigations to determine optimized launch and tow configuration