Subsea Engineering Competency Profile

DYNAMIC RISERS MODELLING AND DESIGN ELECTIVE	DRM-002

This competency demonstrates a subsea engineer has an in depth understanding of the analysis of dynamic riser and cable systems, and how each product interacts with its environment, the surface facilities and the subsea equipment.

This competency enables a subsea engineer to lead offshore engineering services as part of a wider team, in relation to the analysis of:

- Dynamic Riser Systems, including Flexible Risers, Steel Catenary Risers, incl. Steel Lazy Wave Risers, Free Standing Hybrid Risers and Top Tension Risers
- Dynamic Electro-Hydraulic Umbilicals (steel or thermoplastic), Power Cables and Signal Cables
- Associated components and equipment

ELEMENT OF COMPETENCE	WHAT THIS COMPETENCE MEANS IN PRACTICE	INDICATORS OF ATTAINMENT Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence
Expert knowledge of at least one engineering tool used for dynamic riser and cable system analysis. Common design tools including but not limited to: • General finite element software • Specialist dynamic modelling software • Company proprietary software tools	Is proficient in the use of engineering tools and able to use them to solve intricate engineering problems. Can troubleshoot issues related to the use of a given engineering tool and can effectively consult with developers to resolve the most complex problems. Capable of: • Optimising analytical models; • Developing add-on tools to optimise or automate the interface with engineering tool • Interpreting software release notes and providing guidance to others	Can cite examples of interfacing with the developer when glitches or bugs were identified in the engineering tool. Can demonstrate continuous professional development in terms of the latest developments in engineering tools and software.

Subsea Engineering Competency Profile

ELEMENT OF COMPETENCE	WHAT THIS COMPETENCE MEANS IN PRACTICE	INDICATORS OF ATTAINMENT Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence
Expert knowledge of the key theoretical foundations of dynamic system analysis including: ● Different analysis techniques, including frequency and time domain variants, model testing and their applicability. ● Hydrodynamic response of dynamic systems under different loading conditions. ● Sources and impacts of damping and inertia Working knowledge of advanced theories used for dynamic system analysis. Examples include: ● Data processing, rain flow counting, statistics and extreme value theory ● Finite Element Theory	Can transfer the experience from one technology to another based on fundamental theories, e.g. analysis of a steel tube umbilical by transferring their understanding of SCR systems. Capable of: ● Translating theoretical knowledge into practical engineering applications. ● Applying first principle theories to develop solutions for complex problems. ● Developing novel methods to analyse dynamic riser and cable systems.	Can cite 2 or more examples of where the engineer has developed a new assessment methodology for an engineering challenge in FEED or detailed design. Can cite examples of where the engineer has transferred knowledge between different dynamic riser/cable technologies.
Expert knowledge of: ● fatigue analysis of dynamic riser and cable systems. ● harmonic phenomenon such as VIV and FLIP. Awareness of fracture mechanics and Engineering Criticality Assessment	Understands the different requirements for global and local analysis. Understands the definition of stress concentration factors and selection of fatigue failure cycle count (S-N) curves for different materials and ambient environments. Capable of performing global and local fatigue analyses independently or in an integrated scope.	Performed or critically reviewed a full scope for a dynamic riser or cable fatigue analysis (global and local). Can cite examples where the engineer has interfaced with other engineers performing complementary analysis for a fatigue scope, including having performed global analysis to generate inputs to local analysis, or performed local analysis with inputs from a global analysis Fitness for service assessment of an operating riser

Subsea Engineering Competency Profile

ELEMENT OF COMPETENCE	WHAT THIS COMPETENCE MEANS IN PRACTICE	INDICATORS OF ATTAINMENT Refer to only as many Indicators of Attainment as you need to demonstrate the Element of Competence
Expert knowledge of relevant design codes and the design requirements for dynamic systems	Is capable of interpretation of industry codes and standards as well as the definition of associated design/analysis methodologies, including: ● Defining limit states ● Defining of acceptance criteria for each limit state ● Defining of load cases based on functional, environmental and accidental loading	Has led detailed modelling & analysis of a dynamic riser system in at least two different projects in the FEED or detailed design phases Originated industry best practice guidelines, either published or as an in-house reference Can demonstrate contributions to industry body of knowledge of dynamic riser design and analysis. Has developed baseline design guidelines for dynamic riser or cable systems