Subsea Engineering Competency Profile

DYNAMIC RISERS AND MOORINGS DESIGN FUNDAMENTALS	DRM-001
This competency demonstrates a subsea engineer has a broad understanding of dynamic systems, including risers (excludes drilling and completion risers), umbilicals, cables and moorings, and how each product interacts with its environment, the surface facilities and the subsea equipment. This competency enables a Subsea engineer to understand their role in providing offshore engineering services as part of a wider team, in relation to the analysis of a dynamic riser or mooring system.	

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
Working knowledge of the following, including any associated components and equipment: ● Dynamic Riser Systems: ○ Flexible Risers ○ Steel Catenary Risers, incl. Steel Lazy Wave Risers ○ Free Standing Hybrid Risers ○ Top Tension Risers ● Mooring Systems: ○ Chain/Wire moorings ○ Synthetic moorings ○ Permanent or temporary ○ Permanent or disconnected ● Power and communication systems: ○ EHU (steel or thermoplastic) ○ Power Cables	Ability to develop dynamic riser and mooring design concepts and screen options	Has worked on two or more projects involving multiple dynamic riser and mooring options

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○ Signal Cables		
Working knowledge of common engineering tools used for dynamic system analysis, including general finite element software and specialist commercial software. Working knowledge of applicable design codes and recommended practices.	Understands the benefits and limitations of different design tools and selects the most appropriate for a given application. Understands the benefits and limitations of different analysis techniques. Understands the different analytical requirements based on scale, e.g. global system analysis vs component analysis. Can conduct engineering analysis to generate system or component loading profiles and interface loads with other structures. Capable of: ● Setting up analysis models ● Setting up post processors ● Interpreting outputs from engineering analysis	Has provided input to basis of design documentation for a dynamic system, including: ● Description of the system assessed; ● Definition of input parameters; ● Definition of the assessment methodology; ● Definition of acceptance criteria. Has provided input to or critically evaluated an engineering study/design report that includes a dynamic system, including: ● Outline of the methodology used; ● Summary of the study results; ● Identification of key conclusions; ● Provision of recommendations for additional assessment or actions.
Working knowledge of the key theoretical foundations of dynamic system analysis including: ● Different analysis techniques (e.g. frequency and time domain variants, model testing) and their applicability. ● (Hydrodynamic) response of dynamic systems under different loading conditions. ● Harmonic phenomenon such as VIV ● Sources and impacts of damping and inertia. ● Derivation techniques for extreme / fatigue loading.		
Working knowledge of the sources of data for dynamic system analysis including: ● Interpretation of metocean data reports ● Marine growth profiles and characteristics ● Interpretation of bathymetry and seabed geotechnical data. ● Interaction between different dynamic systems	Understands the convention in which data is commonly presented and how it relates to dynamic system design. Capable of: ● Defining the required input data for dynamic system modelling ● Making valid assumptions in lieu of missing data	

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• Interpretation of flexible riser cross-section datasheets.	• Assessing implications of changes to inputs • Understanding the importance of corrosion. • Identifying and accounting for appropriate installation / manufacturing tolerances	
Working knowledge of the impact of the dynamic system design on the interface structures, including host vessel, hold back anchor, distributed buoyancy, midwater arch, bend stiffeners, riser base, or umbilical termination assembly	Can define battery limits for dynamic systems and the load cases at each limit Understands the implication of simplifying boundary conditions between dynamic systems and interface structures, e.g. defining a fixed boundary condition at termination of a flexible riser	Can cite examples of where the engineer has interfaced with other engineering disciplines defined by the battery limits to deliver a successful outcome.