DNV GL is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business.

We provide classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas, power and renewables industries. We also provide certification, supply chain and data management services to customers across a wide range of industries.

Combining technical, digital and operational expertise, risk methodology and in-depth industry knowledge, we empower our customers’ decisions and actions with trust and confidence. We continuously invest in research and collaborative innovation to provide customers and society with operational and technological foresight.

With origins stretching back to 1864 and operations in more than 100 countries, our experts are dedicated to helping customers make the world safer, smarter and greener.

DNV GL is the technical advisor to the oil and gas industry. We bring a broader view to complex business and technology risks in global and local markets. Providing a neutral ground for industry cooperation, we create and share knowledge with our customers, setting standards for technology development and implementation. From project initiation to decommissioning, our independent experts enable companies to make the right choices for a safer, smarter and greener future.

**EDB-IPP PhD Opportunities for August 2019 Intake**

**Location**: Singapore

**Local Unit & Position Description**

Oil and Gas Technology Centre department is part of O&G Region South East & Australia operations and holds an important and strategic position for us in the marketplace, both locally and globally. We hold a diverse portfolio of customers in Singapore and other countries in the Region, delivering advisory services to the onshore and offshore oil, gas and process industries. DNV GL has identified Metal Additive Manufacturing as the next phase of EDB-IPP research. These projects will be under a DNV GL contract with the co-supervision of Associate Professor Zhou Kun and at the premises of the Singapore Centre for 3D Printing at Nanyang Technological University and DNV GL jointly.

**Project 1: Investigation on the processing-microstructure-property correlation to establish qualification requirements for 3D printed metals for marine and offshore applications**

This project aims to study the processing-microstructure-property correlation of metals manufactured by 3D printing that can be used in the sector of marine and offshore. Specifically, the project will primarily investigate high-strength materials with excellent corrosion resistance for directed energy deposition (DED), a 3D printing technique, including wire arc additive manufacturing (WAAM) and laser aided additive manufacturing (LAAM). The DED process for these materials will be explored and optimized. The effect of DED processing parameters on the microstructural features, mechanical properties and material anisotropy of printed materials will be studied. Specimens will be printed along different orientations within both horizontal and vertical planes for hardness, tensile, fatigue and corrosion testing to investigate. Numerical modelling will be used to understand the temperature distribution, melt pool evolution, thermal-induced deflection, warpage and residual stresses in DED for process optimization. A damage mechanics approach-based model will also be established to predict the mechanical behaviour and fatigue lifetime of AM components for quality control. The tested properties will be compared with ASTM standards for certification. It will provide valuable knowledge on the development of metal 3D printing in the applications of marine and offshore and their qualification criteria.
Project 2: Application of design methodologies and tools for novel design and redesign of metal additive manufacturing products for marine and offshore applications

This project focuses on application of tools and methods such as topology optimization, unit cell-based design, and generative design for design of material and component systems under a given design specification with a view to application to new product design as well as redesign of existing products for marine and offshore applications. Typical marine and offshore components will be identified and designed or redesigned for the AM process. Topology optimization will be taken in the design not only to achievement lightweight structure for the AM components but also to minimize potential thermal distortion due to residual stress induced in their printing process. A mechanics model will be developed to predict the mechanical behaviour and functional performance of the components to be printed and provide feedback for their structural design and topology optimization. DED will be used to print the redesigned components and mechanical testing will be conducted on the printed components to verify the design. The thermal distortion of the AM components will also be minimized through the DED process optimization. This project will demonstrate great potential of AM in marine and offshore via innovative design and how that can be validated and approved.

Requirements:

- Singapore Citizens / PRs Only
- Eligible for PhD studies with a Bachelor degree in related disciplines (minimum 2nd class honours upper or Honours (Distinction))
- High motivation for spearheading research and development
- Ability to structure and manage cross-disciplinary projects
- Self-driving & self-motivated, able to initiate & drive projects/ideas independently

Support provided:

- Full sponsorship for PhD studies under the EDB-IPP scheme with the company
- Company provides and drives industry project with student through close supervision by academic partner
- Monthly salary and CPF contributions pegged at prevailing employer’s contribution rate
- Other terms and conditions are subjected to offer details provided by the company upon confirmation

For more information on DNV GL, please visit our website www.dnvgl.com

How to Apply:
Interested applicants please send your CV including education history, research experience and undergraduate CGPA to Ms Ng Suan (suan.ng@ntu.edu.sg), indicating the project you are applying for.