



**ENGINEERING
INNOVATION**

**PROVIDING OPTIMAL TECHNICAL
SOLUTIONS AND MANAGEMENT
SUPPORT FOR SUBSEA CONTROLS
AND DISTRIBUTION EQUIPMENT
THROUGH LIFE OF FIELD.**



**ASSET INTEGRITY MANAGEMENT
SUBSEA CONTROL SYSTEMS**



VIPER SUBSEA SUBSEA CONTROL SYSTEM MAINTENANCE

CONTACT ENQUIRIES AND FURTHER INFORMATION

At Viper Subsea we believe that good system maintenance is essential to ensure your control system remains in service for longer and experiences fewer costly failures. Routine and preventative maintenance means that critical components are serviced offline at a time of your choosing, rather than costing you unnecessary time and money were they to fail whilst in service.

We like to take a proactive approach to managing the integrity of the control system by monitoring key parameters (e.g. system pressures, umbilical insulation resistance, fluid loss, and module level alarms etc) on a periodic basis, analysing the data collected, and then providing you with a recommended rectification plan when required. With the volume of system performance and house-keeping data available from modern control systems a lot of problems can be diagnosed early and repaired on an opportunity basis without interrupting production.

Viper Subsea has extensive experience in the support and maintenance of subsea control systems.

From our base in Aberdeen, we can provide you with a package of services tailored precisely to your needs, including:

- Routine system integrity reviews
- Preparation of maintenance strategy
- Preparation of maintenance procedures
- Risk assessment of maintenance and test workscopes
- Development of system sparing philosophy (Operational and Capital)
- Development of obsolescence mitigation strategies
- Procurement, storage and maintenance of system spares
- 24/7 telephone support
- Identification of system upgrade opportunities
- Engineering and management of field expansion and subsea hardware change-out workscopes.

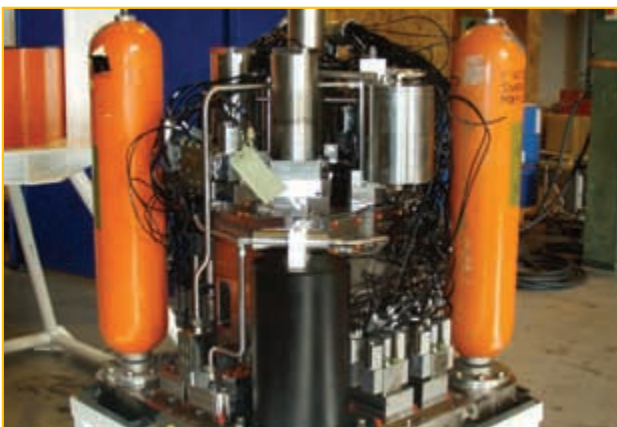
Our asset integrity management services can cover all equipment associated with subsea production control systems. We can provide onshore workshop facilities to ensure that your capital spares are always ready for service, including:

- Subsea Control Modules
- Hydraulic Power Units
- Master Control Stations
- Umbilicals and Jumpers
- Umbilical Termination Units
- Installation tooling

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VIPER SUBSEA OBSOLESCENCE MANAGEMENT

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Every field that has a life expectancy of greater than five years is likely to face the challenges of obsolete components and of legacy equipment that can no longer be supported by the OEM. Field extensions in particular, make for considerable challenges specifically with obsolescence of the existing installed controls equipment. An obsolescence strategy is required to ensure continuous effective support within an ever changing environment.

With OEMs, obsolescence mitigation understandably takes second priority to the primary task of new product introduction and sales into green-field projects. Viper Subsea are able to apply experienced resources and focus on this important issue, developing a strategy for managing obsolescence within the subsea, topsides, and test equipment associated with Production Control Systems, and periodically reviewing that strategy to reflect the dynamics of the supply chain and field operational issues.

Viper Subsea can then implement that strategy and provide a 'through life' obsolescence management programme, which can include the following:

- Undertake an obsolescence investigation – identifying components (hardware and software) that are already obsolete and quantifying the risk of others becoming obsolete within the lifetime of the equipment.
- Manage and update system documentation – to always reflect current build standard.
- Develop a spares holding strategy – based on mtbf calculations and obsolescence review.
- Manage spares holding.
- Develop an inspection and test programme for spares and undertake routine maintenance and testing.
- Undertake periodic availability checks for parts and components.
- Advise the Operator of 'last time buy'/'life time buy' opportunities.
- Liaise and interface with the OEM, their sub-contractors and also component suppliers.
- Identify substitute parts and alternative sources when available.
- Reclaim and salvage parts from recovered equipment or other products.
- Undertake design modifications as required to replace or 'work around' obsolescence.
- Store test equipment, software and other critical items in a secure, benign environment.

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VIPER SUBSEA SUBSEA ELECTRICAL INTEGRITY AND INSULATION RESISTANCE MANAGEMENT

The electrical integrity of umbilicals, cables, connectors, and distribution equipment has proven to be a real cause of concern with subsea controls equipment. Problems can often come to light soon after installation, and even if the electrical performance is good in the early years, industry experience suggests that often problems will manifest themselves as the equipment ages.

Add to this the fact that normal fault finding by process of elimination is extremely expensive in deep water, and that the diagnostic intervention itself can cause further damage to non-recoverable parts of the system, there is clearly a need to understand, monitor, and manage the integrity of subsea electrical power and communications systems right through the life of the asset from design to decommissioning.

Viper Subsea has extensive practical experience, theoretical knowledge and analysis tools to be able to predict, and mitigate against failures as well as implement long-term condition monitoring programmes. Specifically, the Asset Integrity Management team can provide the following services:

1. System Design Support

- Review of component and system designs to assess for design integrity
- Redesign of inter-connection systems
- Definition of acceptance tests to ensure maximum integrity of new equipment

2. System modelling, analysis and trending

- Long term trending analysis of the umbilical and subsea electrical integrity
- Predictive electrical analysis to forecast the point at which system failure occurs (loss of subsea controls operability)
- Modelling to define minimum operational Insulation Resistance (IR) levels

3. Operational/Field Support

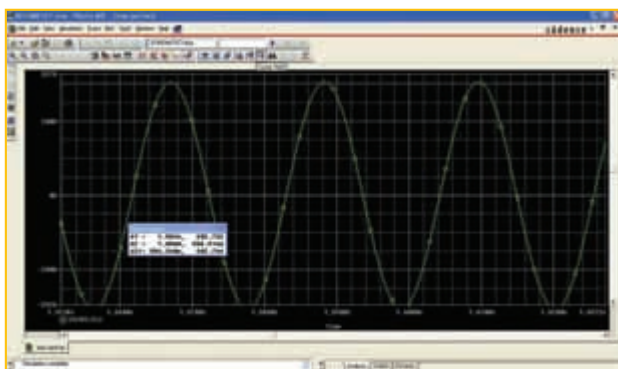
- Make recommendations for operational changes to mitigate the impact of failing IR and hence extend life expectancy of the distribution equipment
- Preparation of intervention procedures and recommendations for equipment replacement and fault finding
- Recommendation of minimum contingency spares holding based on quantitative risk assessment
- Monitoring of umbilical IR and Polarisation Index (PI) from topsides with proprietary monitoring equipment
- Supply of replacement equipment and spare parts

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System Analysis

 V-SLIM

