Guidance on integrity management for subsea production control systems
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The North Sea oil and gas industry has pioneered the use of subsea production control systems (SPCSs) and has driven the development of the technology to enable the efficient commercial exploitation of smaller reservoirs tied back to existing platforms.

This publication aims to raise awareness amongst subsea engineers and non-specialists across the industry on good integrity management practices for SPCSs and its associated subsystems and components. This publication does not seek to replicate or replace existing industry standards covering the design of subsea production control systems. It should be noted that subsea production control systems are diverse in their design, age and operation and consequently not all of the good practices in this publication will be technically feasible or cost-effective in every situation.

By following integrity management good practice, it is possible to assess the in-service operating behaviour of subsea production control systems to identify anomalies, faults and, where possible, predict incipient failures whilst presenting the opportunity for proactive planning and maintenance.
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1 INTRODUCTION

This integrity management guidance recommends the design, implementation, monitoring and continuous improvement of a subsea asset integrity management programme to ensure subsea production control systems (SPCS) function, operated and maintained in accordance with the required design and operating performance standard throughout their whole life cycle. The guidance is intended to be used by those in the oil and gas industries, including:
- operators of oil and gas facilities;
- providers of asset integrity management services for the oil and gas industry;
- providers of inspection and maintenance services for the oil and gas industry;
- designers and manufacturers of subsea production control systems, and
- providers of installation and commissioning services for the oil and gas industry.

The guidance provides good practices to satisfy, if any, regulatory and stakeholders’ requirements for effective management of the integrity of SPCs through design, manufacture, installation, operation, maintenance and decommissioning. The guidance is designed to enable the integration of the SPCS integrity management system with other existing management systems such as Coabis, thus providing a holistic solution that maximises production availability through minimisation of equipment downtime.

This guidance outlines key criteria for developing a robust integrity management strategy for SPCs. It describes how asset owners or stakeholders can plan and execute integrity management activities for SPCs.

1.1 PURPOSE

This guideline outlines good practice for integrity management of subsea production control systems. It provides guidance on how in-service faults, failures, deterioration and degradation of subsea production control systems (SPCSs) are appropriately monitored, allowing effective diagnosis, prognosis and management of subsea production control systems in terms of optimised up time.

The guidance is intended to satisfy (as required) any regulatory and stakeholders’ requirements by defining a programme to provide assurance that asset owners are meeting the minimum requirements for managing the integrity of SPCs. In the event of a conflict between this guidance and any relevant regulatory and/or stakeholders’ requirements, the relevant regulatory and stakeholders’ requirements should take precedence. If the guidance provides a better assistance for managing the integrity of subsea production control systems, then the guidance can be used to supplement any existing requirements.

1.2 SCOPE

The guidance provides good practice for effective and efficient management of the integrity of subsea production control systems throughout the whole life cycle. The whole life cycle in this context includes ageing lifecycle extension (ALE) as defined in the Health and Safety Executive (HSE) Key Programme 4 [HSE Key programme 4 (KP4) – Ageing and life extension programme].
The guidance is applicable to the integrity management of both topside and subsea-located production control system equipment on all installations.

Topside-located production control system equipment comprises as a minimum:
- electrical power unit (EPU);
- master control station (MCS);
- hydraulic power unit (HPU), and
- subsea power and communication unit (SPCU).

The subsea-located production control system equipment comprises as a minimum:
- subsea distribution module (SDM);
- subsea router module (SRM);
- remote power controller (RPC);
- subsea control module (SCM);
- subsea electronic module (SEM);
- subsea umbilical;
- hydraulic flying lead (HFL);
- electrical flying lead (EFL), and
- sensors.

Figure 1 shows the boundary definition of a subsea production control system.
Figure 1: Boundary definition of a subsea production control system