



Global Projects Organisation

Is your System Safe, Is It Reliable?

Wind farm operators are aware that good reliable systems are needed to ensure all aspects of running and maintaining wind farms are safe and efficient. However, it is also necessary to understand engineering hazards associated with the plant and process systems. By systems, we mean process and power systems such as oil, gas, chemicals, electrical power, lubrication, cooling etc. It is important to understand and recognise the hazards that could make these systems fail. Therefore, safeguards to reduce these risks can be built into the design, thereby reducing risk to the health and safety of operators and maintenance crews, the environment and the plant and process of the asset.

GPO employ the investigative tools to determine the hazards and reduce risk on a regular basis. As part of the design process it is also necessary to ensure the safeguards are reliable and fit for purpose. The safeguards when determined are checked usually by reliability analysis.

Three important considerations for those involved in an engineering system design, whether for an offshore oil & gas installation or wind farm, are:

- Has the system a potential to harm people – this is considered as safety?
- Has the system a potential to cause harm to the environment?
- Does the system carry commercial risk?

Generally the starting point for a project safety review is a HAZOP study. This identifies hazards and operability problems through credible deviations from the design intent. The methodology is based on parameters and guideword examination of the plant or system i.e. *no pressure* or *high pressure*, etc. This is an important step in ensuring that possible hazards have been recognised

Functional Safety

Functional Safety is not about slips and trips but about dynamic active systems and reducing the risks associated with them.

Following a HAZOP study, the three considerations mentioned above are further investigated and mitigated against by the use of functional safety assessment methods. This methodology has been driven by the UK and international safety organisations. The investigative methods used are also very effective when used to investigate risk reduction for environment and commercial risk.

GPO has more than 10 years experience in this field. In the last few years we have increasingly used the methodology on volatile hydrocarbon systems but also on electrical power networks. This is mainly because of the increased use of microprocessor controlled systems, such as power surge protection and short circuit protection systems.

Since the 1990's *IEC61508 - Functional Safety of electrical/electronic/programmable electric safety-related systems* has become an international standard, since its emergence this has been combined with hazard and operability investigative studies to become the driving force for the analysis and consequential improvement in system reliability and availability of the dynamic active systems

GPO uses key industry standard references for determining the Safety Integrity Level (SIL) specification. Our analysis of electrical power distribution networks include guidelines from:

- IEEE - Guidelines 493-2007
- Energy Institute, London - Guidance on Assessing SIL of Electrical Supply Protection.

These guidelines refer to the risk associated with safety of people, this has always been at the forefront of engineering oil & gas processes and structures. Alongside this, and just as important are environmental risks and commercial risks. This must also become the case for wind farm systems.

Functional Safety – Life Cycle Proof Testing

The life cycle maintenance and management concept is raised in IEC61508 and is a further feature of Functional Safety. GPO build these aspects into the design completion, implementation and commissioning process. This requires a register that details all safety critical items which must be maintained during their lifecycle.

Safety issues and mitigating against risk has to be considered very seriously at all times. This should always be included as an activity during any FEED or detailed engineering phase of a project and during the whole life-cycle of a plant or installation.

The GPO consultancy group manages all aspects of hazard and safety analysis when project managing and engineering new and modified systems.