EI 3584

Good practice guidelines

Governance of mechanical lifting operations in the offshore wind industry

G+ Global Offshore Wind Health & Safety Organisation

In partnership with

energy institute

IMCA®

GOVERNANCE OF MECHANICAL LIFTING OPERATIONS IN THE OFFSHORE WIND INDUSTRY

A G+ Good Practice Guideline

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ACKNOWLEDGEMENTS

G+ gratefully acknowledges contributions made by International Marine Contractors Association (IMCA) representatives to the development of this document. IMCA members perform many lifting operations in the life cycle of an offshore wind farm; the working group felt it was essential that guidance in this topic was aligned and cohesive with their organisation.

Presentation

Information in standard black text introduces the background to or rationale for the requirements, providing understanding and discussion of the issues involved.

The guidelines themselves are concise statements of G+ recommendations. They are numbered and shown in **bold, dark blue** text.

Terminology

The terms in bold have special meanings in this good practice guideline (GPG).

Ensure: where, as in many of the guidelines, it is stated that offshore wind companies (OWCs) should 'ensure' something, it means that they should arrange for that task to be done, and check and assure themselves that it is being done. But it does not mean that they should necessarily do the task themselves.

Exclusion zones are areas around a lift operation where personnel are prohibited. They are also sometimes known as red zones or no-go zones.

Lifting includes fleeting, i.e. horizontal movement of a suspended load, as well as vertical lifting and lowering.

Lifting equipment includes both:

– Mechanical equipment used to lift or lower a load: cranes, hoists and winches etc, as well as their supporting structures, mountings or fixing points.
– Items used to attach the loads to the crane, hoist etc – i.e. usually, anything below the crane hook. These include slings, chains, shackles, bags, nets, eyebolts, magnetic and vacuum devices and spreader beams.

Note, however, that this terminology is not universal, and definitions of what is/is not included in each term vary. For example, in some references, the former are called 'equipment', and the latter are 'accessories'. Another variation is that 'appliance' is sometimes used rather than 'equipment'. For the purpose of this GPG, there was no need to make a distinction, as the guidelines are high-level, governance material, and apply similarly to both.

Importantly, though, more detailed and technical regulations, standards and guidance sometimes have differing requirements for equipment with different functions – in particular, between requirements for equipment that lifts or lowers a load, and for items used to attach loads.

May indicates a guideline whose suitability depends on circumstances: '*…it may be helpful to…*'. It is also used to describe different possible cases that need to be considered, for example, in '*…other work may be taking place in the vicinity of lift, and this may have safety interactions*'.

Must/shall: G+ does not have legal authority to mandate requirements, so terms such as 'must' and 'shall' are not used, except when citing legal requirements.

Offshore wind company (OWC): this GPG is intended for all parties involved in the management of lifting operations. Primarily, these will be client organisations (wind farm owners, operators and developers) as well as high-level ('Tier 1 and 2') contractors, such as principal contractors and their lifting teams. Such organisations are collectively referred to as OWCs) in the document. OWC is a deliberately broad term, since the parties involved will vary from project to project, and how responsibilities are shared between them will depend on contractual arrangements.

Personnel: the term 'personnel' is used throughout this GPG to include both employees and contractor staff.

Should: consistent with other G+ Good Practice Guidelines, this document uses 'should' as the default term for presenting good practices. This allows for flexibility in the means of achieving the safety aims, but does not mean that the practice is merely optional. Rather, G+ expects that wind companies to either:

– follow the guidelines (and go beyond them wherever reasonably practicable);
– do something else, demonstrably as at least equally safe, or
– risk assess, justify and document the acceptance of any exemption.

1 INTRODUCTION

This GPG aims to share, advance and encourage good practice for the governance of lifting operations in the offshore wind industry, setting out the collective expectations of G+ members.

A collated list of all the Guidelines themselves (i.e. the 'should' statements) is provided in Annex A.

1.1 BACKGROUND

The G+ Global Offshore Wind Health and Safety Organisation (G+) – Home | G+ Offshore Wind Health and Safety Organisation (gplusoffshorewind.com) – brings together the offshore wind industry to pursue shared goals and outcomes. It is run in partnership with the Energy Institute, which provides the secretariat and supports its work. The G+ has four main work areas:

– incident data reporting and analysis;
– development and publication of good practice guidelines (GPGs);
– Safe by Design workshops, and
– learning from incidents.

A wide range of lifting operations occur in the offshore wind industry, including, for example:

– during construction – lifting of major components, materials, equipment;
– in loading and unloading from vessels, and
– during maintenance of wind turbine generators (WTGs) – technicians will transfer bags of tools and equipment to and from the WTG, and there may be rigging and fleeting of loads within the WTG for maintenance and component replacement activities.

Analysis of safety data reported by G+ members [Health and safety statistics | G+ Offshore Wind Health and Safety Organisation (gplusoffshorewind.com)] has shown that the work process 'lifting operations' has the highest number of incidents reported and that the lack, or inconsistency, of a management system is a reoccurring factor in such incidents. Lifting operations also had a high proportion of 'high potential' incidents when compared to other work processes with high numbers of incidents reported, as shown in Figure 1.

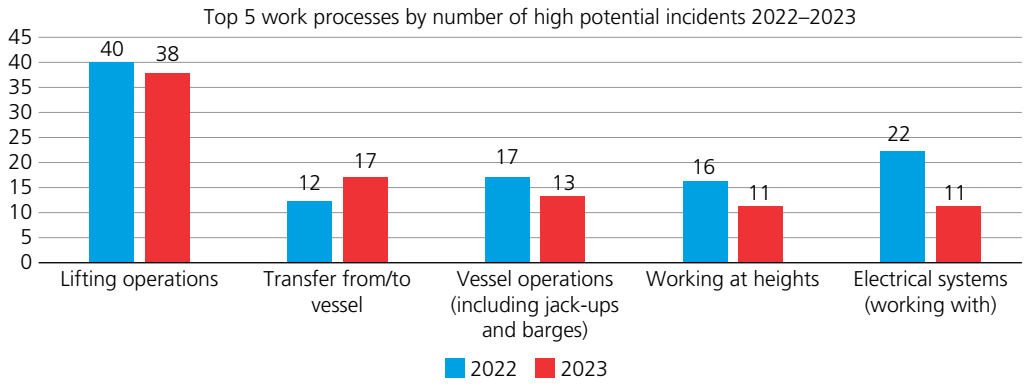

Figure 1: Top 5 work processes by number of high potential incidents 2022–2023 (G+ incident data)

Lifting has therefore long been a concern of G+ members, and this has been reflected in the G+ work programme to date, with outputs such as:

– Safe by Design workshops on topics such as material handling and davit cranes.
– G+/DROPS reliable securing for offshore wind guidance .
– Materials and guidance to run a workshop on routine, smaller lifts that are part of day-to-day operations.

As a continuation of that programme, the G+ convened a working group (WG) of lifting subject matter experts, drawn from member companies, to develop a GPG that would help improve the safety of lifting operations. Those experts identified that although very good technical lifting guidance and standards exist that apply to the industry, there was a gap in guidance on overarching lifting governance.

1.2 WHAT IS LIFTING GOVERNANCE?

Lifting governance, in this GPG, refers to the organisational structures, roles and responsibilities, policies and management procedures that are used to manage and control lifting operations. Governance is a key component of a safety management system (SMS), helping to ensure effective, consistent and coherent management across all aspects of lifting, such as planning and review, execution, equipment management, incident investigation and auditing.

Many aspects of lifting governance will be common to those for other offshore wind activities. Indeed, for efficiency and coherence, they should be so. For example, the arrangements for reporting, investigating and learning from incidents should be the same for lifting incidents as for other types of incident. This GPG focuses on the aspects of governance that are most important and specific to lifting, and how good governance systems can sustain improvements in safety of lifting operations. It touches on some aspects of generic governance and safety management systems, but does not provide comprehensive guidance on them.

1.3 OBJECTIVES

This GPG aims to share, advance and encourage good practice in managing lifting operations in the offshore wind industry, specifically by providing guidelines for effective governance. It sets out the collective expectations of G+ members.

It builds on and signposts existing good practices and guidance (standards, recommendations, codes of practice etc.) from the wind industry and the wider marine and offshore energy sectors.

1.4 AUDIENCES AND USES OF THE GPG

This GPG is intended for all parties involved in the management of lifting operations. Primarily, these will be client organisations (wind farm owners, operators and developers) as well as high-level ('Tier 1 and 2') contractors, such as principal contractors and their lifting teams. Such organisations are collectively referred to as 'Offshore Wind Companies' (OWCs) in this document. OWC is a deliberately broad term, since the parties involved will vary from project to project, and how responsibilities are shared between them will depend on contractual arrangements.

We anticipate that the GPG will be of particular value to OWCs that do not have an extensive wind industry background, or much technical involvement with projects. And, in line with the focus on governance, the GPG is likely to be more relevant for managers than for 'front-line' operational personnel. But it may be beneficial for any personnel involved in lifting to be aware of the GPG.

The GPG is a reference for organisations to use in developing their 'intelligent client' capability[1] and to adopt and implement within their own SMS. The GPG can be used, for example, to:

- establish consistent, common ground for the project, avoiding conflict between the systems of different parties (OWCs, contractors, original equipment manufacturers (OEMs) etc.);
- incorporate into company standards, procedures and practices;
- incorporate into contract specifications;
- provide prompts for use in gap analyses, audits and reviews, and
- provide a resource to use in developing 'golden rules' for front-line personnel, such as the right and duty to stop work if there is imminent danger.

The GPG may also be of use to other interested parties, such as health and safety (H&S) professionals in the wind industry, other industries that interface with offshore wind, and H&S regulators.

1.5 SCOPE

This GPG is a system level document, but specific to the offshore wind context as shown in Figure 2.

Figure 2: Focus and emphasis of the GPG

A key consideration in deciding the scope was whether there was a gap, i.e. a need for guidance not available elsewhere.

1 The 'Intelligent Client' concept is the ability for an organisation to pass specialist activities to contractors to plan and perform, whilst having the procedures and competencies to ensure that there is informed review of what contractors are proposing/doing, recognising potential errors or unsafe proposals and challenging where appropriate.

The GPG aims to address lifting in offshore wind as comprehensively as possible, including:

– offshore wind farms and organisations of all sizes, and at any location globally;
– operations on both new and existing sites;
– the entire wind farm life cycle, from planning and design, through construction, operation and planned or unplanned maintenance to repowering or decommissioning, and
– cross-life-cycle aspects such as incident reporting and feedback, auditing, monitoring and review.

The focus is on offshore lifting, but much of the content will also apply, at least in part, to onshore lifting related to the offshore wind, such as at cable landfall sites.

The main **exclusions** from the scope of the GPG are:

– H&S management in general (i.e. within or beyond the offshore wind industry), such as the principles of risk assessment or the hierarchy of control. It is assumed that users of this GPG already have an SMS in place. Nevertheless, because the maturity of SMSs varies across the industry, and for clarity, we have mentioned some generic SMS principles, especially where there are lifting-specific aspects.
– Climate, sustainability or other environmental aspects of the design, selection or use of equipment.
– Purpose-designed passenger-carrying lifting equipment, such as service lifts inside WTGs.
– Lifting by means of manual handling, i.e. lifts in which a person picks up the load, without assistance from mechanical equipment. There may still be some manual handling involved in mechanical lifting, e.g. when using tag lines or manoeuvring loads into slings. However, this GPG is just about lifting using mechanical devices: it does not cover ergonomics of any such manual handling.
– Climb assist systems, fitted to fall arrest equipment to help personnel climb ladders.
– 'process' type equipment for handling or moving equipment and materials, such as conveyor belts or pipelines.
– Helicopter hoisting (this is covered in the G+ GPG on helicopter operations).
– Details of legislation and guidance in individual regions or states.
– The detailed design of lifting equipment and attachment points on loads. Nevertheless, OWCs do need to consider whether the equipment that they or their contractors select and purchase is safe by design – see 2.9.
– Quality and other controls in the processes for the design, manufacture and certification of lifting equipment (the importance of procuring properly designed, manufactured and certified equipment is included, but not the processes used internally by equipment designers or manufacturers).
– Detailed technical aspects of lift operations, such as the selection of ropes and attachments or the design of slinging arrangements. The GPG does, however, signpost some more detailed technical standards and guidance.

1.6 RELATIONSHIP TO REGULATIONS, STANDARDS AND OTHER GUIDANCE

This GPG complements regulations, standards and other guidance.

Wind companies must comply with all relevant legal duties and should take account of regulatory and other authoritative standards and guidance.

Where there are differences between these guidelines and local legislation and regulatory requirements (or flag state requirements for vessels and vessel crews), the more stringent should be followed.

As explained in the Terminology section, for the purpose of this GPG, there was no need to make distinctions between different types of lifting equipment. However, more detailed and technical regulations, standards and guidance sometimes have differing requirements for equipment that lifts or lowers a load (cranes, hoists etc.), and for items used to attach loads to them (slings, chains etc.). The OWC's system for ensuring compliance will need to recognise this.

Documents that complement these guidelines are referenced at various points throughout this GPG. The key documents of which OWCs should be aware and that are most likely to be relevant are identified in Table 1. (A complete list of references is in Annex F, and a bibliography is in Annex G.)

Table 1: Key references complementary to this GPG

Topic	Publishing organisation	Reference	Primary audience	Comment
Offshore lifting	International Marine Contractors Association (IMCA) and G+	**IMCA LR 006** Guidelines for Lifting Operations, Aug 2022	Marine contractors, service companies, energy companies, and their supply chain	Governance and intelligent client not explicitly addressed Includes a lift plan template Signposts many other IMCA documents for more detailed guidance, e.g. on equipment
Onshore and offshore lifting	International Association of Oil & Gas Producers (IOGP)	**IOGP 376** Lifting and hoisting recommended practice, Aug 2022	IOGP members (oil and gas industry) and their lifting providers	Governance and intelligent client not explicitly addressed Uses 10 principles as a framework Includes checklists for start of work and personnel lifting (see also 2.2.4) Signposts IMCA LR 006 for offshore technical aspects

1.7 STRUCTURE OF THE GPG

After this introductory section (1), guidelines on general principles for lifting governance are given in section 2. Section 3 gives additional guidelines for specific lifting operations and contexts: lifting of personnel, work under suspended loads and others. Section 4 summarises the key messages of the GPG.

2 GUIDELINES – CORE PRINCIPLES OF LIFTING GOVERNANCE

The following core principles have been identified as essential to effective governance in all lifting operations and contexts:

1. Competence.
2. Roles and responsibilities.
3. Support and engagement and information sharing.
4. Lift categorisation.
5. Risk assessment.
6. Lift planning.
7. Human factors.
8. Exclusion zones.
9. Design, selection, use and management of lifting equipment.
10. Management of change.
11. Continual improvement.

Details and guidelines for each principle are presented in sections 2.1 to 2.11.

2.1 PRINCIPLE 1 – COMPETENCE

The required competencies will vary widely across the spectrum of lifting operations, the nature and magnitude of the risks, and the roles and responsibilities of those involved.

G.1 OWCs should ensure that all personnel involved in leadership, development, implementation and management of the governance system, in planning and carrying out lifting operations and in supporting tasks such as risk assessment, inspection and audit, have and maintain the necessary competencies for their role.

Competence means having the experience, education, qualifications, training, knowledge, skills, attitudes and abilities for the role. Physical and cognitive factors on the day can also affect someone's competence (see 2.7).

Those involved in leadership, and in development, implementation and management of the governance system may not need to be lifting specialists, but should be competent in safety management and have a good understanding of the issues associated with lifting.

Competence will generally need to encompass both generic principles of lifting and aspects specific to the role and the types of lift that may be performed, in their operational and environmental contexts.

Where external contractors are used, their competence should be verified as part of the pre-qualification, selection and control process.

It should be possible for the project or site staff to check a person's competence as part of the review and acceptance process.

To maintain competence and avoid skill fade, regular assessment and refresher training should be provided.

As a starting point for defining competencies, Annex B presents typical competencies for developing the lifting governance system and for the various functions involved in lifting. OWCs should, however, review and adapt this in line with their own organisational and contract structures, the nature of the lifting operations to be carried out, and the associated risks.

G.2 OWCs should ensure they have access to lifting subject matter expertise.

As lifting is specialist topic, OWCs need access to subject matter expert(s) (SMEs) to help them exercise proper oversight or control of lifting operations. SME roles can include, for example, reviewing the design or selection of equipment, reviewing lift plans, developing/ reviewing inspection programmes or reviewing the competence of contractors. The SME can be in-house or external (third-party).

G.3 OWCs should ensure that those defining and assessing the required competencies are competent for this task.

G.4 OWCs should take into account the competence of personnel when conducting risk assessments and planning lifting operations.

This is an iterative process: risk assessments should also help in determining the required competencies.

2.2 PRINCIPLE 2 – ROLES AND RESPONSIBILITIES

G.5 OWCs should ensure that senior management shows safety leadership, setting clear expectations and good examples of safe attitudes and behaviours.

The ‘tone from the top’ is crucial in any organisation. Senior managers should set clear expectations, exemplify safety attitudes and behaviours and listen actively to personnel, thus building trust and a psychologically safe culture where concerns and learning can be shared openly. The governance system should have the support of, and sign-off by, senior management.

G.6 OWCs should ensure that everyone involved in lifting has their roles, responsibilities, and associated competencies clearly defined, communicated, and understood.

For each specific lift, the number of people required and their competencies should be detailed in, for example, the lift plan (see 6 and Annex D).

G.7 OWC should define roles and responsibilities at a high level in corporate or regional lifting procedures, with details relating to specific lifts described in lower level documentation, such as lift plans.

Overall, continuing responsibilities should be defined in procedures etc. The lift plan for each is the place for more detail of responsibilities for tasks involved in that specific lift. (See also Annex D on the differences between lifting procedures and lift plans.)

G.8 OWCs should ensure that one person is designated as in charge for each lift.

This is to ensure there is no confusion about responsibilities on site.

G.9 OWCs should ensure that all personnel understand that they have a duty and a right to stop the lift where they perceive an imminent danger.

OWCs could also consider the use of tools to support lift crews in verifying that all controls are in place and functioning as intended before a lift starts. Such tools focus on ensuring it is safe to start, rather than relying on someone noticing and work being stopped in time and appropriately to prevent an incident. They help identify issues and create the opportunity to address them before workers are exposed to risk. See, for example, the IOGP Start Work Checks for mechanical lifting and man-riding (personnel lifts) in Life-Saving Rules – Start Work Checks and in IOGP 376.

2.3 PRINCIPLE 3 – SUPPORT, ENGAGEMENT AND INFORMATION SHARING

G.10 OWCs should identify, document and implement appropriate stakeholder engagement for all work processes.

Engagement with OEMs will be necessary to ensure that equipment is safe by design – see 2.9.

For certain higher risk or complex lifts, review and sign-off of key documents may be needed, for example by lifting or health and safety (H&S) specialists, marine warranty surveyors or others. Engineering departments may be required to review rigging and lifting arrangements, and/or to carry out structural calculations. These sign-off stages should be set as decision gates in the management system, with clear pathways that cannot be bypassed without the required approvals.

G.11 OWCs should set up systems, processes and agreements to ensure good information sharing ('why' as well as 'what') between all parties.

Information sharing between all parties (clients, contractors, OEMs etc) is essential for day-to-day operations, both for the intelligent client concept to work and to help develop a good safety culture.

It is important to share 'why' information, as well as 'what'. For example, in order to carry out their roles effectively, lifting SMEs (see G.2) should have access to the information that the OEM or contractor used to make their decisions regarding, for example, equipment design or selection, or how a work activity would be carried out. Also, parties may make potentially unsafe changes if they do not understand the rationale for and implications of decisions made earlier.

2.4 PRINCIPLE 4 – LIFT CATEGORISATION

Lift categorisation is part of the planning process. The purpose of categorisation is to identify, in a risk-based way, what levels of control need to be applied in ongoing assessment, planning and execution of the lift.

The category will depend on factors such as whether the crane operator's view will be restricted, the percentage of the equipment's load capacity required, and whether personnel are to be lifted. The assigned category then determines the controls required, for example in terms of the required processes and documentation, who should be involved, and any additional on-site controls.

G.12 OWCs should categorise all lifts

Categorisation should be based on tools, processes and criteria that reduce reliance on purely subjective opinion.

IOGP 376 contains a simple methodology for categorisation, and provides illustrative examples of the risk control measures that might be appropriate to each category.

At present there is no industry-wide standard for categorisation schemes. Some organisations use three categories, some just two, and the titles and criteria vary as well. What is most important is that all organisations involved in lifting liaise at the start of a project, to identify any potential inconsistencies and agree on a categorisation scheme and associated risk control measures.

Illustrative examples of lift categories are provided in Annex C.

2.5 PRINCIPLE 5 – RISK ASSESSMENT

Lift categorisation (2.4) is a form of early, high-level risk assessment (or risk categorisation), used to guide the overall process of preparation for a lift. But more detailed risk assessment (sometime referred to as a job risk assessment) will also be needed for the on-site execution of the lift.

G.13 OWCs should ensure that a suitable and sufficient risk assessment is prepared and documented for every lift, regardless of lift category.

G.14 OWCs should ensure that risk assessments are carried out by personnel with competence appropriate to the lifting operation, and in the process of risk assessment.

G.15 OWCs should ensure that risk assessments involve expertise from front-line lifting teams.

Risk assessment is not just a desk exercise. Involving front-line personnel will ensure that their practical experience is captured and make it more likely that control measures identified in the assessment will be implemented and followed.

G.16 OWCs should ensure that risk assessments are tailored and updated to accurately reflect the specifics of each lift, in its operational and environmental context.

Generic risk assessments are likely to fail to take account of important factors specific to each lift and its context.

The focus should be on identifying and assessing 'non-common', hazards and controls specific to the lift under consideration. Common hazards should have already been recognised, and eliminated or minimised by design, or through existing, generic procedures and controls. Too often, risk assessments merely restate the generic hazards and controls, and miss aspects specific to that lift.

Risk assessments, especially generic ones, are vulnerable to being ignored due to over-familiarity, or being seen as adding little value ('just paperwork'). Accordingly, they should be evaluated before each task, as well as being periodically reviewed and updated.

2.6 PRINCIPLE 6 – LIFT PLANNING

A lift plan is, in effect, a method statement: a detailed instruction on how to perform a specific task, incorporating and collating all relevant information. The primary audience is the on-site lift crew: those physically present and involved in the lift operation; the content should be developed with this audience in mind. (The differences between a lift plan and a lifting procedure are explained in Annex D2.)

G.17 OWCs should ensure that a documented lift plan is prepared for every lift, with the content and level of detail appropriate to the lift category.

An illustrative outline of the typical contents of a lift plan is provided in Annex D. OWCs should specify minimum lift plan content for the lift categories that they adopt.

G.18 OWCs should ensure that a permit to work system is available for use with higher hazard lifts or where other work may be taking place in the vicinity of the lift.

Permit to work (PTW) systems or equivalents are often used to control higher-hazard activities, such as lifting, hot work and electrical work. They formalise the process for requesting and authorising such activities to control who can do what, where, when and how.

PTW systems are particularly important when different activities are taking place in, or could affect, the same area, as there are likely to be safety interactions. As a simple example, workers engaged in other tasks might inadvertently enter a lifting exclusion zone (G.22). A PTW system will help ensure that any conflicts between activities are resolved and that the work co-ordinator or supervisor has a good awareness of everything happening on site.

2.7 PRINCIPLE 7 – HUMAN FACTORS

Human factors is an umbrella term for the study of people's performance in their work and other environments. Perhaps because human factors is often discussed as 'human error' in incident investigations, it is easy to think of it negatively. However, human factors also includes the positive aspects of human performance: the unique things that human beings do well, and how to set-up systems and processes that enable that. Applying human factors principles should aim to optimise the fit between people and the systems in which they work, to improve safety and performance.

G.19 OWCs should apply human performance principles throughout the development and implementation of the lifting governance system.

Systems should be designed and implemented to eliminate the chance for human error where possible and ensure that the system is resilient to the variability of human performance and the inevitability of error. Error can occur in any role: management, designers, engineers, crane operators, banksmen etc. The system needs to make it easier for workers, especially those at the 'front line'/point of risk, to get it right on the day and harder to get it wrong. If something goes wrong, the system needs to fail safely.

Key human factors principles for developing and implementing a governance system are that:

- Front-line workers should not be relied upon as the primary control measure, solving any problems that may occur on the day. Rather, the OWC should empower the lift crew with tools, competence and authority to understand the work situation, check whether safety controls are present and functioning and to stop the work and seek further support if they have any doubts. (See also 2.2.4 on start work checks.)
- People's performance is shaped by their capabilities and limitations, both physical and psychological.
- Performance is variable: people cannot be expected to act at peak performance all of the time.
- People interpret situations differently and perform in ways that make sense to them at the time.
- People adapt to meet the demands of a complex and dynamic work environment.
- People assess risk and make trade-offs.
- People's performance is influenced by other people, technology and the environment.
- The pressures on personnel that may lead them to act other than in the safest way should be recognised and allowed for. Commercial and financial pressures to meet project deadlines can be very powerful. Time pressure can also arise within the operational team itself. For example, on a routine maintenance trip to a WTG, the last activity of the day is lifting bags down to the crew transfer vessel (CTV). There are pressures to get this done quickly in order not to delay departure.

When human error is identified as a cause of incidents, as it so often is, organisations often focus on the actions of the last person to touch the equipment (usually someone on the front line, at the highest point of risk), rather than on everything else that happened up until that moment. When an incident involving human error happens, understanding why people acted as they did is critical to understanding how work is done (as opposed to 'work as imagined') and what is needed to improve performance. EI 3295 *Learning from incidents, accidents and events* and IMCA HSSE 016 *Guidance on the investigation and reporting of incidents* are useful references on this topic.

G.20 OWCs should plan and conduct lifting operations to ensure good communications and clear understanding of responsibilities.

The following should be defined in the lift planning phase:

- primary means of communication;
- secondary (backup) means of communication, and
- emergency hand signals.

Before every shift/crew change, and whenever communication arrangements change significantly, crews should:

- confirm and test the primary and secondary means of communication (radio channels etc.);
- confirm the emergency stop and other hand signals;
- if necessary, confirm the language in use;
- confirm who is the person in charge of the lift and who is the bankmans/signaller;
- ensure all crew members understand their individual roles and responsibilities, and
- ensure that the emergency plan is understood.

Example: communication issues and potential solutions

'Every time I asked a group of people involved in offshore wind what the signal for emergency stop is, I get different signals.'

Hand signals are important because most people watching a lift will not be on the radio, but may see a need to call an emergency stop.

There should be only one dedicated bankmans/signaller directing a crane operator at any one time. This individual should be acknowledged and approved by the entire lift crew. Colour differentiation can be utilised to identify the bankmans/signaller, by assigning them a different colour helmet/hard hat or high-visibility tabard compared to other crew members.

Where more than one bankmans is needed, e.g. to view the lift from different angles, any handover between directing bankmans should be formally communicated and agreed between them and accepted by the crane operator.

Secondary (backup) communication is important, as someone may be blocking the channel, e.g. by inadvertently leaning on the 'transmit' button of a radio, as well as because of the potential for failure of the primary means. If there are any problems or doubt with communications the lift should stop immediately, until the difficulties can be resolved.

For blind lifts, there should be continuous, two-way communication between the bankmans/signaller and the crane operator (e.g. using Bluetooth devices), as this allows far more nuanced information than 'one way at a time' radio that is in either transmit or receive mode. Two-way continuous radio can also be helpful in other situations.

Communication arrangements such as the above should be set out as part of developing the lift plan.

G.21 OWCs should take steps to ensure that complacency does not creep in.

There is a danger of complacency with routine operations, especially if they are, or are seen as, inherently low risk. Complacency can manifest itself in both:

- on-site behaviours (taking short-cuts, reduced vigilance etc.), and
- in the development of documents and procedures (e.g. in using 'copied and pasted' lift plans and risk assessments that fail to identify or take account of the specifics of the lift to be carried out, as noted in 2.5.4).

The most effective methods to ensure that awareness and vigilance are maintained will depend on the OWC's operations and overall safety culture, but can include, for example, sharing learning from incidents (see 2.11.3), and holding toolbox talks at the start of each shift.

A useful resource is the G+ Workshop document Improving compliance workshop – basic lifting operations. This provides material and guidance for running a workshop with offshore technicians, aiming to share ideas and improve safety in the routine, smaller lifts that are part of day-to-day operations – a safe space for those who are expected to comply with procedures to voice their opinions about why non-compliance occurs, and how safety could be improved.

2.8 PRINCIPLE 8 – EXCLUSION ZONES

This subsection covers exclusion zones in general. For guidelines on work under suspended loads (WUSL), see 3.2.

G.22 OWCs should ensure that exclusion zones are established around each lifting or landing area.

An exclusion zone should be established to prevent personnel entering any at-risk areas, from when a lift is ready to commence until it is completed. The zone should be marked, barriered, clearly communicated to personnel and monitored to ensure that people do not enter it or move/remove barriers.

The size and shape of the zone should be determined from the risk assessment, taking account of hazards from both planned and potential unplanned movements of loads and equipment. The hazards include:

– being struck by moving loads or equipment;
– dropped objects, and
– trapping or crushing between a load or equipment and another object.

Additional outer zones can also be established where lift crew members are allowed as and when essential, but other personnel are excluded.

The PTW system (see G.17) should identify activities that are being undertaken nearby simultaneous operations (SIMOPS) and that may need to be restricted during lifting or necessitate restrictions on lifting.

Example: hazards from swinging hook blocks

One of the OWCs involved in developing this GPG has experienced incidents in which an empty (i.e. unloaded) hook block of a nacelle crane/hoist/winch has been blown by the wind, smashed against the tower wall and broken into pieces, resulting in a dropped object(s).

As towers become taller and the suspension point moves further out from the tower wall, greater swing amplitudes can develop, and so the potential impact force if a block hits the tower wall increases. Ideally, safe-by-design principles would eliminate or minimise this risk, and/or the forces taken into consideration in the design and material selection of hook blocks.

On existing WTGs, however, as a result of these incidents, the OWC does not allow anyone to be on the Transition Piece when an empty hoist block is deployed.

Example: hazards from hoist chain spilling out of the chain bucket

Some designs of chain hoist have a failing that allows excess chain building up in the chain bucket to spill over the side. This has been known to happen many times in the wind industry. There is a risk that the chain could then strike persons below.

This hazard can arise with both nacelle-mounted hoists and portable hoists used inside the WTG to support O&M activities.

Again, appropriate safe-by-design principles could eliminate or minimise this risk, but if this is not reasonably practicable with existing systems, at least in the short term, other mitigations should be put in place.

G.23 OWCs should ensure that stored energy is identified on the lift plan and controls are implemented to keep people out of the line of fire or danger zone.

G.24 OWCs should follow the G+ Dropped Loads guidance.

See G+/DROPS – Reliable securing booklet for offshore wind

Further resources available on the DROPS website as well as IMCA's, for example this video.

2.9 PRINCIPLE 9 – DESIGN, SELECTION, USE AND MANAGEMENT OF LIFTING EQUIPMENT

Safe lifting operations depend, largely, on the continued safety of the equipment.

2.9.1 OWC involvement in safety by design

OWCs and OEMs can have different roles in relation to design. Where an OWC buys ‘off the shelf’ items, the design process will have been the responsibility of the OEM.

For bespoke items, the OWC will have more input into specification and design. In some cases, the OWC may themselves be the designer. But safety by design is important regardless of how the roles of OWC and OEM, and the relationships between them, are defined.

G.25 OWCs should assure themselves that the principles of safety by design have been respected.

General principles and approaches for safety by design in offshore wind are set out in the *G+ Safe by design – Good practice guidance for the offshore wind industry*

For more information on specific applications of safety by design principles, please refer to the G+ Safe by Design webpages at G+ Offshore Wind Health and Safety Organisation. The SafetyOn material at Work programme SafetyOn may also be useful. Currently, relevant specific reports are:

- the *G+ Safe by design GPG*
- *G+ Safe by design workshop report: Material handling*
- *G+ Safe by design workshop report: Davit cranes*
- *SafetyOn Safe by design workshop report: Working under suspended loads – major component exchange* (but see also 3.2 for guidelines specific to work under suspended loads).

Two aspects of safety by design particularly relevant to lifting are:

- the design/review cycle, and
- the engagement of the right interested parties.

Summary guidance on these two topics is presented as follows but, again, OWCs are referred to the G+ Safe by Design GPG for a more comprehensive account of safe by design principles and approaches.

2.9.2 Safe by design review cycles

Effective design reviews are critical for the safety, usability and correct application of lifting equipment.

G.26 OWCs should assure themselves that an effective design review cycle is being, or has been, applied.

The frequency and level of design review will depend on the item's complexity and the design solution. Complex items such as motion-compensated equipment, vessel cranes, and WTG internal hoists or davit cranes will need more frequent, periodic reviews throughout the design process.

Topics to be considered in initial solution development typically include:

- the principles of safe lifting operations;
- the environment in which the system will be operated;
- integration with surrounding assets and equipment;
- safe operability and usability (see Human Factors – 2.7), and
- learning from experience (LfE) – from past designs and feedback from users, clients/customers and others.

2.9.3 Engagement of the right people

Unless the appropriate range of competent people from the various interested groups are involved, the assurance of the suitability and safety of a given solution will be low. This potentially leads to costly and/or non-ideal solutions having to be retrofitted later on, and may also contribute to the occurrence of accidents or incidents.

G.27 OWCs should ensure that all relevant interested parties are involved in key stages of design, review and acceptance.

G.28 Where the OWC is procuring lifting equipment from an OEM, the OWC should involve its lifting specialists in engagement with the OEM.

Relevant personnel should be present from the start to ensure that the designers have all the inputs required, and through the review cycles.

The disciplines that might typically be involved with a design review for a complex lifting solution include:

- lifting specialists;
- other relevant SMEs;
- engineering disciplines (e.g. mechanical or control depending on the concept);
- H&S;
- human factors;
- construction (for views on constructability etc.);
- O&M (for views on operability, maintainability etc.), and
- projects.

2.9.4 Suitability and adequacy of equipment

G.29 OWCs should ensure that lifting equipment is suitable and adequate for the specific lift and its context.

Certification or other forms of approval may form part of the assessment of suitability and adequacy, but are not always essential, or sufficient.

G.30 OWCs should check the maintenance and inspection records of lifting equipment before bringing it ont o a project.

2.9.5 Use of equipment

G.31 OWCs should ensure that lifting equipment is used according to industry-recognised standards and OEM instructions.

A key area for attention is load limits and safety factors.

G.32 OWCs should ensure that there is a common understanding of the load limit parameters in use, and their meanings, in each situation.

These can be defined in term of various parameters, such as:

- MRC – rated capacity (or sometimes maximum, or manufacturer's, rated capacity);
- SWL – safe working load;
- WLL – working load limit (WLL), and
- MBL – minimum breaking load.

Such parameters can have different meanings, for example, whether they refer to the maximum load that an item is designed to raise, lower, or suspend in any situation, or within a specific configuration or application. The actual capacity may be less than the full rated capacity due to factors such as the load radius, or wind load. Also, there are variations in terminology and meanings between organisations and regions. Consequently, it is important that everyone who may need to use such limits has a common understanding of the parameters used and their meanings.

G.33 OWCs should ensure that equipment (whether off the shelf or bespoke) is used only for its intended purposes, and remains safe within the specific operational and environmental context of use.

Even where an item has been assessed as 'safe by design', it is essential to recognise that an item is only safe in that context of use.

G.34 OWCs should ensure that safety and monitoring devices are fully operational and not bypassed or disabled.

The bypassing of safety devices, alarms and alerts can happen when frequent false alerts or shutdowns occur that are considered to be a nuisance. This practice is dangerous and unacceptable.

2.9.6 Asset management

OWCs need to maintain up-to-date information about the lifting equipment they use.

G.35 OWCs should ensure that lifting equipment is operated, inspected, examined, maintained and controlled to ensure its continued safety functionality, performance, integrity and reliability.

An effective asset management programme, with a register or database to enable recording and making information available, will assist in ensuring that:

- Equipment is used only for its intended purpose and within its operational and environmental limits (see Guideline 2.9.9).
- Deterioration is minimised and detected. Equipment will have a finite life; the rate of deterioration will depend on factors such as usage, maintenance, the environment and elapsed time.

The programme should include:

- issue and return of items;
- operation, inspection, examination and maintenance histories and due dates, and
- quarantining etc.

Asset management programmes will involve various departments and functions within the OWC, such as engineering, operations, and maintenance, and should cover mechanical, electrical, hydraulic and pneumatic systems. OWCs often appoint specialist third-party contractors to support these activities where the scope of work is beyond their expertise or resource capacity or where independence and/or accredited status are required.

2.9.7 Inspection

The main objective of inspection is to determine whether an item is fit for purpose and safe for continued use. Inspections may be needed at specific stages in the life cycle, and in service, including for example:

- Commissioning inspections and tests of newly installed or assembled equipment, to ensure it is correctly set up and functioning as required. Such inspections are normally performed by the OEM or a competent, independent third party.
- Statutory inspections/'thorough examinations' at certain intervals, as legally required or advised. 'Thorough examination' has a special meaning in some jurisdictions, such as in the Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) in the UK. Ideally, such inspection/examination should be performed by an independent third party.
- Other regular in-service inspections, for example to improve safety, reliability and availability by identifying needs for preventive maintenance.
- Pre- and post-use checks: functional and condition checks to pick up faults or damage due to day-to-day wear and tear or incidents, carried out by competent users/technicians.
- Special inspections for any other reason: for example, after 'exceptional circumstances' have occurred, such as overloading, misuse, damage, alterations or prolonged disuse.

Inspections can include checks of associated documentation, such as certificates and maintenance records, as well as inspection of the physical items themselves.

G.36 OWCs should ensure that personnel carrying out inspections and examinations have an appropriate level of independence.

Having inspections and examinations carried out by an external (third-party) organisation can help to ensure independence, by avoiding a situation in which someone checks their own work, and reducing the risk of conflict with time and cost pressures. But it is not always essential to have a third party. Statutory inspection, for example, should preferably be carried out by a third party but it may be reasonable, and indeed desirable, for the operator to carry out daily pre- and post-use checks on the equipment they use. OWC management should support in-house examiners/inspectors in using their authority and independence.

2.9.8 Third-party inspection

G.37 OWCs should undertake a suitable qualification process before appointing a third-party inspection organisation.

Factors for the OWC to consider include the organisation's technical competence, validity of inspection methodology and techniques, impartiality, organisational and administrative capability and quality management system.

The process may include establishing that the organisation has accreditation by a recognised external accreditation body.

An example of criteria for accreditation of inspection organisations is ISO/IEC 17020 ISO/IEC 17020:2012 *Conformity assessment — Requirements for the operation of various types of bodies performing inspection*. This standard specifies requirements for the competence of the inspection organisation and for the impartiality and consistency of their inspection activities.

2.9.9 Maintenance

Maintenance may be preventive or reactive. It may include one or more of the following:

– servicing, e.g. lubrication, oil and filter changes;
– adjustment and/or verification, e.g. bolt torquing, functioning of safety protection devices;
– replacement of components, e.g. wire rope;
– major overhaul, e.g. of mechanical or electrical systems;
– dismantling equipment to enable inspection, and
– repair or corrective activities, e.g. addressing findings from inspections or thorough examination.

This wide variety of maintenance tasks, and the different frequencies at which they will be required, underlines the need for an asset management system (see Guideline 2.9.11).

2.9.10 Frequency and nature of inspection and maintenance

G.38 OWCs should ensure that inspection and maintenance take place at predetermined time intervals and at other times when necessary throughout the equipment's working life.

G.39 OWCs should ensure that inspection and maintenance are at least as frequent and extensive as set out in manufacturers' recommendations and any statutory requirements or regulatory guidance relevant to the jurisdiction of operation.

Various factors, including the following, may affect the required nature and frequency of inspection and maintenance:

– frequency of use, e.g. general duty, heavy duty or infrequent;
– operational cycles or hours of service (some equipment can have counters built into the design);
– environmental conditions, e.g. exposure to sea water or spray that can accelerate corrosion, extreme temperatures, and
– safety factors, working tolerances and discard criteria.

Condition monitoring can be used to support and inform the inspection and maintenance programme. Techniques and technologies for condition monitoring include temperature, vibration and oil or grease monitoring, and simple design features such as wear indicators. These can effectively alert the OWC to impending failure and help to focus inspection and maintenance in a risk-based way.

2.9.11 Evaluation of inspection and maintenance findings

G.40 OWCs should record, analyse and evaluate inspection and maintenance findings in order to identify any trends and support continual improvement.

2.10 PRINCIPLE 10 – MANAGEMENT OF CHANGE (MOC)

G.41 OWCs should have clear criteria and procedures in place for managing change, both planned and reactive.

Aspects to be covered include:

- What counts as a change requiring the OWC's formal management of change (MOC) procedure: what, for example, are the physical, operational or environmental criteria?
- How to review the acceptability of the change and who (e.g. in terms of their competence) should carry out such a review.
- The actions that may be taken as a result of the review, such as: a full MoC process, a (temporary or one-off) dispensation against a nonconformity, or an update to existing policies, procedures, safe systems of work or other elements of the management system.
- Who should approve the change and planned actions.
- The criteria for stopping the process and carrying out a more detailed review.

Work under suspended load (WUSL) – see 3.2 – is an example of a situation in which the MOC procedure should be followed, since it falls outside the general principle of not allowing anyone to be under a suspended load.

General guidance on managing change is available in IMCA HSSE 001 *Guidelines for management of change.*

When change occurs, care is needed to resist time pressure and the natural tendency to press on with the job. This is particularly the case for reactive changes, which will be, to some extent, unexpected.

2.10.1 Planned changes

Planned changes are any planned works that are not in accordance with existing policies, procedures, safe systems of work or other elements of the management system. They can include, for example, changes in lifting contractors, or in the planned lift procedure or equipment.

2.10.2 Reactive changes during a lift

Changes may become necessary or be proposed during a lift because of, for example:

- changes in forecast or actual environmental conditions that may lead to exceedance of environmental limits (see lift plan contents in Annex D);
- equipment breakdown;
- late delivery of lifting equipment or of the loads to be lifted;
- changes in simultaneous or neighbouring operations (SIMOPs), where there are interactions or dependencies;

– unplanned absence of personnel, e.g. due to sickness, and
– discovery of non-conformances requiring correction.

2.10.3 Innovation management

The offshore wind industry is constantly evolving, and the technologies and tools used to perform lifting operations are continually being updated.

G.42 OWCs should have clear and defined processes in place for technical due diligence (TDD) checks on new equipment and work processes.

These TDD checks should involve all required departments of the organisation, including, but not limited to, the relevant SMEs, engineering and H&S.

Those performing TDD should, as far as possible, be independent of the project to help ensure unbiased and objective decisions.

A typical process to manage a TDD would be for the project or contractor proposing the use of a new item of equipment or process to issue a written justification outlining why the equipment is appropriate for the task and its environment.

As an example, the written justification might include, for example:

– manufacturer's specifications, user manual/instructions, data sheets etc;
– operational and environmental limitations;
– engineering details and reports;
– failure analyses such as failure modes and effects analysis (FMEA) or failure modes, effects and criticality analysis (FMECA);
– details of certification and conformity to relevant standards;
– inspection and maintenance requirements;
– training requirements for personnel using the system, and
– historical data from testing and development.

It should conclude with a summary (comparative risk assessment) of the advantages and disadvantages relative to current systems.

The team performing the TDD should evaluate all this information and respond to the requester with their opinion on whether the innovation should be adopted, stating any additional controls to be implemented.

2.11 PRINCIPLE 11 – CONTINUAL IMPROVEMENT

G.43 OWCs should keep the governance system under systematic review and revision.

Like any aspect of an SMS, the governance system itself will need systematic review and revision at minimum intervals and whenever relevant changes occur (as well as defining the process to ensure that all other aspects of the SMS are kept up to date and continually improved).

G.44 OWCs should establish systems and processes to detect warning signals, gain and share learning from experience (LfE), and identify opportunities for improving safety.

The following are sources of LfE:

- incident and near miss reports;
- safety observations;
- verification activities;
- hazard reports;
- workforce consultations and feedback (consultation with the workforce should be proactive – it is not sufficient merely to wait for feedback);
- audits and reviews;
- *ad hoc* observations (e.g. from senior management walk around, visitors), and
- industry schemes for sharing incident data, safety alerts and incident reports, such as:
  - EI Toolbox
  - G+ incident data, safety alerts and notifications etc. – see Learning from incidents
  - SafetyOn incident data, safety alerts and notifications etc. – see Safety release SafetyOn (although these are from the onshore wind industry, much of the content is potentially also relevant to offshore)
  - IMCA Safety Flashes
  - CHIRP

G.45 OWCs should share lessons learned across the organisation and the industry.

OWCs should contribute to G+ and other schemes such as those listed in G.44.

G.46 OWCs should systematically identify the potential consequences of incidents and flag high-potential incidents.

High-potential incidents should:

- be reported with more urgency and to a higher level of management;
- be investigated with more rigour, and
- have LfE disseminated and preventive/corrective action taken with a higher priority.

The identification and reporting of high-potential incidents should be actively encouraged, even when there are no, or limited, actual consequences. Sustainably learning from such events by putting in place the systems and controls to prevent them in the future is essential. They should be seen as a gift ('a free lesson in safety') and opportunity.

OWCs need to be very careful not to introduce systems and create a culture that discourage reporting, for example financial incentive schemes related to traditional safety metrics have been known to hinder some level of reporting. Similarly, philosophies such as 'if you chose to break the rules you chose not to work for our company' while helpful to some extent can also, for example, prevent front-line workers from reporting issues they are struggling with and which the OWC could address before an incident occurs.

G.47 OWCs should implement verification systems to review the effectiveness of risk controls put in place in response to LfE.

G.48 OWCs should ensure that competent personnel schedule and conduct periodic audits and reviews.

3 GUIDELINES – LIFTING GOVERNANCE IN SPECIFIC CONTEXTS

This section highlights aspects of lifting governance that are specific to particular contexts: lifting of personnel (3.1), work under suspended loads (3.2) and others (3.3).

3.1 LIFTING OF PERSONNEL

Lifting of personnel includes both lifting for transfer between assets and vessels, and lifting for work access – e.g. lifting a person in a work basket.

G.49 OWCs should avoid lifting personnel unless there is no reasonably practicable safer alternative.

Solutions such as walk-to-work (W2W) gangways, mobile elevating work platforms (MEWPs) or rigid personnel transfer carriers *may* be acceptable for lifting personnel. However, the first question should always be, 'Why are we lifting personnel?'. There needs to be clear, safety-based justification for any lifting of personnel. With appropriate investigation and planning, it can generally be avoided and should only occur when there is no reasonably practicable, safer alternative.

Purpose-designed service lifts are generally considered an appropriate solution (provided they are properly designed, installed, operated and maintained) but, as stated in 1.5, these are outside the scope of this GPG. Climb assist systems, fitted to fall arrest equipment to help personnel climb ladders, are also outside the scope.

G.50 Where lifting personnel is unavoidable, OWCs should carefully consider how they will be lifted and put additional risk controls in place.

Example controls include, but are not limited to, ensuring that:

(a) The lift has been evaluated and endorsed by all interested parties.
(b) There is a very clear understanding of exactly how the operation will be performed, the equipment to be used, the roles and competencies of all involved and what control documentation is required.
(c) The lift has been categorised as the highest risk category (see 2.4).
(d) A task-specific lift plan, risk assessment and method statement are in place.
(e) A rescue plan is included with the lift plan.
(f) The lift will be controlled by PTW
(g) Appropriate environmental and operational limits (e.g. wind speed and hoisting speed) have been established and will be complied with.
(h) The crane to be used is certified for lifting personnel.
(i) Load limits for equipment are based on increased safety factors, and equipment is derated accordingly.
(j) Any capsule/basket, etc. in which personnel are to be lifted has been designed for the task and its context, is certified, and offers full lateral and vertical impact protection. Collapsible 'Billy Pugh' type baskets and bosun's chairs are not to be used. See also the *G+GPG on personnel transfer.*
(k) If lifting over water, the capsule etc is buoyant and self-righting.

(l) The capsule has a secondary retention line to crane.
(m) The crane station will be crewed at all times.
(n) Continuous communications will be available between operator and signaller and those in the capsule, with suitable contingencies in place.
(o) A trial lift, without personnel, is carried out.
(p) Appropriate PPE will be provided and worn by personnel being lifted.
(q) Appropriate inspection/maintenance frequencies and arrangements are in place (see Appendix 3 of IMCA LR06).

3.2 WORK UNDER SUSPENDED LOADS (WUSL)

Work under suspended loads (WUSL) is unacceptable[2]. OEMs have been introducing designs that eliminate the need for WUSL, for example by providing guidance systems or bumpers for tower section and nacelle installation[3]. The industry is evolving, this document reflects where it is now and the actions that G+ members believe will drive further improvement in this area.

G.51 OWCs should drive and encourage the elimination by design of WUSL.

OWCs have a responsibility to eliminate WUSL, and should require new designs of WTGs or other assets to eliminate WUSL, working proactively with OEMs. They should challenge designs that appear to require WUSL.OEMs have safety responsibilities as designers, OWCs and OEMs should therefore work together to drive the elimination of WUSL.

G.52 OWCs should work with OEMs and contractors to find solutions for legacy assets where WUSL has been performed.

OWCs should also work proactively with OEMs to eliminate WUSL on legacy WTGs or other assets that were not designed to eliminate WUSL. This can be through retrofitted features and/or changes to the lifting procedure. The assumption that the industry has to carry on doing what it has always done should be challenged.

G.53 OWCs should consider all alternatives and solutions to WUSL, including new technological developments to eliminate need for WUSL.

WUSL should never be performed without first thoroughly challenging the assumption that there is no alternative.

G.54 Where it has been demonstrated that there is no alternative to WUSL, OWCs should perform a thorough assessment and demonstration of safety, and apply the strictest controls before authorising WUSL.

Even where consideration of alternatives (as in G.53) shows that WUSL is unavoidable, the lack of an alternative does not in itself justify WUSL: there should also be rigorous assessment

2 The G+ Lifesaving rules for offshore wind, for example, include the rule 'Never place yourself under a suspended load during lifting' (gplusoffshorewind.com)

3 See for example, the *SafetyOn Safe by design Workshop report: Working under suspended loads – major component exchange*.

and demonstration of safety, and effective implementation of controls.
At present there is little guidance on how to do this or who should be involved. The following outline process has been developed with the aim of filling this gap. **NB: the provision of this process in the GPG is not intended to allow the acceptance of WUSL as a common practice.**

Table 2: Safety process before allowing WUSL

No.	Step	Comments/guidance
1.	**Assess whether any alternatives to WUSL are available**	
	(a) identify alternative methods or technologies that remove the need for WUSL	Alternatives can include tools such as bumpers and other positioning/guidance systems, supported by remote observations using cameras, lasers or drones
	(b) apply regulatory and corporate risk tolerability criteria for deciding whether to pursue alternative solutions	Risk tolerability criteria should be in line with legislation, and regulatory guidance in the relevant jurisdiction, and as with the OWC's corporate criteria, following whichever is the more demanding In the UK, for example, the Health and Safety Executive (HSE) Approved Code of Practice (ACOP) and *Guidance on the Lifting Operations and Lifting Equipment Regulations 1998* (LOLER) states that '*Where practicable, loads should not be carried or suspended over areas occupied by people. Where this is not practicable you should establish a safe system of work which minimises the risks to people who may need to be below the load.*' The use of the term 'practicable' means that a more stringent test should be applied than that of 'reasonable practicability' (which is a key test in most other safety decisions: the 'as low as reasonably practicable' – ALARP – principle in UK law). This means that the reasonableness (i.e. cost, primarily) of eliminating WUSL cannot be taken into account
2.	**When, from Step 1, it appears that WUSL is unavoidable, there will need to be a formal management of change process (see 2.10), as WUSL is a deviation or exemption from normal principles and procedures**	
	(a) categorisation of the lift at the highest risk category	
	(b) understanding and detailed definition of the task	OWCs need to be clear about what they consider to constitute WUSL. For example, is a load 'suspended' if it is in place, supported by resting on a structure below, and stabilised by being still attached to the crane but not yet bolted firmly in place? Such considerations are not just a matter of categorising the lift, but are important in understanding the hazards thoroughly

Table 2: Safety process before allowing WUSL (continued)

No.	Step	Comments/guidance
	(c) detailed, task- and site-specific risk assessments: identifying controls	Controls can include prevention of failure or reduction of probability, reduction of exposure (e.g. minimising the time at risk) and mitigation of consequences with, for example, physical protection
	(d) engineering support and analysis to identify potential safe zones, or critical areas to be avoided	For example, dropped load and structural analyses might be needed to establish whether personnel on the tower level below a lift are at risk if the load falls
	(e) review of steps (a) to (d) by all stakeholders	Stakeholders include but are not limited to those involved in planning, managing the lift and in the approval of this safety process, as well as external parties, e.g. contractors
	(f) opportunity to revisit, in the light of the understanding gained from steps (a) to (e), the decision made in Step 1 and to incorporate any changes in assumptions	
	(g) formal approval of the agreed plans and controls	(as per the OWC's MOC process)
	(h) effective implementation and monitoring of the planned controls	

Throughout the process in Table 2, competent persons (including lifting SMEs) should take the lead, with the involvement of relevant stakeholders. Assistance from external persons, to provide specialist expertise and/or independence, should also be considered. Sufficient time should be allocated, recognising that many parties and people will need to be involved, that there may be much discussion, and that new or amended documentation is likely to be needed.

In summary, WUSL should only ever be carried out when it has been demonstrated that no alternatives are available, and it has been thoroughly assessed, planned and controlled. Effective lift planning, together with site supervision and monitoring should ensure that WUSL does not happen in an unplanned or *ad hoc* way.

3.3 OTHER CONTEXTS REQUIRING SPECIFIC OR ADDITIONAL RISK CONTROLS

G.55 OWCs should define specific or additional controls for any other contexts that require it

Other contexts for which specific or additional controls are likely to be needed include, but are not limited to, those in Table 3. In general, such contexts will have a high-risk lift category.

Table 3: Examples of other lifting contexts requiring additional risk control

Context	Example additional hazards	Example additional risk controls
Tandem lifts (two or more cranes)	Complex crane manoeuvres, striking of cranes, overloading of cranes, unstable loads	Things to be considered/defined: – crane positions – communications (continuous communication, additional parties and call signs to be considered) – shared loads, maximum allowable and contingencies – lift path design to eliminate possibility of collision – load reactions (additional forces, safety factors, etc.)
Blind lifts	Lifting equipment operator does not have a direct view of the lifted object/ load path or landing/lift-off area	Continuous communication between crane operator and bankmans/ signaller (see 2.7.2) Use of cameras, drones etc.
Lifts over or in close proximity to sensitive or hazardous systems	Dependent on scenario, e.g. lifting over live plant	Lift categorisation escalated to complex, and that current controls are reviewed by senior personnel who are senior and of suitable expertise
Subsea lifts/lifts in support of diving	Limited visibility Effects of currents Buoyancy Risks to divers	See IMCA LR 006 Appendix 2

Table 3: Examples of other lifting contexts requiring additional risk control (continued)

Context	Example additional hazards	Example additional risk controls
Lifting to or from, and onboard, vessels and floating installations	Movement of vessels/ loads due to sea state and weather. These can increase hazards associated with load movement, equipment stability and the movement of mobile cranes, forklifts, MEWPs etc. Seasickness affecting human performance Salt corrosion Risks to and from other marine operations	See IMCA LR006 for Offshore Lifting Operations Information on engineering and calculations can be found in DNV ST-N001 ICSA N0005 Guidance - Working with Land-based Mobile Cranes on Floating Vessels Lift over water where possible, to minimise consequences in event of dropped load. For personnel lifting, however, the risks of lifting over water may outweigh those of lifting over a solid structure or surface Careful consideration of vessel ballasting
Rigging and fleeting within WTGs	Complexity of rigging configurations/ arrangements for lifts inside a nacelle or tower Use of portable lifting equipment introduces additional hazards, e.g. equipment attached to uncertified lifting points	
Lifting loads without dedicated/ integrated lifting points)	Uncertainty regarding strength of attachment points and load stability when suspended	Careful consideration of slinging
Onshore lifts, e.g. at ports, preassembly and fabrication yards	Vehicle-people interactions, potentially including interactions with the public Overhead power lines Ground conditions However, onshore lifts will generally be in more benign and controllable environment	IOGP Report 376 Lifting and Hoisting recommended practice SafetyOn and G+ Good practice guidelines: Contractor engagement and behavioural safety in onshore civils (for onshore wind, UK-specific, but some overlaps)

Table 3: Examples of other lifting contexts requiring additional risk control (continued)

Context	Example additional hazards	Example additional risk controls
High utilisation lifts	Utilisation is the ratio between the capacity required to lift the load and the WLL or MRC, expressed as a percentage. The higher the utilisation, the greater the stress on lifting components	Pre-warning and overload alarms on equipment (rated capacity indicators on cranes have an allowable inaccuracy) Reducing the load Splitting the loads into multiple components Reducing the lift radius or distance the load is to be lifted Increasing the equipment rated capacity Tandem lifts Selecting a more favourable configuration for the lifting equipment Limiting the height that the load needs to be lifted Performing a radius check with the load before lifting to ensure that the radius has not increased from what was planned (further increasing utilisation)
Night and low visibility operations	Poor visibility caused by fog, heavy rain, snow etc, glare from the sun or deck lighting potentially causing light blindness As well as affecting the lift, visibility can also limit the availability and performance of emergency response	Environmental limits – visibility, minimum light levels etc. Lumen assessments Portable adjustable lighting Tinted anti-glare safety glasses

4 SUMMARY OF KEY MESSAGES

The key, overarching good practice points for lifting governance are:

- ensuring that roles and responsibilities are clearly defined and that the role holders have the right competencies;
- ensuring compatibility between the lifting governance systems of all interested parties (OWCs, OEMs, contractors etc.);
- leadership: senior management should demon safety leadership, set clear expectations and provide good examples of safe attitudes and behaviours;
- early engagement with personnel and contractors, at both individual and organisational levels, to obtain their input and ensure that safety expectations are clearly understood;
- using appropriate lift management approaches and documentation, including lift categorisation and lift plans, and risk assessments specific to each lift;
- open and continual consultation and communication, and
- ensuring that there is clear and visible communication of 'golden rules', such as the right and duty to stop work if there is imminent danger, and the importance of reporting incidents and concerns.

ANNEX A
COLLATED LIST OF GUIDELINES

OWCs should:	
Core principles of lifting governance	
Principle 1 – Competence	
Guideline1.	OWCs should ensure that all personnel involved in leadership, development, implementation and management of the governance system, in planning and carrying out lifting operations and in supporting tasks such as risk assessment, inspection and audit, have and maintain the necessary competencies for their role
Guideline 2.	OWCs should ensure they have access to lifting subject matter expertise
Guideline 3.	OWCs should ensure that those defining and assessing the required competencies are competent for this task
Guideline 4.	OWCs should take into account the competence of personnel when conducting risk assessments and planning lifting operations
Principle 2 – Roles and responsibilities	
Guideline 5.	OWCs should ensure that senior management demonstrates safety leadership, setting clear expectations and providing good examples of safe attitudes and behaviours
Guideline 6.	OWCs should ensure that everyone involved in lifting has their roles, responsibilities, and associated competencies clearly defined, communicated, and understood
Guideline 7.	OWCs should define roles and responsibilities at a high level in corporate or regional lifting procedures, with details relating to specific lifts described in lower level documentation, such as lift plans
Guideline 8.	OWCs should ensure that one person is designated as in charge for each lift
Guideline 9.	OWCs should ensure that all personnel understand that they have a duty and a right to stop the lift where they perceive an imminent danger
Principle 3 – Support and engagement	
Guideline 10.	OWCs should identify, document and implement appropriate stakeholder engagement for all work processes
Guideline 11.	OWCs should set up systems, processes and agreements to ensure good information sharing ('why' as well as 'what') between all parties
Principle 4 – Lift categorisation	
Guideline 12.	OWCs should categorise all lifts
Principle 5 – Risk assessment	
Guideline 13.	OWCs should ensure that a suitable and sufficient risk assessment is prepared and documented for every lift, regardless of lift category

OWCs should:	
Core principles of lifting governance	
Guideline 14.	OWCs should ensure that risk assessments are carried out by personnel with competence appropriate to the lifting operation, and in the process of risk assessment
Guideline 15.	OWCs should ensure that risk assessments involve expertise from front-line lifting teams
Guideline 16.	OWCs should ensure that risk assessments are tailored and updated to accurately reflect the specifics of each lift, in its operational and environmental context
Principle 6 – Lift planning	
Guideline 17.	OWCs should ensure that a documented lift plan is prepared for every lift, with the content and level of detail appropriate to the lift category
Guideline 18.	OWCs should ensure that a permit to work system is available for use with higher hazard lifts or where other work may be taking place in the vicinity of the lift
Principle 7 – Human factors	
Guideline 19.	OWCs should apply human performance principles throughout the development and implementation of the lifting governance system
Guideline 20.	OWCs should plan and conduct lifting operations to ensure good communications and clear understanding of responsibilities
Guideline 21.	OWCs should take steps to ensure that complacency does not creep in
Principle 8 – Exclusion zones	
Guideline 22.	OWCs should ensure that exclusion zones are established around each lifting or landing area
Guideline 23.	OWCs should ensure that stored energy is identified on the lift plan and controls are implemented to keep people out of the line of fire or danger zone
Guideline 24.	OWCs should follow the G+ Dropped Loads guidance
Principle 9 – Design, selection, use and management of lifting equipment	
Guideline 25.	OWCs should assure themselves that the principles of safety by design have been respected
Guideline 26.	OWCs should assure themselves that an effective design review cycle is being, or has been, applied
Guideline 27.	OWCs should ensure that all relevant interested parties are involved in key stages of design, review and acceptance
Guideline 28.	Where the OWC is procuring lifting equipment from an OEM, the OWC should involve its lifting specialists in engagement with the OEM
Guideline 29.	OWCs should ensure that lifting equipment is suitable and adequate for the specific lift and its context
Guideline 30.	OWCs should check the maintenance and inspection records of lifting equipment before bringing it on to a project

OWCs should:	
Core principles of lifting governance	
Guideline 31.	OWCs should ensure that lifting equipment is used according to industry-recognised standards and OEM instructions
Guideline 32.	OWCs should ensure that there is a common understanding of the load limit parameters in use, and their meanings, in each situation
Guideline 33.	OWCs should ensure that equipment (whether off the shelf or bespoke) is used only for its intended purposes, and remains safe within the specific operational and environmental context of use
Guideline 34.	OWCs should ensure that safety and monitoring devices are fully operational and not bypassed or disabled
Guideline 35.	OWCs should ensure that lifting equipment is operated, inspected, examined, maintained and controlled to ensure its continued safety functionality, performance, integrity and reliability
Guideline 36.	OWCs should ensure that personnel carrying out inspections and examinations have an appropriate level of independence
Guideline 37.	OWCs should undertake a suitable qualification process before appointing a third-party inspection organisation
Guideline 38.	OWCs should ensure that inspection and maintenance take place at predetermined time intervals and at other times when necessary, throughout the equipment's working life
Guideline 39.	OWCs should ensure that inspection and maintenance are at least as frequent and extensive as set out in manufacturers' recommendations and any statutory requirements or regulatory guidance relevant to the jurisdiction of operation
Guideline 40.	OWCs should record, analyse and evaluate inspection and maintenance findings in order to identify any trends and support continual improvement
Principle 10 – Management of change	
Guideline 41.	OWCs should have clear criteria and procedures in place for managing change, both planned and reactive
Guideline 42.	OWCs should have clear and defined processes in place for technical due diligence (TDD) checks on new equipment and work processes
Principle 11 – Continual improvement	
Guideline 43.	OWCs should keep the governance system under systematic review and revision
Guideline 44.	OWCs should establish systems and processes to detect warning signals, gain and share learning from experience, and identify opportunities for improving safety
Guideline 45.	OWCs should share lessons learned across the organisation and the industry
Guideline 46.	OWCs should systematically identify the potential consequences of incidents and flag high-potential incidents
Guideline 47.	OWCs should implement verification systems to review the effectiveness of risk controls put in place in response to learning from experience
Guideline 48.	OWCs should ensure that competent personnel schedule and conduct periodic audits and reviews

OWCs should:	
Core principles of lifting governance	
Lifting governance in specific contexts	
Lifting of personnel	
Guideline 49.	OWCs should avoid lifting personnel unless there is no reasonably practicable safer alternative
Guideline 50.	Where lifting personnel is unavoidable, OWCs should carefully consider how they will be lifted and put additional risk controls in place
Work under suspended loads (WUSL)	
Guideline 51.	OWCs should drive and encourage the elimination by design of WUSL
Guideline 52.	OWCs should work with OEMs and contractors to find solutions for legacy assets where WUSL has been performed
Guideline 53.	OWCs should consider all alternatives and solutions to WUSL, including new technological developments to eliminate need for WUSL
Guideline 54.	Where it has been demonstrated that there is no alternative to WUSL, OWCs should perform a thorough assessment and demonstration of safety, and apply the strictest controls before authorising WUSL
Other contexts requiring additional risk controls	
Guideline 55.	OWCs should define specific or additional controls for any other contexts that require it

ANNEX B
EXAMPLE COMPETENCE REQUIREMENTS

B.1 COMPETENCIES FOR DEVELOPING THE LIFTING GOVERNANCE SYSTEM

Development and maintenance of the lifting governance system will require input from personnel with competencies including:

- Lifting operations – subject matter experts (SMEs) in lifting should be the primary authors of technical content of the system.
- Lifting regulations and standards – this may be adequately covered by the lifting SMEs, but further investigation should be conducted into differing regions' regulatory requirements specific to lifting.
- Organisational knowledge – to ensure that the governance system is compatible with the OWC's structure and safety management system, it will be important to involve personnel who are familiar with these.
- Industry knowledge – the system must be tailored to the specifics of the wind industry – its activities, environment, hazards and other challenges. It is therefore important to involve people who have breadth of experience in the industry.

B.2 TYPICAL COMPETENCIES FOR LIFTING IN PRACTICE – AN ILLUSTRATIVE FRAMEWORK

Important notes:

The framework presented in this Annex is intended only as a starting point. OWCs should review and adapt it in line with their own organisational and contract structures, the nature of the lifting operations that may be carried out, and the associated levels of risk. A competent lifting specialist should be responsible for providing a lifting competence framework for each specific OWC (see G.2).

Job titles vary between organisations and around the world. The matrix is therefore structured by functions (i.e. Function is the first column) rather than by job titles.

Site personnel will also require standard safety training (especially for offshore work), medical checks, site inductions etc.

The nature and level of the competencies required may vary according to whether the lift is simple or complex.

A person may have more than one function – there are many ways to allocate functions between individuals depending on the organisational needs and structure.

Table B.2 Typical competencies for lifting in practice – An illustrative framework

Function	Example job titles	Experience	Education, qualifications, training, knowledge	Skills, attitudes and abilities	Comment
Point of contact and advice for all lifting matters Developing lifting processes and procedures Developing this generic competence framework into onethat is specific and appropriate to the OWC and its activities	Appointed Person Lifting SME Lifting Adviser Lifting Specialist Head of Lifting	Extensive, demonstrable experience in: – managing, planning, designing, supervising and performing lifts – selection, procurement, use and maintenance of equipment – regulations and standards	Accredited, industry-recognised training in different aspects of lifting Further advanced or specific training/development directly relating to lifting in the OWC's context Degree in an engineering or similar discipline desirable but not essential if can prove extensive industry experience and knowledge as lifting SME Advanced understanding and knowledge of relevant regulations, standards, guidance documents, best practice and company procedures	Critical thinker and problem-solving attitude	
Designing/ reviewing the lifting arrangement and all engineering aspects	Appointed Person Lifting Authority Lifting Engineer Technical Authority	Extensive, demonstrable experience in relevant engineering roles	Degree in an engineering or similar discipline desirable but not essential if can prove extensive industry experience and knowledge as lifting appointed person Advanced understanding of design, standards, safety factors Well versed in all safety factors associated with lifting operations relevant to their area Knowledge of different lifting equipment and their capabilities and limitations	Critical thinker and problem-solving attitude	

Table B.2 Typical competencies for lifting in practice – An illustrative framework (continued)

Function	Example job titles	Experience	Education, qualifications, training, knowledge	Skills, attitudes and abilities	Comment
Developing the lift plan and categorising the lift	Appointed Person Lifting engineer/ authority Lift Planner SME	Extensive, demonstrable experience in lifting	Accredited, industry-recognised training in lift planning, control and supervision Advanced understanding of relevant regulations, industry best practice and company procedures	Progressive attitude, exploring ways to update and improve how lifting operations are performed	Differing categorisations of lift will require differing competencies for planning, this should be defined in organisational processes
Reviewing the lift plan	Appointed Person Lifting Authority Lifting Specialist/ Engineer SME Technical Authority	Extensive, demonstrable experience in lifting operations of the type being defined in the lift plan	Accredited, industry-recognised training in lift planning	Advanced understanding of relevant regulations, industry best practice and company procedures Pragmatic approach to review, with good communication skills to relay any required updates/revisions to lift planner	Differing categorisations of lift will require differing competencies for review, this should be defined in organisational processes
Supervising the lift (on site, on the day)	Appointed Person Lift/Crane/Site Supervisor Person in Charge Responsible Person	Extensive, demonstrable experience in planning, supervising and performing lifts similar to what is being performed under their supervision	Accredited, industry-recognised training in lifting Accredited, industry-recognised training in H&S	Team leadership Confident to take ownership of the operation on day of execution	Lift supervisors should assure themselves of the competencies of the lift crew on the day. However, realism is needed about expectations of what checks they can perform on the day

Table B.2 Typical competencies for lifting in practice – An illustrative framework (continued)

Function	Example job titles	Experience	Education, qualifications, training, knowledge	Skills, attitudes and abilities	Comment
Operating cranes, hoists etc.	Crane/Hoist Operator	Demonstrable experience in operation and the equipment being used	Accredited, industry-recognised training in the operation of the equipment in accordance with regulatory or manufacturer requirements Familiarisation training with the specific equipment in use and site features Understanding of maintenance Thorough understanding of equipment certification and maintenance requirements	Medical fitness for operating safety-critical equipment	Some equipment requires specific certification or licence to operate, and some just require familiarisation. This should be defined in company procedures
Monitoring the lift/directing equipment operator	Banksman/ banksperson Signaller Dive supervisor (subsea lifts)	Demonstrable experience in performance and monitoring of lifting operations, or directly supervised by someone who has that experience	Accredited, industry-recognised training in directing of lifting equipment and loads	Good communication skills Team leadership	Training for this often in line with 'slinger' training, but differing responsibilities should be recognised
Slinging of loads and connection of lifting equipment to loads. Load control	Load Handler Slinger	Demonstrable experience in slinging, or directly supervised by someone who is experienced	Accredited, industry-recognised training in selection and use of slinging equipment	Good team skills	Training for this often in line with 'signaller' training, but differing responsibilities should be recognised

Table B.2 Typical competencies for lifting in practice – An illustrative framework (continued)

Function	Example job titles	Experience	Education, qualifications, training, knowledge	Skills, attitudes and abilities	Comment
Installing and operating (specialised) lifting equipment (e.g. portable lifting equipment) May include rigging, lifting and fleeting inside a WTG	Crane Rigger Portable lifting equipment rigger Rigger	Demonstrable experience in rigging of (specialised) lifting equipment, or directly supervised Include experience of rigging, lifting and fleeting inside a WTG, where required	Accredited, industry-recognised training in selection, installation, and use of specialised equipment	Good team skills	Rigger is a specialised role and not to be confused with slinger/signaller The correct use of portable lifting gear is not covered under slinger/signaller training. In the offshore wind industry personnel performing lifting can often be doing so as a secondary skill, not as a dedicated role and therefore it is important that competence and roles are not confused
Tagline or winch operation	Tagline/Winch Operator	Demonstrable experience in tagline or winch operation, or directly supervised by someone who has that experience	In-house training	Good team skills	

Table B.2 Typical competencies for lifting in practice – An illustrative framework (continued)

Function	Example job titles	Experience	Education, qualifications, training, knowledge	Skills, attitudes and abilities	Comment
Maintaining stores and supplies of lifting equipment May also include inspection of equipment and associated documentation	Storeperson	Demonstrable experience in maintaining an engineering store, or directly supervised by someone who has that experience	In-house training in procedures, e.g. for issue, return and stock control or quarantining Accredited, industry-recognised training in inspection, if this is part of the function Knowledge of any pre- or post-use checks that they should do themselves	Good organisational skills	Accredited training only required if inspection of equipment is part of the role
Visual (pre- and post-use) inspection of equipment	Multiple job titles – anyone using equipment	Demonstrable experience in visual inspection, or directly supervised by someone who has that experience	Accredited, industry-recognised training in lift-related inspection In-house training Good awareness of requirements for equipment under their control		Anyone using lifting equipment (e.g. WTG technicians, CTV crews when slinging bags for loading on/off vessels) should be competent in pre- and post-use checks
Thorough examination/ statutory inspection of equipment	Lifting/Quality Inspector/ Engineer	Extensive, demonstrable experience in relevant engineering roles	Accredited, industry-recognised training in statutory inspection/ thorough examination. Knowledge of applicable regulations and standards	Good awareness of requirements for equipment under their control Effective judgement, decision making, awareness of failure modes	
Marine Warranty Services	Marine Warranty Surveyor	The role and qualification of a MWS varies considerably as it depends on the task(s) assigned. See for example: IMCA: JR2023 029 Renewables COP SOW COA – JNRC Approved 16.02.2023 and IMCA: JR2019-010 MWS Co Pre-Qual and GPG			

ANNEX C
ILLUSTRATIVE LIFT CATEGORISATION SCHEMES

Categorisation depends on the characteristics of the lifting equipment, the load and the operational and environmental context.

C.1 TYPICAL EXAMPLES OF LIFT CATEGORISATION

Simple/Simple & routine

Simple lifts are often routine by nature, so this category may be split into subsections that include routine. Simple/Simple and Routine lifts are defined as generic and repetitive lifting operations of low complexity, with clear set parameters. These activities are typically basic material handling using fixed cranes, such as CTV loading/unloading via davit cranes, general platform/deck work using pedestal cranes, or use of internal hoists to manoeuvre lifting bags.

Due to the repetitive nature of simple and routine lifting, it may be sufficient for these operations to be controlled using generic lift plans and risk assessments, but each task should be independently reviewed for the suitability of any generic plan and risk assessment, and the generic documents should be subject to periodic review and improvement. See also G.16 on generic and specific risk assessments and G.21 on complacency in routine tasks

Intermediate

Some organisations define an intermediate categorisation between Simple/Routine and Complex.

Complex

The complex category is used for lifts with inherently higher levels of risk, which therefore require additional risks controls such as authorisation by engineers and technical authorities. Examples of complex lifts are given in section 3.

The use of the term ‘complex’ for the highest category is common but potentially misleading. While complexity (technical, operational etc.) will in general increase risk, it is not the only factor. For example, a lift might be simple in terms of the equipment and the load, but could have a higher inherent risk if carried out in adverse weather or over sensitive or hazardous plant.

ANNEX D
LIFT DOCUMENTATION – LIFTING PROCEDURES AND PLANS

D.1 GENERAL

A variety of documents are required for a management system to be developed, established, explained, maintained, verified and complied with. Without a full suite of control documents there is a risk of the management system being undefined, and therefore misunderstood, which potentially allows for poor or unsafe practice. All such documentation should be:

– created, reviewed and approved by suitably competent personnel;
– managed at an appropriate level (e.g. corporate, regional or site-specific), and
– understood by the appropriate interested parties.

Document development, review/checking, approval, dissemination, feedback processes, modification, withdrawal and retention should be under an effective document control system.

D.2 LIFTING PROCEDURES AND LIFT PLANS

Key documents include, but are not limited to, lifting procedures and lift plans. These (even if they are known by other names in the OWC) are two different types of document, with distinct functions as shown in Table D.2, but they are sometimes confused.

Table D.2: Comparison of lifting procedures and lift plans

	Lifting procedures	Lift plans
Purpose(s)	Various, but taken together they define how the management system operates and the processes that personnel are required to follow when involved in any aspect of lifting	A lift plan is in effect a method statement: a detailed instruction on how to perform a specific task, incorporating and collating all relevant information
Primary audience	Various, according to topic. Typically though, there are management system documents, not 'on the day' instructions	Lift crew: persons physically present and involved in the lift operation

Table D.2: Comparison of lifting procedures and lift plans (continued)

	Lifting procedures	Lift plans

Minimum content	Various, but can include, for example:
	– definitions of overall roles and responsibilities
	– generic requirements for lift design, categorisation, planning, risk assessment, supervision etc.
	– document controls and approvals
		– key facts such as: task, location, geometry etc, MRC/WWL, utilisation %, equipment configuration (e.g. of crane boom), personnel locations during lift
		– load details
		– equipment required
		– the assigned lift categorisation
		– roles, responsibilities and numbers of each type of personnel needed for the lift, with their required competencies
		– communications – means and procedures (see 2.7.2)
		– risk assessment – focussing on significant (unusual, or specific to the lift and its context) hazards and the controls needed
		– exclusions
		– environmental limits, such as:
		  – wind speed (mean & gust, at relevant heights, e.g. of crane or landing zone)
		  – significant wave and swell heights (significant wave height) and periods
		  – splash zone considerations
		  – weather window (time required to perform the lift)
		  – ground-bearing pressures for onshore mobile cranes
		– step by step instructions, including any hold points where additional checks should be made
		– 'point of no return'
		– additional safe stopping points that can be used if required
		– plan for toolbox talk/dynamic risk assessment on the day: include situation on the day, e.g. weather, SIMOPs
		– visual aids, sketches, drawings and photos, to indicate exclusion zones, rigging/slinging arrangements, crane load charts, crane curves etc.
		– limits on acceptable on-site change: what needs to be dealt with through the formal MOC process?

Table D.2: Comparison of lifting procedures and lift plans (continued)

	Lifting procedures	Lift plans
		– emergency arrangements (to the extent they may differ from site-wide arrangements) – any other special considerations for lifts in high risk categories – references to supporting documents The scope and level of detail of the above will depend on the lift categorisation
Exclusions	Lift procedures should not attempt to include details of every specific lift: these belong better in lift plans. Procedures should, however, define the required content of lift plans, and the responsibilities and competencies of those involved in developing, reviewing and authorising them	Lift plans should not include generic company information that is in the procedures. The plan should be concise and easy to absorb. Excessive content not directly relevant to the task in hand will detract from its effectiveness

Additional details of lift plan contents are available in IMCA LR 006 *Guidelines for lifting operations* – IMCA and in IOGP 376.

ANNEX E
ABBREVIATIONS AND ACRONYMS

ACOP	Approved Code of Practice
ALARP	as low as reasonably practicable
CTV	crew transfer vessel
DNV	Det Norske Veritas
DP	dynamic positioning
EI	Energy Institute
FMEA	failure modes and effects analysis
FMECA	failure modes, effects and criticality analysis
G+	G+ Global Offshore Wind Health and Safety Organisation
GPG	good practice guideline
H&S	health and safety
HSE	Health and Safety Executive (the UK's principal health and safety regulator)
IMCA	International Marine Contractors Association
LfE	learning from experience
IOGP	International Association of Oil & Gas Producers
LOLER	Lifting Operations and Lifting Equipment Regulations 1998 (UK)
MBL	minimum breaking load
MEWP	mobile elevating work platform
MOC	management of change
MRC	maximum (or manufacturer's) rated capacity
OEM	original equipment manufacturer
O&M	operations and maintenance
OWC	offshore wind company (see Terminology)
PTW	permit to work
RCI	rated capacity indicator
SIMOPs	simultaneous operations
SME	subject matter expert
SMS	safety management system
SWL	safe working load
TDD	technical due diligence
T&I	transportation and installation
WG	working group
WLL	working load limit
WTG	wind turbine generator
WUSL	work under suspended loads

ANNEX F
REFERENCES

Please refer to the latest versions of all documents listed in this section.

Energy Institute (EI) (https://www.energyinst.org/technical/publications)

EI 3262 *Good practice guideline working at height in the offshore wind industry*

EI 3295 *Learning from incidents, accidents and events*

EI 3387 *G+/DROPS Reliable securing booklet for offshore wind*

EI 3423 *SafetyOn Safe by design workshop report: Working under suspended loads – major component exchange*

EI 3429 *Good practice guideline - Offshore wind farm transfer*

EI 3512 *G+ Improving compliance workshop: basic lifting operations*

EI 3520 *SafetyOn and G+ Good practice guidelines: Contractor engagement and behavioural safety in onshore civils*

EI 3555 *SafetyOn Good practice guidelines: Mobile crane lifting for onshore wind farms*

EI 3562 *G+ 2023 incident data report*

International Marine Contractors Association (IMCA) (https://www.imca-int.com/)

IMCA LR 006 *Guidelines for lifting operations*

IMCA HSSE 001 *Guidelines for management of change*

IMCA HSSE 016 *Guidance on the investigation and reporting of incidents*

Guidance on the transfer of personnel to and from offshore vessels and structures https://www.imca-int.com/product/guidance-on-the-transfer-of-personnel-to-and-from-offshore-vessels-and-structures/

IMCA M254 *Guidelines for walk to work operations*

IMCA C017 *Guidance on Competence Assurance and Assessment Marine Roles for Small Workboats*, Rev. 0.2

International Crane Stakeholders Assembly (ICSA) (https://icsa-crane.org/)

ICA N005 Guidance - Working with land-based mobile cranes on floating vessels ICSA-N0005_Landbased-Mobile-Cranes-on-Vessels_March-2022.pdf (estaeurope.eu)

International Association of Oil & Gas Producers (IOGP) (https://www.iogp.org/)

IOGP Report 376 *Lifting and hoisting recommended practice*, Version 2, August 2022

Det Norske Veritas (DNV) (https://www.dnv.co.uk/)

DNV Standard ST-N001 *Marine operations and marine warranty,* Edition 2023-12

This covers design and planning of marine operations for the transport, installation and removal of offshore wind farms, subsea cables and oil and gas assets. It addresses marine warranty survey requirements relevant to load-out, construction afloat, voyages and installation/removal and the load cases that should be addressed in design and planning. One of the sections is on lifting and hoisting (it also includes towing, sea fastening etc.) and there is a section on offshore wind farm installation. It is unique as a document defining dynamic load factors, but is focused on transportation and installation (T&I) rather than O&M, and on lift design and planning rather than implementation.

ANNEX G
OTHER RELEVANT DOCUMENTS

Although not direct references in this Good Practice Guidance, there are many other documents and standards used in the planning lifting operations in the offshore wind industry, including but not limited to:

- API-RP-2SK *Design and analysis of station keeping systems.*
- DNVGL-OS-E301 *Position mooring*.
- DNV-OS-J301 *Wind turbine installation units*.
- DNVGL-ST-N001 *Marine operations and marine warranty*.
- DNVGL-ST-0054 *Transportation and installation of wind power plants*.
- DNV-OS-H205 *Lifting operation*.
- DNV-OS-H203 *Transit and positioning of offshore structures*.
- DNV-OS-C401 *Fabrication and testing of offshore units.*
- EEMUA 158 *Construction specification for fixed offshore structures in the north sea*.

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