Competent person

"Competent person" is a term primarily used within LOLER to indicate the company or individual who carries out a statutory inspection of a wind turbine lift. The term is also used to indicate who has the responsibility for creating a WSoE to adjust the inspection schedule.

Guidance on selecting a competent person is provided in the HSE Simple Guidance for Lift Owners.[5] It states:

"A competent person is someone who has sufficient technical and practical knowledge of the lift to be able to detect any defects and assess how significant they are. It is also important that the competent person is sufficiently independent and impartial to allow them to make an objective assessment of the lift. For this reason, it is not advisable for the same person who performs routine maintenance to carry out the thorough examination, as they are then responsible for assessing their own work.

You can use someone from an external company or someone from within your own organisation to act as the competent person as long as they meet the above criteria."

The competent person has the following key responsibilities:

- Carrying out specified work in accordance with a suitable framework
- Signing off and reporting defects
- Effectively managing data from any inspection or risk assessment carried out.

Siemens selected an independent third party service provider who offer through-life support for operational wind farms as the competent person with the responsibility of creating a WSoE.

Written scheme of examination

A WSoE is a mechanism defined within LOLER that can be used to amend the frequency of statutory inspections. It is also known as an examination scheme.

The HSE Simple Guidance for Lift Owners[5] states:

"As an alternative to thorough examinations at statutory intervals, the competent person may draw up an examination scheme. The scheme may specify periods which are different from the statutory intervals, but this must be based on a rigorous assessment of the risks. An examination scheme may be particularly appropriate if you have a lift which is used infrequently for light loads."

The fundamental purpose of a WSoE is to create a framework with sufficient detail to provide confidence to all stakeholders – including project owners, OEMs, lift users and service providers – that the proposed adjustment to an inspection schedule is safe.

Therefore, a WSoE can be thought of as comprehensive risk assessment. It requires significant

substance, taking account of the equipment model, equipment condition and the site conditions. Furthermore, the resulting decision to alter lift inspection intervals is turbine-specific.

The resulting documentation has sufficient detail to be used by technicians as the guideline when the statutory inspection is carried out.

Implementing the WSoE in the Siemens portfolio

Since 2014, Siemens has gained valuable experience in implementing the WSoE mechanism at multiple offshore wind farms to extend turbine lift statutory inspection intervals. As an example, this section focuses on the first site to successfully implement a WSoE. The anonymised site is a typical Round 2 offshore wind farm with crew transfer vessels as the only access and transfer solution.

Making the case

Between 2014 and 2015, and as part of the wider "one-stop shop" project, Siemens invested significant time building internal confidence in the WSoE mechanism.

Siemens noted that communicating the purpose and scope of a WSoE was not simple, and there is a perception that the mechanism is not well understood across the industry.

An internal WSoE champion with experience in the process was extremely valuable in building confidence internally. Siemens happened to navigate much of the process before identifying that such an internal resource was available. There are many generic aspects of this process that are component-, discipline-, and department-agnostic.

On 28 September 2015, for reasons that are still unknown, a wind turbine lift in Germany crashed. This event caused the death of one person and seriously injured another. The incident raised awareness throughout the industry about amendments to the lift inspection schedule, and sharpened focus on the WSoE's risk assessment aspect.

What are the main components of a written scheme of examination?

Rationale
Why is a change to the schedule being proposed?

Operational hours
Quantitative assessment of the operational hours of the equipment

Known issues and repair history
Lift-specific history of any maintenance that has occurred

Risk assessment
Identification of risks and mitigation strategies along with resulting probability and severity scores

Cost-benefit analysis
Making the case for the alteration to the schedule (supporting the rationale)

Inspection guidance
Step-by-step instructions to support technicians when carrying out the statutory inspections

Appendices
Relevant Siemens work instructions
Lift OEM operations manual

The in-depth nature of the WSoE and its application on a lift-by-lift basis effectively kept the "one-stop shop" project on course. By the end of 2015, Siemens issued a framework tender that included in its scope the need for organisations that could carry out a WSoE for lift statutory inspections.

Developing the WSoE

In September 2016 an external company was awarded the contract to create a WSoE and carry out the resulting statutory inspections. Subsequently, a pre-implementation site visit was arranged involving the project owner, Siemens, and the competent person.

The importance of involving a wide range of stakeholders, internally and externally, as early as possible in the process must be emphasised. Site-based operations teams will be expected to alter their plans, and as such they must be involved and informed as a priority. The most effective method of communication was face to face discussions. If repeating the process, Siemens indicated that it would have implemented these sooner. Furthermore, customer (project owner) engagement is necessary to make the case, and ultimately sign off any changes.

Another potential area of improvement identified by Siemens is that the process could have been started earlier than it was. The relative lack of knowledge around the creation of a WSoE was considered a barrier to issuing the tender, but much of the knowledge gained throughout the process came from the supplier who prepared it.

Early in the process, the competent person completed an assessment of the operational hours of the lifts and confirmed that the average was typically much lower than 25 hours over the preceding year. This confirmed the hypothesis that they are used infrequently, relative to the lift OEM guidance (50 hours every six months) and hence supported the rationale of the WSoE. Siemens realised that at other sites with a different lift OEM, there is a lack of access to this data and hence they would not be able to build the evidence base to support such a rationale.

Following an assessment of the reliability of the lifts, a key finding was that the wire is one of the most commonly repaired components. Birdcaging of the wire, as shown in Figure 3, is the most common failure mode. Consequently, the elements of the statutory inspection focusing on the wire must be thorough. Siemens recommends changing wires when the average thickness is under 7.6mm.

The risk analysis revealed that the top three risks when unmitigated were related to the failure of the safety brake, the motor, and the lift roller door.

The comprehensive assessment led the competent person to conclude that the proposed lift inspection regime is preferable overall, compared with the existing regime, in terms of cost and risk exposure.

A draft WSoE was reviewed by Siemens health and safety experts and the internal resource that had experience in this mechanism from a previous role.

Ultimately the WSoE was presented to, and signed off by, the project owner by the end of 2016.

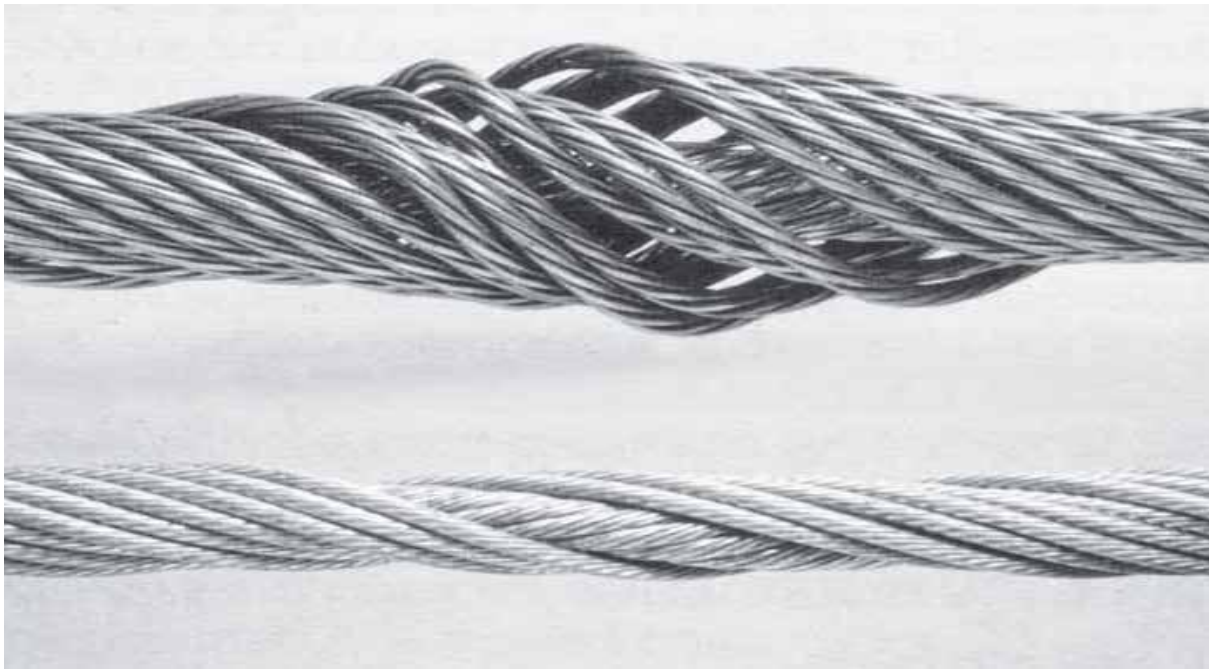

Figure 3: Birdcaging of wire

Implementation of 12-monthly statutory lift inspections

The competent person found that a 12-month statutory inspection interval can be considered safe at this site unless 50 hours of lift use has accrued since the previous inspection. Therefore, in the event of a ramping up in activity (such as, for example, during a retrofit campaign), the inspection schedule would revert back to the default six-monthly interval. Effectively, the WSoE allowed Siemens to implement the inspection schedule as recommended by the lift OEM.

The WSoE took effect at the site from January 2017, and Siemens and its customer are already seeing benefits: it has resulted in most turbines receiving one less statutory inspection than under the previous system.

The results

At the time of publication, Siemens has successfully extended the wind turbine statutory inspection intervals from six months to 12 months at two offshore wind farms, with a third site awaiting approval from the project owners. The WSoE was the mechanism used to facilitate this amendment. It is a comprehensive and bespoke risk assessment that creates a framework for providing confidence.

At other wind farms in the Siemens portfolio, barriers inhibit the implementation of a similar strategy. In one region, a strategic decision has been made to explore the in-housing of statutory

inspections, as opposed to sourcing from third parties. This has become the priority at these wind farms, but ultimately extending inspection intervals may also provide benefits.

At other wind farms, the limitation on access to lift operating hours data is inhibiting the ability to build the evidence base for altering the inspection schedule: the application of a WSoE relies on historic performance and behaviour data of the machine. For certain machine models this data is not yet available and so the application of a WSoE is not possible, although work streams are looking into alternative methods of deriving such data in order to extend the statutory inspection intervals.

Figure 4: Technicians transfer to a turbine at London Array. Credit: www.siemens.com/press

Benefits

An offshore wind turbine lift statutory inspection requires one third party competent person and one Siemens authorised person. On average, they can carry out one-and-a-half inspections per day. Extending the wind turbine lift statutory inspection intervals from six months to 12 months effectively removes the need for one inspection per year per turbine.

In a representative 100-turbine offshore wind farm, the difference between a six-month and 12 month statutory inspection schedule are presented in Table 2.

	Scenario 1	Scenario 2
Number of turbines	100	100
Interval between lift statutory inspections	Six months	12 months
Number of inspections required per year	200 inspections	100 inspections
Number of days required for inspections	133.333 days worked	66.667 days worked
Personnel in each visit	1 Siemens authorised person 1 competent person	1 Siemens authorised person 1 competent person
Total number of person days per year	266.67 person days	133.33 person days
Personnel costs per year (assuming £1000 per team per day)	£133,333	£66,667
CTV costs per year (assuming £200 per seat per day)	£53,333	£26,667
Personnel and CTV costs combined	£186,666	£93,334
Number of transfers per year (where one transfer is one person from base to turbine, between turbines, or from turbine to base)	802	400
Downtime per year (assuming 4 hours downtime per inspection and that the turbine is operational between inspections)	800 hours	400 hours
Lost production per year (assuming 3.6MW rated capacity turbines, capacity factor of 40%, £115/MWh)	£132,480	£66,240

Therefore, extending the statutory inspection intervals by six months has the following potential benefits:

- A reduction in personnel days and associated personnel costs: in particular, fewer contracted competent person days and reduced Siemens authorised personnel requirements, resulting in a saving of £66,667 per year at this representative wind farm.
- A reduction in crew transfer vessel (CTV) costs and an alleviation in demand for CTV seats, resulting in a saving of £26,667 per year at this representative wind farm.
- Fewer turbine transfers, resulting in risk exposure, in terms of personnel transfer, being halved. At this representative wind farm there are 402 fewer personnel transfers required: this reduces risk exposure, with fewer people at sea reducing the risk of incidents.
- A reduction in turbine downtime by 400 hours.
- A significant reduction in lost production for the asset owner. Avoiding 400 hours of downtime at this representative 360MW site is equivalent to a saving of £66,240. Here, a capacity factor of 40% is assumed[6] and a conservative estimate of the price for electricity of £115 per MWh is assumed. Further savings may be achieved by the ability to "bundle" lift inspections with other statutory inspections too.

It is important to note that the WSoE may not be appropriate in the event of frequent use of the lift, such as during a retrofit campaign, so the figures given here are approximate. In spite of this, the business case for extending these inspection intervals is clear.

It is important for the ongoing development of offshore wind for costs to reduce. Small improvements in O&M costs taken collectively and across the operational life of a windfarm can contribute to overall reductions in the Levelised Cost of Energy (LCoE), and can also reduce risk exposure through reducing the number of visits to turbines. While the size and value of lift service contracts might fall as a result of less frequent inspections, overall the industry will be in a better position to continue with its growth ambitions thereby creating a bigger overall maintenance market opportunity.

Lessons learned

The following lessons learned were identified by Siemens during this process:

- In general, most stakeholders are supportive of the objective to extend inspection intervals – including asset owners and the HSE – given the associated reduction in man hours, turbine visits and downtime. The biggest challenge is quantifying confidence in any alteration to an existing schedule and effectively mitigating potential risks.
- The appetite from service providers to offer support is helping to improve the efficiency of offshore wind O&M and indicates a confidence that the market will continue to grow.
- Historic data will be required to demonstrate the rationale for extending statutory inspections of any equipment. The WSoE application relies on historic performance and behaviour data of the machine; for certain machine models this data is not yet available and so the application of a WSoE is not possible.

- Communicating the purpose and scope of a WSoE was not simple and there is a perception that the mechanism is not well understood across the industry.
- The scope of a WSoE straddles detailed engineering and health and safety, and has the potential to fall between the remit of individuals and departments within an organisation.
- Identifying an internal WSoE champion with experience in the process was found to be extremely valuable. Siemens happened to navigate much of the process before identifying that such an internal resource was available.
- Ultimately, bringing six-monthly lift statutory inspections in line with the annual statutory inspections of all other equipment on the wind turbine has reduced turbine visits and stops and enabled integration of scheduled activity. This has unlocked significant cost reductions and operational efficiencies.

Recommendations

Having successfully implemented a WSoE to extend the statutory inspection intervals for offshore wind turbine lifts, Siemens can offer the following recommendations:

- The interval period between statutory inspections at offshore wind farms is not set in stone. The WSoE can be used to alter the schedule of statutory inspections, and should be considered on a site-by-site and turbine-by-turbine basis.
- It is important to retain a thorough operation and maintenance history of the lifts, which can be used as part of the assessment process when considering an appropriate inspection frequency. It should include operating hours and the number of operations carried out on lifts, results from previous inspections, and any maintenance, upgrades or repairs carried out.
- A lack of internal knowledge or experience should not be considered a barrier to implementing a WSoE. Siemens gained a wealth of knowledge about the WSoE process through the suppliers who prepared the document on their behalf.
- When making the case for a WSoE-enabled alteration, it is important to engage a wide range of stakeholders internally and externally. Site-based operations teams will be expected to alter their plans, so involve them as early as possible. Furthermore, customer engagement is necessary to make the case for, and ultimately sign off on, any changes.
- To help make the case for a WSoE, a resident expert with experience in this process should be identified. There are many generic aspects of this process that are component, discipline, and department agnostic. A key role for such a resource is to review any documentation created - both the business case for the change, and any drafts of the WSoE.
- Engaging in face-to-face discussion is one of the most effective ways to share the rationale and impacts of altering any scheduled work, such as statutory inspections.

Appendices

References

[1] Renewable UK, Offshore Wind and Marine Energy Health and Safety Guidelines, 2014: Issue 2
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About the O&M Case Studies series

This is one in a series of offshore wind O&M-focused case studies, supported by ORE Catapult's O&M forum and funded by The Crown Estate and the Offshore Wind Programme Board. These studies aim to highlight game-changing O&M projects, and promote the dissemination of knowledge among the offshore wind O&M community.

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