T-shore Education

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Module and Scenario Overview

Module:
Bolt Tightening
Learning scenario:
Basic Bolt Tightening Techniques

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Note This is a fictive generic equipment checklist intended for training purposes and therefore may vary from the equipment checklist provided by a company. It is important that a technician always read and fill checklist carefully prior to any task.

1 Description of module

In tasks performed in the wind turbine environment, knowledge of bolted connections and the ability to correctly execute bolt tightening operations are particularly crucial in the context of turbine installation and subsequent maintenance. Bolt tightening is carried out both for large structural bolts in tower sections, blade-to-rotor connections, and for smaller bolts responsible for securing components to the nacelle bedplate or small bolts related to component casings of wind turbine elements. Proper bolt tightening skills are essential not only for ensuring the correct assembly and operation of the turbine but also for mechanical safety and minimising the risk of workplace accidents.

This module will introduce fundamental technical knowledge about bolts and the correct basic methods of bolt tightening using mechanical and electric tools.

1.1 Theory

The module includes a theoretical part in which participants will learn about bolts, washers, nuts, materials, bolt tightening physics, names and markings on bolts, specifications of torque movements and tension tightening, safety aspects of bolt tightening operations, and different types of bolt tightening tools, both manual and electrical.

1.2 Practical

In the practical part, participants, under the instructor's guidance and following the provided documentation, perform practical training in bolt tightening operations using both manual and electrical tools. The practical part also includes a demonstration of an advanced bolt tightening method using a hydraulic torque wrench.

1.3 Evaluation

Throughout the entire module, the participant is evaluated by the instructor. The final evaluation is based on a report's review and discussion with conclusions.

2 Instructor pre-qualification

To conduct the learning module theory and practical training, instructors must meet the minimum requirements below:

Knowledge: specialised education or advanced knowledge in the field of bolts, bolted connections, materials and bolt tightening physics.

Skills: manual skills and experience enabling the demonstration of bolt tightening methods using a manual torque wrench, an electric torque wrench, and a hydraulic torque wrench.

Ability: educational skills related to the ability to conduct classes as an instructor, a reflective approach to teaching, and an instinct related to safe work practices.

3 Participant pre-qualification

To conduct the module (practical training), participants must meet the minimum requirements below:

Knowledge: basic knowledge of wind turbine construction, rotating machinery

Skills: basic use of manual mechanical tools

Ability: safe work evaluation of situation

4 Overview of theoretical content, scenario documents, training equipment and infrastructure

Name	Q/A	Type	Category	Where to use
PC with projector screen	1	Real-life equipment	Theoretical part equipment	Theoretical part
E-learning on moodle		Digital material	Theoretical part material	Theoretical part
Risk assessment example	1	Printed document	Theoretical part material	Theoretical part
Risk assessment template	6	Printed document	Theoretical part material	Theoretical part
Equipment checklist example	1	Printed document	Practical part material	Preparation for practical exercises part
Equipment checklist template	6	Printed document	Practical part material	Preparation for practical exercises part
Learning scenario manual	6	Printed document	Practical part material	Practical part
Inspection report	6	Printed document	Practical part material	Practical part
Stand for bolt training – torque (size matching manual torque wrench)	1	Real-life equipment	Training infrastructure	Practical part
Stand for bolt training – torque (size matching hydraulic torque wrench)	1	Real-life equipment	Training infrastructure	Practical part

Stand for bolt training – torque (size matching electrical torque wrench)	1	Real-life equipment	Training infrastructure	Practical part
Impact gun	1	Real-life equipment	Electrical tools	Practical part
Hydraulic pump with pendant - torque	1	Real-life equipment	Electrical tools	Practical part
Hydraulic hoses and couplings - torque	1	Real-life equipment	Electrical tools	Practical part
Hydraulic torque wrench cassette type	1	Real-life equipment	Electrical tools	Practical part
Electrical torque wrench with reaction arm	1	Real-life equipment	Electrical tools	Practical part
Bolts (size matching hydraulic torque wrench cassette size)	4	Real-life equipment	Training infrastructure	Practical part
Nuts (size matching hydraulic torque wrench cassette size)	4	Real-life equipment	Training infrastructure	Practical part
Washer (size matching hydraulic torque wrench cassette size)	4	Real-life equipment	Training infrastructure	Practical part
Bolts (size matching Electrical torque wrench socket)	4	Real-life equipment	Training infrastructure	Practical part
Nuts (size matching Electrical torque wrench socket)	4	Real-life equipment	Training infrastructure	Practical part
Washer (size matching Electrical torque wrench socket)	4	Real-life equipment	Training infrastructure	Practical part
Counter support/counter wrench/backup wrench	1	Real-life equipment	Tools	Practical part
Vernier calliper	6	Real-life equipment	Tools	Practical part

Manual torque wrench	1 for each 2 x participants	Real-life equipment	Tools	Practical part
Gloves with ANSI cut resistant level A1	6	Real-life equipment	Safety equipment	Practical part
Safety shoes	6	Real-life equipment	Safety equipment	Practical part
Safety googles	6	Real-life equipment	Safety equipment	Practical part
Safety helmet	6	Real-life equipment	Safety equipment	Practical part
Suitable working clothing	6	Real-life equipment	Safety equipment	Practical part

Note The list is provided for a group of 6 participants. For smaller or larger groups, the list needs to be adjusted accordingly.

5 Timeframe

Time	Part
3 hours	Theory
5 hours	Practice in practical training area (include evaluation)
Total: 8 hours	-

Note Timeframe may vary depending on number of participants, level of initial knowledge, skill and ability of participants and need to meet learning objectives.

6 Learning methods

Part	Learning method
Theory part	E-learning on Moodle T-Shore
Practical part	Practical skill training and scenario participation in practical training, VR trainings

Note Learning methods depends on accessibility of infrastructure and equipment.

7 Main learning outcomes for the module

Main learning outcome	Competency	No.
Demonstrates a good understanding of bolt technology and its function in wind turbines.	Mechanical	2.4 Install and maintain mechanical components of wind turbines.
Has knowledge of bolt tightening operations in wind turbines.	Mechanical	2.5 Operate machinery and tools commonly used in the wind industry.
Can use precision measurement tools commonly used in wind turbine work.	Mechanical	2.5 Operate machinery and tools commonly used in the wind industry.
Can use mechanical tools commonly used in wind turbine work.	Mechanical	2.5 Operate machinery and tools commonly used in the wind industry.
Can use power tools commonly used in wind turbine work.	Mechanical	2.5 Operate machinery and tools commonly used in the wind industry.
Can use advanced torque tools commonly used in wind turbine work.	Mechanical	2.5 Operate machinery and tools commonly used in the wind industry.
Can plan and conduct safe work in accordance with general HSE requirements	Health, Safety, and Environment	4.2 Implement safety procedures and protocols for wind energy work environments
Has knowledge about hazardous environment, can plan risk assessment and execute work in accordance with risk assessment	Health, Safety, and Environment	4.6 Perform risk assessments and have the proper safety mindset / risk awareness
Can recognise the importance of, and demonstrate, proper teamwork and communication	Teamwork & communication	5.1 Communicate effectively using verbal skills, industry-specific terminology, and active listening. 5.2 Interpret and apply industry-standard hand signals for crane operations and equipment movement.
Can supply written and verbal report	Teamwork & communication	5.3 Document technical information accurately, including maintenance records and reports, using written and digital tools.

8 Theory part

8.1 Learning theory

The part of the training dedicated to theory - involves the assessment of knowledge for training participants who have completed e-learning before commencing the learning scenario.

Note Some modules / practical learning parts may require a back-and-forth between theory and practice.

Instructor must:

- Verify if participants complete e-learning on their own
- Collect feedback after theory.
- Answer questions and explain additional material if needed

Each course participants must:

- Learn theory part
- Ask questions related to learning materials and module
- Conduct feedback questionnaire

Learning outcomes:

Detailed learning outcome	Main learning outcome
The participants know the bolt connection specification and build	Demonstrates a good understanding of bolt technology and its function in wind turbines.
The participants know different types of bolts and their components, as well as the materials used.	Demonstrates a good understanding of bolt technology and its function in wind turbines.
The participants can explain how bolt tightening operations are performed using different techniques.	Has knowledge of bolt tightening operations in wind turbines.
The participants can describe various manual, electric, and hydraulic tools used in bolt tightening operations.	Has knowledge of bolt tightening operations in wind turbines.

8.2 Risk Assessment

The part of the training focused on risk assessment and its planning involves the instructor guiding training participants through an exercise on planning a risk assessment for a specific learning scenario and location.

Instructor must:

- Explain what risk assessment is and how it is being created
- Show template of risk assessment (**Bolt tightening techniques_Risk assesment_Template_V01**) and filled example (**Bolt tightening techniques_Risk assesment_example_V01**)
- Conduct risk assessment exercise with training participants
- Answer questions and give feedback

Each course participants must:

- Ask questions related to learning materials
- Conduct risk assessment exercise

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants can identify and list specific hazards associated with executing the planned learning scenario.	Has knowledge about hazardous environment, can plan risk assessment and execute work in accordance with risk assessment
Participants can create a corresponding risk assessment addressing the hazards identified in the planned learning scenario.	Has knowledge about hazardous environment, can plan risk assessment and execute work in accordance with risk assessment

9 Practical part - introduction

9.1 General Introduction

This part of the document describes how the practical part of the module should be organised. This template is a guideline which may need local adaptation. Modules may require that the training participants undergo practical skill training before they do scenario training. This may include how to operate tools, equipment and how a component function. After the skill training, the training participants will test their skills and knowledge in a practical learning scenario. Both the practical skill training and the scenario training can be adapted to be a practical examination.

Instructor must provide constructive feedback to participants on relevant practice activities. It includes feedback concerning the correctness of the exercise performed by the training participant, suggestions for improving the execution of the exercise by the training participant, and general remarks about participant safety at a given moment during performing of exercises.

At all the time during training participant can ask questions and expect feedback from the instructor.

9.2 Practical training introduction

Before start of practical exercises:

Participants may be divided into more groups. Max ratio: 6 participants per instructor for practical session.

All participants and instructors shall use appropriate PPE in accordance with local laws and regulations.

The minimum requirement is:

- Overalls/work clothes – long sleeves
- Safety shoes

- Safety helmet
- Safety glasses
- Gloves with ANSI cut resistant level A1

The participants must be instructed about the followings:

- All the equipment to be used and their correct use.
- The instructor must be informed immediately if anyone feels ill, in pain, or exhausted about any condition that may affect health and safety.
- If anybody feels uncomfortable during the training, e.g. uncomfortable working position, dizziness, etc., the instructor must be notified immediately.
- If anyone gets injured or causes harm to others, the instructor must be notified immediately.

Exclusion zones must be set up and maintained around the practical training area.

10 Preparation for practical exercises

10.1 HSE brief & PPE dressing

The HSE brief includes information specific to the components and equipment used during the practical portion. It also involves verifying all safety aspects related to the practical exercises and ensuring that participants use PPE correctly.

Instructor must:

- Present and explain the hazards and risks in practical training zones.
- check if each participant has correct PPE and wear it correctly.

Each course participants must:

- Demonstrate the ability during practical exercises to keep themselves out of hazard and risk in practical training zone during scenario exercises.
- Inspect PPE before use and wear correct PPE equipment for training.

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants can select the appropriate PPE based on the hazard analysis related to planning activities	Can plan and conduct safe work in accordance with general HSE requirements

Participants can wear correctly PPE equipment for planning activities	Can plan and conduct safe work in accordance with general HSE requirements

10.2 Manual handling

Manual handling is a part of the training dedicated to preparing participants for physical tasks such as lifting heavy objects, bending, or assuming unnatural positions during exercises.

Instructor must:

- Facilitate warming up exercise, and manual handling exercises with group and discussions on to handle equipment manually according to the equipment characteristics and potential hazards and risks.
- Correct positioning under manual tasks

Each course participants must:

- Warm up, and practice correct manual lifting techniques. Focus on correct work positioning.

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants understand the rules for proper manual handling techniques.	Can plan and conduct safe work in accordance with general HSE requirements
Participants can perform practical tasks in compliance with manual handling requirements.	Can plan and conduct safe work in accordance with general HSE requirements

10.3 Equipment check

This part of the training focuses on presenting the verification and inspection process for equipment needed during the practical part, as well as identifying when equipment require quarantine. It also emphasises proper storage conditions and procedures.

Instructor must:

- Show where the gearbox service accessories, tools, equipment's are stored. Explain how to store it correctly and describe potential consequences of failing to do so.
- Explain the different indicators that must be checked during pre-use and post-use checks
- Explain the reasons for quarantining accessories and equipment.
- Explain how to fill **equipment checklist**

Each course participants must:

- Practice the ability to correctly store accessories and tools – executing also during later practical exercises.
- Practice how to conduct pre-use and post-use check of equipment and accessories.
- Practice the ability to identify accessories requiring quarantine.
- Practice the completion of equipment checklist

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants understand the importance of correct equipment storage	Can plan and conduct safe work in accordance with general HSE requirements
Participants can perform equipment inspection	Can plan and conduct safe work in accordance with general HSE requirements
Participants can correctly fill out equipment checklist	Can supply written and verbal report

11 Practical skill training

Practical skill training is a part highly dependent on participants' pre-qualifications. Based on an assessment of participants' skills, the instructor should determine the amount of skill training required to allow participants to engage in exercises from the learning scenario. In cases where participants possess varying skill levels identified through a gap analysis, skill training should be planned according to the lowest skill level identified. This approach ensures learning opportunities for less experienced participants, while for more advanced participants, it serves as a review and practice of their skills.

Examples of skill training exercises related to the Bolt tightening techniques learning scenario:

- Use of precision measuring tools
- Use of mechanical tools
- Use of power tools
- Use of advanced torque tools

Implement practical skill training on equipment that can simulate the environment.

11.1 Use of precision measuring tools

The skill training on the use of precision measuring tools focuses on familiarising participants with the tools required for accurate measurement in the learning scenario. In this case, a vernier calliper is used to measure the dimensions of bolts, nuts, and other components with high precision.

Instructor must:

- Present and explain the correct usage of the vernier calliper, including how to read measurements accurately, zero the instrument, and handle it properly to avoid errors.
- Observe participants' use of the vernier calliper, assess their technique, and provide constructive feedback on their actions.

Each course participants must:

- Demonstrate the skills and ability to correctly use a vernier calliper during practical exercises, ensuring precise and consistent measurements.

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants can effectively and correctly use vernier calliper	Can use precision measurement tools commonly used in wind turbine work.

11.2 Use of mechanical tools

The skill training on the use of mechanical tools focuses on familiarising participants with the tools required for the learning scenario. In the case of Bolt tightening techniques, the primary manual tool is a manual torque wrench, which is used for tightening bolts according to the correct value

Instructor must:

- Present and explain the correct usage of tools, including how to properly set and adjust the torque wrench to the correct value.
- Observe participants use of the tools, assess their technique, and provide constructive feedback on their actions.

Each course participants must:

- Demonstrate the skills and ability to correctly use mechanical tools during practical exercises

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants can effectively and correctly use manual torque wrench to perform precise bolt tightening operations accurately	Can use mechanical tools commonly used in wind turbine work.

11.3 Use of power tools

The skill training on the use of power tools focuses on familiarising participants with the tools required for the learning scenario. In the case of bolt tightening techniques, the basic power tool is an impact gun, which is used for bolt loosing or tightening which doesn't require precise value like pre-tightening bolts before final torque.

Instructor must:

- Present and explain the correct usage of the impact gun, including how to safely operate the tool, adjust settings, and ensure proper handling.
- Observe participants' use of the impact gun, assess their technique, and provide constructive feedback on their actions.

Each course participants must:

- Demonstrate the skills and ability to correctly use an impact gun during practical exercises, ensuring safe and efficient operation.

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants can effectively and correctly use an impact gun to perform bolt tightening and loosening operations safely.	Can use power tools commonly used in wind turbine work.

11.4 Use of advanced torque tools

The skill training on the use of advanced torque tools focuses on familiarising participants with the tools required for the learning scenario. In the case of bolt tightening techniques, the primary advanced tool is an electrical torque wrench with a reaction arm, which is used for precise torque application and controlled bolt tightening.

Instructor must:

- Present and explain the correct usage of the electrical torque wrench with a reaction arm, including how to properly set torque values, position the reaction arm, and operate the tool safely.

- Observe participants' use of the tool, assess their technique, and provide constructive feedback on their actions.

Each course participants must:

- Demonstrate the skills and ability to correctly use an electrical torque wrench with a reaction arm during practical exercises, ensuring safe and accurate operation.

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants can effectively and correctly use an electrical torque wrench with a reaction arm, to perform precise bolt tightening operations safely and accurately.	Can use advanced torque tools commonly used in wind turbine work.

12 Learning scenario

12.1 Scenario Introduction

During the learning scenario, participants will perform various bolt tightening tasks that simulate the daily activities of a wind turbine technician. These tasks will cover both installation work and maintenance operations on wind turbines. Special emphasis must be placed on safety when working with mechanical and electrical tools, as well as on executing tasks with the precision and accuracy specified in the work instructions.

If the practical training area does not have realistic wind turbine components that supports all the practical steps described below: Implement practical skill training on equipment that can simulate the environment.

12.2 Exercise 1 – Bolt loosening with an impact gun

The first key aspect of effective bolt tightening operations is the correct technique and proper handling of tools used for loosening turbine bolts. This is especially important in the context of efficient work during internal component inspections. In loosening operations, precision and torque accuracy are not required. In this case, an impact gun is ideal, as it allows for the quick removal of tightly fastened smaller-sized bolts. The exercise should focus on correctly selecting the appropriate socket for the impact gun according to the size of the bolt nut, ensuring the proper and safe operation of the impact gun, and correctly storing loosened bolts and nuts.

Instructor must:

- Explain and discuss the steps in Exercise 1 from the **learning scenario manual**, emphasising the details of each action while maintaining safety protocols.
- During the exercise, provide feedback and reflections to the participants, engaging them in discussions.

- Review and discuss the results of the participants actions

Each course participants must:

- Familiarise yourself thoroughly with the exercise manual and clarify any unclear points.
- Perform each step from the manual.

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants can effectively and correctly use vernier calliper	Can use precision measurement tools commonly used in wind turbine work.
Participants can effectively and correctly use an impact gun to perform bolt loosening operations safely.	Can use power tools commonly used in wind turbine work.
The participants are able to collaborate effectively to successfully complete the task.	Can recognise the importance of, and demonstrate, proper teamwork and communication
The participants can fill out check documentation in correct and reflective way	Can supply written and verbal report

12.3 Exercise 2 – Bolt tightening with manual torque wrench

Using a manual torque wrench allows for precise tightening of bolts to a low torque value. This is typically used for small bolts found in turbine component enclosures, such as during inspection tasks or filter replacement. Precisely tightening bolts according to the manufacturer's recommendations ensures the proper lifecycle of the component and prevents damage, alterations to the physical properties of the bolts, or corrosion. The main objective of the exercise is to focus on the accuracy of bolt tightening to the values specified in the documentation.

Instructor must:

- Explain and discuss the steps in Exercise 2 from the **learning scenario manual**, emphasising the details of each action while maintaining safety protocols.
- During the exercise, provide feedback and reflections to the participants, engaging them in discussions.
- Explain and demonstrate how to complete the **service report**.
- Review and discuss the results of the participants reports with them.

Each course participants must:

- Familiarise yourself thoroughly with the exercise manual and clarify any unclear points.
- Perform each step from the manual.
- Complete the according section in **service report**.

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants can effectively and correctly use vernier calliper	Can use precision measurement tools commonly used in wind turbine work.
Participants can effectively and correctly use manual torque wrench to perform precise bolt tightening operations accurately	Can use mechanical tools commonly used in wind turbine work.
The participants are able to collaborate effectively to successfully complete the task.	Can recognise the importance of, and demonstrate, proper teamwork and communication
The participants can fill out check documentation in correct and reflective way	Can supply written and verbal report

12.4 Exercise 3 – Bolt tightening with electrical torque wrench with a reaction arm

The objective of this exercise is to train participants in the correct and safe use of an electrical torque wrench with a reaction arm for precise bolt tightening. Participants will learn how to set the correct torque values, position the reaction arm properly, and apply controlled tightening forces in accordance with manufacturer specifications. The exercise will focus on ensuring accuracy, safety, and proper handling of the tool to achieve reliable bolted connections.

Instructor must:

- Explain and discuss the steps in Exercise 3 from the **learning scenario manual**, emphasising the details of each action while maintaining safety protocols.
- During the exercise, provide feedback and reflections to the participants, engaging them in discussions.

Explain and demonstrate how to complete the **service report**.

- Review and discuss the results of the participants reports with them.

Each course participants must:

- Familiarise yourself thoroughly with the exercise manual and clarify any unclear points.
- Perform each step from the manual.
- Complete the according section in **service report**.

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants can effectively and correctly use vernier calliper	Can use precision measurement tools commonly used in wind turbine work.
Participants can effectively and correctly use an electrical torque wrench with a reaction arm, to perform precise bolt tightening operations safely and accurately.	Can use advanced torque tools commonly used in wind turbine work.
The participants are able to collaborate effectively to successfully complete the task.	Can recognise the importance of, and demonstrate, proper teamwork and communication
The participants can fill out check documentation in correct and reflective way	Can supply written and verbal report

12.5 Exercise 4 – Demonstration of Bolt tightening with hydraulic torque wrench

The exercise involves observing how the instructor performs a complex bolt-tightening operation using a hydraulic torque wrench. This task is at an advanced level and is not part of basic bolt tightening techniques. Participants will observe the proper preparation of the workstation, equipment check and setup, parameter adjustment, safe operation, and execution of tightening according to the documentation. High-torque tightening operations, such as those performed with hydraulic torque tools, are particularly critical for securing tower flanges and foundation connections. During the exercise, participants should pay special attention to safety aspects and working in accordance with technical documentation.

Instructor must:

- Present the equipment and documentation required for the demonstration
- Demonstrate the bolt-tightening operation using hydraulic torque tools
- Explain each step of the process, highlighting potential mistakes and their consequences.
- Answer participants' questions.

Each course participants must:

- Observe each element of the demonstration carefully.
- Engage in discussion about various aspects of the process
- earning outcomes:

Detailed learning outcome	Main learning outcome

The participants can explain how bolt tightening operations are performed using hydraulic torque wrench	Has knowledge of bolt tightening operations in wind turbines.
The participants can explain how hydraulic tools are being used in bolt tightening operations.	Has knowledge of bolt tightening operations in wind turbines.

12.6 Exercise 5 – Final reporting

The final exercise, Final Reporting, focuses on practicing reporting skills, including clear and accurate communication of content, as well as reflections on the previously performed exercises. In this part, the instructor evaluates how well the participants understood the tasks they carried out and whether they drew correct conclusions and reflections.

- Instructor must:
- Discuss with participants each of the exercises and summarise results of them
- Review with participants their filled-out documentation
- Discuss final report outcome

Each course participants must:

- Engage in discussion about exercises.
- Finalise all required documentation and verify if all documentation is completed.
- Prepare final report section in **Service report** with next step service action proposition.
- Listen to feedback from the instructor and peers to improve your assessment skills.

Learning outcomes:

Detailed learning outcome	Main learning outcome
The participants can fill out check documentation in correct and reflective way	Can supply written and verbal report
The participants can reflect on service outcomes and recommend the next step actions	Can supply written and verbal report

13 Completion of training practical part

13.1 Safe dismounting and tools storage

This exercise involves safely cleaning up the practical training area after completing the practical sessions. It aims to demonstrate the correct sequence for safely dismantling equipment, returning it to the storage space, and preparing it for future use.

Instructor must:

- Inform participants how safely and in what order unmount tools & accessories and return it to the storage.

Each course participants must:

- Safely unmount tools & accessories.
- Correctly return tools and accessories to the storage

Learning outcomes:

Detailed learning outcome	Main learning outcome
Participants understand the importance of correct equipment storage	Can plan and conduct safe work in accordance with general HSE requirements
Participants can perform equipment inspection	Can plan and conduct safe work in accordance with general HSE requirements

14 Learning module & scenario evaluation

Module part	Exercise name	Evaluation method
Theory	learning theory	LMS system moodle verification that participant completed e-learning
Theory	Risk assessment	Instructor evaluation based on the **risk assessment** document created by the participant.
Preparation for practical exercises	HSE brief & PPE dressing	Instructor evaluation based on the participant's correct preparation procedure.
Preparation for practical exercises	Manual handling	Instructor evaluation based on the participant's demonstration of proper manual handling techniques.
Preparation for practical exercises	Equipment check	Instructor evaluation based on the **equipment check** report completed by the participant.
Practical skill training	Use of precision measuring tools	Instructor evaluation based on the practical skills demonstrated by the participant.
Practical skill training	Use of mechanical tools	Instructor evaluation based on the practical skills demonstrated by the participant.
Practical skill training	Use of power tools	Instructor evaluation based on the practical skills demonstrated by the participant.
Practical skill training	Use of advanced torque tools	Instructor evaluation based on the practical skills demonstrated by the participant.

Learning scenario	Bolt loosening with an impact gun	Instructor evaluation based on the participant's practical skills demonstrated and the completed section of the **service report**.
Learning scenario	Bolt tightening with manual torque wrench	Instructor evaluation based on the participant's practical skills demonstrated and the completed section of the **service report**.
Learning scenario	Bolt tightening with electrical torque wrench with a reaction arm	Instructor evaluation based on the participant's practical skills demonstrated and the completed section of the **service report**.
Learning scenario	Demonstration of Bolt tightening with hydraulic torque wrench	Instructor evaluation based on the participant's practical skills demonstrated and the completed section of the **service report**.
Learning scenario	Final reporting	Role-play exercise between a site manager and a wind technician regarding the inspection reporting. Instructor evaluation based on the participant's reflections, reporting quality, and the completed **service report** document.

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