# Purpose

The purpose of this micro-credential is to provide a competency-based evaluation. Earning a micro-credential shows mastery of a skill set and supports professionals in their careers in the wind energy industry.

# Scope

This micro-credential sets the minimum requirements for a wind technician to demonstrate proficiency in hazardous energy identification, control, and mitigation using current industry standard lockout tagout (LOTO) procedures for gearbox.

# MICRO-CREDENTIAL Gear Box

1. **Terminology**
   1. Authorized employee / individual – An employee who locks or tags machines or equipment in order to perform servicing or maintenance.
   2. Affected employee / individual – An employee who is required to use machines or equipment on which servicing is performed under the Lockout/Tagout standard or who performs other job responsibilities in an area where such servicing is performed.
   3. Other employees – All employees who are or may be in an area where energy control procedures may be utilized.
   4. Capable of being locked out – An energy-isolating device is considered capable of being locked out if it:
      1. Is designed with a hasp or other means of attachment to which a lock can be affixed.
      2. Has a locking mechanism built into it.
      3. Can be locked without dismantling, rebuilding, or replacing the energy-isolating device or permanently altering its energy control capability.
   5. Energized – Machines and equipment are energized when they are connected to an energy source or they contain residual or stored energy.
   6. Energy-isolating device – A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.
   7. Energy source – Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
   8. Group LOTO – One authorized individual performs steps of LOTO while affected individuals will verify de-energization prior to beginning work.
   9. Lockout – The placement of a lockout device on an energy-isolating device, in accordance with an established procedure, ensuring that the energy-isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
   10. Lockout device – Any device that uses positive means, such as a lock, blank flanges and bolted slip blinds, to hold an energy-isolating device in a safe position, thereby preventing the energizing of machinery or equipment.
   11. Normal production operations – Utilization of a machine or equipment to perform its intended production function.
   12. Personal Protective Equipment (PPE) – Equipment designed to protect the wearer's body from injury or infection. (Source – <https://www.google.com/search?client=firefox-b-1-d&q=Personal+Protective+Equipment>)
2. **Acronyms**
   1. LOTO – Lock Out Tag Out
3. **Lockout Tagout of Gearbox**
   1. To prove competency the candidate MUST:
      1. Perform a hazard assessment for the area in which they are to demonstrate proper LOTO procedures.
         1. Energized equipment and electric shock
         2. Oil contamination
         3. Hot Oil
         4. Fumes
         5. Rotating equipment
      2. Select appropriate PPE for the de-energization and the immobilization of equipment.
      3. Select appropriate LOTO based on manufacturers recommendation and company policy for the de-energization of the Gearbox. Identify the zone of protection given the energy isolating devices applied.
         1. Gearbox
         2. Gearbox Oil Filter
         3. Gearbox Heaters (if applicable)
         4. Low and high-speed shaft
      4. Perform the LOTO, using appropriate steps.
         1. ***Prepare*:** Gather paperwork, PPE, and required tooling. Notify affected individuals the LOTO process is about to begin.
         2. ***Shutdown*:** Shutdown the equipment.
         3. ***Isolate*:** Isolate or disconnect the equipment from energy sources
         4. ***Apply*:** Apply Lockout/Tagout Devices to Energy Isolating Devices.
         5. ***Control*:** Control, release, or restrain all potential stored or residual energy.
         6. ***Verify*:** Verify zero volts during a HCH test using a DMM. Verify safe pressure using pressure gauge. Verify no gearbox movement during a function test.
      5. Upon completion of work and prior to re-energization candidate must verify all individuals, tools, and debris are clear of the area.