# 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 describes the minimum criteria for an individual to demonstrate proficiency when replacing brake pads in a wind turbine.

# MICRO-CREDENTIAL Brake Pad Replacement

* 1. Does the candidate possess the required safety training to demonstrate the task?
     1. Candidate SHALL
        1. Have completed ALL required safety training topics prior to attempting this competency
           1. These topics shall at a minimum meet the requirements of the authority having jurisdiction or the company policies; whichever is more protective
  2. Did the candidate perform the required steps for work at the turbine?
     1. Candidate SHALL
        1. Verbalize and/or demonstrate the steps that are required prior to shutting off the machine and climbing
  3. Did the candidate perform a hazard assessment for the work about to be demonstrated?
     1. Candidate SHALL
        1. Perform a hazard assessment for the area in which they are to demonstrate this competency
        2. Use safety glasses as a minimum requirement for PPE
        3. Verbally communicate to the evaluator and include all recognized hazards
     2. Proper PPE SHALL
        1. Be selected and inspected for the hazards identified
  4. Did the candidate select and inspect the needed PPE?
     1. Candidate SHALL
        1. Have safety glasses
  5. Did the candidate demonstrate, or verbalize, the procedure for placing the turbine in a safe state BEFORE disabling the brake system?
     1. Candidate SHALL
        1. Demonstrate, or verbalize, the steps to make the turbine safe BEFORE disabling the hydraulic system
           1. SHALL include items such as the low speed lock pin(s), high-speed lock pin(s), disabling blade pitch ability, disabling the yaw system, etc.
  6. Did the candidate verify that the brake system(s) is/are at a 'zero energy' state prior to beginning the work?
     1. Candidate SHALL
        1. Utilize some form of lock-out, tag-out, or tag-out procedure
        2. Verify that the system is at zero energy state
           1. Demonstrate to the evaluator by releasing stored pressure, disconnecting the ability of the pump motor to run and verifying that there is no system pressure by using a pressure gauge
  7. Did the candidate correctly measure the pad thickness of the fast shaft brake and the yaw brake pad inclusive of the backing material and compare it to the service manual/maintenance sheet specifications?
     1. Candidate SHALL
        1. Demonstrate brake pad thickness measurement inclusive of the backing plate which the friction material is bonded to. This should be done for the fast shaft brake and the yaw brakes as necessary
        2. Follow work instructions to access the brake pads
           1. This may be using one bolt to pivot with, installing a fixture or using other methods described in work instructions
        3. Explain to the evaluator why one pad might have a different thickness measurement than the pad on the opposite side of the brake rotor (fast shaft brake)
  8. Did the candidate correctly demonstrate replacement of the yaw brake pads?
     1. Candidate SHALL
        1. Correctly demonstrate replacing the yaw brake pads using the method of rotating the yaw brake caliper away from the rotor disc
        2. Prepare the torque tool/system the evaluator assigns for use
        3. Correctly demonstrate reinstalling the yaw brake caliper and torqueing the fasteners to the torque value assigned by the evaluator
           1. Follow all established safe tool use procedures
           2. Properly demonstrate torque of the bolts
  9. Did the candidate remove the fast shaft brake pad return springs and bolts?
     1. Candidate SHALL
        1. Remove all brake pad return springs and bolts from the brake pads
  10. Did the candidate remove one set of pad reaction blocks to gain access to the brake pads?
      1. Candidate SHALL
         1. Remove a set of pad reaction blocks from the caliper
  11. Did the candidate correctly explain the pad orientation to the evaluator?
      1. Candidate SHALL
         1. Explain to the evaluator how to determine which direction the pad is installed if the labels are missing from shipping
            1. Include details such as

The arch of the pad material

Density of the pad material pucks

* + - 1. Explain how this relates to velocity at a given point on the rotor disk
  1. Did the candidate install the pad retention/return spring bolts without damage to the new pads?
     1. Candidate SHALL
        1. Install the retention bolts with springs without cross threading them or otherwise creating any damage
     2. Retention bolts SHALL
        1. Be torqued to the appropriate torque value which may be assigned by the evaluator
  2. Did the candidate correctly install the pad reaction blocks?
     1. Candidate SHALL
        1. Install the reaction blocks
        2. Torque the fasteners to the proper value
           1. Torque value may be assigned by the evaluator
  3. Did the candidate adjust the pad gap properly?
     1. Candidate SHALL
        1. Adjust the pad gap to be equal on both sides of the rotor and no more than 1mm total gap when both sides are added together
  4. Did the candidate restore the system to operational status and verify that it operates properly?
     1. Candidate SHALL
        1. Return the system to full operational status
        2. Verify, through operation, that the system is fault free and capable of stopping the turbine
  5. Did the candidate fill out the required paperwork properly?
     1. Candidate SHALL
        1. Complete required documentation
  6. Did the candidate notify operations that work was complete and place the turbine back into operation?
     1. Candidate SHALL
        1. Demonstrate, or verbalize to the evaluator that operations has been notified of work completion and that the turbine has been restarted and fault free
  7. Did the candidate perform all tasks in a safe manner?
     1. Candidate SHALL
        1. Use all PPE
        2. Practice the safety steps required for work on a wind turbine and hydraulic system