

# NATIONAL ELECTRIC COIL



**Leading Independent  
Manufacturer  
Rotor Windings for  
Steam- and Gas-Driven Generators**

**TURBOGENERATOR  
ROTORS**

**Premier Provider of  
Comprehensive Services  
for Engineering Design,  
Testing, Evaluations, Repairs  
& Winding Installations**

**OUR EXPERIENCE GENERATES RESULTS!**



# Quality Work On a Tight Schedule? You Need National Electric Coil



Specify NEC's Rotating Field Windings  
For Your Next Rotor Rewind  
And Make an Investment In Reliable Performance

Serving the entire power generation sector — utilities, cogenerators, refineries, paper mills and other industries — NEC can handle any rotor problem, large or small. We've seen a full range of failure modes or near-failure conditions for machines of almost every make and model.

Our engineers and technicians can diagnose a full range of problems, electrical or mechanical. They are skilled in dealing with rotors with shorts, grounds, or coil damage. Repairing damage to rotor forgings or retaining rings is a particular specialty. Our full machine shop capabilities make it possible for us to design and manufacture a replacement for almost any rotor component.

With no loyalty to a particular machine design, our engineers can look instead to a wide range of makes and models to analyze which design solutions have worked effectively and which have not. This broader perspective can provide you with a more innovative and cost-effective approach to your rotor repair. We will do a complete evaluation of your rotor and recommend repairs to correct problems and prevent them from occurring in the future

National Electric Coil has developed proven solutions for a number of problems germane to machines of a certain age or to those made by specific OEMs. These include rotor dovetail cracking, retaining ring stress corrosion, J-strap fatigue, top turn cracking, brazed joint cracking, ground failures, among others. With our experienced engineering team, we have been able to provide our customers with timely solutions to these and other problems, with no sacrifice of quality workmanship or machine reliability.

Additionally, rotor winding design and manufacture has been an important part of NEC's long history as an industry leader. No matter the winding configuration or the method of ventilation, our expertise in repairing or refurbishing existing windings or in manufacturing new windings means that customers can be confident that machines returned to service will perform as rated or better.



Cleaning windings for reuse



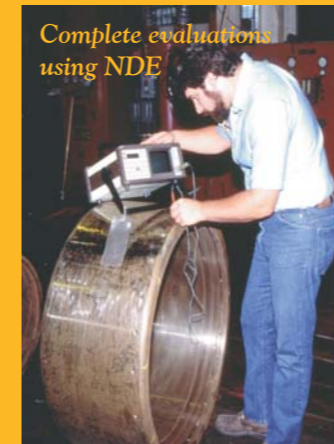
Insulating rotor coils



Verifying braze integrity



New rotor coils ready for overseas crates



Complete evaluations using NDE



Testing rotor for shorts



Clean room used for rotor rewinds



Offset holes in each coil form diagonal cooling passages typical for certain types of rotors

Beyond the usual and expected range of rotor services, National Electric Coil also offers a number of optional or diagnostic services, such as high speed and over-speed balancing with a full battery of running electrical tests. We can also heat the rotor to evaluate its sensitivity to temperature changes. Rotors with special requirements for asbestos or contaminant-free environments can be easily accommodated.

Our operation is set up to serve you. Production staffing is scheduled for three shifts, seven days a week. We manufacture insulating tapes, rotor coils, slot liners and blocking in-house. We also manufacture new collector



Setting up for rotor thermal sensitivity tests

Digital controls for pit's variable-speed drive

Balance pit for rotors up to 50 tons

rings, axial and radial leads, axial lead insulating tubes, and "J" straps. Our full-service machine shop can make any needed replacement part. All critical components are under our control!

With our engineering team on-call 24 hours a

day and our ability to staff a three-shift work force, seven days a week, National Electric Coil is your best choice for quality work and responsive service. Call us today and find out how our experience can work for you!

## National Electric Coil

800 King Avenue

Columbus, Ohio 43212

Phone: (614) 488-1151

FAX: (614) 488-8892

Email: [sendinfo@National-Electric-Coil.com](mailto:sendinfo@National-Electric-Coil.com)  
Website: <http://www.National-Electric-Coil.com>

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# NEC's Turbogenerator Rewind Features

## Overview

- rotor body prepared: cleaned, painted, slot liners installed
- contaminant-free clean rooms provided per customer specs
- winding installation: overhead trees support coils, temporary blocking for end turns
- continuous electrical tests verify insulation integrity
- winding cured in temperature-controlled oven
- high-speed thermal balancing
- final electrical testing

## Baseline Condition Recorded; Initial Electrical Tests For Rotor Winding & Component Insulation:

- rotor body temperature
- winding resistance
- insulation resistance
- polarization index (PI)
- pole balance

## Initial Mechanical Inspections of Rotor Components:

- check all major diameters
- check shaft straightness and component alignment
- measure retaining ring hardness
- measure, inspect: retaining rings, fans, coupling, collector rings

## Component Documentation:

- rotor fans, retaining rings, slot wedges and rotor coils: identity, and location of parts marked, condition recorded

## Disassembly:

- specialized equipment prevents damage to components
- induction heating for retaining ring removal
- non-metallic tools for removing wedges
- coil trees to support windings as turns are removed from slots

## Pre-Rewind Inspections, Testing & Evaluations of Mechanical Components:

- non-destructive testing techniques: visual inspection, dye penetrant, magnetic particle, ultrasonic testing
- evidence of cracking, burning, fretting, pitting or other signs of distress: replica examinations, and photomicrographs

## Turn Insulation:

- all types available: Class F mica tape, Nomex<sup>®</sup>, Conolite<sup>®</sup>, glass melamine
- mica tapes impregnated with B-stage epoxy resin; applied half-lapped
- strip insulation placed on the top and bottom of the turns

## New or Remanufactured Rotor Windings:

- main field or amortisseur
- edge-bent or fabricated
- solid or inner-cooled
- all brands, all styles

## End Turn Blocking:

- high-quality Class F "EHC" or G-11 rotor blocking for long-lasting coil support
- machined in-house per engineering drawings

## Retaining Ring Insulation:

- All types available: bonded Teflon<sup>®</sup>-coated melamine, Scotch-Ply<sup>®</sup> composites

## Slot Liners or Slot Cells:

- designed to match slot width, height, taper and step
- manufactured in-house using glass epoxy, Nomex<sup>®</sup>, and other composites to meet all required operating regimes.
- all liners ground tested: minimum of 20 times the normal operating voltage of the rotor
- slip planes permanently molded into the liner during manufacturing

## Pole to Pole Crossovers:

- all copper connections replaced with new OFHC copper
- crossovers upgraded: flexible configuration with multiple layers of copper strands, 30-year expected life

## High-Speed Balancing:

- rotors up to 125,000 pounds at 3600 RPM
- optional thermally-controlled enclosure