

# Service Shop

## Motors and Generators

García, Nuevo León - México



**GE INDUSTRIAL MOTORS**  
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# Who We're

We are a highly qualified group of experts with more than 20 years experience in technologies from various special electric motors and generators manufacturers

We perform complex works with the necessary security and support, to serve large clients, in various demands of industrial sectors such as: food, cellulose, cement, electric power, mining, petrochemical, chemical and steel



## Vision

Work safely and with operational excellence offering our customers specialized solutions in recovery, maintenance and repowering of motors and power generators



## Mission

Be recognized as world wide company in the maintenance segment of medium and high-power electromechanical equipment presenting world class service, parts and products



## Values

Integrity, valorization of the human being, team spirit, business sustainability, innovation and challenges.

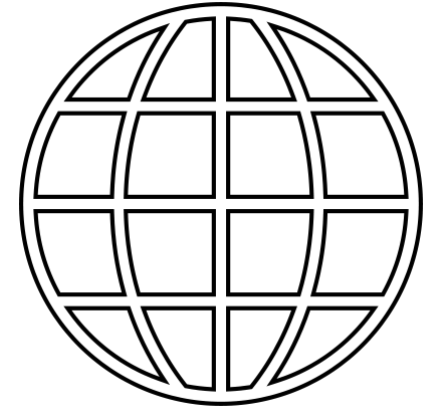
## Our Solutions

- ▼ AC/ DC Motors, and Generators repairs
- ▼ Low / High Voltage, Induction & Synchronous
- ▼ Auxiliary / Brushless Excitation
- ▼ Reverse engineering solution
- ▼ Re design , issues resolution
- ▼ Commissioning and LTSA
- ▼ Field Service Engineering
- ▼ Project Management



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# Equipment and installations



- 
- ▼ Service center of repair and modernization of electromechanical equipment
  - ▼ Engineering, assembly and machining service.
  - ▼ Maintenance and long-term service agreement contracts



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# Equipment and installations

## Workshop area and main equipment

- ▼ Located in García, Nuevo León Mexico with a dedicated area of 23200 Sq. Ft - (2150 Sq. M) shared resources with new motors and generators manufacturing shop.
- ▼ Coil manufacturing area from low voltage to 13800 V.
- ▼ Manufacture capacity of insulated rectangular bars used in DC machines and wound rotors winding.
- ▼ Test area with load capacity including temperature, performance, vibration analysis, up to 13800 V at any polarity
- ▼ Cranes 40T, 15T lifting capacity
- ▼ VPI and ovens for 13800 V windings
- ▼ Paint booths with filters that protect the environment
- ▼ Balance machine up to 20T rotors , capacity to balance in 2 or more planes of symmetry



Experience Engineering team for upgrades and special projects including reverse engineering process



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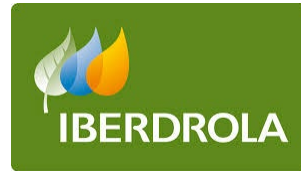
# Our Customers



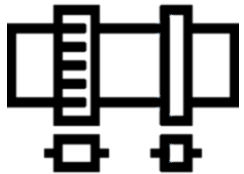
## Mining



## Utility



## Steel



## Cement



## Oil & Gas



## EPCs



## Paper



# Equipment and resources



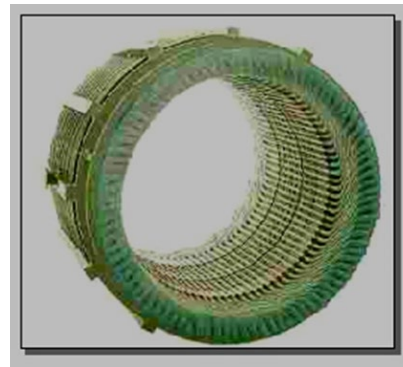
- ▼ Coil fabrication area in a sealed environment to avoid particles contamination and ensure high quality insulation process
- ▼ Modern and automated coil forming machines, CNC arms controlled
- ▼ Rectangular fish coil up to 13800 V, random coils construction for low voltage
- ▼ Robust quality control process including turn to turn / turn to ground in process test validation
- ▼ Dimensional control with dummy resulting in smooth winding process without impact during slot insertion



# Equipment and resources

## Large VPI System

- ▼ 8 Ft. (2.6 m) diameter , VPI recently installed new control system using PLC and PID controls
- ▼ 2 or more cycles to minimize partial discharge and effective ground insulation increasing the winding insulation integrity life.
- ▼ Resin and process quality control 24 / 7 , viscosity , gel time and additives content



## Resin cure ovens after VPI

- ▼ Capacity for stators, rotors and armatures
- ▼ Oven with Internal air circulation system to ensure uniform winding temperature and cure with minimum resin drain
- ▼ Automatic temperature control using embedded sensors
- ▼ High temperature oven used for coils insulation removal during re winding scopes. Minimizing risks to the lamination core
- ▼ Controlled temperature ramp according resin gel time specification



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# Equipment and resources



- ▼ Rotating machines power test lab capable for load test , dual frequency , vibration cold and hot conditions , design and issues investigation
- ▼ New and modern installations with 10MVA generators dedicated to running tests. Flexibility and capacity to test from low voltage to 13800 V machines including variable frequency motors
- ▼ Automatic test bench equipped with new and high-performance instrumentation as Bently Nevada , Yokogawa, Fluke managed by LabView from National Instruments.
- ▼ Dedicated test bench technical board with trained engineers and technicians' experts in electrical motors and generators

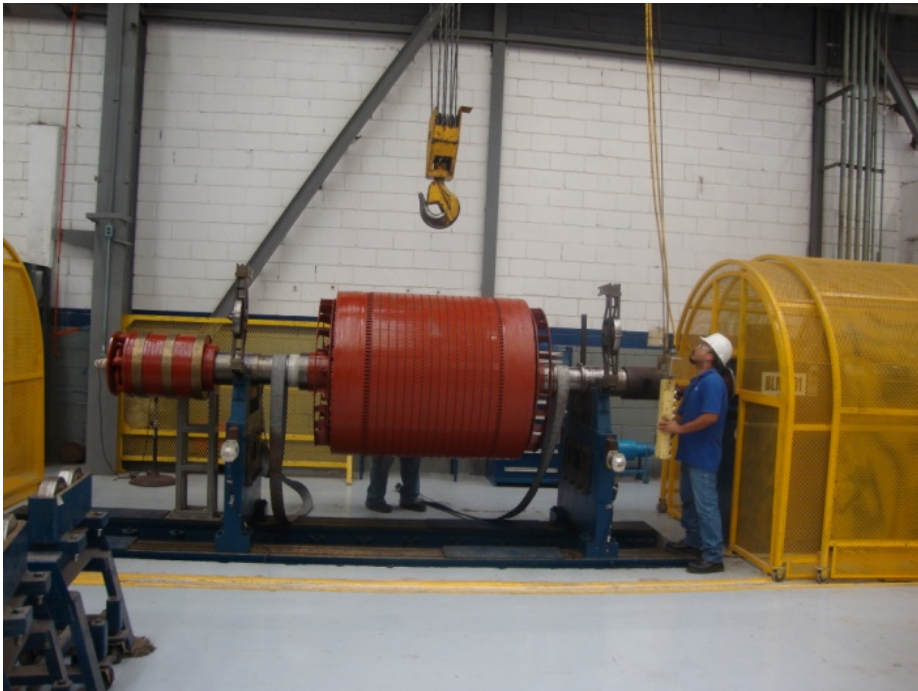




# Equipment and resources

## **Rotor Balance Machine**

- ▼ Equipped with Schenck CAB920 Balance Software
- ▼ Capacity to rigid and flexible rotors construction
- ▼ Balance routines in 2 or more planes
- ▼ Capacity to plot BODE curves , evaluation of critical speed and resonances caused by incorrect design



## **Phoenix In process Test Bench**

- ▼ 750 KVA nominal power
- ▼ 14,400V@30A / 480V@902A
- ▼ DC Armature 600V 1125A
- ▼ DC Field shunt 300V 100A
- ▼ Equipped with temperature and vibration sensors



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# Equipment and resources



## LexSeco Core Loss

- ▼ Voltage lamination core test center specifically designed to test stators, rotors and armatures up to 10,000 HP
- ▼ Fully automated
- ▼ Core Losses evaluation of the magnetic package according to IEEE and EASA standards.
- ▼ Provides the pass and fail criteria using design characteristics



## Clean Jet

- ▼ Cabin prepared with anti-slip floor with dimensions of 18 ft. X 16.4ft
- ▼ High pressure system with 5 GPM, 3000 Psi
- ▼ Cleaning with dielectric degreaser w/ high dielectric strength, > 32,000 volts.
- ▼ Provides optimal corrosion protection for stator and rotor core



## Winding

- ▼ Experienced technicians in complex windings in AC and DC connections
- ▼ Specialized in winding for synchronous rotors
- ▼ Certified technicians and equipment
- ▼ Use of GEGARD 200, 300, 400 and 600 technologies and others.

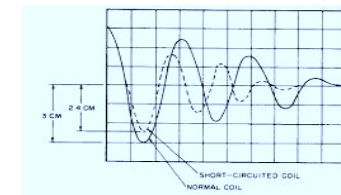
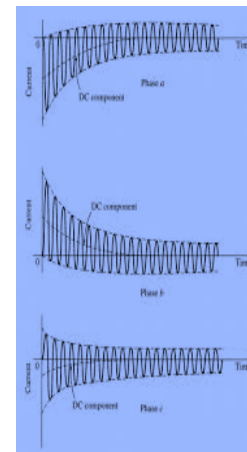


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# Equipment and resources

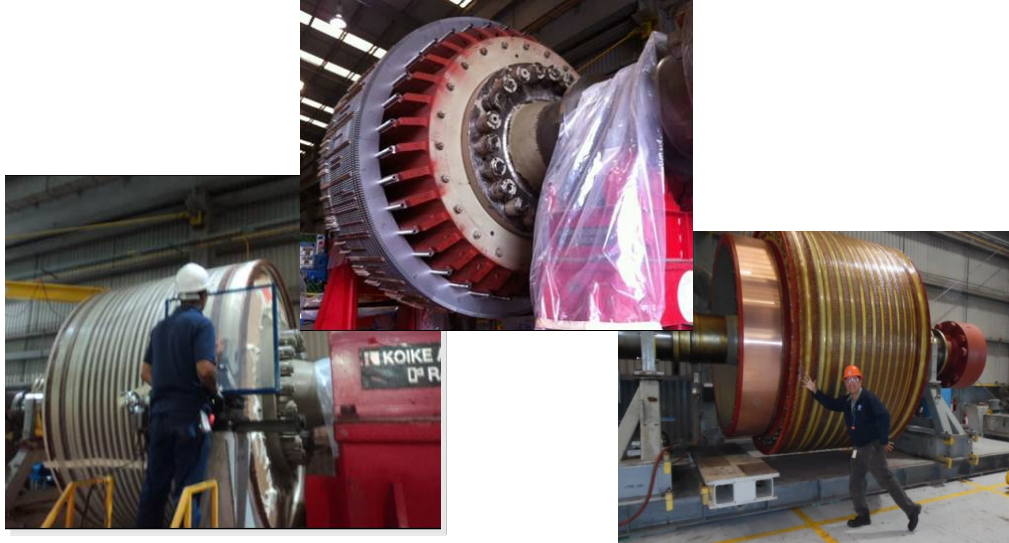
## Mechanical and Electrical Investigation

- ▼ Phoenix 750 KVA test bench
- ▼ PDMA MCE MAC GOLD
- ▼ CSI 2130 – ADRE 408 P , Vibration analyzers
- ▼ Baker Advanced Winding Analyzer AWAIV 12/ 30 KV
- ▼ Baker Explorer 4000 Dynamic Motor Analyzer
- ▼ DC HIPOT - 120 KV
- ▼ Winding Insulation , IP / IA / Megger FLUKE 1507
- ▼ Bearing, space heaters and accessories tests
- ▼ NDT Ultrasonic & Penetrant die
- ▼ Growler testers
- ▼ Infrared thermal camera T130 & FLIR E40
- ▼ Thermal images , hot point / malfunction identification
- ▼ Mechanical instrumentation for quality control and issues identification
- ▼ Micrometer 0 to 1.8 meter



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# Customers Success Histories



## Job G13016 Guatemala, Hidroeléctrica Las Vacas, 6000 KVA, 6 Poles Hidro Generador

- ▼ Rotor dynamic balance in 3 planes, fan cooling and exciter
- ▼ 14 Ton rigid shaft - 450 RPM balance speed
- ▼ Surface Run out mapping



## Job SF 388573 Mexico, Ternium

### 6000HP , 40/100 RPM DC Motor Armature

- ▼ Armature full re stack and complete re winding
- ▼ 70 Ton Armature
- ▼ Resiglass bandage process
- ▼ Mechanical dimensional and electrical tests
- ▼ Commutator disassembling , insulation replacement , machining and surface finishing
- ▼ Symmetry verification and final assembling

## Job SF 407594 Mexico, CFE La Venta , 5 Units - 7.5MW, 24 poles Síncrono Hidrogenerador – 50 T , GEGARD 600 Coils

- ▼ Stator , complete winding , lamination re stacking
- ▼ Rotor, poles complete re winding , impedance , resistance and insulation tests
- ▼ Final tests, assembling and field commissioning
- ▼ Special safety procedures developed due to size and activities complexity



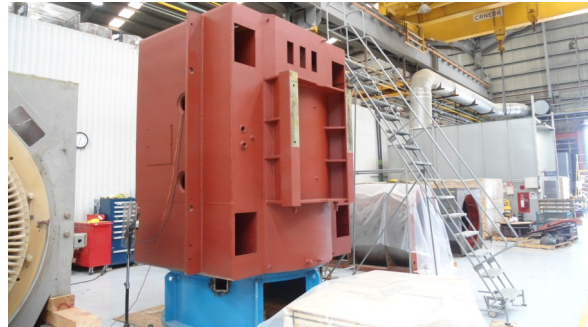
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# Customers Success Histories



## Job A12055 Chile, Minera La Escondida, 9000HP, 36 poles synchronous motor– 40 T

- ▼ Stator , complete re winding and lamination re stacking
- ▼ Assembling and final tests , sealed insulation system
- ▼ Stator winding connection TPS welding procedure



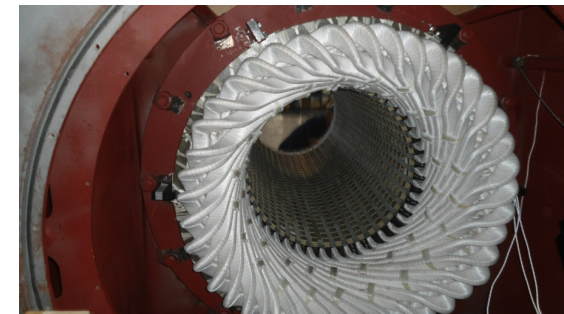
## Job A12043 Mexico, Cemex, 8000HP, 8 poles Synch motor

- ▼ Rotor poles re winding
- ▼ Stator, insulation system cleaning and insulation recovering
- ▼ Welding connection
- ▼ Final tests



## Job A12027 Republica Dominicana, La Romana, 12.5MVA, 2 poles Turbogenerator 38 Ton

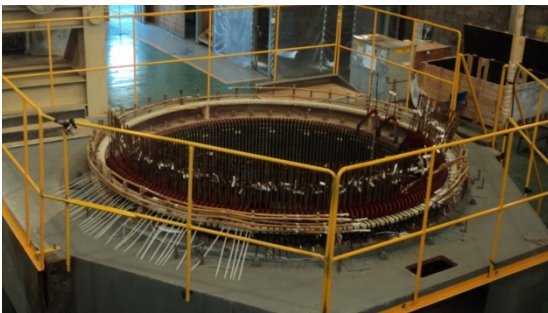
- ▼ Stator new lamination core , stacking and tests
- ▼ Stator new coils
- ▼ Winding and VPI
- ▼ Final tests



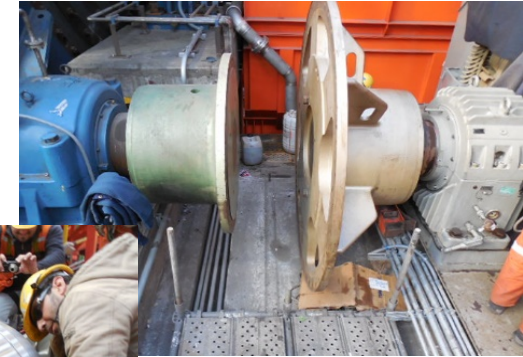
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# Our Experience

## Field Service Activities



- ▼ Design change , power uprating , connection change , cooling system replacement.
- ▼ Recovery / replacement of magnetic core stator and rotor
- ▼ Recovery / replacement of rotor polar parts
- ▼ Installation of coils up to 13,800 V voltage level
- ▼ Stator Rewinding
- ▼ Manufacture / Re-insulation of rotor polar coils
- ▼ Replacement of Babbitt or bearing sleeves
- ▼ Replacing shafts
- ▼ Replacement / recovery slip rings for wound rotor
- ▼ Recovery / replacement of heat exchangers
- ▼ Supply of brushes, springs and brush holders
- ▼ Disassembly / assembly in general
- ▼ Supply of spare parts such as covers, fans, connection boxes, etc.



## Installation and commissioning

- ▼ Vibration analysis
- ▼ Mechanical tests
- ▼ Electrical tests
- ▼ Coupling Laser alignment
- ▼ Lubrification unit recovery
- ▼ Inspection and diagnostics



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