TEAM SESCO
Industrial Technology Services

THE **WINDPOWER** REPAIR SPECIALIST™

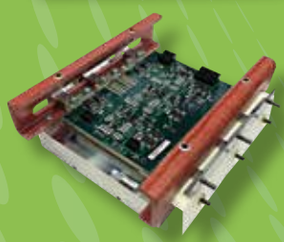
GE Energy Load Center

The New Standard In Wind Repair Testing.

The newest test equipment engineered and built by TEAMSESCO, exclusively for the wind industry gives our technicians the ability to fully load test the AEPS, AEBI, rotor and line IGBT modules. This equipment tests all four components together as a system exercising every function utilized in the GE turbine.

Using proprietary software, the AEPS is heavily loaded with the 24v rails loaded inductively and the 5v rails used to power control circuitry. Load is comprised of high frequency, high rise time, digital current pulses duplicating the relationship with the MACC card.

The AEBI card is fully loaded by three IGBT modules on its outputs while simultaneously monitoring the DC bus voltage, current from the 3 phase outputs and the IGBT heat sink temperatures. Collected information is translated and verified to be within specification by the control circuitry. Power supplies and driving pulses going to the IGBT's driver boards are loaded with high peak current, capacitive load from the IGBT's.



The 3 phase IGBT bridge is driven with constant carrier frequency variable duty cycle pulses. Variable frequency, sinusoidal current output drives the inductive load in both motoring and regenerative modes.

Test loads are generated by paralleled motors whose shafts are tied to an infinitely variable hydraulic loading system.

TEAMSESCO
THE **WINDPOWER** REPAIR ADVANTAGE

TEAMSESCO STAR SERVICE GUARANTEED REPAIRS

TEAMSESCO CELEBRATING 100 YEARS

AWEA Business Member

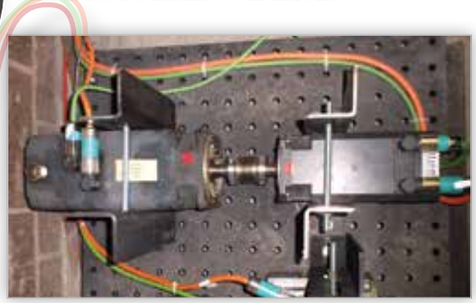
PLCs | AC/DC Drives | Specialty Markets | Displays | Power Supplies | Printed Circuit Boards | Servo Systems | Unconventional Products

SIEMENS LINE AND MOTOR MODULES: TURBINE SIMULATION TESTING CAPABILITY

The Siemens Sinamics series system has a large number of available add-on components. These include a line regenerative bus module, DC brake module, HMI, servo module, power supply module as well as the different control boards for the system of modules.

To ensure a quality repair of your system, we have fully-functional testing capabilities for all module units within each Siemens system. This includes, not only testing, but the ability to run each unit under simulated turbine conditions.

TEAMSESCO can quickly swap a unit out and have it running for hours to find a heat or load related failure. Giving you the confidence that TEAMSESCO repairs are 'done once, done right'.



GE Energy
Load Center Specifications

Simulates both generator rotor & line inductive load

MOTORING MODE

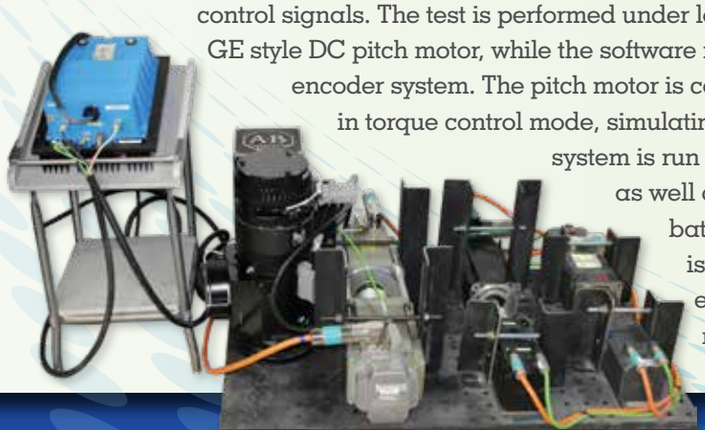
- Driven at 6 kHz
- Current up to 120A at 650V
- Switching verified through current and output feedback
- IGBT temperature rise monitored for excessive power dissipation

REGENERATIVE MODE

- Motor acts as generator
- Flyback diodes across each IGBT serve as conductors
- DC bus rises higher than the line, acts as a load to the motor
- Bus voltage monitored and regulated by control circuitry

TEAMSESCO OFFERS REPAIR AND UPGRADES TO THE GE CONVERTER/H-BRIDGE.

Learning from customer feedback, TEAMSESCO has solved the problems many have experienced with ISP converter/H-bridge repair. Our thorough repair and refurbishment process includes replacing all high failure rate and limited lifetime components with higher temperature and lifetime rated components. The entire power section is also replaced with the TEAMSESCO upgraded power board. After repair, the unit is tested using TEAMSESCO proprietary software. This test is identical to field operation, exercising the serial communications channel and control signals. The test is performed under load with the unit positioning the GE style DC pitch motor, while the software monitors feedback to the motor's encoder system. The pitch motor is coupled to a servo motor operated in torque control mode, simulating the load of the blade. The system is run to full load at full system voltage, as well as reduced input, to simulate battery backup. This in-depth testing is unmatched in the industry and eliminates that second climb to replace a defective repair.



TEAMSESCO® Industrial Technology Services

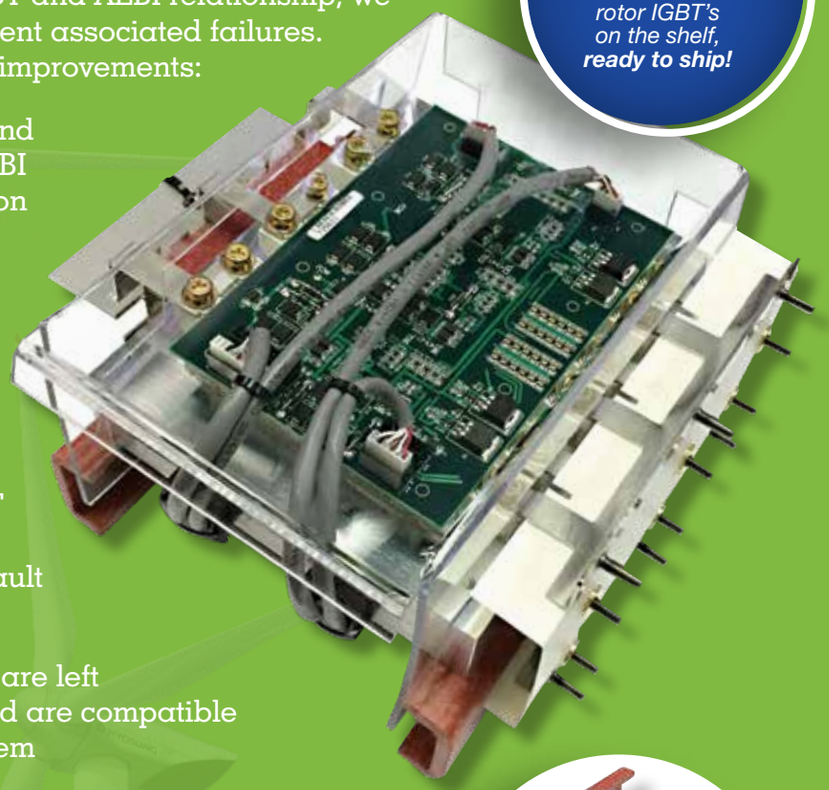
THE **WINDPOWER** REPAIR SPECIALIST™

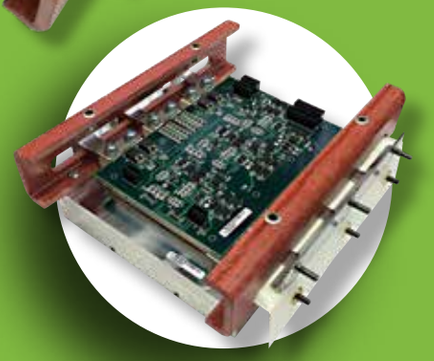
7101 Cessna Drive, Greensboro, NC 27409

NEW UPGRADES PREVENT SYSTEM FAULTS FROM LEADING TO CATASTROPHIC IGBT FAILURES

After many years of servicing GE converter systems, TEAMSESCO has once again improved our line and rotor IGBT builds, exceeding anything else in the market. Using our in-depth knowledge of the IGBT and AEBI relationship, we have completely isolated the two in order to prevent associated failures. To accomplish this, we have made the following improvements:

SAME-DAY REPLACEMENT
We have line and rotor IGBT's on the shelf, ***ready to ship!***





- All signals, turn on/off, overcurrent detection and thermal measurement (a common cause of AEBI failure) are isolated over a 2500V rated isolation barrier
- Prevents system faults from leading to catastrophic IGBT failures and expensive semiconductor fuses while speeding up fault detection
- On board desaturation monitoring and control, slowly and safely shuts down the IGBT and ignores driver signals under fault current conditions while simultaneously sending the fault to the AEBI for decision making
- All IGBT turn on/off speeds and voltage levels are left unchanged to be transparent to the turbine and are compatible with original AEBM cards in the converter system
- On board power supply is higher power than the original to prevent voltage sag and eliminates inductive noise and resistive losses across the wire harness
- In the event of a power loss, the power supply stays active down to 600Vdc (420Vac) and prevents the IGBT from spurious turn on. The gates are held at 0V at complete power loss where the original was left floating
- Same proven design and mounting system technicians are familiar with
- 18-month warranty
- TEAMSESCO barcode and date stamp for effortless warranty tracking

TEAMSESCO *sets the standard in wind repairs with our TEAMSESCO developed IGBTs. Each IGBT is manufactured to exceed manufacturer specifications providing a fast, reliable and cost effective alternative to original equipment manufacturers solutions.*

THREE OPTIONS ARE NOW AVAILABLE FOR ESS AND NON-ESS LINE AND ROTOR IGBTS

1) Full recondition of your failed unit
2) Same day exchange from TEAMSESCO inventory (no extra charge)
3) Brand new unit with upgraded heat sink for improved cooling

TEAM SESCO Industrial Technology Services

Providing **INDUSTRIAL TECHNOLOGY SERVICES** since 1913.

Ship your wind power repairs to

TEAMSESCO National Service Center

7101 Cessna Drive, Greensboro, NC 27409

Call us today at **1-800-48-SESCO**

or visit us online at www.teamsesco.com

Our commitment to unsurpassed service, skilled repairs and fast turnaround are just a few of the reasons why more wind power facilities are choosing TEAMSESCO for their critical repairs than ever before!

Here are just a few advantages of choosing TEAMSESCO for your wind turbine repairs:

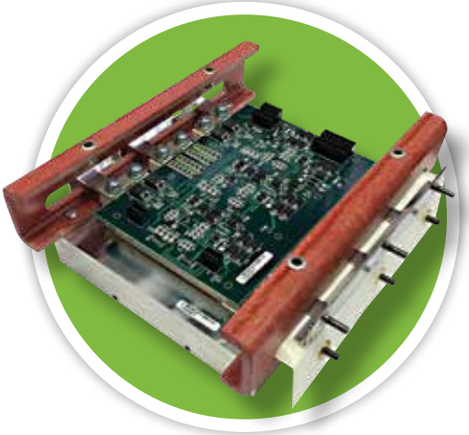
TEAMSESCO STAR SERVICE GUARANTEED REPAIRS

- *Each wind power repair is backed by our exclusive **StarService Guarantee**, including a one-year warranty*
- *Each repair is tracked with TEAMSESCO's state-of-the-art barcode system*
- *TEAMSESCO's proprietary equipment duplicates and tests each repair as part of a total turbine control system*
- *Our vast library of schematics and test documentation, plus an inventory of over one million industrial electronic parts*

For fast, reliable wind turbine repairs at a fraction of the cost of OEM solutions, turn to the experts at TEAMSESCO!

TEAMSESCO THE WINDPOWER REPAIR ADVANTAGE

TEAMSESCO provides quality repairs on all brands of wind power electronic equipment. Every repair is backed by our exclusive, one-year, **StarService** warranty and tracked using our state-of-the-art barcode tracking system. Before any repair ships, it undergoes complete comprehensive testing based on the original design specifications. We utilize infinitely variable semiconductor load testing for applicable repairs insuring that your repaired unit works in the field as well as it did in our facility. This level of testing is critical to TEAMSESCO's overall quality control and reliability guarantee.



BEFORE **AFTER**

Before and after photos of a line-side IGBT unit repair. TEAMSESCO has full capabilities to repair or replace every component, creating a like new or better unit at tremendous savings over OEM pricing!