



# The Difference

Newsletter for Customers, Employees, Alliance Partners, and Vendors

June 2007

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## From The President

### ReGENco Welcomes New Investor- Toshiba International Corporation (TIC)

By John C. Bobrowich

[jbobrowich@regencoservices.com](mailto:jbobrowich@regencoservices.com)



ReGENco has recently selected Toshiba International Corporation (TIC), a wholly-owned subsidiary of Toshiba Corporation, Japan, as our new majority investor. We have selected the Toshiba group because of their industry leading steam turbine-generator technology, their extensive financial strength to support our continued business growth and their commitment to use ReGENco as their authorized service provider for their extensive North American fleet of steam turbine-generators.

Toshiba is a major supplier of power equipment throughout the world. They have dominant positions worldwide in the supply of nuclear NSSS systems, hydro-turbine generators, and gas turbines. In the US, they have secured the number one market share position for the supply of steam turbine-generators for the past four years and will have over 100 operating large steam-turbine generators by 2010. Toshiba views the US market as one of the most important global markets. As such, their recent major investment in ReGENco and their acquisition of the Westinghouse Nuclear Power Division will position them to be a leading supplier to our industry going forward.

In the US, Toshiba International Corporation's Power System's Division has provided aftermarket services to their operating fleet since 1967. They have operating centers in San Francisco, CA., Chadds Ford, PA, and Denver, CO. As part of our cooperation, TIC is now in the process of opening a major OEM service office adjacent to ReGENco's facility in West Allis.

Our new investor (TIC) desires that ReGENco remain an independent company under Jim Mathes' and my leadership. In this capacity, Jim and I will also retain our significant ownership interest and board membership in ReGENco. ReGENco does not envision deviating from our core business strategy of providing maintenance and service for all OEM turbine-generator equipment. We recognize that the diversity we offer in being able to support all major makes and models of steam and combustion turbine-generators is of great value to our customers. In the next phase of our growth, it is our intent to become a world-class service provider for Toshiba steam turbine-generators. This step will further broaden our OEM portfolio and naturally further enhance our ability to service GE OEM units.

Although ReGENco will maintain its independence, I believe that Toshiba's involvement as an investor will be of significant benefit to our customers. Toshiba's financial commitment to the business will enable our company to continue to upgrade our facility, tooling, processes and manpower during the coming year. To make certain that our continued growth can be accommodated within our shop facility, I am also pleased to announce that we have recently taken an option on over 100,000 sq. ft. of additional contiguous manufacturing and office space. Toshiba's commitment to subcontract extensive parts manufacturing and repairs, particularly during our slower non-outage months, will enable this expansion to occur while maintaining our financial health, which is a constant challenge due to the seasonality of service in our business.

*continued on page 2*

continued from Cover (ReGENco Welcomes New Investor)

As an investor, Toshiba has also committed to support our business by sharing certain proprietary knowledge, quality best practices, engineering resources and technology. Since Toshiba was a long-term manufacturing and service partner of GE, this insight will further enhance ReGENco's ability to service GE OEM steam turbine-generators. This sharing will also help further enhance our ISO based quality program and give us access to certain upgraded parts for retrofit that will help enhance the performance and availability of your turbine-generators. All of this will further contribute to our company's ability to supply the best overall value in the industry today.

During the coming months we will continue to update you regarding various aspects of our new investor and the various related programs underway to better support your needs.

## Ask The Expert

by Vikas Gupta & Alan Kleman  
[vgupta@regencoservices.com](mailto:vgupta@regencoservices.com), [aklema@regencoservices.com](mailto:aklema@regencoservices.com)

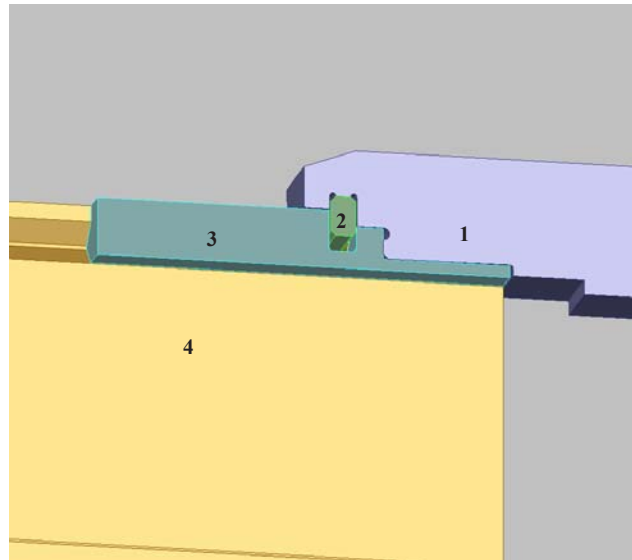
### INTERNATIONAL LONG RING MODIFICATION BY EMAIL

A company located in Germany, recently contracted ReGENco to perform Finite Element Analysis (FEA) and Cumulative Fatigue Analysis on the tooth tops of a Siemens generator rotor.

The tooth tops act as a shrink fit surface for the retaining rings. Between tooth tops, wedges are engaged which carry the load of the copper coils. Hence, the tooth carries the shrink load from the retaining ring as well as coil load through the wedge.

Due to high loads and the thin cross-section of the teeth, cracking has been a known issue in these types of generator rotors. Typically, the cracking is due to low cycle fatigue from start-stop cycling. Therefore, the cracking has been more prominent in those generators which are cycled more often than the others. A base loaded unit generally undergoes about 10 start-stops per year. This unit is planned for 200 start-stops per year in the future!

The customer emailed drawings of the parts to ReGENco. A 3D computer model was created and analyzed with Cosmos FEA and in-house fatigue programs. Inspection of the teeth showed cracks, verifying the high stress in



Long Ring Modification Section View  
(1) Retaining Ring, (2) Snap Ring, (3) Wedge,  
(4) Rotor Tooth are shown

the FEA model and hence, low fatigue life (<300 start-stops).

The customer anticipated the need for a short ring modification, and requested analysis of this modification. Based on the computer analysis, ReGENco concluded that a short ring modification would not extend the fatigue life of the rotor to the next major outage. ReGENco recommended a long ring modification.

The difference between a short ring and long ring modification is the extent of the machining required, and the transfer of load through the assembly. A long ring modification always results in higher fatigue life but has the disadvantage of the requirement for two new retaining rings.

The customer accepted the recommendation and requested an analysis of this alternative. A design was generated and analyzed. ReGENco recommended an inspection interval of additional 5000 start-stops. The customer was very satisfied with the recommendation. Design drawings were emailed to Germany, and forwarded to the eventual customer in Holland. Two retaining ring forgings were shipped from ReGENco. They created machining drawings based on the ReGENco design. ReGENco reviewed the machining drawings as a final check on the process. Then the customer completed the repair on the rotor.

## Employee Appreciation Dinner

On April 21<sup>st</sup>, ReGENco held an Appreciation Dinner for all its employees at the Milwaukee Zoo Peck Welcome Center. As employees mingled and enjoyed butler style hors d' oeuvres, they had the opportunity to get a professional picture taken with their spouse.



ReGENco and Toshiba Management Receiving Line

We also had an extra visitor that night, Mayor Jeanette Bell from the City of West Allis, for the formal Transfer of Ownership Ceremony between Mr. Bill Beres, a past ReGENco Board Member, and Mr. Nakata from TIC. We all had a Ceremonial Champagne Toast celebrating this commemorative passing of the torch, as you will.

One of the high points of the evening was the raffle event. With Toshiba's help, ReGENco raffled off a 42" LCD HDTV, won by Jeff Janosch, a United Airlines \$1000.00 travel certificate, won by Greg Nowicki, (10) Portable Toshiba DVD players, and (50) ,1 GB Toshiba Flash Drives.



Raffle winner Jeff Janosch (right) being handed his winning envelope for a 42" HDTV



Mayor Jeanette Bell with Mr. Kasagi



Transfer of Ownership Mr. Bill Beres and Mr. Nakata

We also celebrated a "Kagamiwari", a Japanese Sake Cask breaking ceremony, which signifies a fresh start – a new beginning – an energizing of our new relationship with Toshiba.



"Kagamiwari", Sake Cask Breaking Ceremony

## ReGENco Meets Customer Expectations in Rotor Repairs

by Peter Fuelleman

[pfuelleman@regencoservices.com](mailto:pfuelleman@regencoservices.com)

ReGENco recently completed repairs on two steam turbine rotors for a customer with a plant in the Ohio Valley. The repairs were performed on a HP and an IP rotor for a 600 MW Westinghouse unit. Both rotors were transported to ReGENco's West Allis facility where the repairs were performed on a 24 hour – 7 days per week schedule. One of ReGENco's turbine engineers was onsite during the disassembly to support the customer with initial inspection and defining the work scope on the rotors. It also allowed for preliminary information to be fed back to the shop to start preparation for blade manufacture gaining 2 days on the project schedules critical path.

### HP Rotor

The HP rotor was processed through ReGENco's incoming inspection steps of blast cleaning, NDE inspection, full runout inspection, and engineering evaluation. Runout abnormalities were noted in one of the journals and the thrust faces. Also light to medium FOD and trailing edge thinning on blades was noted. Repairs performed were FOD blending, and dressings of the blades trailing edges. One journal and the thrust faces were refurbished. The rotor's stub shaft with main oil pump and overspeed trip was also disassembled, cleaned, inspected, tested and reassembled. The final step was to perform a low speed balance before shipping the rotor back to site.

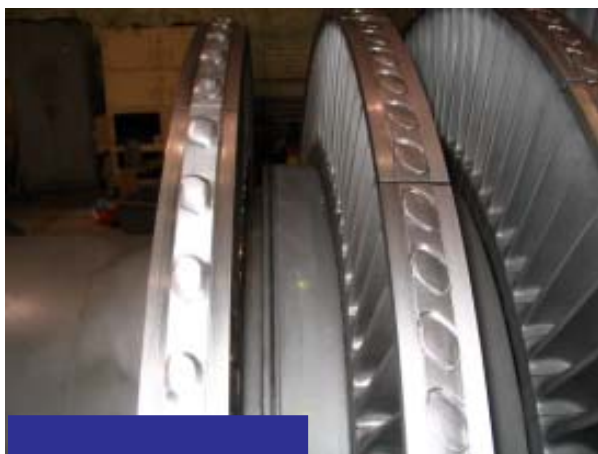
### IP Rotor

The IP rotor was also processed through ReGENco's incoming inspection steps. This rotor required 2 rows of blades to be replaced. The work scope included blade removal, reverse engineering, manufacture, installation and final machining. In addition this rotor experienced erosion of the tenons on some of the blade rows. It was agreed to perform a tenon and shroud modification (also known as a foxhole tenon repair) on 2 of the rows, 4 additional rows had erosion shields welded in front of the tenons to minimize future erosion. This rotor also has a damaged dovetail in one of the blade rows being replaced. This damage occurred many years prior and has been left in operation as is. The customer wanted to get a better understanding of risks involved with leaving this defect as is. ReGENco's engineering staff performed an engineering analysis to determine the stresses encountered by that dovetail and provided the customer with recommendations on the continued operation of the rotor. As with the HP rotor the final step was to perform a low speed balance of the rotor before shipping it back to site.

### IP Flow Guide

This was a last second addition to the work scope. The IP flow guide is a stationary component directing the steam flow in the IP section. This component had a severe out-of-round condition. It also had broken bolting hardware, damaged seals, and worn centering pin fits. ReGENco was able to reround the flow guide shell, redowel the joint, manufacture new bolting hardware, and repair the seals and centering pin fits within a very short time frame.

This was the first turbine repair project that ReGENco performed for this customer. As with any new project for a new customer there are unknowns and concerns whether the vendor will perform to the customer's expectations. And this was no exception. But, through the dedicated and focused efforts of ReGENco's turbine technicians, engineers and project management, along with the close working relationship with the customer, the concerns were quickly displaced by trust and a teamwork atmosphere. The project was a success meeting both the quality and project schedule requirements. The customer has expressed their appreciation by submitting a customer survey with a perfect score, but more important, the customer has invited ReGENco to be a participant in their upcoming fall outage.



## Siemens V84.2 Rotor Rewind Winding Braze Problems Identified, Diagnosed, & Eliminated

By Robert Rettler  
[rrettler@regencoservices.com](mailto:rrettler@regencoservices.com)

The initial customer inquiry to ReGENco LLC was for the replacement of terminal bushing gaskets on the generator and visual inspection. The OEM has issued a technical advisory for the replacement of these gaskets based on this unit's operation hours. Since the gas turbine was scheduled for a major overhaul, this work and inspection was planned.

This customer had previous issues on their newer sister Siemens V84.2 generator rotors and subsequently, a borescope inspection of the generator rotor was requested. (On the newer sister units, rotor pole-to-pole connector brazes had cracked, which in one case, had manifested into a forced outage during the summer.)

ReGENco LLC had previously rewound two other older Siemens V84.2 generator rotors for other customers. On these earlier rewinds, full NDE of the rotor winding's brazes was included and discovered that approximately 30-40% of these coil brazes were found to have indications. These defective brazes were completely redone prior to winding installation.

Recognizing the additional potential risk and concern for the rotor braze joints, ReGENco dispatched a staff generator engineer to perform the generator inspection. Borescope inspection of the rotor winding identified a number of suspect coil brazes. Unfortunately, in the assembled state, only a small percentage of the braze joints could be examined. In-place penetrant testing was performed and significant bleed-out confirmed the borescope findings.

The resulting recommendation was to rewind the rotor to enable qualification and repair of the rotor winding braze joints. Based partially on the issues identified on the sister units, the customer added the requirement that ALL winding braze joints be redone.

ReGENco, LLC was the successful bidder and initiated the rewind on an expedited schedule. Upon removal of the retaining rings and support blocking, the winding turn brazes could be more thoroughly examined. During this



*Cracked Winding-Turn Brazes As Found*



*Rewound Coils Prior to Support Blocking Insulation*

early stage of the rewind, a significant number of braze joints were found to be cracked. In fact, in one location, the winding had separated and the turns were arcing. (See Photo). Interestingly, the coil with the arcing also corresponded to running turn-to-turn short that the customer had previously identified with flux-probe testing. This discovery clearly highlighted the need for the rotor rewind.

In order to efficiently re-braze all of the winding joints, ReGENco developed and certified a braze process to control quality while maintaining schedule. The 500+ brazes were completed and NDE tested to confirm their integrity. The rotor was rewound with all new Class F insulating materials and new end winding air baffles were manufactured and installed. The rotor was dynamically balanced and electrically tested in the ReGENco Balance and Overspeed Bunker (B.O.B.) and returned to the customer on schedule to enable them to meet their demand commitments.

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To View Our Current Newsletter  
view our homepage at: [www.regencoservices.com](http://www.regencoservices.com).  
To access our previous newsletters -  
click on *News & Events - Newsletters* -  
and view any of our past issues along with  
giving us your feedback on  
our present ones.

## Distinguished Service Award



By:

Professor Ronald Perez, Ph.D., P.E.  
Associate Dean, Academic and Administrative Affairs  
UWM-Milwaukee

### **John Bobrowich Receives Distinguished Service Award from UWM College of Engineering and Applied Science**

At a banquet on May 5, the UWM College of Engineering and Applied Science (CEAS) presented John Bobrowich with the highest honor the college presents to its friends. The Distinguished Service Award is presented to an individual or group of individuals who have made a significant impact or contribution to the college over an extended period of time. The award recognizes outstanding service or devotion to the college and to the university. Volunteer service represents a commitment to the betterment of the college and the university. Such volunteer service represents an uncommon gift of self, time and energy. The recipient must demonstrate a consistent pattern of volunteerism having great impact on the mission and goals of the college.



Mr. Bobrowich serves as Chairman of the Industrial Liaison Council, a group of 35 executives representing major industries from Milwaukee and throughout southeastern Wisconsin. The ILC is an advisory group to the Dean of UWM's College of Engineering and Applied Science, providing significant input on curriculum, coop and internship opportunities for students, and collaborative research with CEAS faculty and graduate students.

As Chairman of the ILC, Mr. Bobrowich has been deeply involved in forming the first-ever CEAS Strategic Plan, which was put in place in 2006. Under his leadership, the ILC has established as its mission "to develop a mutually beneficial relationship between the college and the businesses and industry in Wisconsin in support of the college's primary mission: to provide world-class education, research and services and to act as a catalyst for economic development with a focus on the diverse needs of southeast Wisconsin."

## New Employee Addition



**Fumio Otani**

Fumio Otani joined ReGENco on April 2, 2007 as our Company's Chief Alliance Officer. Fumio's primary responsibility will be to manage the new relationship between ReGENco and Toshiba/

TIC in an effort to achieve maximum cooperation. Fumio joined Toshiba after graduating from the University with a degree in Mechanical Engineering. He started his career as a Hydro Mechanical Designer for 13 years in the Keihin Product Operations, which is the main factory for Toshiba's Power Systems Company. He moved to the Production Engineering Department and took care of the overseas subcontracting and out-sourcing business. Afterward he spent 2 years in the Overseas Sales Department, then came back to the design office again as Manager of the Hydro Division. He then moved to the Thermal Division and spent the days in the Turbine Cycle Planning Dept. and Proposal Department for the EPC business. Fumio was then assigned to set up a new project office in Kuala Lumpur, Malaysia, and lead those significant projects. Then he came back to TOSHIBA HQ as a Senior Manager of the Overseas Services Sales Department, and Chairman of the Overseas Services business unit. Last year, his position was Senior Quality Expert, emphasizing his Black Belt certification in the Six Sigma Methodology of Management.

***We'll Make a Difference!®***