

The next Issue of Newsletter will be published in August 2015. Submit articles by August 10.

## Technical tour of the Mechanicville Hydroelectric Power Plant

Mechanicville, New York

May 29, 2015

By Karim Younsi and Qin Chen

Many other members who wanted to participate in the tour could not be accommodated due to number restriction. Another tour is being planned. The details will be announced when available.

The local IEEE DEIS chapter of Schenectady, NY organized a tour of the historic Mechanicville hydroelectric power station on Friday May 29, 2015. A group of about 36 participants from the local IEEE section joined the tour. The group was guided by the staff members at the power plant led by Mr. James Besha, President of the Albany Engineering Corporation and owner of the power plant.

The hydroelectric station is located on the Hudson River just south of the City of Mechanicville. The tour started with an introduction to the station by Mr. Besha, followed by visits to the generator hall (Figure 1), the plant offices (today used as a Visitor's center), and the external civil structures including a concrete ogee spillway, a non-overflow earth embankment dam, and the adjacent Lock 2 on the Hudson river. The tour with the question and answer period lasted about two hours.

During the tour the group learnt much about the long and rich history of the power plant. The construction of the station started in July 1897, and the first of the turbines and generators was tested on May 29, 1898 – precisely 117 years ago from the date of the tour. The commercial operation commenced in July 22, 1898 and continued to today, making it the oldest 3-phase AC hydro-power plant in continuous service. Originally there were seven generators at the station each providing 750 kW (a total of 5250 kW). The generated electricity was delivered to the GE facility in Schenectady over a distance of 19 miles.



Figure 1: The Mechanicville hydroelectric power plant - generator hall

The generators are among the first generation of three-phase AC generators, and were designed by Charles Steinmetz. With today's fully automated grid control, one should not forget the significant challenges in the early days with the control of multiple power plants and highly varying loads - the plant operators achieved this through constant switching of generators between different transmission circuits and adjustment of voltages, as recorded in the plant logbooks on a minute-to-minute basis. The generators run at 40 Hz as there was no frequency standard in the 1890's. Therefore, rotating frequency converters can be found converting 40 Hz to 60 Hz (Figure 2). The site also witnessed one of

the earliest experiments in HVDC transmission. In 1932, GE installed an experimental HVDC transmission line between Mechanicville and Schenectady, and the 12 kV, 40 Hz generated power at the plant was converted to about 20 kV DC voltage, using mercury arc valves for both the rectification and inversion processes. The DC system suffered from frequent outage due to issues with fault tolerance, a problem which is still attracting heavy attention and innovations in today's HVDC systems.

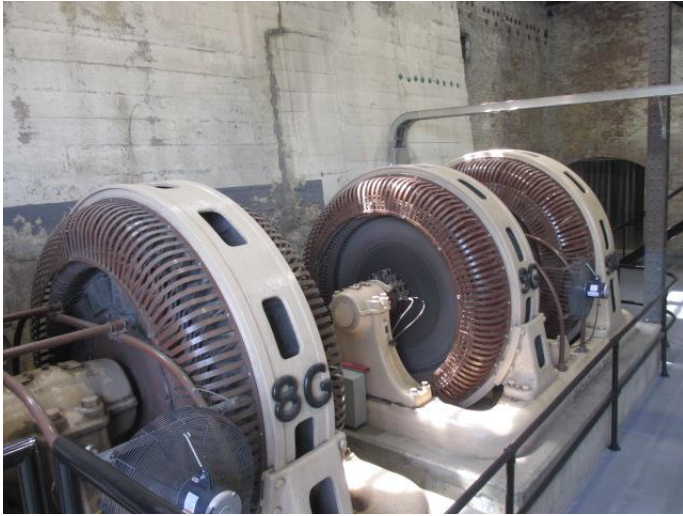


Figure 2: Rotating frequency converters - 40Hz to 60 Hz

Over the course of more than one hundred years the Mechanicville station deteriorated in condition and lost its favor from the utility to the larger and centralized hydroelectric plants. It is only through the persistent effort of Mr. Besho and the Albany Engineering Corporation that the plant was saved from demolition, and was added into the National Register for Historic Place (since 1989) and fully restored into an operating museum of hydroelectric power (since 2007). Today, six of the original turbines and generators are still operating, harnessing the power of Hudson and returning the water peacefully

into the river just as it was 117 years ago (Figure 3). If one has visited large power plants like the Hoover Dam the power may not be the most impressive element at Mechanicville. It is the marvelous technical achievement at the time of its construction, the rich technical innovations it has witnessed, and the entrepreneurship and persistence associated with its construction and renovation that make the Mechanicville Hydroelectric Station a strong and continued inspiration to us power engineers moving into the future.



Figure 3: Turbulence in the water discharged from the power house

More information regarding the station can be found in the following reference:

James A. Besho, "The Historic Mechanicville Hydroelectric Station", IEEE Industry Applications Magazine, vol 3; Part 1: issue 1, pp 8-11; Part 2: issue 2, pp 8-10; Part 3: issue 3, pp 9-11. (2007)

**Edison Tech Center Outreach Project**  
**Looking for Experts in Power System Measurement Tools**

The Edison Tech Center has received the funding from IEEE to start Outreach Project "Multimedia Web-based Module on Metering and Measurement Tools in Circuits for High School and College Educators and Students".

The Project goals are: Classify and identify the major types of meters and measuring devices used by electrical engineers and Demonstrate the importance of these measuring tools in circuits, and their role in driving technological innovations.

To that end a video segment that introduces the fundamental measurement systems used in the electrical industry will be produced. Due to funding constraints, the focus will be limited to on measuring Current and Voltage.

Edison Tech Center is looking for people who can talk about the importance of measurement tools in the power industry. If interested, please contact [Bill Kornrumpf \[wkornrum@nycap.rr.com or \(518\) 209 3244\]](mailto:wkornrum@nycap.rr.com).

**IEEE Engineering Colloquium**

**Where:** Union College, Schenectady, NY

**When:** Friday, September 25, 2015

**Who:** Engineering enthusiasts and Professional Engineers

Please see IEEE Schenectady Section website for Registration process, details regarding the PDHs to be earned, webinars and any further updates.

**Speakers:**

1. 1.Dr. Chuck Seifert, Siena College – Engineering Ethics
2. Dr. Kannan Tinnium, GE Global Research – Smart Grid
3. Dr. Bob Currie, Smarter Grid solutions, Inc. – Smart Grid
4. Clay Burns, National Grid - Micro-grid pilots in New York State
5. Mike Worden, NY PSC - REV proceeding impacts on technology
6. Joshua Burroughs, Vermont Electric Power - New High Voltage DC substation
7. Herman Wiegman, GE Global Research Center - Battery technologies

## 2015 Elected Officers

Is your local society staffed? If not, we need you.

A Society with no Events/Talks/Meetings for 3 years will be dissolved by IEEE.

Call for Volunteers! The Schenectady Section needs your help! By volunteering you will meet great people and help plan professional, educational or social events in the area. These events are reimbursed and bring our IEEE dues back to the local area. Please contact Rebecaa Nold or James Barrett.

<p style="text-align: center;"><b>Executive Committee</b></p> <p><b>Chair</b> James Barrett, jbarrett@nyiso.com</p> <p><b>Vice Chair, Membership</b> Pat Irwin, patriciairwim@gmail.com</p> <p><b>Vice Chair, Treasurer</b> Rebecca Nold, r.nold@ieee.org</p> <p><b>Vice Chair, Secretary</b> Anh Nguyen, ANguyen@sunycnse.com</p>	<p style="text-align: center;"><b>Electron Device Society</b></p> <p><b>Chair</b> Stanley Kocsis, kocsis@ieee.org</p> <p><b>Vice Chair</b> Anuj Bhatia, anuj.bhatia@ieee.org</p> <p><b>Vice Chair</b> Vinit Todi, Vinit.Todi@globalfoundries.com</p> <p><b>Vice Chair</b> Ahmed Elasser, ahmed.elasser@ge.com</p>
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<p style="text-align: center;"><b>Computer Society</b></p> <p><b>Chair</b> open: Plan technical speaker(s)</p> <p><b>Vice Chair</b> Howard Halstead halstead@ieee.org</p>	<p style="text-align: center;"><b>Industry Applications Society</b></p> <p><b>Chair</b> Abouzar Ghavami, abouzar_ghavami@yahoo.com</p> <p><b>Vice Chair</b> Kumar Modepalli, modepk@rpi.edu</p> <p><b>Vice Chair</b> Javad Heydari, khormizi@gmail.com</p>
<p style="text-align: center;"><b>Dielectrics and Electrical Insulation Society</b></p> <p><b>Chair</b> Karim Younsi, karim.younsi@ge.com</p> <p><b>Vice Chair</b> Qin Chen, chenq@ge.com</p> <p><b>Vice Chair</b> Dr. Nancy Frost, drnancyfrost@gmail.com</p>	<p style="text-align: center;"><b>Power and Energy Society</b></p> <p><b>Chair</b> Vince Forte, vforte@nycap.rr.com</p> <p><b>Vice Chair</b> Sowmya Nellutla, sowmya.nellutla@cgglobal.com</p> <p><b>Vice Chair</b> Amal Mallavarapu, Amal.Mallavarapu@cgglobal.com</p>
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<p style="text-align: center;"><b>Signal Processing Society</b></p> <p><b>Chair</b> Michael Lexa, lexa@ge.com</p>	

## 2015 Appointed Officers

<b>Awards Chair</b>	Karim Younsi, karim.younsi@ge.com
<b>Membership Meeting Coordinator</b>	Lou Tomaino, l.tomaino@ieee.org
<b>Newsletter Editor</b>	Krishnat Patil, krishnat.patil@siemens.com
<b>Nominating Committee Chair</b>	Open: Short time commitment - coordinate volunteers
<b>PACE Chair</b>	Sina Afshari, afshas@rpi.edu
<b>Past Section Chair</b>	Chandra Reis, creis@ieee.org
<b>PDH Coordinator</b>	John Golde, John.Golde@goldeengineering.com
<b>Section Historian</b>	Neal Taylor, ntaylor@ieee.org
<b>Section Liaison to Prof. Eng. Society</b>	Louie Powell, louie.powell@ieee.org
<b>Steinmetz Committee Chair</b>	Vince Forte, vforte@nycap.rr.com
<b>Student Activities Co-Chair</b>	Hugo Raul Bashualdo, hugo.bashualdo@siemens.com
<b>Student Activities Co-Chair</b>	Vinit Todi, Vinit.Todi@globalfoundries.com
<b>Webmaster</b>	Rebecca Nold, r.nold@ieee.org
<b>Women in Engineering Affinity Group</b>	Anna Topol, atopol@us.ibm.com
<b>Young Professionals Program</b>	Masoud Abbaszadeh, abbaszadeh@ge.com

## Robert L. Smith Jr. Obituary



Robert L. Smith Jr. Schenectady Robert L. Smith Jr., 89, died Sunday, May 10, 2015 at Kingsway Arms Nursing Center in Schenectady. Bob was born in Brooklyn, New York, on June 21, 1925, the son of Robert L. Smith and Miriam Edson Fradenberg. As a boy he sang first and second soprano in the Cathedral of the Incarnation, Garden City, NY choir. In high school he played bassoon and clarinet. Later he sang baritone in concerts presented by the Schenectady Octavo Singers and the Berkshire Choral Festival in Sheffield, MA. Mr. Smith received a bachelor of electrical engineering in October 1945 from Cornell University, and attended the University of Pennsylvania and Syracuse University, taking various graduate courses. He served in the [US Navy](#) from 1943-1946 as an apprentice seaman in the V-12 program and in the Pacific as an ensign on an LST. Mr. Smith had a 44-year career with General Electric Company, retiring in 1991, when he founded his own company, Volts and Vars, Inc. to furnish engineering services to industrial customers. His contributions to industry include more than 50 technical papers, trade press articles and handbook sections, plus one book, *Industrial and Commercial Power Systems Handbook* (McGraw-Hill 1996), coauthored with two associates. He wrote numerous articles and contributed chapters to various handbooks, and contributed to IEEE Standards. His industry awards include IEEE Life Fellow and IEEE/I&CPS 1995 Achievement Award. Following his retirement from General Electric, he volunteered his services at the Schenectady Museum Hall of Electrical History for several years. Mr. Smith was a member of the First Unitarian Society, Schenectady, sang in its choir, and regularly represented this group as a delegate to the annual Unitarian-Universalist General Assembly for many years. He sang in the General Assembly choir at several Assemblies. He is survived by his wife of 16 years, Louise V. Steele; two daughters by his first wife, Dorothy A. Steiger, who died in 1996, Bridget Smith of San Francisco, CA; and Georgia Smith of Friday Harbor, WA; granddaughter, Holly K. Smith of Corvallis, Oregon; sister, Miriam Hardy of Middlebury, VT; and numerous nieces, nephews and cousins. He was predeceased by a brother, Willard F. Smith, of Ilion, NY. Mr Smith's family would like to thank both Ellis Hospital and the Kingsway Arms Nursing Center for their considerate care and attention. It is greatly appreciated. Mr. Smith donated his remains to the Albany Medical Center; there will be no calling hours or viewing. A memorial service will be held at the Unitarian Universalist Society of Schenectady, 1221 Wendall Ave., on June 21, 2015 at 2 p.m. June 21, 2015 is a Sunday, it is Father's Day, and it would have been Mr. Smith's 90th birthday.

Published in *The Daily Gazette Co.* on May 17, 2015

See more at: <http://www.legacy.com/obituaries/dailygazette/obituary.aspx?n=robert-l-smith&pid=174875614>