



VIRGINIA MOUNTAIN SECTION NEWSLETTER

IEEE Region 3, Council 09, Section 65

September 2007

Thursday, September 20, Holiday Inn Hotel Roanoke Airport

Electrical Engineering Problems in Resistance Welding

Dr. Wilbur N. Dale

Assistant Professor, Electrical & Computer Engineering
Virginia Military Institute, Lexington, VA

Abstract

Resistance welding is a method of joining two metal pieces together using an electrical current to melt the metal. Two electrodes are brought in contact with the metal pieces before the electrical current begins to flow. The electrodes remain in contact during the weld and are only removed from contacting the metal pieces after the electrical current stops. There is no arc during a resistance weld. The electrical resistance of the material and the electrical current provide the heat by I^2R . Typical weld currents for sheet steel are 12 – 20 kA. Resistance welding is used extensively in the automotive industry and in many other industries that weld sheet metal. Resistance welding is one of the least expensive types of welding.

However, resistance welding is not without its problems. In this presentation, I will give a brief description of resistance machines and the resistance welding process along with minor variations (spot welds, seam welds, and projection welds). Then I will introduce the problems with instrumentation of the welding machine

(magnetic fields from the 12 kA weld current are troublesome) and I will discuss the methods to overcome the problems. Next, I will discuss the methods of feedback control used in resistance welding and I will point out a fundamental flaw of *all* of the schemes that prevent resistance welding from fully benefiting from negative feedback. Finally, I will discuss the methods used to size a resistance welding machine to the application. One of the main factors needed to size a welding machine is the inductance of the machine. I will present the results of a paper I authored for the 1994 Sheet Metal Welding Conference on an estimation of the inductance of a resistance welding machine. The estimate calculates an upper and a lower bound on the inductance and in most practical applications; the two bounds are relatively close.

Speaker Bio

Wilbur N. Dale was born in Portsmouth, VA and received his BSEE from Old Dominion University in 1984. He received his MS in 1988 and his Ph.D. in 1991; both from The Ohio State University. After graduation, he taught at Cleveland State University for 1 year.

He was a Senior Research Engineer at the Edison Welding Institute in Columbus, OH for 2 years and a Software Engineer at Lumin Software in Oosterhout, the Netherlands for 7 years. He is currently an Assistant Professor of Electrical and Computer Engineering at Virginia Military Institute where his research interests are automatic control theory, electrical power conservation, and antennas.

Date: Thursday, Sept.20, 2007

Social: 6:30 PM

Dinner: 7:00 PM

Talk 8:00 PM

Cost: Members & Guests	\$20.00
Students	\$10.00

Reserve by 5 PM **Monday Sept. 17**

Dr. Wilbur Dale (540) 464-7547

[mail to:dalewn@vmi.edu](mailto:dalewn@vmi.edu)

Please specify number of attendees.

Directions to

Holiday Inn Hotel Roanoke Airport

2727 Ferndale Drive NW
I581 Exit 3 Hershberger Rd West
1st Rt. onto Ordway Drive,
¼ mile, Rt. Into Parking Lot.

IEEE CONSULTANTS AFFINITY GROUP/VMS

The Virginia Mountain Section Consultant's Network Affinity Group has been officially approved by IEEE. The purpose of this Affinity Group is to share information concerning consulting opportunities, and to make a list of consultants and their areas of expertise available to potential employers.

The following is the current listing of consultants:

1. Tuttle International Tech. Marketing, Roanoke

(540)977 4007, Re Electromechanics, Robotics, and Intellectual Property Processes.

2. Squire Consulting,

www.jimsquire.com. Biomedical engineering, instrumentation, endovascular stenting, patent litigation.

3. David H. Geer, PE Geer & Associates, LLC

540-774-4905
d.geer@ieee.org

Mathematical models for industrial processes.

Software development and maintenance in C, C++, Ada, and Fortran.

Website design, development, and maintenance.

4. Ingrid Burbey, IT Works Software Development.

iburbey@vt.edu

Website: filebox.vt.edu/users/iburbey
Embedded, real-time systems, C, Assembly, Woman-owned Business Enterprise (certified in Virginia)

Anyone wishing to be added to this group, or desiring more information should contact Ed Tuttle, Affinity Group Chair, tutleone@earthlink.net.

Competitiveness Legislation

On 2 August, Congress passed landmark legislation designed to enhance U.S. competitiveness and innovation by increasing funding for basic research and improving science, technology, engineering and math (STEM) education. It called for doubling the federal support for physical sciences research over ten years at the Department of Energy's Office of Science, as well as at NSF and NIST laboratories. President Bush signed the bill into law on 9 August.

However, the work is far from over for R&D and STEM education advocates. The big challenge in the months ahead is getting funding for the programs the legislation authorizes. The America COMPETES Act is an "authorization" bill that only gives funding committees guidance. Congress still needs to pass spending bills to fund these programs at the authorized levels.

Read more about this important legislation in the latest edition of IEEE-USA Today's Engineer Online at: <http://bmsmail3.ieee.org:80/u/6868/179883>

2008 Officer Nominations

Would you like to be more active in the operations of the IEEE Virginia Mountain Section (IEEE-VMS)?? Nominations are now being accepted for leadership positions within the IEEE-VMS, including Chair, Vice-Chair, and Secretary-Treasurer. If you are not interested in an officer position, you may want to consider serving as a "Member-at-Large" of the IEEE-VMS Executive Committee.

Please contact Jim Squire (squirejc@vmi.edu), Chair, VMS Nominations Committee, for more information on any of these opportunities. All nominees must submit a brief (approximately 200 words) bio for inclusion in the IEEE-VMS ballot. Bios must be sent to

squirejc@vmi.edu, and must be received no later than October 1 in order to be considered.

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[mail to:bohn@ieee.org](mailto:bohn@ieee.org) 231-3276

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[mail to:dalewn@vmi.edu](mailto:dalewn@vmi.edu) 464-7547

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cbonadeo@verizon.net

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<mailto:d.livingston@ieee.org>

Virginia Council: Jan Helge Bohn

[mail to:bohn@ieee.org](mailto:bohn@ieee.org)

NEWSLETTER

Editor: Ira Jacobs

<mailto:ijacobs@vt.edu> 231-5620

Contact Newsletter Editor to be added to the VMS listserv

WEBSITE

<http://www.ewh.ieee.org/r3/virginia-mountain>

Webmaster: Chris Bonadeo

cbonadeo@verizon.net