



Madison Section NEWSLETTER

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March 2003

The TomoTherapy Process and Advanced Mechanical Design of TomoTherapy Machines

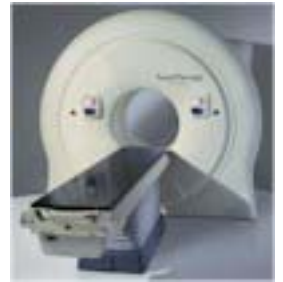
Date/Time: Thursday, March 20, 2003, 11:45 AM - 1:00 PM

Speaker: Richard Schmidt, Hardware Engineering Manager, TomoTherapy, Inc.

Location: Rocky Rococo's Pizza, 7952 Tree Lane (Madison Beltline Hwy. at Mineral Pt. Rd.), 608.829.1444

Menu: Pizza buffet, salad and soft drinks (cost \$10.00, free for student members)

RSVP: by March 17th to Tom Yager via email (tyager@ieee.org) or call 608.821.0821 ext. 342



Non-member guests are always welcome!

TomoTherapy, Inc. has developed a revolutionary cancer treatment device that successfully integrates and improves the state of the art of the radiation therapy process. To the end user, the operation of this device is relatively simple, however accomplishing this requires the successful integration of several sophisticated electrical and mechanical sub-systems, such as: a high precision mechanical support structure (gantry), Linac beamline, solid state RF modulator, computer controlled radiation collimators, electrical slip-rings and an open axis rotating union.

This new device improves the patient registration (positioning) by imaging the patient in the same device in which the therapy is provided (Image Guided Radio-Therapy or IMRT). The treatment is improved by using a helical delivery utilizing a computer controlled multi-leaf collimator (MLC). Real-time dose is monitored via a detector located between the patient and the collimator system. Simulations of TomoTherapy treatments and comparisons to conventional treatments show that the Tomotherapy process can deliver more dose to the tumor while minimizing the dose to surrounding healthy tissue. It is also possible with a TomoTherapy machine to image the patient during treatment and perform dose reconstruction after the treatment.

Richard Schmidt is the Hardware Engineering Manager at TomoTherapy, Inc. In addition to playing a key role in several new technology development programs he supervises the work of all hardware engineers (electrical, mechanical, accelerator and standards). He has an undergraduate degree in Physics (UW '84) and a graduate degree in Mechanical Engineering (UW '00). He is a licensed Professional Engineer and has published research papers in Nuclear Physics and Medical Physics as well as a thesis on Free-Piston Engine Development.

Coming in April: Joint Meeting with UW-Madison Student Branch



*Happy
St. Patrick's
Day*

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Engineers Can't Write? Sez Who!

By Donald Christiansen

To begin with, it is widely accepted — even among ourselves — that we engineers don't write very well. In truth, at least in some cases, we write too much; in others, too obscurely. Yet we are stuck with the need to write. We must document and communicate what we do, or what would be the purpose or the result of our inventing, developing and designing?

As a young engineer, I was invited to address an IEEE Section meeting. My subject was an unusual stereophonic/quadraphonic audio system developed at CBS Laboratories. This technical presentation may have been my first before a large engineering audience. I worried at the prospect. I prepared and projected a number of slides containing a bunch of mathematics that no one could follow during their brief exposure. After all, I had sat through many conference papers that were ritually peppered with unintelligible (at least to me) equations. I had responded in kind, despite my audience having many spouses present — most of whom hadn't a clue what their mates did for a living. I was grateful to the wives, who did not boo or stamp their feet, but discreetly nodded off. The saving factor was that I concluded with a stirring demonstration of the audio system that elicited many compliments. Nevertheless, after the talk, a colleague asked me why I had included all the theory, especially in view of the mixed audience. I could not give him a good answer. I was an engineer, I thought to myself. The theory and the supporting math seemed obligatory.

But I took the criticism to heart. Later, when the paper was published for a strictly technical audience, I heavily edited the math, converting it whenever possible to a word statement of what was physically happening.

What is it that drives us to embed our writing in arcane mathematics and phraseology, and to encumber it with acronyms decipherable only in context and by the knowledgeable — and sometimes, not even then? Could it be our response to the obscure, Latin-rich writing of the medical profession? Are we hoping somehow to acquire the respectability, awe and occasional notoriety accorded medical doctors? A friendlier explanation is that we seek to express ourselves in a way that is complete, accurate, precise and

not subject to misinterpretation, and that we find it necessary to rely on excess verbiage and the jargon of our profession to do so. The case also exists for satisfying the patent lawyers, leaving no possible future extensions of our disclosure uncovered.

Whatever the reason, engineers are not unique. Every profession worth the designation has devised a cryptic language to communicate among its own members. Coincidentally or not, it helps exclude the uninitiated. How we write is one way to separate ourselves from the general public and from other professions, and even to distinguish the members of our particular technical specialty.

When John Pierce of Bell Labs took over as editor of the Proceedings of the Institute of Radio Engineers (the predecessor to the Proceedings of the IEEE), he found he could not understand most of the articles. He asked each member of his editorial board to read an issue of the Proceedings to see if they could understand what they were reading. The answer came back universally that they could not. This exercise helped instigate using specialist reviewers for each Proceedings article, a procedure still in use today.

Notwithstanding, we continue to joke about the incomprehensibility of the articles in many IEEE publications. A perennial comment, seeming always to elicit a sympathetic chuckle, is that only its author and possibly one or two of its reviewers can really understand a Transactions paper.

Woody Gannett, the staff executive who oversaw publishing the technical journals for both the Institute of Radio Engineers and the IEEE, often told this story: A member submitted a paper to one of the Transactions purporting to describe a revolutionary new circuit component. After due peer review, the paper was published. Only then did the author admit to the hoax. He had described the resistor, but in such a convoluted way that its true identity had eluded the reviewers. Woody was never able to recall exactly when and where the article was published, but generations of his colleagues enjoyed the story, and I still believe it might have been true.

Ironically, even those who profess to know good communication when they see it are not immune from the trappings of scholarly publication. In a recent article in the Transactions on Professional Communication, the phrase “motivating users to process/engage text-based communication” is used. Probably this means motivating users to read, or even to read with interest and comprehension. I am not sure.

Engineers have plenty of occasions to write more than just technical papers — reports, proposals and operating and maintenance manuals, plus stuff that helps promote and sell what they create. But perhaps I’ll save those for a future column, and for the professors who are teaching engineering, writing and marketing to today’s undergraduate engineering students.

Meanwhile, can you please keep whatever you write a bit shorter, more to the point, and limit your use of acronyms? And as a personal favor, can you find a title for your next journal article that has fewer than 20 words? Thanks.

In fairness, I will say that I have both written and criticized technical papers, and I should tell you the latter is much easier.

For more on writing, see:



Spring/Summer 2003 Telecommunications Short Courses

- **Introduction to Data Communications**
April 8–10 in Madison, WI
- **Planning and Implementing Point-to-Point Microwave Radio Systems**
April 14–16 in Orlando, FL
- **DC Power System Design for Telecommunications**
April 23–25 in Madison, WI
- **Fundamentals of Cellular and PCS Wireless Communications**
May 14–16 in Madison, WI
- **Telecommunications Law for Engineers and Technical Managers**
May 19–21 in Madison, WI
- **Basic Telephony and Digital Switching**
June 17–20 in Madison, WI

For further information...

Web: <http://epdweb.engr.wisc.edu> or E-mail: danbeck@engr.wisc.edu
College of Engineering Department of Engineering Professional Development

J. G. Paradis and M. L. Zimmerman, *The MIT Guide to Science and Engineering Communication*, MIT Press, 2002.

IEEE Transactions on Professional Communication

IEEE PCS Newsletter <<http://www.ieeepcs.org/newsletter.html>>

For insights to contemporary engineering jargon, see “Technically Speaking,” a column appearing periodically in *IEEE Spectrum* (1981-present).

Donald Christiansen is the former editor and publisher of IEEE Spectrum and an independent publishing consultant. He can be contacted at donchristiansen@ieee.org.

Madison Section Mailing List

Some of you may not realize that the IEEE Madison Section has a email mailing list (madison-section). This list is very low volume and is only used for meeting announcements and general announcements that may be important to the membership. Only the list moderator is allowed to post messages so you won’t receive any advertising or spam. Instructions on how to subscribe may be found on the IEEE Madison Section web site located at <<http://www.bugsoft.com/ieee>>. Just look under “Madison Section Mailing List”. Basically you just send an email to <majordomo@majordomo.ieee.org> with subscribe madison-section in the body of the email (the subject is ignored). The list moderator will receive your request, verify your membership, then add you to the list. You will then receive notification that you have been subscribed to the list. This process may take a few days, so be patient.



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For more information, contact John Hicks at (608) 233-4875 or jhicks@facstaff.wisc.edu.

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