

Reliability Society

N E W S L E T T E R

<http://www.ieee.org/society/rs>



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Dave Franklin
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Dr. Robert J. Loomis, Jr.

President's Message

A professional society should provide its members with data and material to aid them in becoming the professional that they desire. IEEE is no exception. Its 36 technical societies provide its members with the technical knowledge and resources to make an engineer as competent as they desire. The Reliability Society, one of the 36 within IEEE, strives to provide its members with technical knowledge in the form of Transactions, Conferences, videos, etc. However, all the technical knowledge does not ensure a successful career.

The IEEE Professional Activities Committee, now within IEEE-USA, offers conferences and material to develop the 'other' skills needed for a professional career. I attended this year's conference whose theme was 'PREPARING FOR THE NEW MILLENNIUM.' There, workshops on such items as using humor in presentations, dealing with office politics and conducting performance appraisal's help develop skills that an engineer must acquire to survive in today's workplace. These conferences and skills are very important but only reach our US members. We, within the Reliability Society, believe that this information is valuable and useful to all of our members.

Next year, Marsha Abramo will be taking over for Bob Gauger as the Reliability Society representative for Professional Activities. Marsha also attended the conference this year and is already looking for opportunities to share this valuable information among the Reliability Society membership. Marsha also serves as the Society Chapter's coordinator and has the resources to reach out to chapter members to help them develop similar courses at their chapter meetings. She also is working with our technical conferences to include a professional development session within the technical tracks. If you would like to get more information or want to become involved, contact Marsha or myself.



Loretta Arellano
Reliability Society President

Editor's Column

Congratulations

The results are in from the Headquarters run Election and I am pleased to announce the following members were elected:

TERM STARTS 1999 (JAN 1) -
TERM EXPIRES 2001 (DEC 31)

- Ken LaSala
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- Marsha Abramo
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btvmanvm.vnet.ibm.com
- Koichi Inoue
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- Ann N Campbell
ancampbe@sandia.gov
- Bill Tonti
wtonti@us.ibm.com
- Jeff Voas
jmvoas@rstcorp.com

I am also pleased to say that we have an outstanding Runner up. It is hoped that he will be able to join us at meetings and participate in the ADCOM activities, as the society needs more dedicated people.

Continued on page 15

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The schedule for submittals is:

Newsletter	Due Date
January	November 19
April	February 26
July	May 28
October	August 27

ADVERTISING RATES

All copy that contains graphics or special fonts must be camera-ready or delivered on computer disk and be received by the due dates indicated.

Ad Size	One Time	2-3	4+
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Quarter Page	\$205	190	180
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Chapter Activities

Boston Chapter

Our new season of Monthly meetings kicked off on September 9, with Gene Bridgers presentation on Reliability Prediction Process. Drawing from his years of experience, Gene took the audience through a road-map tour (flow chart for the more technically inclined) of the process of generating Reliability Predictions. Both from the technical standpoint (how the "numbers" are generated), and from the infrastructure standpoint (how long predictions typically take, and what is needed for tools, libraries, software tools, etc.). Gene also described the tool set that he commonly uses with its advantages and disadvantage and a number of other commercially available Predictions tools on the market.

The following week, September 16, we had the Technology Development meeting in the MITRE Corporation in which Gene presented the recently advertised Xerox Corporation AET process called: "Thunder and Lightning Accelerated Testing" along with the Excel Spreadsheet that is being used to evaluate the process.

On October 28, we were blessed with a special opportunity to spend a fascinating "Evening with the Experts" in an informal panel discussion moderated by Gene Bridgers. In town to teach at the Hobbs Engineering seminars were Dr. Gregg K. Hobbs himself, the inventor of HALT and HASS, the well known Mr.

Patrick D. T. O'Connor, and Dr. Abhijit Dasgupta, co-director of CALCE EPRC and faculty member at the University of Maryland. We are indebted to these worldwide experts for their willingness to participate in this panel after a long day of teaching and share their views and rich experience with our members.

Gene Bridgers moderated the questions from a packed house of 71 attendees that gathered in the Seminar Room of the Holiday Inn, Boxborough, MA. The panel fielded questions ranging from the future of Reliability Engineering to determining what tests and stresses to apply during HALT and HASS and the effect of temperature on failure mechanisms and failure rates of electronic devices.

The panel members from left to right: Dr. Abhijit Dasgupta, Dr. Gregg K. Mr. Patrick D. T. O'Connor, and standing the moderator Mr. Gene Bridgers

There were several questions on what value, if any, MIL-HDBK-217 and MTBF predictions still hold. The entire panel agreed that using such predictions to drive engineering, design, or project management decisions is absolutely the wrong thing to do. The panel strongly believes that Reliability and Quality performance nowadays is primarily a function of management commitment. It is management's responsibility to engender a culture of reliability awareness across the entire supply chain, with a primary focus on forcing failures out into the open and studying them in detail to understand and address their root

cause. An excellent set of resources covering many of the topics touched upon can be found on the University of Maryland WEB site: <http://www.calce.umd.edu>. Special thanks goes to Virginia Hobbs who was invaluable in helping us organize this event.

Our 37th Annual Spring Reliability Symposium will take place on May 5, 1999 in the Holiday Inn, Boxborough, MA. The theme is "The Reliability Engineer On-the-Job, The Reliability Engineering Profession in Today's Business Environment." We would like to have participants from all over the world. Authors should submit a 300 to 400 word abstract to the Program or Symposium Chair by January 15, 1999. Symposium Chair: Joe Dzekevich, Phone: (508) 229-1761, E-Mail: Joe_dzekevich@ne.3com.com or Program Chair: Tin-Yau Ying, Phone: (781) 271-8130, E-Mail: tying@mitre.org. Additional details on the spring symposium and other chapter activities are on our web site: <http://www.channell.com/users/ieec/home.html>

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Dallas Chapter

Best Regards,

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Denver

I think that Denver is going to have a dynamite year. Let me share what we are doing in case it can apply to your area of the country. We are going to host a meeting on the topic of "Designing for Reliability". It will start at 11:14 and run all day. Seagate will sponsor a meeting room and lunch for us. You can see the notice sent out and one of our responses. I have received inquiry about joining the society from this notice.



We will follow with a similar session on SW reliability. There is a suggestion of running these meetings on a quarterly basis. If I go to a seminar and come away with one good idea I feel rewarded. I think we will farm a lot of good ideas. We are excited about these meetings. We also invite capable developers such as Nick Krull and others to improve our diversity.

Sam Keene
s.keene@ieee.org

Los Angeles Chapter

On September 24, 1998, Clarence Dickson of the Raytheon Company gave a talk on, "Land Warrior, Human Factors/MAN-PRINT Overview"

The Land Warrior Program provides new capability to the Infantry soldier. LW will enhance the soldier's battlefield capabilities through the development and integration of a variety of technologies into a cohesive, cost-effective system that provides for modularity and facilitates technology insertion. This is the first time in the history of defense contracting that the weapons/sensor platform being improved on is the soldier himself. Typically the soldier sits on, stands beside or rides in the weapons/sensor platform that he operates and maintains. With Land Warrior the soldier wears the system and is integral to it. For this reason the role of MANPRINT is crucial to Land Warrior success. MAN-PRINT stands for MANpower PeRsonnel INTegration and is a management approach to ensure that the seven domains that make it up are fully integrated into the design engineering process. The seven domains are Man-power, Personnel, Training, Human Factors, System Safety, Health Hazards, and Soldier Survivability.

The challenges and successes of MANPRINT in assuring that the Land Warrior system is as "user-friendly" as possible was discussed. The kinds and magnitude of trade-offs will also be shown including some that are still not completed. Some of the least expensive parts, for example a two-button switch, have caused the most discussion and heat. You'll hear why. Actual soldier involvement has been uniquely employed to get user feedback at every stage of the design process and the strengths and pitfalls of this approach was outlined. The process and progress from early prototypes to the current IOT&E design was presented.

Mr. Dickson is currently MANPRINT Manager for the Soldier System Integrated Product Team (IPT) on the Land Warrior (LW) Program. He is involved in engineering studies and trade-off analyses and evaluates designs for MANPRINT impact.

On November 19, 1998 we will hear Mr. Marc Franklin of Franklin Video Productions discuss and demonstrate "Multimedia Video Production via Computers".

Marc Franklin will be demonstrating new, affordable, digital video editing technology. Just a few years ago such technology cost a minimum of about \$20,000+. Today more capable systems are available for \$3000. The talk will focus on how new digital technology is allowing for reliable non-linear video editing off of hard drives and new inexpensive digital tape formats that are now available to the general public.

These new innovations allow more people to produce network quality programs at a fraction of what it would have taken just three or four years ago. Faster processors, inexpensive RAM, audio / video hard drives that are going for less than \$100 per gigabit and low cost capture devices are opening new possibilities to every one from hobbyists, to seasoned producers.

Marc M. Franklin has been using computers to produce video since 1992, on both the PC and Amiga platforms. Specializing in sales, training, government and medical videos and TV, Marc has been able to deliver polished products at a fraction of what it cost only a few years ago. He is currently working on a video for an aerospace manufacturing company, medical engineering company and an actor demos. He is Vice President of Technology for the American Videographers Association (AVA), and just returned from lecturing at the Wedding and Event Videographers Association's (WEVA) exposition in Miami where he spoke on the advantages on editing with time code and computers.

Marc Franklin is also a dealer for Pinnacle Systems desktop systems. He will also have literature and special pricing available on a number of digital audio and video editing products.

David L Franklin
Chair
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Philadelphia Chapter

Satellite- Based Global Cellular Communications was presented by Mr. Bruno Pattan on March 17, 1998. He answered the questions, "What is the future of cellular communications?" and "How quickly can existing networks be extended by means of satellites to create truly global coverage?" Mr. Pattan discussed the burgeoning area of wireless communications and, in particular, cellular service via satellite systems - an extension of terrestrial cellular systems without bounds of restricted geographical locations.

A FCC expert, he talked about developing, operating, and maintaining satellite-based, cellular communications networks. Also, included was satellite-based GSO regional systems, which are coming to fruition and which will provide service to hand held transceivers as well as the marriage of satellite and cellular technologies — and the infrastructure that will result.

Mr. Ken Moyer then told us about Available Powder Metallurgy (P/M) Soft Magnetic Materials. P/M magnetic materials are not new to the marketplace. As early as the 1950s iron and silicon irons were available. These, however, were made from either impure or expensive powders. In the 1980s, new water-atomized iron powders that were free of oxides became commercially available. Improved sintering techniques also made it possible to produce, from powders, parts that were free of carbon, oxygen, nitrogen, and sulfur. Today, these P/M parts have soft magnetic properties that compete with wrought products for commercial applications, especially in automotive applications.

Materials consisting of iron, phosphorous iron, ferritic steels, silicon iron, and 50 Ni/50 Fe are commercially available, and are in use for all common applications where soft magnetic material is required. These alloys, their merits, and their disadvantages were discussed; including the processing required to provide optimum magnetic properties. Finally, an insight into future materials and applications was briefly covered.

The April 21, 1998 meeting heard Dr. William G. Duft speak on "Danger — Electromagnetic Interference (EMI) Communications Systems Overload Ahead" We were told that as a result of

our increased mobility and dependence on computers, use of the electromagnetic spectrum for communications, navigation, and radar systems has been rapidly increasing. One important consideration in the design, installation, and operation of a communication-electronic system is to achieve and maintain electromagnetic compatibility (EMC) between systems operating in close proximity. For conventional, narrowband, fixed-tuned, communications systems; effective, well-defined spectrum management procedures have been developed. These procedures rely on observing specified frequency-distance separation criteria and on avoiding frequency assignments that could result in intermodulation problems. For frequency-hopping systems, the spectrum management problem becomes very complex and severe cosine EMI problems often degrade system performance. These problems were described and techniques for minimizing them were presented.

On May 19, 1998 we had two presenters. "Networking: How to Create/Maintain Your Occupational Safety Net", was presented by Ms. Linda Resnick. She emphasizes that "Your network is your occupational safety net". The people in your network constitute a vast part-time sales force that's helping you market yourself. They're the best form of employment insurance that money can't buy. We live in a society where many old structures, such as church and family, have been weakened for many people. Fewer and fewer large corporations offer the sense of long-term security they once did. Our networks are what we have instead. To quote the Beatles, "We get along with the help of our friends." This presentation addressed the general area of networking two parts: 1) definition of networking and 12 steps for effective networking; and, 2) exercises with audience participants who did real networking and learned how to "work a room".

"Recent Trends in Intellectual Property", was presented by Mr. Theodore Naccarella. He covered certain recent trends in intellectual property law have far ranging consequences for individuals and companies working in the electrical and electronic arts, especially computer software, hardware, and the internet. The trends that were discussed included the

developing of software, and recent Supreme Court decisions that are already having a significant impact on patent related lawsuits.

The September 15, 1998 meeting featured two speakers. Mr. Charles A. Cianfrani addressed the impact of ISO9001 in the year 2000. The ISO 9002 Series of Quality Standards has had a significant impact on the electronics industry over the past 10 years. As we approach the millennium, ISO is in the process of preparing an update to this series of standards that will affect all organizations currently registered to ISO 9001 or 9002. This presentation previewed the anticipated form and content of the ISO 9001 Series of Quality Standards that will be released in the year 2000, including a description of the new Process Model structure of the Standard, which represents a significant change from the current Life-Cycle Model structure. The speaker has unique insight into the anticipated content of the Y2K Quality Standards since he is the US Expert Representative to the ISO Working Group (ISOTCI176/SC2/WG18) that is writing these Standards.

Dr. Gordon F. Hughes then presented a talk on Cross-Disciplinary Disk-Drive Technology Futures. About ten years ago, the speaker gave a series of talks with this title, discussing research and development challenges and opportunities in high frequency magnetic materials, thin film disk magnetics and noise, head/disk tribology and mechanics, signal processing for data detection and error control, and optical versus magnetic data storage. Based on mass-market densities available in 1987, data storage industry goals were stated to be a 100-fold increase in storage density, to 2 gigabits per square inch. Today, disk drives can be purchased that exceed this prediction by 50%, and demonstrations of technology for 10 gigabits per square inch are expected. This talk revisited these technology areas, some of which seem to be approaching fundamental physical limits. Alternatives for increasing storage capacity of products, if these limits are hit, were discussed.

On October 20, 1998, Living (and Designing) Sustainably in the Philadelphia Area Today was presented by Mr. Robert P. Thomas. Can one live a sustainable life in the Philadelphia area today? Not too

long ago, Philadelphia had congenial row-house neighborhoods, an easy bike ride from beautiful parks and open spaces, well served by public transportation and excellent public schools. Now one is bombarded by the consumer culture urging us to buy a car (or a large car) or a house often much larger than we need, or even one even farther from our work and friends. Yet, Philadelphia, along with a few other urban areas in the United States, has both a physical and cultural resources for sustainable living, as well as a critical nucleus of a community of people who share in these values and celebrate what this city has to offer.

Dr. Ahirudha Das, then presented Understanding Global Positioning Systems (GPS) Spacecraft. Dr. Das spoke on how the GPS space vehicles (SVs) are built at Lockheed Martin Missiles and Space (LMMS), how navigation signals are used and some of the new design features of these SVs. MMS will deliver 21 spacecraft to the United States Air Force between 1996 and 2001 to replenish the GPS constellation of SVs. These SVs have very high accuracy as a result of painstaking systems engineering and design of the spacecraft. The system engineering is backed up by radiation-hard piece parts, innovative circuit designs, and rigorous testing.

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Singapore Chapter (ED/Reliability/CPMT Joint Chapter)

See Call for papers section of this newsletter.

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AdCom Meeting Minutes

Airport Marriott
Minneapolis, Minnesota
August 8, 1998

Attendees: L. Arellano, K. LaSala, S.Keene, O.Trapp, M. Abramo, P.Gottfried, D. Doyle, T. Rost, Y. Lord, B. Gauger, D. Kowalski, M. Wortman, B. Schlentz, D. Hoffman, R. Loomis, J. Adams

President Arellano opened the meeting at 9:00AM. Minutes of March 29, 1998 meeting approved with corrections.

Dick Kowalski presented treasurer's report. The Society continues excellently with a projected net worth in excess of \$1,000,000.

Clarification of Travel reimbursement for voting members attending adcom meetings is limited to \$300 of unreimbursed expenses for the first Adcom meeting each year and then is limited to a total of \$1,000 for the year, per adcom member.

Bud Trapp presented the meetings report and the upcoming meetings were as listed:

- Sat. October 10, 1998, ETH Zurich Switzerland, Mon. October 12, Tutorials taught by Society members Sunday,
- January 17, 1999 DC with RAMS @ Washington Hilton 50th Anniversary banquet
- Sunday March 21, 1999 @IRPS, Town and Country Hotel, San Diego
- Summer 1999 Denver
- Fall 1999 Japan
- Jan. 2000 Los Angeles with RAMS
- Sun April 9, 2000 San Jose with IRPS

The Switzerland chapter will sponsor a tutorial, including lunch, in conjunction with the Adcom meeting.

Bud Trapp attended a recent TAB meeting and participated in an Intelligent-Transportation-Systems working group. Bud mentioned the IEEE paid his expenses and that he encouraged RS members to consider participating in TAB activities.

Ann Campbell presented an IRPS 98 Summary report. Attendance at the 1998 IRPS Symposium was 680 vs 725

planned. The attendance shortfall was due to the Asian economic crisis. The symposium still had a 9.9% operating surplus of \$40,500. This symposium has grown to the point that they have hired an accountant to maintain their books. The West Coast location (Reno, NV) helped the attendance, but was offset by the Asian economy. The surplus is returned to the ED and RS societies in equal division.

Presented papers came from US 59%, Asia 26%, Europe 15%. Tutorials and workshops were well attended. Tutorials bring in a lot of money. Workshops are free. Many innovations at IRPS and evidence of conference vitality are evident.

IEEE members are a minority in attending and leading the conference from a management standpoint. 205 attendees of the 1998 IRPS were IEEE members. 332 attendees listed themselves as non-IEEE members. The remaining attendees were authors, committee and other. One suggestion was to subsidize attendance for IEEE members and thereby encourage attendees to join when attending the conference. Materials Research Society (MRS) and American Society of Materials (ASM) are societies with failure analysis interest and are well represented at IRPS.

Paul Gottfried reports publications are running behind, their schedule but progress is being made to reduce this slippage.

Bob Loomis presented the RS connection with OpeRa.

Dick Doyle referenced the earlier Adcom commitment to support Sam Keene's travel to ISRE at Paderborn, Germany in November 1998 for unreimbursed expenses up to \$2,500.

Breakout meetings

1. Standards and definitions (status and actions)
 - Standards Process
 - Update Ken's original Process Flow to reflect latest IEEE documentation
 - Generate a set of procedures that will augment the process and provide working groups with the necessary direction
 - Nature and Scope of Standards activities

- Through technical chairs determine what are our Standards needs
- Current Activities
 - Complete prediction document
 - Consider follow up document to Reliability Program Standard
 - Terminate P1468-70
- 2. Long Range Planning
- 3. Field of Interest (attached)

Motions considered:

A motion to reimburse RS past presidents for un-reimbursed expenses of up to \$1,000 to attend the Anniversary banquet was approved.

Further clarification of Adcom subsidy of members travel expense was approved. This was clarified to include a total of \$1,000 for two trips. The first trip could cost only \$10.00 then the second could be covered up to \$990.00 to make the total \$1,000. The annual limit is \$1,000 and that is to cover unreimbursed expenses to attend adcom meetings. In other words, the first meeting attendance entitles one to \$300.00 of expense coverage. Two or more meetings entitle one to \$1,000.00 of expense coverage.

It was determined that the RS cannot support ISACC sponsorship since this conference is a for-profit conference. Therefore a potential conflict with IEEE by-laws exists. The society is interested in the topical field and can only provide notice of this meeting in its newsletter. All agreed that next week Bud will check out the possibility of alternative sponsorship levels for the ISACC and that RS can advertise the ISACC meeting in its newsletter publications. In addition Bud Trapp will check out the WRO reference to the RS. The RS has not agreed to the WRO current reference to the RS .

It was approved that the RS will try to develop a video on MEMS and build a cooperative effort on this with EDS via joint sponsorship. Ann Campbell will talk to Bill Miller and Sam Miller at Sandia Labs.

Development was approved of a video tutorial on oxide dielectric reliability. Marsha Abramo will contact Alan Street to find out his interest and availability in producing this video.

Adcom requested that President Arellano research the duties of the IEEE ombudsman, or executive representative. Investigate the acquisition of an executive director and the duties and costs thereof, and any other alternatives. The issue will be

sent by email to the adcom and otherwise it will be presented in the January Adcom.

The motion that the \$20.00 R07 dues will provide all members with, Annual RAMS proceedings, Annual IRPS pro-

ceedings, Reliability Transactions, Semiconductor Transactions, and the RS Newsletter, as well as, on-line access to EDS articles via OpeRA.

IEEE Reliability Society Technical Operations Report

For July 1 - September 30 1998

Committee Reports

Committee: Reliability Prediction
Committee Chair: Dr. Sam Keene,

A New System Reliability Assessment Method has been developed and released by RAC in June 1998. This prediction technique accounts for the development process impacts on system reliability. This author worked with Mr. Clifford Ryerson in the late 60's during development of MIL-HDBK-217. Subsequently joining IBM, the author was failure analyzing high fall out card assemblies.

Committee: Emerging (New) Technologies/Components
Committee Chair: Mr. Dave Franklin,

Two reliability needs have recently come to my attention, while they are not completely new, I believe the interest in them is.

1. The reliability of immature systems, probabilities of success of a demonstration program.
2. Storage reliability of commercial parts.

Committee: CAE, Concurrent Engineering (CE)
Committee Chair: Mr. Dennis R. Hoffman,

The activity this quarter has been to identify presenters for the RAMS Workshop sessions and to get their agreement to speak. This has been more difficult this year, as many people would like to participate, but they don't have travel budgets — many have to get VP level approval to do any traveling. Things may not be as rosy as the economy appears.

- Still have a few holes but the sessions are firming up nicely. Sessions should be very informative for the

attendees. Featured presentation on Y2K Readiness should be very interesting.

- Will submit Papers for the RAMS Proceedings in early October.
- Program is provided as an appendix to this report.

Committee: Mechanical Reliability
Committee Chair: Mr. Dick Doyle,

Minor activities. We hope to have a new active member of this team from RAC (he is a candidate for ADCOM also).

Committee: Software Reliability
Committee Chairs: Mr. Irv Doshay ,
Dr. Sam Keene,

Irv Doshay resigns. Many thanks to Irv for his years of service in this position. We look forward to continued contributions from Irv.

- Drs. Sam Keene, Bill Everett, and Allen Nikora were requested and contributed a article on the state of the art in software reliability to the September RS transactions (comemerative issue). This article also capsuled the history of software reliability since Dr. Martin Shooman published his similar article in 1984.

Committee: Definitions and Standards
Committee Chairs: Co-Chair: Yvonne Lord, Co-Chair: Tom Brogan,

Meetings Attended:

- Attended the August 3rd, 1998 RMS Partnership meeting in Washington DC. This meeting was tied to the Federal Technical Standards Workshop put on by the DOE. This was the first Partnership meeting that each of the Professional societies provided an up-

date on their standards activities. The IEEE as well as the SAE both presented a standards status.

- Both Yvonne Lord and Tom Brogan attended the August 9th ADCOM meeting in Minneapolis. A status of standards activity was presented before breaking off into splinter groups to discuss action plans for the remainder of the year. One of the key areas discussed was the need for a formalized standards process and guidelines within the Reliability Society. Documents envisioned as part of this activity would include:

- A comprehensive process flow outlining the gates a Working Group would need to pass to obtain approval for submittal of a proposed standard to the IEEE standards board.
- Some form of training material for the Working Group Chairs to acclimate their teams to the Standards Process up front prior to beginning any work.
- Guidelines and procedures for properly filling out a Project Authorization Request (PAR)

Activities Planned for Next Quarter:

- DSC co-chairs plan on sending all WG Chairs a request to provide a plan and schedule for upcoming meetings as well as target dates for document completion. In addition we will be asking that WG rosters be updated to reflect the current make-up of the Working Groups.
- The DSC co-chairs plan to discuss with Dr. Michael Pecht, WG chair his vision of the P1413 (Reliability Prediction Standard). The last meeting of this Working Group was held on May 7, 1998 and resulted in a new draft of the document which was sent out for internal review. The re-

views have been mixed and the document may not match the intent of the original PAR. The DSC co-chairs will make recommendations to the ADCOM regarding future direction.

Committee: Advanced Reliability Techniques and R&D

Committee Chair: Dr. Christian K. Hansen, Chair.,

- The only IEEE business item at this time is the compilation of the annual technology report. I have received only a few reports at this time. I will be in touch shortly with a plan for completing the report.

Committee: Human Performance Reliability

Committee Chair: Dr. Kenneth P. LaSala, k.p.lasala@ieee.org

- Minor activity related to the development of the committee Web page.
- To date, we have had a total of 10 sales on the Human Reliability video.
- IEC TC 56 again is considering our proposal to produce a Human Performance Reliability Standard.

Committee: Computers, Information Systems & Telecommunications

Committee Chair: Mr. Hank Wolf,
No report submitted.

Committee: Energy Systems Reliability & Energy Technology Assessments

Committee Chair: Mark Lively, MbeLively@aol.com
No report submitted.

Committee: Health Care and Medical Reliability

Committee Chair: Mr. John R. Adams, Mr. Robert J. Schlentz,
No activity

Committee: International Reliability

Committee Chair: John Peter Rooney,
No activity.

Committee: Physics of Failure/Reliability Physics

Committee Chair: Dr. Timothy A. Rost,
Minor activity.

Committee: Nuclear Reliability

Committee Chair: Mr. Jalal Zamanali,

I attended and chaired one session in the Probabilistic Safety Assessment & Management (PSAM4) meeting in New York City during the September 14-18. This program was held cooperatively with IEEE, National Laboratories and several other societies. The purpose of this conference was to provide a public forum for the presentation of scientific papers covering both methodology and application of system-based approaches to the design and reliable/safe operation of technological systems and processes. Over 440 papers were presented and about 1/3 of them was related to reliability analysis for different applications (Nuclear Reliability was dominated).

Committee: Quality Assurance Technology

Committee Chair: Mr. Puran Luthra, luthrap@admiral.umsl.edu
No report submitted.

Committee: Testing and Screening

Committee Chair: Mr. H. Anthony Chan, Mr. Bill Wallace,

Bill Wallace retires effective 1 Oct 98. We all wish him well and thank him for his many years of service as Test and Screening chair and co-chair.

- The 4th IEEE Workshop on Accelerated Stress Testing is held on September 22-24 at Pasadena and is held jointed with CPMT Society. The program consists of one full day tutorial, and 2 days of paper presentation, panel and tour of JPL.
- Kirk Gray (RS chapter chair at Denver) has set up a discussion group. The email address is acceleratedstresstesting@major-domo.com

Committee: Speakers Bureau

Committee Chair: Ms. Marsha Abramo,
No report submitted.

Committee: Sensors Council

Council Representative: Dr. Kenneth P. LaSala, k.p.lasala@ieee.org

- The council was identified as an Ad Hoc council. Activities consisted of the members distributing their biog-

raphies and sensor activities and the drafting of both a Field of Interest statement and a constitution.

- We requested that the constitution address a Vice President for Technical Operations and include reliability in the brief field of interest statement. The chair agreed to include our proposals about the VP Tech Ops, but wanted to include reliability in the separate Field of Interest statement and exclude it from the constitution. We replied that reliability should be in both the Field of Interest statement AND the constitution.
- The proposed Field of Interest statement and constitution will be considered by the TAB as part of their decision to set up a Sensors Council.

Technical Operations Projects

As of October 1998, the following projects were underway:

- IEC 60300-3-10 Maintainability Application Guide - initial draft was revised and has been recirculated.
- IEC 60300-3-11 Guide to Reliability Centered Maintenance - initial draft was reviewed, comments were generated, and a revision is being prepared.
- IEC 60300-3-12 Guide to Integrated Logistic Support - The initial draft received a large number of comments. As a result, the document has been revised considerably. The revision was reviewed and amendments were added. It is being revised again.
- IEC 706-1 Guide on Maintainability of Equipment, Sections 1, 2, and 3 Revision. The document was reduced to the first two sections and a first draft has been completed.
- IEC Document 56/636 Reliability Stress Screening - Part 2, Electronic Components has been approved.

Appendix

January RAMs Highlights Workshop — full day session on Monday, 18 Jan 1999

CAE IN CE WORKSHOP: RAM CAE Interoperability

Moderator: Dennis Hoffman, Raytheon Systems Company, Dallas, Texas

A complete day of activities devoted to aiding the attendees to further their understanding and knowledge of R&M CAE interoperability within a project's integrated product development environment highlighting lessons-learned and success stories, plus a R&M CAE user group panel with attendee Q&A participation. Learn how available CAE applications can help get your job done more efficiently.

CAE Interoperability in IPD Environment Panel

Title: Technical Data Interchange through Standards (Note — No Paper)

Presenter: Mike Hurn, Raytheon Systems Company, Information Technology, Dallas, Texas

Title: An Approach to Tool Interoperability (Paper)

Presenter: William L. McMullen, Raytheon Systems Company, Sensors and Electronic Systems, Dallas, Texas

Title: (No Paper)

Presenter: Steve, Lockheed Martin, Tactical Aircraft Company, Fort Worth, Texas

Featured Presentation

Title: A Year 2000 Industry Readiness Update (No Paper)

A featured presentation for a Year 2000 Readiness Update status based on surveys by a leading Y2K consulting firm.

The results of a Year 2000 survey of the nation's top firms and government agencies will be presented with details:

- Year 2000 preparedness on an industry-by-industry basis
- Business impact issues
- Corporate priorities
- Types of Year 2000 failures

Cap Gemini America's survey of IT directors and managers in 12 sectors, one of the longest-running surveys to systematically monitor Year 2000 readiness, has been conducted since March 1995.

Presenter: Tom Klimuc, TransMillennium Services, Cap Gemini America LLC, New York, New York

R&M CAE Users Group Discussion Panel (No Papers)

Presenter: Yvonne Lord, Northrup Grumman, Baltimore, Maryland

Presenter: Ted Mateja, Raytheon Systems Company, Sudbury, Ma.

Presenter: Kevin Abshire, Lockheed Martin, Tactical Aircraft Company, Fort Worth, Texas

Title: CAD for Reliability and the Speed Wars

Reliability speed needs plus some solutions for circuit packs/printed wiring boards/subassemblies CAD tools plus integration with systems engineering tools.

Presenter: Mike Tortorella, Bell Laboratories, Lucent Technologies, Holmdel, New Jersey

Panel — Tuesday, starts after morning break for the rest of the day

R&M CAE CAPABILITIES: Exhibitors Demonstrations

Moderator: Kevin Abshire, Lockheed Martin - Tactical Aircraft Systems

Our RAMS Exhibitors will highlight their latest CAE capabilities through presentations and CAE tool demonstrations. This session will allow you to learn what the RAMS Exhibitors have to offer in a neutral setting. Attend and see what our RAMS Exhibitors' products and services can do for you. Exhibitors participating at the last RAMS were: A.L.D., AST Engineering Services, Inc, Item Software (USA), Inc., Management Sciences, Inc., Powertronic Systems, Inc., Raytheon Systems Company, Relex Software Corporation, ReliaSoft Corporation.

Panel — Wednesday morning, half day session, Jan. 20, 1999

INNOVATIVE RAM CAE SOLUTIONS Panel

Moderator: Keith Janasak, Raytheon Systems Company, Dallas, Texas

Hear about advanced CAE capabilities being developed by industry, government, and university research centers to fill gaps in needed R&M capabilities that are being proven today for tomorrow's solutions. Q&A interchanges with the presenters are encouraged.

Title: Failure Assessment Software for Circuit Card Assemblies (Paper)

Up-front failure analysis of circuit card assembly designs can dramatically reduce cost of ownership, increase product reliability, and thus reduce risks. Innovative software, which is being used to assess modern electronic products, is presented.

Presenters: Dr. Michael Osterman, CALCE Electronic Products and Systems Consortium, University of Maryland, College Park, Maryland

Title: Function-Centered Reliability and Risk Analysis (Paper)

The goal tree-success tree (GTST) and master logic diagram (MLD) are frameworks for functional representation and modeling of complex physical systems. Functional descriptions provide a simple method for modeling complex technical systems. Several examples of using the integrated GTST-MLD framework in assessing development risk, predicting areas of concerns, and estimating performance and other RAM measures during design, development and use of the products will be presented.

Presenter: Mohammad Modarres, Center for Technology Risk Studies, University of Maryland, College Park, Maryland

Title: Prophet(TM) - The Engine for Integrated Risk Management (Paper)

Risks must be managed. The Prophet(TM) toolset collects and merges risk data from multiple teams and integrates it with master planning and scheduling. As a result, it generates powerful reports, which provide efficient risk tracking and decision-making.

Presenter: Deborah S. Huff, Raytheon Systems Company, Sensors and Electronics Systems Segment, Los Angeles, California

Title: Identifying Design Glitches through Automated Design Analysis (Paper)

Engineers have developed a number of design techniques to detect problems in their designs. Concurrent engineering demands that all such activities be carried out in a timely manner. For electrical and electronic systems, many such techniques can be automated using qualitative simulation. The main advantage over

simulation using tools such as Spice is that the analysis can be performed early in the design life-cycle, identifying problems when it is less costly to fix.

Presenter: Chris Price, FirstEarth Limited, Aberystwyth, Ceredigion, United Kingdom.

Title: Risk Mitigation of Reliability Critical Items (Paper)

Using Concurrent Engineering and Risk Management concepts as a foundation, a technique is being developed to aid integrated product development (IPD) teams consider critical item design features impacted by product applications. Technique adds a "virtual" supplier member to the IPD team.

Presenter: Dennis R. Hoffman, Raytheon Systems Company, Sensors and Elec-

tronics Systems Segment, Dallas, Texas

Title: Reducing Human Performance-Related Risk With REHMS-DTM (Paper)

The Reliable Human-Machine System Developer (REHMS-D) can be used to reduce product and process risks by designing for reliable human performance. REHMS-D can be applied to a wide variety of large systems, including those for transportation, medicine, utilities, and defense as well as commercial products, business processes, information systems, and manufacturing processes.

Presenter: Dr. Kenneth LaSala, KPL Systems, Silver Spring, MD

PACE Report Your Career

IEEE, more than any other engineering society, offers you the opportunity to plan and grow your career professionally as well as technically. Take advantage of it. When I staff a PACE display at a RAMS or IRPS conference, I chat with the attendees and try to learn of their interests. I have a hard time finding much to interest the younger attendees. They seem to be interested primarily in the technical information that IEEE has to offer and are leaving their career planning and development up to their employer. For that matter, the majority of IEEE student members drop their membership when they graduate, and strike off on their own. If we get a chance to talk, I explain that I am much more likely to hire the new graduate whom I have met at a professional meeting and has been an active student member of IEEE.

My other concern is for the 50+ engineer who has left career planning to the employer. Usually, I meet these engineers when they are looking for work. Typically, they don't have a computer and can not access the web. The IEEE provides a lot of help to job hunters, but it is almost all on the web. Don't lose your web access when you loose your job. Better yet, plan ahead and don't lose your job.

Professional Development

The Professional Activities Conference (PACE) in Phoenix this year took a new direction, with emphasis on GOLD (graduates of the last decade) members and professional development. I wish that all of you could have been there. The proceedings are available from the IEEE as "The Balanced Engineer" at \$24.95. My recommendation, however, is the "Engineer's Guide to Lifelong Employability" at \$19.95. The cartoons alone are worth the price. Both books are available from the IEEE-USA at ieeusa@ieee.org. Better yet, see their web page electronic catalog at <http://www.ieee.org/usab>. While you are there, check out Employment Services, PACE Network, Today's Engineer, and Consulting.

Call for Papers

Just another Story Phone problems and The British Phone System, a Root Cause Analysis

It is common practice in England to ring a telephone by signaling extra voltage across one side of the two-wire circuit and ground (earth in England). When the subscriber answers the phone, it switches to the two wire circuit for the conversation. This method allows two parties on the same line to be signaled without disturbing each other.

Anyway, an elderly lady with several pets called to say that her telephone failed to ring when her friends called, and that on the few occasions when it did ring her dog always barked first. The telephone repairman proceeded to the scene, curious to see this psychic dog. He climbed a nearby telephone pole, hooked in his test set, and dialed the subscriber's house. The phone didn't ring. He tried again. The dog barked loudly, followed by a ringing telephone. Climbing down from the pole, the telephone repairman found:

1. A dog was tied to the telephone system's ground post via an iron chain and collar.
2. The dog was receiving 90 volts of signaling voltage.
3. After several such jolts, the dog would start barking and wetting on the ground.
4. The wet ground now completed the circuit and the phone would ring

Which shows you that some problems can be fixed by just "drowning" them.

**Story thanks to:
Professor Marvin Roush
Director,
Reliability Engineering Program
University of Maryland
College Park, MD 20742-2115
Phone: 301-405-7299**

Visit the National Reliability Engineering Information Center at:
<http://www.enre.umd.edu>

Another access to PACE, job hunting, or professional development is from the Reliability Society web site. Follow the links to Jobs, Professional Activities, and the Discussion Forum. If you have questions, you can reach me at

r.gauger@ieee.org or Marsha Abramo (who is also working in PACE now) at mabramo@btvman.vnet.ibm.com.

Bob Gauger,
r.gauger@ieee.org



The New System Reliability Assessment Method

Reliability Analysis Center Report IITRI Project No. A06830, June 1998

The greater part of today's system failure problems is from factors other than parts. This new prediction methodology accounts for these special cause failure drivers. There is a Pareto mix of underlying failure drivers. That is 90% of the problems are caused by 10% of the parts and those problems are largely of a "special cause" nature, eg., design deficiencies, manufacturing problems, requirements shortfalls, etc. These special cause problems can be mitigated using the best development practices. The predicted failure rates are then scaled based upon the developer's actual process capability.

The New System Reliability Assessment Methodology extends prediction technology by:

- Integrating all of the available reliability data to make a prediction. Data fusion or Baysean weighting of the data provides the best overall failure rate estimate along with its associated variance.
- Accounting for the failure rate adders due to software, infant mortality, wear out, and the logistic failure adder due to "no defect found".
- Promoting the best development practices for reliability. These practices were developed and weighted by expert opinion. These scaling weights are then used to scale up or down the development process impact on the base part failure rates.
- Providing flexibility to strike out factors that are not applicable in ap-

plying the model to a particular situation.

- Allowing the developer to add lesson learned factors that reflect his own experience. It thus becomes a repository for reliability "lessons learned". It also allows the developer to add

This methodology will be most valuable for those corporations who don't have a large historical database of component failure rate information to determine appropriate PI-Q levels for their various part families. As we all know there are many things that affect the field failure rate of electronic assemblies, other than the physics of the devices that they are composed of, and this new methodology addresses these areas well. There is a tool, under development, to automate this new prediction method. This tool will make the new reliability assessment method immensely more practical and attractive to practitioners. This tool is due out the first quarter of 1999. I will try your new methodology the next time that I do a hardware reliability prediction. I am interested in comparing the results of your methodology with what we get out of our PI-Q modified version of 217. Our reliability predictions come within +/- 15% of that actually observed in the field. So the comparison will prove interesting.

John G. Kennedy
Storage Technology Corporation

Prime Triangles

As history repeats itself, this subject was probably imagined, researched and studied in depth many millennia ago. It is the description of using integers to describe all three sides of a right triangle. The fact that the sum of the squares of the legs equals the square of the hypotenuse was known prior to the Pythagorean theorem. The theorem provided a formal proof approximately 500 BCE. The general set of triangles is sometimes referred to as Pythagorean Triangles.

Now why are we reviewing this material? It is because I believe reliability engineers are outstanding engineers and can perform almost any type of engineering. They are also excellent mathematicians because of their interest and professional knowledge of mathematics.

Introduction:

This brief study should be both interesting and challenging to the reader. A primary fallacy has been taught for years. It is as we have been told: "There are very few perfect triangles". These only include the 3, 4, 5 triangle and the 5, 12, 13 triangle and a few others. These statements are obviously in error. What is presented here, is nothing new. It has been forgotten over the years. So please read on and you will discover some interesting facts. The first fact (postulated) is that every single number that you can think of can form one leg of a perfect triangle (we will call these prime triangles if they can not be reduced to a smaller set of numbers).

So we have already listed two prime triangles. How about the number six, it is 2 times the 3, 4, 5 triangle. How about 7, it has a solution and so does 8. Here is a list of the first 9 numbers and their associated perfect triangles (not all of these are what I would call prime triangles). Each triangle is described as "a, b, & c", where "a & b" are legs and "c" is the hypotenuse.

1 0 1	6 8 10
2 0 2	7 24 25
3 4 5	8 15 17
4 3 5	9 40 41
5 12 13	

Now that you see the trend, we will look at several things. These include: 1.) What about the special cases, the 1 and 2 triangles, 2.) How about the inverse trian-

gle such as the 4, 3, 5 triangle, and 3.) Other characteristics. All of these will be discussed. Also, these triangles are expandable in that you can go from two dimensional triangles to 3 dimensional triangles, 4 dimensional triangles (whatever they might look like) and on and on.

This brings up the age old concern, how about the cubes of numbers. Are there any solutions. Since this article covers many triangles which are the root sum squared numbers, are there any solutions to cubes of numbers? Or solutions of numbers to the forth power. Well these are also addressed.

But first let's look at the solutions and how they were determined. Now what were the tools that were used? Obviously the concern is the difference of large numbers when the numbers are squared. These tend to provide inaccuracies. Particularly, if the computer can not handle a high level of precision. You do not want to look at very large numbers unless you can be assured that the precision of the computer is sufficient and that you are not dropping any significant figures. I went out to 200 and all numbers look accurate. I have an account on a Cray computer, but I did not want to program it for the accuracy that I would need for large numbers. So I have not converted the program over to run on the Cray. After all we have to leave some work to other people so that they can participate in this problem and its solutions. Therefore I have included the fundamental equations from the computer program. You might want to run this and see what numbers that you can find. Remember high precision is essential, there is no room for even the slightest error. The square of each number has to be within the range of the computer capability.

Now that I have said that we have a series of prime triangles, how far do these numbers go? I honestly believe that they go to infinity. I believe that their is a square solution for every integer up to infinity. I do not intend to prove this supposition, however I believe that the basic equations support this assumption.

Lowest Level Of Triangles:

Now I have looked at the first two numbers because they look different than the 3, 4, 5, etc. triangles. We will look pri-

marily at large angle triangles, i.e. the triangles that make an angle greater than 45 degrees when viewed from the short leg or the first leg to the hypotenuse.

Now we will look at the first set of triangles. The first triangle is the 1,0, 1. This is a trivial case. I contend that it has no direction no height and a magnitude of one. Therefore it is just a scalar with not even one degree of freedom just with a magnitude of 1. Now the next triangle that we will look at is the 2, 0, 2 triangle. This is also a trivial case. I believe it is a triangle with one degree of freedom and a magnitude of 2. It still has zero height, but now we are looking at a vector pointing along one of the cardinal directions and with a magnitude of 2 (or 1 normalized). This vector could go negative also. The hypotenuse is always a positive number since it represents the scalar distance between the two vector legs of the triangle.

Fundamental Triangles

Once we get to the number 3, we see that we have a 3, 4, 5 triangle. This is a large angle triangle and it is duplicated four times around a given coordinate system. Two triangles are defined as $x= 3$ and $Y= +/- 4$. the other two are $x= -3$ and $Y= +/- 4$.

Once we get to the number 4 set of triangles (4, 3, 5), this is considered a small angle triangle. You can say this is not a prime triangle, but I contend that this is the first prime triangle. This triangle will describe a set of eight triangles as four small angle triangles and 4 large angle triangles. All prime triangles should describe 8 triangles in a Cartesian coordinate system. This holds true for the 5, 12, 13 triangle and all of the other prime triangles that are listed.

Now what about the number 6 triangle. Six is just 2 times the value of the 3, 4, 5 triangle, therefore 6 is not a prime triangle. You can multiply a prime triangle times any value (2, 3, 4 ..), but obviously you will not obtain another prime triangle. You must use the lowest common denominator to define a prime triangle.

Prime Triangles:

So now we will restrict our prime triangle list to those values that truly describe large angle prime triangles based

on the limits and restrictions that we have just described. The following table lists the legitimate prime triangles up the base number 27.

3 4 5	19 180 181
5 12 13	20 21 29
7 24 25	20 99 101
8 15 17	21 220 221
9 40 41	23 264 265
11 60 61	24 143 145
12 35 37	25 312 313
13 84 85	27 364 365
15 112 113	49 1200 1201
16 63 65	200 609 641
17 144 145	200 9999 10001

As you can see there are fewer prime triangles and some have multiple sets of primes and maybe more. Like number twenty and 200 above, each have two prime triangles. Also, it would probably be more appropriate to start the list with the 4, 3, 5 triangle, since it forms 8 triangles, but the 3, 4, 5 triangle came out of my computer program (nothing is perfect). I have included some larger triangles just to provide checkpoints if you become more interested in this subject.

Another comment is: What have we removed? We have removed all of the trivial cases, all of the duplicate cases and all of the cases that include zero. Obviously zero is always a solution for any number. The remaining numbers provide truly prime triangles. There are a lot of them. These can not be reduced any further.

Multidimension Triangles:

Now we will look at going from a 2 dimensional triangle to a three dimensional triangle. We will just show this by an example. If you take the 3, 4, 5 triangle and replace the hypotenuse 5 with the 5 from the 5, 12, 13 triangle, you obtain a 3 dimensional triangle 3, 4, 12, 13. The 3 is on the x-axis, 4 is on the y-axis and 12 is on the z-axis. The value 13 is the hypotenuse and the value 5 has disappeared. The obvious equation that is solved here is $x^2 + y^2 + z^2 = h^2$ This can be further extended by taking the 13, 84, 85 triangle and making a 4 DOF triangle (whatever it may look like) which is 3, 4, 12, 84, 85. Therefore these integer triangles are multiple dimensioned.

3, 4, 5 + 5, 12, 13 = 3, 4, 5, 12
(3D triangle)

This study provides information for forming ratios and indeterminate proportions. The fact that there are many of prime triangles is contrary to the common statement that these triangles are a rarity. A statement, that has been written in many books and taught over the recent centuries. There is no reason to believe that there is a limit to how large the numbers can go before the prime triangle effect ceases. Now lets regroup. What have we learned? We have learned that there are many prime triangles just like there are many prime numbers. However, prime numbers are only one-dimensional at best. These prime triangles are N dimensional and they can start with any root triangle or any root prime number that you like.

Fermat's Last Theorem:

Can we apply this analysis to cube (triangles) like $x^3 + y^3 = h^3$. The answer is "you can try". I have tried with very little success. You would think that this set of equations and techniques could be used for any powers of triangles and they can. However, I programmed for the cube and ran the analysis and only determined one set of numbers. These are 1, -1, 0 and multiples of this con-

figuration (2, -2, 0, etc.). The corollary is also true. That 1, 0, 1 is also a solution and multiples of this. These trite solutions are basically meaningless other than they are considered to be scalar solutions and not vector solutions. The 1, 0, 1 could be a vector solution of zero height or a 1 DOF solution. They do not form the 2, 3 or 4 dimensions that we saw in the prime triangles. So this does not conclusively prove Fermat's last theorem but it does not disprove it either. The intention of this study was not to disprove the theorem. Although it would have been satisfying to find just one solution to $x^3 + y^3 = h^3$. Turn on your computer folks and see how far you can go before you run out of computer availability time or need your computer for useful work like word processing.

Original Material:

I would like feedback from anyone if they can show where this analysis might have occurred in writing before. I have searched the Web and found very little on this subject. Surly some of our finer mathematicians can give us some insight. We will share the information in some future edition of the newsletter. However our space is limited, so only the outstanding replies will be identified. We want both positive and negative feedback so please

respond. You might want to look at: "<http://www.mathematik.uni-bielefeld.de/~sillke/PROBLEMS/lucas-lehmer>" for a select subset of my study.

Basic Equations:

The equations used and the program limits are listed below:

```
25 PRINT #1, "BY DICK DOYLE - SEP 1998"
40 PRINT #1,
200 Y = (X ^ 2 - N ^ 2) / (2 * N)
210 R = Y - INT(Y)
220 IF ABS(R) < .00001 THEN GOSUB 1030
230 REM == FOR ALL N'S BETWEEN 1 AND X ==
1112 PRINT #1, "TRIANGLE LEGS AND HYPOTENUSE "; X; Y; Y + N
1350 REM == FILTER DUPLICATE TRIANGLES ==
1362 REM == DIVIDE BY PRIME NOS. ==
```

For a copy of the program, please Email me at r.doyle@ieee.org

THANK YOU!
Dick Doyle, Jr.
Past President
Reliability Society

Conference Calendar

Preliminary Announcement International Conference on Modeling and Simulation of Microsystems MSM 99

San Juan Marriott &
Stellaris Casino
Puerto Rico, U.S.A.
April 19-21, 1999

An Interdisciplinary Integrative Forum on Modeling, Simulation and Scientific Computing in the Microelectronic, Semiconductor, Sensors, Materials and Biotechnology fields.

Sponsored By: the IEEE Electron Devices Society, Motorola, Swiss Fed-

eral Institute of Technology of Lausanne, International Association of Mathematical and Computer Modelling, Applied Computational Research Society, TIMA-CMP Laboratory, France, ISTECH, Microcosm, Inc., Molecular Simulation, Inc.

MSM is the arena for advancing computational high technology by providing an evolving foundation for applied modeling, simulation and scientific computing. MSM emphasizes an interdisciplinary approach to computational sciences research, ad-

ressing issues of mutual interest and encouraging bridges between adjacent specialties. The primary goal of this conference is to bring together researchers, designers, programmers and vendors involved in microsystem developments (semiconductor, sensors, materials, and biotechnology) to facilitate cross fertilization of ideas and exchange of information.

The scheduled key note lectures, will be Dr. Len Borucki of Motorola, USA; Dr. Heather B. Dussault of DARPA/ETO, USA; Prof. Michael G.

Pecht of the University of Maryland, USA; Prof. Jean-Louis Sanchez of ULAAS/CNRS, Toulouse, France; Prof. Gerhard Wachutka of the Technical Univ. of Munich, Germany; Prof. Jacob White of the Massachusetts Inst. of Technology

A full day workshop covering Computation Initiatives in Biotechnology will be presented. The workshop will explore current and emerging computational research opportunities within the biotechnology and bioscience areas. The chair, Is Dirk Bussiere, Abbott Laboratories, the topics include: Computational Structural Biology
Computational Genomics and Bioinformatics
Computational Protein Engineering
Computational Chemistry for Rational Drug Design and Discovery

Special Sessions:

Computational Methods for Microfluidics

Chair: Narayan Aluru - Univ. of Illinois Urbana-Champaign

DNA Chip Technology

Chair: Bruce Eichinger - Molecular Simulations, Inc.

System-Level Modeling and Simulation of MEMS

Chair: Gary K. Fedder - Carnegie Mellon University

Computational Extraction of Compact Model Parameters for ULSI and MEMS

Chair: Jan G. Korvink - Univ. of Freiburg, Germany

Silicon Front-End Technology: Computational Materials Modeling and Simulation

Chair: Mike Masquelier - Motorola Modeling and Simulation of Quantum Devices and Systems

Chair: Dragica Vasileska - Arizona State University

MSM Topics and Application Areas

The conference provides a forum for analyses and discussions about how to develop interdependent software packages, how to establish interfaces and cooperation strategies and how to deploy simulation methods progressing towards efficient modeling of complete microsystems. The following non-exclusive list includes the main Topics and Application Areas that help in the progression towards the stated objectives:

TOPICS: Mathematical Modeling and Scaling Laws, Numerical Methods, Finite and Boundary Element Methods, Process, Device and Circuit Simulation, Model Calibration and Validation, Equipment

Modeling, Computational Materials, Combinatorial Chemistry, Atomistics and Molecular Simulation, Computational Genomics and Bioinformatics, Co-simulation and Optimization, System and Multi-level Modeling, Artificial Intelligence and Expert Systems, Virtual Reality and Computer Vision, Data Bases, Data Exchange and Translators

APPLICATION AREAS: Semiconductors and Microelectronics, Advanced Packaging and Interconnects, Micro Electro Mechanical Systems, Smart Sensors and Structures, Advanced Lithography and Photonics, Metrology, Microfluidic Systems, Biotechnology and Structural Biology, DNA Chip Technology, Environmental Monitoring, Manufacturing and Scheduling, CAD/CAE/CAM

Please check the WWW sites for more information concerning registration, lodging, and abstracts.

USA:

<http://www.iamcm.org/MSM99>

Europe:

<http://dmtwww.epfl.ch/MSM99>

USA:

<http://www.iamcm.org/MSM99>

Europe:

<http://dmtwww.epfl.ch/MSM99>

IEEE Educational Activities Video

Concurrent Engineering Perspectives: Concepts to Success

Presented by Dr. Samuel Keene, Performance Technology; Nick Krull, Storage Technology Corp.; and Donald Reinertsen, Reinertsen and Associates; Dennis Hoffman, Texas Instruments, Systems Group, served as technical editor

Sponsored by the IEEE Reliability Society and IEEE Educational Activities

Concurrent engineering is a synergistic approach to product development in a process-oriented engineering environment. Concepts and methods are introduced that will help you avoid pitfalls and speed your robust products to the marketplace. In this

video, you'll learn about these high impact development concepts and methods, currently in practice within industry today. Top experts in concurrent engineering have designed this course to deliver practical information in a way that will enable you to apply these techniques immediately. This video will help you realize shorter product development cycle times, make speedier program decisions, maintain program focus, and keep diversions at bay.

Presented by: Dr. Samuel Keene, a Fellow of IEEE with broad industrial experience, is extensively published and is an

international presenter and consultant in the fields of improved development, assurance, and product optimization strategies.

Nick Krull is an Advisory Engineer at StorageTek Corp. Nick shares his first hand experiences on the IBM Proprinter development team. This IBM team reduced manufacturing time from 30 minutes to 2 minutes, increased reliability fourfold, and reduced parts count by 50%.

Don Reinertsen is President of Reinertsen & Associates, a consulting firm specializing in product development process, management effectiveness, and

efficiencies. He is the co-author of the successful book, *Developing Products in Half the Time*, which has sold over 50,000 copies.

From this video you will learn ...

- Concepts of concurrent engineering for Integrated Product Development (IPD)
- Development tools that save both time and project resources
- How to assure timely consideration of Life Cycle Cost (LCC) factors
- Design for Manufacturability (DFM) and affordability practices
- How to promote state-of-the-art breakthroughs in your products
- Product development "lessons learned" that you can apply immediately

Recorded: 1996

2 Hrs. 40 Min.

List Price: \$449.00 Member Price:

\$399.00

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From the Editor

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May you all be able to help the Reliability Society in its activities and my it be rewarding to each of you.

Sincerely,
Dick Doyle
Junior Past President,
IEEE Reliability Society

Dave Franklin
Editor

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