IEEE

Reliability Society Newsletter

rs: Gary Kushner and Mark Snyder
34, No. 4, October 1988 (USPS 460-200)

3

Chapter News

Cleveland Chapter

The Cleveland Chapter is getting organized for the '88–'89 activities. Our Chapter officers are

Chairman: V. R. Lalli, NASA LeRC
Vice-Chairman: A. M. Peabody, John Fluke, Inc.
Secretary: Prof. C. W. Thomas, Case Institute of Technology

A proposed schedule of activities are:

Date	Topic	Coordinator
10-20-88	Biomedical	Roland
11-17-88	Measurements	Svransky
3-16-89	Aerospace	Gaul
4-20-89	Reliability	McNamee
5-18-89	Electronics	Newman

A special project is being discussed with the Cleveland Section and IES ADCOM–Space Station Workshop. A motion has been made for our chapter to hold the workshop in July, 1989.

We are also working on a reliability Home Study Course for HDs. This is a Membership Development Activity for RS.

Here in Cleveland we are having fun serving our members and looking forward to another interesting year.

Boston Chapter

"Reliability Data Exchange" was the topic of the September monthly meeting. Gary Kushner, a Principal Reliability Engineer at Digital Equipment Corporation and co-editor of this newsletter, described how the current proliferation of technology and increasing use of personal computers have allowed reliability professionals to amass ever increasing databases for collecting data relevant to the field. Gary emphasized the need to foster greater communication and decrease redundant efforts in collecting such data. He presented an over view of the Boston Section Reliability Chapter's initiative to establish a reliability data exchange and introduced two offerings resulting from the initiative: 'Piece Part Derating Criteria' and 'Integrated Circuit Reliability Parameters'. Questions from the audience generated discussions among the attendees.

The social hour and dinner were held at the Hanscom Air Force Base Officers' Club in Lexington, MA. The approximately 50 attendees were treated to a well-prepared meal prior to Gary's talk. Thanks go to Gary for an informative evening.

This month we are looking forward to the start of our Fall Lecture Series on "Reliability Testing." The lecture series dates are October 26, November 2, 9, and 16, and the location is Prime Park in Natick, MA. A different speaker will be presenting on each of the evenings. The topics include Reliability Growth Testing, Environmental Stress Screening, and Reliability Qualification Testing per Mil-Standards-781C and 781D. The speakers presenting these topics will be, respectively, Dr. Larry H. Crow, Supervisor Reliability Methods Group, AT&T Bell Laboratories; James E. (Gene) Bridgers, Quality Assurance Consulting Engineer, Codex Corporation; and Michael Johnson, Consultant, Reliability Engineering of Lexington.

There has been a good response to this lecture series offering. If you would like to attend and have not already registered or would like further information, please contact Don Simpson at (508) 671-5469. Remember space is limited, so hurry and sign-up!

These are just two of this year's activities. There are other monthly meetings on the horizon and our Annual Spring Seminar in April. I hope to see many of our local members at these events. Highlights of those activities will appear in future editions of the Newsletter.

Denver Chapter

The Denver Chapter has developed a technical committee on software reliability. Most of our members participate in this committee. This software reliability committee meets monthly for a half-day. The first two meetings were hosted by U.S. West. The latest meeting, held July 29, was at the Boulder, CO., IBM facility. The committee has adopted Musa's book on Software Reliability as our standard.

We have had John Musa speak to our group. Mr. Mike Dyer, who helped found the "clean room" concept will address our group this Fall. Committee attendees come from along the front range including IBM, Martin, Ball, Dec, HP, U.S. West, Woodard Governor, Tandem, and others. Looks like a topical area of great interest to Reliabilty people.

RS Newsletter Inputs

All RS Newsletter inputs should be sent to one of the associate editors, **Gary Kushner,** 499 Brigham St., Marlboro, MA 01752, or **Mark Snyder,** Digital Equipment Corporation, 24 Porter Road (LJ01/C2), Littleton, MA 01460, per the following schedule:

For October Newsletter:	by July 15
For January Newsletter:	by Oct. 15
For April Newsletter:	by Jan. 15
For July Newsletter:	by Apr. 15

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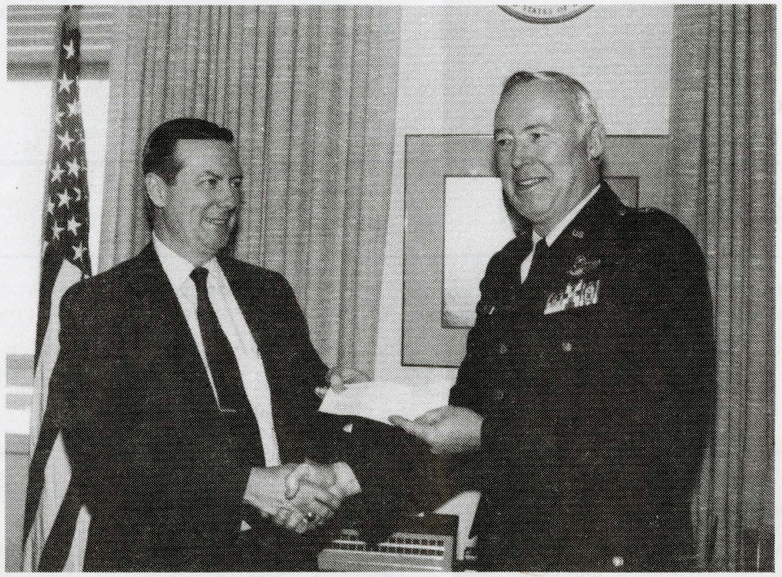
President's Note

The Reliability Society is pleased to inform you that a second year of issues from the *Journal of Manufacturing Technology* will be provided to all R-7 members, compliments of the Society. At the end of the second year, each member will be given the opportunity to continue receiving the journal at the regular subscription rate.

T. J. Fagan

Reliability Workshop — Air Force Scholar Program



IEEE Reliability Society President Tom Fagan presents a $20,000 donation to Brigadier General Frank Goodell, US Air Force Special Assistant for Reliability and Maintainability, for the sponsorship of five Electrical Engineering Professors, Design Engineering, at the AF Scholar Program, Reliability Workshop, held this summer at the Air Force Institute of Technology, Wright Patterson Air Force Base, Dayton, OH. Each professor will take practical examples of R&M in the design process back to their engineering design curriculum. Brief write-ups of their experiences will be published in future issues of the Newsletter or at local Group Chapter meetings.

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

incorporated

1989 INTERNATIONAL RELIABILITY PHYSICS SYMPOSIUM

April 11-13 1989 • Hyatt Regency • Phoenix, Arizona

CALL FOR PAPERS

The 27th Annual Symposium, co-sponsored by the IEEE Reliability Society and the Electron Devices Society, has as its major theme, building-in and validating reliability for present and developing VLSI and hybrid technologies.

YOUR PAPERS ARE SOLICITED on the following subjects:

- VLSI Package Design and Construction for High Reliability
- Building-In Reliability: Design and Process Control for Si and GaAs
  - Designing circuits, multi-chip assemblies, and subsystems
  - Materials selection and control; epoxy adhesives
  - Process design and control; computer-integrated manufacturing
  - Packaging (bonding, die and substrate attachment, coating, encapsulation, sealing, glass-metal seals)
- Analysis for Reliability
  - Failure analysis techniques (new, advanced, simplified)
  - Failure mechanisms and models, for example:
    - electrostatic discharge
    - hot carrier effect
    - electromigration
    - oxide breakdown
    - contact degradation & corrosion
    - surface mount
    - packages
    - mechanical and thermal stress
- Methodologies
  - Wafer-level controls
  - Accelerated stress tests
  - Test combinations
  - Statistical process control
  - Screening
  - Field failure mechanisms
  - Burn in effectiveness and strategy
  - Analytical instruments and techniques

ABSTRACT AND SUMMARY SUBMISSION

DEADLINE, OCTOBER 9, 1988

Submit a one-page, 50-word abstract, and a two-page, single spaced, camera-ready summary of your previously unpublished work suitable for a 20-minute presentation. The submission must state clearly (1) the purpose of the work, (2) why it is important, and (3) the specific results of the investigation.

The two-page summary may contain figures but no photographs. Include title of the paper, name and affiliation of author(s), complete return address, and telephone number at the top of the abstract and first summary pages. The paper title and authors name should be at the top of the second summary page. Use 8 1/2 by 11 inch paper.

Mail abstract and summary to:

Patrick E. Kennedy, Technical Program Chairman
1989 International Reliability Physics Symposium
Hughes Aircraft Co.
PO Box 3310 B675-A122
Fullerton, CA 92634
Tel. 714-441-9003

OTHER SUBMISSIONS AND CONDITIONS

Final camera-ready manuscripts must be submitted by February 24, 1989 in order that they be included in the Proceedings.

The Symposium papers will be submitted for publication review, and if accepted, will appear in a new and special Reliability Section of the **IEEE Transactions on Electron Devices.**

Submissions may be used for publicity purposes and portions may be quoted in magazine articles publicizing the Symposium.

Authors of accepted papers will be required to submit their slides for review to insure quality before March 4, 1989.

LATE PAPERS: A limited number of late papers reflecting important, last-minute developments will be considered on a space available basis. Deadline for these submissions is February 3, 1989.

For general conference information contact:

Bruce Euzent
General Chairman, 1989 IRPS
Intel Corp.
2250 Mission College Blvd.
SC9-06
P.O. Box 58125
Santa Clara, CA 95052-8125
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SYMPOSIUM FEATURES

- Proceedings at Symposium
- Tutorials and Workshops
- Hands-on, one-one-one, analytical equipment demonstrations.
- Awards Presentations
- Authors corners and attendee lounge for discussions

16th Inter-ram

INTERNATIONAL · RELIABILITY · AVAILABILITY · MAINTAINABILITY
Conference for the Electric Power Industry

May 29 – June 1, 1989 Monterey, California

CALL FOR PAPERS

RAM - Solutions for the Competitive 90's

THE CONFERENCE THEME

The theme emphasizes practical applications of RAM techniques in operating, maintaining, improving, upgrading and extending the life of existing production and delivery systems. It reflects increasing concerns with a future of moderate and uncertain growth, limited resources, complex regulatory requirements, and increasing public involvement and competition as considerations for system operations.

The present situation has also resulted in an increased emphasis and stress on delivery systems. Therefore, in addition to transmission and generation, specific sessions dealing with maintaining and improving distribution systems are planned.

AUDIENCE

Managers, Engineers and other professionals in operation, maintenance, training, design, manufacture and research related to transmission, distribution and generation of electricity. This conference will attract those who are concerned with improving utility operations through RAM input to the decision process.

LOCATION

The Doubletree Inn in Monterey, California, and the adjoining Monterey Conference Center will provide a modern and effective environment for the meetings. The natural beauty of the Monterey Peninsula will provide a spectacular background.

PAPERS

Papers submitted should be consistent with the theme of the Conference. They should discuss practical RAM techniques which have been successfully applied to enhance system performance. In particular, papers dealing with specific case histories are welcome.

ABSTRACTS - Due October 1, 1988.

A 250 word abstract in English must be forwarded to the Conference Technical Program Chairman, as listed below.

Abstracts should be structured with the following three sections: problem or questions addressed; work performed; and results and/or conclusions reached. Abstracts should be typed on a single sheet and should include the title; names and affiliations of all authors; address and telephone number of presenting author; and a list of 5 key words. A short (150 word) professional biography for each of the authors should accompany the abstract, and the presenter should be identified.

The selection results will be transmitted to the authors by December 1, 1989. Completed papers of 4000 words or less will be required by February 15, 1989.

SESSIONS

Papers will be organized into parallel sessions on:

Tranmission
Distribution
Fossil and Hydraulic Generation
Nuclear Generation

EXHIBITS

Arrangements are being made for an exhibition to be held during the conference in the conference hotel. Industrial, Technological and Educational exhibits will be welcome. Intending exhibitors are encouraged to make arrangements as soon as possible.

To present a paper, send abstract to:

Mr. Roy R. Fray
Technical Program Chairman
SAIC
Suite 1250
160 Spear Street
San Francisco, CA 94105

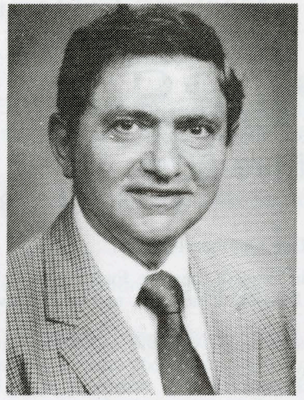
To receive a program and registration information, contact:

Mr. Robert W. Filipovits
General Vice Chairman
Pennsylvania Power & Light
P.O. Box 3328
Wescosville, PA 18106

For information about exhibit space, contact:

Mr. Felmir Singson
Arrangements Chairman
Mechanical and Nuclear Engineering Department
Pacific Gas and Electric Co.
77 Beale Street
San Francisco, CA 94106

1988 Candidate for Division VI Director



Demetrius T. Paris
Georgia Institute of Technology

IEEE Activities (M'59-SM'64-F'75)

COMMITTEE/BOARDS: Awards Board, 1983–84; Basic Sciences Committee; Educational Activities Board, 1977–79, 1981–84, 1986; IEEE Fellow Committee, 1980–82; Fortescue Fellowship Subcommittee, 1973–75; Intersociety Relations Committee, 1973–75.
REGIONS: Region 3, Area 3 Chairman, 1972–74.
SECTIONS: Atlanta, Chairman, 1968–69, Vice Chairman, 1967–68, Secretary, 1966–67.
SOCIETIES: Education: President, 1986; Vice President, 1984–85; AdCom, 1973–79, 1980–82; Fellow Committee Chairman, 1976–79; Transactions on Education Editor, 1976–79. Antennas and Propagation: AdCom, 1975–77.
CONFERENCES: Frontiers in Education Conference, General Chairman, 1975. MIDCON, Board of Directors, 1977–78. International Symposium on Antennas and Propagation and USNC/URSI Meeting, General Chairman, 1974. SOUTHCON, Board of Directors, 1979–83, 1984–88.
REPRESENTATIVE: ABET Evaluator, 1968–73, 1985–88.
CURRENT SOCIETY MEMBERSHIPS: Antennas & Propagation, Microwave Theory and Techniques, Education.

Statement of Position

Societies are the cornerstones of the IEEE. Division VI is broadly based, encompassing engineering and the human environment. I am enthusiastic about this Division's future, and I believe that effective management can have a significant impact on its general health and welfare.

While technical activities form the foundation of the IEEE, they must be balanced by a sensitivity to the attendant educational, professional, and social issues. As Division Director, I would strive to maximize access to decision-making levels and to foster effective communication among the Societies. I would vigorously represent the Division's interests on the Board of Directors and promote fiscal responsibility.

Thank you for your kind consideration and support.

Conference Calendar

DATE	CONFERENCE	PLACE	CONTACT
1988			
Oct. 10–12	Reliability in Power, Transport, and Process Control	Vasteras, Sweden	Dinna Ahlin Vattenfall AED/4 S-162-87 Vallingby, Sweden
Dec. 12–14	IASTED Int'l Conf. Quality Control and Reliability	Los Angeles, CA	QR Los Angeles IASTED Secretariat P.O. Box 25 STN. G., Calgary Alberta, Canada T3A 2G1
1989			
Jan. 26–28	Annual Reliability and Maintainability Symposium	Atlanta, GA	Richard Sackett RAMS Program Chairman ERC International 1725 Jefferson Davis Hwy. Suite 300 Arlington, VA 22202 USA
March 13–14	IEEE International Conference on Microelectronic Test Structures	Edinburgh, Scotland	A. J. Walton Edinburgh Microfabrication Department of Electrical Engineering Kings Building University of Edinburgh Edinburgh, EH9 3JL. UK Tel: 031 667 1081 x3261 FAX: 031 662 4358
Sept. 26–29	V International Conference on Performance Evaluation, Reliability and Exploitation of Computer Systems, Relcomex '89	Ksiaz Castle, Poland	Relomex '89 Institute of Engineering Cybernetics Wroclaw Technical Univ. Janiszewskiego Str. 11–17 50-372 Wroclaw, Poland Prof. Wojciech Zamojski (Tel. 21-26-77) Dr. Ireneusz Jozwiak (Tel. 20-28-23) Telex 0712254 PWR PL 0712559 PWR PL
Nov. 7–10	Physical and Failure Analysis of Integrated Circuits	Singapore	The Secretariat IPFA Symposium Communication Int'l Associate Pte. Ltd. 450 Alexandria RD #10–00 Inchcape House Singapore 0511

Author! Author!

by

Anthony Coppola

A rule of journalism is to discuss the "who, why, what, where, when, and how" of the subject. The subject of this article is technical writing, and the theme is that the "who" is you.

Yes, you. You cannot be doing engineering work without learning something worth publishing. Don't hide your light under a bushel. It is really not difficult to break into print. Writing for publication requires some skill and procedural knowledge and does take effort. The skills come with practice, and there is plenty of help available ranging from spelling check programs for your word processor to the advice of your editors. This article will provide will some procedural knowledge. The effort is strictly up to you.

So why should you make the effort? Publication can increase your prestige, salary, and/or professional satisfaction. One article probably won't make you a vice-president, but when the annual salary review comes around (or a reduction in force) wouldn't it be nice to have some publication credits attesting to your worth. In some places, notably academia, "publish or perish" is an unwritten law. Even companies whose main concern is pushing black boxes out the door like to have their people, and their company name, prominent in the literature. Some even reward publications with cash awards. A self-employed consultant can make good use of the credentials provided by his publications. Although other factors may be more important, getting published has to be a plus for your career. There are occasionally some other practical benefits. For example, when travel funds are tight the management may balk at sending you to an interesting technical conference, unless you happen to be one of the authors of the papers presented.

There are also various intangible benefits to a writer. Seeing one's name in print in a widely read publication can be a great ego trip. On a more lofty plane, there can be a great satisfaction in providing your profession with a worthwhile contribution, especially when you see someone else actually putting it to use. And some people simply enjoy the act of creating a piece of literature; for all its commercial uses, writing is still a form of art.

Now that you're fired with enthusiasm, let's consider the "what" of your writing. What do you write about? The answer is anything that your readers would find interesting. Since our focus is technical writing, we won't consider romance and overt science fiction. Most of your writing should be aimed at providing information useful to a practioner in your field. Ask yourself the question: What do I know that could be of benefit to someone else? Have you found a better technique (e.g., a burn-in environment that finds more defects than the usual method)? Have some data (e.g., a tabulation of failure mechanisms found in a new device)? Developed a better way of managing your project (e.g., a check list, PC program, or cost estimating relationship)? Have a new product of interest (from a technical viewpoint; your sales department will do the advertising)?

Although practical information is the bread and butter of the technical literature, well written topical humor always has a market. Some of the most prestigious technical journals have run humorous items. Besides entertainment, humor can be an effective method of conveying useful advice. This type of writing, however, may require a certain talent.

You will have to avoid publishing any classified or export controlled information unless your target publication can accommodate a restricted access (e.g., the proceedings of a controlled conference). You also must not compromise your company's proprietary information. They may not appreciate the publication of, for example, their method of making a material no one else can yet manufacture. However, a paper on the technical characteristics of the material, showing its advantages, should delight the management. Most organizations have procedures for reviewing papers written by their employees. If in doubt, discuss your idea with you reviewer before making a commitment.

The "where" and "when" of publication include a wide range of options. The following paragraphs will describe various markets for technical literature. What you have to offer and your own desires will determine which you should select as a target. Once you select your target, you'll have to comply with its procedures and desires.

Every field has its prestige publications. These include the IEEE Transactions and a host of specialized journals. They are often filled with academic dissertations and esoteric mathematical derivations, mostly because that is what the editor receives for consideration. Academics living by the "publish or perish" rule submit more manuscripts than the potential authors of more practical material who either don't write it or prefer another market. Be assured that the editors give the same consideration to down to earth technical observations as they do to lofty theory. the IEEE TRANSACTIONS ON RELIABILITY, for example, has published a comparison of observed results of rapid temperature cycling versus sustained high temperature as a burn-in environment, as well as papers on the use of Lagrange multipliers in reliability modeling. What makes these publications so highly respected is not the predominantly theoretical tone of their content, but the care with which they review the accuracy of the material. Material submitted will be reviewed by technical specialists and their comments discussed with the authors. This review process results in a long delay between submission and publication, and quite likely some revisions. Unless your paper has been invited for a scheduled special issue, there will be little or no pressure to meet a deadline. Authors receive a free copy of the issue which includes their article. No other payment is received; in fact, many journals will request your company pay a page charge to help defray printing costs.

The more general trade journals and magazines, including *IEEE Spectrum,* have different priorities. Many articles are written by staff members or by assignment to recognized authorities. However, an unsolicited manuscript has a good chance of acceptance if it is on a topic the readers of the publication should find intersting. Examine the publication and ask yourself if your subject, and your treatment of it, seem to fit. If not, find another market or revise your approach. Topics selected will generally be of wide interest, and more "newsy" than scholarly. Once a piece is scheduled for a specific issue, deadlines become a critical concern. If you have a paper accepted, expect some follow-up work with short due dates. The paper will be reviewed and the editor may request revisions. He will ask you to read galley proofs to assure correctness. Though not customary, some journals may be willing to pay for an article on a hot topic. If you think you are enough of an authority on some burning issue, you can try writing for pay. Be sure the publication understands that you are expecting payment. You can borrow a procedure used by free-lance writers and send a query letter rather than a manuscript. This should outline your proposed article, show why you are qualified to write it, and offer it "on speculation" (i.e., if they don't like it, they don't buy it). You cn ask them to include in their reply what they would be willing to pay for a successful manuscript.

The easiest market for a technical writer is a newsletter. This includes company newsletters, as well as professional society products. Their editors are always short of interesting original material, and submissions can range from a two-line announcement to a full technical paper. Reviews are minimal and there is little or no deadline pressure. There is, however, a lead time you must consider if you want your item in a specific issue. Hence, if you need some encouragement to start writing, use a newsletter article to break the ice. This is not, however, to suggest that you should consider the newsletter with less respect than the other outlets. Remember that every publication has an intended audience and your submission must be of interest to the reader, or it will not get past the editor. Also, note that a newsletter is an excellent channel of communication to its specific audience, and for this reason alone may be your preferred outlet for technical information pertinent to that audience.

Symposium Proceedings are an important market for technical writing, with some unique characteristics. First of all, the author is expected to make a speech at the symposium, which requires he be willing to speak before a large audience, and calls upon another whole set of skills. In preparing the written paper, the symposium author must not only meet the technical focus of the symposium, but a series of deadlines. The first deadline is established by the symposium call for papers which will generally ask prospective authors to submit abstracts of their proposed papers. Hence, if the writer wants to participate in a specific symposium, he should make sure he gets the call for papers in time to respond. If his abstract is accepted, he will be given more deadlines. Symposiums often attempt to referee papers, and authors may be requested to provide drafts for review. The final submission often must be typed on special format paper provided by the symposium. The publication schedule must be observed, especially when the Proceedings are to be available at the symposium. Other deadlines may be established for review of the presentation slides and the author's company may require him to dry run his oral presentation. In compensation for all this required activity, the author will get to hear many (presumably interesting) speeches by the other presenters, be surrounded by people with kindred professional interests, and attend the symposium (which is usually held in a pleasant locale) at company expense. Some symposia do not charge their authors a registration fee, and some offer discounts to participants.

Part of the "how" of writing, the mechanics of manuscript preparation and format conventions, are often dictated by the publication involved. Most journals and symposiums provide "instructions to authors" which must be followed. If not otherwide instructed, submit a neatly typed, double spaced manuscript. Proofread it carefully before you send it out. If you want a rejected piece returned (e.g., when submitting on speculation), enclose a stamped, self-addressed envelope big enough to hold it. Keep a copy of anything you send out. Things do get lost.

More important thn the mechanics of the manuscript is its clarity. Before you beging writing, prepare a logical outline for the paper and then follow it. Consider your audience and write the same words you would use if you were speaking to them. Remember, the whole point is to convey information. Simple words are better than polysyllabic representations. Avoid Jargon unless all your audience speaks it. If you must use an acronym, spell it out the first time you use it (at least). When your first draft is complete, ask yourself how well it conveys the information you want to share. Revise it until you convinced it does the job sell. Don't send it out unless you are proud of it.

All this information is intended to help the potential technical writer (you) get started. Once you begin writing, it gets easier. Your writing skills will improve with every piece you produce, and, as you become known as a writer, the publications will start asking you for articles. However, you'll never earn a reputation unless you get started, so fire up that word processor and start enriching the literature.

1989 ANNUAL RELIABILITY AND MAINTAINABILITY SYMPOSIUM

R&M—Sharpening the Competitive Edge

In today's economic environment, the manufactured product must meet all the customer's expectations if the product's maker and distributor are to retain or increase their share of the market. The need for cost-effective innovations and techniques to assure a high quality product that is reliable and maintainable has never before been so essential. Just meeting the standard engineering and manufacturing requirements will not provide the competitive edge so acutely needed today. The assurance sciences managers and engineers can sharpen the competitive edge by providing concrete, realistic input to their organization's strategic plans and implementation activities, input that has the potential leverage for achieving competitive value and customer satisfaction. Recognition of the need for cost-effective R&M techniques and the need to consider both the customer's and company's viewpoints is the basis for the theme of the 1989 Reliability and Maintainability Symposium: "R&M—Sharpening the Competitive Edge."

1989 ANNUAL RELIABILITY AND MAINTAINABILITY SYMPOSIUM
to be held at the

PEACHTREE PLAZA HOTEL ATLANTA, GEORGIA USA 1989 JANUARY 26-28

Because the Symposium is the major forum for addressing the issues facing the Assurance Technologies, your presentation of a significant paper will benefit your colleagues, your profession, and you.

Papers in the following areas are planned:

TECHNOLOGY

CAD/CAM/CAT/CALS
Robotics
Design to Life Cycle Cost
Design for Supportability
Modeling/Simulation/Methods
Software R&M
Test/Demonstration
Reliability Growth
Screening
Failure Analysis
Built-in Test
Hazard Analysis
Fault Trees
Self Repair
Error Correction Code

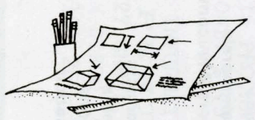
MANAGEMENT

System Effectiveness
CAD/CAM/CAT/CALS
Robotics
R&M Contracting & Management
R&M Requirements
Risk Management
Data Base Management
R&M Cost Benefit Tradeoffs
Design to Life Cycle Cost
Testing Effectiveness
Warranties/Guarantees
Logistics Support
International Programs
Reliability Growth Management

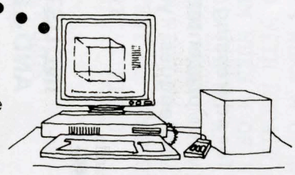
INDUSTRY APPLICATIONS AND LESSONS LEARNED

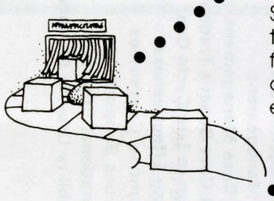
Aerospace & Defense
Power & Other Utilities
Oil & Other Resource Suppliers
Mechanical/Structures
Transportation
Microelectronics
Computers/Peripherals
Microprocessors/Minicomputers
Robotics
Software
Consumer Products
Medical Systems
Communications
Office Automation

SEA Software Previews Profitability



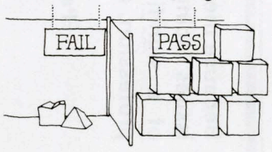
SEA Software Previews Profitability
Computer-aided engineering (CAE) software from SEA allows you to preview reliability, maintainability, and support costs during the design and development process. Using SEA's fully integrated, menu-driven approach, you can quickly and easily see how subtle design decisions affect warranty and service costs for the life of your product. SEA's software shows how prudent design enhancement can optimize product reliability, maintenance strategies, spares inventories, support costs, and, most importantly, profitability.

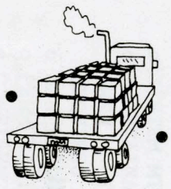




Preview While You Design
SEA's RAMCAD module automatically transfers parts lists and bills of material directly from your CAD system to SEA's reliability analysis software to eliminate tedious data entry and potential errors. This software allows you to investigate product performance during the design, qualification, and acceptance testing phases.

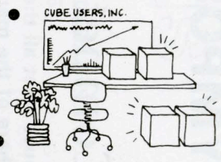
Preview Frequency of Repair
SEA's reliability module (REAP) predicts failure rates for all components and assemblies before a prototype is ever built. Very complex systems or individual components may be modeled, while considering such things as temperature, environment, component quality, and applied stress. Using these real-world parameters, you can access the mean time between failure of your product as installed in your customer's environment.

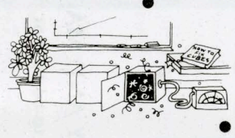




Preview Time to Repair
SEA's maintainability module (MEAP) predicts the average time necessary to repair a product, as well as its probable average down-time. Understanding maintainability characteristics prior to product release allows you to pinpoint design changes which will make your product easier to repair. Additionally, you can optimize support plans and see how changes affect product serviceability.

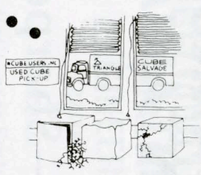
Preview Warranty and Service Costs
SEA's cost analysis module (CHEAP) predicts the life cycle cost of your product. The module can extract results from SEA's reliability and maintainability modules and allow you to combine them with company-specific cost parameters.





Warranty and field service costs can then be identified, and you can model your product's life cycle costs, sparing strategies, etc. SEA's cost analysis module, in conjunction with our reliability and maintainability modules, shows the impact of design decisions on long-term profitability.

Preview Product Performance
By providing a link to your CAD/CAE system, integrating reliability, maintainability, and cost analysis within a product family, and making these analyses possible during the design process, only SEA gives you the unique ability to preview how your product will perform after it is built, tested, shipped, and installed. Using SEA's approach, you get answers to important questions and the opportunity to improve designs before it's too late.



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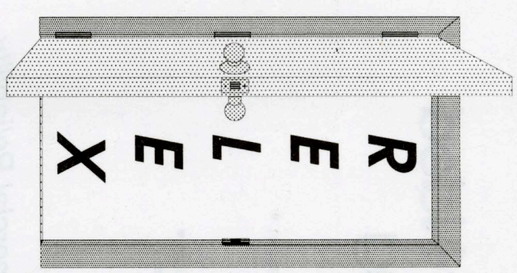

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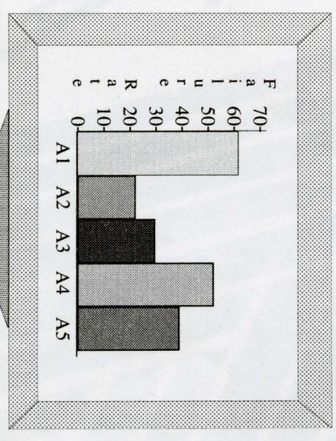
RELEX can undoubtedly make your job easier, and can do it quickly, because RELEX is so fast, so flexible, and so easy to learn and use. Step into the future ... call ISD today.



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*Developed by Wayne State University, College of Engineering