A S Q C

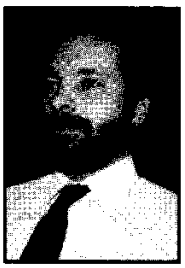
STATISTICS DIVISION NEWSLETTER

AMERICAN SOCIETY FOR QUALITY CONTROL

Volume 11, No. 4 Summer, 1991

OUTGOING CHAIR'S MESSAGE

by Roger Hoerl



Thank you Statistics Division for the most interesting, educational, hectic, fun, and exhausting year of my adult life! Was it as good for you as it was for me? I do think it has been a very productive year. We continued our involvement with several successful conferences, published four Newsletters, continued work on "How-To" Booklets, our Glossary of Statistical Terms, standards development, and upgrading our members' ASQC membership level, were active within ASQC regions, and presented another Hunter Award. In addition, we completed several improvement projects, such as compilation of a speakers list, chartering a team to write a white paper on "Survival Skills for Statisticians", taking a more proactive role in selecting talks and short courses for the Annual Quality Congress(AQC) and Fall Technical Conference, documenting a process to handle requests for financial assistance, improving the form and content of the Newsletter, and holding our first "Annual" Tactical Planning Meeting. Incoming Chair Conrad Fung provides more details on the plans resulting from this meeting in his message. Perhaps most significantly, we took time out from the hectic, demanding, day-to-day duties involved in running the Division to reevaluate our purpose for existing, and the direction in which we would like to see the Division move. The complete outcomes of this Long Range Planning Meeting were explained in our last Newsletter. In short, we revised our Mission, or purpose for existing, significantly upgraded our Vision, or description of the end state for which we are striving, documented Principles to guide our behavior, and developed a Strategy, or set of critical decisions which are aligned, and which collectively guide specific tactics to achieve the Mission. This planning has already enhanced our ability to focus on the critical work required to "delight" our key customers, and should provide a solid foundation for the Division for many years to come. These accomplishments would not have been achieved without the dedication and hard work of the officers, Regional Councilors, and other Council members. They deserve our gratitude. I would also like

Continued on page 2, Outgoing Message

INCOMING CHAIR'S MESSAGE

by Conrad Fung

Roger Hoerl truly deserves special recognition for his year of exceptional leadership, during which Statistics Division found a renewed clarity of purpose and customer focus. Those of us who worked directly with Roger grew personally from the experience, and the Division's upgraded Vision, Mission, Principles, and Strategies are a strong foundation for future success. I take over as Chair with excitement and some awe at what Roger has accomplished.

During our Long Range Planning Meeting in January we recognized that success depends on more than just choosing the right things to do; it requires doing them right. A carefully planned path forward must be developed for every project we seriously intend to pursue. Therefore on May 19, before this year's Annual Quality Congress in Milwaukee, the Statistics Division Council convened an Annual Tactical Planning Meeting to identify and prioritize key projects, and to develop one-year tactical plans for the most important ones.

Highest on the list was a professionally administered membership survey to scientifically evaluate the Division's make-up and to assess members' current and future needs. This information is vital to provide direction to all our other efforts, as Statistics Division members are our primary customers. Detailed plans for the survey are being developed by a team led by Chair-Elect Joe Voelkel, and including Treasurer Rick Lewis, Newsletter Editor Nancy Baxter and Membership Chair Bob Mitchell. Preliminary results from the survey will be presented at the Division Council Meeting on October 23, preceding the Fall Technical Conference in Lexington, Kentucky.

Another key effort is to assure that the Division is run according to Management Systems essential to the Division's continued vitality, identified at the Long Range Planning Meeting--systems for Tactical Planning, Leadership Recruitment and Selection, Maintenance, Evaluation, Continuous Improvement, and Communication. These systems are being prepared by Council members, and will be integrated in

Continued on page 2, Incoming Message

Outgoing Message Continued from page 1

to thank all the members who wrote letters, attended our Annual Members' Meeting at the recent AQC, dropped by the suite, or otherwise provided input or feedback. Every member is important!

While patting ourselves on the back for what we have accomplished, I think it is also important to keep in mind the opportunities and challenges we now face. U.S. business and industry is in a precarious position under the current economic environment and intense worldwide competition; the competition shows no signs of letting up. Much work remains to be done if the potential impact of statistical thinking and methods is to be reached. We all have a role to play in doing this. Last year at this time, Steve Bailey quoted a challenge from the previous Outgoing Chair's Message of Lynne Hare, because he felt it was still relevant. I will repeat it now for the same reason:

"Do everything within your power to foster sound statistical thinking within your organization. There are those who would have statistics oversimplified to the point of following ten easy steps as one might follow a recipe. Conversely, there are those who would have the world believe that statistics is some kind of magic art and that it is so complex that mere mortals cannot understand it. The fact is that statistics is good common sense; it is the language of science, and statistical thinking fundamental to the success of our industry, education, and government."

Thanks again for a great year!

Incoming Message Continued from page 1

the Statistics Division Operating Manual, which is being written by past Chairs Steve Bailey and Roger Hoerl. The Operating Manual will also include all job descriptions for Statistics Division, an organization chart, and the Division's approach to conforming with the requirements of the J.S. McDermond Division Recognition Program. We aim to have the first edition of the manual ready by the Fall Technical Conference, and to assess our success in managing by the manual, at next year's Annual Quality Congress.

A number of suggested projects involved educational services, Statistics Division's primary product. We chose to commit time and resources first to help ASQC improve the statistics questions in the Certified Quality Engineer (CQE) exam. As the focus of statistical leadership within ASQC, we felt that the Division has a special duty to do this. Beth Propst, Education Chair, is heading up this effort. Education has many other aspects as well, and can spawn many additional future projects, such as the publication of case studies and tutorials in the Newsletter or as special books, etc. We will focus our next Tactical Planning Meeting, to be held in conjunction with the Fall Technical Conference, on further educational services.

Of course we will continue our traditional activities—including the support of several conferences, sponsoring short courses, publishing the Newsletter, preparing How-To Booklets, continuing work on the Glossary of Statistical Terms, and on development of standards.

We are grateful for your membership in our Division. I look forward to working actively with you during the coming year.

MISSION

- Promote Statistical Thinking for quality and productivity improvement.
- Serve ASQC, business and industry, academia, and government as a resource for effective use of statistical methods for quality and productivity improvement.
- Provide a focal point within ASQC for problem-driven develop-ment and effective use of new statistical methods.
- Support the growth and development of Division members.

LETTER FROM THE EDITOR

Dear Readers:

It was great to meet many of you at the booth and Hospitality Suite at AQC. I appreciate the comments and suggestions you offered. Two suggestions were the inclusion of a listing of all Statistics Division activities and the listing of universities with Quality Management programs. Statistics Division activities will be included in the next issue of the newsletter. Listing Quality Management programs is going to be a little more difficult but I am investigating possible resources. Are there other readers who are interested in these suggestions or have suggestions of their own?

I am going to be working with our printer to develop a new look for the newsletter. The first step to the process is naming the newsletter. On page 15, you will find an announcement for the "NAME THE NEWSLETTER CONTEST." Since this is your newsletter, we feel that our members should have an opportunity to help us out. I look forward to reading the entries and will share them with you in future newsletters.Any suggestions you have regarding the format, style and colors of the newsletter would be appreciated.

EDITOR'S CORNER

Deadline for the Summer Issue is 31, August 1991.

Send all letters **EXCEPT FOR CHANGE OF ADDRESS** to:

Nancy Baxter
Thomas J. Lipton Co.
800 Sylvan Avenue
C-210
Englewood Cliffs, NJ 07632

I cannot handle changes of address. Labels are ordered directly from ASQC. Neither I nor the printers are going to sort through over 14,000 labels to find yours. You can change your address through ASQC and that will automatically change the address for all publications you receive from ASQC. You can do this by phone.

ASQC (414) 272-8575
or 1-(800) 248-1946

ASQC Statistics Division
1991-92 Officers and Committee Chairs

Chair
Conrad A. Fung
Center for Quality and Productivity Improvement
University of Wisconsin
WARF/l 1O9B
610 Walnut Street
Madison, WI 53705
(608) 263-2652

Chair-Elect
Joseph G. Voelkel
Rochester Inst. of Technology
Center for Quality and Applied Statistics
1 Lomb Memorial Dr.,
Bldg. 18
P. 0. Box 9887
Rochester, NY 14623-0887
(716) 475-2231

Secretary
Galen C. Britz
3M Consumer Products Plant
Highway #22 South
Hutchinson, MN 55350
(612) 234-4000, Ext. 1462

Treasurer
Richard A. Lewis
Monsanto Chemical Company
800 N. Lindbergh Boulevard
St.Louis,MO 63167
(3 14) 694-7735

Mail Tore
048

Past Chair
Roger W. Hoerl
Scott Paper Company
Scott Plaza II
Philadelphia, PA 19113
(215) 522-5011

Senior Past Chair
Steven P. Bailey
Du Pont
Quality Management & Technology Center
Linden Park 418
P. 0. Box 6091
Newark, DE 19714-6091
(302) 999-6672

Newsletter Editor
Nancy E. Baxter
Thomas J. Lipton, Co.
800 Sylvan Avenue
Englewood Cliffs, NJ 07632
(201) 894-4011

"How To" Booklet Editor
Edward F. Mykytka
Auburn University
Industrial Engineering Dept.
207 Dunstan Hall
Auburn, AL 36849
(205) 844-1421

"Glossary" Editor
James L. Bossert
Eastman Kodak Company
Building 69, 4th Floor
Kodak Park
Rochester, NY 14650
(716) 477-3837

Standards Representative
Oswald Willner
Westinghouse Electric Corp.
Bettis Atomic Power Lab
P.O. Box 79
West Mifflin, PA 15122
(412) 476-5954

Examining
Robert L. Perry
Pillsbury Company
330 University Ave. S.E.
Minneapolis, MN 55414
(612) 330-8916

William G. Hunter Award
Peter J. Jacobs
549-2S-03
3M Company
3M Center
St. Paul, MN 55144-1000
(612) 733-4257

Education
Annabeth L. Propst
(Process Management Inst.)
732 Parkview Avenue
Rockford, IL 61107
(815) 397-7943

1991 Fall Technical Conference
Andrew C. Palm
James River Corporation
River Park
P.O. Box 6000
Norwalk, CT 06856
(203) 854-2439

1991 Fall Technical Conference - Short Courses
Don Emerling
3M
New Lair Road
P.O. Box 430
Cynthiana, KY 41031
(606) 234-5671, Ext. 1432

1991 Conference on Applied Statistics- Program
Frank B. Alt
University of Maryland
College of Business
College Park, MD 20742
(301) 454-6315

1991 Annual Quality Congress- Program
Gregory F. Gruska
(The Third Generation, Inc.)
4439 Rolling Pine Drive
West Bloomfield, MI 48033
(313) 363-1654

Liaison with ASQC Divisions
Joseph J. Pignatiello, Jr.
University of Iowa
Department of Industrial and Management Engineering
Room 4131, Engineering Bldg.
Iowa City, IA 52242
(319) 335-5936

Membership
Robert H. Mitchell
3M Consumer Products Plant
Highway #22 South
Hutchinson, MN 55350
(612) 234-4000, Ext. 1864

Meet the Officers

Conrad Fung – Chair

Conrad Fung is an Assistant Professor in the Department of Industrial Engineering and the Center for Quality and Productivity Improvement at the University of Wisconsin–Madison. Before returning to Wisconsin in 1984 to complete his Ph.D., he was for three years a practicing statistician at the Du Pont Company, where he was a statistical consultant to quality control initiatives at manufacturing plants in Europe and the United States.

Conrad teaches undergraduate and graduate courses on statistical methods for quality improvement in the newly established Quality Engineering degree curriculum in the Department of Industrial Engineering, which stresses practical techniques and brings in "current events" from the industrial world. Conrad is also one of the originating members of the Center for Quality and Productivity Improvement, a group that endeavors to develop, disseminate, and promote practical research in quality improvement methods.

Conrad was Secretary of the Statistics Division of ASQC during 1988–90, and Chair-Elect during 1990–91.

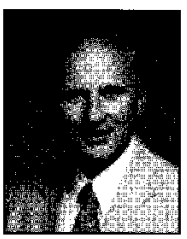
Joseph Voelkel Chair-Elect

Joe Voelkel is an Associate Professor in the Graduate Studies Program, Center for Quality and Applied Statistics, College of Engineering, at the Rochester Institute of Technology. Many of his students are adult engineers and scientists who are getting an M.S. in Statistics to complement their earlier education. In addition to teaching at R.I.T., Joe also performs extensive industrial teaching and consulting, which help ensure that classroom teaching and real-world benefits go hand-in-hand.

Joe's past positions include Senior Statistical Scientist in the Center for Applied Mathematics at Allied-Signal Corporation, and Assistant Professor at the University of Wisconsin-Madison.

Joe has a B.S. in Math from Rensselaer Polytechnic Institute,an M.S. in Industrial-Engineering/ Management-Sciences from Northwestern University, and a Ph.D. in Statistics from the University of Wisconsin-Madison. He is a member of the American Society for Quality Control, the American Statistical Association, and the Biometric Society.

Joe has been the Division Treasurer for the past two years.

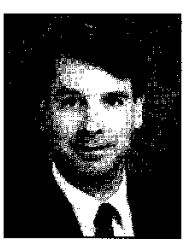


Galen Britz Secretary

Galen Britz is Technical Manager in 3M's Consumer Product Plant in Hutchinson, MN. The Technical Department includes both process and quality engineers, supplier management coordinators, and the plant training function.

Galen joined 3M in 1966 after receiving BS, MS, and PhD in Chemical Engineering from the University of Minnesota (BS) and Iowa State University (MS and PhD). He has worked in product and process development, and as a Corporate Statistical Consultant. He has worked in management during the last eleven years.

Galen became a member of ASQC in 1975. He was a charter member of the Statistics Division and served as Region 12 Councilor from 1985 to 1990. He acted as Regional Councilor Coordinator in 1989- 90, writing the first position description for the Regional Councilor and Regional Councilor Coordinator. During his first year as Secretary he developed a process to start and maintain the Division's speakers list.



Richard Lewis Treasurer

Rick Lewis is Statistical Methods Specialist for the Detergents & Phosphates Division of Monsanto Chemical Company, an operating unit of Monsanto Company. In this role he provides statistical leadership and consulting to research, development and manufacturing. He has extensive experience in quality and productivity improvement, particularly in the application of statistical process control, experimental design, and linear models. Prior to joining Monsanto, Rick was a member of Union Carbide's Applied Statistics Group, where he provided statistical consulting and helped develop and teach a series of short courses on statistical methods.

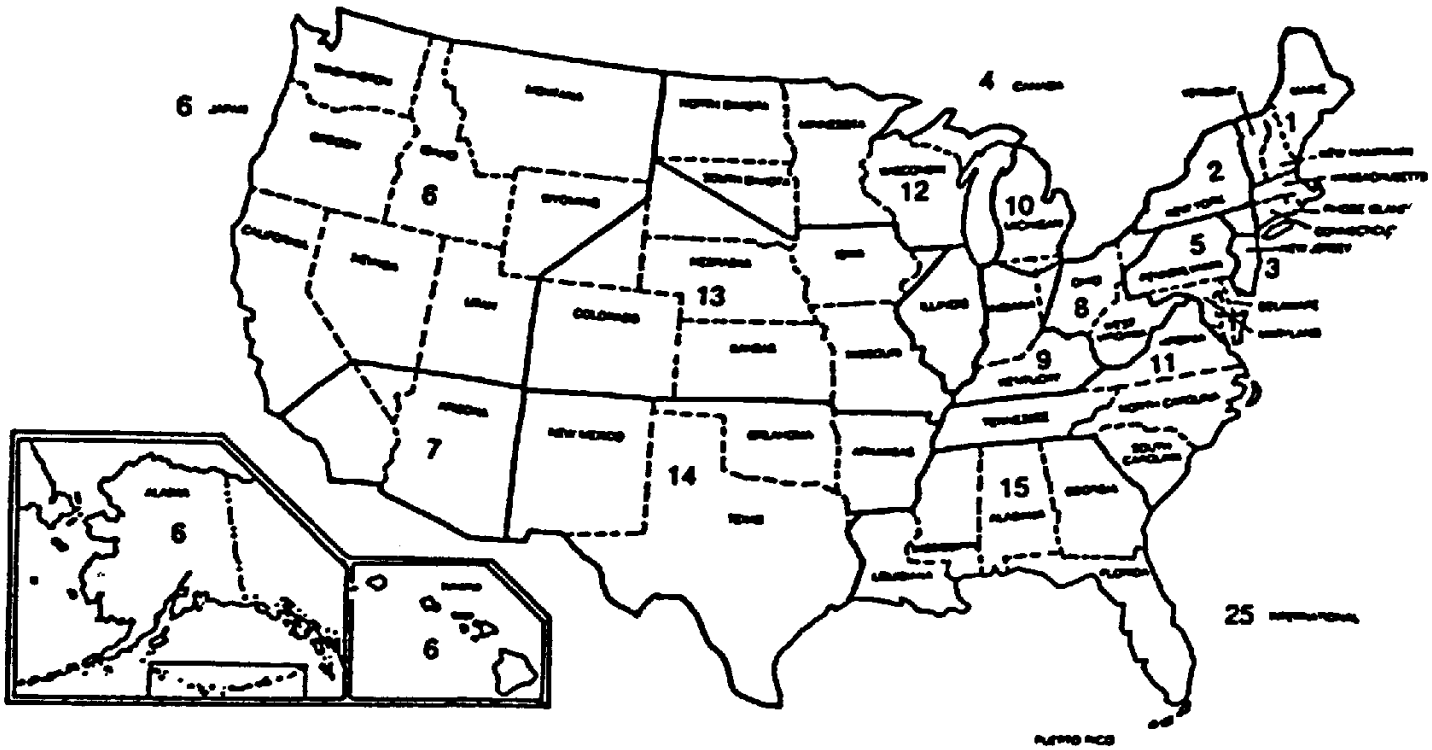
Rick received his B.S. in Mathematics from Miami University, and his M.S. and Ph.D. in Statistics from the University of Wisconsin-Madison. He is the coauthor of seven technical papers, a member of the American Statistical Association and the Institute of Mathematical Statistics, and a Senior Member of the American Society for Quality Control. He served as Statistics Division's Fall Technical Conference Program Representative in 1989 and 1990.

Rick, his wife Debbie, and two children Tom and Beth live in the St. Louis area.

MEMBERSHIP REPORT

As of March 31, 1991, the Statistics Division membership stands at 16,800. This is an increase of 2,200 over last year's enrollment figure. Total ASQC membership is 83,467 of which approximately 52,000 members are associated with 1 or more Divisions. A member belongs to an average of 1.9 Divisions; however, there are over 31,000 members whom are not affiliated with any Division. If you know of an ASQC member whom may be interested in participating in the Statistics Division, please have them contact either their Regional Councilor or the Membership Chair.

REGIONAL MAP



ASQC Statistics Division 1991-1992 Regional Councilors

Regional Councilor Coordinator - Edward R. Hansen
Gillette Company, Prudential Tower Building, Boston, MA 02199
(617) 421-7370

Region 1
Edward R. Hansen
Gillette Company
Prudential Tower Building
Boston, MA 02199
(617) 421-7370

Region 2
Donald J. Baird
Xerox Corporation
800 Phillips Road, 0200-18C
Webster, NY 14580
(716) 422-8085

Region 3
Thomas Calvin
(IBM Corporation)
13 Malstorme Road
Wappingers Falls, NY 12590
(914) 433-9240

Region 4
Ian B. MacNeill
Director, Statistics Laboratory
Engrg. and Math. Sciences Bldg.
University of Western Ontario
London, Ontario N6A 5B9
(519) 361-6618

Region 5
Joseph R. Troxell
Lasalle University
Box 374
20th Street and Olney Avenue
Philadelphia, PA 19141
(215) 951-1031

Region 6
Marilyn Hwan
LFI Logic
3115 Alfred St.
Santa Clara, CA 95050
(408) 433-6362

Region 7
Thomas J. Vaden
Consultant
5765 Grand Avenue
Riverside, CA 92504
(714) 382-5525

Region 8
William M. Bleau
1130 Stonecrest Dr.
Tallmadge, OH 44278
(216) 796-9673

Region 9
Carlos W. Moreno
Ultramax Corporation
650 Northland Blvd.
Cincinnati, OH 45240
(513) 825-7794

Region 10
Gregory F. Gruska
(The Third Generation, Inc.)
4439 Rolling Pine Drive
West Bloomfield, MN 48033
(313) 363-1654

Region 11
George W. Marrah
Department of Mathematics
and Computer Science
James Madison University
Harrisburg, VA 22807
(703) 568-6534

Region 12
Jed Heyes
Rank Video Services of America
555 Huehl Road
Northbrook, IL 60062
(708) 291-2227

Region 13
Richard D. Schleusener
Kodak Colorado Division
Melt/Coat Department
C-42, 3rd Floor
Windsor, CO 80551
(303) 686-0530

Region 14
E.B. Godsey
303 Ridgebriar Drive
Richardson, TX 75080
(214) 690-1744

Region 15
William H. Woodall
Department of Management
Science and Statistics
University of Alabama
P.O. Box 870226
Tuscaloosa, AL 35487-0226
(205) 348-6085

COUNCIL MEETING HIGHLIGHTS

The Statistics Division Council held its annual meeting in conjunction with the Annual Quality Congress in Milwaukee. This article briefly summarizes the meeting. Anyone interested in the full minutes of the meeting may obtain a copy from Galen Britz, Secretary. Galen's address is with the Officers.

•Bob Mitchell, Membership Chair, announced that the Division had 16,800 members (including 2080 unpaid) as of March 1991.

•Plans for new projects for the coming year were discussed (see Annual Tactical Planning Meeting in this newsletter.)

•The Education Committee is sponsoring a "white" paper entitled "Survival Skills for Statisticians" which will be presented at the Fall Technical Conference in October and at the winter American Statistical Association meeting.

•Two new "How To" booklets will be available this summer. (see article elsewhere in this newsletter.)

•Proof copies of the Fall Technical Conference program were distributed. The Division will sponsor two short courses at FTC (see FTC in this newsletter.)

•Rick Schleusener, AQC Chair, reported that the Division requested eight and received nine sessions (24 papers) at the 1991 AQC. We intend to sponsor a short course preceding the 1992 AQC, Beth Propst-Chair.

•The Division is sponsoring five recent graduates who are now teaching, and one graduate student to the 1991 Gordon Research Conference. They will present poster talks of their current or proposed research.

•Several Regional Councilors attended the meeting or sent reports. Ed Hansen (Region 1) and Joe Troxell (Region 5) reported on requests from sections and Division members for speakers and assistance with statistical questions. Oz Godsey (Region 14) offered some suggestions for the Division speaker list. Jed Heyes (Region 12) reported on another successful Quality Day at Argonne Laboratories.

•The Council approved a recently developed policy entitled "criteria for handling donation requests." The criteria should help us remain consistent in our replies to requests for donations from the Division.

•The Council approved expenditures for a membership survey.

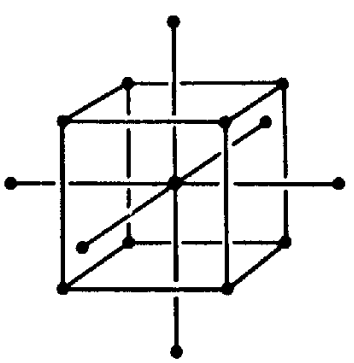
•The beginnings of a new Division Speakers list was distributed. Speakers at the FTC and at the Statistics Division sponsored sessions at AQC will be asked if they want to be included on the list. The list will contain speakers from the most current three years conferences. This list will be available to the Regional Councilors for distribution to sections.

STATISTICS DIVISION TREASURER'S REPORT
April 30, 1991

ASSETS		
Cash	5,705.31	
Money Market	50,841.19	
Certificate of Deposit	15,000.00	
Prepaid Postage	1,000.17	
TOTAL		72,546.67
LIABILITIES & FUND BALANCE		
Net Income	44,516.03	
Beginning Fund Balance	28,030.64	
TOTAL		72,546.67
REVENUE		
Membership Dues	79,516.00	
Investment	2,607.00	
TOTAL	82,123.00	
EXPENSES		
Administration	4,381.00	
Awards, Scholarships & Donations	4,053.00	
Contract & Professional	184.00	
Newsletter	24,416.00	
Postage & Express	4,572.00	
TOTAL	37,606.00	
EXCESS REVENUES	44,517.00	

1991 ANNUAL QUALITY CONGRESS

This year's Annual Quality Congress was held in Milwaukee, Wisconsin. The Statistics Division presented nine sessions. There was a panel discussion by the Deming Study Group from the greater Detroit area. A mini-tutorial on multivariate control charting was presented. There were sessions on experimental design, experiment planning, applications of response surface methodologies and control charting techniques. Talks on application of regression techniques, variability studies, and an application of neural nets were also presented. The "Meet the Speaker" feature was held in the Hospitality Suite. This feature allows attendees to talk with speakers in an informal atmosphere.



STRATEGIC PLANNING

HIGHLIGHTS FROM THE ANNUAL TACTICAL PLANNING MEETING

Twelve members of the Statistics Division Council met on Saturday, May 18, 1991 in Milwaukee for the Annual Tactical Planning Meeting. The purpose was to develop a one year tactical plan to begin implementing the Division's strategy, as described in the Spring, 1991 Newsletter.

The intent of the meeting was to develop the following product:

–A few key projects on which to focus our efforts in the coming year (July 1991 - June 1992).

–Allocation of resources required, including a leader.

–Development of tactics or methods for these projects.

–A timetable.

–Evaluation criteria with which to monitor progress.

The attendees developed plans for the following three projects:

1. Operating Manual

Purpose - To complete the first edition of the Statistics Division Operating Manual. The manual will include job descriptions, organization charts, management systems (identified at the January 1991 Long Range Planning Meeting), and McDermond criteria (ASQC's guidelines on activities in which an active Division should participate.) This work should include publication/communication of the manual and steps required to have the Division begin managing by it.

2. Membership Survey

Purpose - To scientifically evaluate the geographical, educational, and occupational make-up of the Division and assess their current and future needs. This will be used to provide direction to all other efforts, as Statistics Division members are our primary customers.

3. Upgrade Statistics Questions for Certification Exams

Purpose - To upgrade the statistics questions in the certification examinations. As we are the focus of statistical leadership within ASQC, Statistics Division has a responsibility, both to the society and to its members who depend on the exams for certifications, to assume correctness and relevance of the statistics questions in the certification exams.

Many other projects were discussed, primarily those related to educational products which could be delivered to the members. The results from the membership survey should guide the Council as to the educational products the membership wants and needs. Tactical planning will continue at the Fall Technical Conference.

"Statistics & Quality: A Winning Combination" 35th Annual Fall Technical Conference

The 35th annual Fall Technical Conference will be held October 24-25 at the Hyatt Regency in Lexington, Kentucky. The Statistics Division along with Chemical & Process Industries Division of ASQC and the Section on Physical & Engineering Sciences of ASA are the co-sponsors of the conference. (A proof copy of the conference program appears in the center section of the newsletter.)

The Statistics Division will hold a council meeting from 7:30-9:00 pm on Wednesday, October 23. This meeting is open to all Division members and is an opportunity for those who wish to become more involved in Division activities.

The Division is sponsoring two pre-conference short courses on Wednesday, October 23. (See FTC short-course descriptions.) A tour of the Kentucky Horse Park and an afternoon of racing at Keeneland is the non-technical program planned for Thursday, October 24.

All Statistics Division members should be receiving a copy of the brochure in the mail. The brochure contains additional information on the program and logistics.

STATISTICS DIVISION OPEN MEETING

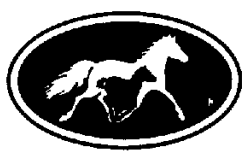
Twenty-four members of the Statistics Division attended the Annual Open Meeting on Monday, May 20 at the Annual Quality Congress in Milwaukee. The purpose of the meeting was to update interested members in the business of the Division, to get input from the members, and to initiate a dialogue with those in attendance.

Chair-elect Conrad Fung reviewed the results of the January Long Range Planning meeting (reported in the Spring 1991 Newsletter.) Chair Roger Hoerl reviewed the Division "management systems" that were deemed important for the operation of the Division at the Long Range Planning Meeting. Secretary Galen Britz then described the "tactical" plans developed at the May 19th Strategic Planning Meeting (elsewhere in this newsletter.) The meeting concluded with a lively brainstorming session in which over a dozen ideas were recorded for future consideration.

The Division Officers thank the members who attended and offered valuable suggestions. We also invite all members to attend future Open Meetings at the Annual Quality Congress. Plan to join us next May in Nashville.

35th Annual Fall Technical Conference

Statistics and Quality: A Winning Combination



October 24-25, 1991
Lexington Hyatt Regency
Lexington, Kentucky

Co-sponsored by

Chemical & Process Industries Division, ASQC
Section on Physical & Engineering Sciences, ASA
Statistics Division, ASQC

Hosted by
The Lexington Section, ASQC

PROOF COPY

8:00	**Thursday, October 24**	**Registration Desk Open**	
	Welcome/Plenary Session		
8:15 to 9:00	*Top ten Triumphs and Tragedies of Genichi Taguchi* Joseph J. Pignatiello, Jr., University of Iowa and John S. Ramberg, Univ. of Arizona Presiding: Thomas W. Lester, University of Kentucky, College of Engineering Dean		
I 9:15 to 10:00	*Some Practical Aspects of Designing Mixture Experiments* Douglas C. Montgomery and Sheila R. Voth Arizona State University **Moderator:** Rick Lewis, Monsanto	*Reliability Engineering Using the Weibull Distribution* Jerry L. Cartwright Clark Equipment Co. **Moderator:** Ray Waller, Los Alamos	*Control Charts: The Promise and the Performance* Bradford S. Brown Consultant: Quality and Statistics **Moderator:** Conrad Fung
	Coffee Break		
II 10:30 to 12:00	**Neural Networks** *Applied Neural Nets - Industrial Strength Solutions* James M. Minor Du Pont Halbert White University of California San Diego **Session Organizer and Moderator:** James M. Minor, Du Pont	**JQT Session** Raymond H. Myers VPI & SU Stephen V. Crowder Sandia National Labs **Session Organizer and Moderator:** John A. Cornell University of Florida	**Tutorial** *Coaching Process Improvement Teams* Annabeth L. Propst Process Management International Lori L. Silverman Partners For Quality **Moderator:** Galen Britz 3M Tape Division
12:15 to 1:45	**Luncheon** *Quality Trends in Industry--A Passing Fad? OR A Prominent Part of American Industry's Future?* L. Raymond Taunton, Vice President-Operations, Engineered Materials Sector, Allied-Signal, Inc. **Presiding:** Norman Knowlden, Allied-Signal, Inc. Chairman ASQC-CPID		
III 2:00 to 3:30	**Robust Design** *Robust Parameter Design with Uncontroled Noise Variables* A.E. Freeny and V.N. Nair AT&T Bell Laboratories *Designed Experiments for Reduction of Variation* *Bovas Abraham and* Jock MacKay University of Waterloo **Moderator:** Ken Tiernan Loral Aeronutronic	**ISO 9000** *ISO 9000 is Here!* Kymm K. Hockman Du Pont *ISO Series Registration: Getting Started* George Q. Lofgren Registrar Accreditation Board **Moderator:**	**Case Studies** *Improving the Quality of a Soldering Process - A Case Study* Peter Mesenbrink North Carolina State University Richard McKenzie, Javad Taheri Northern Telecom, Inc. Jye-Chyi Lu North Carolina State University *Case Study: Pillsbury - Monsanto SAPP SPC Team* Barbara B. Heidolph Monsanto Chemical Co. J. Poluka, The Pillsbury Co. **Moderator:** W. Fischer Mobil Chemical
4:00 to 5:00	**W.J. Youden Memorial Address** William H. Lawton, Presiding: Conrad A. Fung University of Wisconsin, Chairman ASQC-SD		

8:00	**Friday, October 25**
I 8:30 to 10:00	**Process Control** *The Riddle of the Two Controllers* William H. Fellner Du Pont *Multivariate Control Charts for Calibration Curves* J. Roy Robertson Rohm and Hass Company **Moderator:** Dave Stevens Hoechst Celanese
II 10:30 to 12:00	**Technometrics Session** *Spatial Design and Analysis of Experiments* Noel Cressie and Martin O. Grondona *Probability Limits on Outgoing Quality for Continuous Sampling Plans* Lisa M. Mc Shane and Bruce W. Turnbull **Moderator:** Vijayan N. Nair AT&T Bell Laboratories
12:15 to 1:45	**Luncheon** *Statistics and* Arnold Zellner, Presiding: Step
III 2:00 to 3:30	**Design of Experiments** *Another Look at First-Order Saturated Designs* Dennis K.J. Lin University of Tennessee *Sequences of Designs for Locating the Optimum on a Response Surface* Steven G. Gilmour University of Reading **Moderator:** Geoff Wining

1991 FALL

Chairman: Jerry Carl, *Clark Equ*
Registrar: Paris Altid, *Clark Equ*
Treasurer: Bob Young, *Whirlpool*
Publicity: David Hull, *Square D*
Brochure: Julie Lyons, *Clark Equ*
Conference Coordinator: Peter Fort, *American*

ASQC-SD
Chairman: Conrad A. Fung, *Univ. of Wisconsin*
Chairman Elect: Joseph G. Voelkel, *Rochester Inst. ofTechnology*
Secretary: Galen Britz, *3M*
Treasurer: Richard A. Lewis, *Monsanto*

ASQC-CPID
Chairman: Norman Knowlden, *Allied Signal Corp.*
Chairman Elect: Peter E. Fortini, *American Cyanamid Co.*
Secretary: Patrick P. Donnelly, *Drexel University*
Treasurer: Kenneth F. Moist, *Mead Corporation*

ASA-SPES
Chairman: Stephan B. Vardeman, *Iowa State University*
Chairman Elect: Anne Shoemaker, *AT&T Bell Laboratories*
Secretary/ Treasurer: Carolyn Morgan, *General Electric*

Conference Registration Form

34th Annual
Fall Technical Conference

Mail to: Paris Altidis
Clark Material Handling Co.
333 West Vine Street, Suite 500
Lexington, KY 40507

Please circle the sessions that you will most likely attend:

T	I	I	I	F	I	I	I
H	II	II	II	R	II	II	II
U	III	III	III	I	III	III	III

Name _____

Badge Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone _____ *Detach Here*

Registration Fees:

- ☐ Two Days $100.00
  - ☐ Thursday Only $70.00
  - ☐ Friday Only $70.00
- ☐ Student (I.D. Required) $60.00
- ☐ Additional Fee (After Sept. 27) $10.00

Preconference Short Courses

- ☐ Malcolm Baldridge $85.00
- ☐ Experimental Design $85.00

- ☐ Nontechnical Program $35.00

Name _____
(Nontechnical Participant)

Extra Lunch Tickets $25.00/day
_____ No. Thurs _____ No. Fri

TOTAL ENCLOSED _____

Make checks payable to:
FTC-1991
Lexington Section 0911 Fed. Tax ID #

ASQC-ASA
Fall Technical Conference

Hotel Reservation Form
Mail to: **Hyatt Regency Lexington**
Reservation Department
P.O. Box 1370
Lexington, KY 40507 **(606) 253-1234**

Name _____
Address _____
City _____ State _____ Zip _____
Phone # _____
Please reserve ____ (No. of Rooms) for ____ People
For arrival on _____ (day) (date) Depart on _____ (day) (date)
Name(s) of person(s) sharing accommodations _____

☐ Check or money order enclosed in amount $ _____
☐ Credit Card # _____
Expiration Date _____

CIRCLE: AMEX M.C. Diners Club VISA C.B. Discover
I authorize the Hyatt Regency Lexington to charge my account for one night's deposit and all applicable taxes.

Signature _____

SPECIAL GROUP RATES ARE:
Single or Double $82.00, $102.00 Regency Club (+ occupancy tax).
To assure group rates, make reservations by September 22, 1991.
Please mail this card directly to the hotel to make your hotel reservations.

Registration	Desk Open	Tutorial		Case Studies		SD White Paper	
		Why's, When's and How's of Conducting a Process Capability Study		*Total Statistical Process Control (TSPC) in a Tube Drawing/Fabrication Facil.*		*Survival Skills for Statisticians*	
		Robert B. Boser and Cheryl L. Christ Quality Works		Carol A. Christobek Uniform Tubes, Inc.		Roger Hoerl, Scott Paper Jeff Hooper, AT&T Bell Laboratories	
			Moderator: Diane Gibbons		**Moderator:** Edward Kertman		**Moderator:** Nancy Baxter Thomas J. Lipton, Inc.
Collaboration in Experimentation		**Variation Analysis**				**Quality Planning**	
Capturing Engineering Knowledge for a Robust Design Experiment		*Variation Transmission Analysis*		*Graphical Display of Dispersion Effects in Factorial Experiments*		*Maintaining and Improving Process Quality*	
Ramon V. Leon and Margaret W. Dellinger AT&T Bell Laboratories		Wayne A. Taylor Baxter Healthcare Corporation		Larry D. Haugh University of Vermont		*The Human Factor* Roger B. Lewis Toyota Motor Manufacturing	
Collaboration, Cooperation and Designed Experiments						*Implementing QFD at Texas Instruments*	
Richard R. Carlson and Hilal Gudul, Unisys Corporation						Bob Porter Texas Instruments	
	Moderator: Bob Wojewodka		**Moderator:** John Shelton			**Session Organizer and Moderator:** Daniel G. Dufresne Texas Instruments	

Science: Some Personal Views
r, University of Chicago, President ASA
phas B. Vardeman, Iowa State Univ., Chairman ASA-SPES

TECHNICAL CONFERENCE COMMITTEE

Nontechnical Program:	Anita Carwright	*Integrated Engineering, Inc.*
Local Arrangements:	Wally Roscoe	*Trane Company*
Program/CPID:	Gary C. Myers, Jr.	*Du Pont*
Program/SPES:	Gregory F. Piepel	*Battelle Northwest*
Program/SD:	Andrew C. Palm	*James River Corporation*
Short Course:	Don Emerling	*3M*

MINI PAPER

'STOP LIGHT' CONTROL - Revisited

Gregory F. Gruska
The Third Generation, Inc.

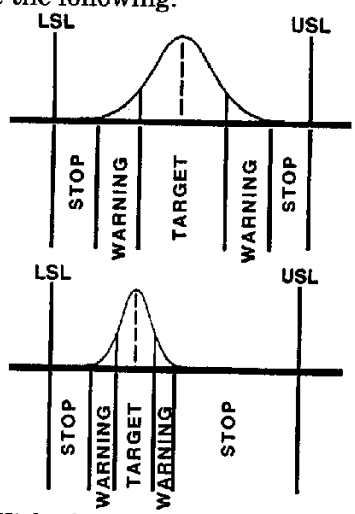
Maureen S. Heaphy
The Transformation Network, Inc.

The transformation of management to continuous improvement has caused us to take another look at our statistical toolbox. In the past, all the tools had their uses under the tolerance philosophy with its focus on parts control and an emphasis on "build it to print the first time." However, continuous improvement is built on the target philosophy with a focus of process control. Here the objective is to provide parts or services from a stable process centered on a customer designated target with continually improving variability. To many individuals, this implies that those statistical tools which rely on categorical data (e.g. attribute charts) are no longer useful tools - especially if the process variation is much smaller than the specification requirements (e.g. $C_{pk} \geq 2$).

The idea that some tools are no longer acceptable is further reinforced when the major automotive OEMs state that any control method based on the tolerances will be considered unacceptable. Since attribute data analysis techniques "require" that we categorize part either within or out of tolerance, they will always be unacceptable - right?

The analysis of categorical data generally utilizes the Binomial, Multinomial or Poisson distribution. There is nothing inherent in any of these forms (or any other forms) that requires one or more categories to be "bad". The problem is that users tend to apply by example, rather than by knowledge. This is as much our fault, as professionals and teachers, as the student's. We tend to take the easy way out, using traditional (and stereotypical) examples. We have failed to realize that our predecessors had (and were constrained to) the tolerance philosophy; i.e., make it to print (or as close as possible).

With a target philosophy we need to be more innovative in our approach. For example, if a process has a $C_{pk} = 2$, we may elect to utilize the following:



With this categorization we can control the process by identifying and "charting" the proportion of pieces designated as "warning" within a sample. Because we choose the apportionment (% warning) we have control over the sample size and frequency required. Of course, this allows us to control the process only if we know the process distribution. The quantification and analysis of the process still requires variable (dimensional) data.

One simple but effective control

FTC Pre-Conference Short Courses

The two FTC pre-conference short courses will run concurrently on Wednesday, October 23. Registration for the courses is limited.

Using the Malcolm Baldrige National Quality Award Criteria - Marshal Herron, Tennessee Eastman Company

This course is designed for those who are actively involved in the design, implementation, and improvement of Total Quality Management or a Baldrige Quality Award Program. Participants will learn how to use the Malcolm Baldrige National Quality Award (MBNQA) criteria, first, to assess and provide feedback on a company's TQM efforts, second, to participate in the application process for the award.

Discussion will cover application guidelines, small group workshops, and using the criteria within a company. The instructor will share his experience as a member of the original Malcolm Baldrige development team and as a member of the management team that developed and implemented TQM at Eastman Chemicals Company, a division of Eastman Kodak Company.

Blending The Best of the Best Experimental Design Techniques - Stephen R. Schmidt, Schmidt/Launsby Consulting

In recent years, experimenters have been asked to choose an approach to Experimental Design - they have had to decide whether to learn classical methodologies, or a variety of untraditional techniques advocated by a spectrum of authors and consultants.

You don't have to choose any longer. This course will introduce the major experimental design approaches that are currently in vogue, with a focus on teaching the participant similarities/differences and advantages/disadvantages. Often, a blend of two or more experimental design approaches is the best strategy to follow.

The more you know about Experimental Design, the easier it will be to discover process problems and implement solutions that lead to better process designs, higher quality products, and reduced product development cycles.

MINI-PAPER

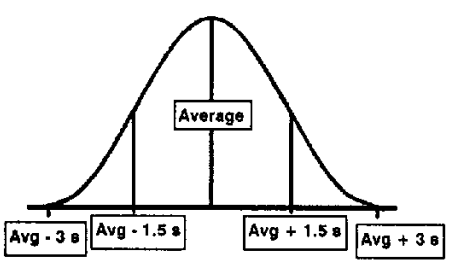
Continued from page 10

procedure of this type is stop light control which is a semi-variable (more than two categories) technique using double sampling. The focus of this tool is to detect changes (special causes of variation) in the process. At its basic implementation, stop light control requires no computations and no plotting, thereby, making it "easier" to implement than control charts. Since it splits the total sample (e.g. 5) into a two stage sampling (e.g. 2,3), this approach can signal out of control conditions with the same or better efficiency than a control chart with the same total sample size (see Heaphy and Gruska, 1982). Although, the development of this technique is thoroughly founded in statistical theory, a program can be implemented and taught at the operator level without involving mathematics.

The assumptions in stop light control are:

- The process is in statistical control.
- Process performance (including measurement variability) is acceptable.
- The process is on target.

Once the assumptions have been verified by a process performance study utilizing variable data techniques, the process distribution can be divided such that average + 1.5 standard deviations is labeled as the green area and the rest of the area within the process distribution is yellow. Any area outside the process distribution (the 99.73% range) is labeled red. If the process distribution follows the normal form, 87% of the distribution is in the green area, 13% is in the yellow area and .3% is in the red area.



Similar conditions can be established if the distribution was found to be non-normal.

For control equivalent to an $\bar{x}$ and R chart with a sample size of 5, the steps for stop light control can be outlined as follows:

1. Check 2 pieces; if both pieces are in the green area, continue to run.
2. If one or both are in the red zone, notify the designated person for corrective action and sort material. When setup or other corrections are made, repeat step #1.
3. If one or both are in a yellow zone, check three more pieces. If any pieces fall in a red zone, notify the designated person for corrective action and sort material. When setup or other corrections are made, repeat step #1.

* If no pieces fall in a red zone, but three or more are in a yellow zone (out of 5 pieces) notify the designated person for corrective action. When setup or other corrections are made, repeat step #1.

* If three pieces fall in the green zone and the remainder are yellow, continue to run.

Measurements can be made with variable as well as attribute gaging. Certain variable gaging such as dial indicators or air-electronic columns are better suited for this type of program since the indicator background can be color coded. Although no charts or graphs are required, charting is recommended, especially if subtle trend (shifts over a relatively long period of time) are possible in the process.

In any decision making situation there is a risk of making a wrong decision. With sampling, the two types of errors are:

- Probability of calling the process bad when it is actually good (false alarm rate).
- Probability of calling the process good when it is actually bad (miss rate).

In addition to these two measures, the sensitivity of the sampling plan can be quantified. Sensitivity refers to the ability of the sampling plan to detect out of control conditions due to increased variation or shifts from the process average.

The disadvantage of stop light control is that it has a higher false alarm rate than an $\bar{x}$ and R chart of the same total sample size.

The advantage of stop light control is that

- It is as sensitive as an $\bar{x}$ and R chart of the same total sample size.
- Users tend to accept control mechanisms based on this type of data due to the ease of data collection and analysis.
- Focus is on the target not specification limits - thus it is compatible with the target philosophy and continuous improvement.

Bibliography

Heaphy, M.S. and Gruska, G.F., Markovian Analysis of Sequenced Sampling, 36th AQC Transactions, ASQC, 1982.

Ibid.p 'Stoplight' Control, ASQC Statistics Division Newsletter, Vol 5, No 2, 1984.

Juran, J.M., *Quality Control Handbook*, McGraw-Hill, 1951.

TWO NEW "HOW-TO" BOOKLETS

Basic References in Quality Control: Statistical Techniques

Statistics Division sponsors the publication of a series of authoritative booklets on important statistical techniques for quality control. This "How To" series introduces in a straightforward manner a variety of statistical techniques. The booklets in this series are all of the intermediate level - recommended for those with some knowledge of the field. Two new "How-To" booklets will be available in August through Quality Press. The booklets are described below.

Volume 14: How to Construct Fractional-Factorial Experiments by Richard F. Gunst and Robert L. Mason

Fractional factorial experiments are among the most cost- effective and information-laden types of

Continued on page 12

THE GREAT STEM AND LEAF PLOT DEBATE

Joseph R. Troxell, La Salle University

The debate centers on the observable fact that all undergraduate level statistics texts use histograms to introduce the display of quantitative information; some include stem and leaf diagrams as an additional topic in displaying data, but none use stem and leafs as the introductory way to display quantitative information. I wish to argue that text book writers ought to begin using stem and leaf diagrams as the primary way to group and display data, with histograms as a secondary topic.

Why are histograms used so much? I think it goes back to the days before personal computers and hand held calculators became so cheap and popular. Histograms served two purposes. They displayed graphically a set of data and they afforded a reasonable way to calculate summary statistics for a large set of data, through the underlying frequency distribution. This writer can remember teaching coding to generate integer midpoints for simpler calculations; you could calculate the mean while riding the bus. With calculators appearing in the early 70's coding made no sense. While it does introduce the idea or standardization, the calculator makes it straightforward to compute means and standard deviations, even for 'big' numbers.

Histograms are fine for displaying data. It can even be explained that if actual tally marks are used to classify the data into cells, then the resulting tally sheet turned sideways is an effective histogram. It was John Tukey [1] who pointed out one drawback to the frequency distribution approach, that the identity of individual data values is lost. He argued that the most simple thing to do in looking at a set of data was to scratch down some marks, and the mark might as well be the data value itself. Thus was born the stem and leaf diagram.

Stem and leaf plots are simple to construct. The stem consists of the first digit, or first several digits, of the data arranged in a column in ascending order. A vertical line can be drawn to separate the stems from the resulting leaves; the leaves are simply the last digit of each data value categorized according to this stem. Stem and leaf plots are not effective when a lot of data is available, say, more than 100 observations. In this case listing each individual value is a drawback and a frequency distribution will be better. Leaves could be two digit numbers, starting with 00, 01, etc; probably in this case too many significant digits are being recorded. Is the second digit really needed? Possible outliers in the data show up well with the actual value readily available.

Several refinements need to be used at times. One desirable refinement is to order the resulting leaves within each stem from low to high. In some cases one observes recorder bias, in that certain digits are used more or less often than others. For example, people may prefer to record 5 rather than 4 or 6 when reading instruments. Finding the median of the resulting ordered stem and leaf is straight forward. Demonstrating the empirical rule by examining one, two and three standard deviation intervals around the mean can be done visu-

Continued on page 13

"How To's"

Continued from page 11

industrial experiments. This book provides step-by-step details for constructing fractional factorial experiments. It also gives general procedures for fractions of two-level factorial experiments. It includes a catalog of useful fractional factorial design plans. There is limited coverage of formal statistical analysis of multifactor experiments and of experiments with factors of more than two levels. The format enables engineers and scientists with little statistics background to effectively use these powerful experimental designs. Extensive graphics illustrate analysis and each method is explained through the use of real-world numerical examples in the engineering sciences.

Item T3514
Member Price: $23.95
List Price: $25.95

Volume 15: How to Determine Sample Size & Estimate Failure Rate in Life Testing
by Eduardo C. Moura

The daily work of quality and reliability professionals frequently involves the design of life tests for reliability demonstration, as well as the estimation of product reliability based on the tests performed.

This book presents the equations necessary to determine the minimum sample size required for an accelerated life test which can be used to demonstrate that an item meets the specified goals with a given statistical precision. It also gives the formulas for estimating the true average failure rate by means of a confidence level. The equations are straightforward and hand calculation is practical. For frequent and repetitive calculation, a computer program is described that eliminates the need for tables. Requiring just a working knowledge of basic statistics, practical, step-by-step procedures are given for the most common life distributions: exponential, Weibull, normal and log-normal. The book also discusses several practical aspects which should be considered for sound application of the procedures. A chapter includes the statistical background underlying the formulas.

Item T3515
Member Price: $23.95
List Price: $25.95

How to Order: Call ASQC at 800-952-6587 (US only) or 800-248-1946 (US and Canada) for more information.

Stem and Leaf Debate Continued from page 12

ally on the stem and leaf. You can even draw lines to separate values into standard deviation zones.

One would like to end up with from 5 to 15 rows when done (Example 1). If the number of rows is much outside this range, then a different scale for classification is suggested. Tukey suggests two alternatives. The first is called a stretched stem and leaf plot and uses two auxiliary symbols, and asterisk and a period. Leaf values of 0,1,2,3 and 4 are put in the asterisk row, values of 5,6,7,8 and 9 in the period row (Example 2). The other alternative called a squeezed stem and leaf plot uses five symbols, letters O,T,F,S and a period. Here values of zero and one go in the O row, two and three in the T row, and so forth (Example 3).

Example 1: Suppose you have a set of data with values ranging from 12 to 275, then the original stem and leaf will have 27 rows as follows:

```
1
2
3
.
.
27
```

Example 2: If the amount of data is small, frequencies will be low or gaps may even occur. Six rows will be used with stems as follows:

```
0*
  .
1*
  .
2*
  .
```

Leaves may be one or two digit numbers.

Example 3: If you have a set of data with values ranging from 19 to 28, the stems are as follows:

```
1.
2O
 T
 F
 S
 .
```

Stem and leaf plots are effective when examining residuals in a regression study. While normal probability plots are the official diagnostic tool to use to examine the normal distribution of errors assumption, I find the time needed to explain them too long, even if only 15 minutes. Most inexpensive statistics packages do not plot them as an optional feature. The stem and leaf shows how the residuals are grouped around zero, whether they appear reasonably symmetric, and even if they have a mound shape resembling the normal distribution. Since stem and leaf plots have already been covered in the course, the instructor need merely refer to putting the residuals into this form, taking no time at all to explain.

The following set of data from Draper and Smith [2] will clarify this. The 25 values consist of residuals derived from fitting a regression model to data which relate the average atmospheric temperature to pounds of steam used per month. Using the original stem and leaf plot, we obtain:

```
-1 2237
-0 122235569
 0 1125689
 1 00223
```

The plot suggests a mound shape consistent with a satisfactory assumption of normal errors. No outliers are revealed. Using Tukey's first alternative, we obtain:

```
-  . 7
-1 * 223
-  . 5569
-0 * 12223
 0 * 112
   . 5689
 1 * 00223
```

This plot is more revealing, indicating a departure from both symmetry and a mound shape. Draper and Smith report that a normal plot of these residuals is "not atypical of normal samples of this size."

[1] Tukey, John W., Exploratory Data Analysis, Addision-Wesley, Reading, MA, 1977.

[2] Draper, Norman and Smith, Harry, Applied Regression Analysis, 2nd ed, John Wiley & Sons, NY, 1981.

PUBLICATIONS

THIS QUARTER IN TECHNOMETRICS

The lead article in the August 1991 issue of *Technometrics* is an expository paper on "Hidden Markov Modes for Speech Recognition" by B.H. Juang and L.R. Rabiner.

Speech recognition by machine has come of age in a practical sense. Numerous speech-recognition systems are currently in operation in applications ranging from a voice dialer for telephone to a voice response system that quotes stock prices on verbal inquiry. What makes these practical benefits happen is the recent technological advances that enable speech-recognition systems to respond reliably to nonspecific talkers with a reasonably sized recognition vocabulary. One such major advance is the use of statistical methods, of which hidden Markov model (HMM) is a particularly interesting one.

The use of HMM's for speech recognition has become popular in the past decade. There are a number of reported recognition systems based on HMM's. The widespread popularity of the HMM framework can be attributed to: its inherent statistical framework; the ease and availability of training algorithms for estimating the parameters of the model from finite training sets of speech data; the flexibility of the resulting recognition systems in which one can easily change the size, type, or architecture of the models to suit particular words, sounds and so forth; and the ease of implementation of the overall recognition system.

Performance, particularly in terms of accuracy, is a critical factor in determining the practical value of a speech recognition system. A speech-recognition task is often taxonomized according to its requirements in handling specific or non-specific talkers and in accepting only isolated utterances or fluent speech. At present, the state- of-the art technology can easily achieve almost perfect accuracy

Continued on page 14

THIS QUARTER IN JQT

The following articles are scheduled to appear in the October 1991 issue of the *Journal of Quality Technology*.

1. "Prediction Intervals for Some Discrete Distributions" by Jagdish K. Patel and V. A. Samaranayake.

Easy to compute one-sided small sample conservative prediction intervals for binomial, Poisson, hypergeometric, and negative-binomial distributions are described. These are obtained using a procedure that connects prediction interval problems to those which arise in the ranking and selection of statistical populations. As a result, known tables can be used to find prediction factors. Further, factors for prediction intervals based on a method suggested in the literature are given for the binomial and Poisson cases.

2. "Grubbs-type Estimators for Reproducibility Variances in an Interlaboratory Test Study" by Tilmann Deutler.

The well-known model of Grubbs, which is based on repeatability conditions, is generalized to reproducibility conditions in an interlaboratory test study. ANOVA-estimators are developed for the repeatability and reproducibility variances of each procedure as well as for the variability within and between laboratories. The paper gives a solution to a problem which often occurs in practice, but which cannot be tackled by the standard model of ISO 5725.

3. "An Optimal Design of CUSUM Quality Control Charts" by F. F. Gan.

An optimal design of CUSUM control charts is reviewed. Plots of chart parameters are given which enable the chart parameters of an optimal CUSUM chart to be determined easily. Both the CUSUM charts with and without head starts are considered.

4. "SPC in Low-Volume Manufacturing" by George F. Koons and Jeffery J. Luner.

Focusing on the process, not the product, is the key to implementing statistical process control in low-volume manufacturing environments. One approach is to initially assume that all products are being produced by a common process. Data can be used to verify or refute this assumption. If it is refuted, the appropriate subprocesses that must be monitored separately can be identified. A case study of a small batch machining process is used to describe this approach in implementing low-volume SPC.

5. "SPC Q Charts for a Poisson Parameter λ: Short or Long Runs" by Charles P. Quesenberry.

Approximately normalized control charts, called Q charts, have been given by the author in other work for charting variables and for a binomial attributes chart. We consider here the corresponding transformations for Poisson distributions, and give the Q charts technology for controlling a Poisson parameter λ. Charts are given for the two cases when the Poisson parameter λ is known and when it is unknown. The chart for the case when λ is unknown is useful both for short runs and for charting processes at start up before enough data are available to assume that λ is essentially known. The chart for the case when the parameter is assumed known gives probabilities of exceeding the control limits that are better approximated by the nominal normal distribution probabilities than the classical c or u charts. We give some tabular results to compare the goodness of the normal approximation to the probabilities for these charts with the c or u charts, and also, with a chart made using a square root normalizing transformation.

6. "Reliability Test Plans for One-Shot Devices Based on Repeated Samples" by Lee J. Bain and Max Engelhardt.

A "one-shot" device has the property that a successful test results in its destruction. An obvious example is the testing of an explosive device selected from a stockpile of military weapons. The type of data obtained differs from that of the standard life-testing situation. Such data is dichotomous (go or no go) rather than data obtained by measuring a continuous variable such as failure time or stress level.

Suppose, at some point in time, it is desired to demonstrate that a device satisfies a prescribed reliability requirement at a specified level of confidence. The number of unsuccessful tests that result when a fixed number of independently selected devices are tested is a binomial random variable with parameters n, the number of tests, and q, the probability of an unsuccessful test. Suppose also that one or more sets of data from earlier tests are available. An obvious question would be: Can such data be used in

Continued on page 15

Technometrics

Continued from page 13

in speaker-independent isolated digit recognition and would commit only 2-3% digit string errors when the digit sequence is spoken in a naturally connected manner by nonspecific talkers. Furthermore, in speaker-independent continuous speech environments with a 1,000 word-vocabulary and certain grammatical constraints, several advanced systems have been able to achieve 96% accuracy. These results sometimes rival human performance and thus affirm the potential usefulness of an automated speech recognition system in designated applications.

Although hidden Markov modeling has significantly improved the performance of current speech-recognition systems, the general problem of completely fluent, speaker-independent speech recognition is far from being solved. For example, there is no system that is capable of reliably recognizing unconstrained conversational speech, nor does there exist a good way to infer statistically the language structure from a limited corpus of spoken words. The purpose of this expository article is, therefore, to provide an overview of the theory of HMM, discuss the role of statistical methods, and point out a range of theoretical and practical issues that deserve attention and are necessary to understand so as to further advance research in the field of speech recognition.

Vijayan N. Nair, Editor

This Quarter in JQT Continued from page 14

order to demonstrate the desired reliability requirement with a smaller sample size at the current stage of testing? For example, suppose annual samples are taken from a stockpile of weapons in order to insure that the ability of the weapons to perform is not decreasing markedly with age.

If the reliability can change from one test to the next, then some type of model assumption will be necessary in order to utilize information from previous samples to decrease then number of devices needed for future tests. The present approach is to model the probability of an unsuccessful test as a function of the device's age.

The emphasis in this paper is on test plans for periodic testing of highly reliable one-shot devices. Based on model assumptions, the sequence of minimal sample size, achieving specified reliability criteria, are derived.

7. "Economic Selection of the Mean and Upper Limit for a Canning Problem with Limited Capacity" by Robert L. Schmidt and Phillip E. Pfeifer.

This paper considers the economic selection of both the process mean and the upper control limit in a two-level process-control scheme for a capacitated (bottleneck) production process. A closed-form expression for the optimal upper control limit is developed, and a one-way table and an approximating equation are provided for the optimal mean. The paper quantifies the savings in expected profit relative to using a single level of process control, and identifies the economic conditions under which the second level of process control is most beneficial.

8. "Determining the Optimal Process Mean and Screening Limits for Packages Subject to Compliance Testing" by Brian J. Melloy.

The repeated uniform filling of a package and the subsequent accurate estimation of its contents are complicated by the variability of the fill and packaging materials. Consequently, although each container is weighed, the process will still yield underfilled and overfilled packages. Therefore, screening limits are employed as a countermeasure, beyond which the product is reclaimed. The lower and upper limits are designed to decrease the risk of noncompliance and minimize product "giveaway," respectively. In this paper, a control policy model is developed for this environment which determines the economically optimal settings of the mean and the screening limits, subject to an acceptable level of risk.

47TH ANNUAL CONFERENCE ON APPLIED STATISTICS

The Annual Conference on Applied Statistics will be held December 16-18, 1991 at the Sands Hotel, Atlantic City, New Jersey. This conference presents new techniques and statistical applications in the biological-pharmaceutical and quality control fields. Two simultaneous two-day short courses will follow the conference. The W. Edwards Deming Award for Excellence in the Application of Statistics will be presented at the conference.

Anyone interested in further information or registration materials can contact:

Walter R. Young, Medical Research Division, American Cyanamid, Bldg. 60, Room 203, Pearl River, New York 10965. (914) 732-3224.

NAME THE NEWSLETTER CONTEST

Do you have an idea for a name for our newsletter?

If your idea is chosen, you will receive a $50 cash prize.

Below are a few ideas we came up with in the Hospitality Suite at AQC. As you can see we really need your help.

- Random Thoughts
- Signal and Noise
- Random Noise
- The New Statistician
- Normal Deviates

Here's how to enter. Send your idea along with your name, address and daytime phone number to:

Nancy Baxter, T. J. Lipton Co.
800 Sylvan Ave., C-210
Englewood Cliffs, NJ 07632

All entries must be received by August 31, 1991.

Problem-Driven Case Studies Symposium

The Center for Quality and Productivity Improvement at the University of Wisconsin is hosting its "Third Annual Symposium on Problem-Driven Case Studies" to be held in Madison, Wisconsin during November 21–22, 1991. The symposium provides a lively forum where people from a variety of fields can share their experiences in solving quality problems.

Again this year, case studies have been solicited from industry, service, and educational organizations. The common aspect of these case studies is that they are *problem-driven* rather than method-driven. Thus, the symposium focuses on problem formulation—often the most difficult part of a successful quality improvement activity—and on the process of developing a solution for the problem.

The cost of the symposium will be $250, including registration, refreshments, lunches, and the symposium banquet. For further information, send your address to Bruce Ankenman, Center for Quality and Productivity Improvement, University of Wisconsin/WARF 575, 610 Walnut St., Madison, WI 53705. To register, phone Engineering Registration at (608) 262-1299 or toll-free at 1-800-462-0876, 8:00 am–4:30 pm (Central Time).

PROBLEM-DRIVEN CASE STUDIES IN QUALITY IMPROVEMENT

Third Annual Symposium
November 21-22, 1991
Madison Wisconsin

A Forum to Share Experiences in Quality Improvement

Hosted by the Center for Quality and Productivity Improvement,
University of Wisconsin-Madison

Contact: Engineering Registration
The Wisconsin Center
702 Langdon Street
Madison, WI 53706
(608) 262-1299
1-800-462-0876, 8:00 AM-4:30 PM
(Central Time)

The *ASQC Statistics Division Newsletter* is a publication of the statistics Division of the American Society for Quality Control.

All communications regarding this publication, **EXCLUDING CHANGE OF ADDRESS**, should be addressed to:

Nancy Baxter, *Editor*
ASQC Statistics Division Newsletter
Thomas J. Lipton Company
800 Sylvan Avenue
C-210
Englewood Cliffs, NJ 07632

Other communications relating to the Statistics Division of ASQC should be addressed to:

Conrad A. Fung
Center for Quality and
Productivity Improvement
University of Wisconsin
WARF/1 1O9B
610 Walnut Street
Madison, WI 53705
(608) 263-2652

STATISTICS DIVISION
AMERICAN SOCIETY FOR
QUALITY CONTROL
c/o Nancy Baxter
T.J. Lipton
800 Sylvan Avenue
C-210
Englewood Cliffs, NJ 07632

Non-Profit Org.
U.S. Postage
PAID
Cedarburg, WI
Permit No. 199

All communications regarding membership including **change of address**, should be sent to:
American Society for Quality Control
310 West Wisconsin Avenue
Milwaukee, WI 53203
(414) 272-8575

ASQC STATISTICS DIVISION NEWSLETTER

INSIDE THIS ISSUE: