References

Al-Salti, M. and Statham, A. (1994), "A Review of the Literature on the Use of SPC in

Batch Production," Quality and Reliability Engineering International, 10, 49-62.

- Alt, F. (1985), "Multivariate Quality Control," *Encyclopedia of Statistical Sciences, Volume 6*, edited by S. Kotz and N. L. Johnson, New York: John Wiley & Sons, Inc., 110–122.
- Alwan, L. C. and Roberts, H. V. (1988), "Time Series Modeling for Statistical Process Control," *Journal of Business and Economic Statistics*, 6, 87–95.
- American Society for Testing and Materials (1976), ASTM Manual on Presentation of Data and Control Chart Analysis, 1916 Race Street, Philadelphia, PA 19103.
- ASQC Automotive Division/AIAG (1990), Fundamental Statistical Process Control: Reference Manual, AIAG.
- Austin, J. A. (1973), "Control Chart Constants for Largest and Smallest in Sampling from a Normal Distribution Using the Generalized Burr Distribution," *Technometrics*, 15, 931–933.
- Boyles, R. A. (1997), "Estimating Common-Cause Sigma in the Presence of Special Causes," *Journal of Quality Technology*, 29, 381–395.
- Box, G. E. P. and Jenkins, G. M. (1976), *Time Series Analysis: Forecasting and Control*, San Francisco: Holden-Day.
- Box, G. E. P. and Kramer, T. (1992), "Statistical Process Monitoring and Feedback Adjustment—A Discussion," *Technometrics*, 34, 251–285 (with discussion).
- Burr, I. W. (1969), "Control Charts for Measurements with Varying Sample Sizes," *Journal of Quality Technology*, 1, 163–167.
- Burr, I. W. (1976), *Statistical Quality Control Methods*, New York: Marcel Dekker, Inc.
- Champ, S. W. and Woodall, W. H. (1987), "Exact Results for Shewhart Control Charts With Supplementary Runs Rules," *Technometrics*, 29, 393–401.
- Champ, S. W. and Woodall, W. H. (1990), "A Program to Evaluate the Run Length Distribution of a Shewhart Control Chart with Supplementary Run Rules," *Journal of Quality Technology*, 29, 393–399.
- Deming, W. E. (1982), *Out of the Crisis*, Cambridge, MA: Massachusetts Institute of Technology, Center for Advanced Engineering Study.
- Doganaksoy, N., Faltin, F. W., and Tucker, W. T. (1991), "Identification of Out-of-Control Quality Characteristics in a Multivariate Manufacturing Environment," *Communications in Statistics—Theory and Methods*, 20, 2775–2790.

- Farnum, N. R. (1992), "Control Charts for Short Runs: Nonconstant Process and Measurement Error," *Journal of Quality Technology*, 24, 138–144.
- Gnanadesikan, R. and Kettenring, J. R. (1972), "Robust Estimates, Residuals, and Outlier Detection with Multiresponse Data," *Biometrics*, 28, 81–124.
- Grant, E. L. and Leavenworth, R. S. (1988), *Statistical Quality Control, Sixth Edition*, New York: McGraw-Hill.
- Hawkins, D. M. (1991), "Multivariate Quality Control Based on Regression-Adjusted Variables," *Technometrics*, 33, 61–75.
- Hawkins, D. M. (1993), "Regression Adjustment for Variables in Multivariate Quality Control," *Journal of Quality Technology*, 25, 170–182.
- Hillier, F. S. (1969), " \overline{X} and *R*-Chart Control Limits Based On a Small Number of Subgroups," *Journal of Quality Technology*, 1, 17–26.
- Hotelling, H. (1931), "The Generalization of Student's Ratio," Annals of Mathematical Statistics, 2, 360–378.
- Hotelling, H. (1947), "Multivariate Quality Control," *Techniques of Statistical Analysis* (C. Eisenhart, M. Hastay, and W. A. Wallis, eds.), New York: McGraw-Hill, 111–184.
- Hunter, J. S. (1986), "The Exponentially Weighted Moving Average," *Journal of Quality Technology*, 18, 203–210.
- Hunter, J. S. (1988), "The Digidot Plot," The American Statistician, 24, 54.
- Iglewicz, B. and Hoaglin, D. (1987), "Use of Boxplots for Process Evaluation," *Journal of Quality Technology*, 19, 180–190.
- Jackson, J. E. (1980), "Principal Components and Factor Analysis: Part I Principal Components," *Journal of Quality Technology*, 12, 201–213.
- Jackson, J. E. (1985), "Multivariate Quality Control," *Communications in Statistics*, 14 (11), 2657–2688.
- Jackson, J. E. (1991), A User's Guide to Principal Components, New York: John Wiley & Sons, Inc.
- Johnson, N. L., Kotz, S., and Kemp, A. W. (1992) Univariate Discrete Distributions, Second Edition, New York: John Wiley & Sons, Inc.
- Kume, H. (1985), *Statistical Methods for Quality Improvement*, Tokyo: AOTS Chosakai, Ltd.
- MacGregor, J. (1987), "Interfaces Between Process Control and Online Statistical Process Control," *Computing and Systems Technology Division Communications*, 10, 9–20.
- MacGregor, J. (1990), "A Different View of the Funnel Experiment," *Journal of Quality Technology*, 22, 255–259.
- MacGregor, J., Hunter, J. S., and Harris, T. (1988), "SPC Interfaces," short course notes.

- McGill, R., Tukey, J. W., and Larsen, W. A. (1978), "Variations of Box Plots," *The American Staistician*, 32, 12–16.
- Mason, R. L., Tracy, N. D., and Young, J. C. (1993), "Use of Hotelling's T^2 Statistic in Multivariate Control Charts," unpublished manuscript.
- Montgomery, D. C. (1996), *Introduction to Statistical Quality Control, Third Edition*, New York: John Wiley & Sons, Inc.
- Montgomery, D. C. and Mastrangelo, C. M. (1991), "Some Statistical Process Control Methods for Autocorrelated Data," *Journal of Quality Technology*, 23, 179–204 (with discussion).
- Montgomery, D. C., Keats, J. B., Runger, G. C. and Messina, W. S. (1994), "Integrating Statistical Process Control and Engineering Process Control," *Journal of Quality Technology*, 26, 79–87.
- Nelson, L. S. (1982), "Control Charts for Individual Measurements," *Journal of Quality Technology*, 14, 172-174.
- Nelson, L. S. (1984), "The Shewhart Control Chart—Tests for Special Causes," *Journal of Quality Technology*, 15, 237–239.
- Nelson, L. S. (1985), "Interpreting Shewhart \bar{X} Control Charts," *Journal of Quality Technology*, 17, 114–116.
- Nelson, L. S. (1989), "Standardization of Shewhart Control Charts," *Journal of Quality Technology*, 21, 287–289.
- Nelson, L. S. (1990), "Setting Up a Control Chart Using Subgroups of Varying Sizes," *Journal of Quality Technology*, 22, 245–246.
- Nelson, L. S. (1994), "Shewhart Control Charts With Unequal Subgroup Sizes," *Journal of Quality Technology*, 26, 64–67.
- Quesenberry, C. P. (1991a), "SPC *Q* Charts for Start-Up Processes and Short or Long Runs," *Journal of Quality Technology*, 23, 213–224.
- Quesenberry, C. P. (1991b), "SPC Q Charts for a Binomial Parameter p: Short or Long Runs," *Journal of Quality Technology*, 23, 239–246.
- Quesenberry, C. P. (1993), "The Effect of Sample Size on Estimated Effects," *Journal* of Quality Technology, 25, 237–247.
- Rocke, D. M. (1989), "Robust Control Charts," Technometrics, 31, 173-184.
- Rodriguez, R. N. and Bynum, R. A. (1992), *Examples of Short Run Process Control Methods With the SHEWHART Procedure in SAS/QC Software*. Unpublished manuscript available from the authors.
- Rodriguez, R. N. and Bynum, R. A. (1993), *Process Capability Analysis Using SAS/QC Software, Release 6.08.* Unpublished manuscript available from the authors.
- Ryan, T. P. (1989), *Statistical Methods for Quality Improvement*, New York: John Wiley & Sons, Inc.

- SAS Institute Inc. (1999), SAS/GRAPH Software: Reference, Version 8, Cary, NC: SAS Institute Inc.
- SAS Institute Inc. (1989b), SAS Technical Report P-188: SAS/QC Software Examples, Version 6, Cary, NC: SAS Institute Inc.
- SAS Institute Inc. (1999), SAS Language Reference: Dictionary, Version 8, Cary, NC: SAS Institute Inc.
- SAS Institute Inc. (1991a), SAS Technical Report P-229: SAS/STAT Software: Changes and Enhancements, Release 6.07, Cary, NC: SAS Institute Inc.
- SAS Institute Inc. (1991b), SAS/QC Software: SQC Menu System, Version 6, First Edition, Cary, NC: SAS Institute Inc.
- SAS Institute Inc. (1999), SAS/ETS User's Guide, Version 8, Cary, NC: SAS Institute Inc.
- Schilling, E. G. and Nelson, P. R. (1976), "The Effect of Non-Normality on the Control Limits of \bar{X} Charts," *Journal of Quality Technology*, 8, 183–187.
- Schneider, H. and Pruett, J. M. (1994), "Control Charting Issues in the Process Industries," *Quality Engineering*, 6, 347–373.
- Shewhart, W. A. (1931), Economic Control of Quality Manufactured Product, New York: D. Van Nostrand Company, Inc. Republished in 1980 by the American Society of Quality Control.
- Snedecor, G. W. and Cochran, W. G. (1980), *Statistical Methods, Seventh Edition*, Ames, IA: The Iowa State University Press.
- Teichroew, D. (1956), "Tables of Expected Values of Order Statistics and Products of Order Statistics for Samples of Size 20 and Less from the Normal Distribution," *Annals of Mathematical Statistics*, 27, 410–426. Reproduced in Sarhan, A. E. and Greenberg, B. G. (eds.) (1962), *Contributions to Order Statistics*, New York: John Wiley & Sons, Inc.
- Tracy, N. D., Young, J. C., and Mason, R. L. (1992), "Multivariate Control Charts for Individual Observations," *Journal of Quality Technology*, 24, 88–95.
- Tukey, J. W. (1977), Exploratory Data Analysis, Reading, MA: Addison-Wesley.
- Western Electric Company (1956), *Statistical Quality Control Handbook*, available from Western Electric Company, Commercial Sales Clerk, Select Code 700-444, P. O. Box 26205, Indianapolis, Indiana 46226.
- Wetherill, G. B. and Brown, D. W. (1991), *Statistical Process Control: Theory and Practice*, London: Chapman and Hall.
- Wheeler, D. J. (1991a), Short Run SPC, Knoxville, TN: SPC Press, Inc.
- Wheeler, D. J. (1991b), "Shewhart's Chart: Myths, Facts, and Competitors," 45th Annual Quality Congress Transactions, American Society for Quality Control. 533–538.
- Wheeler, D. J. and Chambers, D. S. (1986), *Understanding Statistical Process Control*, Knoxville, TN: SPC Press, Inc.

- Wilks, S. S. (1962), Mathematical Statistics, New York: John Wiley & Sons, Inc.
- Woodall, W. H. (1993), "Autocorrelated Data and SPC," ASQC Statistics Division Newsletter, 13, 18–21.

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