Electronic Data Refinement

On the web, one can find an increasing number of textbooks presented in a new form. Such a site may be free of charge, but it may also not be worth the time to read. There are, however, some exceptions. The US National Institute of Standards and Technology (NIST) and the Sematech Consortium have set up a site for engineers and scientists: The Engineering Statistics Handbook is focused on the design and optimization of measurement systems and the generation and evaluation of data and is rather useful for both browsing and searching. The technical editors Carroll Croarkin (NIST) and Paul Tobias (Sematech) together with a group of authors have published this handbook on the NIST web site. From eight chapters, readers can obtain comprehensive information on how to reduce the extent of errors and how to optimally evaluate the resulting data. Both theoretical basics and practical methods are explained. The authors give an overview on

- the basics of exploratory data analysis in comparison to classical methods,
- procedures and protocols of the actual measurement processes and their impact on the quality of the data (especially how to detect and avoid errors, and how to describe and characterize systematic errors),
- planning and execution of studies which characterize a production process, how to

model such a process, and how to use the model to develop a strategy for data analysis,

- models that are necessary to describe a scientific or technical process based on mathematical functions (prediction of results, calibration, or process optimization),
- terms, methods, and techniques for process optimization (even for nonmathematicians),
- how to improve products and processes (statistical process and quality monitoring),
- quality monitoring, and
- the reliability of data.

The book is presented online like a printed textbook (Figure 1). The hints on how to use the book, tools, and aids are very helpful (Figure 2). Tools include the interactive program DATAPLOT. Further programs are presented and linked to.

Various examples accompany every chapter of the book and include graphical and mathematical tools. Pdf files are available, so chapters can also be printed by those who do not like to read everything on a screen.

As mentioned in the title, the handbook is originally geared towards engineers and technicians. But it is also very useful if one only happens to look for a statistical method of data analysis that
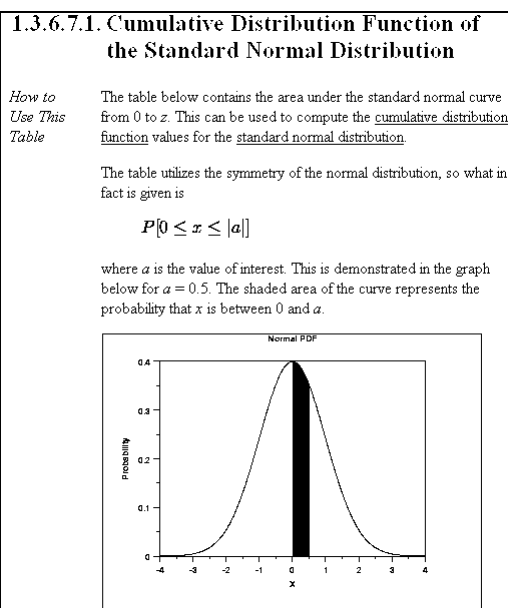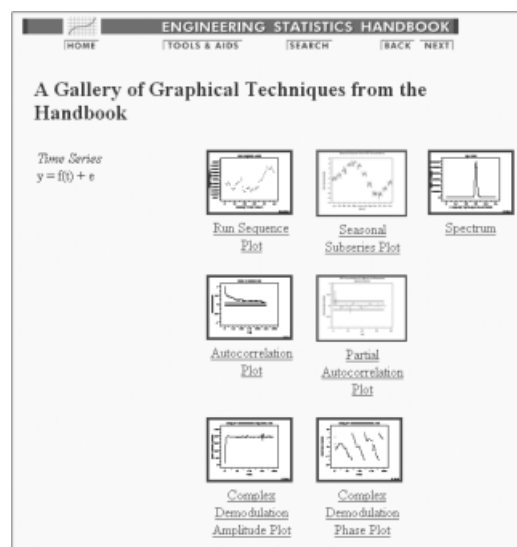

Figure 2. Graphical gallery of some tools for data analysis

goes beyond linear regression. Here is a freely accessible book which presents the theoretical and statistical basics of data acquisition and analysis. Even if only part of the site may be of interest to

a particular reader, it is still worth searching in some cases. One may not need the Engineering Statistics Handbook on the shelf, but it is worth to be accessed through the web.

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Figure 1. A standard normal distribution