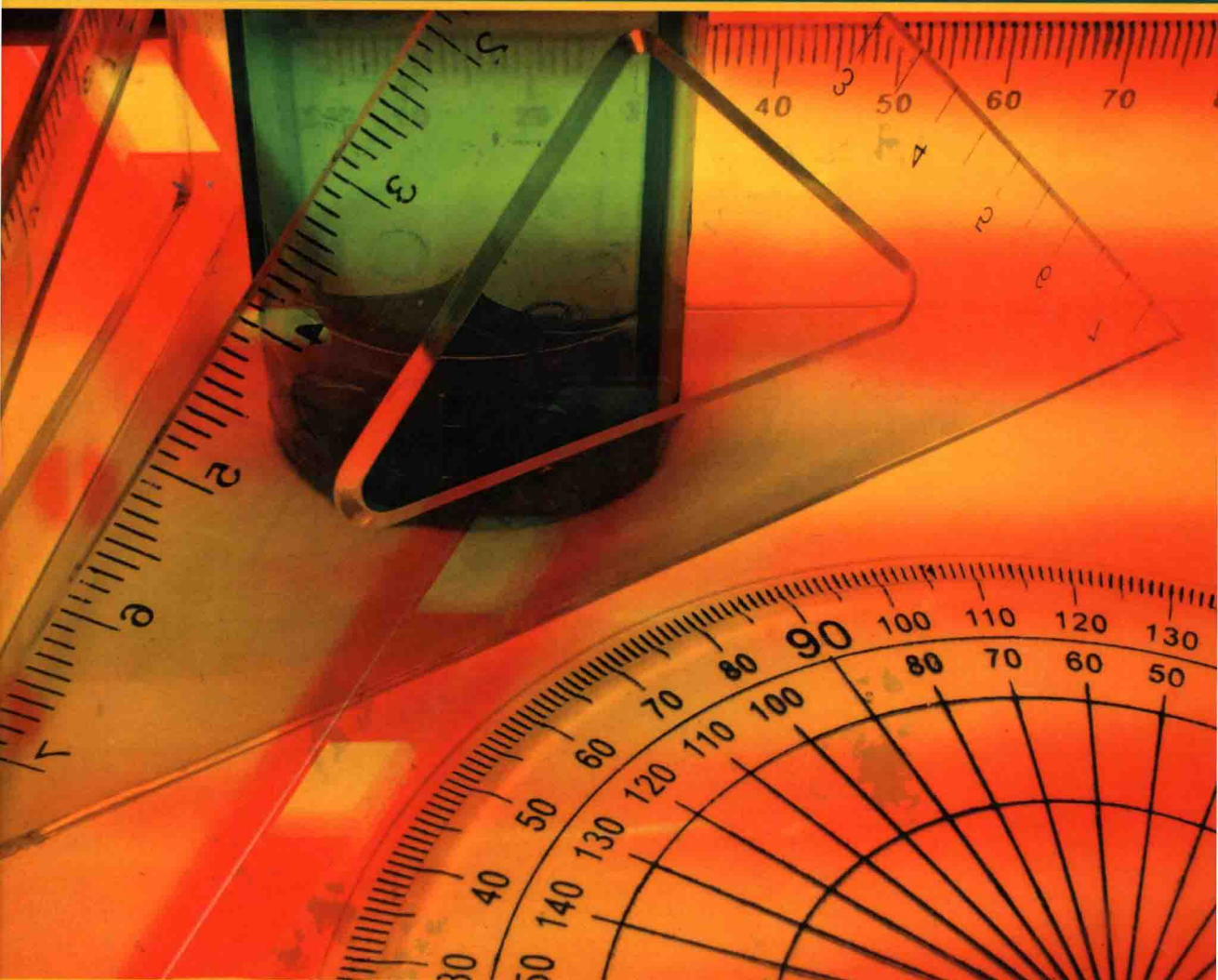


Handbook of Measurements

Benchmarks for Systems Accuracy and Precision



Edited by Adedeji B. Badiru and LeeAnn Racz



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Engineering - Industrial & Manufacturing

The basis for all successful engineering operations lies in planning, measuring, and paying attention to details. Measurements pervade everything we do and must be viewed from a systems perspective. A comprehensive, all-encompassing guide to measurements, ***Handbook of Measurements: Benchmarks for Systems Accuracy and Precision*** focuses on high-level engineering computations essential for benchmarks and technical innovation. The book uses a systems framework and a technically rigorous approach to systems linking of measurements—an approach that sets it apart from other handbooks.

The popular saying “measure twice and cut once” underscores the importance of measurements in human endeavors. This handbook covers both qualitative and quantitative topics of measurement. It opens with a chapter on the fundamentals of measurement and includes coverage of human-centric measurements, such as measurement of personnel productivity and contractor performance. It concludes with three appendices on measurement, references, conversion factors; equations and formulas; and statistics for measurement.

It is well understood that humans cannot manage anything that cannot be measured. All elements involved in our day-to-day decision making involve some form of measurement, whether in the kitchen, retail, sports, service operations, geographical exploration, health care delivery, worker productivity, clothing design, engineering product design, or space craft launching. Measuring an attribute of a system and then analyzing it against some standard, some specification, some best practice, or some benchmark empower a decision maker to take appropriate and timely actions. This book gives you a guide for sustainable practices to ensure accurate measurements, helping you make decisions backed by metrics.



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Badiru
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Industrial Innovation Series

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Adedeji B. Badiru

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for the inspiration and motivation for this work*

Preface

Planning, measurement, and attention to detail form the basis for success in engineering operations. Measurements pervade everything we do and must be viewed from a systems perspective. Using a systems framework, *The Handbook of Measurements: Benchmarks for Systems Accuracy*, presents a comprehensive guide to everything about measurement. Its technically rigorous approach to systems linking of measurements sets it apart from other handbooks. The broad approach of the handbook covers both qualitative and quantitative topics of measurement. Of particular benefit is the inclusion of human-centric measurements such as measurement of personnel productivity and contractor performance. The handbook opens with a chapter on the fundamentals of measurement. It is well understood that humans cannot manage anything that cannot be measured. All elements involved in our day-to-day decision making involve some forms of measurement. Measuring an attribute of a system and then analyzing it against some standard, specification, best practice, or benchmark empowers a decision maker to take appropriate and timely actions.

Fundamentally, measurement is the act, or the result of a quantitative comparison between a predefined standard and an unknown magnitude. This handbook uses a systems view of measurement to link all aspects. For example, one chapter in the handbook addresses systems interoperability measurement, which further illustrates how the elements of any large complex system interoperate to accomplish a desired end goal. Other chapters in the handbook include human factors measurements for work system analysis, measurements of environmental health, measurement of environmental contamination, measurements of land, measuring building performance, energy systems measurements, economic systems measurements, measurement and quantum mechanics, social science measurement, a measurement model to quantify health, large-scale dimensional metrology, performance-based logistics, data processing, visualization of big data, maintenance metrics analysis, measuring success of services contracts, measurement of personnel productivity, measurement risk analysis, data modeling for forecasting, measurements from archival observational data, reduction of measurement imprecision, measurements in ergonomics studies, metrics to manage contractor performance, and a low-clutter method for bistatic radar cross-section measurements. The handbook concludes with three appendices on measurement references, conversion factors, equations, formulas, and statistics for measurement.

Adedeji B. Badiru and LeeAnn Racz

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Editors

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