1. Record Nr. UNINA9910132193703321

Autore	Dodson Bryan <1962->
Titolo	Probabilistic design for optimization and robustness for engineers / / Bryan Dodson, Patrick C. Hammett, Rene Klerx
Pubbl/distr/stampa	West Sussex, England : , : John Wiley & Sons, Inc., , 2014 ©2014
ISBN	1-118-79624-1 1-118-79650-0
Descrizione fisica	1 online resource (270 p.)
Disciplina	620/.00452
Soggetti	Industrial design - Statistical methods Reliability (Engineering) Robust statistics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Probabilistic Design for Optimization and Robustness for Engineers; Contents; Preface; Acknowledgments; 1 New product development process; 1.1 Introduction; 1.2 Phases of new product development; 1.2.1 Phase I-concept planning; 1.2.2 Phase II-product planning; 1.2.3 Phase III-product engineering design and verification; 1.2.4 Phase IV-process engineering; 1.2.5 Phase V-manufacturing validation and ramp-up; 1.3 Patterns of new product development; 1.4 New product development and Design for Six Sigma; 1.4.1 DfSS core objectives; 1.4.2 DfSS methodology; 1.4.3 Embedded DfSS; 1.5 Summary Exercises2 Statistical background for engineering design; 2.1 Expectation; 2.2 Statistical distributions; 2.2.1 Normal distribution; 2.2.2 Lognormal distribution; 2.2.3 Weibull distribution; 2.2.4 Exponential distribution; 2.3 Probability plotting; 2.3.1 Probability plotting-lognormal distribution; 2.3.2 Probability plotting-normal distribution; 2.3.3 Probability plotting-Weibull distribution; 2.3.4 Probability plotting-exponential distribution; 2.3.5 Probability plotting with confidence limits; 2.4 Summary; Exercises; 3 Introduction to variation in engineering design 3.1 Variation in engineering design3.2 Propagation of error; 3.3

Protecting designs against variation; 3.4 Estimates of means and variances of functions of several variables; 3.5 Statistical bias; 3.6 Robustness; 3.7 Summary; Exercises; 4 Monte Carlo simulation; 4.1 Determining variation of the inputs; 4.2 Random number generators; 4.3 Validation; 4.4 Stratified sampling; 4.5 Summary; Exercises; 5 Modeling variation of complex systems; 5.1 Approximating the mean, bias, and variance; 5.2 Estimating the parameters of non-normal distributions
5.3 Limitations of first-order Taylor series approximation for variance5.4 Effect of non-normal input distributions; 5.5 Nonconstant input standard deviation; 5.6 Summary; Exercises; 6 Desirability; 6.1 Introduction; 6.2 Requirements and scorecards; 6.2.1 Types of requirements; 6.2.2 Design scorecard; 6.3 Desirability-single requirement; 6.3.1 Desirability-one-sided limit; 6.3.2 Desirability-two-sided limit; 6.3.3 Desirability-nonlinear function; 6.4 Desirability-multiple requirements; 6.4.1 Maxi-min total desirability index; 6.5 Desirability-accounting for variation
6.5.1 Determining desirability-using expected yields6.5.2 Determining desirability-using non-mean responses; 6.6 Summary; Exercises; 7 Optimization and sensitivity; 7.1 Optimization procedure; 7.2 Statistical outliers; 7.3 Process capability; 7.4 Sensitivity and cost reduction; 7.4.1 Reservoir flow example; 7.4.2 Reservoir flow initial solution; 7.4.3 Reservoir flow initial solution verification; 7.4.4 Reservoir flow optimized with normal horsepower distribution; 7.4.5 Reservoir flow optimized with normal horsepower distribution verification
7.4.6 Reservoir flow horsepower variation sensitivity

Sommario/riassunto

Probabilistic Design for Optimization and Robustness: Presents the theory of modeling with variation using physical models and methods for practical applications on designs more insensitive to variation. Provides a comprehensive guide to optimization and robustness for probabilistic design.Features examples, case studies and exercises throughout. The methods presented can be applied to a wide range of disciplines such as mechanics, electrics, chemistry, aerospace, industry and engineering. This text is supported by an accompanying website featu