

solidworks thermal analysis

SolidWorks Thermal Analysis: A Comprehensive Guide for Engineers

Introduction:

Are you ready to take your SolidWorks designs to the next level by incorporating robust thermal analysis? Understanding how your products will behave under varying temperature conditions is crucial for ensuring functionality, reliability, and longevity. This comprehensive guide delves into the world of SolidWorks thermal analysis, providing a step-by-step walkthrough of the process, best practices, and advanced techniques. We'll explore the software's capabilities, helping you confidently integrate thermal simulation into your design workflow and avoid costly rework down the line. Whether you're a seasoned SolidWorks user or just starting your thermal analysis journey, this post will equip you with the knowledge and insights needed to master this powerful tool.

I. Understanding the Fundamentals of SolidWorks Thermal Analysis:

SolidWorks Simulation offers a powerful suite of tools for thermal analysis, enabling engineers to predict temperature distributions, heat fluxes, and thermal stresses within their designs. This module utilizes the Finite Element Method (FEM) to solve complex heat transfer problems. Unlike simpler methods, FEM breaks down your geometry into numerous smaller elements, allowing for a more accurate representation of heat flow. This is especially crucial for complex geometries or intricate heat transfer scenarios.

Understanding key concepts like:

Conduction: Heat transfer through direct contact within a material.

Convection: Heat transfer through fluid movement (air, water, etc.).

Radiation: Heat transfer through electromagnetic waves.

Boundary Conditions: Defining parameters like ambient temperature, heat sources, and convection coefficients.

Material Properties: Accurately defining the thermal conductivity, specific heat, and density of the materials used in your model is paramount for accurate results. Incorrect material properties can lead to significant errors in your thermal analysis.

II. Setting Up a SolidWorks Thermal Analysis Simulation:

The process involves several key steps:

1. **Model Preparation:** Ensure your SolidWorks model is clean, with properly defined parts and assemblies. Repair any errors or inconsistencies before proceeding. Meshing quality directly impacts accuracy, so a well-prepared model saves time and resources later.

1. Meshing: SolidWorks offers automatic meshing capabilities, but manual control over mesh density is recommended, especially in areas of high temperature gradients or geometric complexity. Finer meshes provide greater accuracy but require more computational resources.

1. Defining Boundary Conditions: Carefully define your boundary conditions. This involves specifying temperatures, heat fluxes, and convection coefficients based on your specific application. Accurate boundary conditions are crucial for achieving realistic results. Misrepresenting these conditions can drastically skew your simulation results.

1. Material Selection: Select appropriate materials from the SolidWorks material library or define custom materials with accurate thermal properties. Incorrect material selection is a frequent source of inaccuracies.

1. Running the Simulation: Once all parameters are defined, initiate the simulation. Monitor the progress and ensure no errors occur.

1. Post-Processing and Results Interpretation: SolidWorks provides a range of tools for visualizing and interpreting your results. Analyze temperature distributions, heat fluxes, and thermal stresses to understand how your design will perform under various conditions. Proper interpretation requires careful consideration of your design context and limitations of the simulation itself.

III. Advanced Techniques in SolidWorks Thermal Analysis:

SolidWorks Simulation goes beyond basic steady-state analysis; it also allows for:

Transient Thermal Analysis: Simulating temperature changes over time, crucial for understanding thermal shock and transient heat transfer effects.

Conjugate Heat Transfer: Modeling the interaction between solids and fluids, essential for applications involving heat exchangers or electronic cooling. This sophisticated analysis involves modeling the heat transfer between different materials and fluids in a complex system.

Non-Linear Analysis: Accurately simulating situations where material properties change with temperature, which is common for many materials at extreme temperatures. This accounts for the variation in conductivity, specific heat capacity, and other material parameters with respect to changes in temperature.

Optimization Studies: Leveraging SolidWorks Simulation's capabilities for design optimization to improve thermal performance by adjusting design parameters. This iterative process can substantially enhance the thermal efficiency of your design.

IV. Best Practices for Accurate Results:

Achieving accurate and reliable results in SolidWorks thermal analysis necessitates adherence to specific best practices:

Mesh Refinement: Employ finer meshes in critical areas of your model to improve accuracy.

Validation: Whenever possible, compare your simulation results to experimental data or analytical solutions to verify accuracy.

Convergence Studies: Perform convergence studies to ensure that your solution is independent of mesh size and other simulation parameters.

Careful Boundary Condition Definition: Ensure accurate and realistic boundary conditions are applied.

Material Property Accuracy: Use accurate material properties. Consult material datasheets for accurate values and account for variations in temperature.

V. Case Studies and Real-World Applications:

SolidWorks thermal analysis finds applications in numerous fields including:

Electronics Cooling: Designing effective heat sinks and cooling systems for electronic components.

Automotive Engineering: Analyzing the thermal performance of engine components and vehicle interiors.

Aerospace Engineering: Modeling the heat transfer in aircraft structures and propulsion systems.

Biomedical Engineering: Simulating the temperature distribution in medical devices and implants.

Industrial Equipment: Designing efficient cooling systems for machinery and equipment.

Article Outline: SolidWorks Thermal Analysis Mastery

Introduction: Brief overview of SolidWorks thermal analysis and its importance.

Chapter 1: Fundamentals of Heat Transfer: Detailed explanation of conduction, convection, and radiation.

Chapter 2: Setting up a Thermal Analysis Simulation: Step-by-step guide to model preparation, meshing, boundary conditions, and material selection.

Chapter 3: Advanced Techniques: Exploration of transient analysis, conjugate heat transfer, and non-linear analysis.

Chapter 4: Best Practices and Troubleshooting: Tips for accurate simulations, mesh refinement strategies, and addressing common issues.

Chapter 5: Real-World Applications: Case studies showcasing the use of SolidWorks thermal analysis across diverse engineering domains.

Conclusion: Summary of key concepts and their application in practical engineering scenarios.

(Detailed content for each chapter would then follow, expanding on the points outlined above. This would constitute the bulk of the 1500+ word article.)

FAQs:

1. What are the system requirements for running SolidWorks Thermal Analysis? The requirements vary depending on the complexity of your models but generally involve a powerful processor, ample RAM, and a dedicated graphics card.
1. Can I perform CFD simulations within SolidWorks Thermal Analysis? While SolidWorks Simulation doesn't directly handle CFD, it can be integrated with other specialized CFD software for coupled simulations.
1. How do I validate my SolidWorks thermal analysis results? Validation can be achieved through comparison with experimental data, analytical solutions, or results from other reputable simulation software.
1. What types of boundary conditions can I define in SolidWorks Thermal Analysis? You can define temperature, heat flux, convection, and radiation boundary conditions, among others.
1. How important is mesh refinement in SolidWorks Thermal Analysis? Mesh refinement is crucial for accuracy, particularly in areas with significant temperature

gradients.

1. Can I use custom materials in SolidWorks Thermal Analysis? Yes, you can define custom materials with their specific thermal properties.
1. What is the difference between steady-state and transient thermal analysis? Steady-state analysis assumes constant temperatures, while transient analysis considers temperature changes over time.
1. How can I improve the convergence of my SolidWorks thermal analysis? Techniques such as mesh refinement, improved boundary condition definitions, and using appropriate solvers can improve convergence.
1. What are the limitations of SolidWorks Thermal Analysis? Limitations might include computational resource requirements for very complex models and potential inaccuracies due to simplified assumptions in certain analyses.

Related Articles:

1. SolidWorks Simulation: A Beginner's Guide: Introduction to the basic functionalities of SolidWorks Simulation.
1. Meshing Techniques in SolidWorks Simulation: A detailed explanation of meshing strategies and best practices.
1. Advanced Meshing Strategies for Thermal Analysis: Focuses on mesh refinement and optimization techniques.
1. Conjugate Heat Transfer in SolidWorks: A comprehensive guide to setting up and

interpreting results of conjugate heat transfer simulations.

1. Troubleshooting Common SolidWorks Thermal Analysis Errors: Guidance on resolving common problems and errors encountered during simulations.
1. Validating SolidWorks Thermal Analysis Results: Methods for validating simulation results against experimental data or analytical solutions.
1. Optimization Studies in SolidWorks Simulation: Explanation of how to perform design optimization using SolidWorks Simulation.
1. SolidWorks Thermal Analysis for Electronics Cooling: Case studies and best practices for thermal analysis in electronics design.
1. SolidWorks Thermal Analysis for Automotive Applications: Case studies and applications in the automotive industry.

solidworks thermal analysis: Thermal Analysis with SOLIDWORKS Simulation 2015 and Flow Simulation 2015 Paul Kurowski, 2015 Thermal Analysis with SOLIDWORKS Simulation 2015 goes beyond the standard software manual. It concurrently introduces the reader to thermal analysis and its implementation in SOLIDWORKS Simulation using hands-on exercises. A number of projects are presented to illustrate thermal analysis and related topics. Each chapter is designed to build on the skills and understanding gained from previous exercises. Thermal Analysis with SOLIDWORKS Simulation 2015 is designed for users who are already familiar with the basics of Finite Element Analysis (FEA) using SOLIDWORKS Simulation or who have completed the book Engineering Analysis with SOLIDWORKS Simulation 2015. Thermal Analysis with SOLIDWORKS Simulation 2015 builds on these topics in the area of thermal analysis. Some understanding of FEA and SOLIDWORKS Simulation is assumed. Topics covered Analogies between thermal and structural analysisHeat transfer by conductionHeat transfer by convectionHeat transfer by radiationThermal loads and boundary conditionsThermal resistanceThermal stressesThermal bucklingModeling techniques in thermal analysisPresenting results of thermal analysis

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solidworks thermal analysis: Engineering Analysis with SOLIDWORKS Simulation 2018 Paul Kurowski, 2018-03 Engineering Analysis with SOLIDWORKS Simulation 2018 goes beyond the standard software manual. Its unique approach concurrently introduces you to the SOLIDWORKS Simulation 2018 software and the fundamentals of Finite Element Analysis (FEA) through hands-on exercises. A number of projects are presented using commonly used parts to illustrate the analysis features of SOLIDWORKS Simulation. Each chapter is designed to build on the skills, experiences and understanding gained from the previous chapters.

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solidworks thermal analysis: An Introduction to SOLIDWORKS Flow Simulation 2016 John Matsson, 2016-07 An Introduction to SOLIDWORKS Flow Simulation 2016 takes you through the steps of creating the SOLIDWORKS part for the simulation followed by the setup and calculation of the SOLIDWORKS Flow Simulation project. The results from calculations are visualized and compared with theoretical solutions and empirical data. Each chapter starts with the objectives and a description of the specific problems that are studied. End of chapter exercises are included for reinforcement and practice of what has been learned. The fourteen chapters of this book are directed towards first-time to intermediate level users of SOLIDWORKS Flow Simulation. It is intended to be a supplement to undergraduate Fluid Mechanics and Heat Transfer related courses. This book can also be used to show students the capabilities of fluid flow and heat transfer simulations in freshman and sophomore courses such as Introduction to Engineering. Both internal and external flow problems are covered and compared with experimental results and analytical solutions. Covered topics include airfoil flow, boundary layers, flow meters, heat exchanger, natural and forced convection, pipe flow, rotating flow, tube bank flow and valve flow.

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steps of creating the SOLIDWORKS part for the simulation followed by the setup and calculation of the SOLIDWORKS Flow Simulation project. The results from calculations are visualized and compared with theoretical solutions and empirical data. Each chapter starts with the objectives and a description of the specific problems that are studied. End of chapter exercises are included for reinforcement and practice of what has been learned. The fourteen chapters of this book are directed towards first-time to intermediate level users of SOLIDWORKS Flow Simulation. It is intended to be a supplement to undergraduate Fluid Mechanics and Heat Transfer related courses. This book can also be used to show students the capabilities of fluid flow and heat transfer simulations in freshman and sophomore courses such as Introduction to Engineering. Both internal and external flow problems are covered and compared with experimental results and analytical solutions. Covered topics include airfoil flow, boundary layers, flow meters, heat exchanger, natural and forced convection, pipe flow, rotating flow, tube bank flow and valve flow.

solidworks thermal analysis: Engineering Analysis with SOLIDWORKS Simulation 2019

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solidworks thermal analysis: Engineering Analysis with SolidWorks Simulation 2011 Paul

Kurowski, 2011 Engineering Analysis with SolidWorks Simulation 2011 goes beyond the standard software manual because its unique approach concurrently introduces you to the SolidWorks Simulation 2011 software and the fundamentals of Finite Element Analysis (FEA) through hands-on exercises. A number of projects are presented using commonly used parts to illustrate the analysis features of SolidWorks Simulation. Each chapter is designed to build on the skills, experiences and understanding gained from the previous chapters. The following FEA functionality of SolidWorks Simulation 2011 is covered: Linear static analysis of parts and assemblies Contact stress analysis Frequency (modal) analysis Buckling analysis Thermal analysis Drop test analysis Nonlinear analysis Dynamic analysis h and p adaptive solution methods

solidworks thermal analysis: SolidWorks Simulation 2020 Black Book (Colored) Gaurav

Verma, Matt Weber, 2019-11-19 The SolidWorks Simulation 2020 Black Book, 7th edition is written for professionals and students of Finite Element Analysis field. The book starts with basics of FEA, goes through all the simulation tools and ends up with practical examples of analysis with explanation of Solver selection, iteration methods and integration techniques.

solidworks thermal analysis: Finite Element Analysis for Design Engineers Pawel M Kurowski,

2016-12-01 Finite Element Analysis (FEA) has been widely implemented by the automotive industry as a productivity tool for design engineers to reduce both development time and cost. This essential work serves as a guide for FEA as a design tool and addresses the specific needs of design engineers to improve productivity. It provides a clear presentation that will help practitioners to avoid mistakes. Easy to use examples of FEA fundamentals are clearly presented that can be simply applied during the product development process. The FEA process is fully explored in this fundamental and practical approach that includes: • Understanding FEA basics • Commonly used modeling techniques • Application of FEA in the design process • Fundamental errors and their effect on the quality of results • Hands-on simple and informative exercises This indispensable guide provides design engineers with proven methods to analyze their own work while it is still in the form of easily modifiable CAD models. Simple and informative exercises provide examples for improving the process to deliver quick turnaround times and prompt implementation.

solidworks thermal analysis: Engineering Analysis with SolidWorks Simulation 2013

Paul Kurowski, 2013 Engineering Analysis with SolidWorks Simulation 2013 goes beyond the standard software manual. Its unique approach concurrently introduces you to the SolidWorks Simulation 2013 software and the fundamentals of Finite Element Analysis (FEA) through hands-on exercises. A number of projects are presented using commonly used parts to illustrate the analysis features of SolidWorks Simulation. Each chapter is designed to build on the skills, experiences and understanding gained from the previous chapters. Topics covered: Linear static analysis of parts and assemblies Contact stress analysis Frequency (modal) analysis Buckling analysis Thermal analysis Drop test analysis Nonlinear analysis Dynamic analysis Random vibration analysis h and p adaptive solution methods Modeling techniques Implementation of FEA in the design process Management of FEA projects FEA terminology

solidworks thermal analysis: Mechanics of Materials Labs with SolidWorks Simulation

2013 Huei-Huang Lee, 2013-10-23 This book is designed as a software-based lab book to complement a standard textbook in a mechanics of material course, which is usually taught in undergraduate courses. This book can also be used as an auxiliary workbook in a CAE or Finite Element Analysis course for undergraduate students. Each book comes with a disc containing video demonstrations, a quick introduction to SolidWorks, and all the part files used in the book. This textbook has been carefully developed with the understanding that CAE software has developed to a point that it can be used as a tool to aid students in learning engineering ideas, concepts and even formulas. These concepts are demonstrated in each section of this book. Using the graphics-based tools of SolidWorks Simulation can help reduce the dependency on mathematics to teach these concepts substantially. The contents of this book have been written to match the contents of most mechanics of materials textbooks. There are 14 chapters in this book. Each chapter is designed as one week's workload, consisting of 2 to 3 sections. Each section is designed for a student to follow the exact steps in that section and learn a concept or topic of mechanics of materials. Typically, each section takes 15-40 minutes to complete the exercises. Each copy of this book comes with a disc containing videos that demonstrate the steps used in each section of the book, a 121 page introduction to Part and Assembly Modeling with SolidWorks in PDF format, and all the files readers may need if they have any trouble. The concise introduction to SolidWorks pdf is designed for those students who have no experience with SolidWorks and want to feel more comfortable working on the exercises in this book. All of the same content is available for download on the book's companion website.

solidworks thermal analysis: Engineering Analysis with SolidWorks Simulation 2009

Paul M. Kurowski, 2009 Engineering Analysis with SolidWorks Simulation 2009 goes beyond the standard software manual because its unique approach concurrently introduces you to the SolidWorks Simulation 2009 software and the fundamentals of Finite Element Analysis (FEA) through hands-on exercises. A number of projects are presented using commonly used parts to illustrate the analysis features of SolidWorks Simulation. This book covers the following FEA functionality of SolidWorks Simulation 2009: Linear static analysis of parts and assemblies Frequency (modal) analysis Buckling analysis Thermal analysis Drop test analysis Optimization analysis Nonlinear analysis Dynamic analysis

solidworks thermal analysis: An Introduction to SOLIDWORKS Flow Simulation 2021 John

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solidworks thermal analysis: Technical Drawing 101 with AutoCAD Douglas W. Smith, Antonio Ramirez, 2009 For courses in Introduction to Technical Drawing. Designed for the two-year college or high-school tech prep student, this book offers a complete field-tested curriculum for the first semester of technical drawing. Its unique approach blends technical drawing and intro to AutoCAD, resulting in a book that emphasizes the fundamental concepts, knowledge and skill needed for the second level courses. Both mechanical and architectural projects are introduced to capture the interest of more students and to offer a broader appeal. Instructor check prints and PowerPoint slides are provided to guide each lecture and the complete curriculum is designed to improve student retention and recruitment.

solidworks thermal analysis: SOLIDWORKS Simulation 2016: A Tutorial Approach Prof. Sham Tickoo, 2017-06-29 SOLIDWORKS Simulation 2016: A Tutorial Approach book has been written to help the users learn the basics of FEA. In this book, the author has used the tutorial point of view and the learn-by-doing theme to explain the tools and concepts of FEA using SOLIDWORKS Simulation. Real-world mechanical engineering industry examples and tutorials have been used to ensure that the users can relate the knowledge gained through this book with the actual mechanical industry designs. This book covers all important topics and concepts such as Model Preparation, Meshing, Connections, Contacts, Boundary Conditions, Structural Analysis, Buckling Analysis, Fatigue Analysis, Thermal Analysis and Frequency Analysis. Salient Features Book consisting of 8 chapters that are organized in a pedagogical sequence Summarized content on the first page of the topics that are covered in the chapter. More than 25 real-world mechanical engineering simulation problems used as tutorials and projects with step-by-step explanation. Additional information throughout the book in the form of notes and tips. Self-Evaluation Tests and Review Questions at the end of each chapter to help the users assess their knowledge. Technical support by contacting 'techsupport@cadcim.com'. Additional learning resources at 'allaboutcadcam.blogspot.com'. Table of Contents Chapter 1: Introduction to FEA and SOLIDWORKS Simulation Chapter 2: Defining Material Properties Chapter 3: Meshing Chapter 4: Linear Static Analysis Chapter 5: Advanced Structural Analysis Chapter 6: Frequency Analysis Chapter 7: Thermal Analysis Chapter 8: Report and Interpretation Index

solidworks thermal analysis: Engineering Dynamics Labs with SolidWorks Motion 2014 Huei-Huang Lee, 2014 This book is designed as a software-based lab book to complement a standard textbook in an engineering dynamics course, which is usually taught at the undergraduate level. This book can also be used as an auxiliary workbook in a CAE or Finite Element Analysis course for undergraduate students. Each book comes with a disc containing video demonstrations, a quick introduction to SolidWorks eBook, and all the part files used in the book. This textbook has been carefully developed with the understanding that CAE software has developed to a point that it can be used as a tool to aid students in learning engineering ideas, concepts and even formulas. These concepts are demonstrated in each section of this book. Using the graphics-based tools of SolidWorks Simulation can help reduce the dependency on mathematics to teach these concepts substantially. The contents of this book have been written to match the contents of most mechanics of materials textbooks. There are 11 chapters in this book. Each chapter contains two sections. Each section is designed for a student to follow the exact steps in that section and learn a concept or topic of Engineering Dynamics. Typically, each section takes 20-40 minutes to complete the exercises. Each copy of this book comes with a disc containing videos that demonstrate the steps used in each

section of the book, a 123 page introduction to Part and Assembly Modeling with SolidWorks in PDF format, and all the files readers may need if they have any trouble. The concise introduction to SolidWorks PDF is designed for those students who have no experience with SolidWorks and want to feel more comfortable working on the exercises in this book. All of the same content is available for download on the book's companion website.

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solidworks thermal analysis: Advances in Fluid and Thermal Engineering Basant Singh Sikarwar, Bengt Sundén, Qiuwang Wang, 2021-04-21 This book comprises the select proceedings of the International Conference on Future Learning Aspects of Mechanical Engineering (FLAME 2020). This volume focuses on current research in fluid and thermal engineering and covers topics such as heat transfer enhancement and heat transfer equipment, heat transfer in nuclear applications, microscale and nanoscale transport, multiphase transport and phase change, multi-mode heat transfer, numerical methods in fluid mechanics and heat transfer, refrigeration and air conditioning, thermodynamics, space heat transfer, transport phenomena in porous media, turbulent transport, theoretical and experimental fluid dynamics, flow measurement techniques and instrumentation, computational fluid dynamics, fluid machinery, turbo machinery and fluid power. Given the scope of its contents, this book will be interesting for students, researchers as well as industry professionals.

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Handbook of Thermal Analysis and Calorimetry: Recent Advances, Techniques and Applications, Volume Six, Second Edition, presents the latest in a series that has been well received by the thermal analysis and calorimetry community. This volume covers recent advances in techniques and applications that complement the earlier volumes. There has been tremendous progress in the field in recent years, and this book puts together the most high-impact topics selected for their popularity by new editors Sergey Vyazovkin, Nobuyoshi Koga and Christoph Schick—all editors of *Thermochimica Acta*. Among the important new techniques covered are biomass conversion; sustainable polymers; polymer nanocomposites; nonmetallic glasses; phase change materials; propellants and explosives; applications to pharmaceuticals; processes in ceramics, metals, and alloys; ionic liquids; fast-scanning calorimetry, and more. - Features 19 all-new chapters to bring readers up to date on the current status of the field - Provides a broad overview of recent progress in the most popular techniques and applications - Includes chapters authored by a recognized leader in each field and compiled by a new team of editors, each with at least 20 years of experience in the field of thermal analysis and calorimetry - Enables applications across a wide range of modern materials, including polymers, metals, alloys, ceramics, energetics and pharmaceuticals - Overviews the current status of the field and summarizes recent progress in the most popular techniques and applications

solidworks thermal analysis: Motion Simulation and Mechanism Design with SOLIDWORKS Motion 2020 Kuang-Hua Chang, 2020-07-31
Motion Simulation and Mechanism Design with SOLIDWORKS Motion 2020 is written to help you become familiar with SOLIDWORKS Motion, an add-on module of the SOLIDWORKS software family. This book covers the basic concepts and frequently used commands required to advance readers from a novice to intermediate level in using SOLIDWORKS Motion. SOLIDWORKS Motion allows you to use solid models created in SOLIDWORKS to simulate and visualize mechanism motion and performance. Using SOLIDWORKS Motion early in the product development stage could prevent costly redesign due to design defects found in the physical testing phase. Therefore, using SOLIDWORKS Motion contributes to a more cost effective, reliable, and efficient product design process. Basic concepts discussed in this book include model generation, such as creating assembly mates for proper motion; carrying out simulation and animation; and visualizing simulation results, such as graphs and spreadsheet data. These concepts are introduced using simple, yet realistic examples. Verifying the results obtained from the computer simulation is extremely important. One of the unique features of this book is the incorporation of theoretical discussions for kinematic and dynamic analyses in conjunction with the simulation results obtained using SOLIDWORKS Motion. Verifying the simulation results will increase your confidence in using the software and prevent you from being fooled by erroneous simulations. This book covers the following functionality of SOLIDWORKS Motion 2020 • Model generation • Creating assembly mates • Performing simulations • Creating animations • Visualizing simulation results

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Paul Kurowski, *Engineering Analysis with SOLIDWORKS Simulation 2021* goes beyond the standard software manual. Its unique approach concurrently introduces you to the SOLIDWORKS Simulation 2021 software and the fundamentals of Finite Element Analysis (FEA) through hands-on exercises. A number of projects are presented using commonly used parts to illustrate the analysis features of SOLIDWORKS Simulation. Each chapter is designed to build on the skills, experiences and understanding gained from the previous chapters. Topics covered • Linear static analysis of parts and assemblies • Contact stress analysis • Frequency (modal) analysis • Buckling analysis • Thermal

analysis • Drop test analysis • Nonlinear analysis • Dynamic analysis • Random vibration analysis • h and p adaptive solution methods • Modeling techniques • Implementation of FEA in the design process • Management of FEA projects • FEA terminology

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