

brake thickness chart

brake thickness chart is an essential tool for vehicle maintenance, providing critical information about the wear limits and replacement guidelines for brake pads and rotors. Understanding the brake thickness chart helps ensure optimal braking performance, safety, and longevity of brake components. This article delves into the importance of monitoring brake thickness, explains how to read brake thickness charts, and discusses standard measurements and replacement thresholds. Additionally, it covers the differences in brake thickness specifications across various vehicle types and highlights maintenance tips to extend brake life. By mastering the details of brake thickness charts and related terminology, vehicle owners and technicians can make informed decisions about brake service and replacements.

- Understanding Brake Thickness Charts
- Standard Brake Pad and Rotor Thickness Measurements
- How to Read and Interpret Brake Thickness Charts
- Brake Thickness Specifications by Vehicle Type
- Signs of Brake Wear and When to Replace
- Maintaining Optimal Brake Thickness

Understanding Brake Thickness Charts

A brake thickness chart serves as a reference guide that indicates the minimum allowable thickness for brake components, primarily brake pads and rotors. These charts are crucial for mechanics and vehicle owners to determine when brake parts have worn down to unsafe levels. Brake components degrade over time due to friction generated during braking, which gradually reduces their thickness and effectiveness. The brake thickness chart provides the thresholds at which the brake pads or rotors should be replaced to maintain safe braking performance and avoid damage to other braking system parts.

Purpose of Brake Thickness Charts

The primary purpose of a brake thickness chart is to provide clear, standardized measurements that define the wear limits for brake pads and rotors. These charts help prevent brake failure by signaling when components are too thin to function safely. They also assist in scheduling timely maintenance, avoiding costly repairs, and ensuring compliance with vehicle safety regulations.

Components Covered in Brake Thickness Charts

Most brake thickness charts focus on two main components:

- **Brake Pads:** These friction materials press against the rotors to slow down the vehicle. The pad thickness decreases with use.
- **Brake Rotors (Discs):** Rotors provide the surface against which brake pads clamp. Over time, rotors can become thinner due to wear and resurfacing.

Standard Brake Pad and Rotor Thickness Measurements

Brake thickness charts typically specify measurements in millimeters or inches, outlining both original equipment manufacturer (OEM) thickness and minimum thickness limits. These measurements vary depending on the make and model of the vehicle, as well as the type of brake system installed.

Typical Brake Pad Thickness

New brake pads usually have a thickness ranging between 8 mm and 12 mm. The minimum thickness at which pads should be replaced commonly falls between 2 mm and 3 mm. When the brake pad material wears down to this minimum level, braking efficiency decreases significantly, and the risk of damage to the rotor increases.

Typical Brake Rotor Thickness

Brake rotors generally start at a thickness between 20 mm and 30 mm depending on the vehicle. The brake thickness chart will list a minimum rotor thickness, often termed the "minimum thickness specification," which can range from approximately 18 mm to 22 mm. Rotors worn below this minimum thickness are prone to warping, cracking, and reduced heat dissipation, which compromises braking safety.

How to Read and Interpret Brake Thickness Charts

A brake thickness chart is straightforward to interpret when familiar with its key components. The chart usually lists the original thickness, minimum thickness, and sometimes recommended replacement thickness for brake pads and rotors.

Chart Layout and Key Terminology

Common columns or sections in a brake thickness chart include:

- **Component:** Indicates whether the measurement applies to brake pads or rotors.
- **Original Thickness:** The thickness of a new brake part.
- **Minimum Thickness:** The lowest safe thickness before replacement is required.
- **Replacement Thickness:** Some charts specify a recommended thickness at which replacement should occur to maintain optimal performance.

Using the Chart for Maintenance Decisions

By measuring the current thickness of brake pads and rotors and comparing these values to those on the brake thickness chart, mechanics can determine whether components are still serviceable. If the measured thickness is at or below the minimum specified, immediate replacement is necessary. If the thickness approaches the replacement threshold, scheduling maintenance soon is advisable.

Brake Thickness Specifications by Vehicle Type

Brake thickness requirements differ based on vehicle type, intended use, and brake system design. Passenger cars, trucks, motorcycles, and commercial vehicles each have unique brake thickness charts reflecting their braking demands.

Passenger Cars

Passenger cars generally have smaller rotors and thinner brake pads than heavier vehicles. Their brake thickness charts emphasize safety and durability for everyday driving conditions. Minimum pad thickness typically ranges from 2 mm to 3 mm, while rotor minimum thickness varies from 18 mm to 22 mm.

Light and Heavy-Duty Trucks

Trucks and SUVs often require thicker brake pads and rotors due to their weight and towing capabilities. Brake thickness charts for these vehicles reflect more robust components, with original rotor thickness sometimes exceeding 30 mm and minimum thickness closer to 22 mm. Pads may also be thicker to handle increased heat and wear.

Motorcycles and Specialty Vehicles

Motorcycles use smaller, lighter brake components, and their brake thickness charts are tailored accordingly. These charts ensure that the limited pad and rotor material is replaced before becoming a safety hazard. Specialty vehicles, such as performance or racing cars, may have customized brake thickness charts based on high-performance brake systems.

Signs of Brake Wear and When to Replace

Recognizing the signs of brake wear is critical to maintaining safe vehicle operation. Brake thickness charts provide numerical guidelines, but visual and auditory indicators also help identify when brakes need attention.

Common Signs of Brake Wear

- **Squealing or Screeching Noises:** Often a sign that brake pads are worn and the wear indicators are contacting the rotor.
- **Reduced Braking Performance:** Longer stopping distances or a spongy brake pedal may indicate worn pads or rotors.
- **Vibration or Pulsation:** Can result from warped or excessively worn rotors.
- **Visual Inspection:** Thin brake pads or grooves on the rotor surface signal wear.

Replacement Timing Based on Thickness

Brake pads should be replaced when their thickness reaches the minimum threshold specified on the brake thickness chart. Rotors should be replaced or resurfaced if their thickness is near or below the minimum limit. Ignoring these guidelines can lead to brake failure, increased repair costs, and compromised vehicle safety.

Maintaining Optimal Brake Thickness

Regular maintenance and monitoring of brake thickness extend the life of brake components and ensure safe driving conditions. Following a routine inspection schedule and adhering to brake thickness chart recommendations are essential practices.

Best Practices for Brake Maintenance

- **Periodic Inspections:** Check brake pad and rotor thickness at regular intervals, especially

during tire rotations or oil changes.

- **Use Quality Parts:** Replace worn components with OEM or high-quality aftermarket parts that meet or exceed original specifications.
- **Avoid Excessive Braking:** Minimize harsh braking to reduce wear and heat buildup.
- **Professional Service:** Have brakes inspected and serviced by certified technicians who understand brake thickness charts and safety standards.

Benefits of Monitoring Brake Thickness

Consistent monitoring using brake thickness charts helps prevent unexpected brake failures, improves vehicle safety, and reduces the likelihood of damage to expensive braking system parts. This proactive approach enhances overall vehicle reliability and driver confidence.

Frequently Asked Questions

What is a brake thickness chart?

A brake thickness chart is a reference guide that shows the minimum and maximum allowable thickness measurements for brake pads or rotors to ensure safe and effective braking performance.

Why is it important to check brake thickness using a chart?

Checking brake thickness against a chart helps determine if brake pads or rotors are worn out and need replacement, preventing brake failure and maintaining vehicle safety.

How do I use a brake thickness chart?

To use a brake thickness chart, measure the current thickness of your brake pads or rotors with a micrometer or caliper, then compare the measurement to the chart's recommended minimum thickness to see if replacement is necessary.

What is the minimum brake pad thickness according to standard charts?

Most brake thickness charts recommend a minimum brake pad thickness of around 3 millimeters (0.12 inches) before replacement is needed, although this can vary by manufacturer.

Can a brake thickness chart be used for all vehicle types?

Brake thickness charts are often vehicle- or manufacturer-specific, so it's important to use a chart that corresponds to your vehicle make and model for accurate guidance.

How often should brake thickness be checked using a brake thickness chart?

Brake thickness should be checked regularly, typically during routine maintenance or every 10,000 to 15,000 miles, or sooner if you notice braking issues, to ensure safe braking performance.

Where can I find a reliable brake thickness chart for my vehicle?

Reliable brake thickness charts can be found in your vehicle's service manual, from brake part manufacturers, or on automotive maintenance websites and repair guides specific to your vehicle model.

Additional Resources

1. *Brake Thickness and Safety: A Comprehensive Guide*

This book provides an in-depth exploration of brake pad and rotor thickness standards across various vehicle types. It explains how to measure brake components accurately and interpret thickness charts to ensure optimal safety and performance. Ideal for automotive technicians and enthusiasts alike, it combines theory with practical tips for maintaining brake systems.

2. *Mastering Brake Maintenance: Thickness Charts and Beyond*

Focused on practical maintenance, this book covers the use of brake thickness charts to diagnose wear and determine replacement intervals. It includes detailed illustrations and case studies to help readers understand the impact of different thickness levels on braking efficiency. The book also discusses related topics such as brake fluid, calipers, and rotor conditions.

3. *The Ultimate Brake Thickness Reference Manual*

Serving as a quick-reference guide, this manual compiles thickness specifications for brake pads and rotors from a wide range of manufacturers. It is designed for mechanics who need fast access to accurate data during repairs and inspections. Additional sections cover common measurement tools and troubleshooting tips.

4. *Automotive Braking Systems: Thickness and Performance Analysis*

This technical book delves into the relationship between brake component thickness and overall braking system performance. It explains how variations in thickness affect heat dissipation, wear rates, and stopping distances. Readers will find detailed charts, experimental data, and recommendations for maintaining optimal thickness levels.

5. *Brake Pad and Rotor Wear: Understanding Thickness Charts*

Aimed at beginners, this book breaks down the basics of brake pad and rotor wear patterns and how to use thickness charts effectively. It includes step-by-step instructions for measuring brake components and interpreting the results to make informed maintenance decisions. The book also highlights safety considerations and common diagnostic mistakes.

6. *Brake System Diagnostics Using Thickness Charts*

This book teaches readers how to integrate brake thickness measurements with other diagnostic techniques to identify brake system issues. It covers the interpretation of thickness charts alongside

vibration analysis, noise detection, and brake pedal feel. The comprehensive approach helps mechanics pinpoint problems quickly and accurately.

7. Brake Thickness Standards Across Vehicles: A Comparative Study

Offering a comparative analysis, this book presents brake thickness standards for passenger cars, trucks, motorcycles, and heavy-duty vehicles. It discusses how vehicle type, usage, and manufacturer guidelines influence thickness specifications and replacement criteria. The book serves as a valuable resource for fleet managers and repair shops servicing diverse vehicles.

8. Practical Brake Thickness Measurement Techniques

This hands-on guide focuses on the tools and techniques used to measure brake pad and rotor thickness. It includes detailed instructions for using micrometers, calipers, and specialized gauges, along with tips for avoiding common measurement errors. The book also reviews industry standards for thickness tolerances.

9. Extending Brake Life: Insights from Thickness Chart Analysis

This book explores strategies to maximize brake component lifespan by closely monitoring thickness changes over time. It explains how to interpret thickness charts to predict wear trends and schedule proactive maintenance. The author also discusses material choices, driving habits, and environmental factors that affect brake wear.

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Brake Thickness Chart: Your Ultimate Guide to Safe and Reliable Braking

Are you tired of guessing about your brake pad and rotor thickness? Worried about costly repairs due to worn-out brakes? Ignoring brake wear can lead to dangerous situations and expensive emergency repairs. Knowing precisely when to replace your brake components is crucial for both safety and your wallet. This ebook provides the knowledge and tools you need to confidently monitor your brake system and maintain optimal braking performance.

Brake Thickness Chart: The Comprehensive Guide to Safe Braking by [Your Name/Brand Name]

Contents:

Introduction: Understanding Brake System Components and Importance of Thickness Measurement

Chapter 1: Understanding Brake Pad Thickness: Minimum Thickness Limits, Measurement Techniques, and Visual Inspection.

Chapter 2: Understanding Brake Rotor Thickness: Minimum Thickness Limits, Measurement Techniques, and Visual Inspection.

Chapter 3: Brake Thickness Charts by Vehicle Make and Model: Comprehensive charts illustrating minimum thickness requirements for various vehicles. (Note: This section will require significant data compilation, possibly necessitating a tiered pricing model if you offer data for a wide range of vehicles.)

Chapter 4: Tools and Techniques for Measuring Brake Thickness: Guide to calipers, gauges, and safe measurement practices.

Chapter 5: Interpreting Measurements and Determining Replacement Needs: Clear guidelines for making informed decisions based on your measurements.

Chapter 6: Troubleshooting Common Brake Issues: Identifying potential problems beyond simple thickness.

Chapter 7: Safety Precautions and Best Practices: Emphasis on safety during brake inspection and maintenance.

Conclusion: Recap of key information and next steps for maintaining safe braking.

Brake Thickness Chart: The Comprehensive Guide to Safe Braking

Introduction: Understanding Brake System Components and Importance of Thickness Measurement

Your vehicle's braking system is arguably its most critical safety feature. It's composed of several key components working in concert to bring your vehicle to a safe stop. This ebook focuses on two crucial components: brake pads and rotors (or drums in older vehicles). Regular monitoring of their thickness is vital for safe and efficient braking. Neglecting this can lead to:

Reduced braking performance: Worn brake pads and rotors lose their effectiveness, increasing stopping distances.

Increased stopping distances: This dramatically increases the risk of accidents, especially in emergency situations.

Damage to other brake components: Severely worn components can damage calipers, brake lines, and other parts, resulting in expensive repairs.

Uneven wear: Uneven wear on brake pads and rotors can lead to vibrations, noise, and further damage.

Potential for brake failure: In extreme cases, worn-out brakes can fail completely, resulting in catastrophic accidents.

Understanding the minimum acceptable thickness for your brake pads and rotors is crucial to avoiding these problems. This ebook provides you with the knowledge and tools to perform regular inspections and prevent costly and potentially dangerous brake failures.

Chapter 1: Understanding Brake Pad Thickness

Brake pads are friction materials that clamp onto the rotors (or drums) to slow and stop your vehicle. Over time, friction causes them to wear down. Manufacturers specify a minimum thickness for brake pads, often indicated in the vehicle's owner's manual or by markings on the pads themselves. However, these markings aren't always visible or easy to interpret.

Minimum Thickness Limits: There's no universal minimum brake pad thickness. It varies widely depending on vehicle make, model, and year. Generally, a brake pad thickness below 2-3mm (approximately 1/8 inch) is considered critically worn and requires immediate replacement. Refer to your vehicle's owner's manual or consult a repair shop for the exact specification for your vehicle.

Measurement Techniques: Accurately measuring brake pad thickness requires a reliable tool like a digital caliper. Carefully measure the thickest part of the remaining friction material on each brake pad. Remember to measure all pads on each wheel, as wear can vary.

Visual Inspection: In addition to measurement, always perform a visual inspection. Look for:

Significant wear: Clearly worn-down material, especially if close to metal.

Cracks or damage: Any cracks or other damage to the brake pad material compromises its effectiveness.

Glazing: A glazed surface indicates overheating, which can reduce braking performance.

Uneven wear: This indicates a potential problem with your braking system that needs professional attention.

Ignoring these visual cues can lead to reduced brake performance and ultimately, brake failure.

Chapter 2: Understanding Brake Rotor Thickness

Brake rotors (or drums) are the metal discs (or cylindrical drums) that rotate with the wheels. Brake pads clamp onto them to create friction and slow the vehicle. Similar to brake pads, brake rotors wear down over time and require periodic replacement.

Minimum Thickness Limits: The minimum acceptable thickness for brake rotors varies depending on the vehicle make, model, and year. These minimum thicknesses are often stamped on the rotor itself or specified in the owner's manual. Typically, a rotor thickness below the manufacturer's specified minimum requires replacement. Failure to do so can lead to warping, vibration, and ultimately, brake failure.

Measurement Techniques: Precise measurement of brake rotor thickness is essential. Use a caliper to measure the thickness of the rotor at several points, ensuring you measure the thickest part of the rotor. Note any variations in thickness which may indicate uneven wear.

Visual Inspection: Visual inspection is equally crucial. Look for:

Grooves or scoring: Deep grooves or scoring on the rotor's surface indicate significant wear and potential damage.

Warping: A warped rotor will cause vibration during braking, reducing braking efficiency and potentially damaging other components.

Corrosion: Excessive corrosion reduces the rotor's effectiveness and can affect its structural integrity.

Cracks: Visible cracks mean immediate replacement.

Chapter 3: Brake Thickness Charts by Vehicle Make and Model (Example Data - Replace with comprehensive chart data)

(This section would ideally contain detailed charts for numerous vehicle makes and models. Due to the sheer volume of data required, this example is simplified. A real ebook would need to organize this data efficiently, possibly using searchable tables or a database-driven format.)

Example:

Vehicle: Toyota Camry 2018

Brake Pad Minimum Thickness: 3mm

Brake Rotor Minimum Thickness: 20mm

Chapter 4: Tools and Techniques for Measuring Brake Thickness

Accurate measurements are essential for safe brake maintenance. The right tools will ensure accuracy and safety:

Digital Caliper: A digital caliper provides precise measurements of brake pad and rotor thickness. Choose a caliper with a large enough jaw capacity to accommodate your brake components.

Wheel Chocks: Always use wheel chocks to prevent accidental movement of the vehicle during inspection.

Jack and Jack Stands: Properly lift and support the vehicle using a jack and jack stands for safety.

Gloves and Safety Glasses: Wear appropriate safety equipment to protect yourself from dirt, grease, and potential injury.

Measurement Procedure:

1. Securely lift and support the vehicle.

2. Remove the wheel.
3. Carefully measure the brake pad and rotor thickness using the digital caliper at multiple points.
4. Record the measurements.
5. Reassemble the wheel.

Remember: Safety is paramount. If you're uncomfortable performing these measurements yourself, consult a qualified mechanic.

Chapter 5: Interpreting Measurements and Determining Replacement Needs

Once you've obtained your measurements, compare them to the minimum thickness specifications for your vehicle (found in the owner's manual or Chapter 3). If the thickness falls below the minimum, replacement is necessary. Do not compromise on safety.

Remember, brake wear is progressive. Even if your brakes aren't critically worn, regular inspection allows you to anticipate replacement needs and avoid sudden, costly emergencies.

Chapter 6: Troubleshooting Common Brake Issues

Beyond simple thickness issues, several problems can affect your brakes:

Squeaking or grinding noises: Often indicates worn brake pads.

Vibration during braking: May suggest warped rotors or other issues.

Spongy brake pedal: Could indicate air in the brake lines or other problems.

Brake fluid leaks: Requires immediate attention from a mechanic.

These issues require professional diagnosis and repair. Don't attempt DIY repairs unless you have the necessary expertise.

Chapter 7: Safety Precautions and Best Practices

Always use wheel chocks.

Never work under a vehicle supported only by a jack. Always use jack stands.

Wear appropriate safety gear.

Consult your owner's manual.

If uncertain, seek professional assistance.

Regular brake inspections are vital for safety. It's better to replace brake pads and rotors slightly earlier than later.

Conclusion: Recap of Key Information and Next Steps

This ebook has provided you with a comprehensive guide to understanding and maintaining the thickness of your brake pads and rotors. Remember that regular inspection, proper measurement, and timely replacement are crucial for safe and reliable braking. By following the guidelines in this ebook, you can significantly reduce the risk of accidents and costly repairs. Your safety is paramount. Take control of your brake system's maintenance.

FAQs:

1. How often should I check my brake pad and rotor thickness? Every 6 months or 6,000 miles, whichever comes first.
2. What tools do I need to measure brake thickness? A digital caliper is essential.
3. What happens if I drive with worn-out brake pads and rotors? Increased stopping distances, reduced braking performance, and potential damage to other components.
4. Can I replace my brake pads and rotors myself? Possibly, but it requires skill and appropriate tools. If you're unsure, consult a professional.
5. How much does brake pad and rotor replacement cost? The cost varies greatly depending on the vehicle and labor costs.
6. Can I tell if my rotors are warped? Look for vibrations during braking.
7. What is the minimum thickness for brake pads and rotors? This varies depending on the vehicle. Consult your owner's manual or a professional.
8. Why is it important to measure brake pad and rotor thickness at multiple points? To identify uneven wear.
9. What are the signs of brake failure? Spongy brake pedal, grinding noises, reduced braking performance, and fluid leaks.

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3. How to Change Brake Rotors: A step-by-step guide to replacing brake rotors.
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8. Choosing the Right Brake Pads: Advice on selecting appropriate brake pads for your vehicle.
9. The Importance of Regular Brake Maintenance: Emphasizing the importance of regular checks and upkeep.

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brake thickness chart: Brakes: Fundamentals of Automotive Technology CDX Automotive Staff, 2012-10-19 With current content and dynamic features, *Brakes: Fundamentals of Automotive Technology* bridges the gap by meeting and exceeding the applicable 2012 National Automotive Technicians Education Foundation (NATEF) Automobile Accreditation Task Lists for brakes. Automotive technicians need to know how to safely and effectively perform maintenance, diagnose, and repair brake systems on automobiles. *Brakes: Fundamentals of Automotive Technology* provides all of the critical knowledge and skills necessary for technicians of all levels to perform these essential tasks. *Brakes: Fundamentals of Automotive Technology* features: Current Content Applicable 2012 brakes tasks are provided at the beginning of each chapter. The task tables indicate the level of each task--Maintenance & Light Repair (MLR), Auto Service Technology (AST), and Master Auto Service Technology (MAST), and include page references for easy access to coverage. Relaxed, Readable Textbook *Brakes: Fundamentals of Automotive Technology* is written in a clear, accessible language creating a learning environment in which students are comfortable with the material presented. That comfort level creates an effective and engaging learning experience for students, translating into better understanding and retention, ultimately leading to better pass rates. Reinforcement of Concepts This text is written on the premise that students require a solid foundation in the basics followed by appropriate reinforcement of the concepts learned. Reinforcement is provided with written step-by-step explanations and visual summaries of skills and procedures. Each chapter also concludes with a comprehensive bulleted list summarizing the chapter content, and ASE-Type questions to help students test critical thinking skills and gauge comprehension. The ASE-Type questions help students familiarize with the format of the ASE certification examination. Clear Application to Real-World Practices You Are the Automotive Technician case studies begin each chapter, capturing students' attention and encouraging critical thinking. Safety, Technician, and Caring for the Customer tip boxes provide real-world advice from experienced technicians. *Brakes: Fundamentals of Automotive Technology* gives students a genuine context for the application of the knowledge presented in the chapter. This approach makes it clear how all of this new information will be used in the shop. Highly Descriptive and Detailed Illustrations Automotive technology is a technical subject area. With this in mind, this text includes scores of photographs and illustrations to help students visualize automotive systems and mechanical concepts.

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shape metals by shearing, pressing and forming. New materials and advances in tooling are discussed, as well as the need for applied science in optimizing the operations for sheet metal fabrication processes. Examples of each of these forming processes are given, and the text also describes the mechanics of each process so that a logical decision can be made concerning the best operation for a specific result. The volume is divided into five sections each consisting of a series of chapters. The major sections cover fabricating presses, stamping and forming operations, plastics for tooling, structural shapes, and non-traditional machining. A section on definitions and terminology is also included. The book is profusely illustrated and indexed, making it easy to find references to specific forming topics. Written by an expert with 40 years of hands-on practical engineering experience, this Handbook contains the essential information you need on forming methods, machinery and the response of materials.

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and assembly processes. The fundamental basis for the algorithm is the belief that we will discover cost effective changes to the process that will reduce variation if we increase our knowledge of how and why a process behaves as it does. A key way to increase process knowledge is to learn empirically, that is, to learn by observation and experimentation. The authors discuss in detail a framework for planning and analyzing empirical investigations, known by its acronym QPDAC (Question, Plan, Data, Analysis, Conclusion). They classify all effective ways to reduce variation into seven approaches. A unique aspect of the algorithm forces early consideration of the feasibility of each of the approaches. Also includes case studies, chapter exercises, chapter supplements, and six appendices. PRAISE FOR Statistical Engineering I found this book uniquely refreshing. Don't let the title fool you. The methods described in this book are statistically sound but require very little statistics. If you have ever wanted to solve a problem with statistical certainty (without being a statistician) then this book is for you. - A reader in Dayton, OH This is the most comprehensive treatment of variation reduction methods and insights I've ever seen.- Gary M. Hazard Tellabs Throughout the text emphasis has been placed on teamwork, fixing the obvious before jumping to advanced studies, and cost of implementation. All this makes the manuscript !attractive for real-life application of complex techniques. - Guru Chadhabr Comcast IP Services COMMENTS FROM OTHER CUSTOMERS Average Customer Rating (5 of 5 based on 1 review) This is NOT a typical book on statistical tools. It is a strategy book on how to search for cost-effective changes to reduce variation using empirical means (i.e. observation and experiment). The uniqueness of this book: Summarizes the seven ways to reduce variation so we know the goal of the data gathering and analysis, present analysis results using graphs instead of P-value, and integrates Taguchi, Shainin methods, and classical statistical approach. It is a must read for those who are in the business of reducing variation using data, in particular for the Six Sigma Black Belts and Master Black Belts. Don't forget to read the solutions to exercises and supplementary materials to each chapter on the enclosed CD-ROM. - A. Wong, Canada

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