

Structural steel design by jack c mccormac Tutorial

Structural steel design by Jack C. McCormac is a comprehensive and authoritative resource widely regarded in the field of structural engineering. This seminal work provides in-depth insights into the principles, methodologies, and practical applications of structural steel design, making it an essential guide for students, practicing engineers, and architects alike. Drawing from decades of experience and academic expertise, Jack C. McCormac's approach emphasizes clarity, precision, and adherence to industry standards, ensuring that readers are equipped with the knowledge necessary to develop safe, efficient, and innovative steel structures.

Overview of Structural Steel Design by Jack C. McCormac

Background and Significance

Structural steel design is a critical component of modern construction, enabling the creation of durable, versatile, and economical structures. Jack C. McCormac's work stands out because of its comprehensive coverage, practical orientation, and integration of current codes and standards such as the AISC (American Institute of Steel Construction) specifications.

This book serves as a bridge between theoretical concepts and real-world application, making complex design principles accessible to learners and practitioners. Its systematic approach helps demystify the intricacies of steel design, focusing on safety, serviceability, and efficiency.

Scope of the Book

The book covers a broad spectrum of topics essential to structural steel design, including:

- Fundamental concepts of steel behavior and properties
- Design principles based on loadings and load combinations
- Design of tension members, compression members, beams, and connections
- Design of special steel structures such as frames, trusses, and bridges
- Detailed examples and problem-solving techniques

Core Principles of Structural Steel Design

Understanding Material Properties

A fundamental aspect of steel design involves understanding the material's properties:

- Yield strength (F_y): The stress at which steel begins to deform plastically.
- Ultimate strength: The maximum stress the material can withstand before failure.
- Ductility: The ability of steel to undergo significant deformation before rupture.
- Modulus of elasticity (E): Determines the stiffness of steel under load.

McCormac emphasizes selecting appropriate steel grades based on project requirements, considering factors like ductility and weldability.

Design Philosophy and Codes

The book aligns with industry codes, primarily the AISC Specification for Structural Steel Buildings. It advocates for a balanced approach that:

- Ensures safety through conservative load and resistance factors.
- Promotes economy by optimizing material use.
- Encourages constructability and adaptability.

McCormac stresses the importance of understanding and correctly applying these standards to produce reliable and code-compliant designs.

Structural Steel Members and Their Design

Tension Members

Designing tension members involves:

- Calculating the required cross-sectional area based on axial tension forces.
- Considering the effects of bolt and weld connections on member capacity.
- Ensuring slenderness ratios are within permissible limits to prevent buckling.

McCormac details the use of tension member formulas, including net area calculations accounting for bolt holes and welds.

Compression Members

When designing compression members:

- Determine the axial load capacity considering buckling effects.
- Apply effective length factors based on end conditions (fixed, pinned, etc.).
- Choose appropriate cross-sectional shapes (e.g., channels, angles, H-piles).
- Calculate slenderness ratios and check for stability against buckling.

The book provides step-by-step procedures and charts for evaluating compression member capacities.

Beams and Flexural Members

Designing beams involves:

- Calculating bending moments and shear forces from loads and spans.
- Selecting steel sections that meet strength and deflection criteria.
- Checking for lateral-torsional buckling and local buckling.
- Designing for shear using web shear capacity formulas.

McCormac emphasizes the importance of serviceability limits, such as deflection and vibrations, in beam design.

Connections

Connections are critical in steel structures:

- Types include bolted, welded, and riveted connections.
- Design involves calculating connection capacity considering bolt strength, weld size, and plate thickness.
- Proper detailing ensures load transfer and ductility.

The book discusses various connection types, their advantages, limitations, and design methods, including detailed charts and examples.

Design Process and Methodology

Step-by-Step Design Approach

McCormac advocates a systematic process:

- Identify loads and load combinations based on service conditions and standards.
- Select initial member sizes based on approximate calculations.
- Determine member capacities considering material strengths and stability.
- Check members against all relevant criteria (strength, stability, serviceability).
- Refine member sizes and details as necessary to optimize economy and performance.

This approach ensures a logical progression from concept to detailed design.

Use of Structural Analysis

Structural analysis techniques, including:

- Elastic analysis for load distribution.
- Plastic analysis for ultimate load capacity.
- Finite element methods for complex structures.

are discussed, with guidance on their application in conjunction with McCormac's design principles.

Design Examples

The book is rich with practical examples illustrating:

- Design of a steel frame under gravity and lateral loads.
- Connection detailing for beams and columns.
- Design of a steel truss bridge segment.

These examples demonstrate how to apply theoretical concepts to real-world scenarios, reinforcing learning and proficiency.

Advancements and Modern Considerations

Seismic and Wind Design

McCormac incorporates considerations for:

- Seismic design principles based on building codes like ASCE 7.
- Wind load calculations according to local standards.
- Damping and bracing systems for dynamic stability.

Understanding these factors is crucial for designing resilient steel structures in various environments.

Sustainability and Material Efficiency

The text emphasizes:

- Using high-strength steels to reduce material quantities.
- Designing for deconstruction and reuse.
- Implementing innovative connection techniques to minimize waste.

These strategies align with contemporary sustainable construction practices.

Emerging Technologies

McCormac discusses:

- Advances in welding and fabrication techniques.
- Computer-aided design (CAD) and Building Information Modeling (BIM).
- Structural health monitoring systems.

which are transforming steel design and construction.

Conclusion: The Legacy of Jack C. McCormac's Work

Jack C. McCormac's Structural Steel Design remains a cornerstone in the education and practice of structural engineering. Its meticulous presentation of fundamental principles, combined with practical application and adherence to modern standards, makes it an invaluable resource. The book not only educates on the technical aspects but also fosters a mindset of safety, efficiency, and innovation.

Engineers and students who engage deeply with McCormac's methodologies will find themselves better equipped to tackle the complexities of steel structure design, ensuring that their projects are safe, economical, and sustainable. As the field evolves with new materials and technologies, McCormac's foundational principles continue to guide the development of resilient and efficient steel structures worldwide.

Keywords: structural steel design, Jack C. McCormac, steel members, load analysis, connection design, steel standards, AISC, structural engineering, steel structures, modern construction

Structural Steel Design by Jack C. McCormac: An In-Depth Review

Structural steel design is a cornerstone of modern civil engineering, underpinning the construction of skyscrapers, bridges, industrial facilities, and various other infrastructures. Among the numerous texts available in this domain, Structural Steel Design by Jack C. McCormac stands out as a seminal work that has influenced generations of engineers and students alike. This article aims to provide a comprehensive, investigative review of McCormac's approach, pedagogical style, technical depth, and its relevance in contemporary structural engineering practice.

Introduction to Jack C. McCormac's Structural Steel Design

Jack C. McCormac's Structural Steel Design first gained prominence through its clear presentation, rigorous technical content, and practical approach aimed at both students and practicing engineers. Since its initial publication, the book has undergone several editions, each refining and updating its content to reflect evolving standards, codes, and best practices in structural steel design.

The core philosophy of McCormac's work emphasizes a balance between theoretical understanding and real-world application. It is often lauded for its comprehensive coverage of design principles, detailed examples, and integration of code requirements, particularly those of the American Institute of Steel Construction (AISC).

Historical Context and Evolution of the Text

Origins and Early Editions

The first edition of Structural Steel Design was published in the mid-20th century, a period marked by significant developments in steel construction techniques and standards. McCormac's work quickly became a staple in engineering curricula, owing to its clarity and systematic approach.

Updates and Revisions

Subsequent editions have incorporated advancements such as:

- The transition from ASD (Allowable Stress Design) to LRFD (Load and Resistance Factor Design)
- New provisions for seismic design
- Updated material specifications and safety factors
- Enhanced digital resources and design examples

These updates have kept the book relevant, reflecting the dynamic nature of structural steel design

and the ongoing refinement of code requirements.

Core Pedagogical Features of McCormac's Structural Steel Design

Structured Learning Path

The book is organized to guide readers logically through the complexities of steel design, starting from fundamental concepts and progressing to advanced topics. Its structure typically includes:

- Basic properties of steel
- Limit states design philosophy
- Member design (beams, columns, braces)
- Connection design
- Seismic and special considerations
- Structural framing and systems

Use of Clear Illustrations and Examples

McCormac's meticulous use of diagrams, tables, and step-by-step calculations facilitate comprehension. The examples are practical, reflecting real-world scenarios that engineers encounter on the job.

Integration of Code Standards

A significant feature is the integration of AISC standards directly into the narrative, with references and commentary that help users interpret and apply these codes effectively.

Technical Depth and Content Analysis

Design Philosophy: ASD vs. LRFD

One of the notable aspects of McCormac's Structural Steel Design is its coverage of both ASD and LRFD approaches, with an emphasis on LRFD in recent editions. The book explains:

- The theoretical basis for load and resistance factors
- The advantages of LRFD in ensuring safety and economy
- Practical guidelines for implementing LRFD principles

Member and Connection Design

The core of the book involves detailed methodologies for designing various steel members:

- Beams and girders
- Columns and compression members
- Tension members
- Shear and flexural members

Connections receive thorough treatment, including:

- Bolted connections (bearing, slip-critical)
- Welded connections (fillet, groove welds)
- Design considerations for connection strength and stability

Special Topics and Modern Considerations

The later editions incorporate discussions on:

- Seismic design principles, including ductility and detailing
- Fatigue and fracture considerations
- Fire protection strategies
- Design for durability and corrosion resistance

This comprehensive approach ensures that the text remains relevant amidst evolving engineering challenges.

Strengths and Limitations of the Work

Strengths

- **Clarity and Pedagogy:** McCormac's writing style is accessible, making complex concepts understandable.
- **Practical Orientation:** The inclusion of numerous examples and design tables aids in real-world application.
- **Updated Content:** Revisions keep pace with current standards and technological advancements.
- **Comprehensive Coverage:** The book covers a broad spectrum of topics essential for steel design.

Limitations

- Focus on American Standards: Primarily aligned with AISC codes, which may limit applicability outside the United States.
- Density of Content: The depth and technicality may be challenging for beginners without supplementary instruction.
- Digital Resources: While the latest editions include digital content, some users seek more interactive or online design tools.

Impact and Relevance in Modern Structural Engineering

Educational Impact

McCormac's Structural Steel Design has become a standard textbook in civil engineering programs worldwide. Its pedagogical approach fosters a deep understanding of steel design principles.

Professional Practice

Practicing engineers rely on this book for:

- Reference during design development
- Clarification of code requirements
- Validation of design calculations

Adaptability to Evolving Technologies

Although rooted in traditional design principles, the book's updates incorporate modern considerations such as seismic resilience and sustainability, ensuring its continued relevance.

Critical Perspectives and Future Directions

Critical Perspectives

While highly regarded, some critics suggest that:

- The book could expand coverage on innovative steel materials and construction methods.
- Inclusion of more digital tools and software integration would enhance its utility.
- Greater emphasis on sustainable design practices could be incorporated.

Future Directions for the Text

To remain a leading resource, future editions might focus on:

- Modular and prefabricated steel structures
- Advanced connection technologies
- Integration of Building Information Modeling (BIM)
- Life-cycle assessment and sustainability metrics

Conclusion

Structural Steel Design by Jack C. McCormac remains a foundational resource in the field of structural engineering. Its meticulous organization, comprehensive coverage, and emphasis on practical application have cemented its status as both an educational tool and a professional reference. While it primarily aligns with American standards, its principles are broadly applicable worldwide, and its pedagogical clarity continues to influence engineering education.

As the field evolves with new materials, construction methods, and sustainability considerations, McCormac's work demonstrates adaptability and relevance. For students, educators, and practicing engineers seeking a thorough understanding of structural steel design, this book offers invaluable insights rooted in decades of expertise. Future updates that incorporate emerging technologies and global standards will only enhance its stature, ensuring it remains a cornerstone of structural steel education and practice.

In summary, Jack C. McCormac's Structural Steel Design is more than just a textbook; it is a meticulous guide that bridges fundamental principles with practical implementation, embodying the essence of effective engineering communication. Its continued relevance underscores its importance as a critical resource in the ongoing development of safe, economical, and innovative steel structures worldwide.

Question What are the key principles of structural steel design outlined by Jack C. McCormac? Jack C. McCormac emphasizes principles such as safety, economy, constructability, and adherence to established codes and standards. His approach integrates structural analysis with practical design considerations to ensure efficient and reliable steel structures. **How does McCormac's 'Structural Steel Design' book address load considerations?** McCormac's book covers various load types, including dead loads, live loads, wind, and seismic forces. It provides methods for calculating and applying these loads in design, emphasizing the importance of load combinations for safety and serviceability. **What design methods for steel members are emphasized in McCormac's approach?** The book emphasizes the limit states design method, including plastic design concepts, as well as traditional allowable stress design. It guides engineers on selecting

appropriate methods based on project requirements and current codes. How does McCormac address connection design in structural steel? McCormac details the design of various steel connections, including shear, tension, and moment connections. It covers bolt and weld design, emphasizing the importance of connection detailing for structural integrity and constructability. What updates or revisions in recent editions of McCormac's book reflect current industry standards? Recent editions incorporate the latest AISC specifications, updates in seismic and wind design provisions, and modern construction practices. They also include new examples, design aids, and clarifications to align with evolving codes. Does McCormac's book cover software tools or modern analysis techniques for steel design? While primarily focused on fundamental principles and manual design methods, the book discusses the integration of software tools for analysis and design, encouraging the use of modern technology alongside traditional methods. What makes Jack C. McCormac's 'Structural Steel Design' a recommended resource for engineers? Its comprehensive coverage of design principles, clear explanations, practical examples, and alignment with current codes make it a valuable resource for both students and practicing engineers in the field of structural steel design.

Related keywords: structural steel, design principles, steel framing, load analysis, connection design, steel structures, structural analysis, steel strength, construction methods, McCormac

Charlotte And Peter Fiell

Charlotte and Peter Fiell are renowned figures in the world of design, architecture, and contemporary visual culture. Their collaborative work as authors, researchers, and curators has significantly influenced how we perceive design history and its impact on modern society. With a keen eye for detail and a passion for uncovering the stories behind iconic objects and movements, Charlotte and Peter Fiell have established themselves as authoritative voices in the field. This article delves into their backgrounds, contributions, notable publications, and their lasting influence on design scholarship.

Who Are Charlotte and Peter Fiell?

Background and Career Overview

Charlotte and Peter Fiell are British design historians and authors celebrated for their extensive work on design history and contemporary design trends. Their collaborative efforts have resulted in numerous influential publications that are widely used by students, professionals, and enthusiasts alike.

Charlotte Fiell's academic background is rooted in art and design history, which she has combined with her keen interest in the cultural aspects of design. Peter Fiell, on the other hand, is recognized for his expertise in design criticism and his ability to contextualize design within broader social and cultural frameworks.

Together, they have spent decades researching, writing, and curating exhibitions that highlight the evolution of design from the early modern period to the present day.

Major Contributions to Design Literature

Key Publications

The Fiells are perhaps best known for their comprehensive and visually engaging books that explore various facets of design. Some of their most influential publications include:

- **Design of the 20th Century** ? A definitive guide that chronicles the development of design over the last hundred years, covering everything from industrial design to graphic arts.
- **1000 Lights** ? An extensive survey of lighting design, showcasing innovations and iconic fixtures from around the world.
- **Furniture Design** ? An in-depth look at the evolution of furniture, highlighting key designers and movements that shaped modern interiors.
- **Design Culture: An Anthology** ? A collection of essays and case studies that examine the cultural significance of design across different eras and regions.

Their books are characterized by their rich visual content, combining high-quality photographs, detailed illustrations, and insightful analysis, making them invaluable resources for understanding the history and significance of design.

Curatorial and Exhibition Work

Beyond their publications, Charlotte and Peter Fiell have curated numerous exhibitions that have traveled worldwide. These exhibitions often serve as visual narratives that bring their written work to life, engaging audiences with immersive experiences.

Some notable exhibitions include:

- Modern Masters: Design in the 20th Century ? Showcasing key works from influential designers.
- Lighting the Future ? Exploring innovations in lighting technology and design.
- Furniture of the 21st Century ? Highlighting contemporary trends and emerging designers.

Their curatorial work emphasizes the importance of storytelling in design and underscores the social, cultural, and technological factors that influence creative practices.

Their Approach to Design History

Interdisciplinary Perspective

Charlotte and Peter Fiell advocate for an interdisciplinary approach to understanding design. They believe that design cannot be studied in isolation but must be contextualized within cultural, political, and technological frameworks.

This perspective allows their work to:

- Connect design movements with historical events.
- Analyze the societal impact of technological innovations.
- Explore the ways design reflects cultural identities.

Visual Emphasis

A hallmark of their publications is the emphasis on visual content. They understand that design is a highly visual discipline, and their books are often praised for their stunning imagery that complements scholarly analysis.

This visual focus:

- Enhances reader engagement.
- Provides a comprehensive understanding of design objects.
- Inspires designers and enthusiasts alike.

Influence and Legacy

Educational Impact

Charlotte and Peter Fiell's work has become standard reading in design education worldwide. Their books are frequently cited in university courses on design history, industrial design, and visual culture.

Their clear explanations and rich visuals make complex subject matter accessible to students and newcomers to the field.

Inspiring Contemporary Designers

Many modern designers cite the Fiells' publications as sources of inspiration. Their detailed case studies and historical insights help emerging designers appreciate the roots of their craft and the evolution of design principles.

Promoting Design Awareness

Through their exhibitions and writings, the Fiells have helped raise public awareness about the importance of design in everyday life. They emphasize that good design is not only functional but also culturally meaningful and aesthetically compelling.

Notable Awards and Recognitions

Over the years, Charlotte and Peter Fiell have received numerous accolades for their contributions to design scholarship and publishing, including:

- Design awards from major institutions.
- Recognition for their influence in curatorial practices.
- Honorary mentions for promoting design literacy worldwide.

Conclusion

Charlotte and Peter Fiell are pivotal figures in the understanding and appreciation of design. Their work bridges scholarly research and popular engagement, making complex design histories accessible and compelling. Whether through their meticulously researched books, inspiring exhibitions, or educational initiatives, they continue to shape the discourse around design's role in culture and society. For anyone interested in the evolution of design or seeking to deepen their appreciation of creative innovation, exploring the work of Charlotte and Peter Fiell offers valuable insights and inspiration.

Keywords: Charlotte and Peter Fiell, design history, design books, design exhibitions, influential designers, contemporary design, visual culture, design education, industrial design, furniture design, lighting design

Charlotte and Peter Fiell are renowned names in the world of design, architecture, and contemporary culture. Their collaborative work as authors, curators, and commentators has significantly shaped how audiences engage with design history and innovation. This dynamic duo's influence extends across numerous publications, exhibitions, and educational initiatives, making them pivotal figures for anyone interested in the evolution of design and its cultural implications. In

this guide, we'll explore their backgrounds, key contributions, notable publications, and the enduring impact they have had on the field of design.

Who Are Charlotte and Peter Fiell?

Charlotte and Peter Fiell are a married couple with a shared passion for design. Their combined expertise spans decades, during which they have authored influential books, curated exhibitions, and contributed to scholarly discussions on design's role in society. Their work often blurs the lines between academic analysis and accessible storytelling, making complex topics approachable for both specialists and general readers.

Backgrounds and Expertise

- Charlotte Fiell: Charlotte has a background rooted in design history and cultural studies. Her focus often emphasizes contemporary design movements and their socio-cultural contexts.

- Peter Fiell: With a robust background in industrial design and architecture, Peter's insights frequently delve into design innovation, craftsmanship, and technological advancements.

Together, their complementary skills allow them to craft comprehensive narratives that contextualize design within broader historical, technological, and cultural frameworks.

Major Contributions and Notable Works

Influential Publications

The Fiell couple has authored and edited numerous books that have become staples in the fields of design and architecture. Some of their most notable publications include:

- "1000 Chairs" (2002): An exhaustive survey of chair design, exploring its evolution from functional object to icon of style and artistic expression.

- "Design of the 20th Century" (1999): A comprehensive overview of the century's most influential designers, movements, and innovations.

- "The Story of Design" (2012): A richly illustrated narrative tracing the history of design from

prehistory to the digital age.

- "Fashion Design": Exploring the trajectory of fashion as an integral aspect of cultural expression and innovation.

- "The FIELL Collection": A series highlighting iconic design pieces, offering insights into their creation and significance.

Curatorial and Exhibition Work

Beyond their writing, Charlotte and Peter Fiell have curated numerous exhibitions showcasing design history and contemporary innovation. Their curatorial approach often emphasizes storytelling, contextualizing objects within cultural and societal shifts.

Educational Impact

Their work has been influential in academic settings, inspiring curricula, lectures, and seminars that introduce students and professionals alike to the richness of design history.

The Fiell Approach to Design

The Fiell duo's methodology combines rigorous research with engaging storytelling. They aim to:

- Make Design Accessible: Simplify complex concepts without sacrificing depth, making design history approachable for a broad audience.

- Highlight Cultural Contexts: Emphasize how design reflects, influences, and responds to societal changes.

- Showcase Innovation: Celebrate the creative process behind iconic objects, emphasizing craftsmanship, technology, and artistic vision.

- Foster Appreciation for Craftsmanship: Recognize the skill and artistry involved in design, encouraging respect for both historical and contemporary designers.

Key Themes in Their Work

- The Evolution of Design

Charlotte and Peter Fiell trace how design has evolved over centuries, influenced by technological advancements, cultural shifts, and economic factors. From early craftsmanship to mass production and digital design, they highlight pivotal moments and figures.

- The Intersection of Art and Function

Their work often explores how functional objects become symbols of aesthetic movement, reflecting societal values and individual identity.

- Sustainability and Future Trends

Recent writings emphasize the importance of sustainable design and innovation in addressing global challenges, positioning the Fiell couple as forward-thinking commentators.

- Design as a Cultural Phenomenon

They argue that design is not merely about objects but is deeply intertwined with cultural narratives, politics, and social change.

Influence and Legacy

Charlotte and Peter Fiell have played a crucial role in elevating the discourse around design, blending scholarly rigor with popular appeal. Their publications are widely used in academic courses, while their exhibitions and public talks inspire a broader appreciation for design's role in shaping human experience.

Key Contributions to the Field

- Bridging Academic and Popular Audiences: Their work makes scholarly insights accessible, fostering a wider appreciation.

- Documenting Design History: Their comprehensive catalogs serve as essential references.

- Encouraging Critical Engagement: They challenge audiences to consider design's impact on society and the environment.

Conclusion: The Enduring Impact of Charlotte and Peter Fiell

In sum, Charlotte and Peter Fiell have established themselves as influential voices in the study and celebration of design. Their collaborative efforts have produced a body of work that is both academically rigorous and broadly accessible, shaping how we understand the history, present, and future of design. Whether through their books, exhibitions, or lectures, they continue to inspire new generations of designers, historians, and enthusiasts to appreciate the artistry, innovation, and cultural significance of design objects and movements.

Their legacy underscores the idea that design is not just about aesthetics but a vital part of human culture—an ongoing dialogue between function, form, and society. As the world faces new challenges and opportunities, the insights and enthusiasm of Charlotte and Peter Fiell remain vital sources of inspiration and knowledge in the ever-evolving landscape of design.

Question Who are Charlotte and Peter Fiell in the design world? Charlotte and Peter Fiell are renowned design historians, authors, and curators known for their influential books and contributions to design education and appreciation. What are some notable works by Charlotte and Peter Fiell? Their notable works include 'Design of the 20th Century', 'Furniture Design', and 'The Story of Graphic Design', which are widely regarded as essential references in the field. How have Charlotte and Peter Fiell influenced design history? Through their comprehensive publications and exhibitions, they have significantly shaped the understanding and appreciation of modern and contemporary design worldwide. Are Charlotte and Peter Fiell involved in any design exhibitions? Yes, they have curated numerous exhibitions on design topics, showcasing their expertise and promoting design awareness in museums and galleries globally. What is the focus of Charlotte and Peter Fiell's writing? Their writing primarily focuses on the history, evolution, and cultural impact of design, covering areas like furniture, graphic design, and industrial design. Have Charlotte and Peter Fiell received any awards for their work? Yes, they have received several awards and honors recognizing their contributions to design scholarship and publishing. Are Charlotte and Peter Fiell involved in teaching or academic work? While primarily known as authors and curators, they have also contributed to academic programs and lectures related to design history. Where can I find the works of Charlotte and Peter Fiell? Their books are available in major bookstores, online retailers, and libraries, and their exhibitions have been held at prominent museums worldwide. What impact have Charlotte and Peter Fiell had on design education? They have influenced design education by providing comprehensive resources and inspiring new generations of designers and historians. Are Charlotte and Peter Fiell still active in the design community? As of the latest information, they

continue to contribute through writing, curating, and participating in design discussions and events.

Related keywords: design, architecture, interior design, furniture, lighting, visual inspiration, design authors, modern design, Scandinavian design, design books

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