

1. Record Nr.	UNINA9910139586503321
Autore	Barron Randall F
Titolo	Design for Thermal Stresses [[electronic resource]]
Pubbl/distr/stampa	Hoboken, : Wiley, 2011
ISBN	1-5231-2346-X 1-283-26815-9 9786613268150 1-118-09316-X 1-118-09318-6 1-118-09430-1
Descrizione fisica	1 online resource (530 p.)
Classificazione	SCI065000
Altri autori (Persone)	BarronBrian R
Disciplina	620.11296 621.402
Soggetti	Science -- Dynamics Science -- Mechanics Science -- Thermodynamics SCIENCE / Mechanics / Dynamics / Thermodynamics Thermal stresses Civil & Environmental Engineering Engineering & Applied Sciences Civil Engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di contenuto	Design for Thermalstresses; Contents; Preface; Nomenclature; 1 Introduction; 1.1 Definition of Thermal Stress; 1.2 Thermal-Mechanical Design; 1.3 Factor of Safety in Design; 1.4 Thermal Expansion Coefficient; 1.5 Young's Modulus; 1.6 Poisson's Ratio; 1.7 Other Elastic Moduli; 1.8 Thermal Diffusivity; 1.9 Thermal Shock Parameters; 1.10 Historical Note; Problems; References; 2 Thermal Stresses in Bars; 2.1 Stress and Strain; 2.2 Bar between Two Supports; 2.3 Bars in Parallel; 2.4 Bars with Partial Removal of Constraints; 2.5 Nonuniform Temperature Distribution; 2.6 Historical Note; Problems

References  
 3 Thermal Bending; 3.1 Limits on the Analysis; 3.2 Stress Relationships; 3.3 Displacement Relations; 3.4 General Thermal Bending Relations; 3.5 Shear Stresses; 3.6 Beam Bending Examples; 3.7 Thermal Bowing of Pipes; 3.8 Historical Note; Problems; References; 4 Thermal Stresses in Trusses and Frames; 4.1 Elastic Energy Method; 4.2 Unit-Load Method; 4.3 Trusses with External Constraints; 4.4 Trusses with Internal Constraints; 4.5 The Finite Element Method; 4.6 Elastic Energy in Bending; 4.7 Pipe Thermal Expansion Loops; 4.8 Pipe Bends; 4.9 Elastic Energy in Torsion  
 4.10 Historical Note  
 Problems; References; 5.1 Introduction; 5.2 Strain Relationships; 5.3 Stress Relationships; 5.4 Stress-Strain Relations; 5.5 Temperature Field Equation; 5.6 Reduction of the Governing Equations; 5.7 Historical Note; Problems; References; 6 Plane Stress; 6.1 Introduction; 6.2 Stress Resultants; 6.3 Circular Plate with a Hot Spot; 6.4 Two-Dimensional Problems; 6.5 Plate with a Circular Hole; 6.6 Historical Note; Problems; References; 7 Bending Thermal Stresses in Plates; 7.1 Introduction; 7.2 Governing Relations for Bending of Rectangular Plates  
 7.3 Boundary Conditions for Plate Bending  
 7.4 Bending of Simply-Supported Rectangular Plates; 7.5 Rectangular Plates with Two-Dimensional Temperature Distributions; 7.6 Axisymmetric Bending of Circular Plates; 7.7 Axisymmetric Thermal Bending Examples; 7.8 Circular Plates with a Two-Dimensional Temperature Distribution; 7.9 Historical Note; Problems; References; 8 Thermal Stresses in Shells; 8.1 Introduction; 8.2 Cylindrical Shells with Axisymmetric Loading; 8.3 Cooldown of Ring-Stiffened Cylindrical Vessels; 8.4 Cylindrical Vessels with Axial Temperature Variation; 8.5 Short Cylinders  
 8.6 Axisymmetric Loading of Spherical Shells  
 8.7 Approximate Analysis of Spherical Shells under Axisymmetric Loading; 8.8 Historical Note; Problems; References; 9 Thick-Walled Cylinders and Spheres; 9.1 Introduction; 9.2 Governing Equations for Plane Strain; 9.3 Hollow Cylinder with Steady-State Heat Transfer; 9.4 Solid Cylinder; 9.5 Thick-Walled Spherical Vessels; 9.6 Solid Spheres; 9.7 Historical Note; Problems; References; 10 Thermoelastic Stability; 10.1 Introduction; 10.2 Thermal Buckling of Columns; 10.3 General Formulation for Beam Columns; 10.4 Postbuckling Behavior of Columns  
 10.5 Lateral Thermal Buckling of Beams

## Sommario/riassunto

The tools engineers need for effective thermal stress design Thermal stress concerns arise in many engineering situations, from aerospace structures to nuclear fuel rods to concrete highway slabs on a hot summer day. Having the tools to understand and alleviate these potential stresses is key for engineers in effectively executing a wide range of modern design tasks. Design for Thermal Stresses provides an accessible and balanced resource geared towards real-world applications. Presenting both the analysis and synthesis needed for accurate design, the book emphasizes key principles,