1. Record Nr. UNINA9910780020303321

Autore	Hearn E. J (Edwin John)
Titolo	The mechanics of elastic and plastic deformation of solids and structural materials [[electronic resource] /] / E.J. Hearn
Pubbl/distr/stampa	Oxford ; ; Boston, : Butterworth-Heinemann, 1997
ISBN	1-281-02747-2 9786611027476 0-08-052400-1
Edizione	[3rd ed.]
Descrizione fisica	1 online resource (xx, 539 p.)
Collana	Mechanics of materials: an introduction to the mechanics of elastic and plastic deformation of solids and structural materials ; ; 2
Disciplina	620.1/123
Soggetti	Strength of materials Materials - Mechanical properties
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and indexes.
Nota di contenuto	Front Cover; Mechanics of Materials 2; Copyright Page; Contents; Introduction; Notation; Chapter 1. Unsymmetrical Bending; Summary; Introduction; 1.1 Product second moment of area; 1.2 Principal second moments of area; 1.3 Mohr's circle of second moments of area; 1.4 Land's circle of second moments of area; 1.5 Rotation of axes: determination of moments of area in terms of the principal values; 1.6 The ellipse of second moments of area; 1.7 Momenta1 ellipse; 1.8 Stress determination; 1.9 Alternative procedure for stress determination; 1.10 Alternative procedure using the momental ellipse 1.11 DeflectionsExamples; Problems; Chapter 2. Struts; Summary; Introduction; 2.1 Euler's theory; 2.2 Equivalent strut length; 2.3 Comparison of Euler theory with experimental results; 2.4 Euler ""validity limit""; 2.5 Rankine or Rankine-Gordon formula; 2.6 Perry-Robertson formula; 2.7 British Standard procedure (BS 449); 2.8 Struts with initial curvature; 2.9. Struts with eccentric load; 2.10 Laterally loaded struts; 2.11 Alternative procedure for any strut-loading condition; 2.12 Struts with unsymmetrical cross-section; Examples; Problems; Chapter 3. Strains Beyond the Elastic Limit SummaryIntroduction; 3.1 Plastic bending of rectangular-sectioned beams; 3.2 Shape factor - symmetrical sections; 3.3 Application to I-

section beams; 3.4 Partially plastic bending of unsymmetrical sections; 3.5 Shape factor - unsymmetrical sections; 3.6 Deflections of partially plastic beams; 3.7 Length of yielded area in beams; 3.8 Collapse loads - plastic limit design; 3.9 Residual stresses after yielding: elastic-perfectly plastic material; 3.10 Torsion of shafts beyond the elastic limit - plastic torsion; 3.11 Angles of twist of shafts strained beyond the elastic limit
3.12 Plastic torsion of hollow tubes3.13 Plastic torsion of case-hardened shafts; 3.14 Residual stresses after yield in torsion; 3.15 Plastic bending and torsion of strain-hardening materials; 3.16 Residual stresses - strain-hardening materials; 3.17 Influence of residual stresses on bending and torsional strengths; 3.18 Plastic yielding in the eccentric loadirig of rectangular sections; 3.19 Plastic yielding and residual stresses under axial loading with stress concentrations; 3.20 Plastic yielding of axially symmetric components; Examples; Problems
Chapter 4. Rings, Discs and Cylinders Subjected to Rotation and Thermal GradientsSummary; 4.1 Thin rotating ring or cylinder; 4.2 Rotating solid disc; 4.3 Rotating disc with a central hole; 4.4 Rotating thick cylinders or solid shafts; 4.5 Rotating disc of uniform strength; 4.6 Combined rotational and thermal stresses in uniform discs and thick cylinders; Examples; Problems; Chapter 5. Torsion of Non-Circular and Thin-Walled Sections; Summary; 5.1 Rectangular sections; 5.2 Narrow rectangular sections; 5.3 Thin-walled open sections; 5.4 Thin-walled split tube
5.5 Other solid (non-tubular) shafts

Sommario/riassunto

One of the most important subjects for any student of engineering or materials to master is the behaviour of materials and structures under load. The way in which they react to applied forces, the deflections resulting and the stresses and strains set up in the bodies concerned are all vital considerations when designing a mechanical component such that it will not fail under predicted load during its service lifetime. Building upon the fundamentals established in the introductory volume Mechanics of Materials 1, this book extends the scope of material covered into more complex areas