# Engineering: Mechanical and Materials

Purpose: This collection supports teaching and research in Mechanical Engineering through the doctoral level and in Materials Science & Engineering through the masters level. Interdepartmental specialization in Materials Science is also offered at the doctoral level. Concern for these fields is centered in Department of Mechanical and Materials Engineering. However, specific areas will be of interest to faculty and students in other programs, schools, and departments including Chemistry, Physics, Chemical Engineering, and Civil Engineering.

## General Collection Guidelines:

Languages: English is the primary language of the collection. Works originally in other languages are purchased only in English translation.

Chronological Guidelines: Primarily the last 100 years.

Geographical Guidelines: Not applicable.

Treatment of the Subject: Undergraduate textbooks are not ordinarily purchased. Advanced level textbooks and popular works are purchased selectively.

Types of Material: Most materials acquired, whether print or electronic, are in the form of monographs and periodicals. Included are reference works; proceedings/transactions of congresses, societies and symposia; and selected government documents.

Date of Publication: Primarily the past five years, though earlier publications may be sought. In the case of non-current publications there is ordinarily no preference given to original printings or editions.

## Observations and Qualifications by Subject with Collection Level:

Materials Science and Engineering

Materials Science: C(1) / B

Structural nature; thermodynamics and phase equilibrium; phase transformations; mechanical, physical and chemical properties of metals, polymers, crystals, ceramics, wood, and composites.

Materials of Engineering: C(1) / B

Non-ferrous metals and alloys, iron and steel, powders, thermoplastics, elastomers, thermosetting materials, crystals, ceramics, glasses, composite materials, thin films.

Behavior of Materials: C(1) / B

Failure, fatigue, creep, oxidation, corrosion, other effects.

Evaluation of Materials: C(1) / B

Property testing, non-destructive testing, macro- and micro examination, materials selection, microscopy and electron microscopy.

Forming and Fabrication of Materials: C(1) / B

Forming processes for metals, polymer materials, and ceramics and glasses, and processes for material removal and joining.

Microtechnology, macrotechnology: C(1) / B

Nanotechnology: C(1) / B

Mechanical Engineering

Basic Methods: B

Continuum mechanics, finite element and finite difference methods, other computational methods.

Dynamics and Vibration: C(1) / B

Kinematics and dynamics, vibrations of structures and structural elements, wave motions, impact on solids, waves in fluids, acoustics, stability, chaotic motion.

Automatic Control: C(1) / B

System theory and design, control systems, robotics, manufacturing, optimization, optimal control systems, differential games.

Mechanics of Solids: C(1) / B

Elasticity, viscoelasticity, fracture, damage processes, and mechanics, friction and wear, machine elements, machine design, fastening and joining.

Mechanics of Fluids: B

Computational fluid dynamics, flow, boundary layers, turbulence, aerodynamics, fluid dynamics, lubrication, flow measurements, multi-phase flows.

Heat Transfer: C(1) / B

Thermodynamics, convection, conduction, radiation, devices and systems, thermomechanics, mass transfer, combustion, prime movers and propulsion systems.

Energy: C(1) / B

Fossil fuel systems, nuclear systems, solar power, hydrogen power, and other energy systems; fuel cells; environmental mechanics.

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