

Introduction to Building Technology

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Key concepts, components, and processes that shape modern construction

1. What Is Building Technology?

Aspect	Description
Definition	The application of scientific, engineering, and technological principles to design, construct, operate, and maintain built environments.
Scope	Materials, structural systems, building services (HVAC, electrical, plumbing), construction methods, sustainability, digital tools, and post-occupancy performance.
Goal	Create safe, functional, efficient, and resilient structures that meet user needs and regulatory requirements.

2. Core Disciplines & Their Roles

Discipline	Primary Responsibilities	Typical Outputs
Architecture	Spatial planning, aesthetics, functional layout, code compliance	Concept sketches, floor plans, façade design
Structural Engineering	Load-bearing systems, stability, material selection	Structural calculations, beam/column sizes, foundation design
Mechanical & Electrical (M&E) Engineering	HVAC, lighting, power distribution, fire protection	Duct and pipe routing, wiring diagrams, control schematics
Construction Management	Scheduling, budgeting, site coordination, quality control	Project timeline (Gantt), cost estimates, risk registers
Building Physics	Heat, moisture, acoustics, daylighting performance	Energy models, thermal bridges analysis, acoustic ratings
Sustainability & Environmental Engineering	Life-cycle assessment, carbon reduction, renewable integration	EPDs (Environmental Product Declarations), BREEAM/LEED credits

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3. Building Materials – Overview

Category	Typical Materials	Key Properties	Common Uses
Concrete	Portland cement, aggregates, admixtures	High compressive strength, fire resistance	Foundations, slabs, columns
Steel	Carbon steel, stainless, alloy	High tensile strength, ductility, recyclability	Frames, reinforcement, cladding
Timber	Softwood, hardwood, engineered wood (CLT, LVL)	Renewable, lightweight, good thermal mass	Floors, walls, roof panels
Masonry	Brick, block, stone, AAC	Durability, fire resistance, thermal mass	Load-bearing walls, façades
Glass & Glazing	Float glass, low-E, insulated units	Transparency, solar control, insulation	Curtain walls, windows, skylights
Insulation	Mineral wool, EPS, XPS, PIR, cellulose	Low thermal conductivity, moisture resistance	Envelope, pipe and duct insulation

Selection criteria: structural demand, fire rating, thermal performance, acoustic performance, sustainability, cost, and availability.

4. Structural Systems

System	Description	Typical Applications
Load-bearing walls	Walls carry vertical loads directly to foundations	Low-rise residential, historic buildings
Post-and-beam (frame)	Vertical columns support horizontal beams; slabs span between	Commercial offices, schools
Shear wall/ Core	Reinforced concrete or masonry walls resist lateral loads	High-rise towers, hospitals
Space frame	3D truss network, high stiffness, minimal material	Airports, exhibition halls
Prefabricated modules	Factory-built panels or units assembled on site	Rapid-build housing, hotels

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System	Description	Typical Applications
Hybrid systems	Combination (e.g., steel frame with concrete core)	Tall buildings, mixed-use towers

5. Building Services (MEP)

| Service | Main Functions | Design Considerations | |-----