STEEL FLOOR SYSTEMS & TIMBER FLOOR SYSTEMS

(Ref: Building Construction Illustrated, Francis DK Ching)
Steel Structural Framing

~ Steel girders, beams and columns are used to construct a skeleton frame for structures ranging in size from one-storey building to skyscrapers.

~ Steel structures are most efficient when they are laid out along a regular grid.

~ Resistance to wind or earthquake forces requires the use of bracing or framing with moment-resistance connections.

Steel Structural Framing

One-Way Beam System

~ Each pair of external columns support a long-spanning beam or girders.

~ Suitable for long, narrow buildings. Especially when a column-free space is desired.
Steel Structural Framing

**Two-Way Beam System**

- Framing beams into girders
- Two layer system increases floor depth
- Girders spanning short axis of a building can contribute to stability to the structure
- Typical span range of beams is 20'0" to 32'0"
- Beam spacing is 6'0" to 15'0"

Steel Structural Framing

**Triple Beam System**

- Suitable for large, column-free space
- Long-spanning plate girders or trusses can be used to carry the primary beams
Open-Web Joist Framing

- May be supported by bearing walls or reinforce concrete, or by steel beams and girders.
- Spacing of joist is resistance to the magnitude of the floor load, the spanning capability of the decking material and the floor construction depth desired.

Steel Structure Connections

- Connections usually use transitional elements, such as steel angles, tees, or plates.
- When bearing on concrete or masonry, steel bearing plates are required to distribute the concentrated load imposed by a column or beam.
Moment Connections

~ Rigid Frame
~ Connections are able to hold their original angle under loading by developing a specified resisting moment
~ Usually by means of welded plates or bolted to the beam flanges and the supporting columns

Shear Connections

~ Simple Frame
~ Connections are made to resist only shear
~ Shear walls or diagonal bracing is required for stability of the structure
~ Made by welding or bolting the web of the beam to the supporting columns or girders with two angles or a single tab plate.
Semi-Rigid Connections

~ Beams and girders connections possess a limited but known moment-resisting capacity

~ All welded connections are aesthetically pleasing

~ But it can be very expensive to fabricate

Metal Decking

~ Corrugated to increase its stiffness and spanning capability

~ The floor deck servers as a working platform during the construction and as formwork for a site-cast concrete slab
Form Decking

- It serves as permanent formwork for a reinforced concrete slab

Composite Decking

- Serves as tensile reinforcement for the concrete slab which is bonded with embossed rib patterns
Cellular Decking

- The corrugated is welded to a flat sheet metal
- Forming series of space or raceways for electrical and communication wirings

Light-Gauge Steel Joist

- Manufactured by cold-forming sheet or strip steel
- Making steel lighter, stable and longer span

Types of Light-Gauge Steel Joist
Interior Bearing

Exterior Bearing