MLZ 460 "MATERIALS SELECTION & DESIGN" PROJECT

Spring 2022-2023

"STRUCTURAL MATERIALS FOR COLUMN OF BUILDINGS"

Materials are used in very large quantities (family house: around 200 tonnes; large apartment block; around 20,000 tonnes) in the buildings. The materials are used in three ways structurally; to hold the building up, as cladding, to keep the weather out; and as 'internals', to insulate against heat, sound, and so forth.

Consider the selection of materials for the structure of a building. The cross section is chosen to carry the loads without compressive failure or buckling. It should be strong, so that there is no risk of collapse. The structural frame of a building is very rarely exposed to the environment, and it is not generally visible. So criteria of corrosion resistance or appearance, are not so important. The design goal is simple: strength and safety at minimum weight.

The design requirements are summarised in the Table below.

The design requirements

Function	Structural material for building (minimum 4 floors) column
Objective	Minimum weight
Constraints	(a) Must carry design load (b) Must not buckle under design load (c) Length L and cross-sectional area is specified (d) Must not fracture catastropically