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STEEL CONSTRUCTION

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PREAMBLE

Designing and building are done with materials, and each has its own conceptual, technical, and mechanical specificities.

Building with steel is part of the composite sector. It is a material whose preparation and shaping are largely done in the workshop, and its elements arrive on the site ready to be assembled and combined with other materials. The logic of construction with steel is one of assembly, where the framework is made by load-bearing points of the column-and-beam type, on which the elements of floors, envelopes, and partitions are grafted.

Steel is part of a very specific universe with its families of products, including long or flat, cold sections, beams, and columns in the shape of H, I, U, etc. Steel lends itself to all kinds of applications and offers a wide range of aspects. We can even say that there are steels since stainless steel, for example, does not have the same composition as carbon steel, and it comes in multiple grades.

In this course for engineers and civil engineers, all important aspects of steel construction are covered in a synthetic and didactic way. The mechanical qualities of this material and the technical possibilities it offers are presented, with constant concern for detailing the verifications to be carried out and addressing the classic general calculations of the structures for each type of stress in accordance with the regulations in force (Eurocode 3, CCM97) in particular.

Compared to other construction materials, metal constructions require special attention to be paid to specific key points, in particular:

- Elastic instability phenomena (buckling, buckling, and buckling), which considerably amplify the stresses in the parts and which are particularly formidable in metal construction due to the use of thin and very slender parts. These three phenomena are detailed in their theoretical, experimental and regulatory aspects.
- Assemblies (bolted, welded); to protect against the risk of sudden ruptures, which would lead to the ruin of the structure by collapse.

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1.1 Steel in Construction

1.1.1 Historical

The development of furnaces allowed the evolution of metal, where steel replaced wrought iron.

Advances in knowledge of behaviour and the materials resistance have led to remarkable progress and integration of steel construction in the construction field.

1.1.2 Metal Framing and Boiler making

Depending on the purpose of the metal constructions, the following two (02) main divisions can be adopted:

Boilermaking: Consists of the search for tightness about a fluid or gas. These are tanks, tanks, large spheres and silos.

Metal frame: An area where the issue of resistance is the most preponderant. Steel constructions are an important area of use for rolled products from the forge. They use, in particular, sheet metal and profiles.

1.1.3 Some examples of elements in Steel construction

The posts:

Steel construction generally uses 02 types of poles: continuous posts and lattice posts.