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assemblies, the determination of their mechanical and metallurgical efficiencies, and the calculation of their strength and safety.

Constructors have been won over to the idea that general designs for welded structures cannot be based simply on the traditional designs for riveted structures, but must develop in the direction of arrangements that are better adapted to the peculiarities of welded structures. However, the synthesis of these considerations has yet to be effected. Attention is drawn to certain trends which have become apparent in some fields of metallic engineering structures, particularly in the case of hydraulic structures, such as sluice gates for dams, and lock-gates. There is a growing tendency to make use of relatively thin metal sheets employed in the form of elements which take the fullest advantage of surface continuity allied to that of sufficient flexibility to avoid the unfavourable effects of the rigidity of welded assemblies and the sensitivity towards welding of members of considerable thickness. The study of the stiffening of these plates is making substantial progress and large bridges have been constructed, or are in course of construction, in accordance with these techniques, particularly those in which the main bearing members are of the box section type.

IIIb

Structural steels for welded structures

Co-operation between metallurgists, welders and constructors has resulted, in most countries, in the standardisation of the types of steel known as weldable steels, which are adapted to the requirements of the various types of welded structures.

The relative character of the conception of weldability is generally recognised nowadays. The combined efforts of metallurgists, welders and constructors should lead to the development of a range of steels which will enable welded structures to be fabricated economically. The final step that has to be taken is the standardisation of a few fairly simple tests to be made on delivery and capable of being applied to steels suitable for welded structures, according to their size and complexity.

IIIc

Various welding methods for the execution of welded steel construction

Although the very nature of welded structures makes it inevitable that manual welding should be retained to a large extent, considerable progress has been achieved in the utilisation of automatic and semi-automatic welding. These processes are of particular interest for the fabrication of members which happen to be duplicated a certain number of times in a single engineering structure.

The use of special treatments, such as pre-heating and local or generalised thermal treatment, as well as the utilisation of certain special welding processes, may be taken into consideration when this is rendered necessary by the nature of the steel, the structural design and the purpose for which the structure is intended.