

SYMPOSIUM ON DEVELOPMENTS IN GLUED-LAMINATED AND OTHER WOOD CONSTRUCTIONS

INTRODUCTION

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The ready availability and ease of fabrication of wood set the pattern for extensive use by early craftsmen, and there had accumulated over the years a large background of empirical information on its physical properties, characteristics, and methods of application. While wood is thus among the oldest structural materials, it significantly maintains an important place in our modern economy, as a result of the extensive engineering research and development since the turn of the century.

The parade of technical progress has appropriately included an extensive evaluation of the mechanical and physical properties of the various species of timber employing unified methods of test established as ASTM Standard D143 - 52, Standard Methods of Testing Small Clear Specimens of Timber; extensive development of technical information on factors affecting the strength, covering such factors as moisture content, rate of loading, duration of stress, fatigue, temperature, direction of grain, position of growth rings, influence of inherent characteristics such as knots, cross grain, checks, and shakes; timely development of structural grades for timber in which knots and other characteristics are limited in size and position so as to permit definite quality classes susceptible to close evaluation of strength; the establishment of working stresses for timber based on a more intimate knowledge of

factors affecting strength and design; the development of improved joints and fastenings including metal connectors that have greatly widened the horizon of timber construction for large structural applications; the development of commercial and structural plywood involving the fabrication of large flat sheets; and the development of structural fiberboards.

In addition, much attention in recent years has been given to the further development of glued-laminated, stressed-skin, and sandwich constructions. Significantly, the utility and field of application of these constructions is greatly broadened by the developments in synthetic resin adhesives that permit bonds with any desired degree of moisture or water resistance. For example, glued-laminated members are now used for keels and other structural parts of ships.

From the time of its introduction, glued-laminated construction met with favor, and its acceptance and utility have resulted in the establishment of a new fabricating industry. Broadly, the term "glued-laminated construction" refers to members or structural units glued up from smaller pieces of wood, either in straight or curved form, with the grain of all the laminations essentially parallel to the length of the member. In one form of this construction, glued-laminated arches have afforded a means of achieving large clear spans in buildings with excellent architectural

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effects. In recent designs, spans upwards of 250 ft have been employed.

Further studies on plywood, as another versatile wood product dependent on adhesives, have resulted in broadened structural applications. It is particularly effective for facings in sandwich construction and for gusset plates in the newer forms of glued wood trusses, as well as in connector construction. At the same time there has been continued development in engineered timber construction with solid wood.

Because of the developments in timber construction in the West and the extensive use and applications in this region, the Second Pacific Coast Area Meeting of the ASTM afforded a particularly appropriate occasion to review this progress through a series of symposium papers. These presentations give an overall picture of the importance of these developments in wood construction and some details of the nature, variety, and extent of their current use and application.