

Hydrothermal modification of wood: a review

ABSTRACT

Wood is a versatile material that is used for various purposes due to its good properties, such as its aesthetic properties, acoustic properties, mechanical properties, thermal properties, etc. Its poor dimensional stability and low natural durability are the main obstacles that limit its use in mechanical applications. Therefore, modification is needed to improve these properties. The hydrothermal modification of wood exposes wood samples to elevated temperatures and pressure levels by using steam, water, or a buffer solution as the treating medium, or by using superheated steam. Abundant studies regarding hydrothermally treated wood were carried out, but the negative effect on the wood's strength is one of the limitations. This is a method that boosts the dimensional stability and improves the decay resistance of wood with minimal decrements of the strength properties. As an ecofriendly and cost-effective method, the hydrothermal modification of wood is also a promising alternative to conventional chemical techniques for treating wood. Researchers are attracted to the hydrothermal modification process because of its unique qualities in treating wood. There are many scientific articles on the hydrothermal modification of wood, and many aspects of hydrothermal modification are summarized in review papers in this field. This paper reviews the hydrothermally modified mechanical properties of wood and their potential applications. Furthermore, this article reviews the effects of hydrothermal modification on the various properties of wood, such as the dimensional stability, chemical properties, and durability against termites and fungi. The merits and demerits of hydrothermal wood modification, the effectiveness of using different media in hydrothermal modification, and its comparison with other treating techniques are discussed.

Keyword: Hydrothermal modification; Buffered media; Thermal treatment; Wood modification; Dimensional stability; Strength properties