TanWood®: The Brazilian Process of Thermal Modification of Wood

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ABSTRACT

Thermal modification of wood has been scientifically studied for almost one century, although it was industrially consolidated in Europe only on the 1990's. Nowadays, in that continent can be found in operation the most important industrial processes of the world, such as the Finnish ThermoWood® and the Netherlander Plato®. From 2006 the Brazilian company TWBrazil started its own research on thermal modification, and nowadays there is a Brazilian process named TanWood®. The aim of this work was to describe briefly the Brazilian process of thermal modification TanWood® and provide a comparison to the European ones based on bibliographic information.

A diagram of a theoretical program, with final cycle temperature of 160 °C, is presented in Figure 1, but the pressure is not shown and can achieve from 3 to 10 bar in the phase four, according to the final temperature.

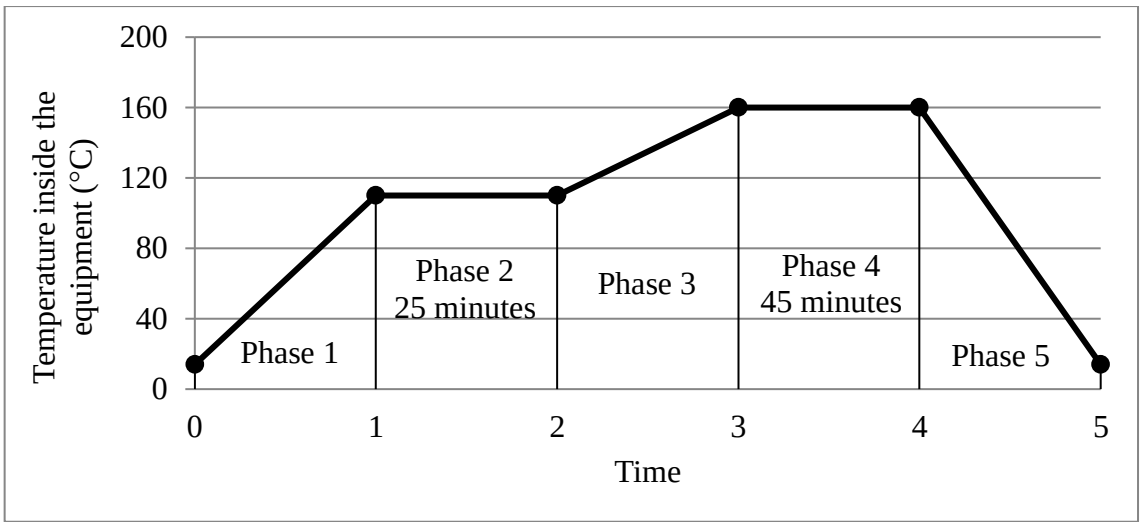

Figure 1: Example of a typical theoretical process.

The description of each phase follows:

- Phase 1 – Initial heating: this phase corresponds to the begin of the process, after lumber is loaded and the cylinder is closed. Steam is injected inside the equipment and the system is heated, according to a predetermined heating rate (°C min^{-1}). The lasting of this phase is variable and depends on the heating rate adopted.

- Phase 2 – Constant temperature: after the initial heating, starts the first phase of constant temperature, at 110 °C for 25 minutes, so the heating rate is nil in this phase.
- Phase 3 – Secondary heating: this is the second phase of heating, and lengths until the system reaches the final cycle temperature, according to a determined heating rate (°C min^{-1}).
- Phase 4 – Thermal modification: in this phase occurs the thermal modification of wood, and the final cycle temperature is kept constant for 45 minutes.
- Phase 5 - Cooling: after phase 4, the equipment is turned off and the system cools down.

TanWood® is a hygrothermal process of thermal modification, which uses saturated steam (wet heat) as heating medium, and due to particularities of the equipment and the process variables it can be considered different from the European processes. The technical features of each process do not permit then to be entirely compared because the nature of the imparted chemical modifications is different. Wood species is a factor which hampers comparisons between the Brazilian and the Europeans processes, mostly because the species available in Brazil for thermal modification are different from those in Europe.