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Investigations on the Influence of the Addition of Carbon Dioxide on the Production and Properties of Rapidly Set Wood–Cement Composites

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Abstract

This paper gives a short description of the manufacturing process of cement particle boards. Production methods currently used are characterized by a pressing time of boards of about 8 h. Also, flakes from only a limited number of wood species are suitable as reinforcing material. A new process is described where pressing time is reduced to only 4 min, and which allows the utilization of wood species not known as suitable so far. This process is distinguished by the injection of carbon dioxide into the furnish during pressing, whereupon the cement sets within a few minutes. A similar process, also described in this paper, uses carbonates of ammonium, sodium or potassium as additives to the mixture of wood flakes, cement and water. The carbonates decompose during pressing and carbon dioxide is released to react with calcium hydroxide from the hydration process. Thus, the cement sets within a very short time. The paper compares the properties of cement particle boards made according to these new processes with those from the old process.

Keywords: Wood fibre–cement composites, particle boards, manufacture, production time, setting time, density, bending strength, composite materials.

1 INTRODUCTION

A schematic view of the industrial process of cement particle board production according to Elmendorf[1] is given in Fig. 1. Appropriate wood particles are soaked with gauge water which may contain cement setting accelerators. Portland cement is then added, and blending is continued until a homogeneous mixture is obtained. A water/binder ratio of about 0·4 yields a spreadable mixture of wood particles, water and cement (the furnish). Thus, equipments commonly used for the manufacture of particle boards are suitable for the production of cement-bonded boards.

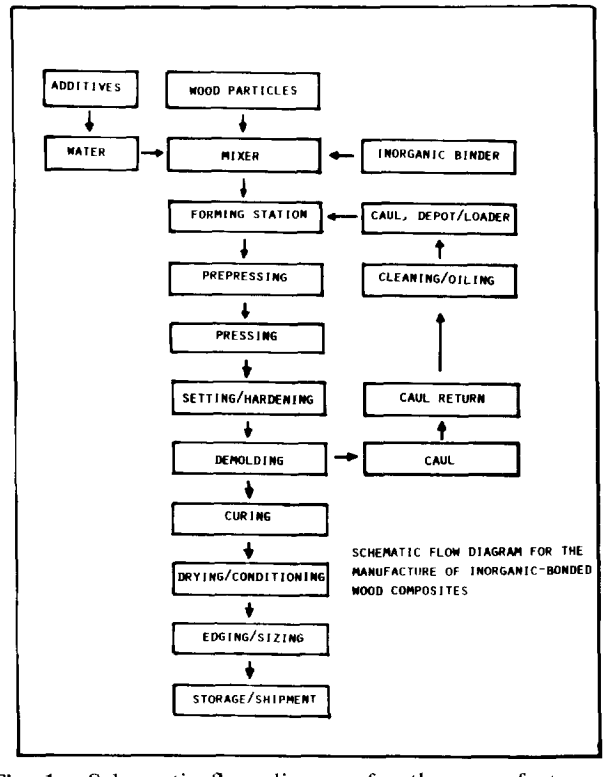

Fig. 1. Schematic flow diagram for the manufacture of cement particle boards.

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