

THE 3D LIQUID WOOD SHEETS FORMING THROUGH A VACUUM PROCESS

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Abstract: *The plastic materials are involved in a multitude of important processes having a major influence on our everyday lives. Their applicability can be found in all activity area. The use of fossil fuels is more important nowadays because of their limited reserves. It is essential to search and develop alternatives to fossil-based materials that can complete, replace them with success. In this way the renewable resources are a crucial area in the search for alternatives to common plastics. To develop new products from renewable resources it is required to perform a multidisciplinary research at a highly technological level. To meet this need, the German Fraunhofer Institute for Chemical Technology together with Tecnar GmbH Company have made studies and developed, a thermoplastic material – deformable under heat – based on natural resources (wood components) - a new material named “liquid wood” which can be processed in the same way as thermoplastics. “Liquid wood” is available in three different versions: ARBOFORM® Liquid wood 100% biodegradability (based on lignin, organic additives and natural fibers), ARBOBLEND® plastic composite with wood 80% biodegradability (its content is based on biopolymers degree, e.g.: lignin, starch, natural resins, wax and cellulose), ARBOFILL® biopolymeric composite 60% biodegradability (polymers and natural fibres-based compound provided with natural cork aspect). “Liquid wood” has better thermal and mechanical properties than wood and plastic put together. It is a biodegradable thermoplastic engineering material of superior quality and strength that will meet the technological demands replacing the indomitable market giant-plastic. “Liquid wood” granules can be processed by different procedures, i.e. injection moulding, extrusion, calendaring, blow molding, deep drawing or pressing into moulded parts, semi-finished products, sheets, films or profiles.*

The paper presents equipment that consists in a metal oven that has an enclosure with constant thermal environment. It uses the vacuum thermoforming technology which consists in hot shaping of plastics. As a principle, the thermoforming process involves the heating of sheet (in this case of “liquid wood”) and the formation of product under vacuum, on the mold. Special attention should be given to the mold surface quality to ensure a perfect vacuum and fines vacuum holes. The thermoforming device can have concave or convex form. The most beneficial aspects of thermoforming it is the effectiveness in terms of production costs and limiting production cycle. With this equipment can be obtained a variety of items such as interior automotive parts, protective casings, transport containers and packing, recreational and sports equipment, medical equipment and supplies for industrial purposes.

Keywords: *vacuum, positive mold, “liquid wood”*

1. Introduction

Plastic, a material used in all activity area, has been held responsible for the cause of everything from the greenhouse effect to taking up a major part of the landfill. Fortunately, a german chemical company, Tecnar GmbH in collaboration with

Fraunhofer Institute for Chemical Technology, has taken the initiative in constructing an environmentally friendly plastic that reduce the footprint left by plastics in recent decades, [1]. This newly developed material is being called “Liquid wood”, being unique and protected by international patents. “Liquid