The project has been financed by the European Commission through the LIFE+ program

REVALORIZATION OF COASTAL ALGAE WASTES IN TEXTILE NONWOVEN INDUSTRY WITH APPLICATIONS IN BUILDING NOISE ISOLATION

SEAMATTER-LIFE11 ENV/E/000600

LAYMAN'S REPORT

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CONTENT

The aim of this document is to compile the results and conclusions reached by the European SEAMATTER Project. This project was financed by the EC through the LIFE+ Program and developed by AITEX who acted as project coordinator in a consortium including IEL (Fundación de la Comunitat Valenciana Instituto de Ecología Litoral), Perugia University (Università degli Studi di Perugia Dipartimento di Ingegneria Civile ed Ambientale) and ATEVAL (Asociación de Empresarios Textiles de la Comunidad Valenciana).

WHAT IS SEAMATTER?

PROBLEM TO BE SOLVED AND PROJECT OBJECTIVES

Algae and seaweed accumulations on beaches and along our coasts are an environmental nuisance; this biomass emits unpleasant odours, promotes mosquitos and their rotting contribute to increase the high mortality in shellfish beds as they turn into rubbish. .City Councils of the coastal areas are required to remove them if they want to remain their touristic conditions and their Blue Flag Beach category. It is important to remark that sand is also removed when algae residues are collected so, year by year the beach goes back and must be regenerated applying new sand. For this reason, currently the most widely adopted practice is to leave the algae residues in the coasts in winter and collect them in summer when tourists make massive use of the coastal areas. Generally, this actuation takes place within the Integrated Management System where all the marine accumulations are managed as urban solid wastes and are deposited in a landfill and/or incinerated.

LIFE SEAMATTER project intends to solve the environmental problem of the vegetal, algae and seaweed accumulation in the coastal while validating the best collection and transport management method for these natural wastes. This particular kind of natural residues will find application in non-woven textile industry as materials derived from marine biomass will become sustainable textile reinforcements suitable to be implemented in composite industries, specifically as acoustic panels in buildings.

INTRODUCTION

SEA-MATTER demonstrates that non-woven textile structures made from coastal vegetal wastes can be used as composites reinforcement in noise isolation acoustic panels. Wet-laid technology has been selected as the most optimum technology to transform the algae wastes in non-wovens to be used as reinforced structure. Fibrous and particulate materials can be easily applied in wet-laid process to develop non-woven structures. These wastes have to meet some technical requirements (length, size, density, etc.) that have already been successfully studied; confirming the possibility of using these wastes as raw materials to form non-woven reinforcement. So, it is understood the positive impact of **SEA-MATTER** project in terms of give value and recycling of the algae wastes accumulated and also it will have an environmental impact because these wastes will not have to be disposed but reused.

In addition, the possibility of using this algae and seaweed residues in textile non-woven industry with applications in building noise isolation opens a new environmental attractive option, to design new green composites as an alternative to the conventional synthetic ones.

WHAT HAVE WE DONE?

PROJECT DESCRIPTION

The development of SEAMATTER initiative has implied in a first stage to study the current situation of the management of algae and seaweed deposition wastes from the coast.

The actual procedures for collection, transportation and cleaning procedures used nowadays have been reviewed. Different municipalities and companies in charge of the management of the coastal wastes have been contacted for this purpose.

OPTIMIZATION OF THE METHOD OF MANAGEMENT OF THE SEAWEED DEPOSITION WASTES.

In order to define the best solution for collecting the marine wastes from the coast and to suggest techniques for transport and storage of the coastal vegetal wastes some entities which work on the management and collection of Posidonia have been contacted. A complete Best Practices Guideline has been developed in order to find the most optimum technological solution for the management of the coastal wastes..

DEFINITION, SELECTION AND CHARACTERIZATION OF THE PROPERTIES Of COASTAL VEGETAL WASTES TO OBTAIN NONWOVENS.

The seaweed wastes collected from the beach have been characterized and prepared to be used as raw material for wet-laid process. This material has been characterized in terms of mechanical, acoustical and thermal properties in order to optimize the non-woven composition.

WET-LAID APPLICATION TO OBTAIN NONWOVENS THAT ACT AS REINFORCEMENT STRUCTURES IN COMPOSITES.

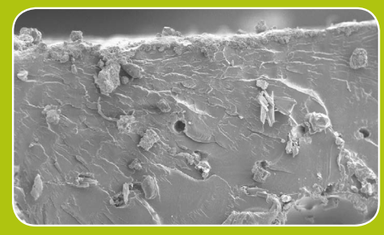
The wastes have been cleaned and prepared to develop nonwovens using wet laid technology. For this purpose the wet laid parameters have been optimized. Different samples have been produced and characterised to be used as reinforcement of composite materials.

PROCESSING OF COMPOSITES THROUGH DIFFERENT TECHNOLOGIES WITH THE OBTAINED NONWOVEN.

We have started producing some samples of composites reinforced with the non wovens obtained in the rear actions using compression moulding. We have selected PLA as polymeric matrix. The resulting composites have been characterized in their mechanical, physical, acoustic and fire retardant properties.

MONITORING OF THE IMPACT OF THE PROJECT ACTIONS.

With the environmental and economic information obtained from above actions a complete monitoring study has been performed including the economic variables of the current procedures of collection, logistic and disposal of the natural wastes materials, the raw materials, the wet-laid nonwoven production, the cleaning, drying and cutting processes of the wastes used and the composites production process. The complete LCA and LCC have also been performed .

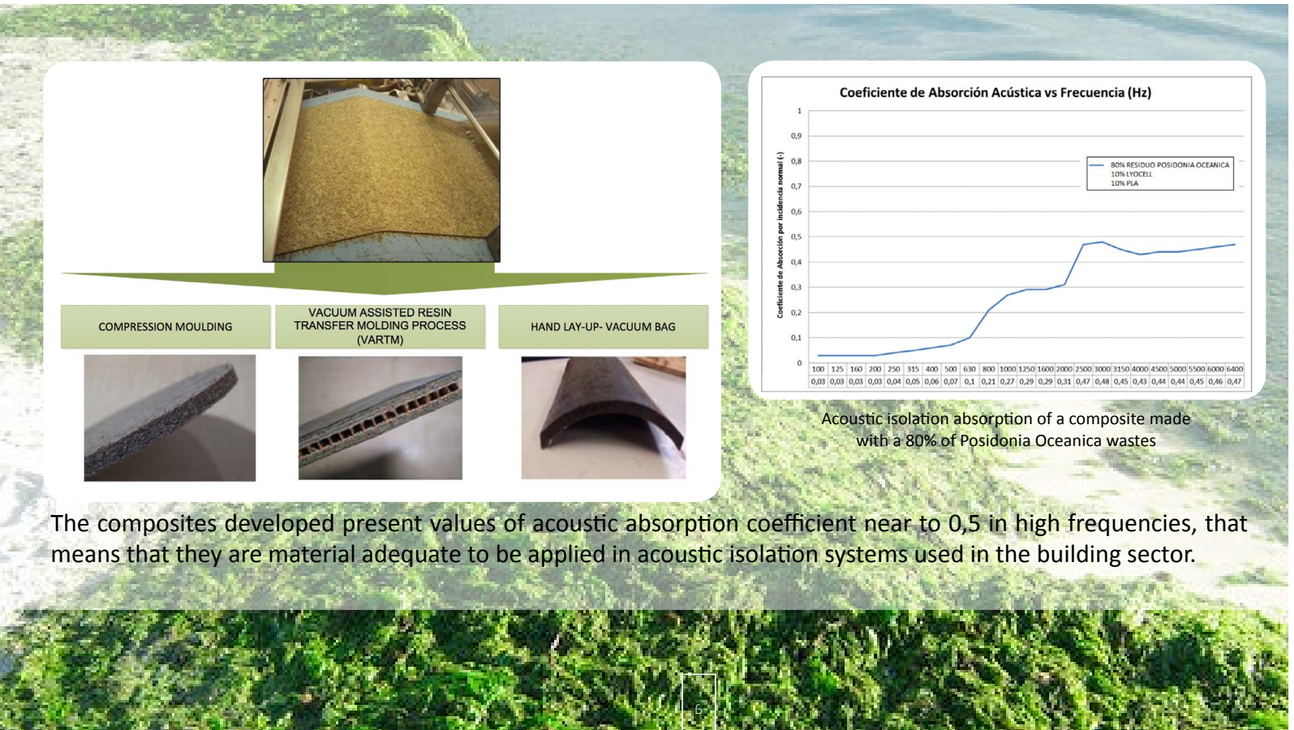


WHAT WE HAVE OBTAINED?
MAJOR OUTPUTS AND RESULTS

Our first result has been the development of a Good Practices Guide focused mainly on technicians and municipal services that manage the collection of the vegetal wastes accumulated in the beaches in order to know the nature of these wastes, their ecologic function in the beaches protection and when, where and how can these wastes be collected.

On the other side, with the aim of optimizing the product, it has been necessary to carry on an exhaustive preparation of the Posidonia Oceanica wastes for their correct process with the wet-laid technology. For this purpose, the optimal processes of management, cleaning, drying and crashing of the wastes have been defined and afterwards a big number of nonwovens with vegetal wastes have been manufactured in AITEX wet-laid experimental plant.

The wet-laid non-wovens have been used as reinforcement in thermoplastic and thermo-stable composites assessing their applicability in the following composite manufacturing processes: thermos-compression moulding, resin infusion (VARTM) and manual laminating (HAND LAY-UP and VACUUM BAG). We have developed a high variety of composite materials in the context of this project.



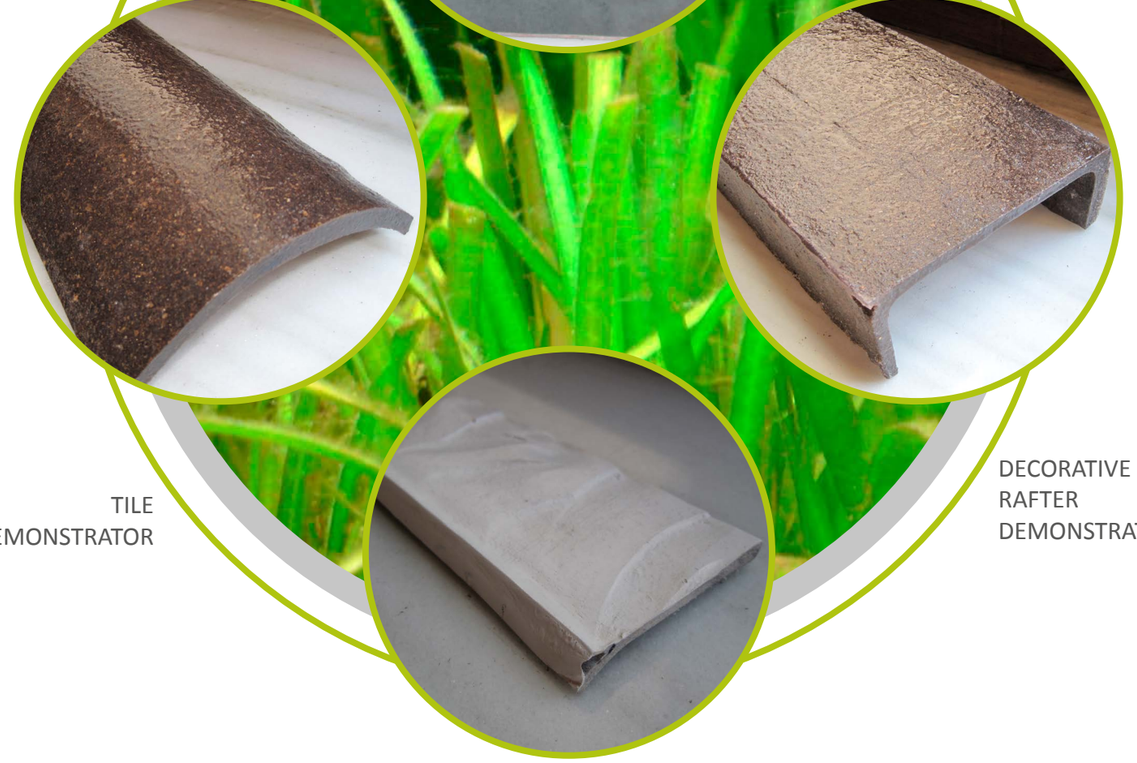
Acoustic isolation absorption of a composite made with a 80% of Posidonia Oceanica wastes

The composites developed present values of acoustic absorption coefficient near to 0,5 in high frequencies, that means that they are material adequate to be applied in acoustic isolation systems used in the building sector.

CONCLUSIONS

Through the correct execution of the LIFE-SEAMATTER Project we demonstrate the possibility of give value to the Posidonia Oceanica wastes obtaining technique acoustic isolation panels to be applied in the building sector. The non-wovens developed through the wet-laid technology from coastal vegetal wastes are easily applicable as reinforcement for obtaining of composites through different technologies, offering good properties of acoustic isolation. Furthermore, when a good fire behavior is needed, it is possible to incorporate technical fibres with high thermal properties in the textile reinforcement process using wet-laid technology apart from fire retardant resins in the thermo-stable composites manufacturing process.

WALL COVERING DEMONSTRATOR



TILE DEMONSTRATOR

DECORATIVE RAFTER DEMONSTRATOR

MOLDING DEMONSTRATOR

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