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RE^4 Project

REuse and REcycling of CDW materials and structures in energy efficient pREfabricated elements for building REfurbishment and construction

D6.1 Production. Conditioning, manufacturing and quality control. Safe production guideline

Public summary of deliverable

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Distribution[2]	This document is a public summary of the confidential deliverable D6.1 of RE^4 project.
Status[3]:	Final
Abstract:	The Deliverable D6.1 summarises the results obtained by the RE^4 team involved in Task 6.1 – *Design and adapt the prefabricated elements production line.* The work in this task focused on the realization and adaptation of their facilities by Creagh, Vortex and Cetma for the production of the CDW elements and components developed in previous tasks. Quality control and safety procedure are key points together with the minimization of energy requirements, residues generated and time needed.
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[1] *Just mention the partner(s) responsible for the Deliverable*

[2] *PU: Public, RE: restricted to a group specified by the consortium, CO: Confidential, only for members of the consortium; Commission services always included.*

[3] *Draft, Revised, Final*

Introduction

Deliverable D6.1 summarises the results obtained by the RE^4 team involved in *Task 6.1 – Design and adapt the prefabricated production line* (VORTEX, CETMA and CREAGH).

Efforts within the task were focused on the realization and possible adaptation, where needed, of their facilities by Creagh, Vortex and CETMA for the production of the CDW precast elements (i.e. slabs, walls - structural and non-structural, façade sandwich panels, roof, columns and beams) and extruded elements (roof and floor tiles and façade elements).

Description of results

Facilities and pilot line of the partners involved in the manufacturing phase revealed themselves to be suitable to accomplish the task, without any specific adaptation.

Figure 1 – **Creagh's main factory in Toomebrige**

Figure 2 – **Vortex's factory**

Figure 3 – **Pilot line at CETMA facility**

Quality control and safe production guidelines have been adopted and implemented in order to ensure that the production phase was carried out according to well established, reliable and high quality and efficiency-oriented standards. The control protocol for the manufacturing of the CDW-based concrete elements was drawn in accordance with the Quality Management System **ISO 9001:2008** and Environmental Management System **ISO 14001:2004**. The quality procedure foresees several steps including:

- Screening procedure
- Receipt of CDW materials
- Rejections of unacceptable materials
- Categorising
- Finished product testing.

Risk assessments and safe methods of work were performed in order to:

- Ensure that all personnel is adequately informed, instructed, trained and made aware of the requirements of these procedures.
- Review these methods on a regular basis to ensure that all latest technologies have been adopted to ensure the safety of all employees.

- Implement safety signs.

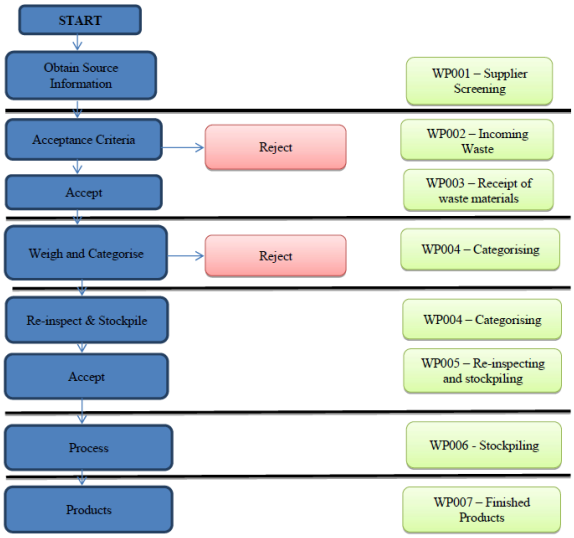

Figure 4 – Production and control procedure

Policies and strategies for the minimization of energy consumption, residues and time are implemented by partners involved in the manufacturing phase of CDW-based products.

- Wood recycling
- Concrete waste minimization
- Proper handling of hazardous products
- Carbon footprint minimization

For the **industrial partners** involved (Creagh and Vortex), the manufacturing of CDW-based concrete elements did not lead to any major impact on standard equipment and production procedures.

Figure 5 – Poured mould at Creagh's facility

Figure 6 – Extruder at Vortex's facility

The upscale phase carried out by CETMA for the production of CDW-based wood panels, asked for a preliminary tuning phase at lab test level, in order to ensure that the larger amount of CDW to be processed did not represent a problem. This step led to an optimized mould concept.

Figure 7 – CDW-based wood panel

Conclusions

The use of CDW-based materials, as replacement of virgin raw materials for the manufacturing processes of precast and extruded concrete products, has been proven to be feasible without affecting in any way well established production cycles. The scale up operation from lab test production to pilot line for insulating panels with wood did not require any specific adaption as well.

A Quality Control protocol and safety rules already in force in production sites, have been implemented and transferred with success to the manufacturing of CDW-based products.
No relevant impact on energy consumption, residues generated and production times in comparison to standard operations have been noticed. CETMA have been capable to optimize their production procedure exploiting their hydraulic press setting and processing more panels at the same time.

The elements produced have been shipped to the sites where mock-up buildings for field tests are erected and for further investigation of the performance of the CDW based products.

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