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## Issue # 03

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The **CelluWiz** project started in June 2019 and since the last newsletter in September 2021, significant progress has again been made. In the past year, the partners of the project discussed several times by web meeting and met in Voith (Germany) in June 2022.

As a reminder, the overall objectives of **CelluWiz** project were to develop two processes able to produce an all-cellulose packaging material:

1. **The MFC wet lamination** process that allows the deposition of a thin layer of Micro-Fibrillated Cellulose on a paperboard and confers oil and oxygen barrier properties and
2. **The Chromatogeny grafting** process, aims at providing water and water vapour barrier to the MFC layer.

## Main Achievements

### Proofs of concept

The full set of proofs of concepts, clamshell, tray and cup have been produced by partners ITENE, Stora Enso and CTP and sent to the CelluWiz partners. The performances of these proofs of concepts will serve as a baseline for further development of the packaging material developed in CelluWiz and the objects themselves will serve as a source of inspiration to innovate new applications using the material. They also serve the purpose of demonstrating the performance of the material in common industrial converting unit processes such as creasing, folding, pressing and heat sealing as well as the performance of the particular clamshell, tray and cup in real use situations.

The **clamshells** demonstrate the performance of the material in creasing and folding operations. Careful tool and creasing geometry selection is essential to make optimal use of the material. It is also important to preserve humidity in the material before converting otherwise cracks can appear in the barrier layer of grafted microfibrillated cellulose in connection to the creases and folds. The clamshells perform well in real life applications such as food service.



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The **tray** forming process adds more severe creasing and also compression of the material in the pressing operation when the flat material is converted to a deep drawn tray. In the current development stage of the material this induces severe cracking of the barrier layer and subsequent loss of barrier performance in some tests performed. The material can still be used for short-term use trays for example in food service but the loss of performance makes it less suitable for long shelf life food packaging.



Producing **cups** of the material introduce a new challenge: heat sealing is used to seal cups and the material is not heat sealable in itself. To overcome this limitation a minute amount of heat sealing agent was added to the areas where heat sealing takes place. In an industrial application this can be done by printing. After the addition of the heat sealing agent, the material is sealed in common equipment for cup production facilitating straight forward industrial implementation. The cups performed well when tested with liquids in real life situations.



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The proofs of concepts demonstrate that the material have an applicability in a range of industry relevant applications and by improvement of the ductility of the barrier layer the

## Recyclability of CelluWiz POC

The three proofs of concept have then been tested according to the CTP-REC21 recyclability test. The aim is to confirm that the PoCs produced during the CelluWiz project will not disrupt a standard recycling line for packaging (low consistency pulper, coarse screening, fine screening and heavyweight cleaning) and are perfectly recyclable for the paper industry.



At the laboratory scale, the 3 PoCs were disintegrated under conditions as close as possible to those in industry. After pulping, the totality of the pulp suspension is screened on two Somerville devices placed in series. The former is equipped with a 5 mm holed plate and the latter with a 15/100 mm slotted plate. A third Somerville device equipped with a 10/100 mm slotted plate is placed in control after the 2<sup>nd</sup> Somerville device to check if the efficiency (in contaminant removal) of the 2 previous devices is good. Rejects are collected at each screening steps, observed and weighted. Handsheets are manufactured after the pulping step and after the fine screening step for visual observation.

Initial composition (50% P/B)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disintegration (15 min)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rejects rate (<2%)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visual aspect	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No tackiness effect	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Results have shown that the 3 PoCs are easily disintegrated, the amount of rejects is very low (less than 2% for the cup and less than 0.5% for the 2 other) and the visual aspect of the handsheets is very good.

RECYCLABILITY (EN13430)

The recyclability according to the EN13430 has been proved for the 3 PoCs.

## Zoom on partners

The CelluWiz consortium **associates 6 partners from 4 European countries**: four research organizations and two industrial companies. The partners are being presented through the different newsletters.



The 3SR Laboratory (3SR Lab) is a Joint Research Unit of the Université Grenoble Alpes, the CNRS and the Institut Polytechnique de Grenoble. The 3SR Lab is conducting cutting-edge research in Solid Mechanics for civil engineering, transport, manufacturing industry and health. Research is based on experimentation and modelling, both at the material and structural scales. Experimental studies are conducted to understand, analyse and develop theoretical and numerical models by taking into account physical-mechanical couplings and multi-scale analyses.



Applied research, Consultancy Diagnosis, laboratory tests and training for those involved in the production, conversion and printing of paper and board, these are the missions of the Centre Technique du Papier. Independent, innovative, at the cutting edge of technology, the CTP develops the products and processes of tomorrow through technological innovation in many fields and ensures its transfer to industrial sites.

For almost 65 years, the CTP has been a partner to companies by developing new products and processes, both in the laboratory and on a pilot scale, to give new properties and functionalities to paper and cardboard. CTP brings to market new processes such as chromatography or wet lamination of MFC which open up new possibilities and new markets.

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### Follow us!

The **CelluWiz** Consortium has been actively communicating with the public about the project progresses on LinkedIn, Twitter and on the CelluWiz project **website**. Presentations in international conferences were done. A video presenting the main results of **CelluWiz** was released widely on social media. You have not seen it yet? [Click here!](#)

The many exciting results achieved in the CelluWiz project, have been presented to an audience of experts and industrials of the sector during a workshop on September, 29<sup>th</sup> 2022.

Follow us on LinkedIn ([@CentreTechniqueduPapier](#)) and Twitter ([@CommCTP](#)).

Feel free to contact us if you have questions.

**The Celluwiz Team**

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