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## ABSTRACT

- **Development of a new release sheet with technical added-value**
- **Disruptive innovation**
- **Environmentally friendly (fully bio sourced and compostable)**
- **Positive impact on lamination cost**

### OptiLayup™:

An innovative release sheet for PCB & CCL laminating system was developed in order to offer a greener and cost-effective alternative as well as added technical value compared to traditional plastic films:

- Excellent release with improved handling
- Higher thermal and dimensional stability
- Lower static build-up

## Objective & Goals

- **Using Ahlstrom-Munksjö's expertise in natural fibers parchmentization we aimed at creating a new release sheet: OptiLayup™**
- **bringing a greener and more cost-effective alternative to the PCB & CCL manufacturers**
- **providing great release performance with added technical value in terms of temperature resistance and enhanced handling**

## Current work

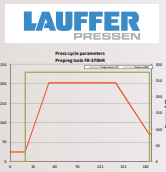
### Introduction

PCB & CCL industries use plastic release films as process aids during the lamination. They aim at protecting press tools and increase process performance. Few alternatives are available on the market and none offer a sustainable option contributing to the negative environmental impact of this industry. In addition, at temperatures above 200°C (392°F), standard plastic films become brittle and hard to manipulate. To face the challenges of this industry in terms of performance, sustainability and costs, a new alternative was needed.

### Material & Methods

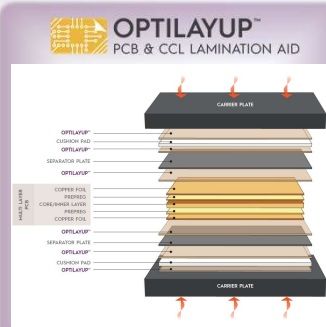
Tests simulating a 4 ML PCB were performed with a Lauffer Pressen's RLKV 50-1E-HT vacuum press.

ISOLA prepregs and laminates (370HR FR-4 + P95/P25 Polyimide-based) and Circuit Foil (Doosan) 18 µm copper foil have been used. ISOLA recommended processing guide has been followed. Additionally, higher temperature was assessed.



Comparatively, 3 standard release plastic films (PET, PTFE and PVF) were tested in the same conditions. All properties were tested under controlled atmosphere and according to current ISO standards when available.

OptiLayup™ was validated in industrial conditions thanks to our Chinese partner, Shanghai SunGoods Electronic, at several CCL & PCB producers.



## Results

### OptiLayup™ manufacturing:

OptiLayup™ is a mono-material made of 100% cellulose. Two thicknesses have been developed: 57 and 98 µm.

### Release material qualification for lamination processes:

- Optical and SEM testing confirmed that it contains no loose fiber or impurities.
- ICP-OES spectroscopy has shown that the copper layer remains free of chemical contamination and impurities.

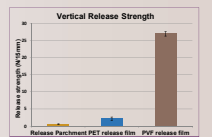
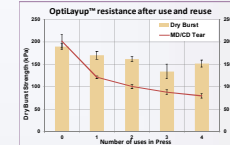
◆ **OptiLayup™ is suitable for lamination processes in the electronic industry**



### Release and operating performances:

The strength needed to remove model tape from the release layer is 5x lower for the OptiLayup™ than PET film. The difference is over 40x for PVF film.

◆ **OptiLayup™ has the best release properties**

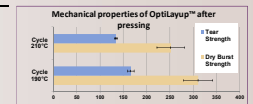


OptiLayup™ can be used several times and it maintains good mechanical properties after pressing. PET films could not be reused due to loss of mechanical properties. PVF film exhibited good mechanical properties but could not be reused due to important shrinkage.

◆ **OptiLayup™ is reusable**

OptiLayup™ keeps good mechanical properties even when used at higher temperatures or during pressing with overshoot.

◆ **OptiLayup™ is less sensitive to process parameters**



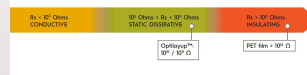
## Manufacturing



OptiLayup™ was developed using AM capacities:

1. Production of 100% cellulose waterleaf
  2. Parchmentization of waterleaf and application of the release coating
- The process was adapted to optimize properties of the release sheet. The resulting product is a genuine vegetable parchment (GVP).

### ESD - Surface resistance measurement



### Sustainable attributes:

- Made from renewable raw materials
- Biodegradable and certified compostable according to EN 13432 and OK compost HOME standards (TÜV Austria).



### Surface resistivity and static buildup:

OptiLayup™ has a lower value of surface resistivity compared to plastic films (10<sup>11</sup> vs >10<sup>12</sup>). Static Decay testing for plastic films yielded aberrant results, whereas OptiLayup™ had Decay time in the 0,1-0,5s range at +/-5 kV.

◆ **OptiLayup™ allows to prevent static buildup better than plastic films**

## Conclusion & Perspectives

A brand new generation of release material for lamination has been developed meeting the environmental and cost reduction challenges faced by the PCB & CCL industries.

Our study shows that OptiLayup™ meets the performance requirements to protect both press tools and laminates and brings additional features such as higher temperature resistance, re-use and low static coefficient.



5x lower release strength



Dust clinging reduced and easy handling



Operates at 210°C (410°F) for 3 hours at 275 psi



From renewable resources, biodegradable, compostable



Possible reuse

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