



**METNIN™ SHIELD**

**FOR PACKAGING APPLICATIONS**

# Cardboard boxes – Current challenges

## Unsustainable forms of packaging

- ✓ Current cardboards contains fossil-based additives and synthetic materials
  - Generate non-biodegradable waste in landfill
  - Increase GHG emission
  - Contains petrochemicals

## Shortcomings of current sustainable alternatives

- ✓ Do not offer enough durability in high humid conditions
  - Increased probability of damaged goods in supply chain
  - Not fully biodegradable
  - Not completely recyclable



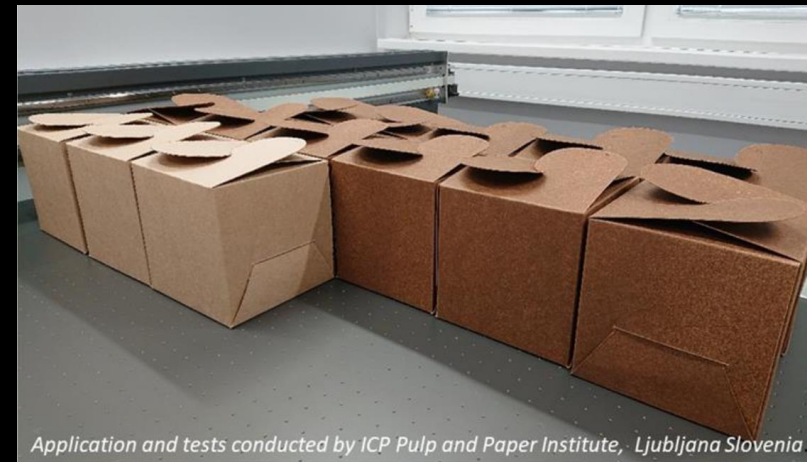
# Cardboard boxes – Our solution

## METNIN™ SHIELD, a sustainable biobased aqueous formulation

- ✓ Additive to packaging papers consisting of METNIN™ refined lignin
- ✓ Applied during the production of packaging paper
- ✓ Solution demonstrated on trial runs on paper machine
- ✓ Scale-up and technology transfer to the producer is ready
- ✓ Patent filed for the METNIN™ SHIELD solution

## METNIN™ SHIELD, an efficient strength additive for packaging papers

- ✓ 100% biodegradable
- ✓ Increased strength and durability
- ✓ Improved water/moisture resistant
- ✓ No green premium
- ✓ Creates better boxes



Application and tests conducted by ICP Pulp and Paper Institute, Ljubljana Slovenia.

# METNIN™ SHIELD - HIGHLIGHTS

- METNIN™ SHIELD is a sustainable **BIO-BASED additive** for fibre based packaging board and cardboard boxes.
- The **SHIELD** improves strength and moisture resistance properties of the paper board:
  - In regular and high moisture environment (up to 80% more strength @90% humidity)
  - Provides industry-standard hydrophobicity (Cobb60 <30 g/m<sup>2</sup>)
  - Improves the strength of ready-made cardboard boxes (up to 20%)
  - Compliance with food contact regulation FDA, BFR36, BFR36/2
  - Recyclable, re-pulpable, printable, biodegradable, compostable & petroleum-free
- Up to 30% reduction of virgin fiber savings maintaining the strength improvement (SCT)
- Industrial-size paper machine pilot runs completed successfully with global industry technology provider.
- Gas and grease barrier properties, continued improvement of performance and cost reduction are underway

# METNIN™ SHIELD - COMPETITIVE ADVANTAGE

Property	Current Solutions	SHIELD Benefits
Repulpable, Recyclable, Biodegradable	X	✓
Strong in high-humidity	X	✓
Plastic-free and fully bio-based	X	✓
Raw material savings	X	✓
Allows for lightweight packaging	X	✓
Strength and water-resistance in one solution	X	✓
All paper and box properties equal or better	X	✓

**IT'S TIME TO  
STRENGTHEN  
PACKAGING  
WITH  
METNIN™ SHIELD**



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