

LAMIDRY: A NEW PERSPECTIVE IN PHENOLIC RESINS APPLICATION

Longoni Roberto e figli srl

WHO WE ARE:

Longoni Roberto e figli srl

Founded in 1996 , coming from a long experience of our founder Roberto in the HPL and low pressure lamination industry

Program of supply of:

Know how
Machinery
Raw materials



For plastic decorative laminates (HPL and CPL), particle boards, and panels coated with melamine papers or finish foils

Last 10 years main achievements:

- Development of partnership with NTST impregnation line manufacturer resulting in supply of 33 lines worldwide
- General contractor for complete HPL plant Lemark Russia
- Main supplier of new complete HPL plant Al Hofaity Saudi Arabia / Maica Malaysia
- Worldwide partenrship with Formica Group
- Main supplier of new factory with 4 short cycle presses in Pisopak Perù
- Development of partnership with short cycle press manufacturer resulting in supply of OEM lines
- General contractor for new impregnation and lamination plant Lamintec Egypt
- Technology transfer for liquid overlay lamination in company Dillon China
- Distributor of Sandvik Surface Solutions press plates for south America
- Distributor of FLAI press plates for South America / turkey
- Distributor of Aluminum Feron GmbH foils
- Distributor of High gloss Aluminum foils and deep mat plastic films for HPL, CPL, SCL

Longoni
Roberto e figli s.r.l.

WHO WE ARE:

Eng. Maurizio Nasatti

Education :	University Master degree Mechanical Eng at Politecnico of Torino
Job Experiences	
Period :	from 14th March 2006
Activity :	Free lance Consultant for lines' project and technologies in the converting/packaging and impregnation's fields. Consultant for acquisition/sales and refurbishing of the line in the converting/packaging and impregnation's fields . Technical support and documents preparation for Patents .
Activity 2009-10	Innovative technology for "Dry Impregnation" for melaminic and phenolic impregnation for décor and backing papers (impregnated papers for furniture, flooring , low and high pressure) , filter papers (automotive industries, conditioning systems).
From January 2010	contract with Surface Tec. GmbH company (www.classen.de) Tech. collaboration with the Italian company Longoni Roberto e figli for the selling in CHINA of different technologies of
impregnation.	
Period :	from 1st December 2002 to 14th March 2006
Company :	Tocchio srl , Vigevano PV Italy
Position :	General Manager
Period :	from 16th April 1986 to 30th November 2002
Company :	ROTOMECH (Bobst Group) , San Giorgio Monferrato AL Italy
Position :	- Coordinator for all Market' purchasing (like extruders, Dies , Register Controls , Corona Treaters.....) - Installation and Start Up Manager - Mechanical Tech. Office Manager - R&D Manager

**The idea comes from a baby-like
observation:**

**Why shall we wet the paper just to
dry it up afterwards using a 50 m
long big box of hot air?**

LET'S THINK DRY

THE PROJECT ORIGIN:

- The project takes start with the reserch job made by Mr. Pietro Cassaghi and Eng. Maurizio Nasatti
- It resulted in the pubblication in 2009/2010 of a patent covering the process and apparatus for manufacturing decorative papers for lamination of panels for the furniture and flooring industry with dry resin
- The process has been tested and developed in laboratory but it lacked a real demonstration of the possibility of industrialization

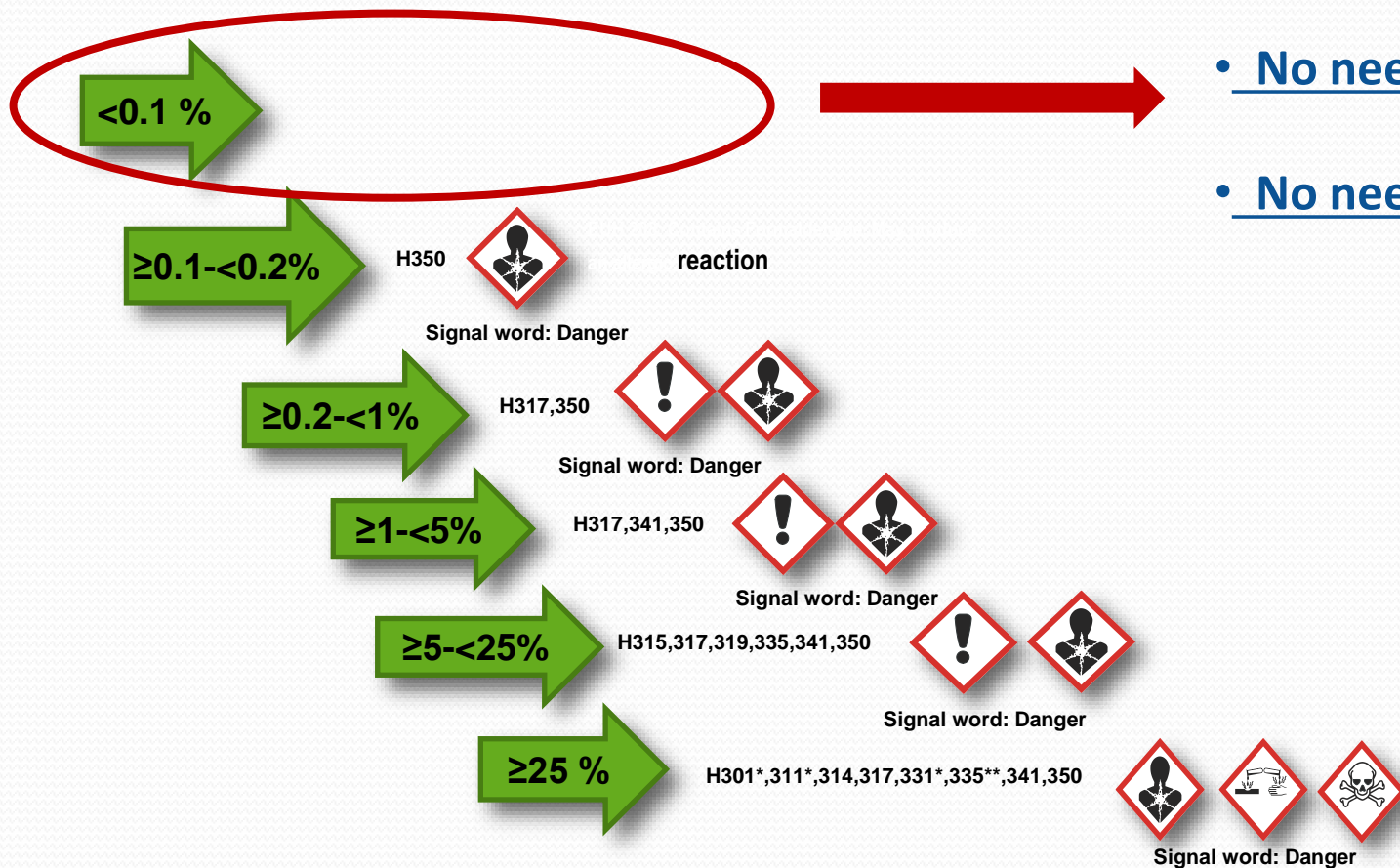
THE DEVELOPMENT

- Longoni has joined the project with the target to set up a line in full scale size of paper to demonstrate the potential of Lamidry technology
- Longoni in team with partners has developed a phenolic resin optimized for HPL manufacture after powder coating, and developed laboratory tests
- Longoni in team with partners has run industrial production on an existing coating line in full scale
- Longoni in team with partners is proposing a package of technology transfer that includes the use of patent, the delivery of an executive project to install a treating line with industrial capability, the access to all process parameters developed in pilot line tests, the supply of ready-to-use dry resin

NOVOLAC DEVELOPED FOR LAMIDRY

- A proper Novolac phenolic resin specifically selected for Lamidry Process totally different from standard liquid resole resins
- Free phenol < 0,5%, powder not labeled as a dangerous product
- Free Formaldehyde < 0,1%, powder not labeled as a dangerous product

LABELLING REFERRED TO FORMALDEHYDE CONTENT



- No needs of special handling procedures or devices
- No needs of special medical monitoring

* according to specific concentration limits of 67/548/EWG. Corresponding concentration limits do not exist under CLP. Mixture classification should be calculated in line with CLP regulation Annex I, chapter 3.1.3.

** no upper limit is stated for the H335 in the CLP regulation

1° PROJECT MACHINE

- 2) handling line
- 3) support fed into line along a predetermined path P;
- 4) pre-heating unit 4 for support 3
- 5) Treated face is heated at a predetermined temperature;
- 6) preparation unit for the powder compositions
- 7) application group
- 8) powder dosing device capable of finely dosing and uniformly distributing the powder composition onto support 3
- 9) heating unit for fixing the powders,
- 11) polymeric coating layer fully crosslinked
- 12) cooling unit to harden the polymeric component of the treatment composition.
- 13) A finishing or decoration station to apply a picture, impression or finishing onto the treated substrate. or as an alternative a collection station for treated support 3, for instance a winder, or a sheet cutting and stacking unit, etc

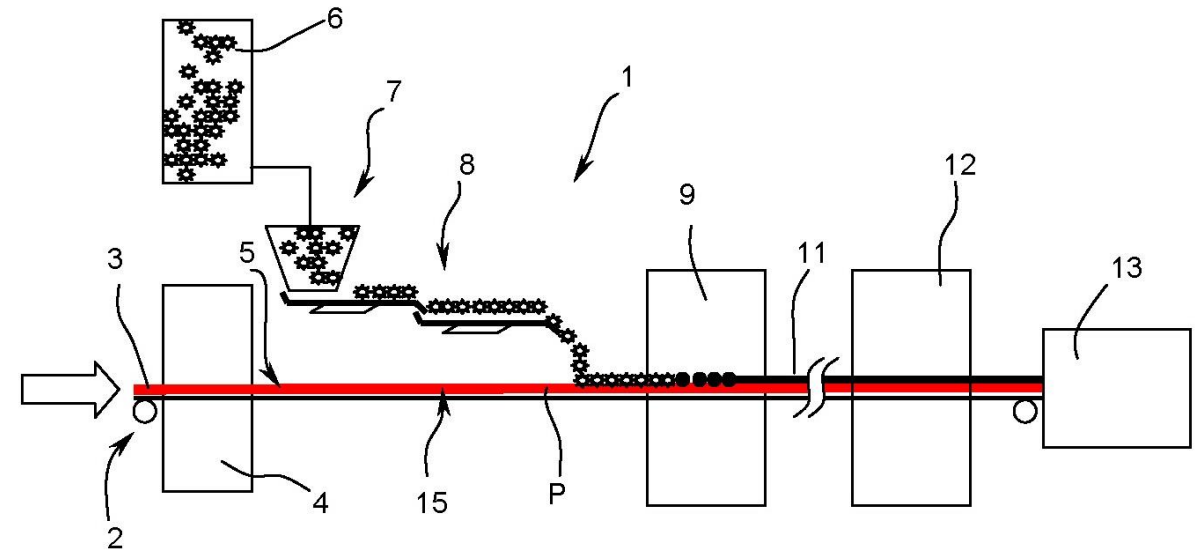


Fig. 1

2° PROJECT MACHINE

In this case:

7) application group

15) Opposite face

17) melter

6) preparation unit in which the powder composition prepared is heated so that its polymeric component is melted and taken to a fluid state;

18) applying device to distribute the fluid composition, possibly embedding solid particles,

Heating unit 9 is therefore not required for fixing the powders,

Also in this variant, apparatus 1 may comprise multiple applying groups 7 (more melamine and/or phenolic resins, by suitable catalysts and additives, for instance corundum, glass microspheres, etc.),

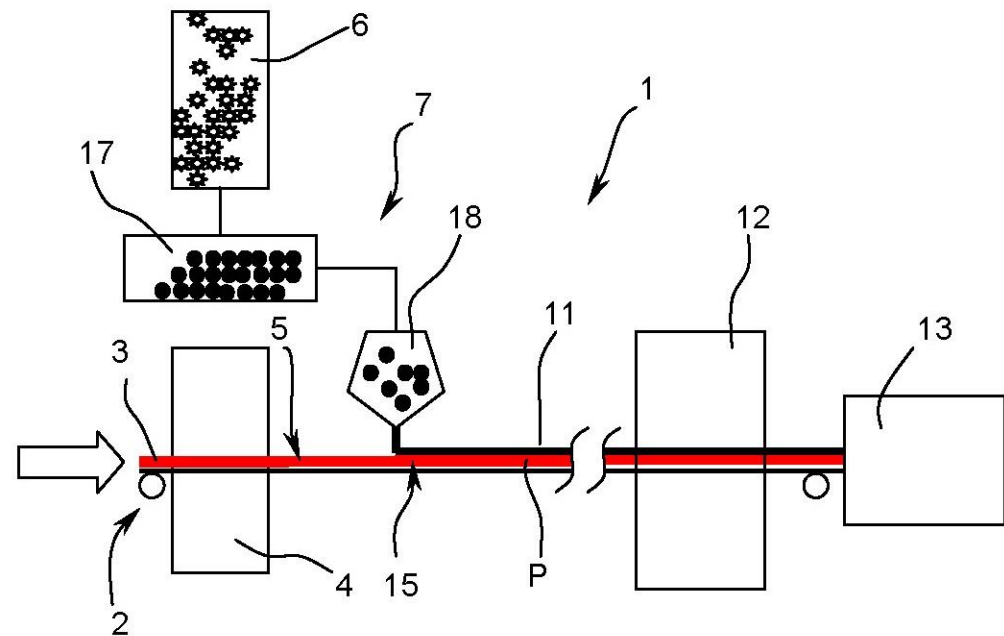
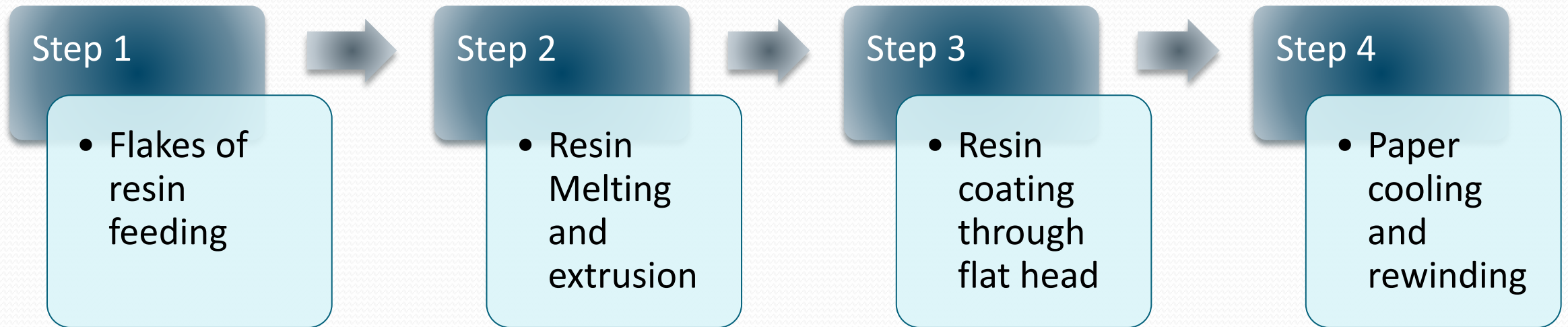


Fig. 2

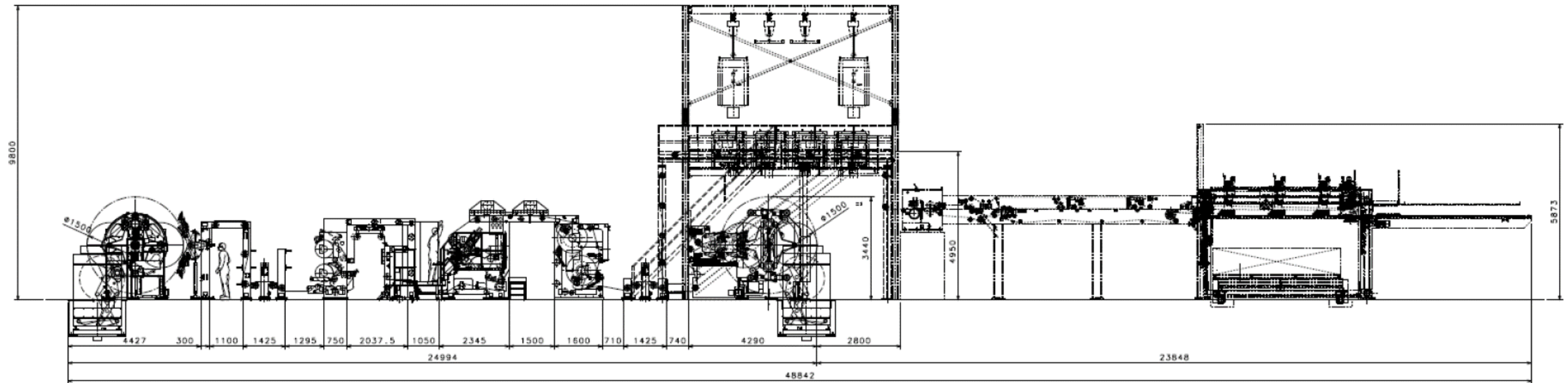
IMPLEMENTED PROCESS IN OUR COATING LINE



Line during operation



INDUSTRIAL PLANT LAYOUT



STANDARD IMPREGNATION VS. LAMIDRY: typical cost analysis

Here we calculate the production cost of a typical paper treated with Lamidry technology:

Energy cost for production at 300 m/min - width 188 cm kraft 155 gr base + 75 gr resin

Electric consumption estrusion	465	kWh
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Electric consumption stacker at 300 m/min	145	kWh
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Electric consumption paper handling line	100	kWh
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Energy cost at 300 m/min **0,021 kW/m² = 0,015 €/m²**

This is a preliminary evaluation subject to fluctuation of energy market prices

WET IMPREGNATION VS. LAMIDRY:

Environmental advantages

- Only electrical power supply = no use of gas
- Minimal formaldehyde emission in the environment
- Minimal phenol emission in the work environment
- No waste water treatment
- No possibility of leakage of pollutant liquids
- No Energy consumption for waste air treatment

WET IMPREGNATION VS. LAMIDRY:

Economical advantages

- No investment in resin production facilities
- high efficiency and capacity of coating machine
- Lower environmental protection costs
- Lower energy cost in the entire process
- Lower resin cost and cheaper supply chain

WET IMPREGNATION VS. LAMIDRY

Why we like dry:

- Novolac condensed in an acid environment as melamine resin
=> greater compatibility => pressing times can be reduced => highly postformable behavior
- Highly efficient resin distribution control with extrusion flat had application
=> less resin / m² required for the lamination process
- compatible with use of recycled kraft papers = lower final cost of impregnated paper
- Possibility of speeding up the press cycles by accelerating resin with more catalyst and additives
- Very high processing speeds => roll to sheet line design speed: 300 m/min
 => roll to roll line design speed: 600 m/min

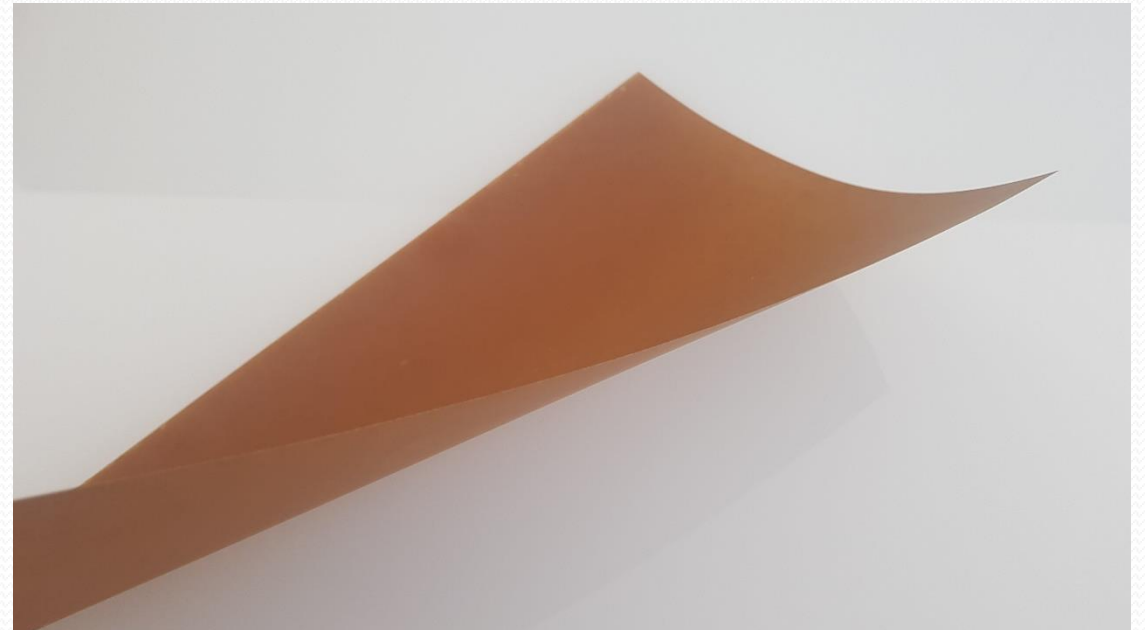
WET IMPREGNATION VS. LAMIDRY

Why we like dry:


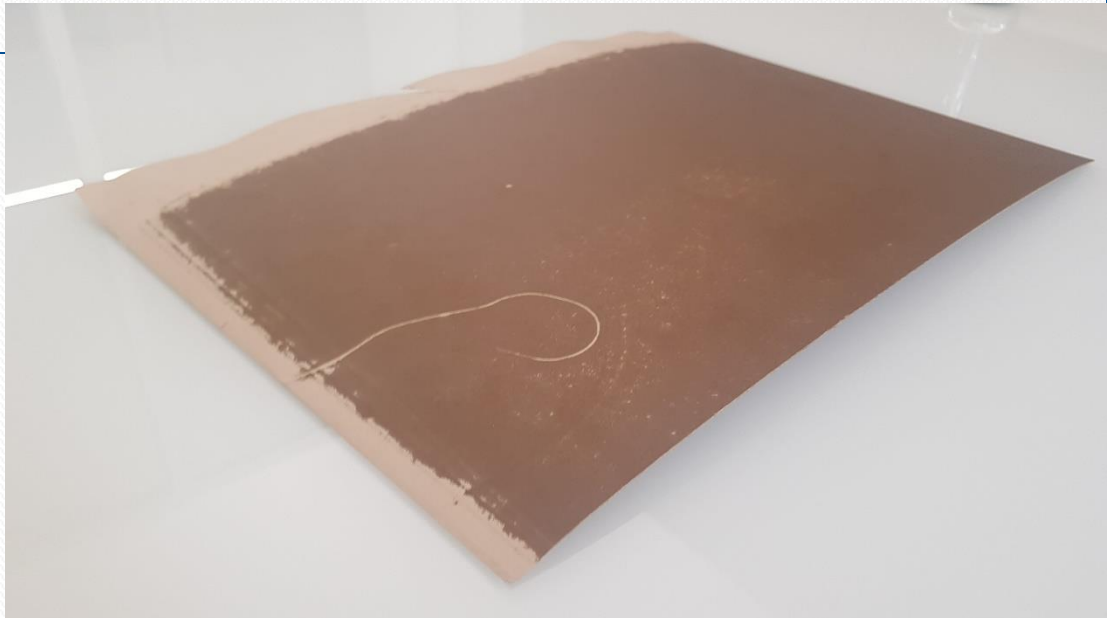
- longitudinal and transversal weight distribution independent from paper or substrate condition => possibility to use lower cost kraft papers
- High weight kraft treatment => CPL with single kraft layer
- Very good fluidity of resin: less resin required for CPL (28-30% vs. 35-40% of standard process)
- ease of storage and absence of preparation of the baths to obtain resins suitable for use;
- Long resin shelf life (resin tested for 6 months) = waste reduction
- Novolac suppliers available worldwide, no limitations for liquid or short distance transportation requirements => access to more price-efficient negotiation

Tested materials:

Substrate	processed test
Standard kraft paper 160 gr/m ²	HPL produced in labo press with n.1 laminated sheet of kraft paper (without decor)



Tested materials:

Substrate	processed test
<p>Sandard kraft paper 160 gr/m²</p> 	<p>HPL produced in labo press by pressing overlay + n.3 sheets kraft lamidry (160 gr kraft + 90 gr resin) + 1 sheet of raw kraft 160 gr</p> 

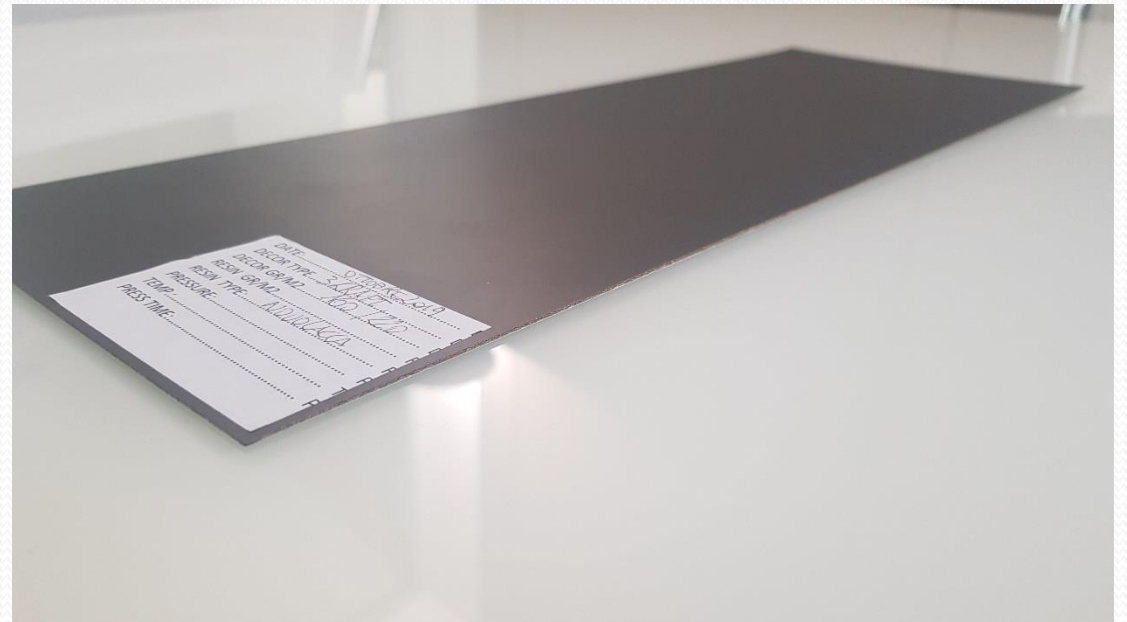
Tested materials:

Substrate	test di processo
Kraft paper 189 gr/m ²	Compact HPL , thickness 10 mm with 2 sides melamine decor



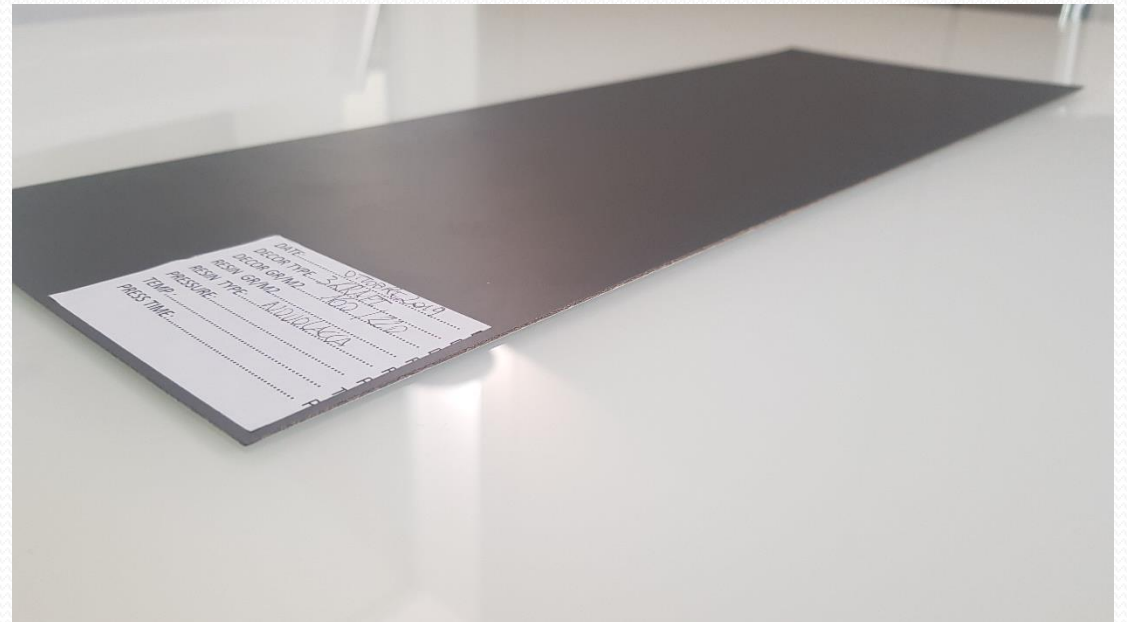
Tested materials:

Substrate	Test processed
Standard kraft paper 160 gr/m ²	HPL 0,6 mm with 2 sides melamine decorative paper



Tested materials:

Substrate	Test processed
Standard kraft paper 155 gr/m ²	CPL 0,4 mm in industrial press



Tested materials:

Substrate	Test processed
Standard kraft paper 189 gr/m ²	COMPACT HPL 6 mm with 2 sides melamine decorative paper In industrial scale multi-daylight press



Achievements:

- 1) Implemented the production process on a pilot plant and developed an industrial scale production based on real data
- 2) Processed papers have been used for full scale manufacture CPL, multi daylight and single daylight HPL presses
- 3) Process respectful of the environment and in line with the tightest regulations for phenol and free formaldehyde emissions,
- 4) free from use of gas energy supply, only electric supply required
- 5) Possibility to increase the production capacity in the presses for CPL and HPL

CONCLUSION

- The approach to the phenolic treatment of kraft papers with powdered resin gives us the opportunity to tackle the problems that have always existed in standard impregnation technology from a new point of view
- New market trends and the increasingly restricted working conditions dictated by legislation give meaning and opportunities to this new technology
- The time has come for a serious and far-sighted industrial investor to take up the challenge of creating the first industrial plant and integrating Lamidry technology into the existing laminating process in order to take advantage of the potential of this new idea

WET? OR DRY?



*Lamidry*TM
SOLID STATE LAMINATION

LET'S THINK DRY