
UMV
INVENTING FOR COATING & SIZING
Värmland Ingenjörers
besök hos:
UMV Coating Systems Säffle
20190321

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# Agenda

- Lite om UMV (Inventing)
- Innovationens drivkrafter
- Barriär bestrykning
- Hälsa
- Metod för barriärbestrykning
- Hållbarhet
- Hållbart material ?
- Coating Technique challenges
- Studie av pilotmaskinen

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# UMV Coating Systems AB

- Independent lead developer and global supplier of innovative
- Coating & Sizing Technology to the coated paper and board industry,
- for new installations and rebuilds.


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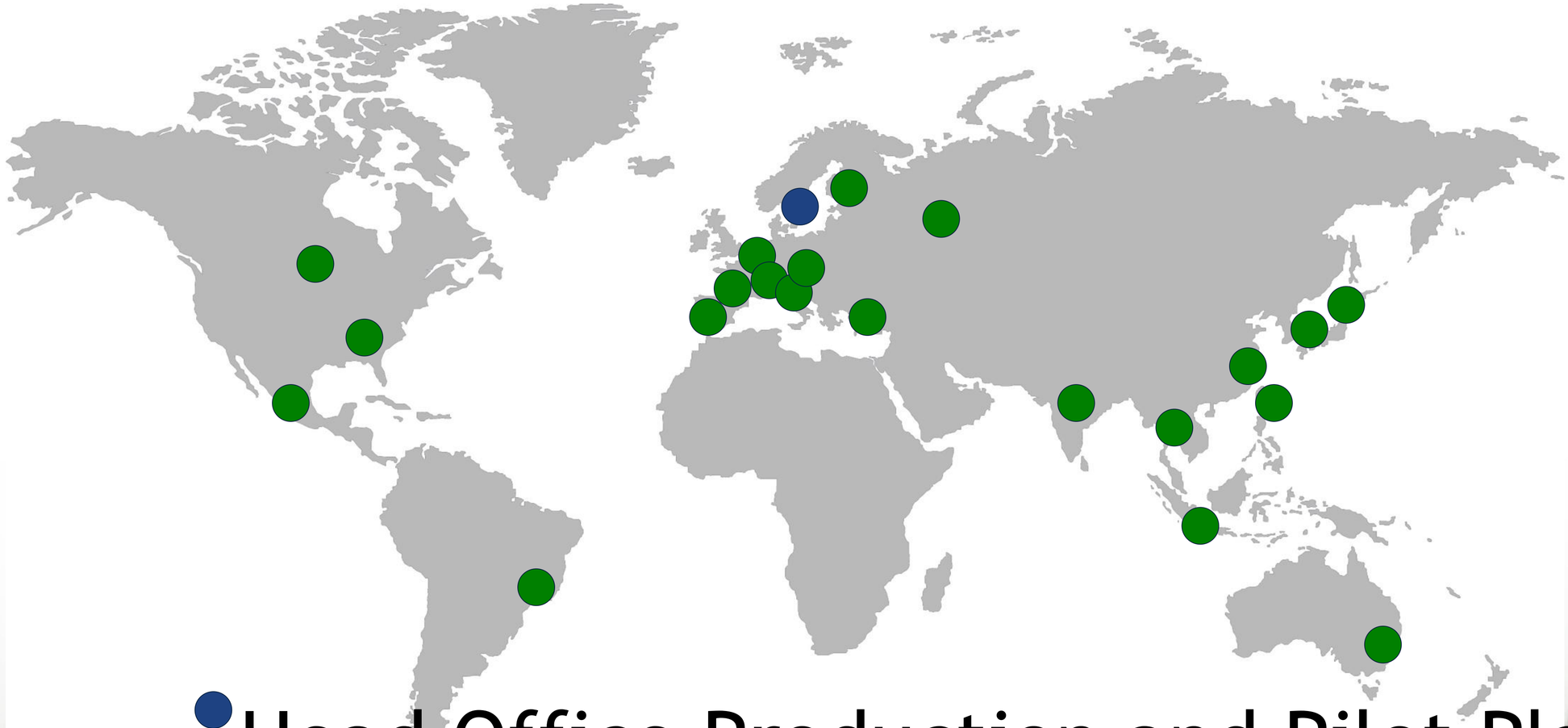
# UMV Coating Systems
# Locations



Head Office Production and Pilot Plant, Säf

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# Hans Wallstén

Foto: Peter Ringström

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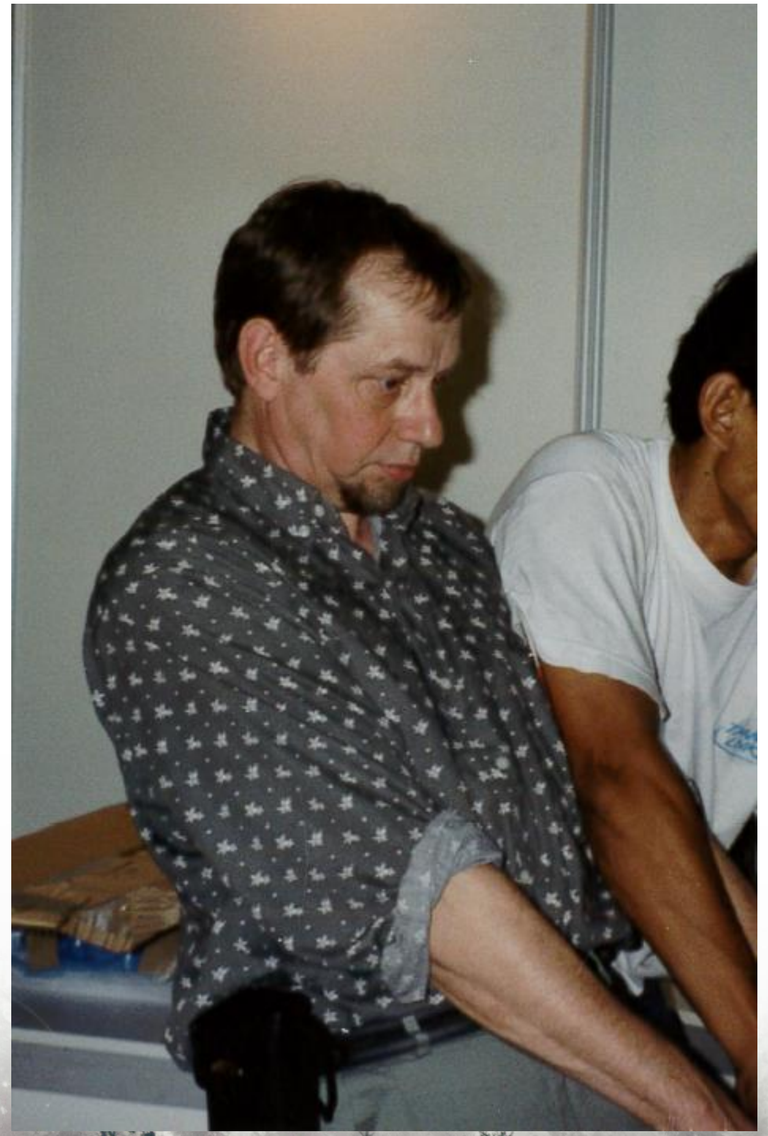
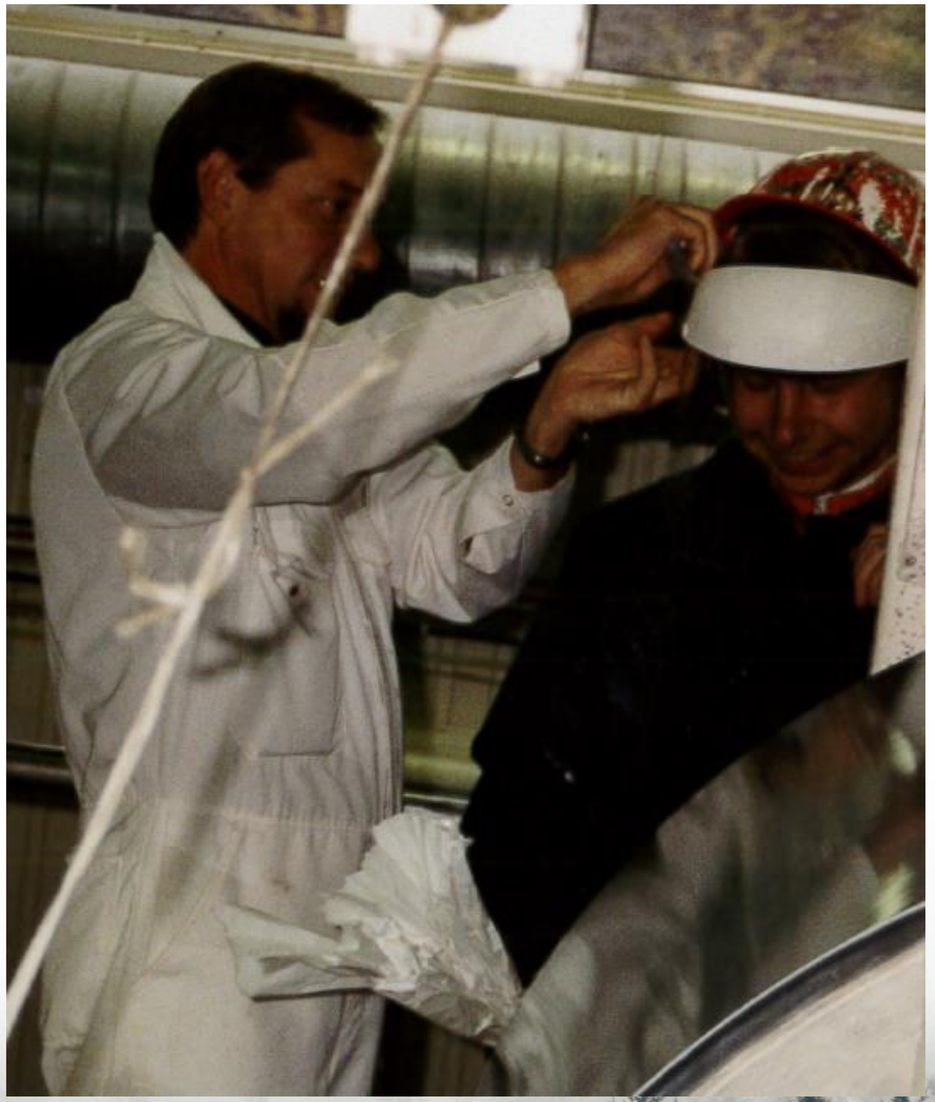
# Tore Eriksson





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# Håkan Karlsson

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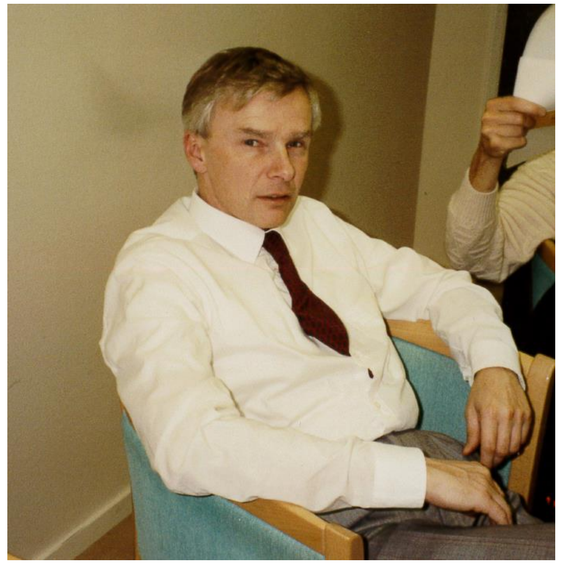

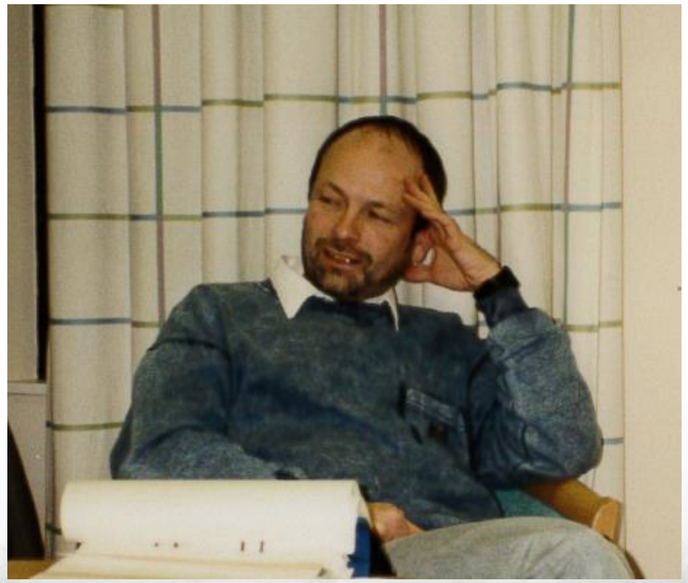

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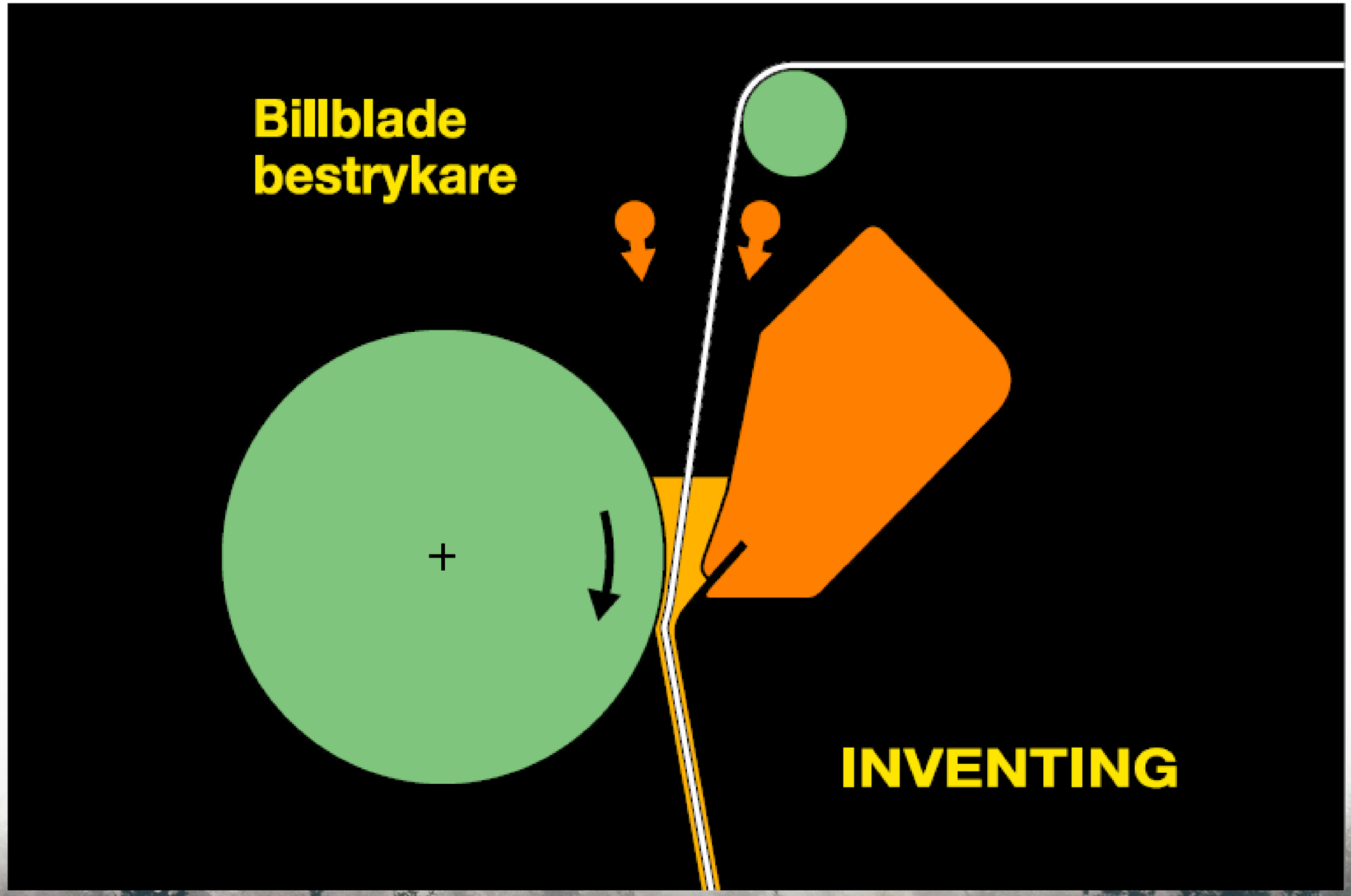

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## Behovsdrivna Innovationer:

- **Dubbelsidig bestrykning simultant båda sidor - Billblade**
- Differentiell bestrykning simultant- Billblade Differential (65 % världsmarknad CF)
- **Bestrykningsblad med keramisk spets - Duroblade**
- Ytutmning av tidningspapper- LAS

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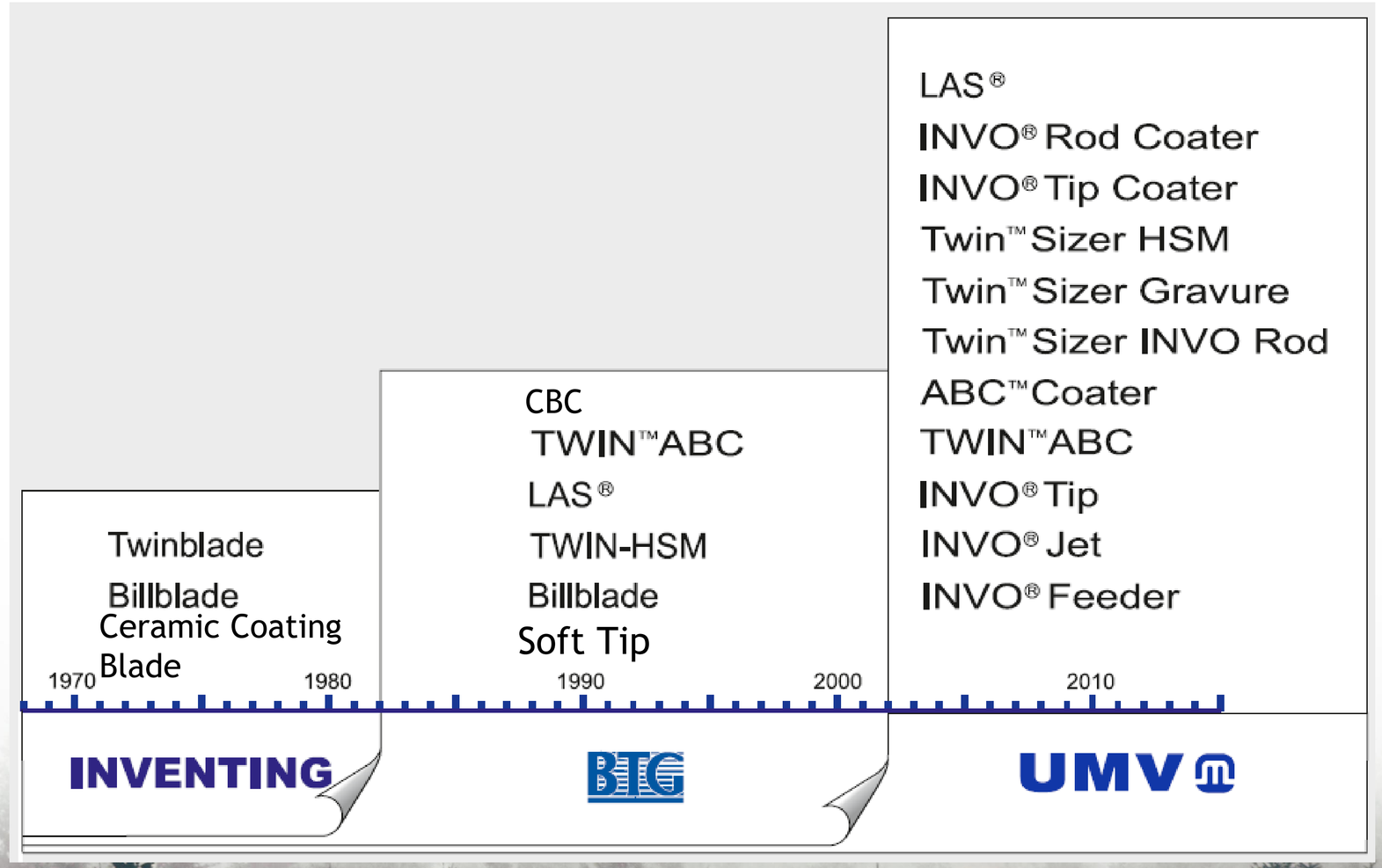
# UMV Genealogy



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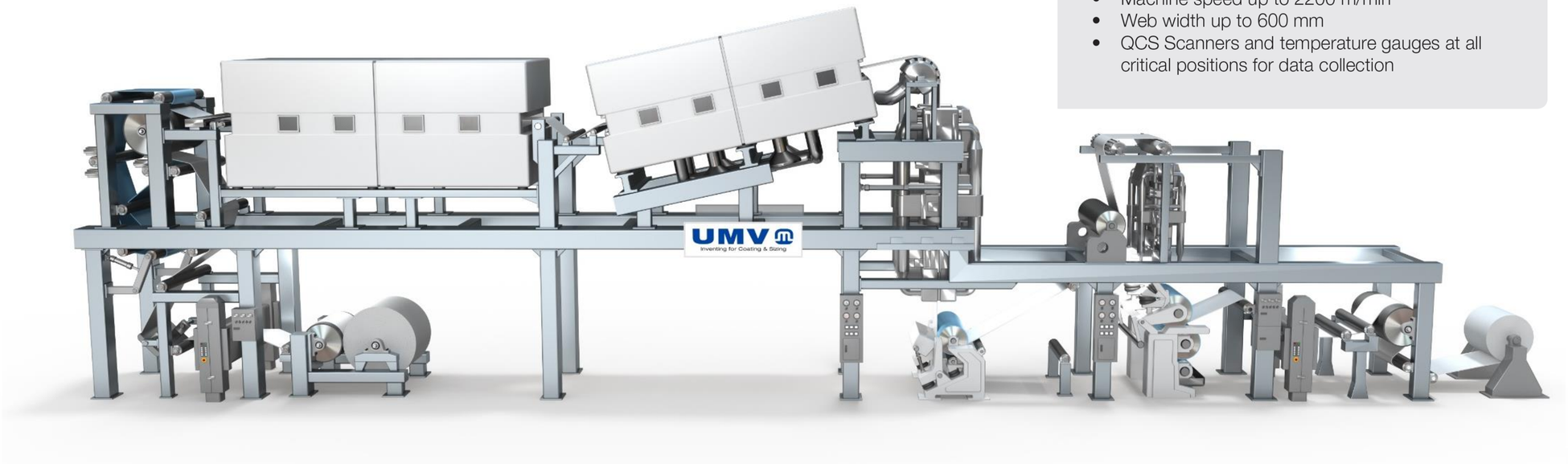
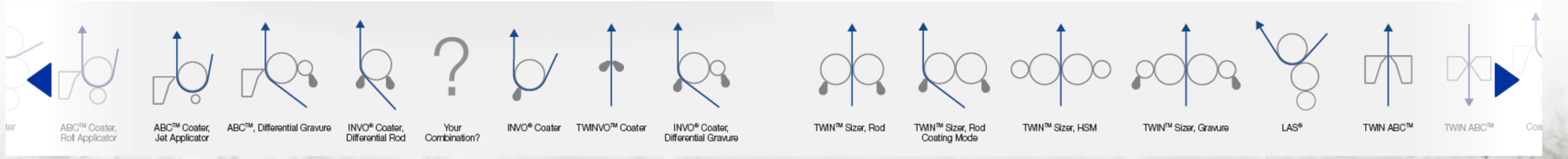
# UMV Pilot Plant

## Pilot Plant Facts

- Multiple Coater configurations possible (see below)
- Possible to have two coating layers in one run
- Lamination of webs
- IR- and Air-flotation dryers
- Cooling Cylinder
- Machine speed up to 2200 m/min
- Web width up to 600 mm
- QCS Scanners and temperature gauges at all critical positions for data collection



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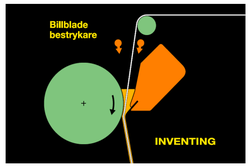
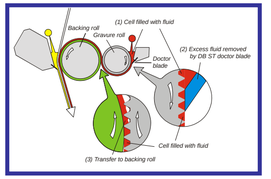
# Innovation examples

## Commercial

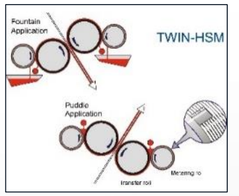
- Graphic paper - Double side coating simulataneously  C-2-S - Billblade




- C-1-S ,with simultaneous reverse side application- Billblade Differential (65 % worldmarket CF)




- Coating of at low basis weights & base from recycled fibers- TWIN-HSM




- Flexibility - Combination machine

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# Innovation drivers:

## Commercial

- New & Improved products on the market
- Flexibility
- Less Feedstock, Less Coating Media and Less energy
- Higher efficiency and availability
- Utilization of woodfibers

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# In touch with...




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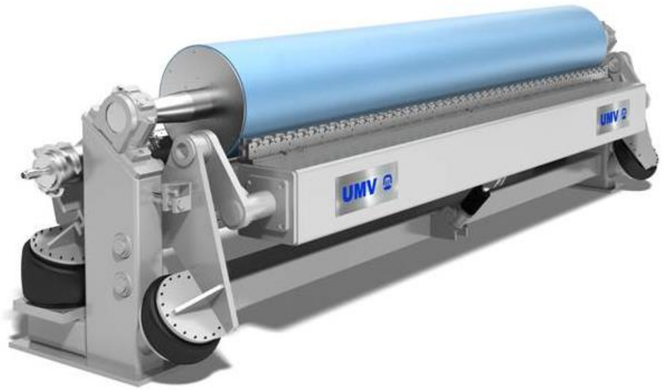
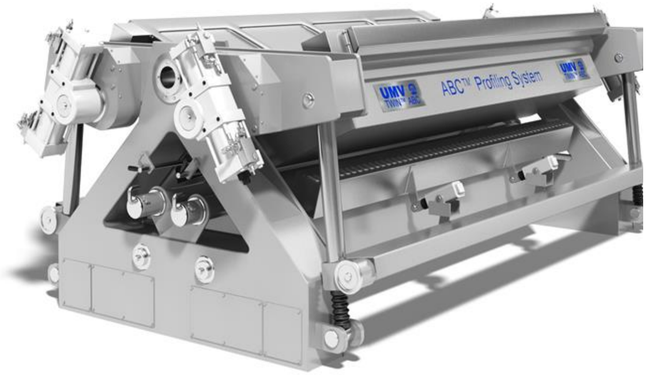
# Coaters



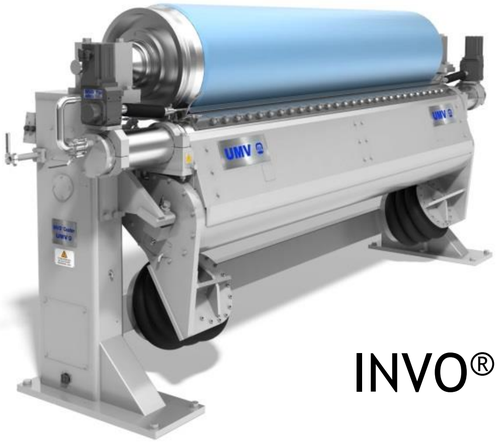
ABC™ Coater




TWIN™ ABC

LAS™

TWIN™ Sizer



INVO® Coater

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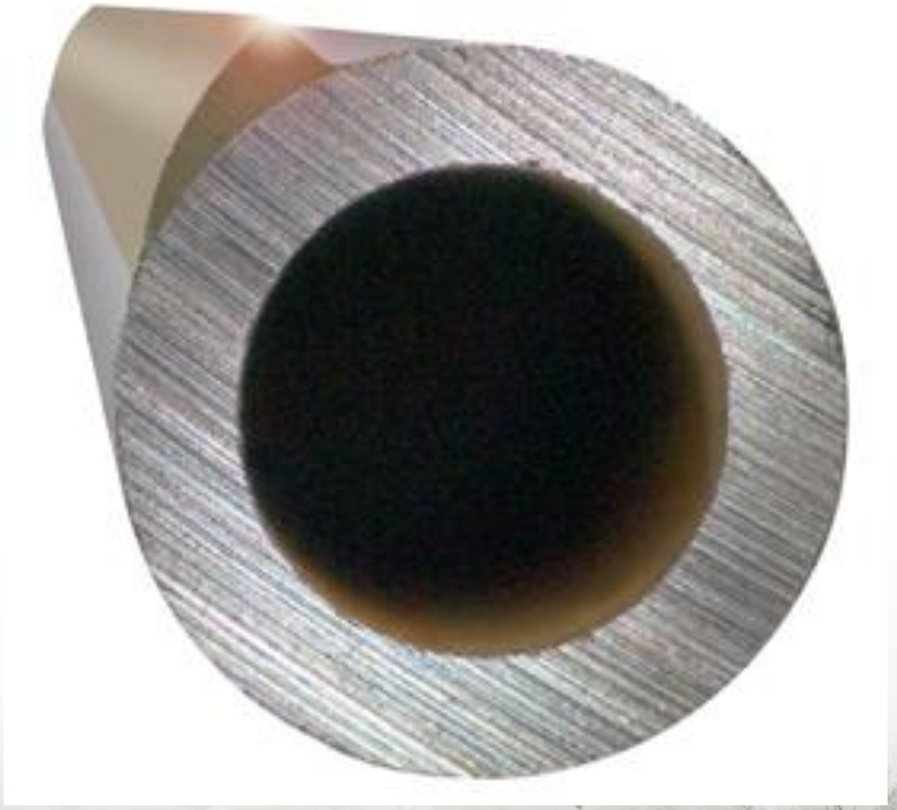
# Metering Elements

## INVO®
## Tip



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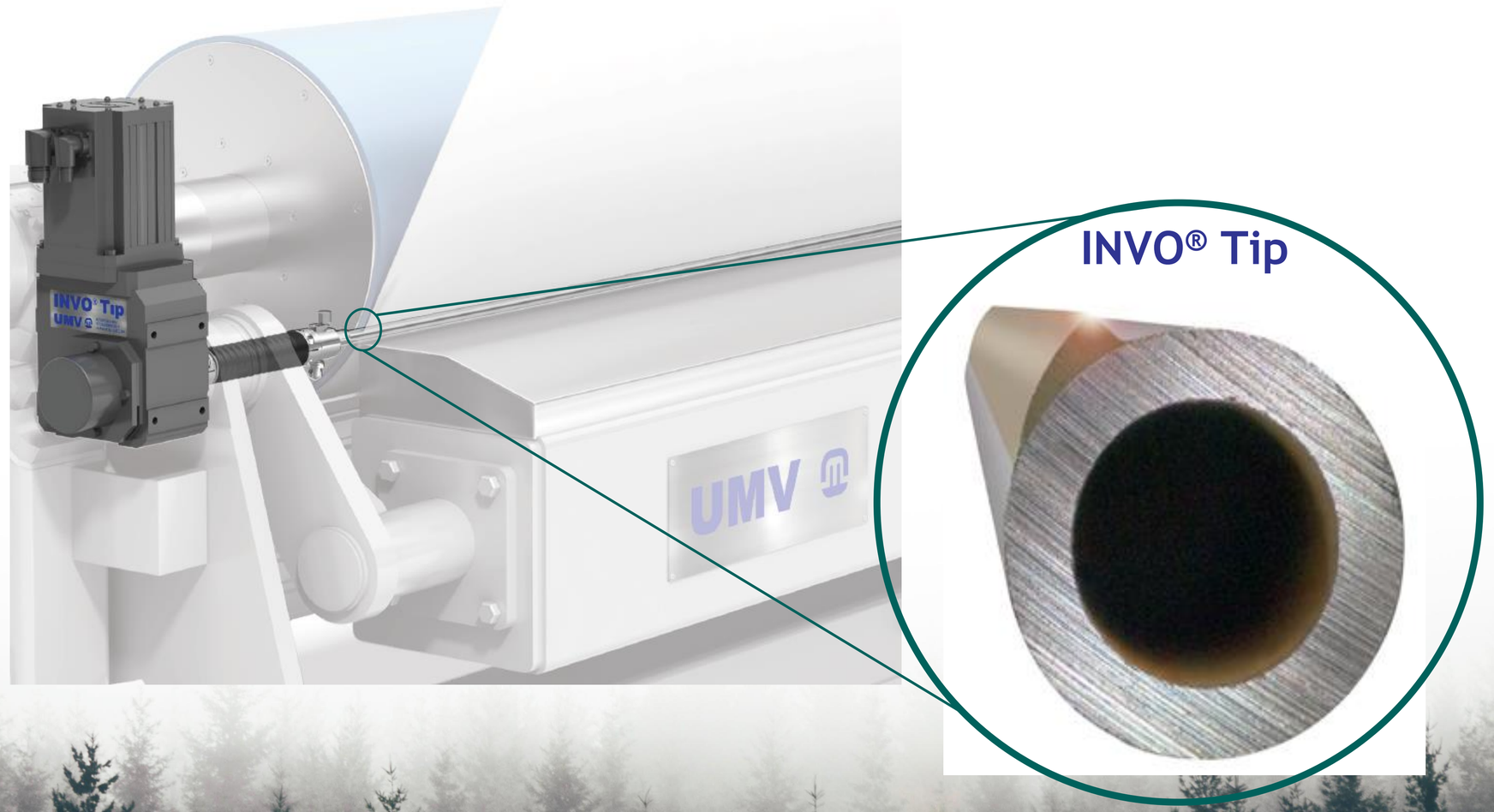
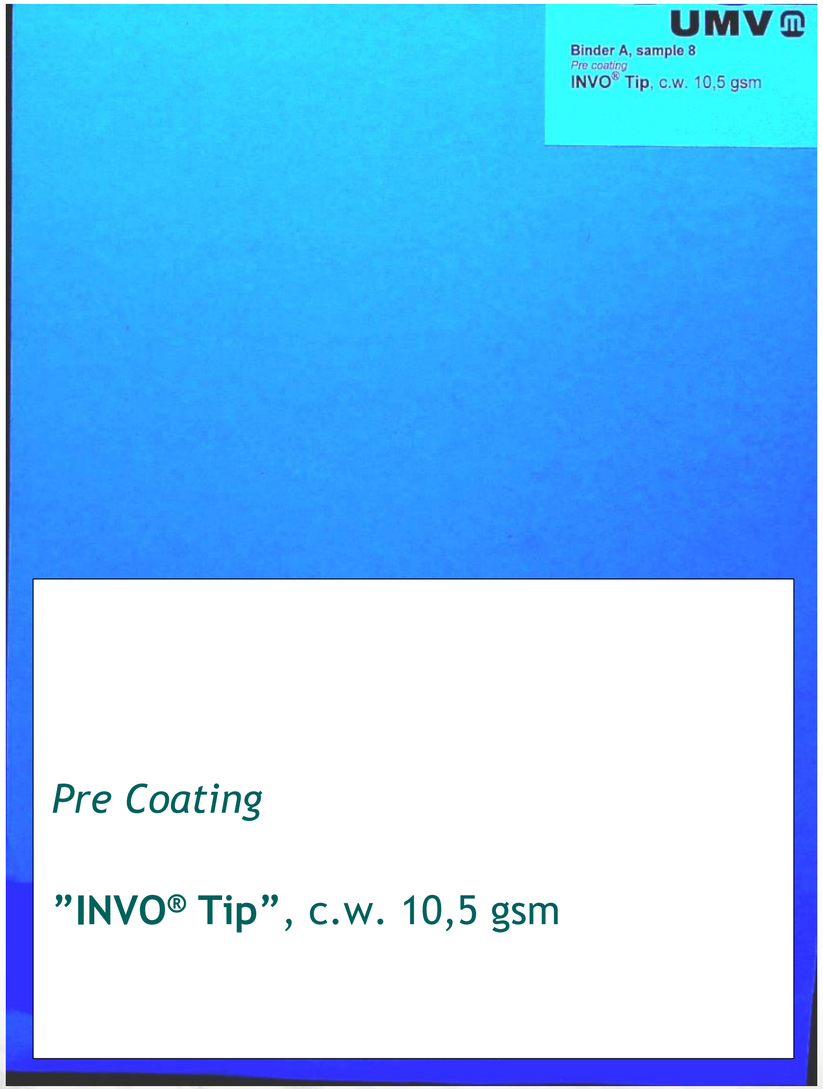
# INVO® Tip position in Coater

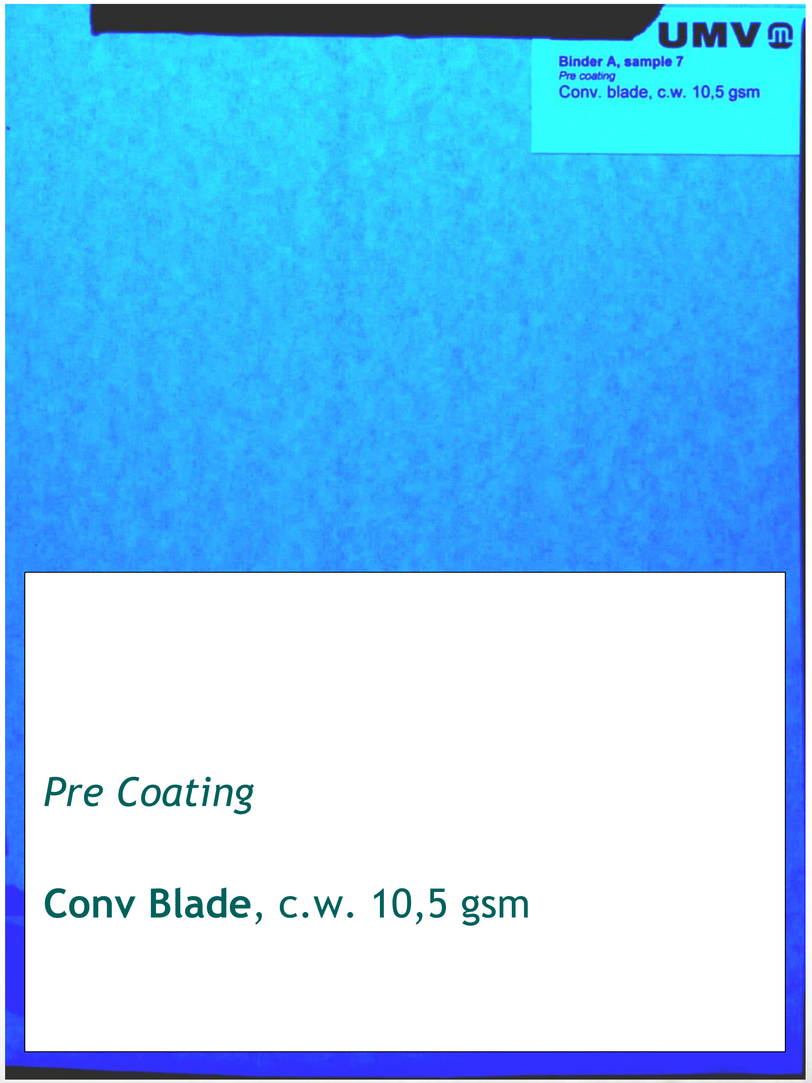
## Installation possible on all Blade & Rod coaters!






*Pre Coating*

**”INVO® Tip”**, c.w. 10,5 gsm




*Pre Coating*

**Conv Blade**, c.w. 10,5 gsm

# Bevis på förträfflig fördelning

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PATENT- OCH REGISTRERINGSVERKET

Sverige

(12) Patentskrift (10) SE 529 662 C2

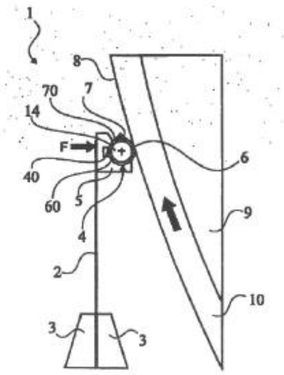
(21) Patentansökningsnummer: 0502614-1
(45) Patent meddelat: 2007-10-16
(41) Ansökan allmänt tillgänglig: 2007-05-29
(22) Patentansökan inkom: 2005-11-28
(24) Löpdag: 2005-11-28
(83) Deposition av mikroorganism: —
(30) Prioritetsuppgifter: —

(62) Internationell klass: *B05C 11/04* (2006.01)

(73) Patenthavare: Mattsonföretagen i Uddevalla AB, Gustaf Mattsons väg 2, 451 50 Uddevalla SE

(72) Uppfinnare: Håkan Karlsson, Säffle SE
(74) Ombud: Hynell Patenttjänst AB
(54) Benämning: Metod och anordning för bestrykning
(56) Anförda publikationer: GB A 1 289 609
(47) Sammandrag:

Metod vid bestrykning, innefattande en löpande bana (8)anordnad att påföras ett bestrykningsmedel (11), ett vid nämnda bana (8)anordnat bestrykningsorgan (1), en vi bestrykningsorganet (1) anordnad bestrykningsyta (6,7) anordnad att i kontakt med nämnda bana (8) dosera nämnda bestrykningsmedel (11), varvid nämnda bestrykningsorgan (1) anordnas med åtminstone en första bestrykningsyta (6) och en andra bestrykningsyta (7) och på så vis att man vid nämnda löpande bana (8) kan växla mellan den ena (6)och den andra (7) ytan vid samtidig anliggning av åtminstone en av nämnda ytor (6,7) i aktivt läge.



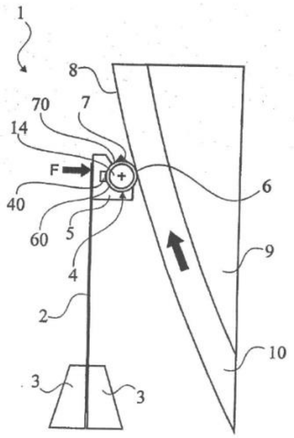




Fig. 1

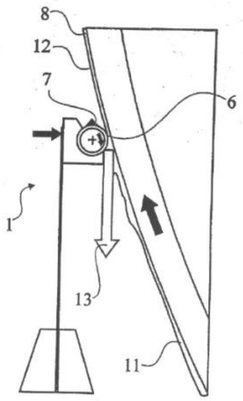



Fig. 2

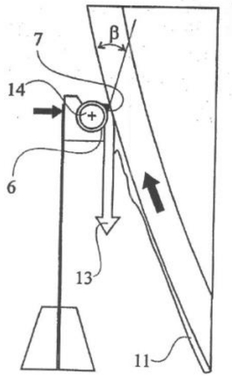
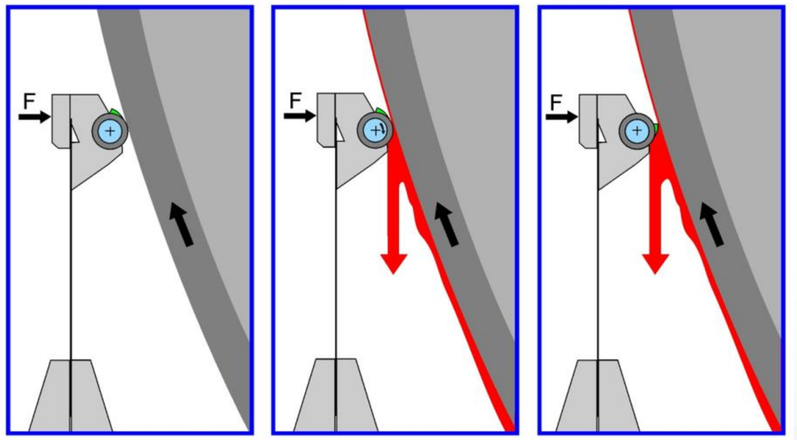



Fig. 3



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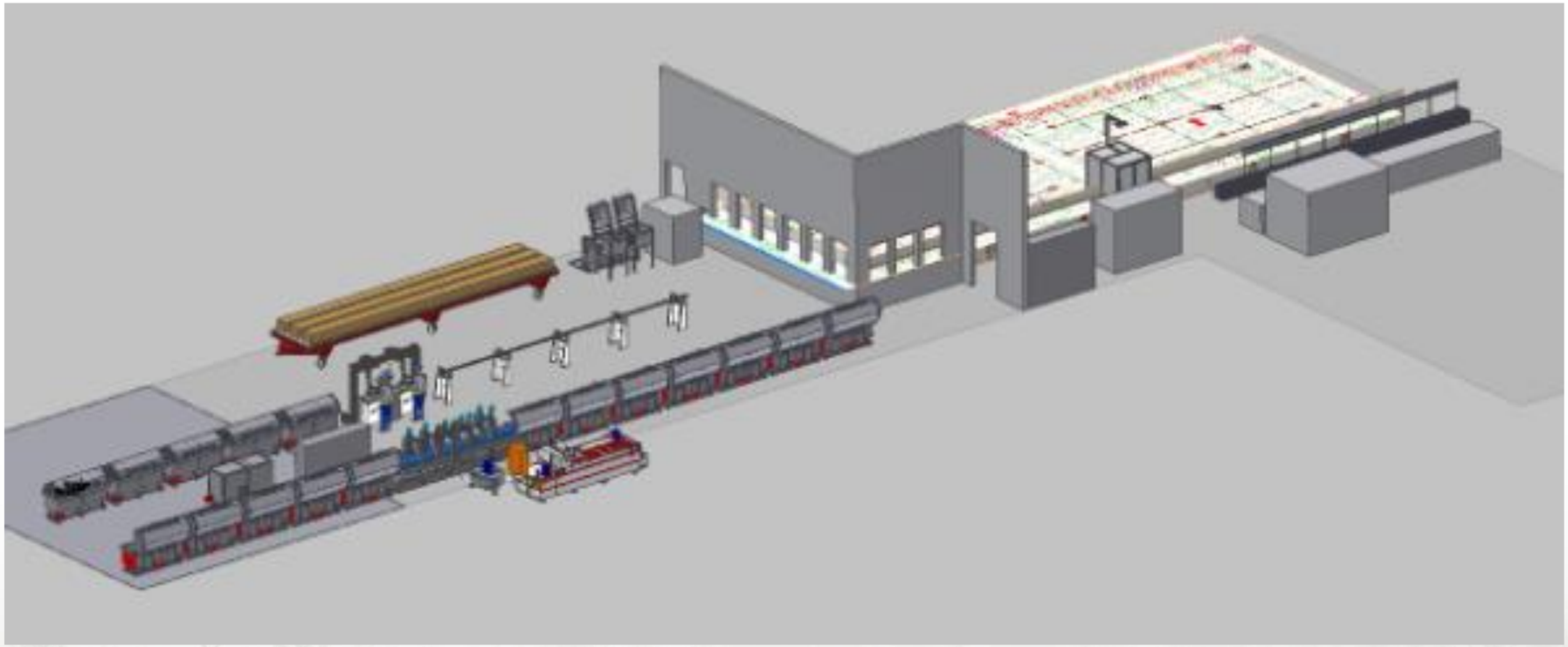
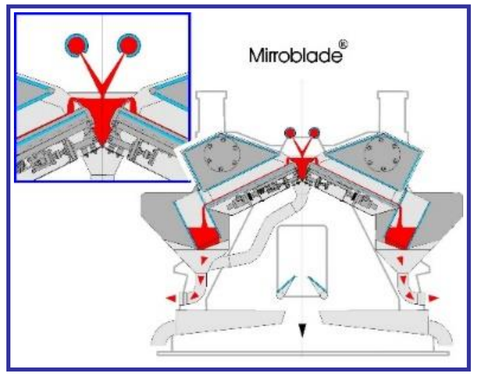
# Layout of 1 INVO® Tip line

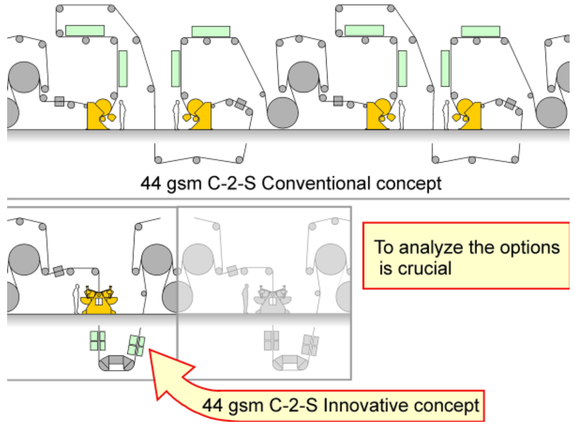


# Innovation examples:

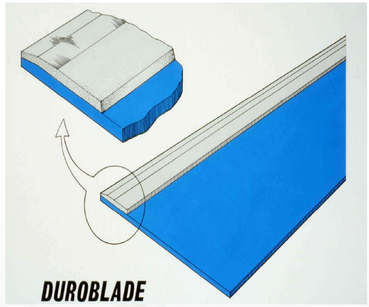
## Commercial

- **Higher efficiency and availability**

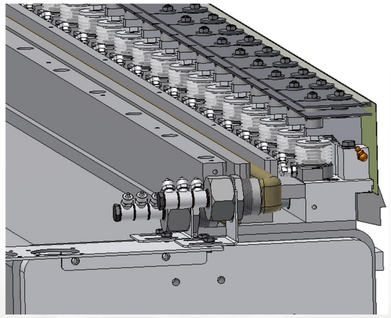



| Parameter | PM9 | PM7 |
|---|---|---|
| **Machine speed [m/min]** | 400 | 400 |
| **Total efficiency, förklaring** | 87% | 86% |
| **Number of web breaks/ day** | 2.4 | 2.7 |
| **Coating blade life time** | 3 days | 3 days |
| **Web break, time (min)** | 10 | 10 |
| **Max running time/ no web break** | 11 days | 5 days |




Not owned



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# Innovation drivers:

## Political

- Health
- Sustainability
- Reduction of plastic utilization

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# Health

*Mineral oil migration*

**Food sold in recycled cardboard packaging 'poses risk'**

By Nick Higham
BBC News

8 March 2011 | UK

**Leading food manufacturers are changing their packaging because of health concerns about boxes made from recycled cardboard, the BBC has learned.**

Researchers found toxic chemicals from recycled newspapers had contaminated food sold in many cardboard cartons.

The chemicals, known as mineral oils, come from printing inks.

Major brands are taking action

- MOSH & MOAH

2018-03-19

Successful completion of the project DIN SPEC 5010 - Measurement method for the evaluation of migration from paper and board with a barrier

Legislation limit for MOAH migration- 4 BMEL draft 0,5 mg/kg (not yet implemented)

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# Health

- MOSH & MOAH

**The industry has different solutions to this problem and it is more or less, just to push the button and the demands will be met.**

**The media involved are more or less conventional at reasonable cost levels and can be applied in straight forward methods.**

**With multilayers combined with inbetween drying the amount needed to apply is max 4-5 gsm.**

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# Health

- Perfluorinated substances

**The industry has different solutions to avoid perfluoraded substances for grease & fat resistance.**

**Grease & fat resistant paper production without perfluorated substances is already up running.**

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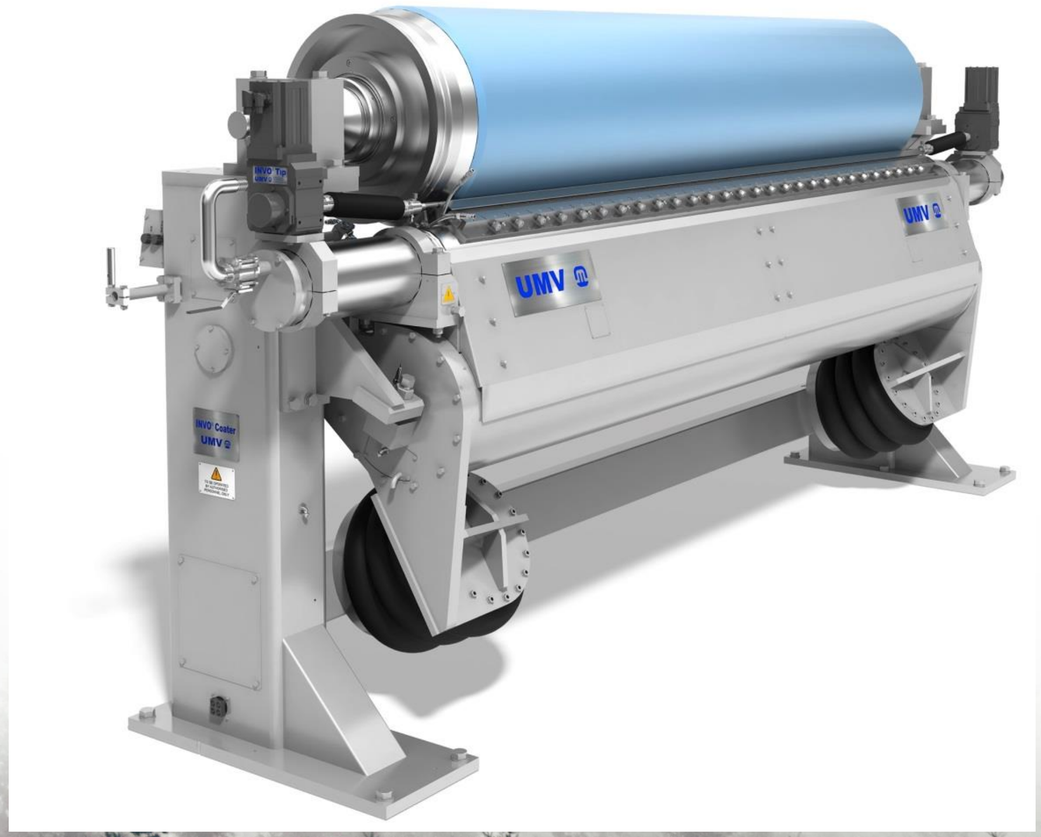
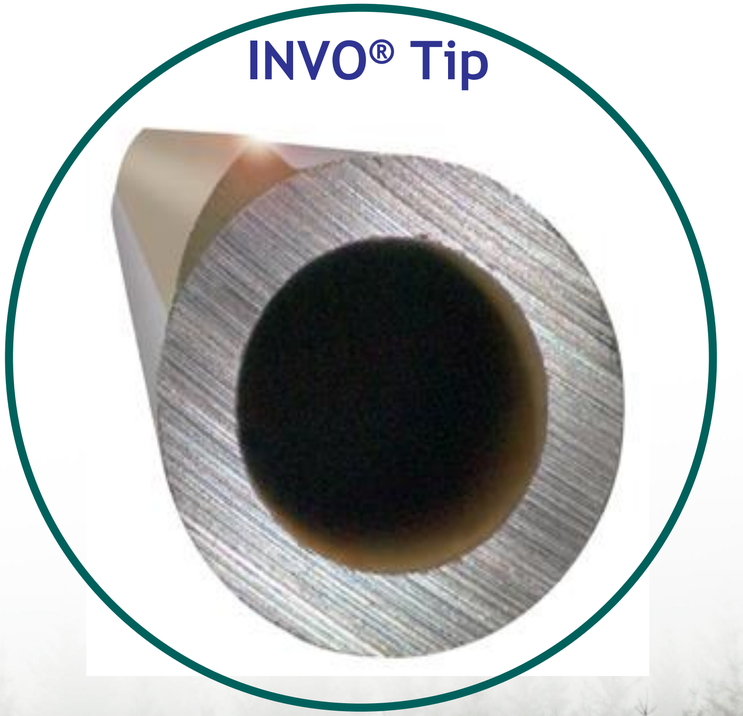
# UMV concept for barrier application:

## Multiple thin layers, with zero dwell application and INVO Tip metering

- Kombinationen INVO ®Coater och INVO ® Tip ger möjlighet till applicering av tunn film, viktigt för Multipel applicering av barriär

# INVO® Coater



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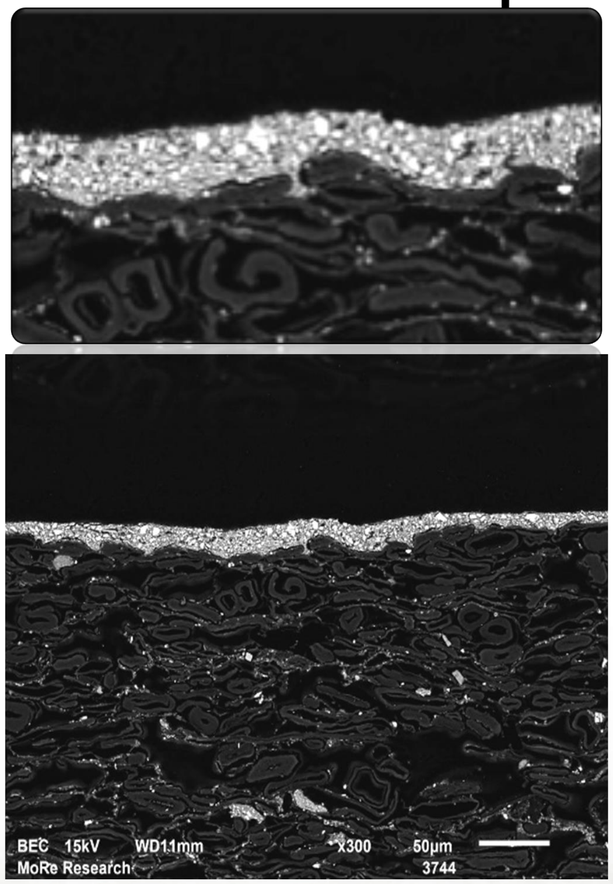
# Metering Element

INVO® Tip

Resilient Tip



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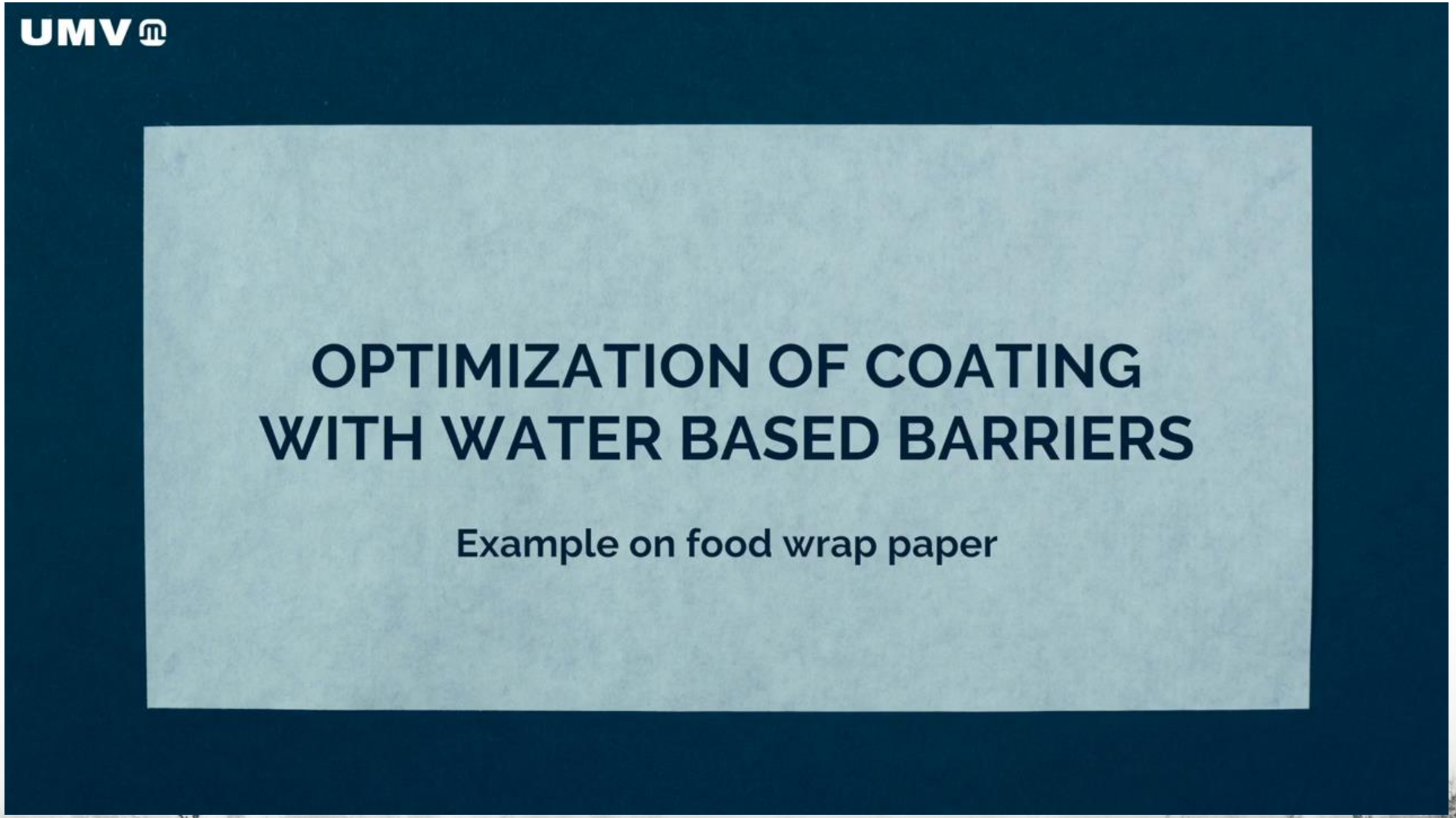

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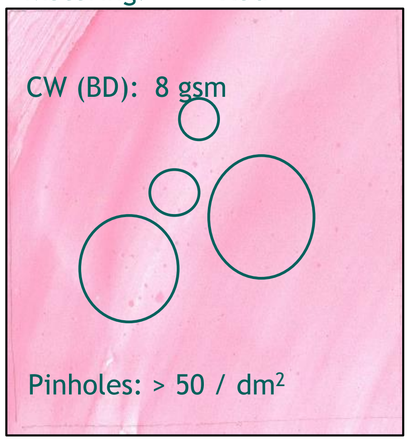
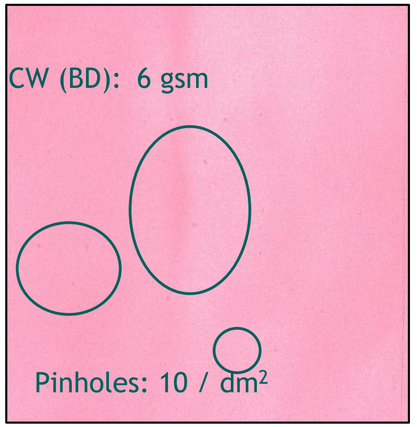
# Coating concept is important

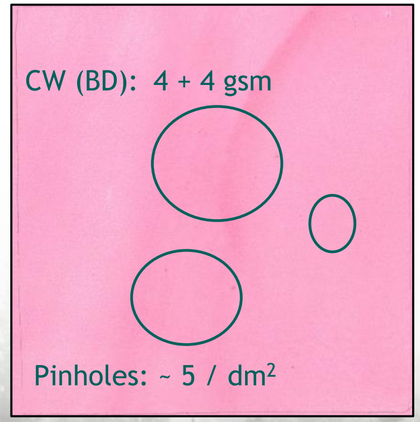
Metering: **Rod**



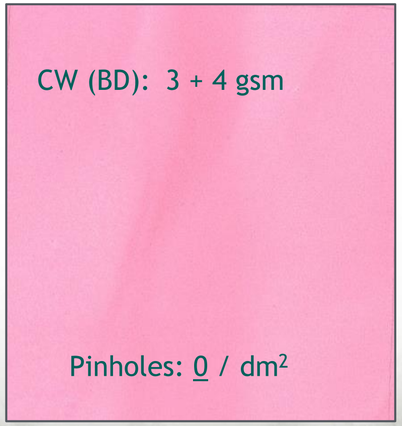

Metering: **INVO Tip**




Metering: **Rod + Rod**




Metering: **IT + IT**



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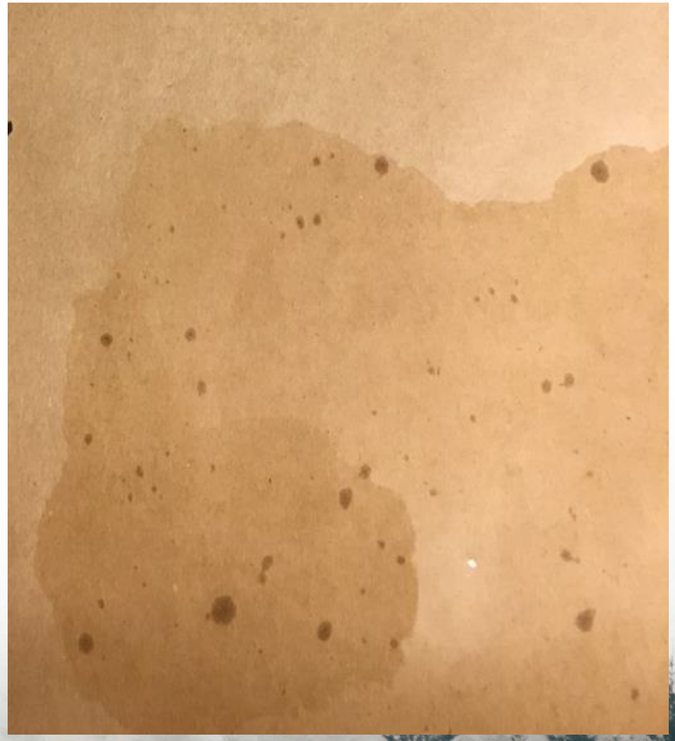
# Typical investigations that can be done in the pilot line

Coater: Long dwell – Jet applicator
Metering: Rod

CW (BD): 18 gsm

Coater: Zero dwell - INVO® Coater
Metering: INVO Tip

CW (BD): 14 gsm



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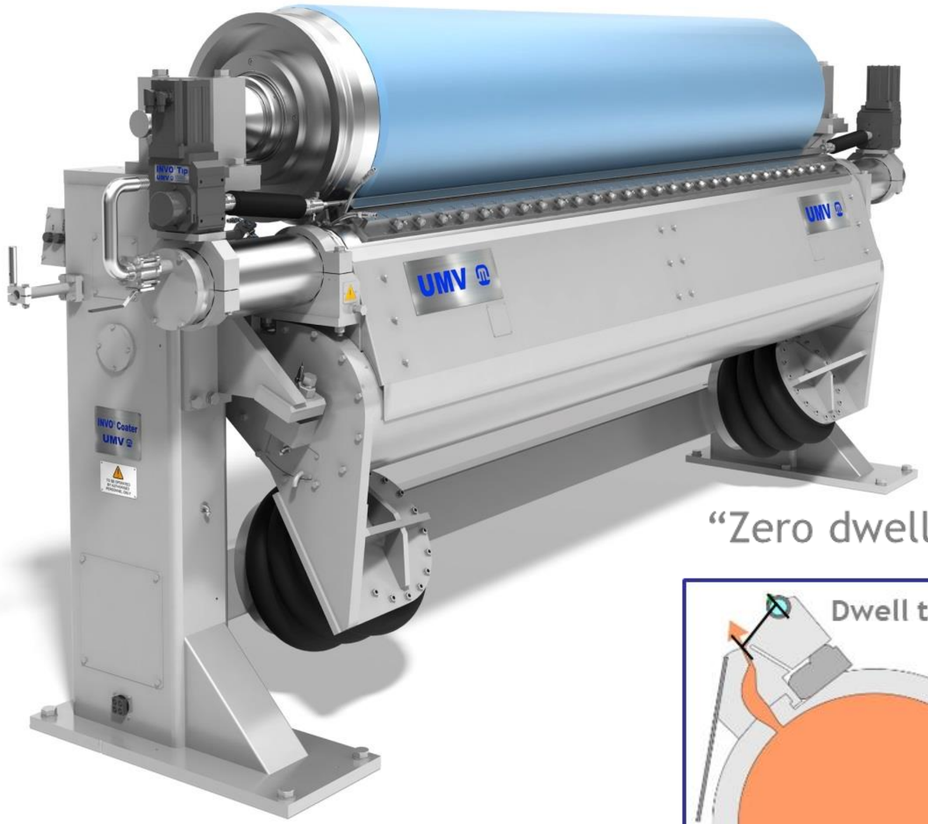
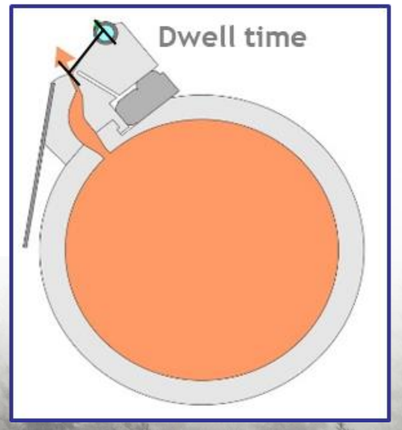
# INVO® Coater

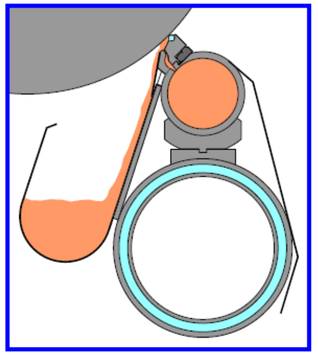
- Latest product developement, zero dwell application.




"Zero dwell"



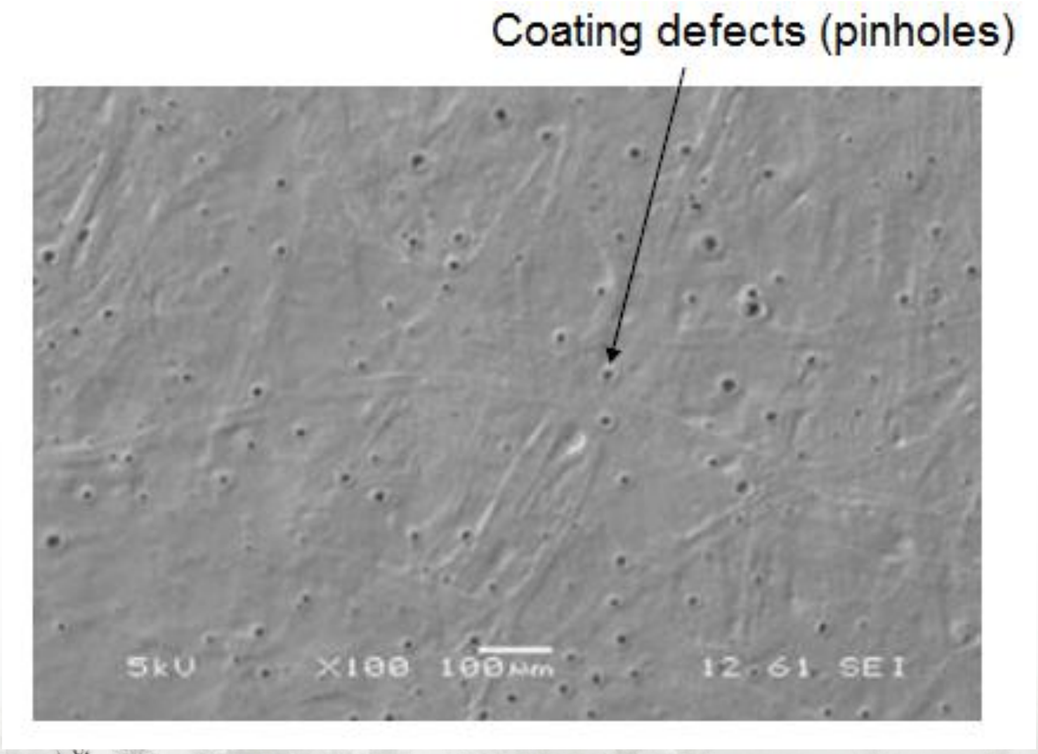

## INVO®Coater




**Versatile & Compact**
**Coating / Sizing module**

# Drying is important !

**Too fast drying/evaporation speed is senstive for pinholes. Thin layers are less sensitive and precondition for high speeds.**




From Järnström, L. et al. (2013). *Renewable*

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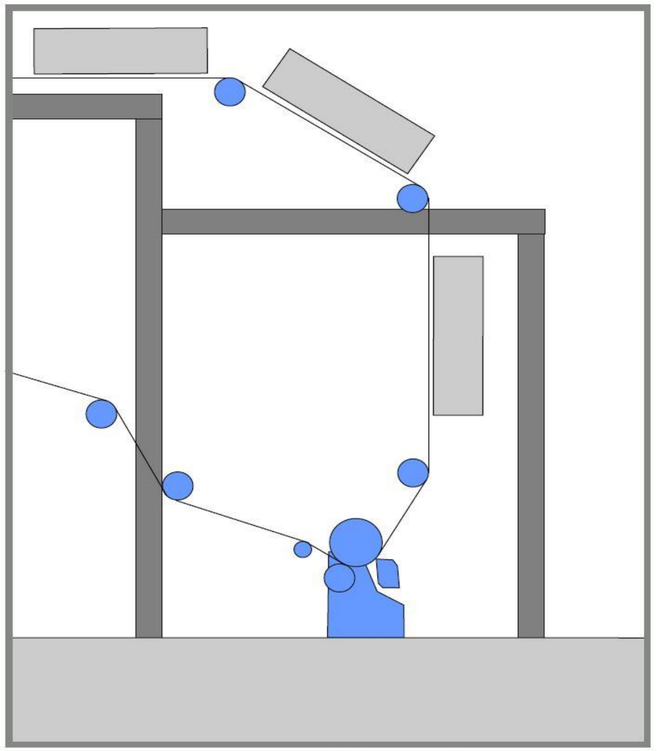
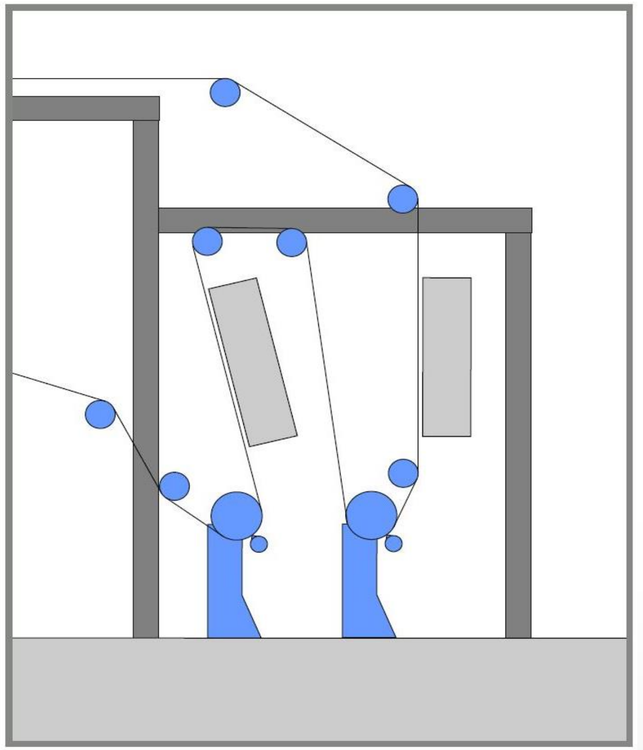
# Typical layouts for two layers

## Case: Exisiting one layer



## Future two layers



2 bumps save 30-40 % media for same barrier properties

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# SUSTAINABILITY

**Increased interest from the market and thus the industry for sustainable fiber-based products. Focus on barrier properties to increase versatility of the products.**

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# MFC an interesting alternative

## Barrier properties

- MFC can increase the oxygen and oil barrier properties of the packaging
- Humidity decreases the oxygen barrier properties → improved with hydrophobic modifications or by using MFC in a multilayer structure

| Material | Oxygen permeability ($cm^3 \mu m/(m^2\ day\ kPa)$) | relative humidity (%) |
|---|---|---|
| native MFC | 0.011 | 0 |
| native MFC | 3.52-5.03 | 50 |
| PET | 10 - 50 | 50 |
| PLA | 184 | 0 |
| LDPE | 1900 | 50 |

Values taken from Aulin, Gällstedt, Lindström, "Oxygen and oil barrier properties of microfibrillated cellulose films and coatings", *Cellulose*, (2010) 17:559-574 and Padberg, Bauer, Gliese "The influence of fibrillation on the oxygen barrier properties of films from microfibrillated cellulose" *Nord Pulp Pap Res J* (2016) 4: 548-560.

Borregaard

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# MFC gives low airpermability

Cellulose (2010) 17:559–574
DOI 10.1007/s10570-009-9393-y

## Oxygen and oil barrier properties of microfibrillated cellulose films and coatings

Christian Aulin · Mikael Gällstedt · Tom Lindström



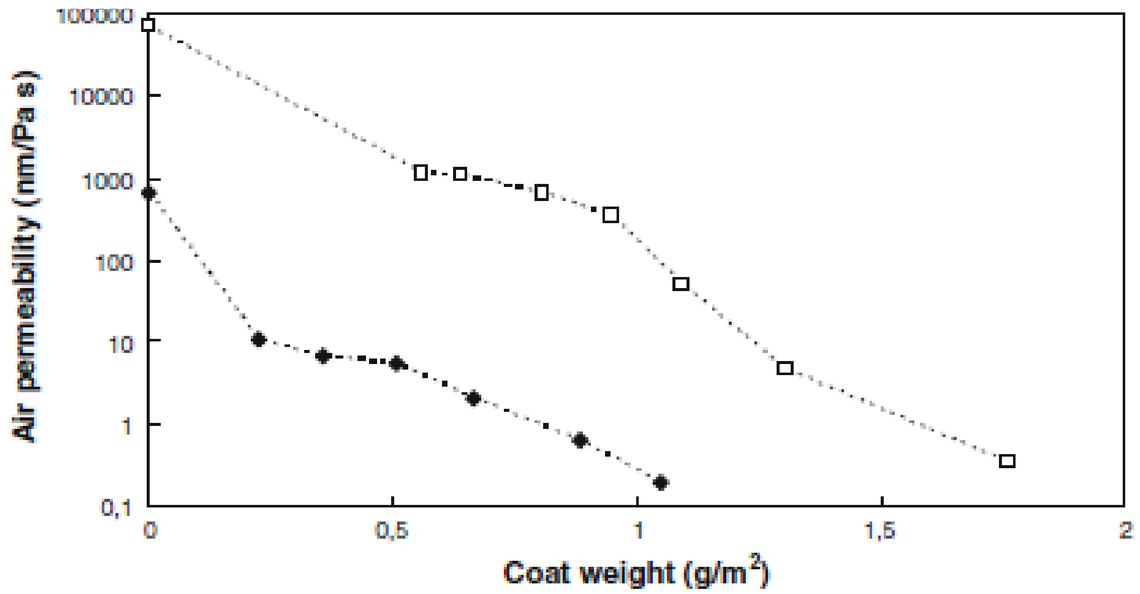
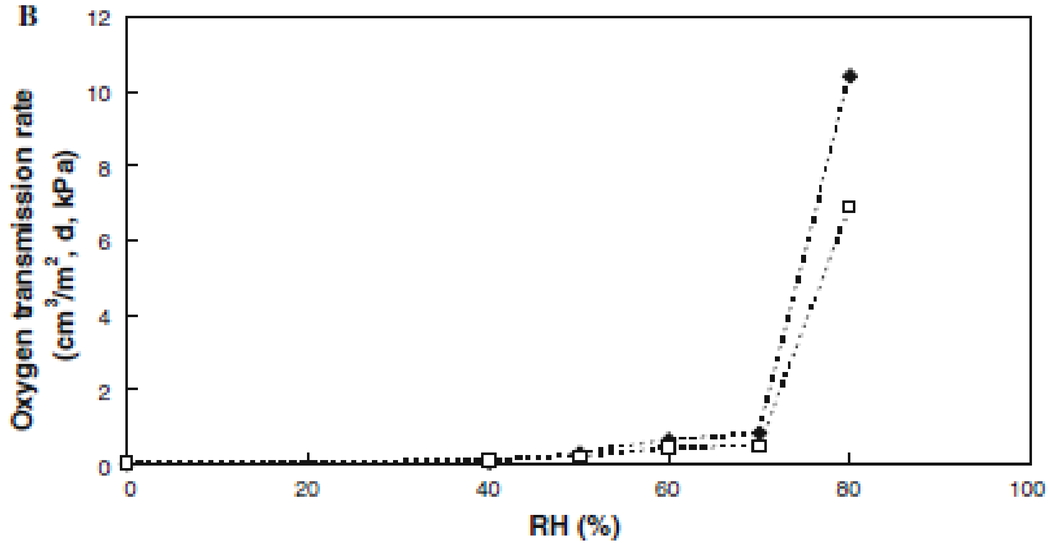



**Fig. 8** Air permeability (logarithmic scale) as a function of MFC-coat weight for an unbleached (*open square*) and a greaseproof paper (*filled diamond*) coated on a bench scale. The unbleached paper was coated twice using the largest wire diameter rod to ensure a complete surface coverage of MFC. The air permeability was then 0.3 nm/Pa s. The average coefficient of variations was 4.51 and 3.19% for the determination of coat weights and air permeability, respectively

# RH% influences airpermability

Oxygen and oil barrier properties of microfibrillated cellulose films and coatings

Christian Aulin · Mikael Gällstedt · Tom Lindström




70%, there was a sharp increase in permeability. The influence of film thickness on the OP was also studied. Interestingly, the OPs were founded to be 0.009 and 0.0006 $cm^3$ µm/ ($m^2$ day kPa) for film thicknesses of 2.54 and 3.19 µm, respectively. The OP of 5 $g/m^2$ grammage films was measured as a function of the

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# Polymeric dispersion barrier for waterprotection

Caisa Andersson. *Polymer Interdiffusion in Dispersion Coatings and its Relation to Barrier Properties.*

Licentiate thesis in Chemical Engineering at Karlstad University.

Karlstad University Studies 2001:24
ISBN 91-89422-59-7
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SE-651 88 KARLSTAD
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2. FORMATION OF A COATING FILM FROM BARRIER DISPERSIONS

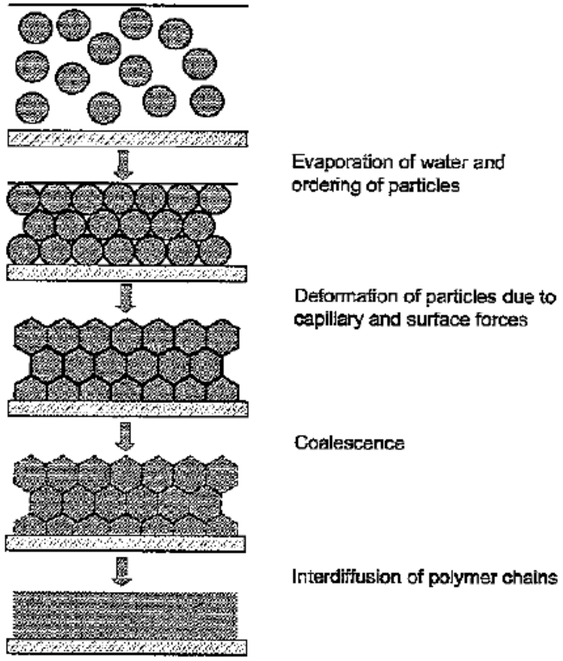


***Figure 2.** Formation of latex polymer films.*

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# Classification of Biopolymer

## KLASSIFISERING AV PLASTMATERIALER

**Konvensjonelle materialer, ikke biodegraderbare**

**Konvensjonelle, fossilbaserte materialer**

- PE (LDPE, LLDPE,HDPE)
- PP
- PET, PS
- PA, COC, EVOH
- Oxo-degraderbare blandinger

**Materialer fra fornybare ressurser**

- Grønn PE
- Grønn PP
- Bio-PET
- Bio-PA
- Polyisoprene

**Biodegraderbare materialer**

**Biodegraderbare fossilbaserte materialer**

- Ecoflex
- Bio-blandinger
- TPS Blends
- PVOH
- PCL

**Biodegraderbare materialer fra fornybare ressurser**

- PLA
- PHB, PHA, PBS
- Cellophane
- Ecovio
- TPS blends, Bio-blends

| Biobased polymer | | |
|---|---|---|
| Type | Renewable source | Biodegradable |
| ~~Conventional~~ | no | no |
| A | x | no |
| B | no | x |
| C | x | x |





norner™ The Polymer Explorers

# Material & Coating technique challenges

Renewable Barrier chemicals need to be explored and its potential utilized.

Within a couple of years, Fossil free laminats will be present in the market, with air/aroma-, fat- and water resistance well in the range of the best fossil based plastic solutions today.

The total amount of bioplastic polymers in this packaging material is in the range of 20% compared to today fossil based plastic solution.

The product can be repulpable.

The race is on!

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# Rel. High MW

Flexible and closed film, which can be bended to a certain degree

# Rel. Low MW

Brittle film, which breaks fast, when bended

# Material Coating technique & Pilot plant challenges

To meet the new challenges, new coating solutions need to be developed.

- **Extreme high viscosity- no circulation**

The idea is to be able to run extremely high viscosity level with no cirulation, in order to avoid air development in the media.

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# Summary

Our industry knows how to cope with MOSH and MOAH. It is just to push the button.

Perfluorchemicals for grease & fat proof properties are not needed. There are other solutions up running.

Multipel application in thin layers, give higher barrier efficiency and It allows higher production speeds: ON ot OFF-line.

Fossilfree laminats will be available in the market with properties comparable to today best plastic solutions.

# Material Coating technique & Pilot plant challenges

To meet the new challenges, new coating solutions need to be developed.

- **Extreme high viscosity & big wet amounts**

Specifically MFC needs except for high viscosity big wet amounts in order to reach necessary dry pickup.

(UMV has sold and built the first coater for application of MFC on running web.

UMV is also developing Wet - end coating, which suits well for MFC application.)


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Tack för uppmärksamheten !