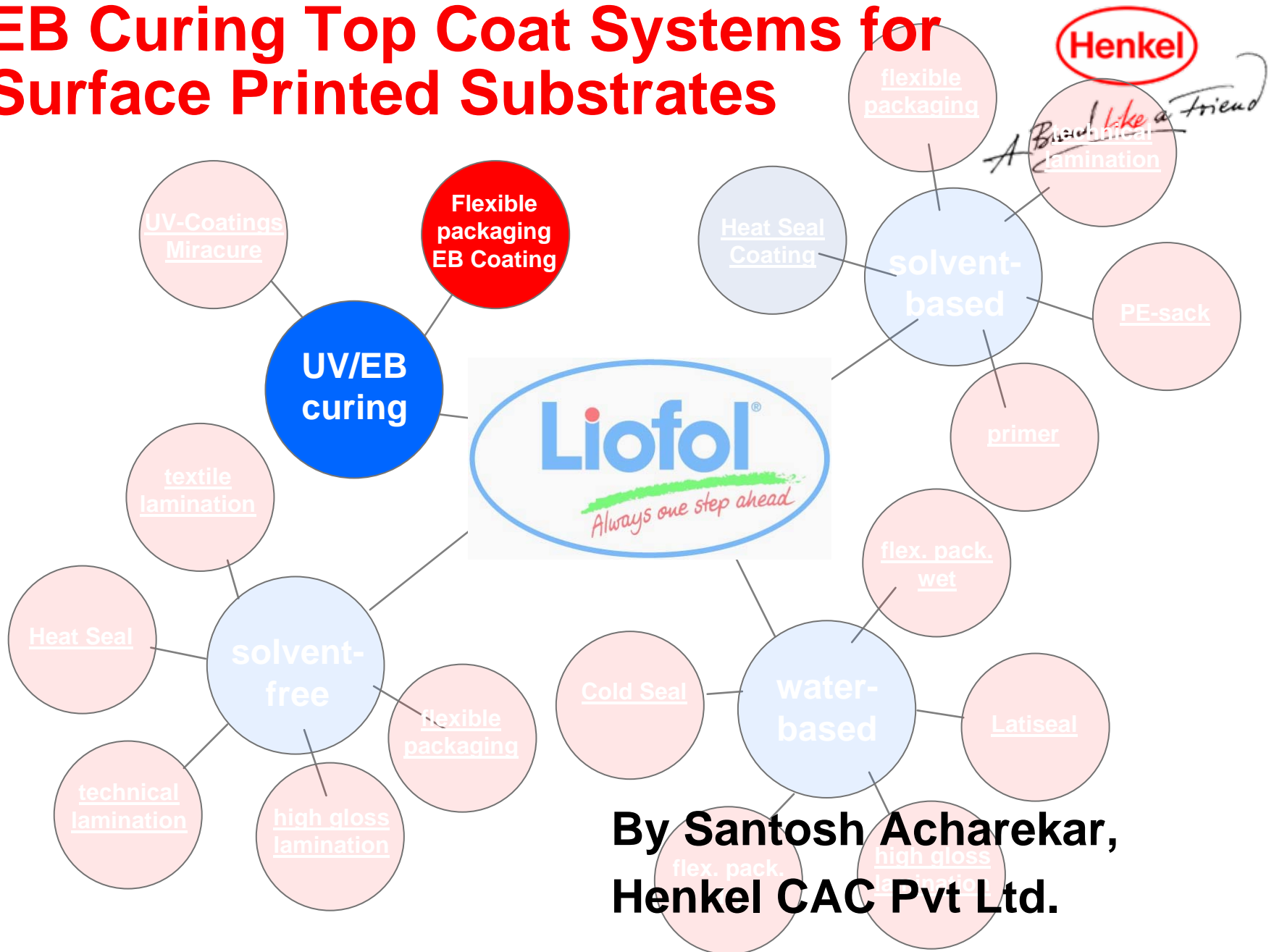


EB Curing Top Coat Systems for Surface Printed Substrates



By **Santosh Acharekar,**
Henkel CAC Pvt Ltd.

EB Cure Coatings



Characteristics and Advantages

Application

Product portfolio range

Flexible Packaging Applications

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Multi-layer packaging materials:

- Transparent plastic films, printed films, metallised films, aluminum foil...
- Each layer bond by a laminating adhesive
- Package closed either by a sealable film (PE, CPP,...) or to a sealing-lacquer

Issues with conventional curing

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Use of heat and organic solvent-based formulations give rise to several problems and impose limitations Like

- High Energy requirement : expensive
- Equipment needs extended and complex heating systems
- Solvents : inflammable and unsafe for handling or inhalation
- Emission of volatile organic compounds (VOC's) on drying that cannot be exhausted or released directly into the atmosphere
- Speed of the process constrained by the rate at which the solvent evaporates
- Heat sensitive substrates like oriented films and some specialty polymeric films require special handling

EB Cure Coatings – Characteristics

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- **No VOC**
- Extremely fast cure: instant cure
- No pot-life : bond on command
- Mono-component : no risk of mixing errors
- Room temperature processes possible
- Various gloss levels and CoF requirements
- **EB Coatings can be formulated to meet FDA compliance.**

EB Cure : Mechanism



- **EB Coating is applied**
- **Stream of ELECTRONS accelerated till 2/3 speed of light to enter the coating**
- **CARBON=CARBON Double Bonds are broken , creating “FREE RADICALS”**
- **FREE RADICALS connect to form DRY FILM INSTANTANEOUSLY.**

EB Cure Coatings – Advantages

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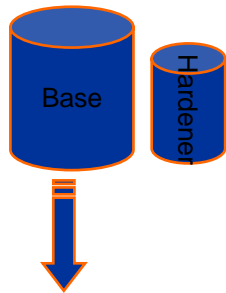
- **Process simplification:**
 - 2 processes in 1, with a multi-functional EB lacquer
 - The EB coating can be applied with a printing press, in-line with the printing process
- **Tremendous reduction of processing time:**
 - Instant cure: No need for intermediate storage
 - The EB coating can be applied with a printing press, in-line with the printing process
 - Flexibility of production planning and fast response to orders
- **Waste reduction, Quality improvement:**
 - Quality Control Check possible directly off-line enables the immediate detection and correction of faulty parameter settings.
 - Excellent yellowing resistance, excellent gloss
- **Material cost savings:**
 - No need for an extra release or gloss lacquer
 - Mono-web structure
 - ● ●

EB Cure - Process Simplification

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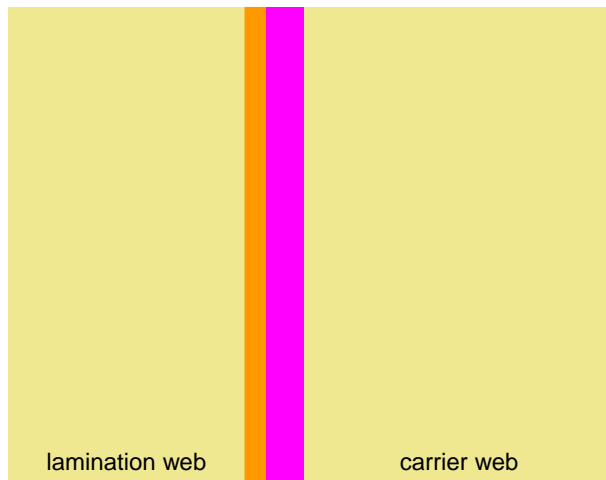
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2-component adhesive,
hot applied

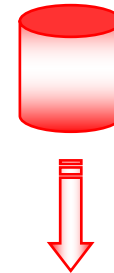


adhesive

ink

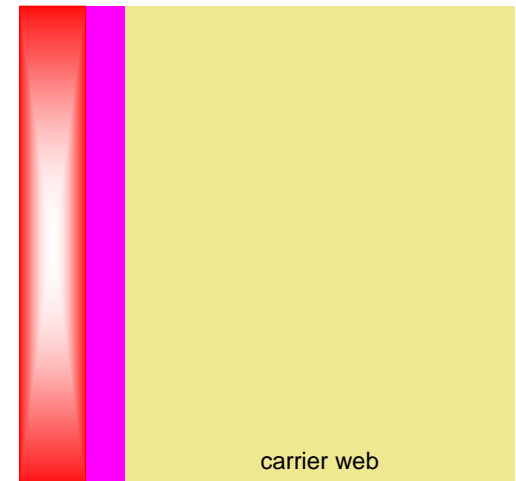


EB lacquer, 100% solids



ink

Process
Simplification



EB Coating with Slip Properties

EB Cure Coatings



Characteristics and Advantages

Applications

Product portfolio range

EB Cure Coatings : Applications

...



Two mass-applications where the economics play along:

- **EB Cure Coatings for heavy-duty bags**
- **EB Cure Coatings for snack packaging**

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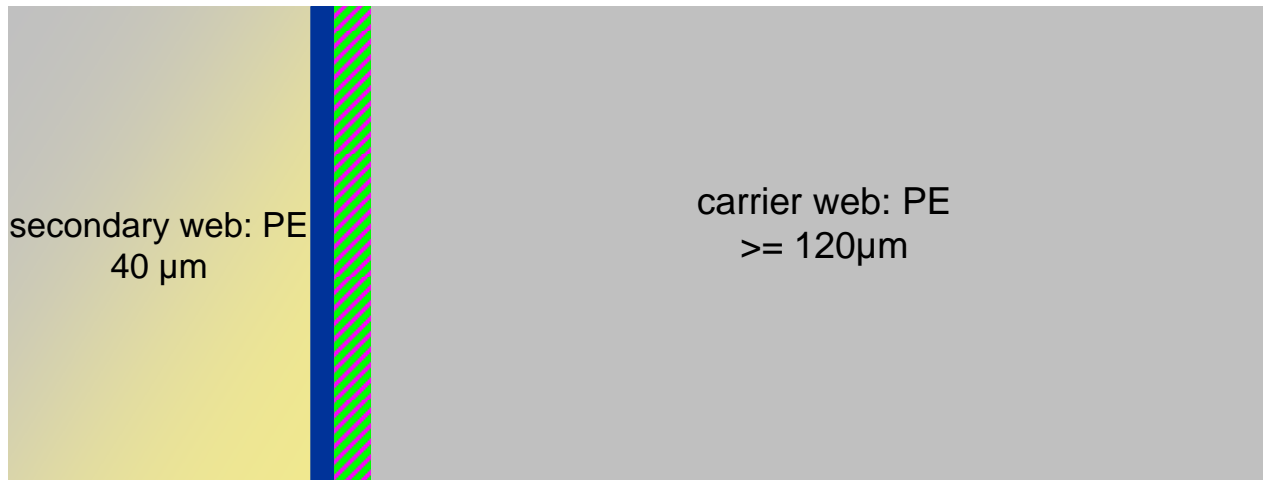
EB Cure Coating for heavy-duty bags



Original structure for heavy duty bags **Stenkel**

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Aliphatic Solvent Free PU adhesive inks - solvent-based



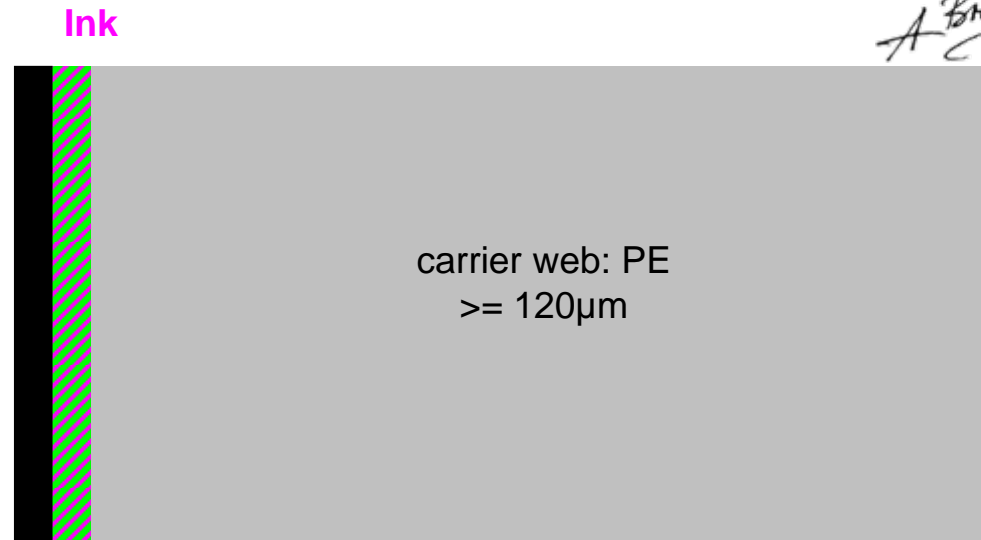
- **Two-step** manufacturing process on separate equipment \Rightarrow Printing and Laminating
- **High-priced** laminating adhesive and **long curing** time

New structure with EB Coating

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EB Coating
with anti-slip properties



Benefits

- Process simplification: printing and coating in-line \Rightarrow gain of handling time, waste reduction
- Saving of material cost: PE film and aliphatic PU adhesive.
- Gain of gloss \Rightarrow + ca. 10 % at 60°
- Improved weathering stability \Rightarrow no more yellowing after standard lab test

EB coatings for Flexible Packaging

(examples from US market)



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**EB coating for surface
printed white LLDPE**

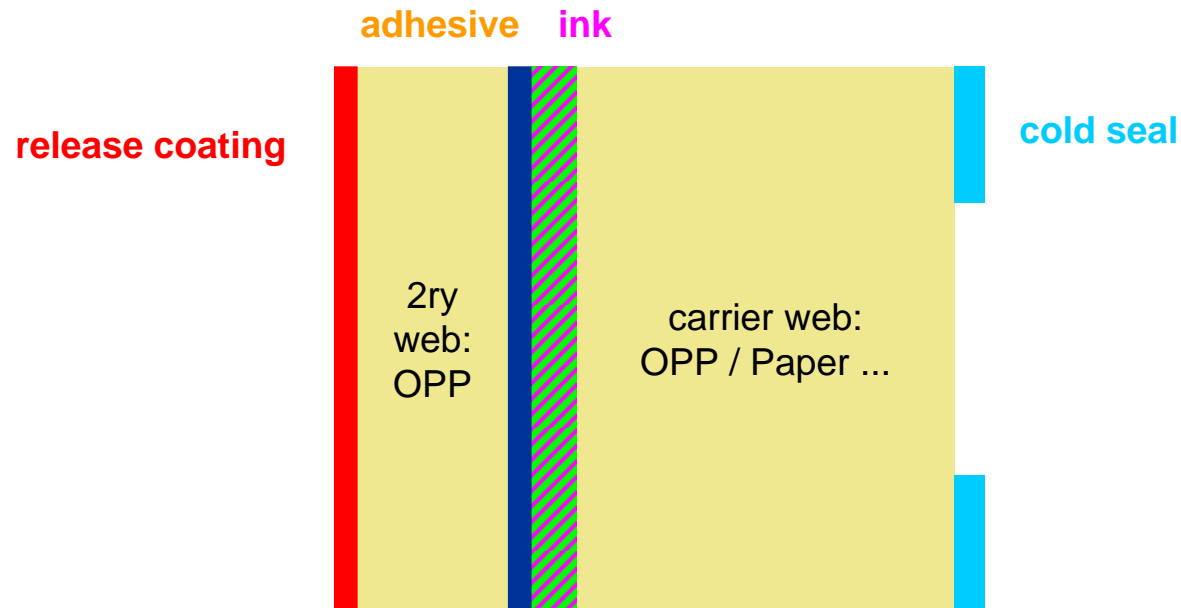
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EB Cure Coating for snack packaging



Original structure for snacks

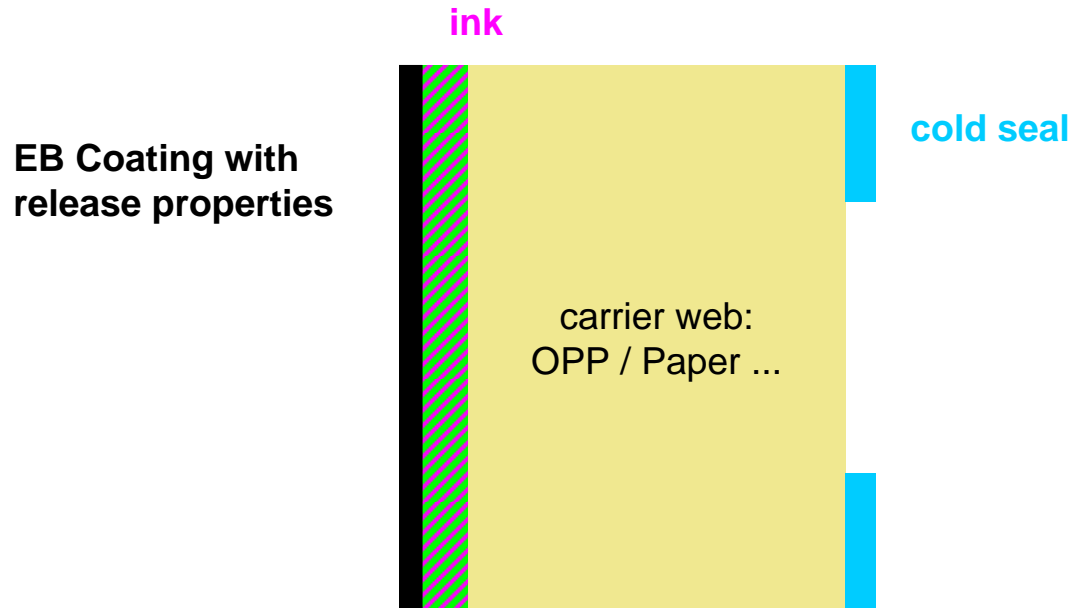


- At least **three-step** manufacturing process on separate equipment
⇒ Printing, Laminating and Coating
- **High-priced** release coating

New structure with EB Coatings

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Benefits

- Process simplification: printing and coating in-line \Rightarrow gain of handling time, waste reduction
- Saving of material cost: Release coating , OPP film and adhesive.

EB coatings for Flexible Packaging

(examples from US market)

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**EB release coating for
surface printed OPP with
cold-seal on the backside**

EB Coatings



Characteristics and Advantages

Application

Product portfolio range

EB Cure Coatings for Flexible Packaging

(US product range, EINECS compliance open)

- **Miracure EB Coating**

- Low extractable EB coatings for **mono web applications** with release characteristics for cold seal
- Viscosity 170-240 mPas
- Low CoF
- **Suitable for OPP, PE**
- FDA §175.105 compliance



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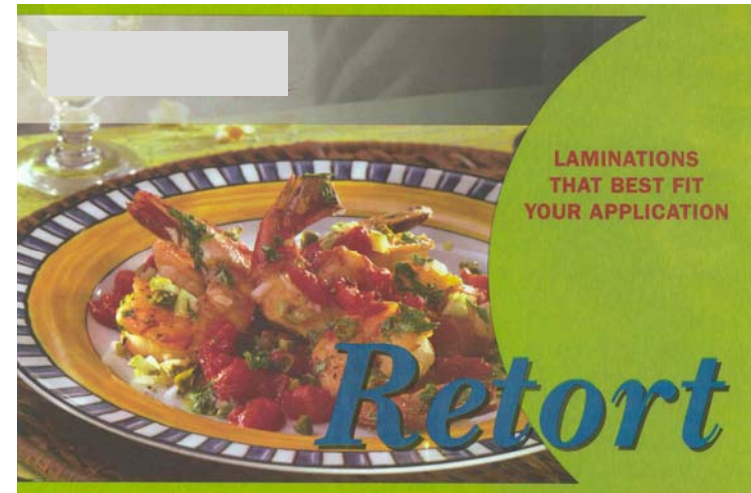
EB coatings for Flexible Packaging

(US product range, EINECS compliance open)



- **Miracure EB Coating**

- **Retortable EB** coating for surface printed PET
- **Viscosity 140-200 mPas**
- **Low CoF**
- **FDA §175.105**



Retortable EB coating for
surface printed PET/Al/ CPP



EB coatings for Flexible Packaging

(US product range, EINECS compliance open)



- **Miracure EB Coating**

- EB coating for **paper/foil laminate** - dry food pouches
- Viscosity 125-175 mPas
- medium CoF
- FDA §175.105



EB Cure for Flexible Packaging:



Hurdles / Chances

- **Hurdles**
 - Equipment cost (EB-unit)
 - Difficult to compete against low-priced and high performing polyurethanes (fast curing cannot be the unique selling argument)
- **Chances**
 - Converters receptive to innovative ideas and new technology
 - Price competitiveness of EB overprint coatings vs PUR laminating adhesives
 - EB overprint coatings already commercialised at a few customers' in USA

EB Cure Coatings ...

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- ... **simplify** manufacturing processes ⇒ Application directly in the print station of a printing machine.
- ... are easily **processable** ⇒ 1-component, no pot-life, cure-on-command
- ... **protect** inks and films very well ⇒ excellent scratch and solvent resistance
- ... create attractive **optics** ⇒ glossy or matt
- ... are suitable for **heat-sensitive** films ⇒ application at room temperature and cold cure
- ... can **suppress** the cost of filmic material

Conclusion



For **specific applications**, technical challenges can be overcome and EB coating proven **economical** compared to conventional lamination.



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Thank You