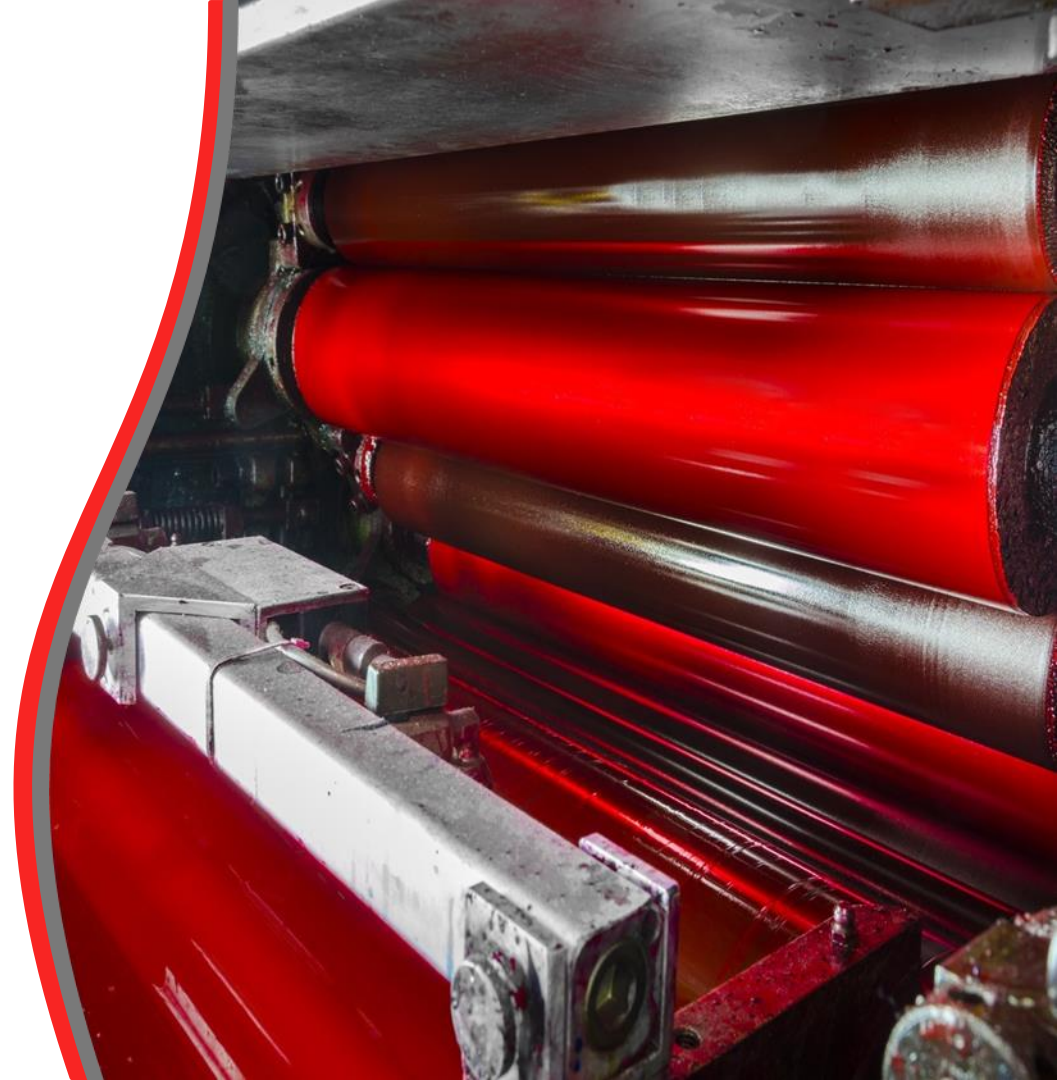




Embrace Energy Curing Inks

German Paint and
Printing Ink Association (VdL)



Definition of EC

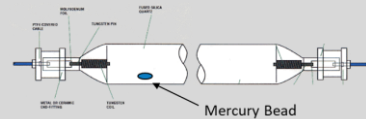
EC describes the process of curing ink- and/or varnish system with highly energetic radiation.

	Flexo solvent based	Flexo water based	Offset conventional	Energy curable
Pigment	<ul style="list-style-type: none">• Pigments	<ul style="list-style-type: none">• Pigments	<ul style="list-style-type: none">• Pigments	<ul style="list-style-type: none">• Pigments
Binder	<ul style="list-style-type: none">• Polymers	<ul style="list-style-type: none">• Polymers	<ul style="list-style-type: none">• Oils/resins	<ul style="list-style-type: none">• Acrylate Poly- /Oligomers• Monomers
Additives	<ul style="list-style-type: none">• Divers	<ul style="list-style-type: none">• Divers	<ul style="list-style-type: none">• Divers• Driers	<ul style="list-style-type: none">• Additives• (Photoinitiators)
Solvent	<ul style="list-style-type: none">• Alcohols/Esters	<ul style="list-style-type: none">• Water	<ul style="list-style-type: none">• ---	<ul style="list-style-type: none">• ---

Standard or conventional UV

- Radiation with wavelength from approx. 200nm-380nm

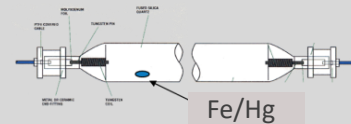
Typical Medium Pressure Mercury Lamp



Low Energy Curing

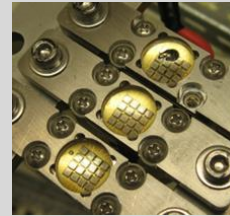
- Radiation with wavelength from approx. 275nm-380nm

Typical Medium Pressure Mercury Lamp



LED

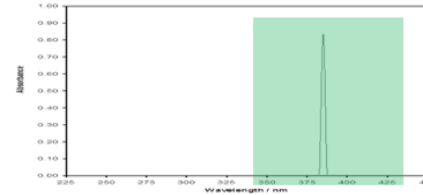
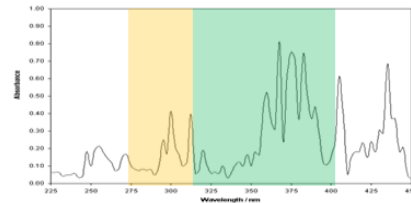
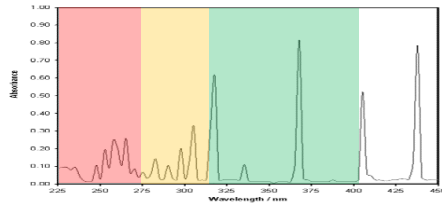
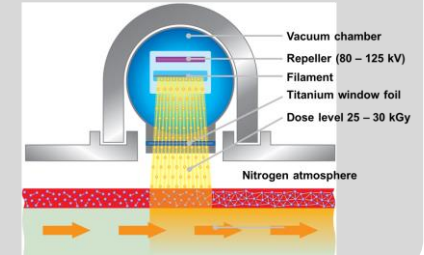
- Radiation with wavelength from either 395; 385 or 365nm



Electronic Beam

- Accelerated electrons under inertization

How does an EB work?



Paper & Board

Folding boxes, wraparounds



- fold and abrasion resistance on edges
- highest gloss with UV OPV

Magazines

Prospects, Catalogues



- High gloss
- Attractiveness for classic market

Commercial

Mailings, Post cards, Calendars, Flyer, Bills



- Haptic effects
- Complex printing designs
- Small job size

Successful markets (non-absorbent substrates)

Labels

Aluminium Lids

Various Applications

Flexible Packaging

Self adhesive labels
In-mould labels



- Chemical and physical resistance

Dairy and ready-made meals



- High heat seal and chemical resistance to peroxide
- Sterilization resistance

Bottles, Tubes, Credit cards, Cups



- Mechanical / scratch and water resistance needed

Wraparound labels
Shrink sleeves
Stand-up pouches



- Abrasion resistance
- Chemical resistance

General Benefits

- ✓ Immediate further converting – high productivity
- ✓ Easy handling and installation of the curing system
- ✓ VOC free – no additional investments necessary
- ✓ FCM- and standard inks/varnishes are available
- ✓ Wide range of substrates and printing technologies
- ✓ High printing quality

UV Mercury

- Low investment costs
- Established curing system
- Big knowledge in the market
- Curing capabilities

UV LED

- Long lifetime of the lamps
- Stable curing capabilities
- Low maintenance
- Low heat in the working environment
- Ozon and mercury free
- No exhaust air investment
- Simple retrofit of existing UV mercury systems
- Low energy (on/off)

EB Curing

- Photoinitiator free
- Established curing system
- Long lifetime of the EB
- Ozon and mercury free
- Adapt dose for used substrates
- High speed curing

Raw Materials

- Global economy fluctuations
→ Availability and procurement costs

Regulatory issues

- Classification of photoinitiators and monomers
→ stricter labelling
- Voluntary exclusion policies and chemical inventories

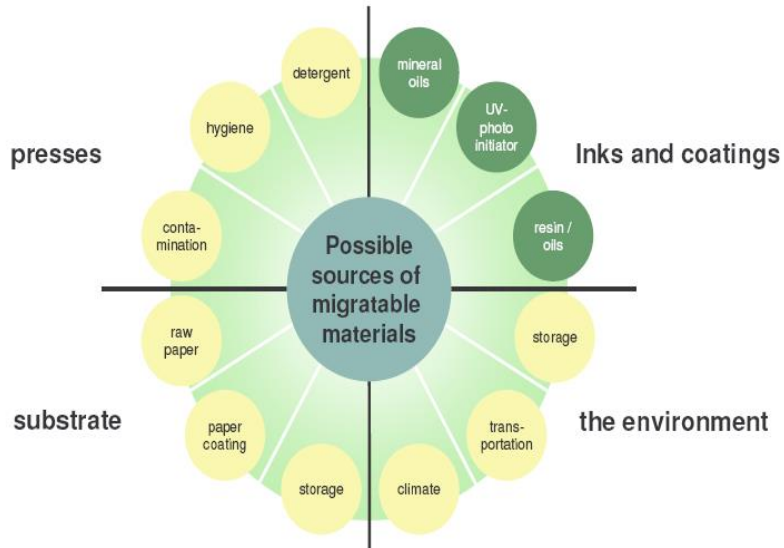
Safety

- Personal safety equipment
- EB demands a Radiation protection commissioner

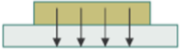

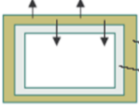
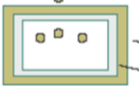
Process

- GMP is required
- Thorough curing is mandatory for food contact material

Where do migrating materials come from?



Types of migration

1.	Penetration Migration Migration from the printed side through the substrate onto the unprinted side.	 <p>ink substrate substrate</p>
2.	Contact Migration Migration from the printed side to the unprinted side of another sheet in a stack or roll.	 <p>ink substrate substrate ink substrate substrate</p>
3.	Evaporation Migration Migration due to the evaporation of volatile materials by heating (e.g. cooking, baking, or boiling frozen products in their original packaging).	 <p>ink substrate substrate</p>
4.	Distillation Migration Migration through steam distillation during cooking, baking or sterilisation.	 <p>ink substrate substrate</p>

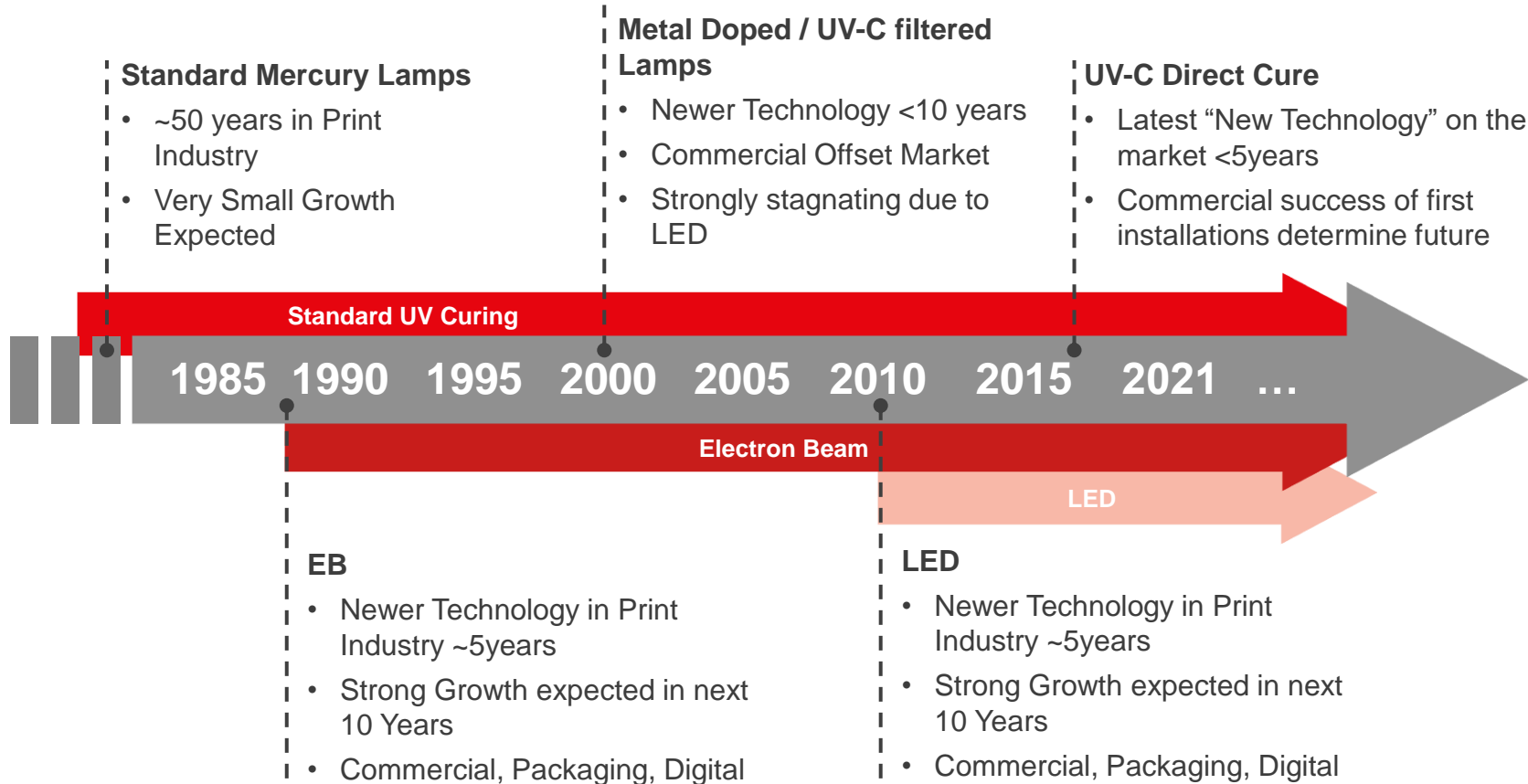
Ink manufacturer

- Selection of raw materials
- FCM ink composition
- GMP facilities
- Full traceability of production batches
- Support application technology
- Analytical checks & migration tests

Printing house

- Selection of ink technology
- Condition of curing units
- Stable Printing process
- Condition printing press
- Proper curing of ink layer
- Frequent migration test final products

EC – Drying Technology: History & Future



Standard UV

- “Low Energy UV Curing” expands to **Commercial** Offset Printing (>1000 presses)
- Iron doped UV lamps
- Printing Presses not **ROHS II** -> Mercury Lamps exempt!

LED UV

- Commercial **365, 385, 395nm** lamps available
- Trend in **Commercial** Print from Low Energy to LED
- **Chip Technology** further increases UV Dose to 20W/cm²
 - 365nm @60% output
- **UVC LED Chips** appear for Surface cure
 - 265, 285nm @~1% output

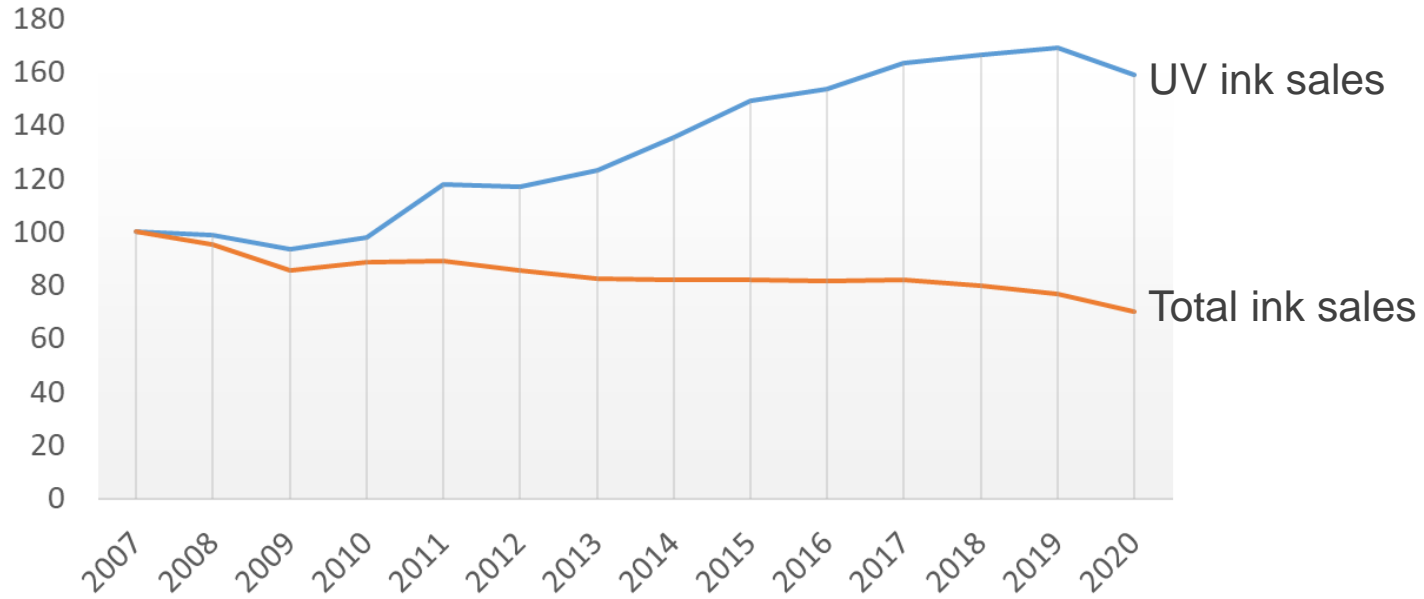
Direct Cure VUV

- **First Commercial Installations** in Printing appear
- Similar **Formfactor** to Std UV/LED
- **Inter Deck** Drying

EB Technology

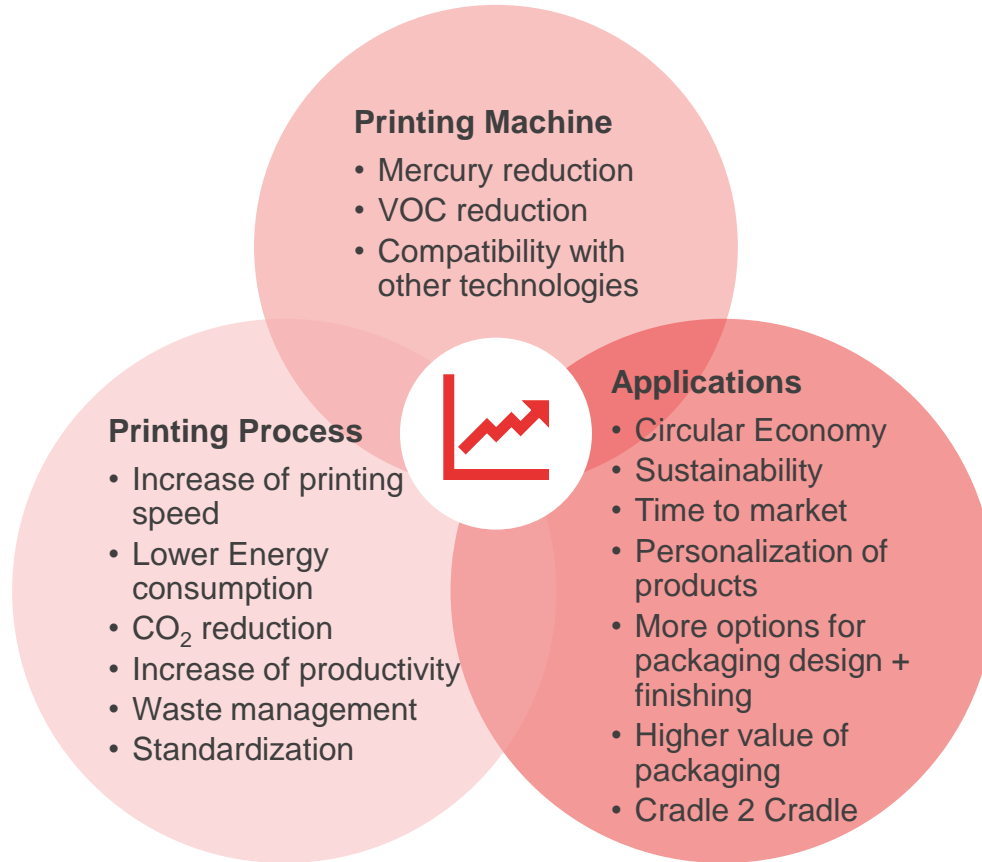
- Commercial Small Formfactor EB Lamps – **Digital IJ**
- **Commercial EB Flexo** Technologies
- Commercial **Central Impression Offset**
- Combination with SB/WB possible
- Increased field of application

Index of annual UV ink sales volume in Europe (2007 = 100)



Source: EuPIA Sales Statistics report, published 12 February 2020

Note that the number of participants in the statistics increased in 2011, and in 2015, improving coverage of the UV inks market



Thank you for your attention!



Sector Group Printing Inks

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