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Electron beam curing of lacquers

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The curing of lacquers with low-energy electrons is an advanced, extremely rapid, and energy-efficient method for cross-linking molecules in reactive lacquer systems at normal pressures.

The lacquers (e. g. acrylate-based systems) that are cured with this method are

solvent-free, allow the admixing of pigments, and require no photoinitiators. The end products often possess better properties than comparable products that have been cured with UV radiation.

The properties of the cured lacquer layers can be customized by altering the process parameters.

The gentle curing conditions mean that even temperature-sensitive substrates can be coated with lacquers and cured.

Electron beams are already used to cure lacquers in a variety of applications. The technology is already established, for example, for lacquer finishes for interior and exterior architectural elements, for the coating of furniture panels, and for the production of flooring materials. Potential applications include barrier layers in the packaging industry and in photovoltaic technology.

Electron beam curing promises key benefits for the manufacture of high-quality barrier and encapsulation systems for innovative products such as solar cells, OLEDs, and printed electronics.

Contact

Prof. Dr. Gösta Mattausch
Phone +49 351 2586-202
goesta.mattausch@fep.fraunhofer.de

Dr. Burkhard Zimmermann
Phone +49 351 2586-386
burkhard.zimmermann@fep.fraunhofer.de

Fraunhofer Institute for Electron Beam and Plasma Technology FEP

Winterbergstr. 28
01277 Dresden, Germany

www.fep.fraunhofer.de

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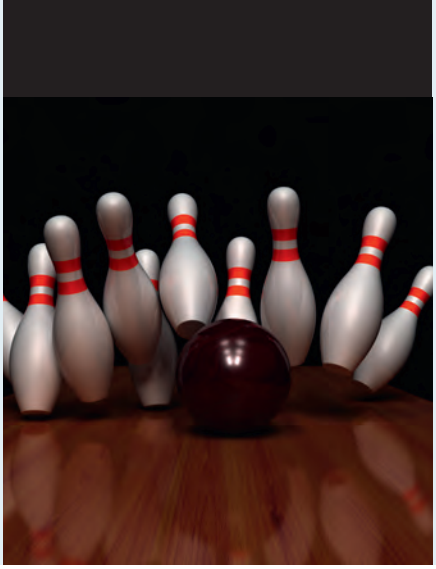

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Properties of the cured lacquers

- Very low emissions
- High resistance to chemicals
- UV resistance; yellowing does not occur as no photoinitiators are used
- Resistant to elevated temperatures
- High abrasion resistance
- Good adhesion on plastic substrates
- Uniform lacquer quality

Advantages of the technology

- Environmentally friendly, as no solvents or photoinitiators are used
- Energy-efficient
- Very fast processing (up to 600 m/min) and very rapid curing
- Can be used with a large variety of reactive lacquer systems (liquid, powder, water-soluble, pure substances or mixtures, biodegradable, biocompatible) and on a variety of substrates (rigid or flexible, also temperature-sensitive substrates)
- The properties of the lacquers (e. g. surface topography, printing properties, hardness/elasticity, gloss/brilliance, depth of hardening) can be very accurately set by altering the process parameters such as the dose of energy
- Easy processing with low-energy electrons at normal pressure
- In-line monitoring of the electron beam power and immediate in-line layer analysis possible
- Curing as a finishing process possible

Applications

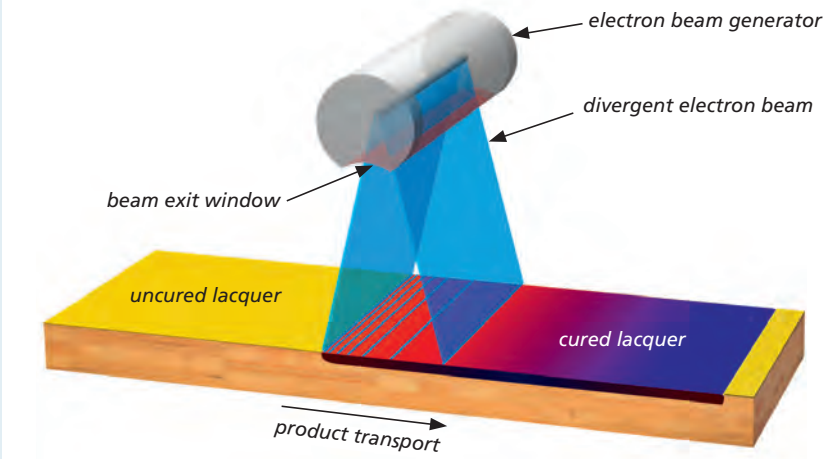
The technology can be applied to a wide range of materials. Surface layers down to a depth of 0.2 mm can be cured.

- Flat and 3-D substrates, bulk goods
- Car and machine parts
- Furniture/doors, flooring (polymers/wood)
- Coil coating (sheet materials/white goods)
- Special papers, wall coverings, films (for barriers, packaging, printing, gloss effects, release films)
- Glass articles, architectural glass, abrasion-resistant layers for optics
- Exterior facade elements and interior architectural elements made of inorganic, ceramic, metallic, or polymeric materials
- Barrier and encapsulation layers for photovoltaic technology and printed electronics

Our offer

We offer:

- Expert advice about the technology and customization to your needs
- Selection, testing, and appraisal of popular commercial electron beam generators
- Development of customer-specific electron beam generators
- Feasibility studies
- Pilot trials
- Servicing of electron beam generators
- Optimization of existing process technologies (energy, electron beam power, beam guidance, product transport)
- Accompanying tests for selecting suitable lacquer systems and for development of lacquer formulations
- Accompanying process and product analysis



Schematic representation of lacquer curing with an electron beam