

EB for non-thermal Crosslinking/Vulcanisation of coatings

Considering that some years ago solvent free systems savings in energy or low space requirements were the main arguments in favour of irradiation of surfaces to dry lacquer with low-energy electrons come to the fore:

- High scuff resistant coatings
- Controlled, calculable, through-curing
- Immediate stacking or subsequent treatment of the materials
- High flow rate, substantial increase in production speed in comparison to heat treatment methods
- Constant product quality, precise maintain crosslinking and vulcanising process conditions through very high dose precision over working width, depth of material and production time
- Considerably lower extraction values compared to UV-curing, processing without photoinitiators
- Acceptable costs at appropriate quantities
- Minimal temperature increase through radiation process; therefore no migration of low boiling components from the coating material. No change of moisture level in the substrate.

Today electron-beam curing (non-thermal curing) is used industrially for the surface technology in the following fields:

- Curing of pigmented lacquers on doors
- All-around curing of lacquers on mouldings
- Controlled through-curing of coatings on finished parquet
- High scuff-resistant floor-coverings
- Production of high-gloss surface in the board industry
- Curing of coatings on furniture foils (lacquer from the roll)
- Crosslinking of Lacquer on top of papers for the production of HPL (high-pressure Laminate) - and CPL (Continuous-Pressure Laminate)-material with lacquered surface
- Curing of coating on boards with UV-/EB-curing processes
- Even Crosslinking of pressure-sensitive adhesive masses (Tesakrepp-material) to increase temperature stability
- Drying of printing inks

ELECTRON CROSSLINKING AB

Head office
Skyttevägen 42
SE-302 44 Halmstad
Sweden

Telefon / Phone
+46 (0)35 15 71 30
Telefax
+46 (0)35 14 82 06

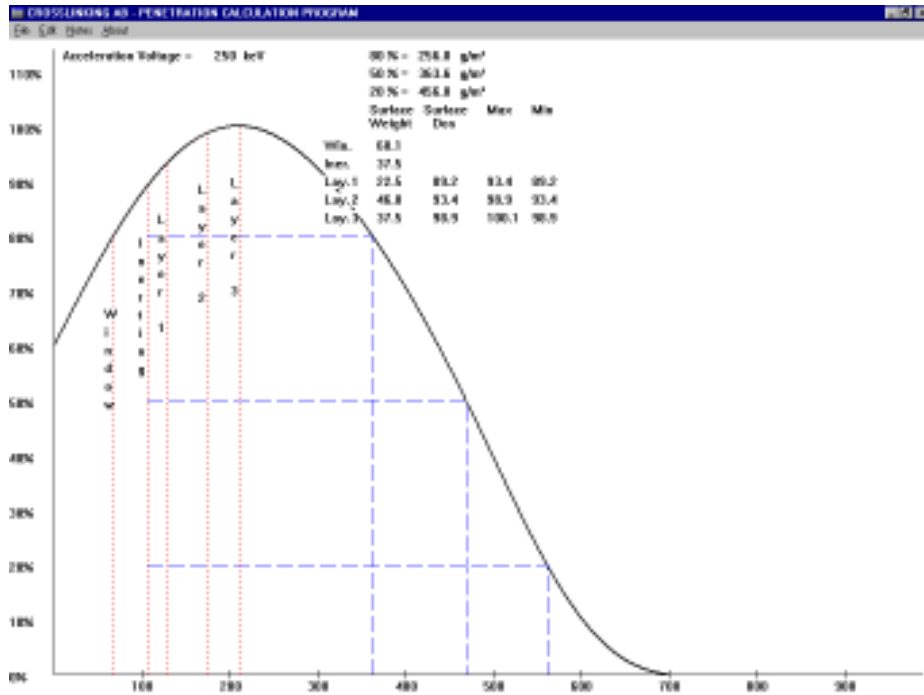
Bruhlstraße 7
DE-72147 Nehren
Germany

Telefon / Phone
+49 (0)7473 920 281
Telefax
+49 (0)7473 920 282

Controlled, calculable through curing

Electron-beam irradiation is calculable and is determined by 3 factors:

- Acceleration voltage as the measure for the penetration depth of the electrons.



Depth dose distribution for 250 keV electrons when curing coatings on parquet (50 % ionization), ($\rho = 1,25 \text{ g/cm}^3$)

- Electron current

It determines the possible flow rate. The applied irradiation dose D is connected with the electron current I and the web speed v as follows with k as equipment factor.

$$D = k \cdot \frac{I}{V} \quad \text{with } k \text{ as equipment factor.}$$

The formula above shows the following details:

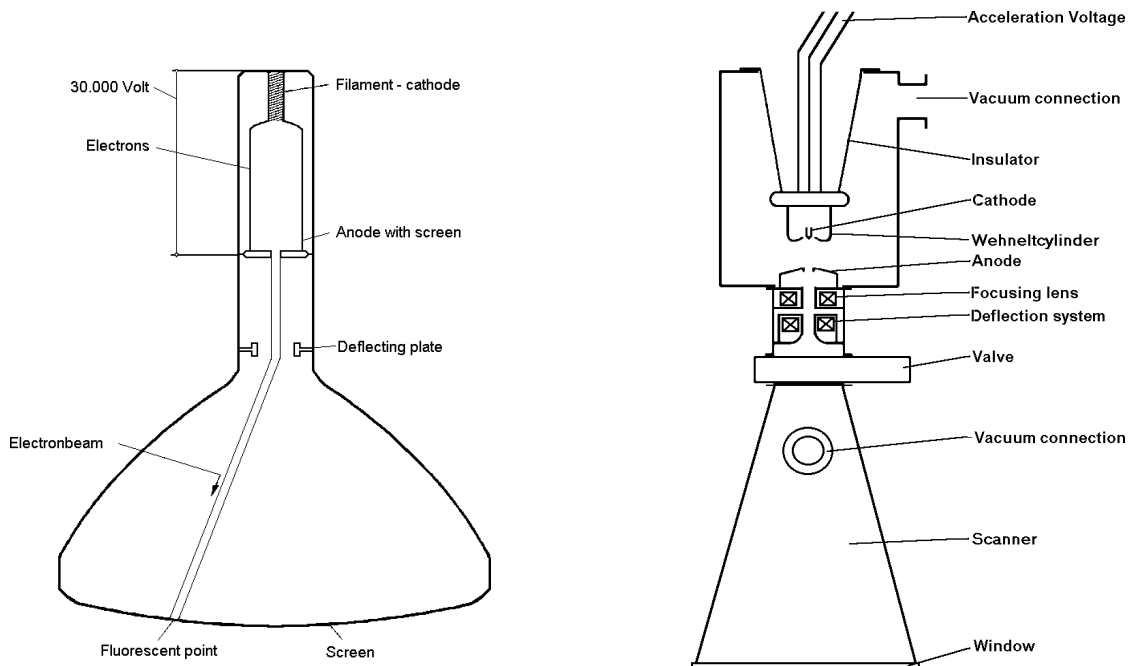
- Dose and electron current are directly proportional.
- If the proportion of electron current and speed is constant, you will receive reproducible and saleable products in all production phases including when starting up and shutting down the plant.
- The accelerator only takes power of the main supply according to the web speed.
- Quality protection is possible when using this formula.

- Working width

The width of the electron-beam exit window has to be adjusted to the max. working width (object width).

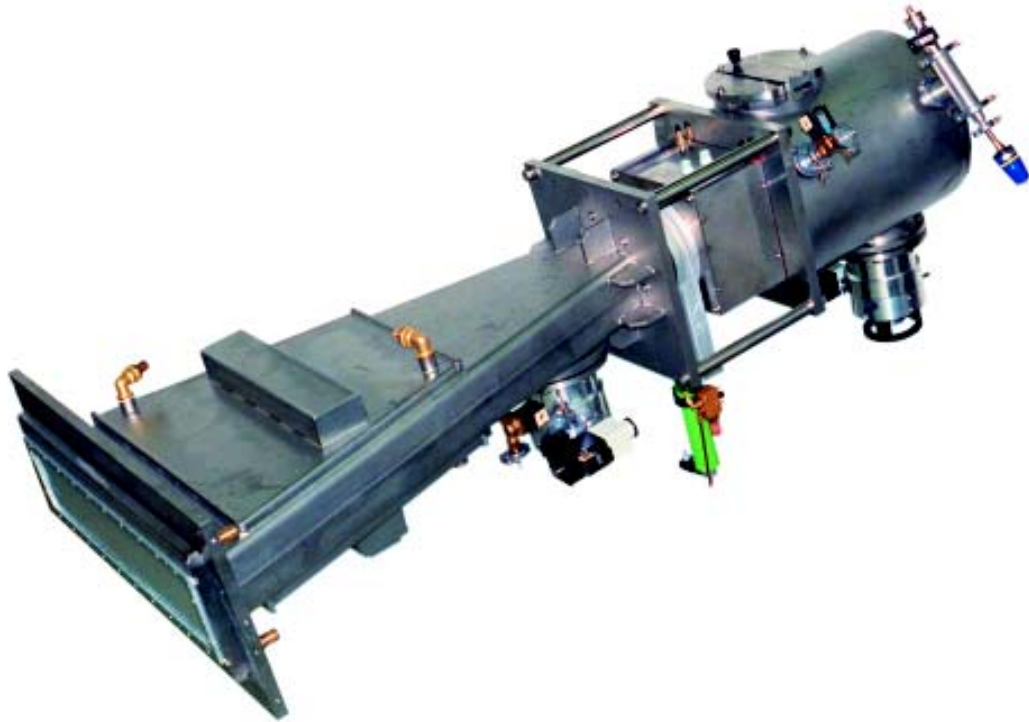
Electron Crosslinking AB electron-beam accelerators

The function of our electron-beam accelerators can be compared to a cathode ray tube of a TV-set.



Cathode ray tube and Electron Crosslinking AB electron-beam accelerator

By means of flow of electron current a heated tungsten cathode puts free electrons at its surface to disposal in high vacuum. These negative charged particles (or waves) are accelerated by a negative voltage in direction to the anode and then deflected over the screen at cathode ray tubes or the electron-beam exit window at electron-beam accelerators. With the accelerator these electrons can pass through a thin titanium foil from vacuum out into the air or inertgas, where they can act on the object.



Performance data of Electron Crosslinking AB Accelerators

- Acceleration voltage 80 - 300 kV
- Electron flow per cathode max. 200 mA
- Working width 200 - 2000 mm
- Electron flow per cm window length max: 3,2 mA/cm
- Speed of web at 10 kGy up to 800 m/min
- Distribution of dosage over working width better $\pm 5\%$
- Productive penetration depth of electrons max. 520 g/m²
-incl. metals also-
- No cooling of electron exit window necessary.
- The radiator may be installed in any position whatsoever.
- No measurable X-radiation outside protective screen.

Enquiries of process principle trials direct to the manufacturer of electron radiation systems:



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