Curing via Novel Electron Beam Accelerator

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Curing via E-beam accelerators offers many advantages over other technologies

Potential manufacturing cost savings of 25-65%
due to its ability to localize the radiation energy within the coating, unlike thermal curing which heats the surrounding material

Improved material properties
including chemical and thermal resistance and mechanical properties such as tensile strength and impact resistance

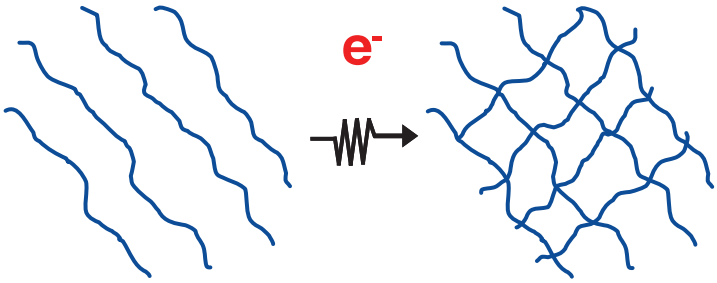
High cure rate and instant curing
allowing for higher manufacturing rates and quicker usage of cured material

More environmentally friendly curing
with no solvents, initiators or other toxic processing aids

E-beam crosslinking

Electron beam processing involves the absorption of large doses of energy from accelerated electrons in materials in order to modify them in some beneficial manner.

The main processes initiated by electron beam are polymer modification by crosslinking or scission, curing of coatings or synthesis of new substances.

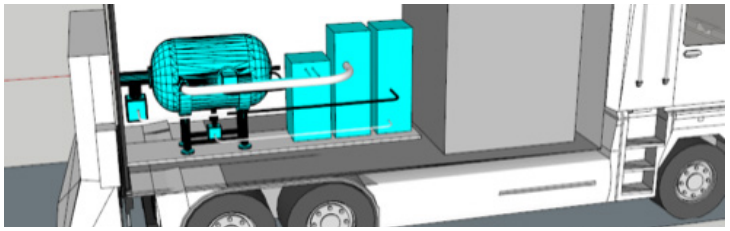


E-beam curable coatings

- Electron beams are used to polymerize a mixture of reactive monomers, colorants, surfactants and other additives.
- Products include floor coverings, tape, barrier layers for packaging, fiber optic coatings and sealants.
- Some examples of crosslinkable polymers are polyethylene, polyesters, polyamides, rubbers, neoprene, fluoroelastomers and many more.
- Commercial electron beams can deliver curing energy up to 200 microns (8 mils) beneath the surface of a coating layer.
- The ability to penetrate the surface in this manner enables a full thorough cure for very thick coating layers and can deliver good substrate adhesion and a high-performance surface finish.

Fermilab improvements over existing E-beam tech

- Superconducting technology increases energy efficiency by 50% and decreases overall OpEx costs by 30%.
- Increased device power enables a high throughput rate.
- New cooling approach reduces size from a three-story building to a compact and portable skid-mounted unit.
- The compact E-beam accelerator being developed at Fermilab will allow for curing of thicker coatings.



Current opportunity

- Proof of principle work in Fermilab's applications development and demonstration E-beam accelerator (A2D2), potentially using simulants.
- Modeling shielding requirements for a high-powered E-beam and projecting the associated costs.
- Modeling and designing E-beam/target interaction area.
- Calculating the operational power and expense needed to meet the objective and comparing to alternative benchmarks.
- Investigating overall E-beam footprint and capital costs.
- Building a field demonstration unit. Low power unit already being constructed.

For more information contact

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