Industrial Applications of Electron Beam

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Industrial Applications of Electron Beam

- Cross-linking
  - EB Irradiated Wires and Cables
  - EB Irradiated Components for Tire
  - PE Foam
- Radical Polymerization
- Graft Polymerization
- Others
  - Semiconductor Device
  - Sterilization

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EB Irradiated Wires and Cables

Purpose

- Cross-linking of Wire insulator

Applications

- Automotive wire harness
- Audio/Video Products

Advantages of EB cross-linking

- High Productivity
- Simple composition & saving material
- Easy Control

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EB Irradiated Components for Tire

Purpose

- Partial cross-linking

Components

- Inner liner
- Carcass ply

Advantages

- To save rubber material

→ ***Reducing manufacturing cost***

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PE Foam

Purpose

- Cross-linking

Applications

- Interior of automotive products
- Sporting goods
- Heat insulation

Advantages of EB cross-linking

- Different process cross-linking and foam
- High productivity
- Simple composition
- Easy controlled by beam current

Application of Radical Polymerization

Purpose

- Surface treatment

Applications

- Floppy disk/magnetic tape

Advantages of EB process

- Instantaneous process
  → *Reduce aging time*
- No solvent requirement
  → *Environment advantage*
- No color limitation
- Low temperature rise

Application of Graft Polymerization

- Separator of battery
- Anti-fog film

Electron Beam
Useful Tool for Medical products

1) Sterilization

Medical Disposables;

Syringes (Radiation Tolerant Polypropylene)

Surgical (Nylon) Suture

Clinical Test Instruments;

A Laboratory Dish

Non-Woven Textile

2) Heat Resistance Improvement

Blood Bags

Plastic Tubes

(PVC ->Polyethylene=halogen-free and Heat Resistance)

3) Mechanical Property Improvement

Catheter

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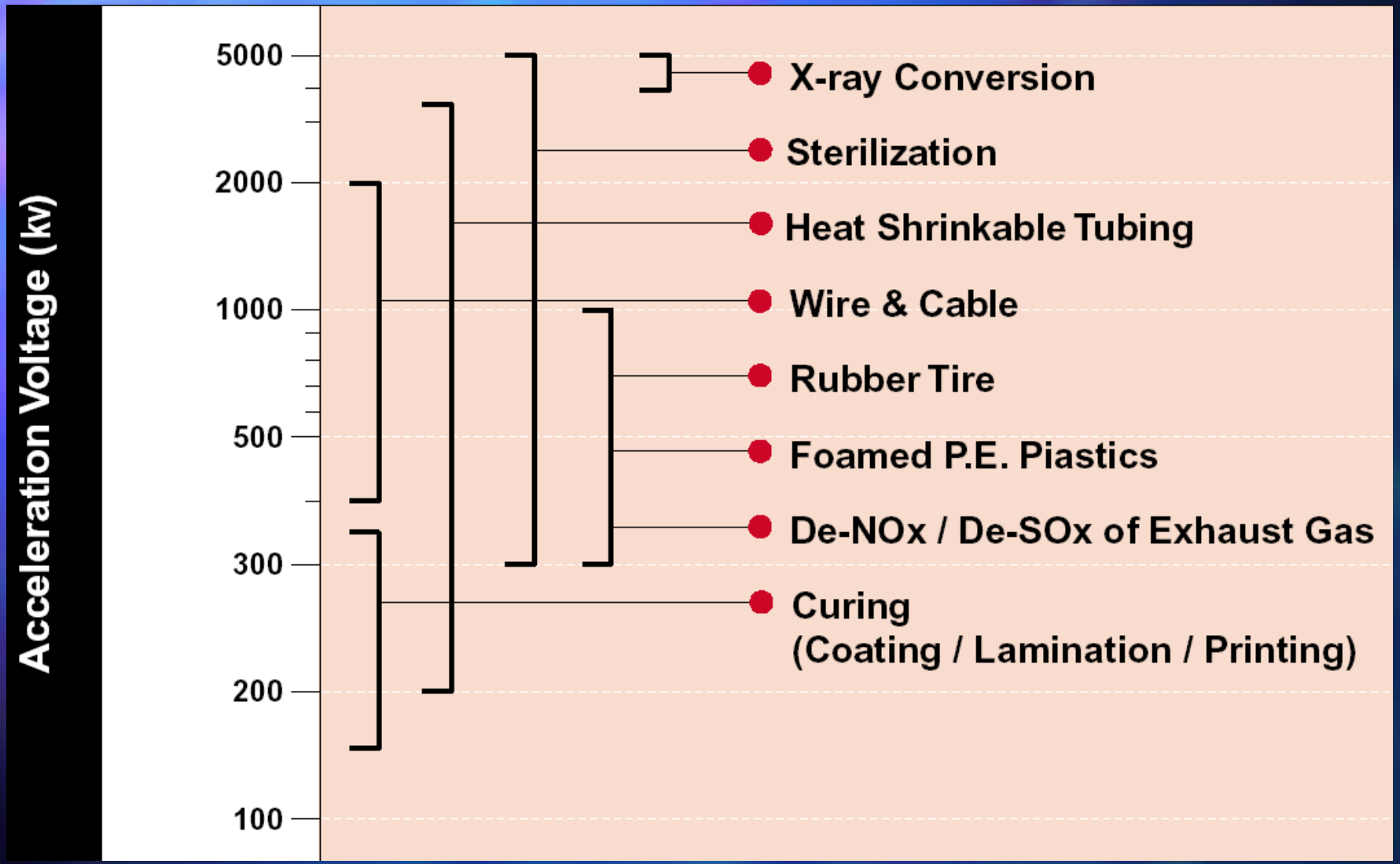
Feature of EPS

EPS has the following feature

- EB gives its energy directly to the irradiated material
- It is not necessary to mix third material such as catalyst for chemical reaction.
- EPS has very large capacity for irradiation process.
- Easy operation (Start/Stop)
- Easy maintenance

Acceleration Voltage v.s. Application



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Electron Accelerators in the Industrial Fields

- High power, high reliability, compactness and low cost are key requirements.
- Accelerators available at this time
  - Electrostatic accelerator
    - Demerit: big size
  - Linear accelerator
    - Demerit: low power, low power efficiency
  - Re-circulating accelerator
    - Demerit: high cost

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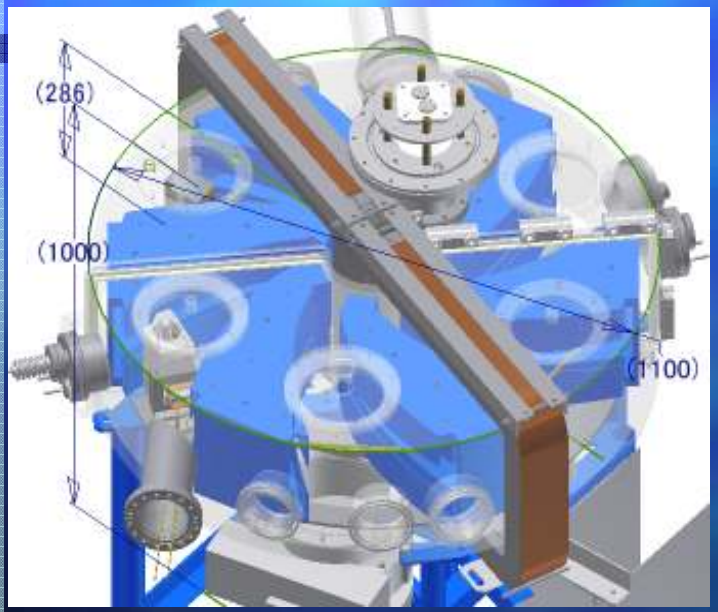
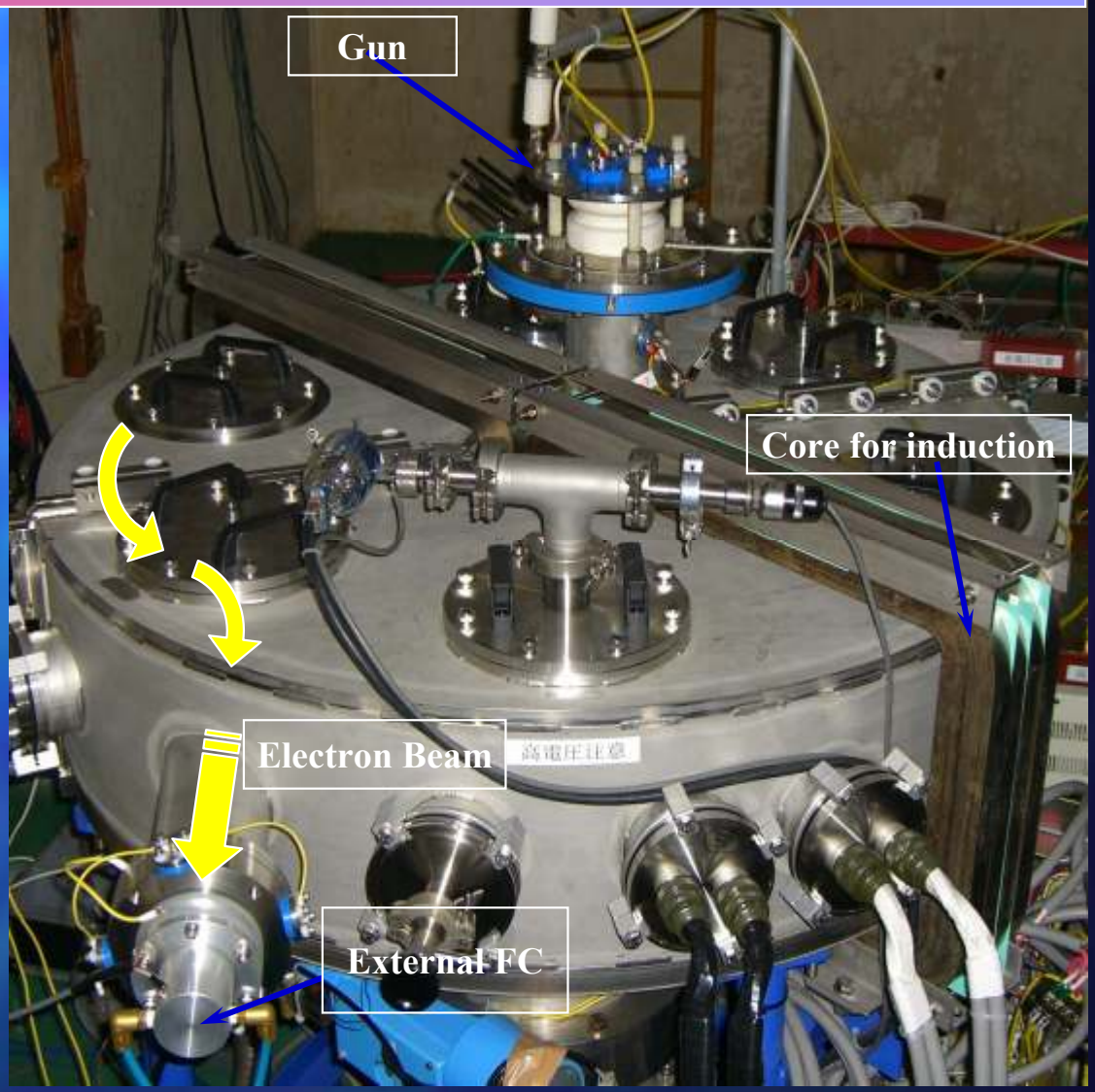
500keV Electron FFAG

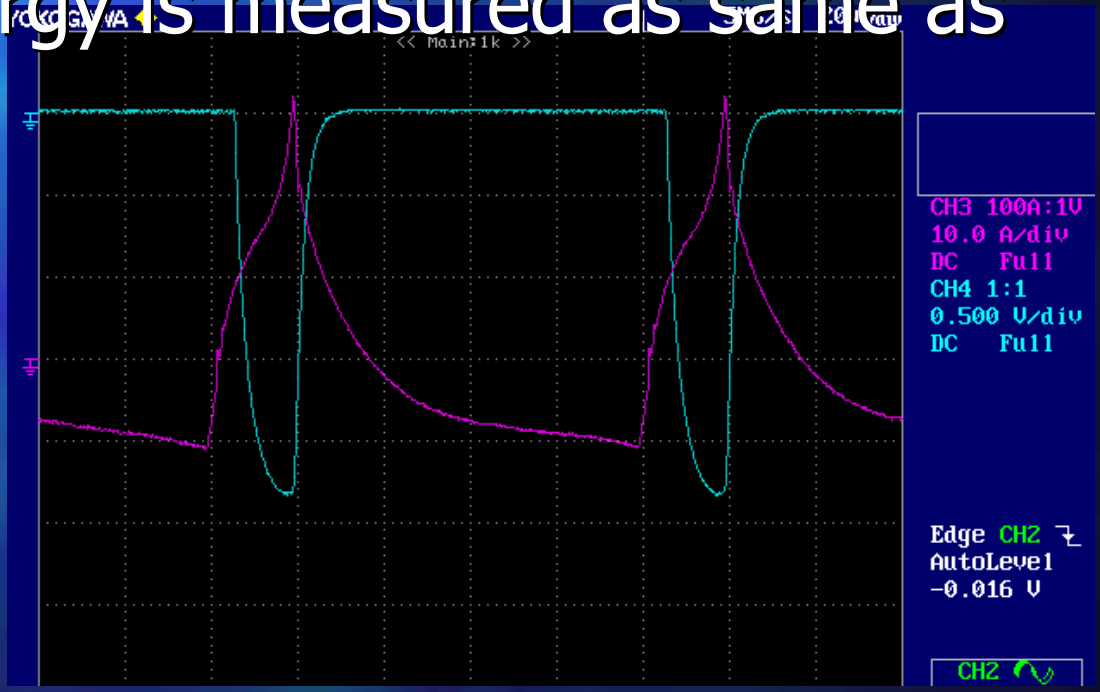
Energy	250-500keV
Acceleration frequency	10kHz (Induction)
Beam Power	10kW
Outer diameter	1.1m





Beam extracted from 500keV Electron FFAG

- Accelerator assembling is completed.
- Beam injection and acceleration are successful.
- 90% of the beam is extracted form FFAG ring.
- Extracted beam energy is measured as same as the specified energy.



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