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Is Technology the route to a more sustainable future?

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IFE Manufacturing

IFE Manufacturing
21-23 March 2022 | ExCeL London

Manufacturing pressures

Technology trends

- Industrial Decarbonisation Strategy (March 2021) and 2050 Net 0.

- Equipment manufacturers are moving production of equipment in the future to electric

Pulsed Electric Fields

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PEF is a process of Electroporation (holes in cells) which can utilise low energy and offer a broad range of applications for the food and drink sectors

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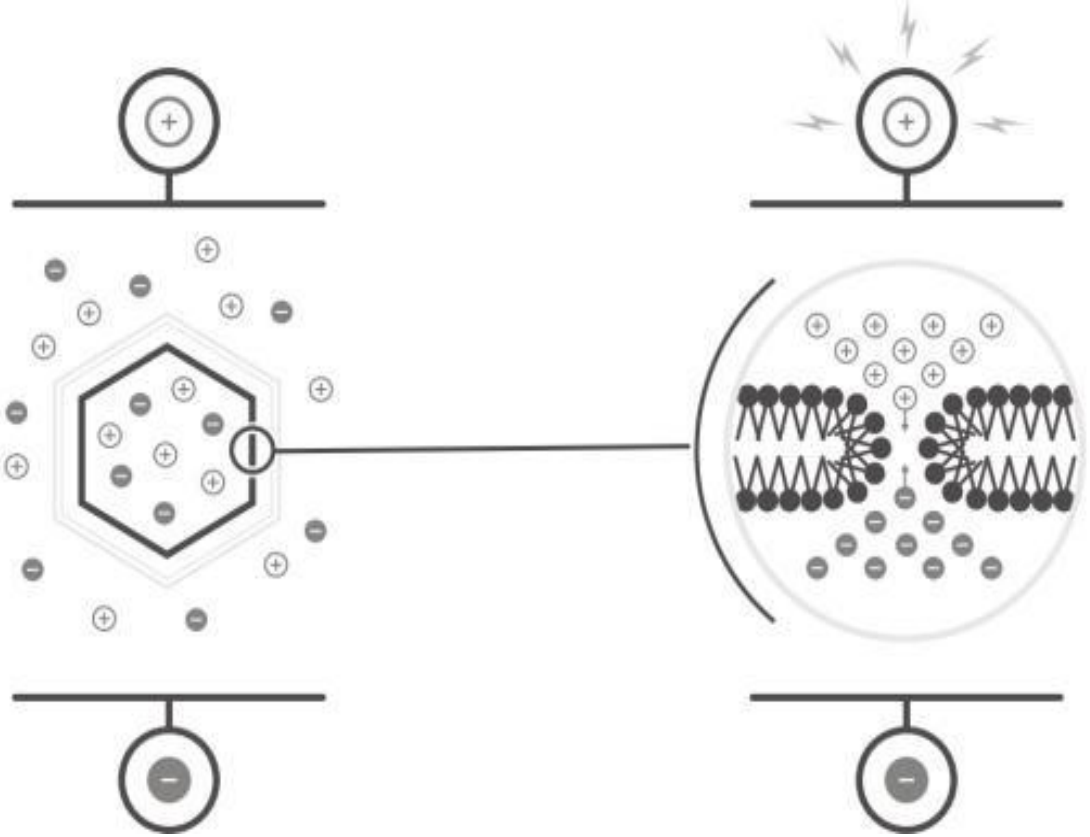
PEF Mechanism

- Cells natural ion gradients become disrupted when aligning with the field
- Polarisation of the ions leads to pore formation



PEF applications

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0,1 kJ/kg	stress response	biotechnology, medicine
1,0 kJ/kg	cell electroporation	solids, fruits, roots,
3-10 kJ/kg	cell permeabilisation	extraction, meat
90 kJ/kg	cell inactivation	liquids, juices, smoothies, dairy
150 kJ/kg	cell disintegration	sludge





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Plant tissue processing benefits

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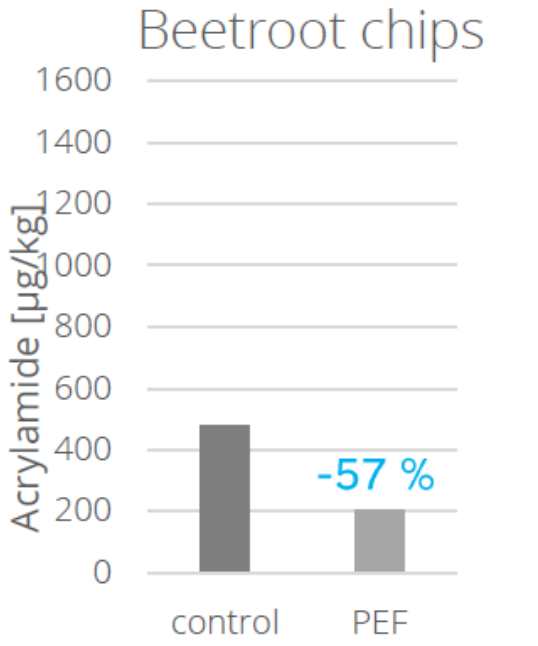
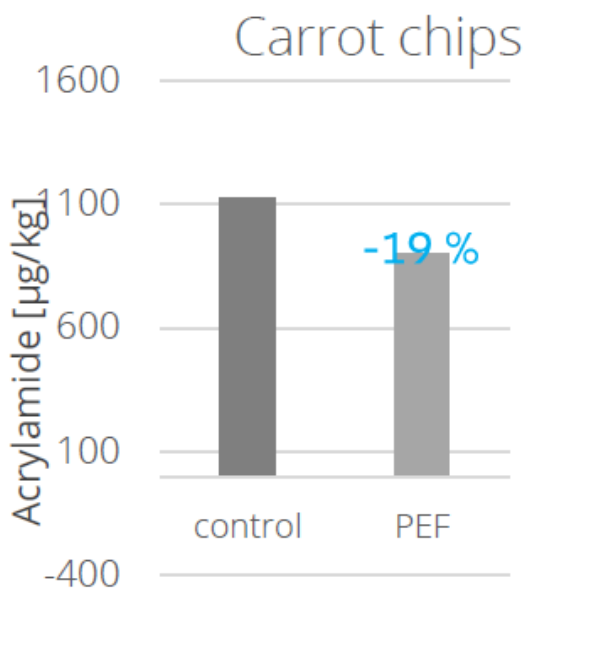
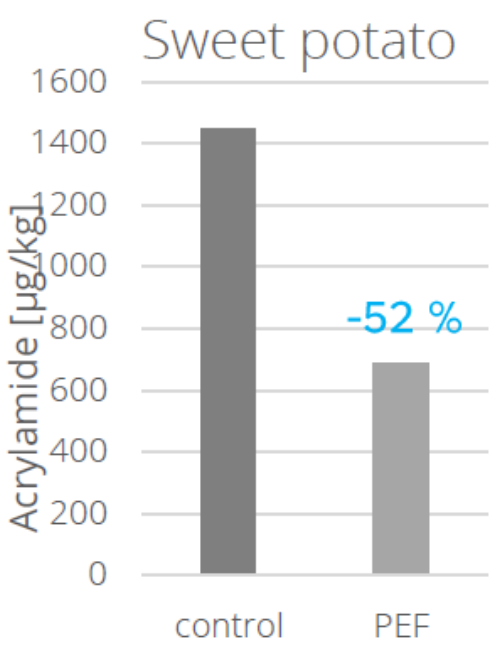
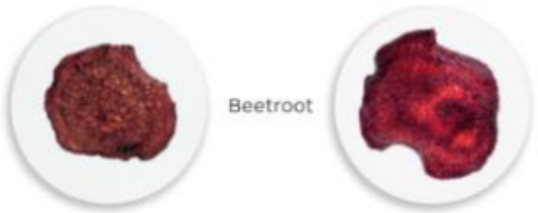
Snack applications

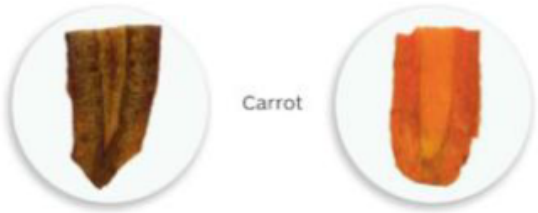
- PEF treated raw materials are stronger, longer, much more flexible, easier and cheaper to process.

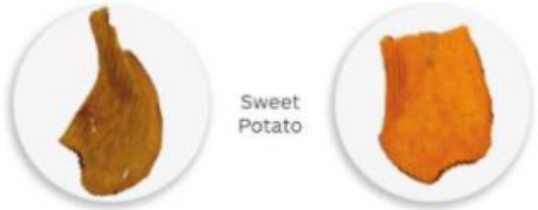












Significant acrylamide reductions in PEF treated veggie chips

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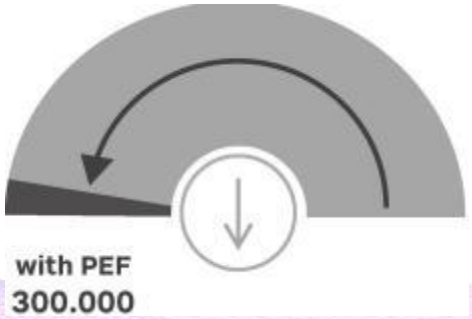
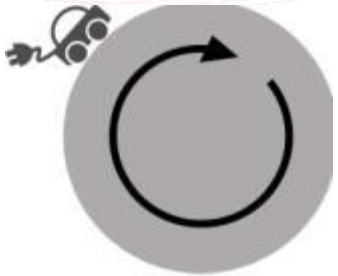
Energy consumption

11,206,000
kWh/year



10,906,000
kWh/year

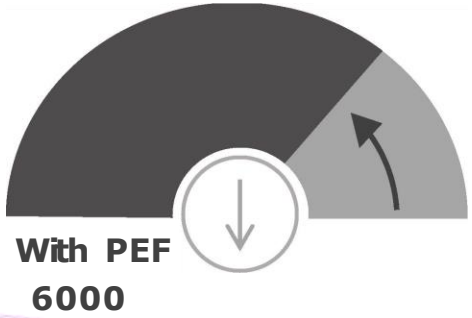
Energy saved
to drive around the globe with an electric car 1363 times



X 1363

Water usage

8400
m^3/year



-2400
m^3/year

Water saved
to fill 17,143 bathtubs

X 17,143

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Example:

26 t/h raw material French fries line, 7,700 production hours per year

- Food Data Group, German Institute of Food Dr. Sergiy Smetana | DIL e.V

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Oil usage

5244 t/year

with PEF 4876

-368 t/year

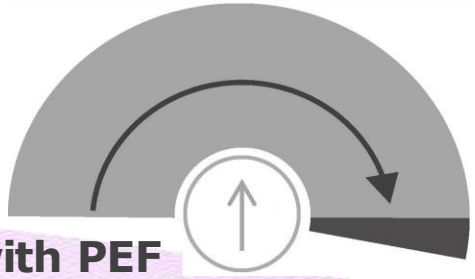
Oil saved

equivalent to 376 football field sized rape seed fields

X 376

Yield increase

26,000 t /year

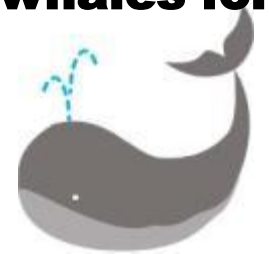


with PEF 26,260

+260 t /year

Yield increase

equivalent to feed 33 blue whales for one year



X 33

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PEF helps manufacturers to save money, resources and the environment

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UVC processing

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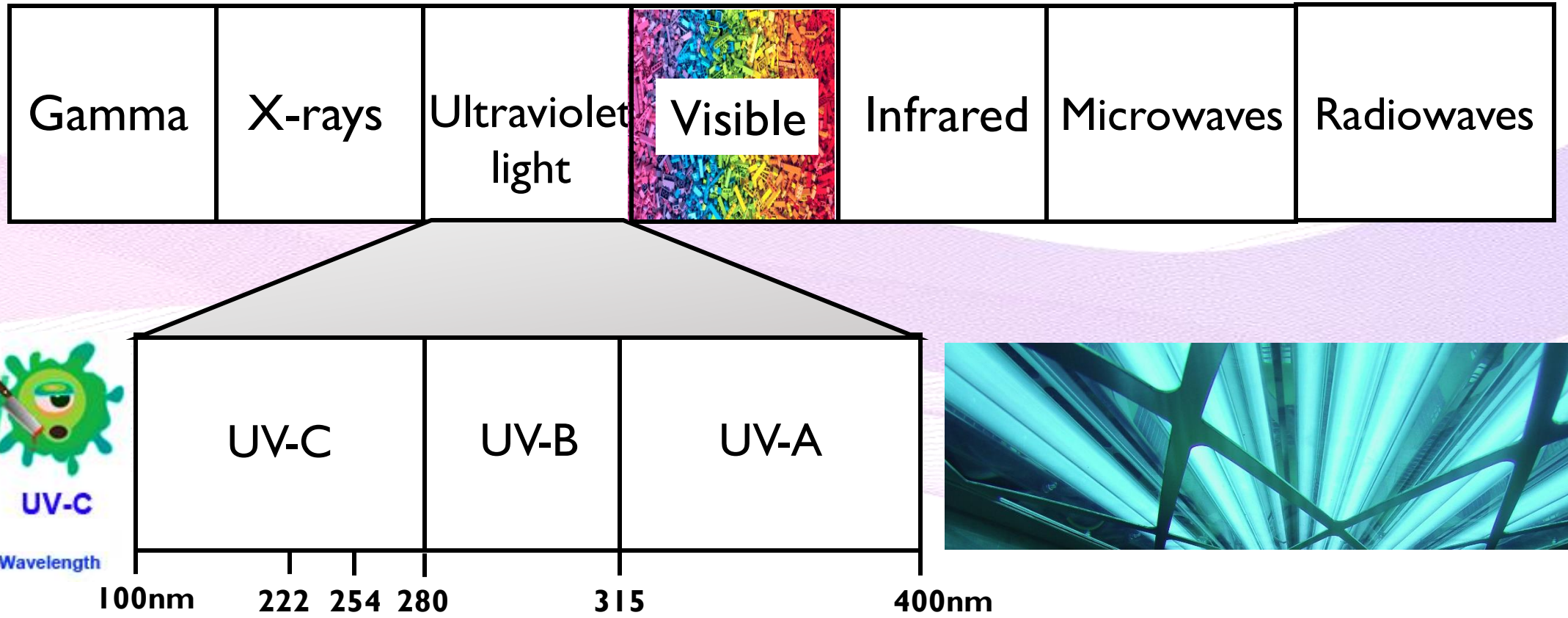

UV-C transfer systems

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Images courtesy of Steve O'Brien UV Technology Ltd

UV-C transfer systems

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Conveyor transfer system

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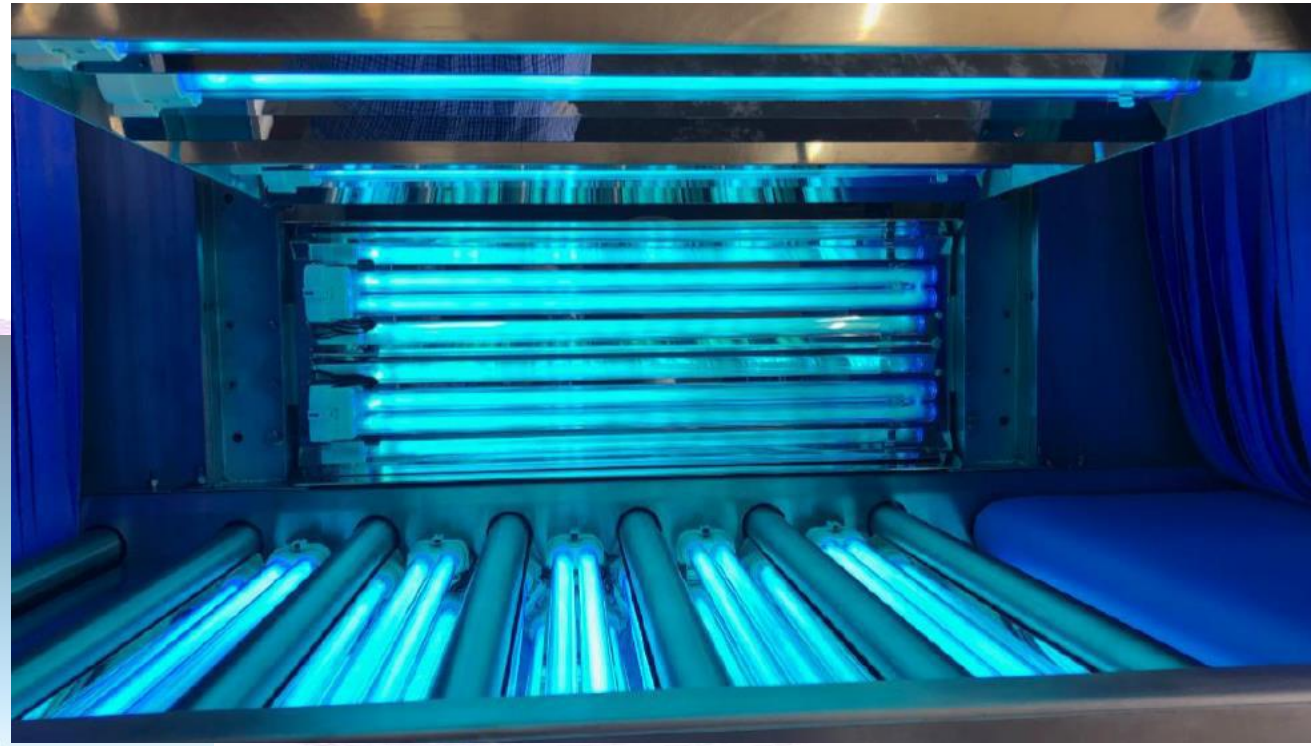
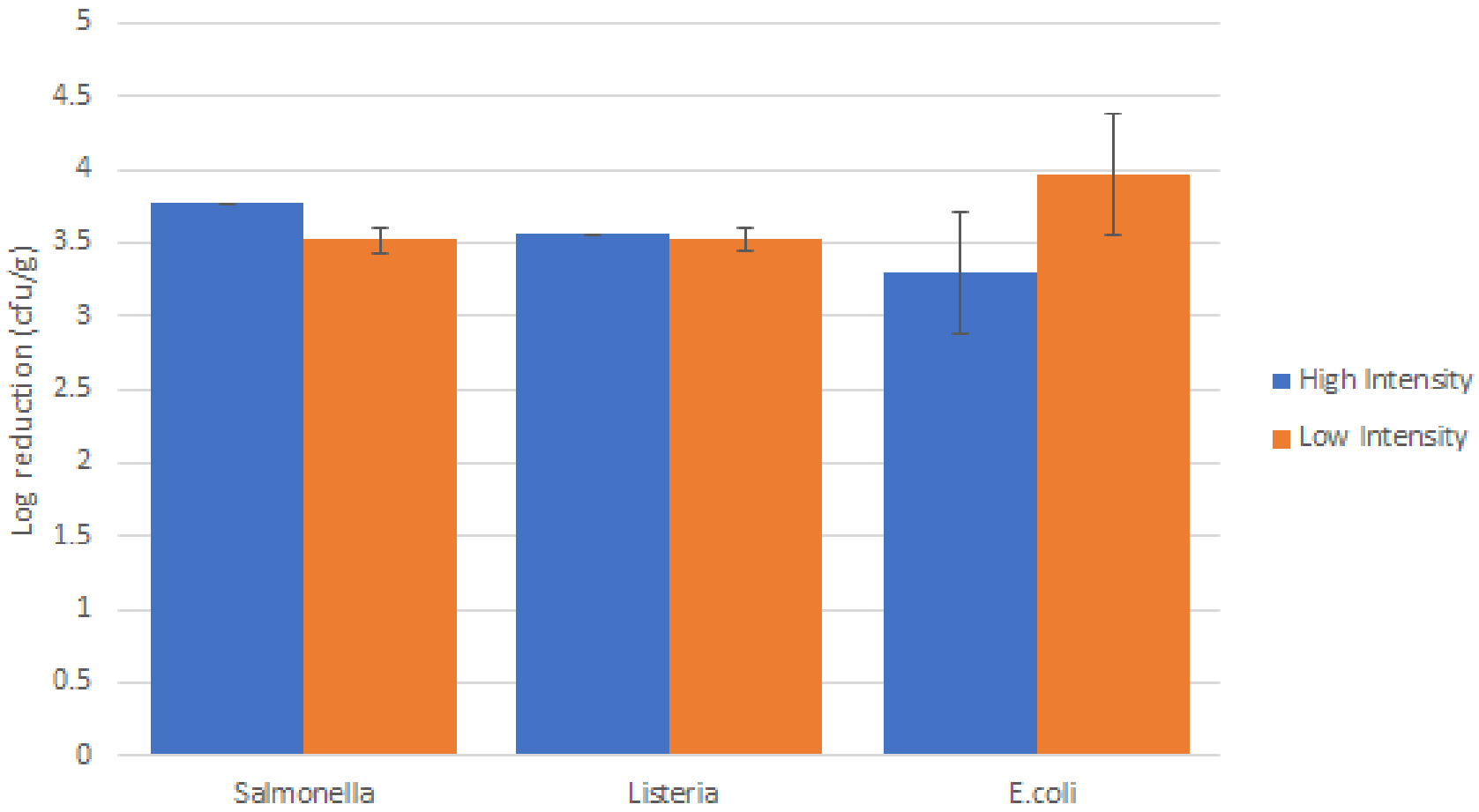


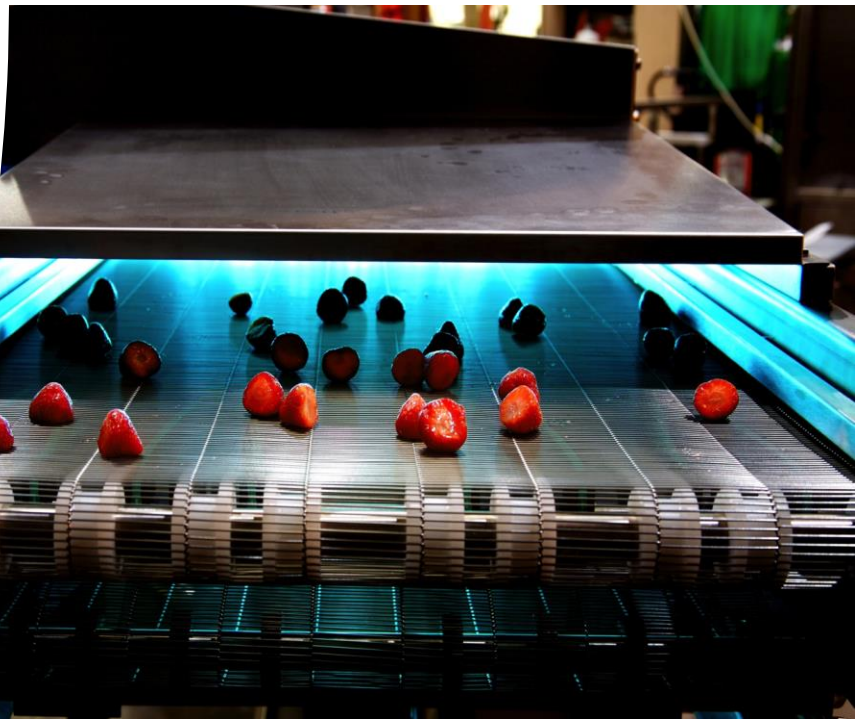
Images courtesy of Richard Little Jenton Group

UVC packaging decontamination



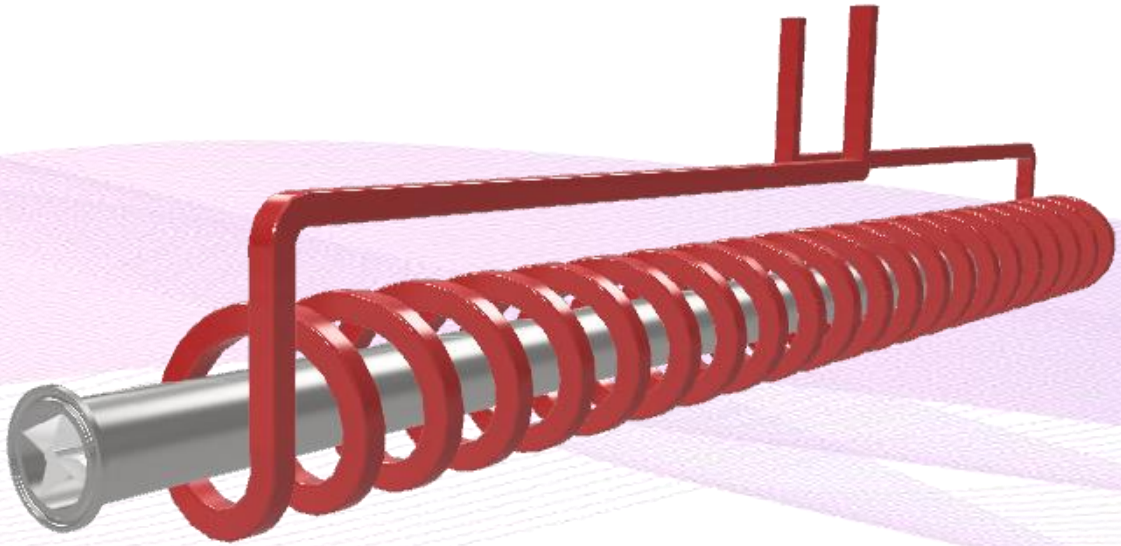
- Smooth surface log reductions with low UVC dosage
- No use of water or chemicals

Food Processing



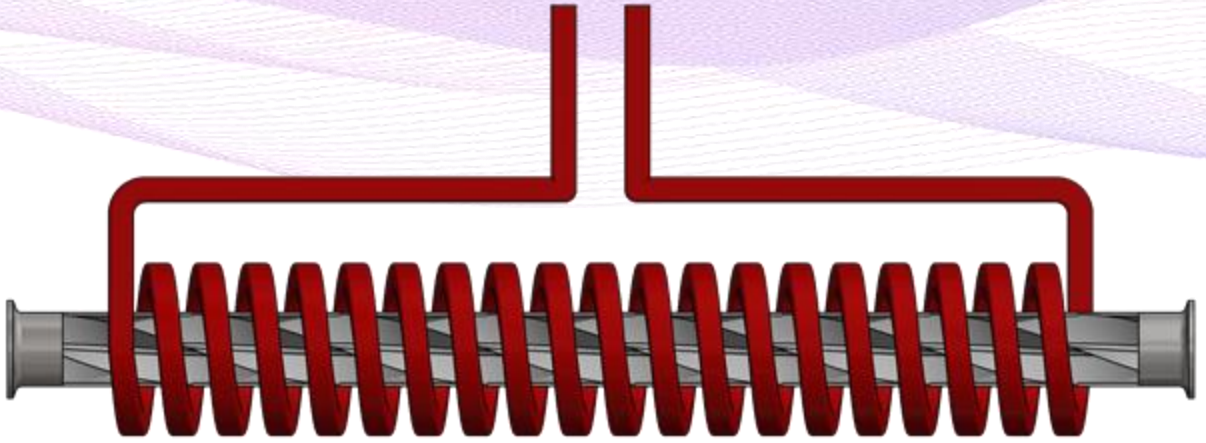
Images courtesy of Steve O'Brien UV Technology Ltd

Induction heating



Direct heating of liquids with a hot surface controlled through induction

Middle out heating



Induction heating

Images courtesy of IFS

Applications:

- Pasteurisation/sterilisation
- Kettle heating
- CIP
- Trim heating

Benefits

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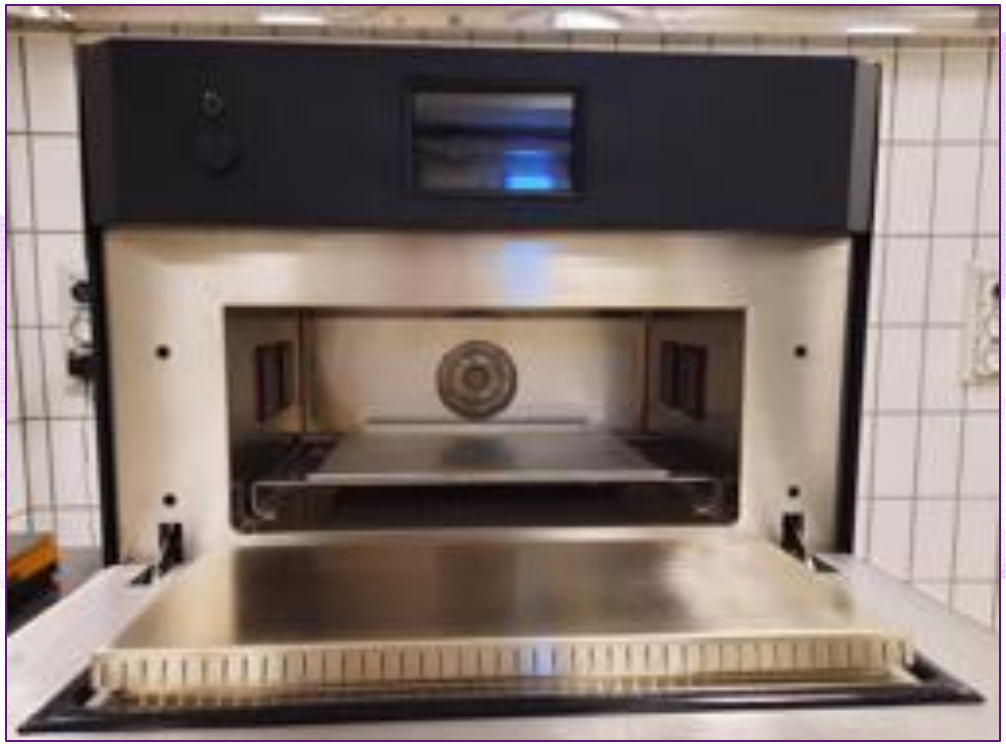
- All electric
- Rapid response time (heat up and fluctuations)
- Tighter temperature control (+/- 0.3°C)
- Smaller heating zone (reduced space and waste less product)
- Improved energy efficiencies (85-90%)
- Increased heat transfer coefficients
- Reduced Fouling

Technology developments

Solid state microwave technology with frequency and phase shifting with multiple horns to produce more uniform heating and:

- Feedback loops to reduce energy input
- Program algorithms to optimise product specific heating for optimised safety and quality



Future Technology – UVC LEDs and Far UV

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LEDs

LEDs making strides into the UVC world. Efficiencies, energy outputs, and lamp life are improving.
Current applications are in end consumer applications but the tech is closing in on industrial applications

Far UV

Far UV (222nm) KrCl excimer lamps
The light is absorbed by the dead skin cells and is said to not penetrate the outer skin layer or eyes.
Could open up new application opportunities on lines

Plasma Processing

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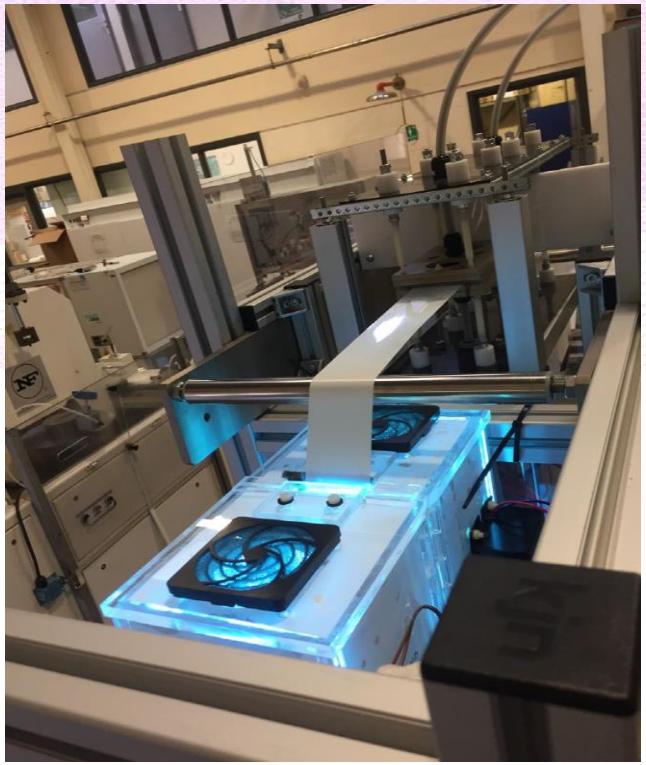
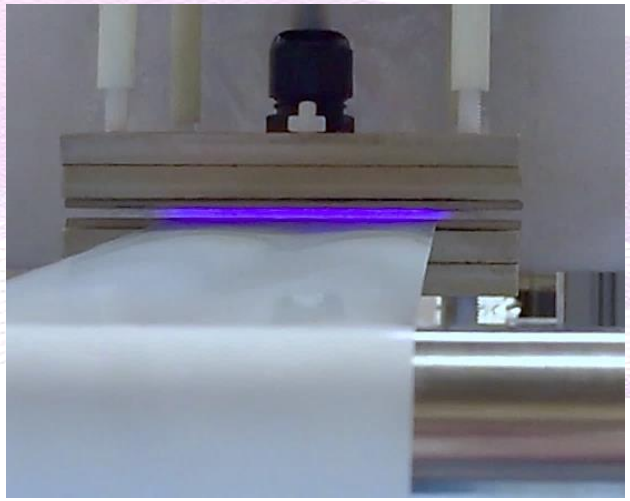
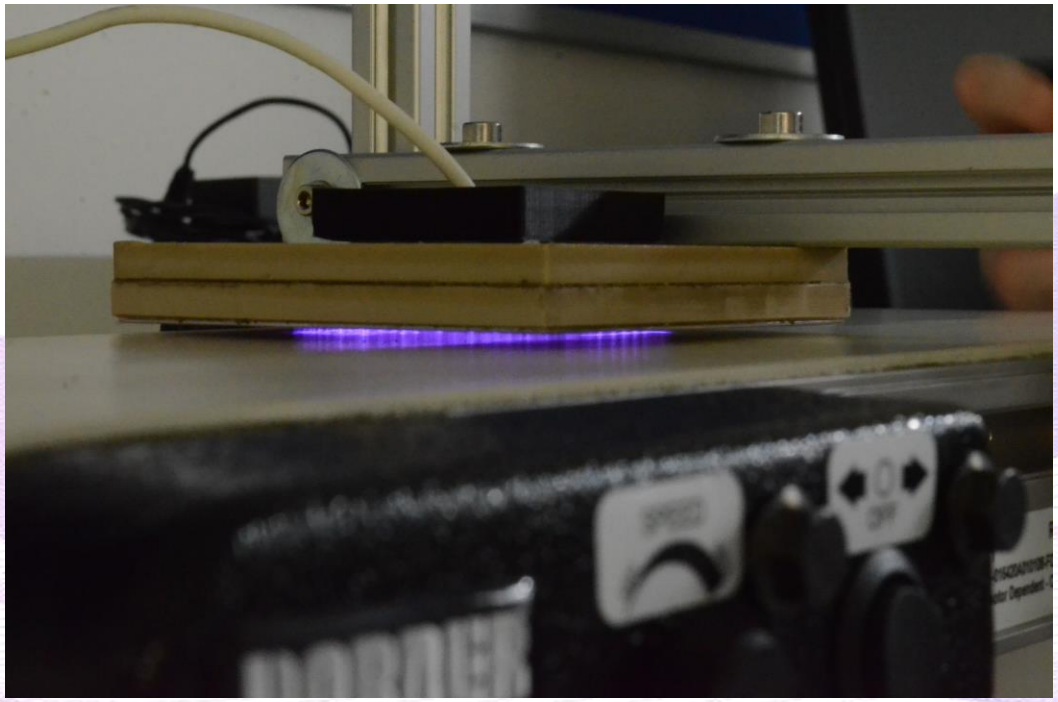
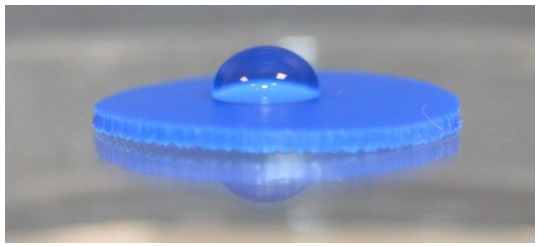
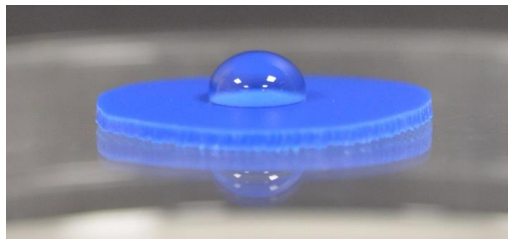
Innovate UK funded project to develop an aseptic packaging machine using plasma for packaging sterilisation











Continuous plasma decontamination

Summary

- Equipment manufacturers moving to electrified technology
- A range of emerging and emerged technologies are available to offer companies food processing benefits whilst also improving sustainability
- Future technologies will also allow further improvements

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Thanks you for Listening

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