



FRY THE PERFECT FRENCH FRY WITH PEF
**HIGHER YIELD, LESS BREAKAGE,
SMOOTHER CUT, LONGER FRIES,
BETTER COLOUR, REDUCED
OIL UPTAKE AND NEW
PRODUCT OPPORTUNITIES**

www.elea-technology.com



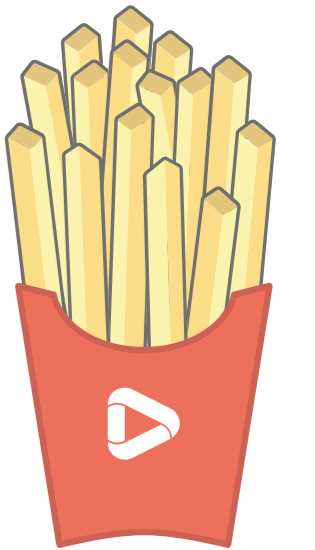
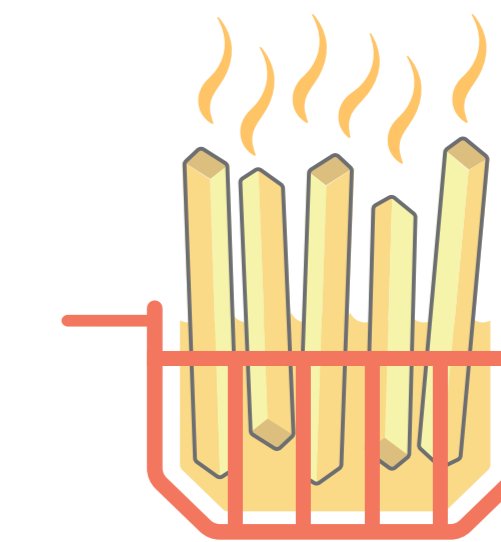
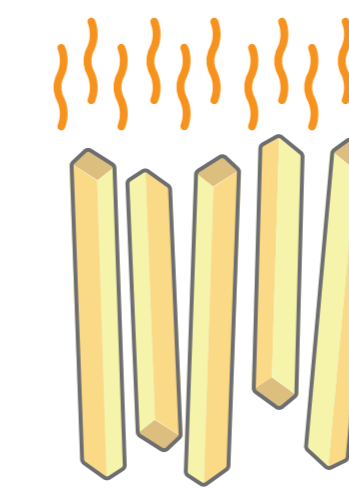
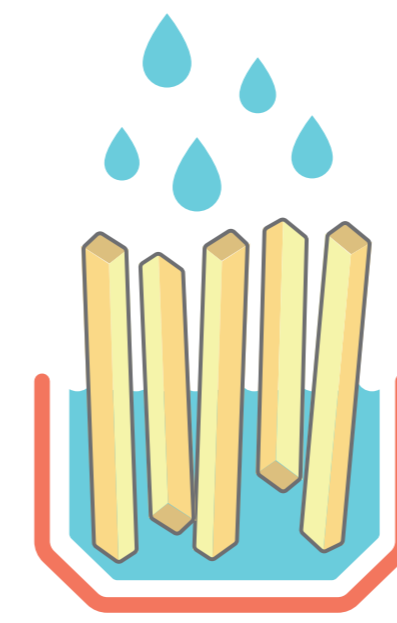
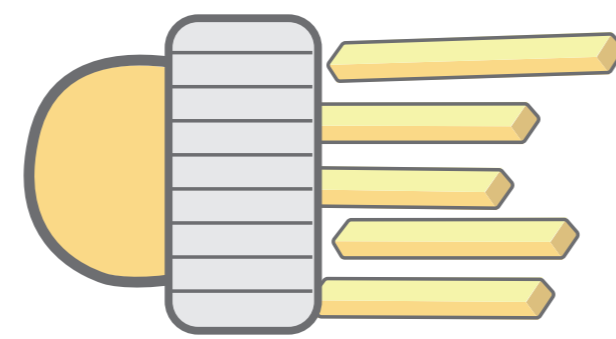
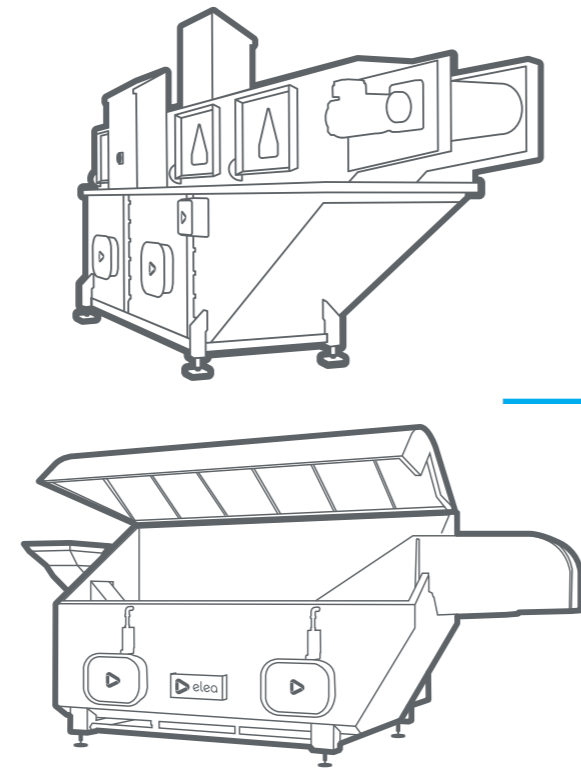
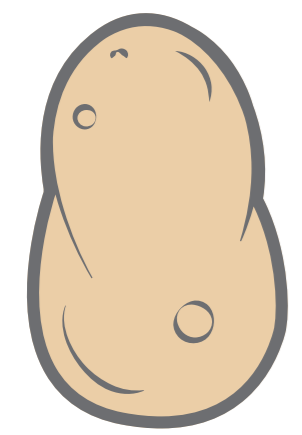
Enhance production, improve quality, save energy, easier cutting, better colour

Elea PEF Advantage Belt systems increase value, enhance production and improve quality

Fast treatment, energy & water savings, 24/7 reliable operation

Easier cutting, enhanced frying control and increased capacity

Reduced browning, better colour and improved flavour adhesion



Potato Selection

Peeling

Elea PEF Advantage

Cutting

Blanching

Drying

Frying

Better quality fries

PEF pre-treatment compensates for natural variations in the quality of the raw material, allowing new and normally more difficult to process varieties to be used in production.

The treatment has no influence on the peeling process of potatoes. Also the peel has no influence on the PEF treatment itself. This allows a constant process with peeled or unpeeled potatoes.

Ensuring a smooth and quick process, the belt transports the product through an electric field. The size of the raw material can vary, the treatment remains constant.

Easier cutting due to PEF softening provides greater yields, improved cut consistency and longer knife durability. Improved slicing also results in less waste and breakage.

A smooth cut reduces product losses and increases water exchange intervals. Blanching time is also reduced with PEF.

The PEF induced open-cell structure enhances mass transfer through the French fry and accelerates water removal during drying. Better water removal enables significant energy savings in the dryer and reduces moisture content going into the fryer, providing further energy savings.

A smoother surface results in less oil uptake. Increased water evaporation enables a lower frying temperature leading to reduced browning, improved colour and higher throughput.

PEF results in more significant quantities of longer French fries, with less breakage and a more uniform filling due to fewer air pockets. Colour is also improved with more uniform browning.

Average French fry length **58.9 mm**



Possible with PEF **3m 14cm & counting**



watch how we made this super long French fry

Structural modification, cutting improvement, new shapes and cuts

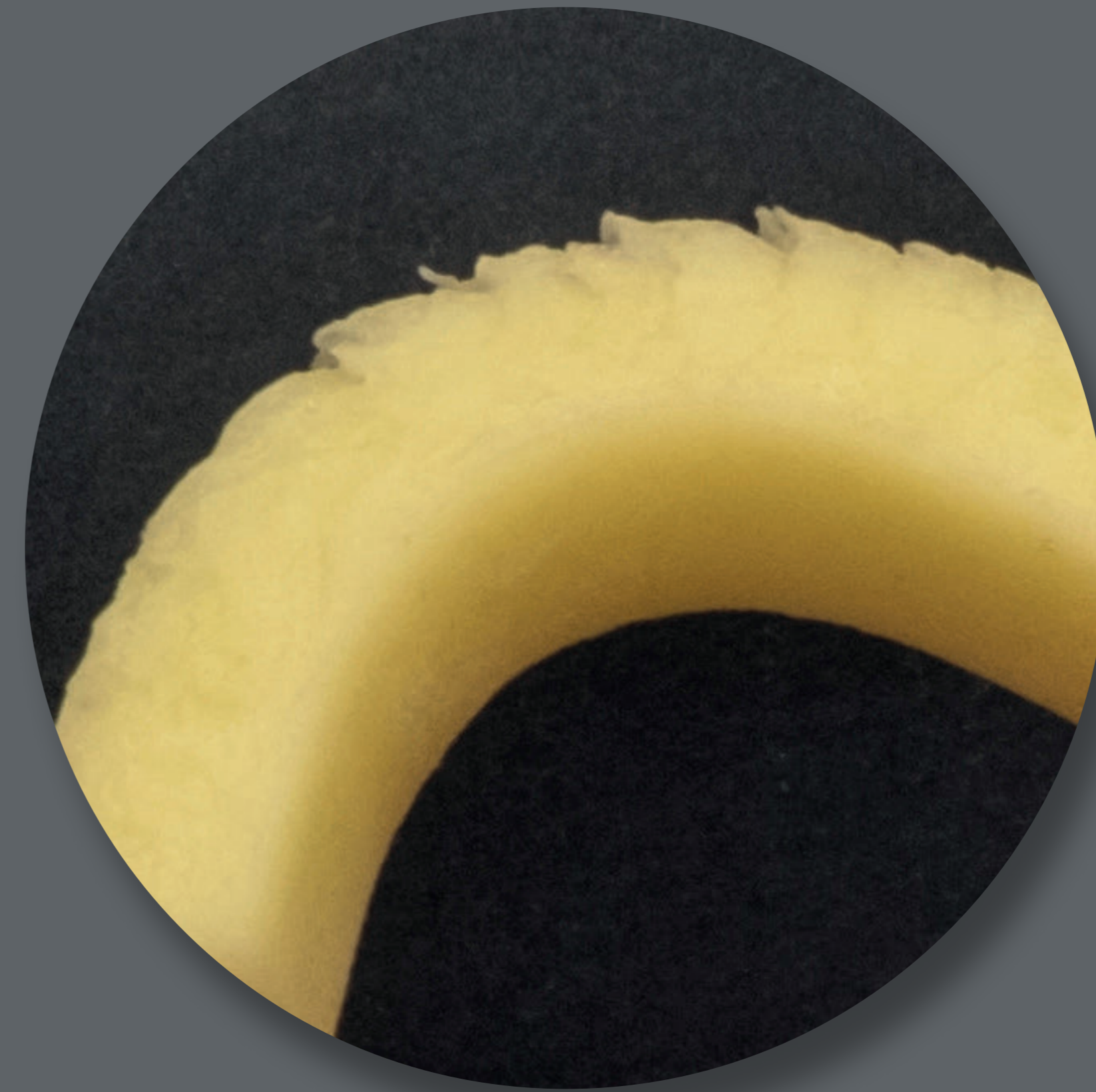


PEF treated raw materials are stronger, longer, much more flexible,
easier and cheaper to process.

Smother cuts and less feathering

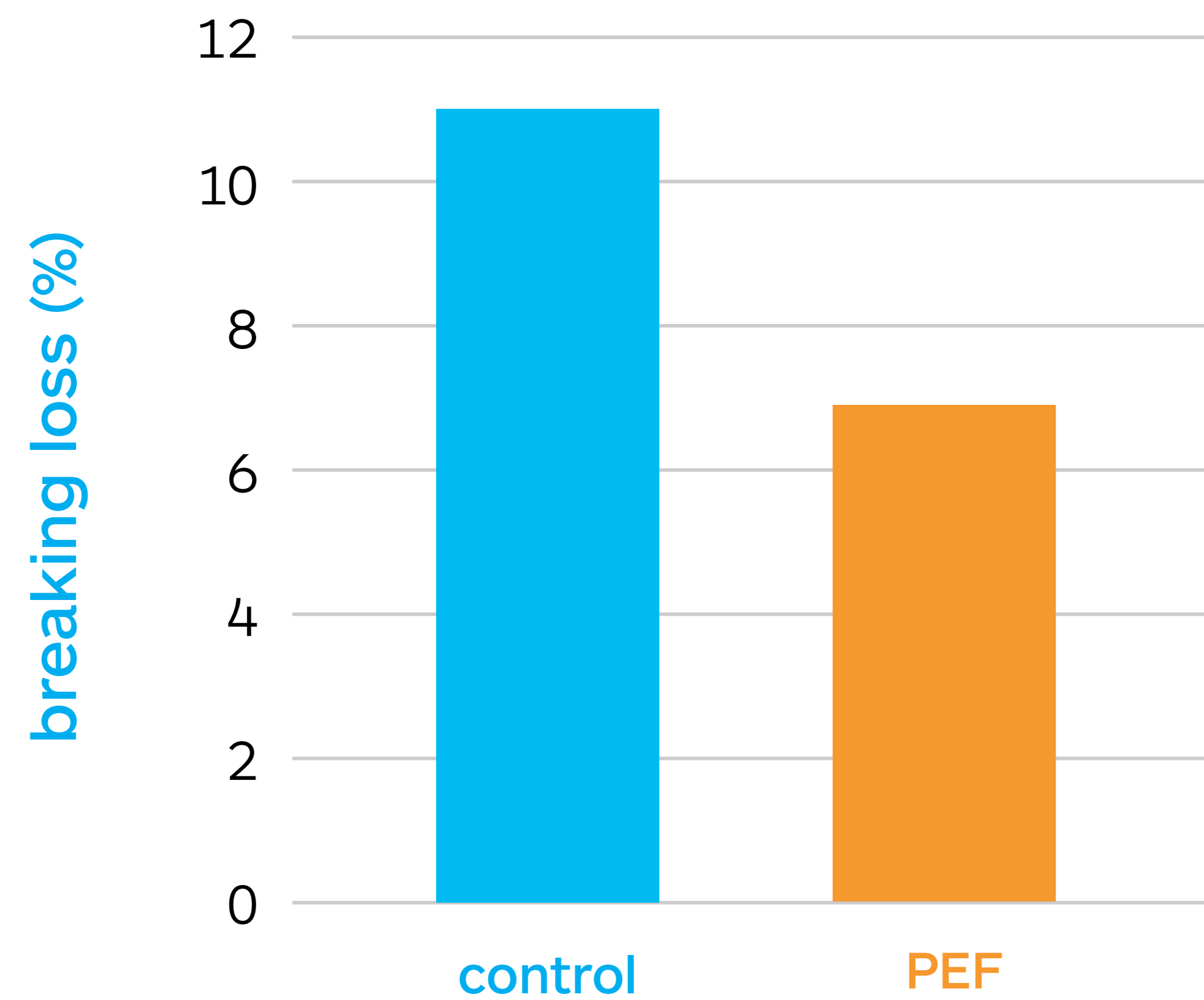


PEF treated potato



untreated potato

**Up to 50% reduction
in breaking losses**



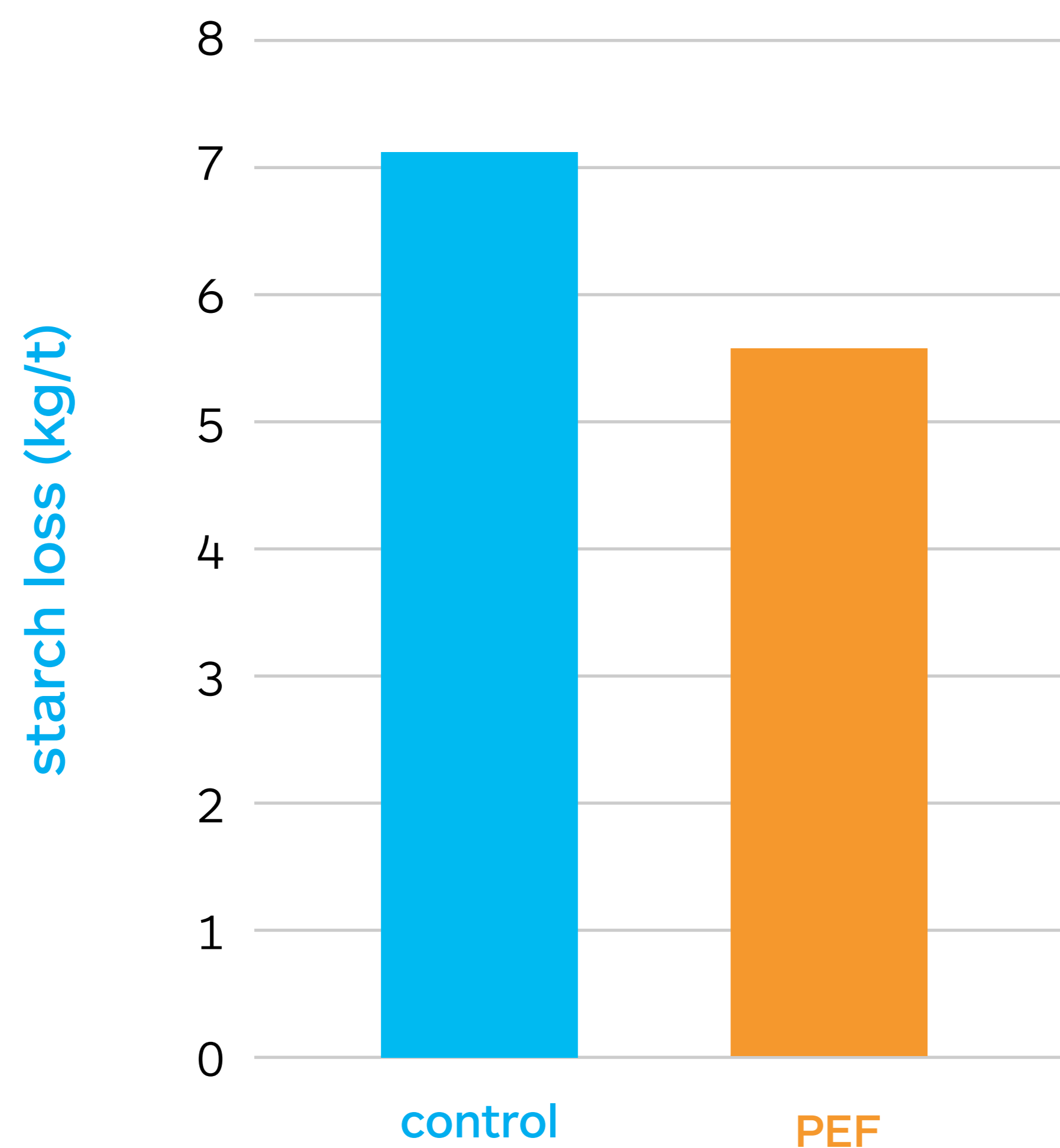
**No crust separation and an
overall better appearance.**



untreated

PEF

Reduced starch loss



Less starch leakage during washing, because fewer cells are mechanically damaged during cutting.

(Data from an 8 t/h final product line)

€71.400

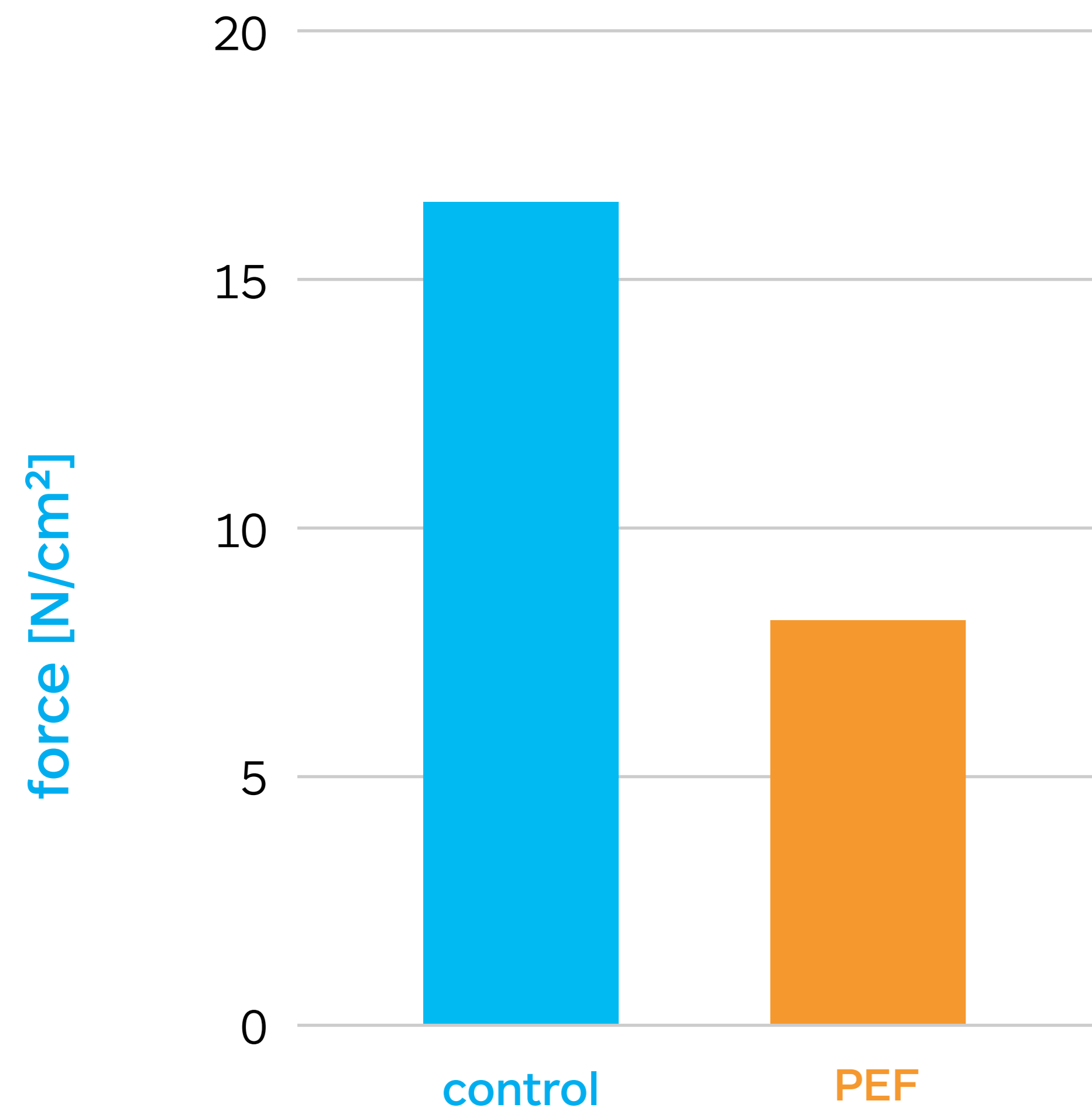
Value from more starch yield

50t/year

10kg/h

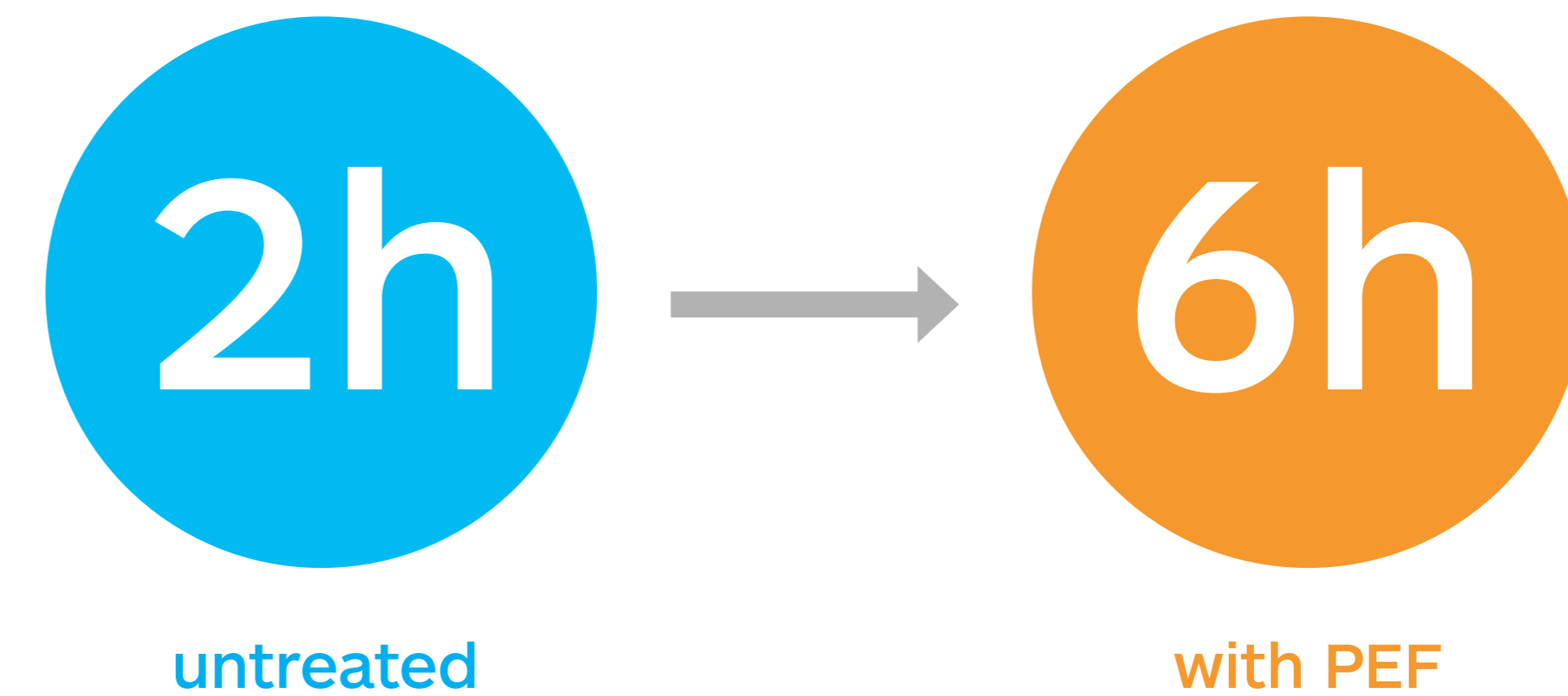
240kg/day

Cutting force reduction with PEF of up to 50%



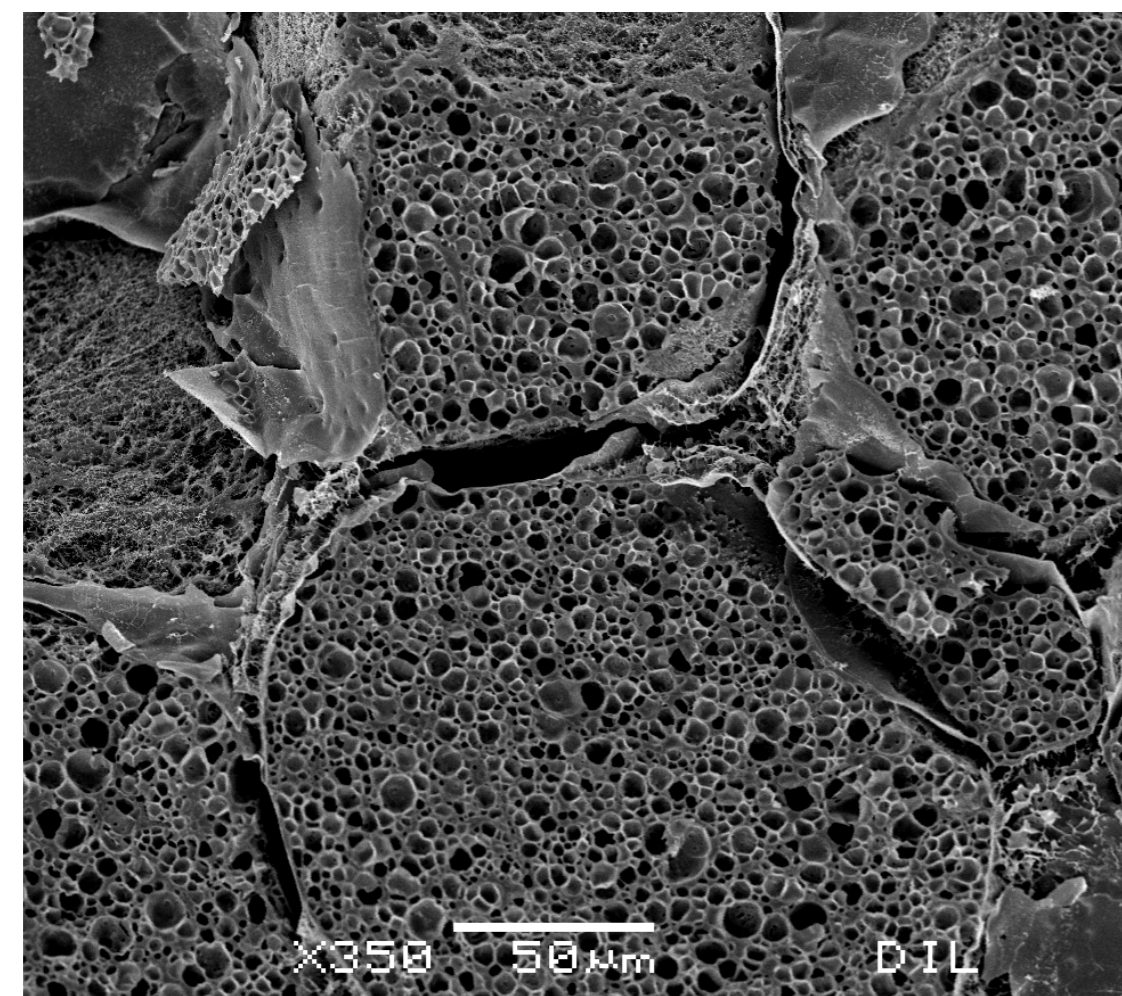
The PEF induced open cell structure and water release softens the raw material making cutting easier.

Longer knife durability.
Up to 60% less knives needed.

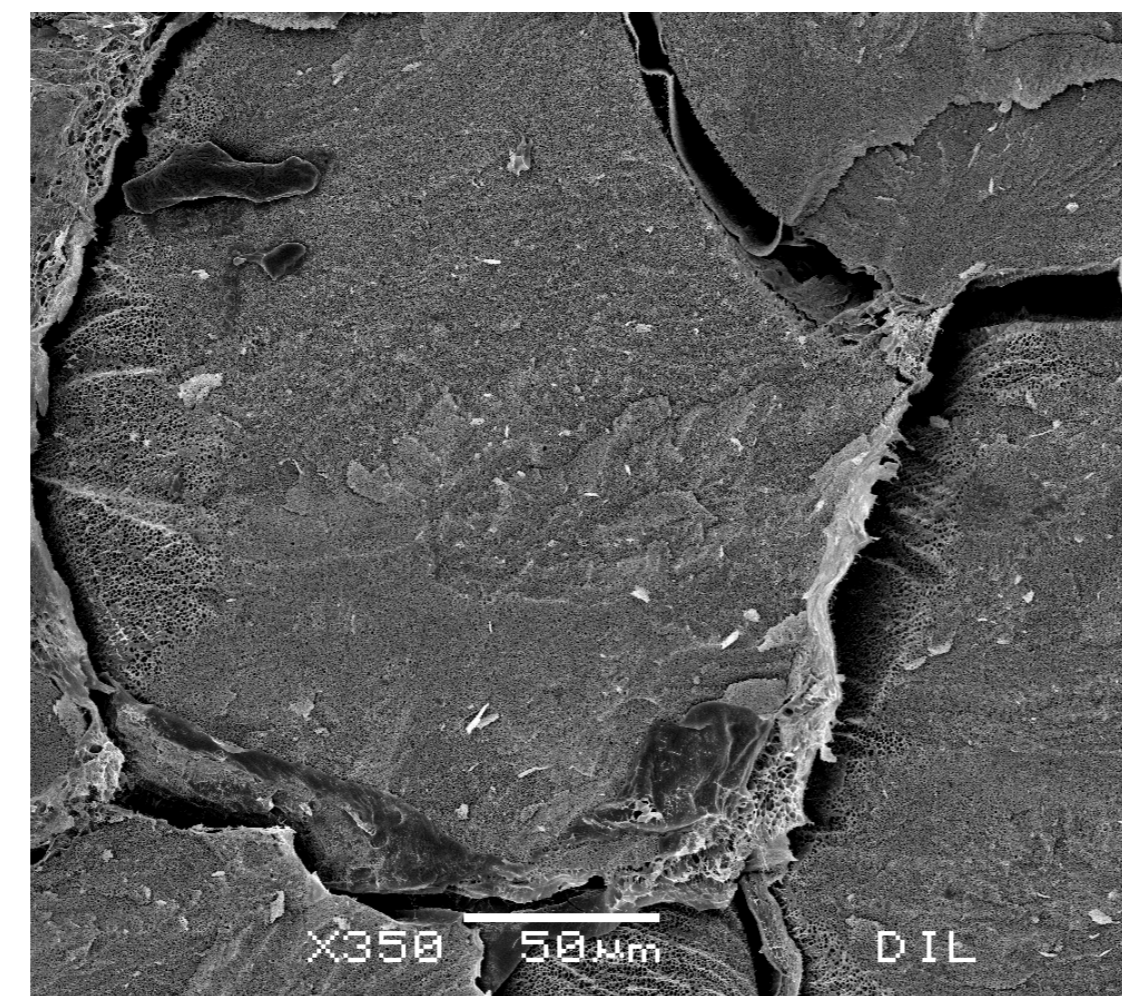


PEF softens the product making cutting easier. The effect is even more noticeable in harder products such as sweet potato, cassava, taro, etc.

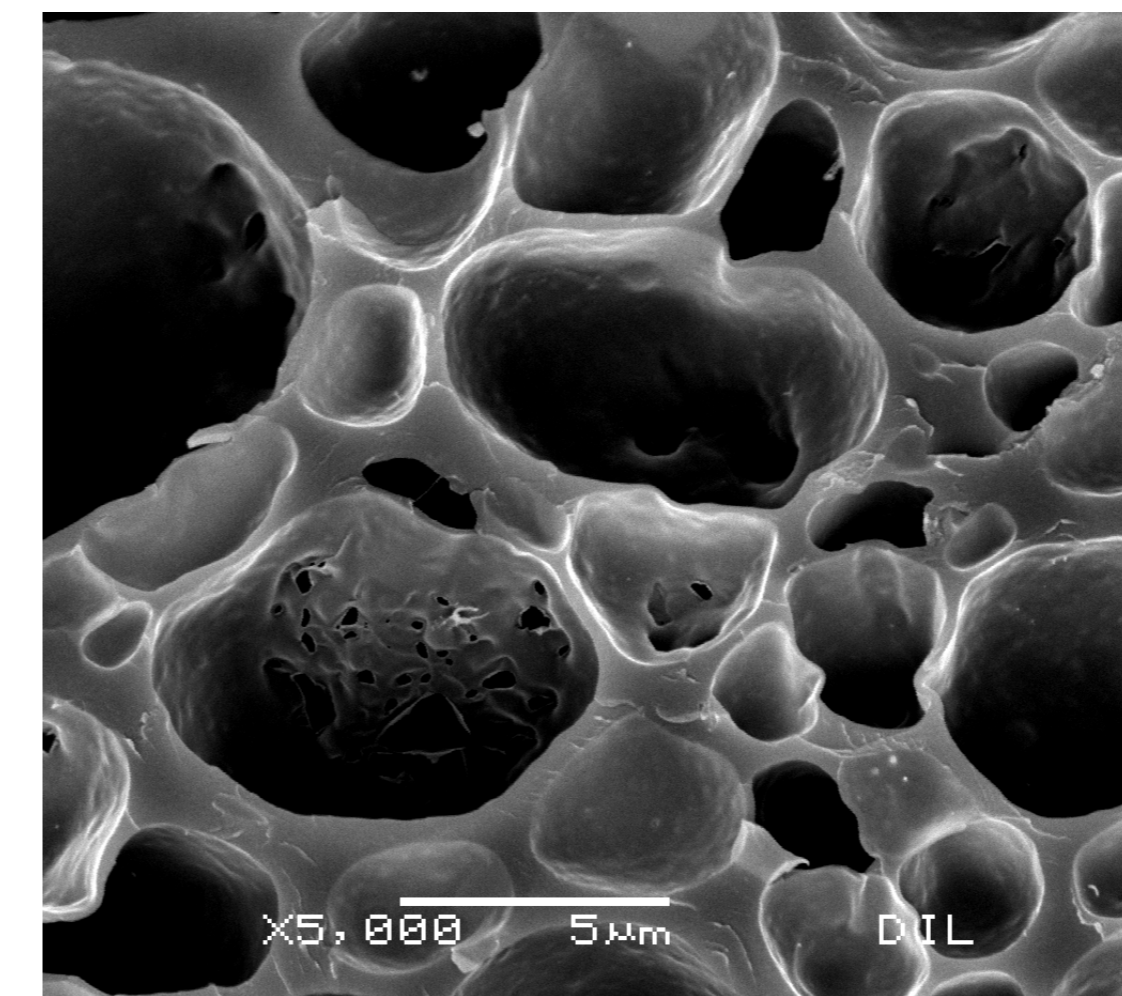
Improved cutting, smoother surface



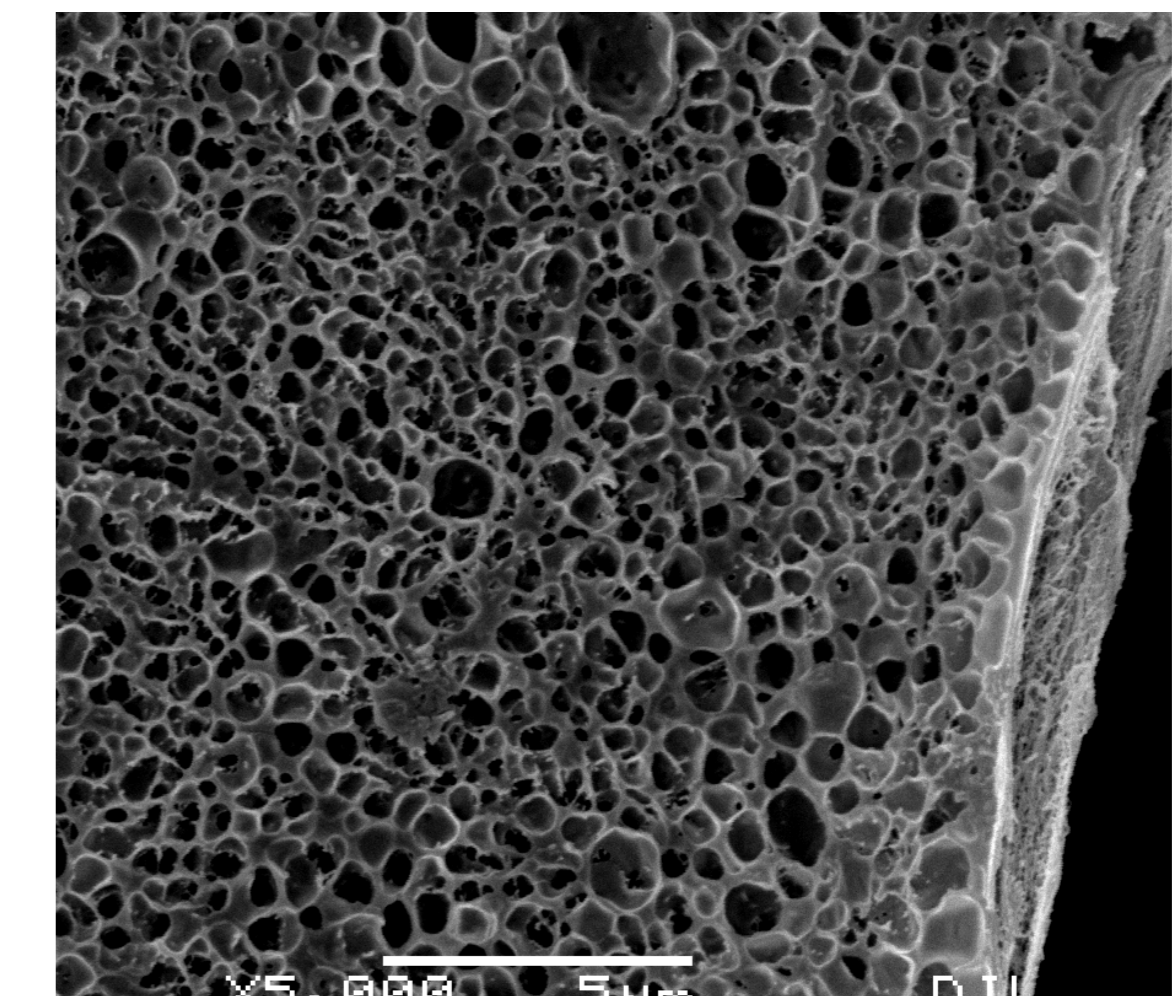
untreated



PEF



untreated

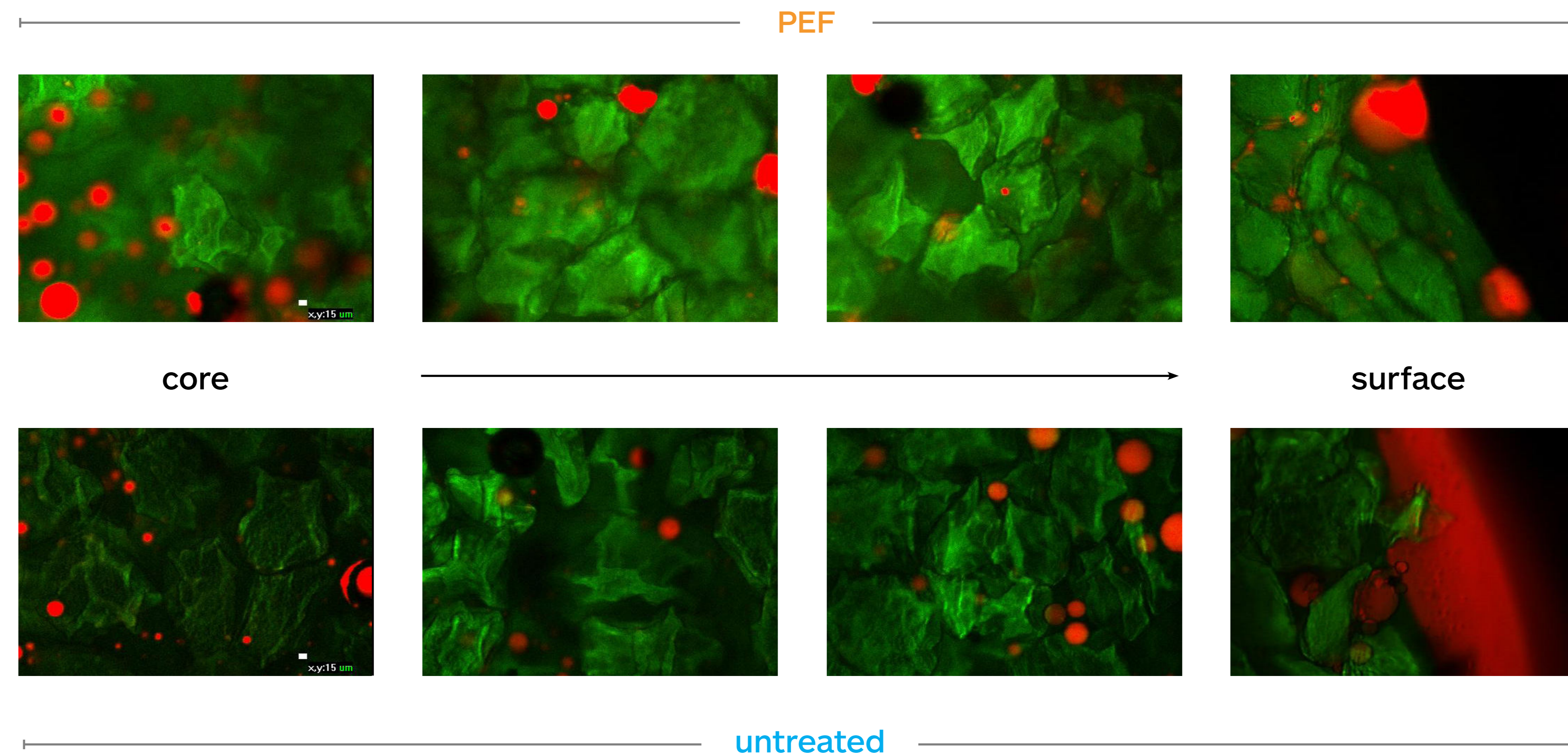


PEF

Scanning electron microscopy images of potato slices. Compared at equal magnification.

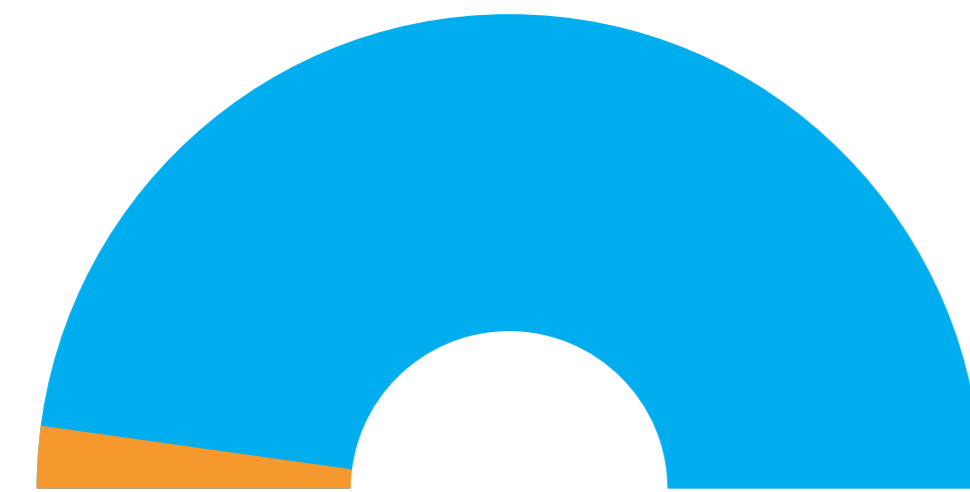
Reduced Oil Content

The smoother surface produced by PEF results in less oil uptake.
Confocal laser scanning pictures of a French fry.



Reduce energy, oil & water consumption whilst increasing yield.

Reduce energy



300,00 with PEF

11.206.000
kWh per year
without PEF

-10,906,000 kWh per year

Reduce water



6,000 with PEF

30,000
m³ per year
without PEF

-24,000 m³ per year

Reduce oil



4,876 with PEF

5,244
t per year
without PEF

-368 t per year

Yield increase



92,957 with PEF

92,000
t per year
without PEF

+957 t per year

Examples shown here: 26 t/h raw material French fries line, 7.700 production hours per year



Get the right Elea PEF Advantage system for your French fries

We offer a range of different sized PEF belt systems with varying line capacity. In addition, we provide a design and build service to customise Elea PEF technology to your specific requirements.

All of our systems share the same 24/7 production capability and are designed to operate under extreme conditions. Designed to be easily and fully integrated into your existing production line with minimal disruption.



PEF Advantage B 10, 100, 1000

The industrial scale solution for the treatment of tubers, roots, vegetables and fruits. Our PEF Advantage Belt systems are available in a range of four models: the PEF Advantage B 1, 10, 100 & 1000. Each option is fully customisable to your requirements.

Up to 100 t per hour processing capacity, quick start-up, low energy and water consumption.



PEF Advantage B 1 & B 1 mini

The compact industrial scale systems for treatment of vegetables and tubers. The PEF Advantage B 1 & B 1 mini systems are built as a single unit including pulse generator, treatment belt and vessel. The B 1 is designed for treatment capacities of 1t - 9t per hour.

The B 1 mini is especially engineered for smaller lines with treatment capacities of 1t - 3t of per hour, with an option to upgrade to B 1 capacity if required.





We are the world's leading manufacturer of Pulsed Electric Field solutions with close to 300 Elea PEF Advantage systems already installed globally.

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**Fry the perfect potato chip with
Elea PEF Advantage Belt systems**

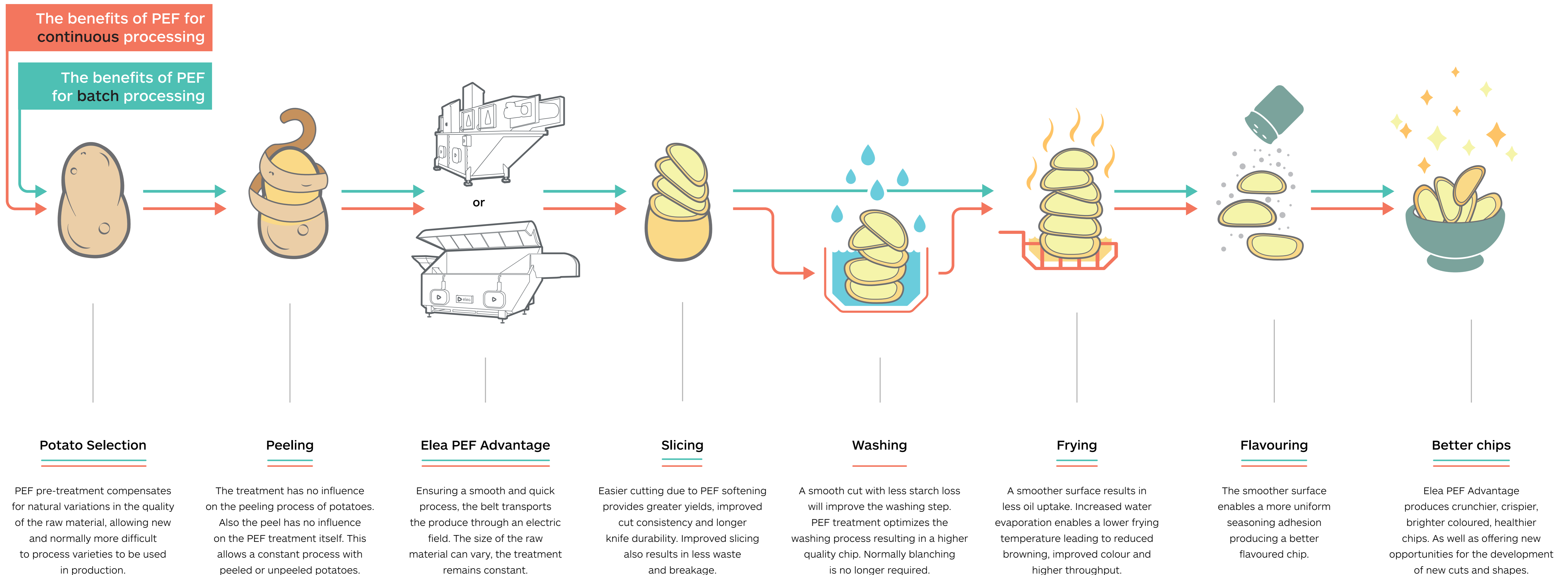
Reduce costs, increase yield, control colour, improve quality
and develop new product opportunities

Frying the perfect potato chip with Elea PEF Advantage Belt systems

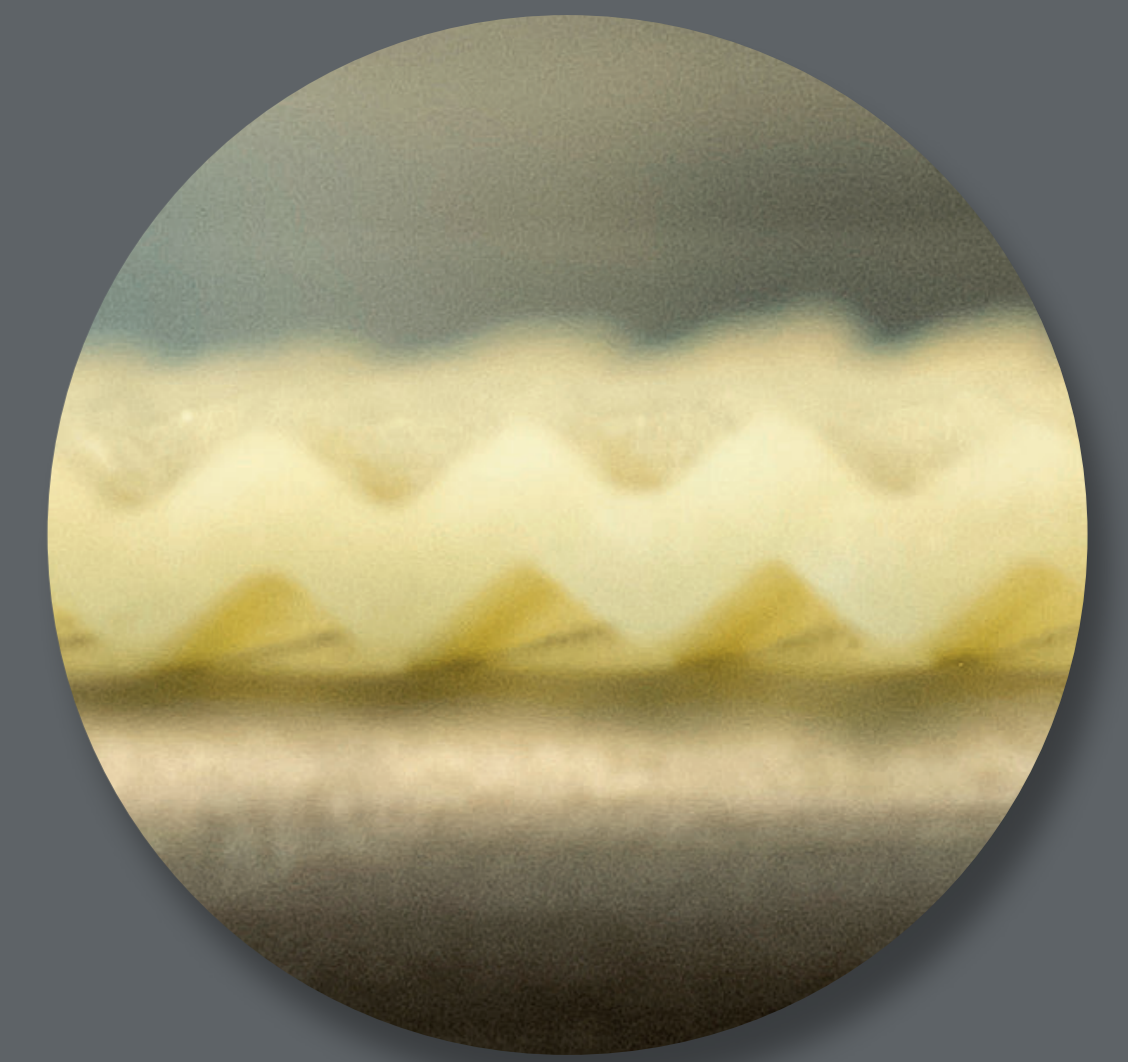
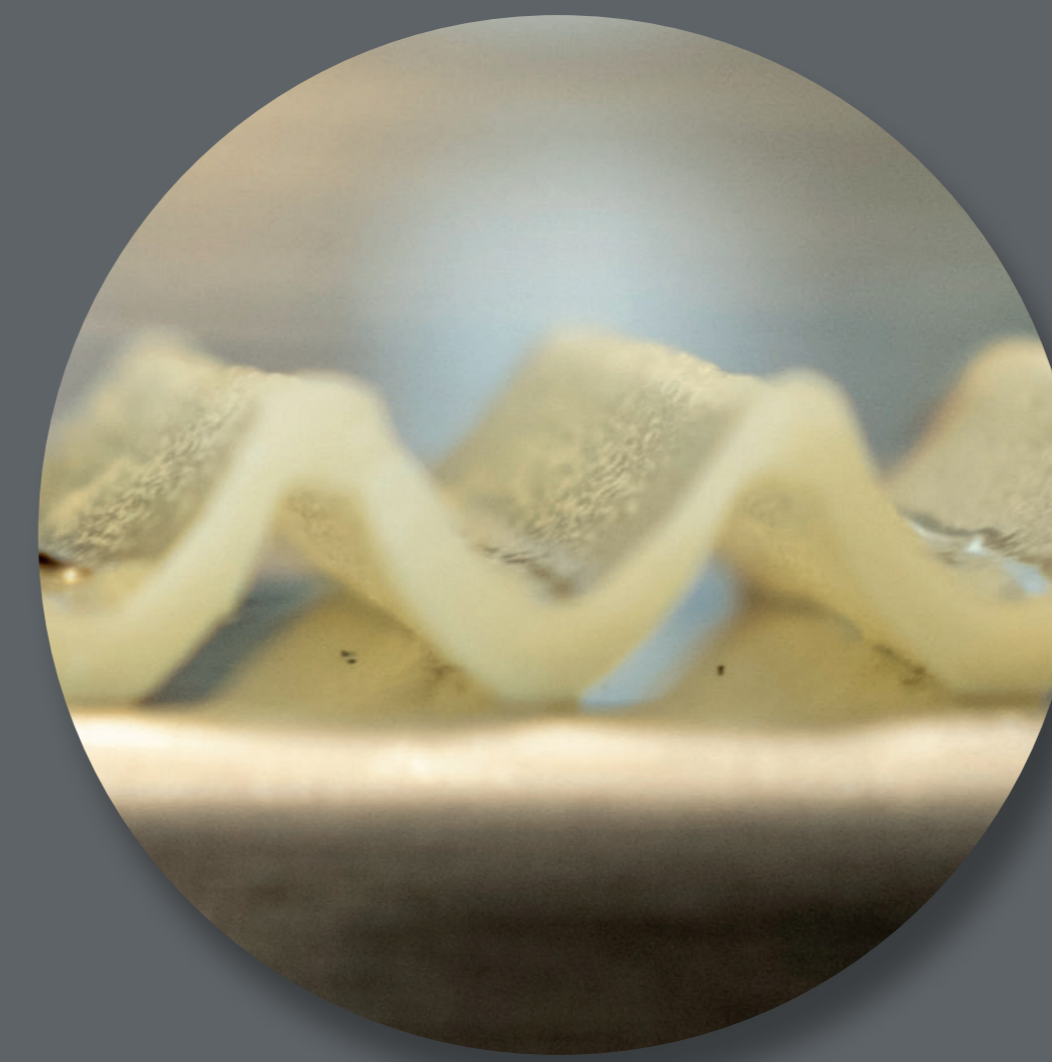
Fast treatment, energy & water savings, 24/7 reliable operation

Easier cutting, enhanced frying control and increased capacity

Reduced browning, better colour and improved flavour adhesion



New cuts, greater flexibility & improved quality



PEF can create radical new shapes and cuts for potato chips.
Raw materials now have the strength and flexibility to maintain greater structural integrity and provide exciting opportunities for novel product development.

Longer knife durability for batch & continuous

6h+

with PEF

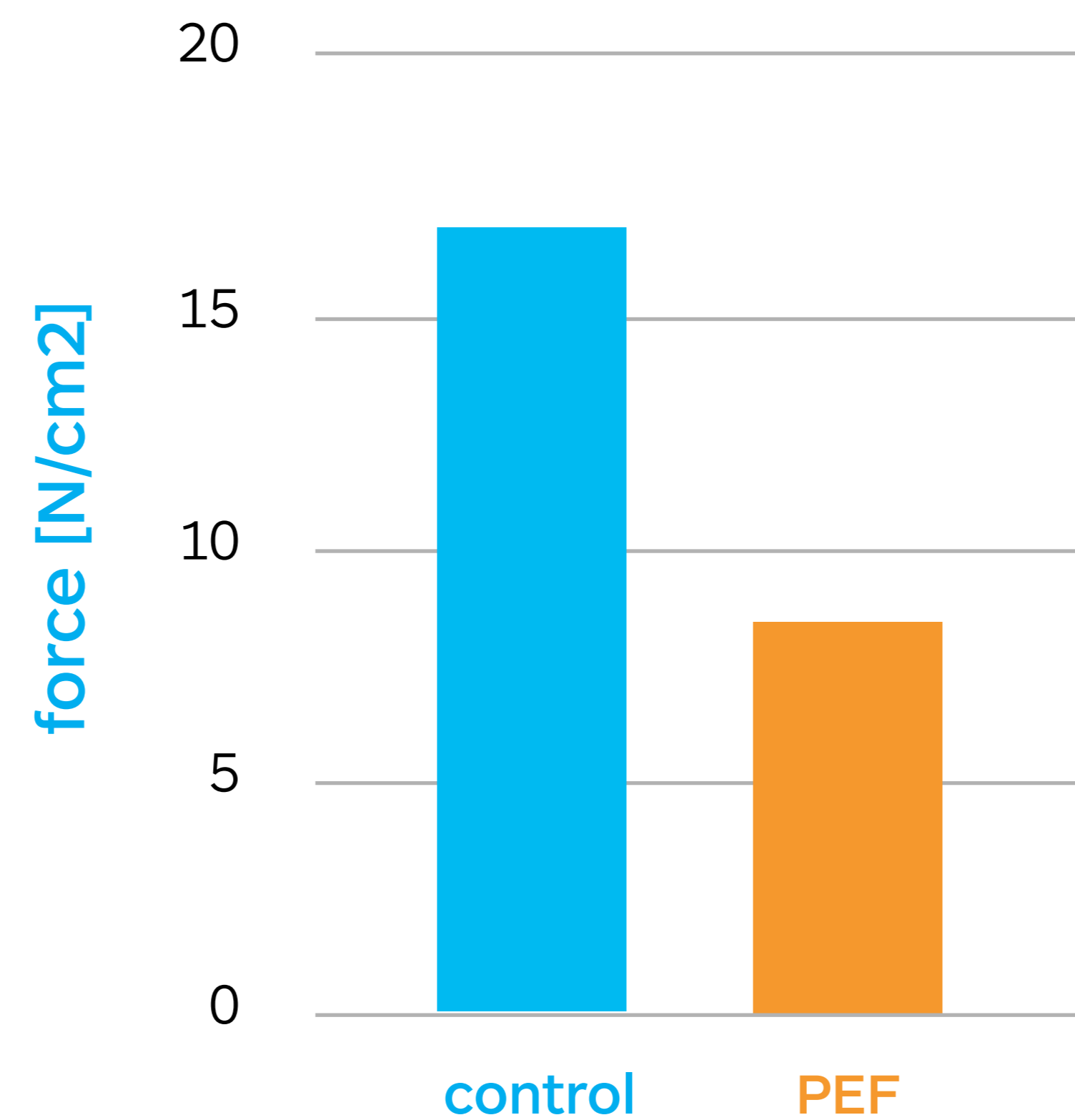


2h

untreated

Due to a softer product the knife durability can be increased.

Cutting force reduction with PEF of up to 50% for batch & continuous



The PEF induced open cell structure and water release softens the raw material making cutting easier.

Reduced clusters for batch frying

4%

with PEF

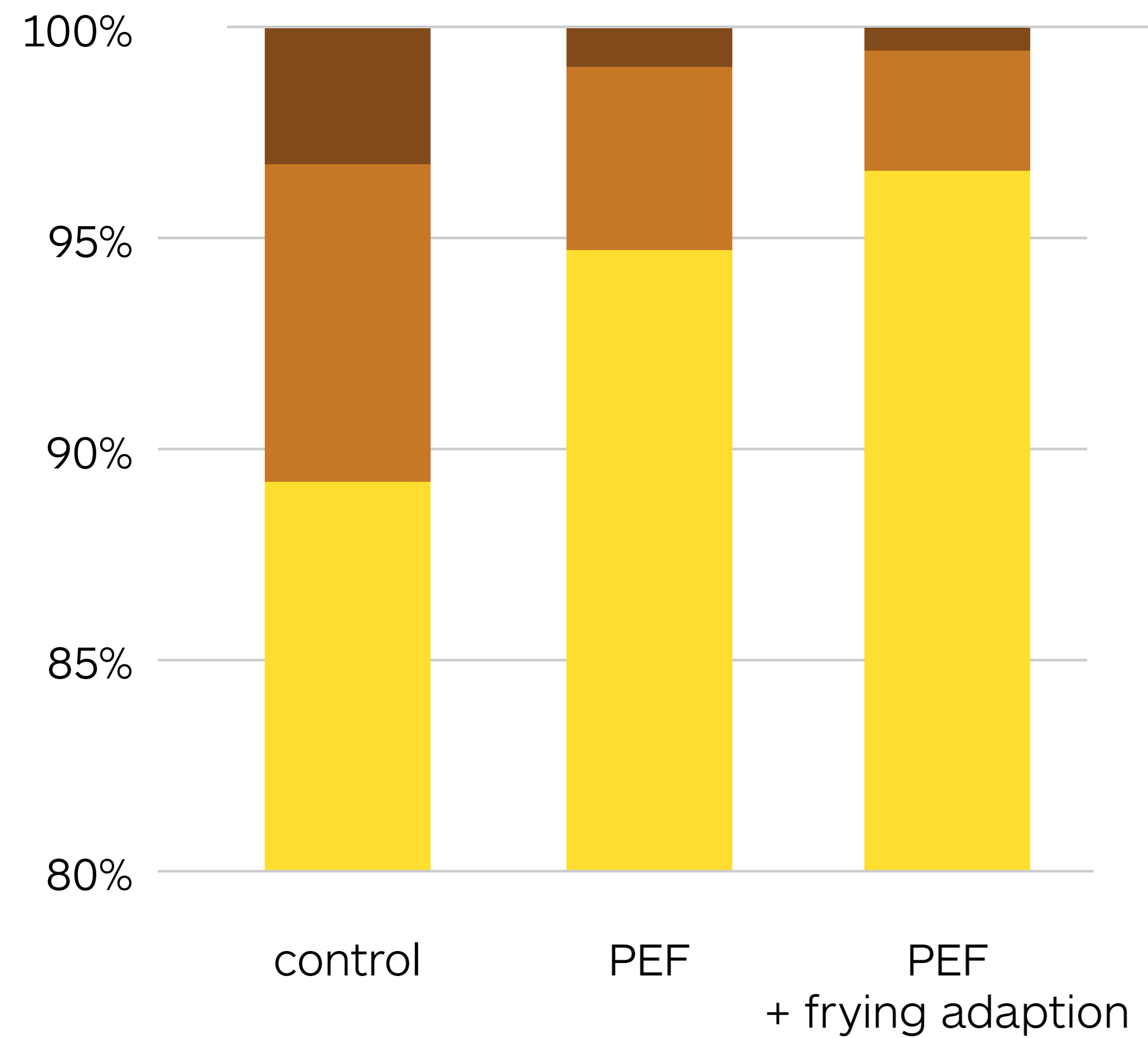
VS

12%

untreated

Water leakage creates a vapour barrier reducing the amount of slices sticking together while batch frying.

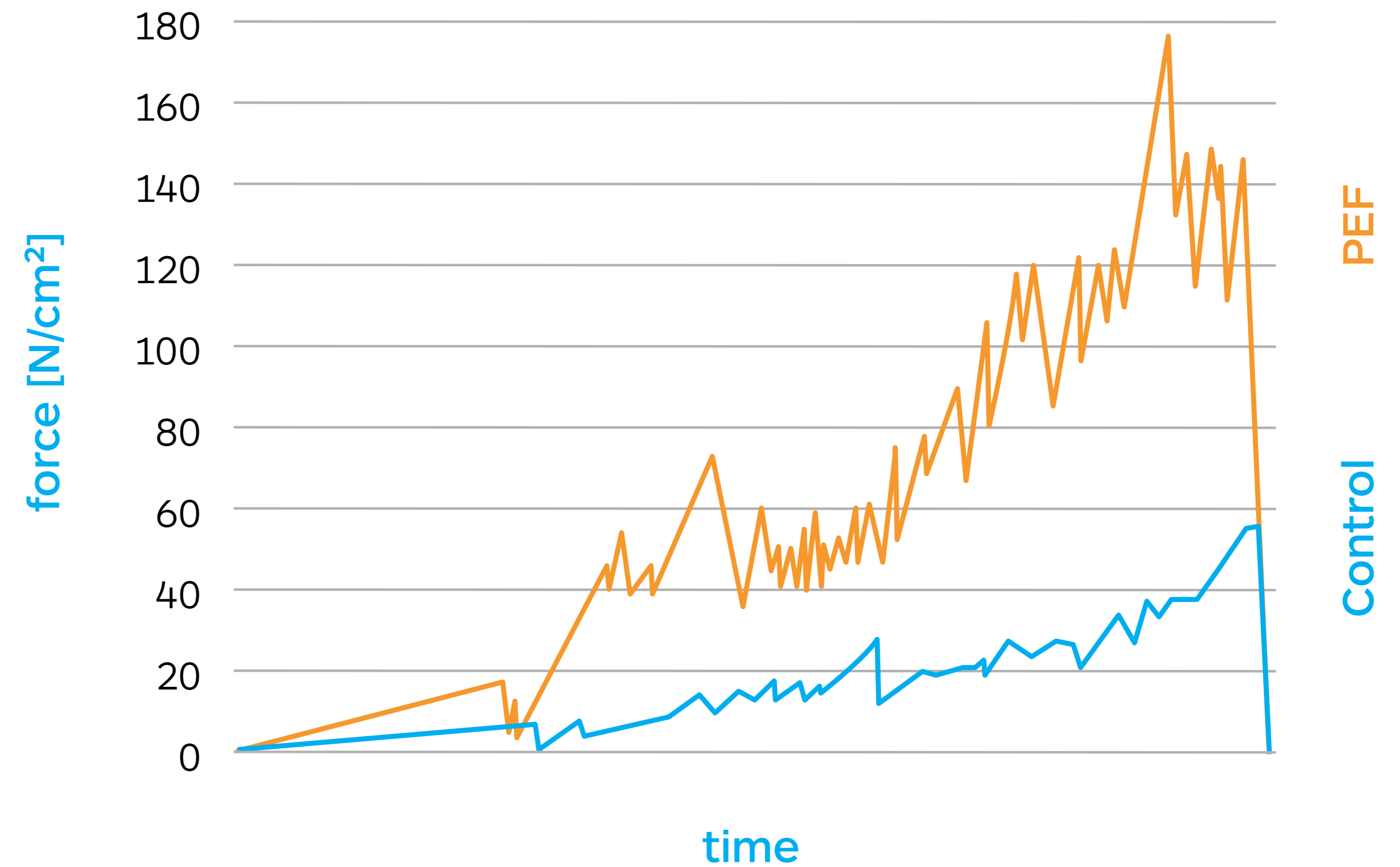
Better colour and less browning for batch & continuous



- BPC colour grade 4-5
- BPC colour grade 3
- BPC colour grade 1-2

An optimized frying process with lower temperatures results in colour improvements.

Improved texture and crispiness for batch and continuous

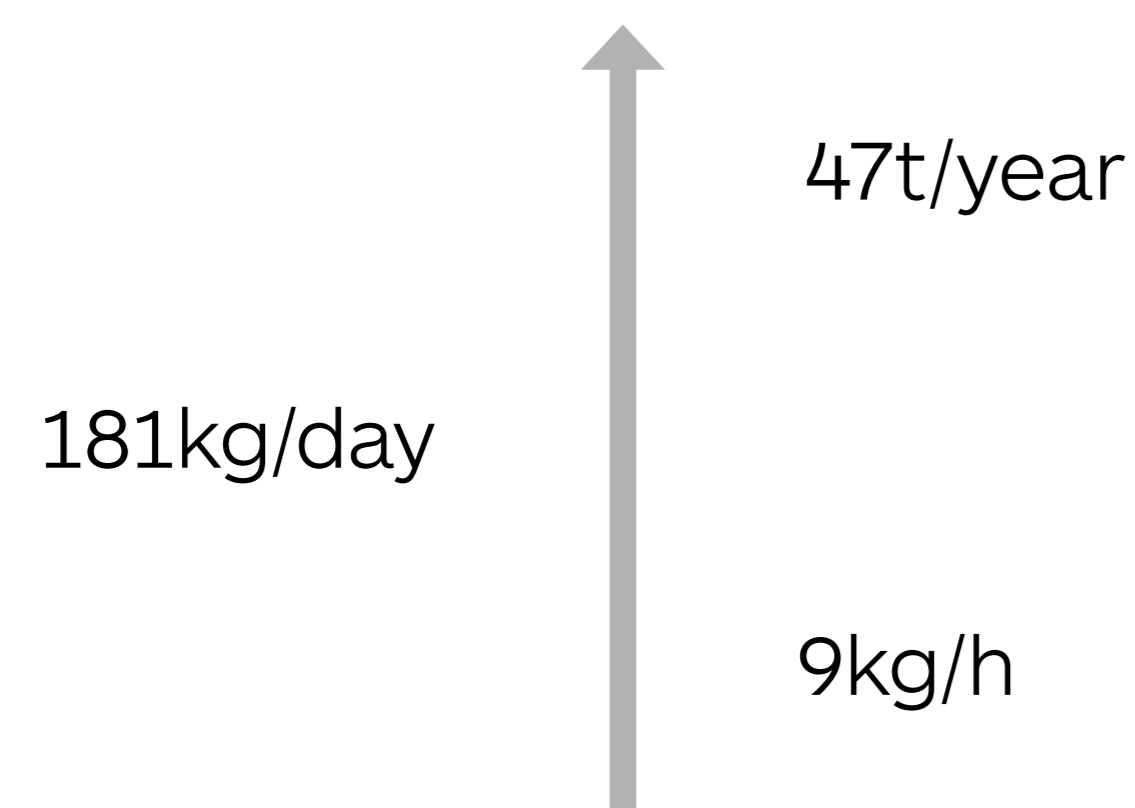


Enhanced water release and homogeneous starch gelatinization lead to an improved crunch and mouthfeel.

Reduced starch loss with cutting improvement for continuous processing

€188.000

Value from more solids



10%

reduced starch loss with PEF

Less starch leakage during washing, because less cells are mechanically damaged during cutting.

(Data from a 1.3 t/h final product line)

Greater capacity for batch frying

The improved water evaporation leads to batch size increase and frying time reduction.

+5% & -10% = +15%

increased batch size

frying time

increase in line capacity can be achieved

Reduced oil content for batch & continuous

A smooth cut results in a smaller surface area and less oil uptake.

33%

untreated

28%

with PEF



Get the right Elea PEF Advantage system for your chip line

We offer a range of different sized PEF belt systems with varying line capacity. In addition, we provide a design and build service to customise Elea PEF technology to your specific requirements. All of our systems share the same 24/7 production capability and are designed to operate under extreme conditions. Designed to be easily and fully integrated into your existing production line with minimal disruption.



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The B 1 mini is especially engineered for smaller lines with treatment capacities of 1t - 3t of per hour, with an option to upgrade to B 1 capacity if required.



PEF Advantage B 1, 10, 100, 1000

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Up to 100 t per hour processing capacity, quick start-up, low energy and water consumption.





Pulsed Electric Field benefits for chips at a glance



Reduce costs, increase yield, control colour, improve quality and develop new product opportunities with Elea PEF:

- Improved slicing for longer knife durability and less waste and breakage.
- Better colour and less browning.
- Improved texture and crispiness.
- Energy & water savings.
- Reduced starch loss with cutting improvement for **continuous** processing.
- Greater capacity for **batch** frying.
- Reduced clusters for **batch** frying
- Opportunity for new shapes and cuts and harder to process raw materials.
- Better flavour adhesion.
- Up to 50% cutting force reduction.
- Reduced oil uptake.

[click here to watch a film
about PEF and chips](#)



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