It’s time to turbocharge your cooking process.

steaminfusion.oalgroup.com
How do you heat 1,000kg of product from 15 to 90°C in 5 minutes with no burn on or particulate damage?

Fastest Growing Industrial Cooking Technology

£54,537,100
The two-year turnover of the new UK healthy frozen ready-meal category cooked using Steam Infusion; growing at 78% per annum.

327,000
Kilograms of soup, sauces & ready-meals are made every day using Steam Infusion.

Steam Infusion Adopters Include

DIAGEO  BAKKAVOR  greencore group  Larco foods

Award Winning Technology

Join the Revolution
Get in the fast lane, swap Steam Injection for Steam Infusion

Manufacturers are under more pressure to produce food without increasing their factory footprint. Speeding up cooking processes using technology such as Steam Infusion can dramatically increase productivity without compromising the end product. See the graph below demonstrating how the speed of heating 1,000kg in a 2,500kg kettle changes depending on the cooking method.

The Steam Infusion Vaction™ Pump eliminates burn on contamination by preventing direct exposure to excess high temperatures.

So What?
The technology cooks from the centre of the vessel outwards and the low-pressure vapour phase coupled with the short residence times mean the ingredients do not see excess temperatures whilst processing.

For food manufacturers, this increases yields as the lack of burn on reduces the amount of product wasted and improves product consistency as the risk of subsequent batches being contaminated is significantly reduced.

Zero

50%

Typical increase in cooking capacity from using Steam Infusion based on a decrease in heat-up and cleaning times.

The Science

It has been calculated that Steam Infusion heats three times faster than traditional cooking technologies. Due to the lack of burn on, cleaning is significantly decreased reducing downtime and increasing productivity.

18%

Reductions in energy consumed when using the Steam Infusion system compared with traditional steam jacketed cooking vessels.

The Science

The annular design of the Vaction™ Pump allows steam to condense within the Pump itself; the heating process does not rely on contact time between the steam and the product and it can run at comparatively higher steam pressures without compromising on efficiency, thereby minimising losses to the atmosphere.
“Consumers want new, indulgent, yet healthy food products at the best price but can your existing food processing systems deliver?”

Traditional steam jacketed vessels and steam injection systems haven’t changed much over the last century but the demands of the forward-thinking food manufacturer have. New processing technologies can unlock product development opportunities and achieve a step change in food processing efficiency.

**Product Differentiation**

“*If you want something new, you have to stop doing something old*”

The most powerful food innovations combine all of the constituent parts; raw materials, recipe, and process. On their own, raw materials, recipe, and process can be replicated but innovation across all three will create a unique product that can be better protected from copycats.

**RAW MATERIALS + RECIPE + INNOVATIVE PROCESS = A DIFFERENTIATED PRODUCT.**

By combining new product development across all three areas, food manufacturers can create new and differentiated offerings that retailers and their consumers will LOVE.

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**20%**

Industry trials utilising Steam Infusion on high dairy fat content sauces have been able to remove up to 20% of that fat addition while maintaining the luxurious mouthfeel.

**So What?**

With traffic lights on products a key driver of consumer purchase decisions, dropping from red to amber or amber to green can make all the difference.

**The Science**

The unique processing environment manipulates starch to form a fat mimetic which enhances the creamy mouthfeel, enabling a reduction in overall fat content.

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**4/5**

Consumers identified Steam Infusion flavours as homemade*.

**So What?**

The enhancing of flavours allows manufacturers to reduce quantities of seasoning and spices whilst still maintaining the required flavours.

**The Science**

The Steam Infusion cooking process also creates fresher, more natural, homemade flavours because of the shortened, direct cooking process which prevents burn on and over-processing of ingredients; retaining volatiles usually boiled off and destroyed by traditional processing.

How Steam Infusion Works

1. The Vaction™ Pump sits within the cooking vessel flooded with a product as culinary grade steam is introduced via the steam lance. It has no moving parts and uniquely uses steam to simultaneously heat, pump and mix the product. The following is based upon operating at 6 Bar steam pressure; by changing the controlled steam pressure, the processing conditions are changed within the Vaction™ Pump to achieve the required product characteristics.

2. Profiling within the steam chamber accelerates the velocity of the steam to 1,000m/s, faster than the speed of sound. The steam passes into the mixing chamber through an annular nozzle, disrupting the fluid flow to form small droplets, referred to as the vapour phase. The momentum transfer from steam to the product creates a partial vacuum of -0.7 Bar within the Pump.

3. As the steam condenses into the fluid droplets, the pressure rises. This is referred to as the condensation shock-wave and generates a pumping effect. The small droplets within the low-pressure vapour phase offer a significantly increased product surface area for the steam to condense into, typically resulting in a near instantaneous temperature gradient in the order of 10 to 15°C.

4. The very short residence times and partial vacuum within the Pump prevent exposure to excessive temperatures. There are no hot contact surface areas/hot spots and therefore the Steam Infusion process stops Maillard reactions and burn on contamination to products.

5. An unrestricted Vaction™ Pump can pump at a rate of 55,000 kg/hr on water at 20°C and the turbulent mixing conditions in the low-pressure vapour area enhance the transfer of flavours. The Vaction™ Pump has an uninhibited bore of 47mm enabling particulates to freely pass through the Pump.
What is Steam Infusion Best For?

The matrix below scientifically ranks food products on Steam Infusion’s ability to create a differentiated product (flavour, nutritional, colour etc.) against the ability to improve the operational efficiency of production (production time, cleaning, energy etc.). The findings are from a £978,246 Innovate UK* funded “Nutrition for Life” project with the University of Lincoln that scientifically explored the operating envelope of the Steam Infusion Vaction™ Pump.

*Innovate UK is the UK government’s innovation agency.
Steam Infusion FAQ

How do you Calculate the Amount of Steam Added During Heating?

As steam is added to the process, it condensates adding water to the product. Typically heating from 20°C to 80°C will result in a 10% addition. The easiest way to calculate the weight gain is to have the vessel mounted onto load cells. Alternatively, a steam flowmeter can be used.

Can Steam Infusion Heating Effect the Product Colour?

Fast heating with Steam Infusion can change the colour of food products. As Steam Infusion heats faster than conventional cooking methods, it preserves the natural colour of fruits and vegetables, generally seen as a benefit to food manufacturers.

Does Steam Infusion Heating Damage Particulates?

Particulate damage can be a challenge for food manufacturers cooking chunky soups and ready-meals. Slow cooking times and agitator damage can breakdown particulates easily. The OAL Steam Infusion Vaction™ Pump has an unrestricted 47mm bore which allows particulates to pass straight through unhindered. The steam vacuum acts as a pump to the liquid part of the product but allows the larger particles to pass through undamaged.

The degree of shear from the Pump can be altered to account for more delicate particulates such as peppers and/or sliced mushrooms and the time of addition adjusted to create the perfect finished product.

The mixing properties of Steam infusion creates extra agitation and may be controlled to result in far less damage to particulates than a conventional agitator. If particulates are required to be broken down for example in fruit pulps or purees, Steam infusion’s operating parameters can be set to help accomplish the required textures and results.

Can I use Steam Infusion to Caramelise Products?

Certain products such as French onion soup and some other onion based products require caramelisation of the onions. Steam Infusion cooking doesn’t expose ingredients to excess temperatures, and accordingly, cannot caramelise products. This is a benefit for dairy based products in particular because there is no burn on contamination or fouling to the vessel.

If your recipe requires caramelisation and you wish to cook with Steam Infusion, there are two options:

1) Steam Jacketed Kettle Fitted with Steam Infusion:
Start by caramelising ingredients with steam jacket cooking. When the required colour is achieved, switch to Steam Infusion.

2) The Addition of Pre-Caramelised Ingredients:
Pre-caramelised ingredients added to a Steam Infusion sauce deliver the required taste and colour without burn on.

Can Steam Infusion Processing Damage Starch?

The processing conditions within the Steam Infusion Vaction™ Pump can damage starch. Based on research from a £1 million Innovate UK project and our commercial systems in operation, two approaches can be taken:

1) Protect Starch with the Structure of the Recipe:
By changing the time of the starch addition and operating mode of the Steam Infusion Vaction™ Pump, starch can be processed undamaged. As would be expected, this will be recipe dependent and we work closely with starch manufacturers, like Ingredion, to ensure we can advise you on the best starch to use for your application.

Some starches are not suitable for the Steam Infusion process. For instance, potato starch is too delicate, however, it can be added as a final addition if required at the end of the process.

2) Reduce Fat with “Over Processed” Starch:
Under certain operating conditions, starch processed with Steam Infusion can act as a fat mimetic resulting in a creamier mouthfeel. This means that you could potentially reduce the butter or cream content from a recipe without affecting the taste or texture.
Adopting Steam Infusion

With Steam Infusion, seeing is believing so we’ve tried to make it as easy as possible to test the technology. If you’re already using direct steam injection, you’ll find it is a straight swap and our team can work with you to optimise your recipes.

1) Run Trials at our UK Test Centre

At the National Centre for Food Manufacturing, OAL has a dedicated 4,000 sq ft food processing hall for food manufacturers to test and learn about our technologies. Food manufacturers can have their ingredients delivered and stored at the centre, before spending a day with our team cooking products on our 500kg Steam Infusion test system. Customers have access to the University’s full suite of analysis equipment including a sensory suite, Mastersizer laser particle size analyser and GC-MS (Gas Chromatography-Mass Spectrometry).

2) Swap for Existing Direct Steam Injection

If you’re already using direct steam injection, switching to Steam Infusion is easy. As you’re already adding steam to your products there will be minimal recipe changes and we can use your existing steam filtration equipment.

3) Retrofit to New/Existing Cooking Vessel

Based on extensive knowledge and learnings, OAL can offer process guarantees for certain applications. Customers can then retrofit the technology to existing vessels and perform their own testing safe in the knowledge their application will work.

How much is a Steam Infusion Vaction™ Kit?

What it Includes:

- Patented Steam Infusion Vaction™ 47 In-Tank Pump.
- Multi-position steam lance and mounting arrangement.
- Steam Infusion control module.
- Recipe development support.
- Engineering installation support.

Service Requirements:

- Culinary Grade Steam at 750 [kg/hr] at 6.5 Bar.
- Electricity at 24V DC or 110 AC.

Ready to order and ship.
For pricing, please visit: steaminfusion.oalgroup.com/pricing
Where to buy from:

We have a global network of approved system integrators ready to integrate Steam Infusion into your cooking processes. All are supported by OAL’s engineering and product development teams.

For more information, contact OAL at:

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Or your local system integrator:

Tel:
Email:
Web: