



White Paper



Automated Shellfish Handling: Reducing Damaged Product Losses by Up to 60%

Our washing, grading, and packing solutions for scallops, langoustine, and other shellfish products significantly reduce damage while maintaining throughput and minimising giveaway.



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Introduction

Shellfish are high-value products. According to a [report by Seafood Scotland on the Scottish Nephrops Industry](#), for example, live whole Nephrops had a value of £11.71 per kilo in 2019. For chilled whole Nephrops, the value was £4.78 per kilo.

While they are of high value, Nephrops and other shellfish are also delicate. This makes them susceptible to damage during processing, leading to product and financial losses for shellfish processors.

In fact, as much as 10 percent of products can be lost during the grading process alone, and up to four percent during packing. Product losses in this range can cost processors hundreds of thousands of pounds/euros per year.

Stocks of high-value and delicate shellfish products like langoustine are well-managed, particularly in Scotland where the industry [accounts for 16 percent of Scottish landings](#). However, damaged product losses during grading and packing processes still have an impact on sustainability within the sector.

In other words, there are two main drivers for reducing damaged products when automating the handling of shellfish:

- Financial, with savings that can run into hundreds of thousands a year
- Sustainability, where more landed shellfish make it to the plates of consumers

At SF Engineering, we have direct experience in the delivery of automated shellfish handling solutions. The lines we design and manufacture deliver a range of benefits, with reductions in damaged products being high on the list.

The reduction in damaged products that we achieve has been proven in side-by-side tests. We also have data from now well-established automated shellfish handling lines.

Our solutions use cutting-edge technologies and innovative designs that deliver rapid returns on investment – returns on investment based on reductions in damaged products alone.

Scallop and Langoustine Washing

Scallop and langoustine washing processes are time-consuming and resource-intensive when done manually. Automating the process solves these challenges, as well as delivering other benefits. For example, it is often possible to increase the throughput rate with an automated scallop or langoustine washing solution.

The main challenge when automating the scallop and langoustine washing process is preventing damage to these delicate products. Each product damaged during washing represents lost revenue. Given the fact that scallops and langoustines are high-value products, the revenue lost can quickly add up.

Our scallop and langoustine washing solutions are designed to ensure the gentle handling of scallop and langoustine products, resulting in minimal product damage during the process.

Scallop Washing

Scallop washing solutions typically involve a wash tunnel that uses a high-volume amount of water to wash the products as they move down a carefully specified conveyor belt.



In the solutions that we design, as much water as possible is recirculated to keep water use to a minimum.

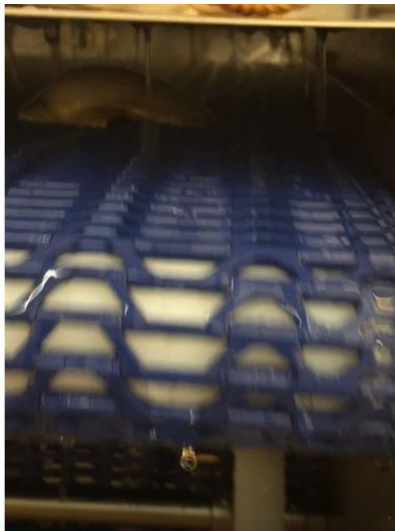
The washing process is much faster than manual washing, minimal operator involvement is required, and the equipment is energy efficient and hygienic.



Our washing solutions ensure the product is washed to a high standard, leaving it ready for the next phase of the production line.



Resource-intensive manual washing



Faster & automated solution



Washed scallops with no product damage

Langoustine Washing

Langoustine washing is a two-stage process. The first washing stage removes material that naturally attaches to the product. For this stage, an elevated conveyor takes the product from the de-icing tank into the industrial washer where the langoustine is gently but effectively washed.

The second stage involves dipping the product into a tank containing a preservative after it comes out of the industrial washer.



Elevated conveyor into the industrial washer



Water jets wash the product



Out of washer and into preservative tank

Langoustine Grading

Grading shellfish by hand is a time-consuming and labour-intensive process. With automation, throughput in the grading process can be increased to match the capabilities of the rest of the line, while also reducing the number of operators that are required. Grading and batching accuracy also improve, as automation eliminates human error.

There are other benefits of using automation, too, including the collating and tracking of production data for internal analysis at your shellfish processing facility. Production data can also be automatically sent to your customers.

However, one of the biggest wins with the solutions that we design is the reduction in damaged products.

Several processes are required on a typical langoustine grading line, including:

- Removal of ice
- Product washed and preservative applied (see section above)
- Grading
- Packing

The grading element of the process can be manual or automated. At SF Engineering, we have experience upgrading manual lines to an automated process, as well as improving existing automated solutions with modern machines and processes.

An example of the latter would be upgrading machines that use grading arms. In tests that we have conducted, machines on langoustine lines that use grading arms can have a damage rate as high as 10 percent.

The solutions that we implement use retractable belts instead of grading arms. This method of grading delicate langoustine products results in significantly less damage.

Customers that have implemented our grading solution have seen **product damage rates drop by over 50 percent**. Such a large reduction in damage rates on high-value products like langoustine has a sizeable impact on ROI, as well as the ongoing profitability of the line.



Video opens
in YouTube

Our solution for grading langoustine and other delicate shellfish products delivers a range of other benefits in addition to reducing damage rates.

This includes designing a feed system for the graders that ensures a consistent flow of product while also preventing the product from becoming clogged up. Our process at SF Engineering involves getting a full understanding of your facility. We then use our in-depth knowledge of the grading process and the flow of products on shellfish processing lines to create bespoke designs that maximise throughput and prevent interruptions in product flow.

The solution also captures all weight data as the products move through the grader. This includes the weight of any rejects and the weight of products that go to each grade, helping ensure target batch weights are met.

This data can also be used for other purposes, including checking the accuracy of information about product weights coming off boats.

Our shellfish grading solutions are also highly accurate, as they use an intelligent batching system to not only ensure target batch weights, but also reduce giveaway to an absolute minimum.



We can customise the solution to your requirements, including designing the grading machine over multiple lanes to achieve the required throughput rate. In this example, the design of the grading solution enables a consistent throughput rate of 120 pieces per minute.



Shellfish Packing

Grading isn't the only process on a shellfish production line that can be optimised to minimise product damage. We also have experience designing packing lines that make packing processes gentler on delicate products, as well as being more controlled. We achieve this without any impact on throughput, ensuring production targets can continue to be achieved.

One of the approaches we use is to optimise the workflow of packing a product into different weight bands. In most shellfish production lines, there are a small number of main weight bands. Most of the products that come through the grader fall into one of these central bands. You then have a much lower percentage of products that are smaller, as well as a small percentage of products that are larger.

The workflows we design in collaboration with our customers involve packing the most common weights as the priority. The less common weights are then packed when enough product has accumulated.

In addition to minimising product loss through breakage and optimising packing workflows, we also ensure full data recording and product traceability. Screens at the workstations of operators display the weight that is being packed, storing that information on both the processor's database as well as the databases of the processor's customers.



In other words, our solutions control the product to prevent breakages. They also control the weights being packed and the work of operators. The result is a packing line operating at an optimal level of performance.

Benefits Summary

- Advanced washing, grading, and packing solutions that ensure **maximum throughput rates** for scallops, langoustine, and other shellfish products
 - Significant **reduction in the loss of products** because of damage through the use of highly controlled washing, grading, and packing solutions that are **gentler on the product**
 - Enhanced automation that delivers substantial productivity benefits
 - Bespoke solution designs that prevent the product from becoming clogged up while ensuring a **consistent product flow**
 - Highly accurate grading machines that operate at speed while **reducing giveaway** to a minimum
 - Improved collation, storing, and transmission of real-time production data
 - Ergonomically optimised workstations for operators, as well as workflows and processes that are more streamlined, controlled, repeatable, and predictable
 - Hygienically designed solutions that have an open structure and other features that make them easy to clean
 - Solutions optimised for OEE, energy efficiency, sustainability, and flexibility
 - Full end-to-end support from the SF Engineering team and our equipment partners
 - Focus on return on investment
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Conclusion

If you currently process langoustine or other delicate shellfish products, the washing, grading, and/or packing processes in your facility could be damaging more products than necessary. Our solutions will add to your bottom line by increasing the volume of landed shellfish products that you are able to sell at the maximum rate after processing.

Once we know more about your products and current processes, our team will be able to put accurate figures on the savings you will make by modernising your shellfish grading and packing processes. You will start to realise those savings as soon as the new lines are operational at your facility. This will quickly cover the cost of the solution and deliver a rapid return on investment.

To discuss the grading and/or packing process in your facility and how it can be further automated and improved, please contact a member of our team today.

SF Engineering – UK

Ormond House
Nuffield Road
St Ives
Cambridgeshire
PE27 3LX
United Kingdom

Tel: [+44 1487 740131](tel:+441487740131)

Email: info@sfengineering.co.uk

SF Engineering – Ireland

Aghagad
Grange
Co. Sligo
F91 YY46
Ireland

Tel: [+353 71 9163334](tel:+353719163334)

Sales: info@sfengineering.ie



SF Engineering - Ireland

Grange, Co. Sligo

F91 YY46, Ireland

Tel : +353 71 9163334

Email : info@sfengineering.ie

SF Engineering - UK

Ormond House, Nuffield Road, St Ives

Cambridgeshire, PE27 3LX, UK

Tel : +44 1487 740131

Email : info@sfengineering.co.uk

sfengineering.net