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# GRADING SOLUTIONS

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# Introduction

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MARELEC Food Technologies started with MARine ELECtronics it created for the trawler industry in 1983 . Soon after, robust and reliable weighing and sorting systems for the fish industry were developed for use on shore as well as at sea. Their unique features, including high speed, precision and custom design were then integrated into solutions for the meat and poultry industry.

In 2023, Duravant, a worldwide supplier of custom equipment and automation solutions for the food processing, packaging and material handling industries, acquired MARELEC Food Technologies. Leveraging its expertise in engineering, integration, project management and operational excellence, Duravant delivers comprehensive process solutions to customers and collaborators through its extensive global sales, distribution and service networks. Duravant’s market-leading trademarks are known for their innovation, durability and reliability, aligning seamlessly with MARELEC’s values.

We kindly invite you to browse through our brochure to find out more about the different models, applications and our unique selling points. This brochure will also identify which model is most suited to your needs and products. Our sales team is ready to answer any questions you may have.

Regardless of the grader you need, choosing MARELEC - a worldwide leader in this technology - will ensure that you are working with a service-oriented company, one that listens to your specific needs and is a flexible partner with a human approach. We look forward to a mutually profitable cooperation!





# Unique Selling Points

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**MARELEC's Grading Solutions combine state-of-the-art technology creating fast, accurate and highly advanced grading solutions.**

## **1 // INTELLIGENT BATCHING ALGORITHM**

The MARELEC intelligent batching algorithm keeps track and makes combinations of all the different weights to fill the stations to the target batch weight, with the absolute minimum giveaway. MARELEC will gladly run a simulation to determine the optimal number of stations for your application.

## **2 // MODULAR CONCEPT**

MARELEC grading systems are built with modular key component parts. This reduces the amount of spare parts required and guarantees swift maintenance with minimal downtime.

## **3 // USER-FRIENDLY SOFTWARE INTERFACE**

The interface allows quick, user-friendly and intuitive programming. Over 100 programs can be stored.

## **4 // HYGIENIC DESIGN**

The graders have a completely open structure, non-tubular design without hidden corners, for complete cleaning and disinfecting. Horizontal surfaces have been avoided. Batching stations can easily be opened. All electrics and electronics are in a completely sealed cabinet with a unique hygienic labyrinth double sealing. All materials used are FDA approved.

## **5 // WIDE RANGE OF SEPARATION METHODS**

Speed, type and state of the product are crucial factors for choosing the most suitable separation method. MARELEC offers a complete range of separation methods: pull arms, kick arms, tilting conveyors, pushbars, retract conveyors, etc.

## **6 // STAINLESS STEEL DRUM MOTORS**

To avoid the need for housings and reduction gears, all motors used are silent stainless steel drum motors with IP 66 or higher protection.

## **7 // SERVICE**

MARELEC has built a very strong reputation for its after sales service. A team of service engineers is available 24/7 to reply to your queries. All MARELEC grading systems can be connected to the internet, which allows our service team to diagnose the status of the machine from our head office. This puts us in a position to react on the spot to assist you.



## 8 // LOW NOISE

The grading machines have a very low noise level during operation. This creates a pleasant environment for the operators.

## 9 // FLEXIBLE DESIGN

Our team of experienced engineers translates the requirements and specific needs of the customer into a grading system that is custom designed and built. This flexible approach guarantees the exact solution for the application, keeping the maximum throughput from the minimum footprint as priority.

## 10 // WORLDWIDE SUPPORT

MARELEC has a network of exclusive distributors throughout the world, with fully trained and qualified engineers ready to assist our customers whenever needed.

## 11 // PRODUCTION REPORTS

Production data can be viewed on the grader HMI. The user-friendly MATRIX program stores processing data on an office PC for traceability. MATRIX also allows for remote control of the grader.



# Overview

## 1 // INFEEED

Various infeed systems are available to suit your application and capacity. For a complete overview go to page 10.

## 2 // SEPARATION METHOD

Speed, type and state of the products determine the ideal separation method: pull arms, kick arms, tilting conveyors, pushbars or retract conveyors.

## 3 // OUTPUT

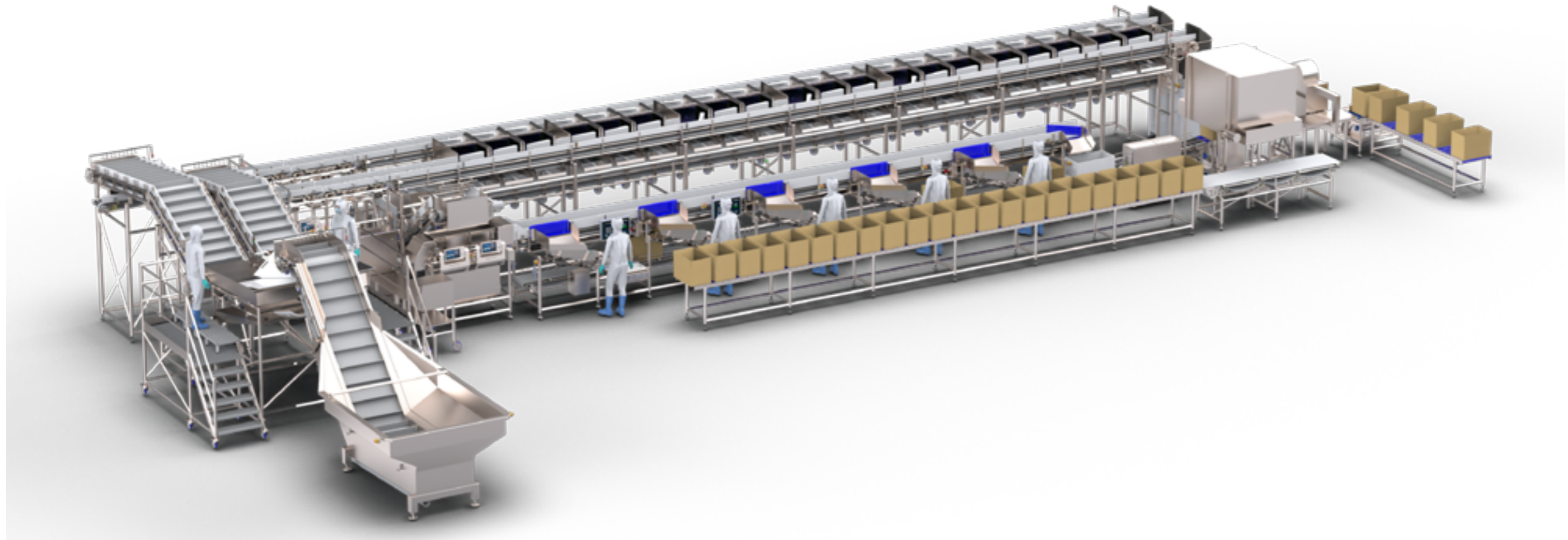
The graded products can be sorted straight into boxes or via various types of batching bins, presentation trays, bag holders or take away conveyor systems.

## 4 // HYGIENIC DESIGN

All grading systems have a completely open structure, without hidden corners, for thorough cleaning and disinfecting. Horizontal surfaces have been avoided. Batching stations can easily be opened for clean while being mounted to the grader.

## 5 // TAKE-AWAY

A take-away conveyor underneath the grading stations transports the batches from the grader towards a dedicated packing area.



## 6 // REMOTE SERVICE

The grader can be connected to the internet, which allows the service team to diagnose the status of the machine. This on a 24/7 service.

## 7 // PROTECTION COVER

The sensitive weighing section is protected by a cover to prevent the wind or drafts from affecting the measurement. This cover also protects the weighing platform from mechanical overload.

## 8 // TABLES

Tables can be mounted underneath the stations to hold the trays or containers. Elevation systems are available to bring the tables to an ergonomic height for the operators. There are options to swing the tables away, to be replaced by a trolley or tub.

## 9 // LABEL PRINTER

Label printers can be mounted in between the stations, or at the end of the take away conveyor to print labels with traceability information such as processing data "best before" or batch weight for each batch.

## 10 // MATRIX

MATRIX software is a tool to optimize processing performances and profits. This includes a cockpit view on real-time parameters: yield, throughput, give-away, stock movement, profitability and user programmable KPIs.



# Infeed Systems

Infeed system *	Application	(pieces/min)	
		Capacity **	Dimensions ***
In-line	Packed products		
	Whole fish / fillets	50 - 120	100 - 1200 mm
	Frozen, fresh & live		
Slotted in-line	Fresh fish fillets Langoustines (in conjunction with retract grading system)	60 - 150	≤ 500 mm
Circular	Live lobster	60 - 80	
	Frozen fish fillets	80 - 120	≤ 500 mm
Perpendicular z-conveyor	Whole fish Headed and gutted fish Marine	120	< 400 mm
		100	340-500 mm
		50	800-1200 mm
Species / quality selection pockets on top of z-conveyor	Salmon	50 - 100	
	Marine	50	500 - 1200 mm
Z-conveyor over circular infeed	Sea bass / sea bream	150	< 450 mm
	Frozen fish fillets	110	400-500 mm

\* Please contact MARELEC sales department with your product specifications. We will be pleased to help you select and design the optimal infeed system.

\*\* Actual capacity depends on dimensions and condition of the product.

\*\*\* Dimensions (length) are subject to change depending on the products.

# Compact Grader

Compact graders incorporate infeed, weighing and grading on one belt and one frame. The MARELEC M3 compact grader is an easy to use, simple and robust solution for whole fish and fillets. All of this with the same precision as the classic graders.

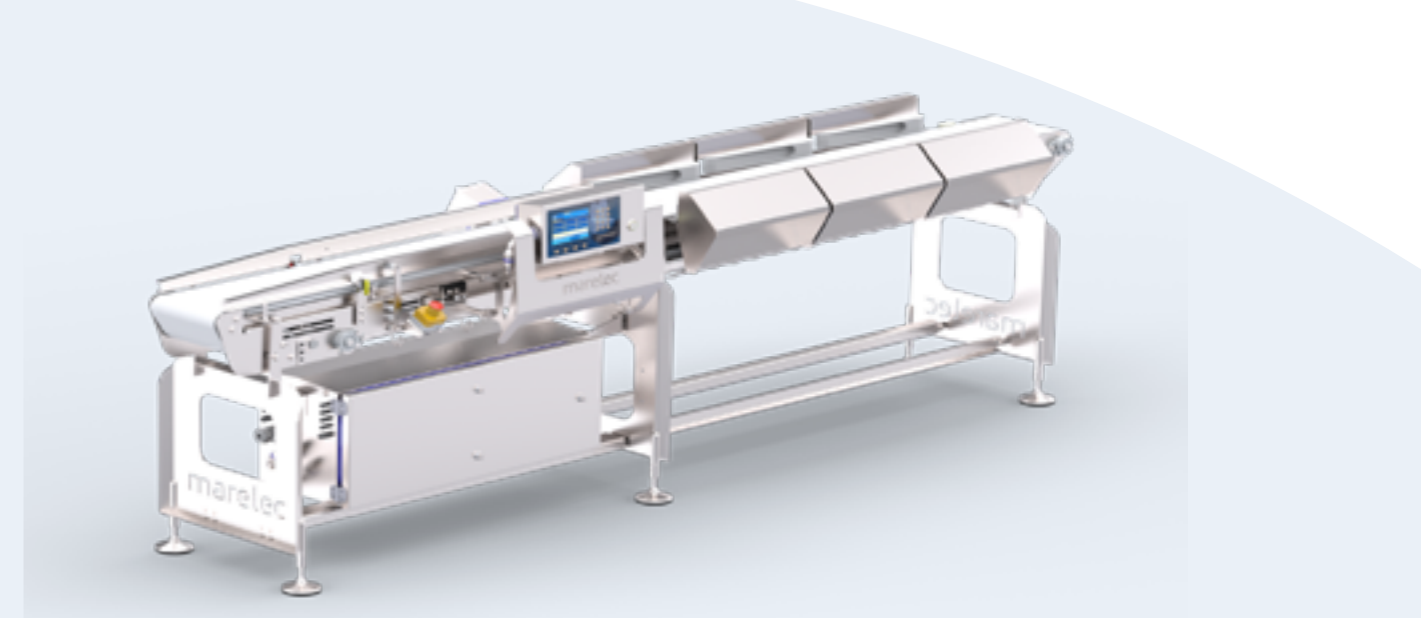
With the MARELEC M3 compact grader, MARELEC sets the new standard for smaller versatile grading systems using pull arms and featuring six or eight stations, combined left and right. Options such as batching are available on request.

## 1 // MARELEC M3/6P-6025-D

Equipped with a 250 mm-wide belt and six stations, for smaller products.

## 2 // MARELEC M3/8P-6030-D

Equipped with a 300 mm-wide belt, eight stations and higher flippers for larger products.



	M3/6	M3/8
Gates	6	8
L x W x H(belt)	3235 x 643 x 825 mm	4185 x 693 x 825 mm
Product dimensions W x L	240 x 400 mm	290 x 400 mm
Capacity	150 pieces/min	120 pieces/min
Product weight	20 gr - 1,5 kg	100 gr - 5 kg
Options	<ul style="list-style-type: none"> <li>• MATRIX G</li> <li>• Label printer: MARELEC PR1 or PR2</li> <li>• Stainless steel 316</li> <li>• Infeed belt</li> <li>• Batching</li> </ul>	

# Flowscale

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MARELEC offers the most efficient equipment for flow weighing. These systems are able to accurately weigh a flow of products, e.g. pelagic fish or ice, over a certain period of time. This eliminates the need for collecting the raw material in trays or tubs for weighing and provides a continuous raw material throughput.

The MARELEC M1F-115 has a capacity of 115 tonnes/hour based on a 900mm-wide belt that runs at 0,5m/s. The lower-capacity flow scale begin at a minimum weight of 10 tonnes/hour. Several models in-between those capacities are also available.

The flow of raw material is continuously weighed with the conveyor belt running, all of which is added up to produce a grand total. The recorded weight is send to MATRIX Pro software with a fixed interval resulting in real time weight capturing. This data is stored and can be visualized in a spreadsheet, graphs or exported.

The machines have been developed for use in the most severe marine environments, and in this way fast, accurate weighing is always assured.

The marine version flowscale has active motion compensation and is manufactured from high-grade stainless steel. The onshore version is currently undergoing a certification process.



# Grading after portioning

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MARELEC has become the world leader in fish processing with the PORTIO intelligent portion cutter. The PORTIO scans the fish fillets or whole fish using advanced laser and camera technology. With the exact shape, volume and density known, the software instantly calculates where to cut to obtain a portion of the desired programmed fixed weight.

To optimize yields, multiple target weights can be programmed on the PORTIO. To group the different weights together, a grader is put inline with the PORTIO. The Outfeed Product Holder on the PORTIO separates the portions while the acceleration conveyor of the grader ensures the correct distance between them optimizing the maximum capacity via consistent feeding to the weighing unit.

With the intervention of the MATRIX PRO software, the portion cutter receives feedback from the grader, resulting in automatic fine tuning of the programs for more accurate cutting and a reduction in give-away. When the portion cutter and grader are communicating, switching programs on both machines can be achieved from either device. A further benefit of MATRIX is its generation of production reports comparing the output of the two units.

The graders inline with PORTIO comprise a wide range of designs. For the handling of fragile portions, MARELEC uses retractable belts to maintain the quality of the product. Customized solutions for special applications, e.g. trim tables, storage of boxes etc., can be designed according to your specific needs.



# Grader on vessel

Adding value at the very start of the processing line can be achieved by grading on-board. On-board graders incorporate active motion compensation which ensures accurate readings - even at the roughest seas. As available space on a fishing vessel is always limited, MARELEC offers tailor-made designs to meet the wishes of the customer. Even at sea, MARELEC can provide remote service in the event of technical assistance being required.

## 1 // POCKET SYSTEM

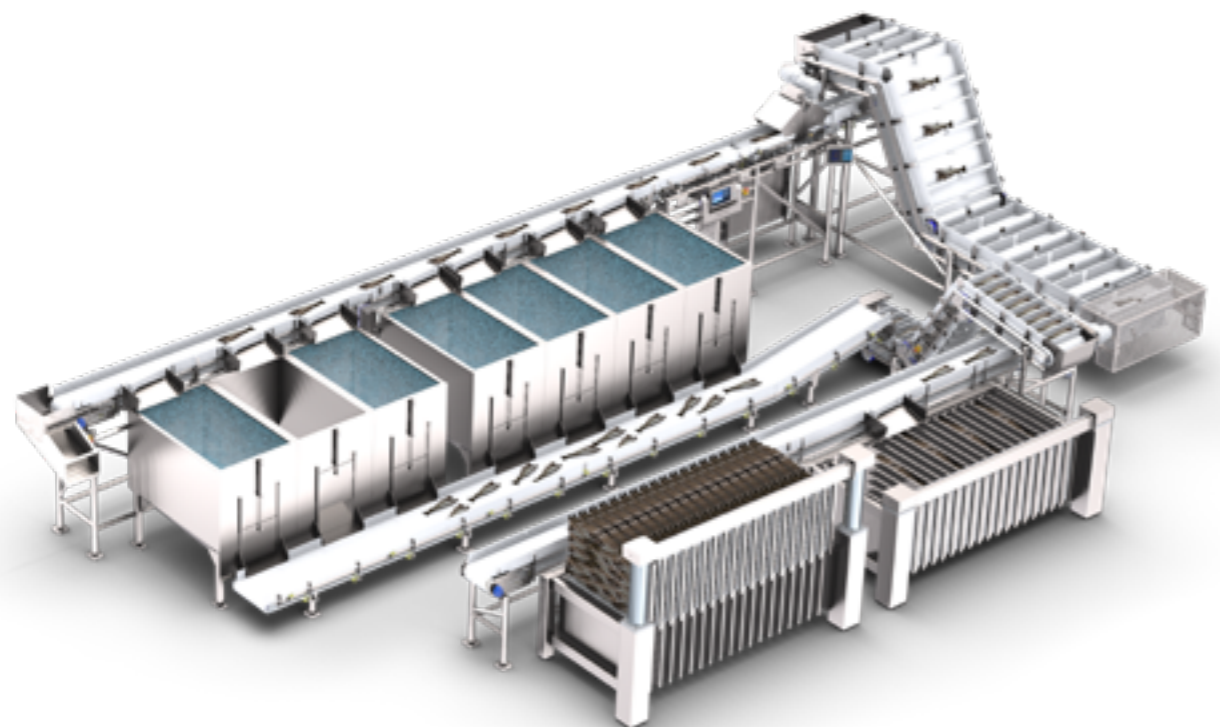
Each fish is individually placed into a V-shaped pocket. This guarantees a constant speed and allows the separation of species or to grading according to quality. The pockets can also be equipped with weighing cells.

## 2 // SPECIE SELECTION SYSTEM

When placing a fish into a pocket, the operator has the possibility to allocate a certain specie to that pocket, by pressing the corresponding button on the control panel which is located right above the pockets. The grader will now sort by weight, yet keeping the same species together.

## 3 // MOTION COMPENSATED

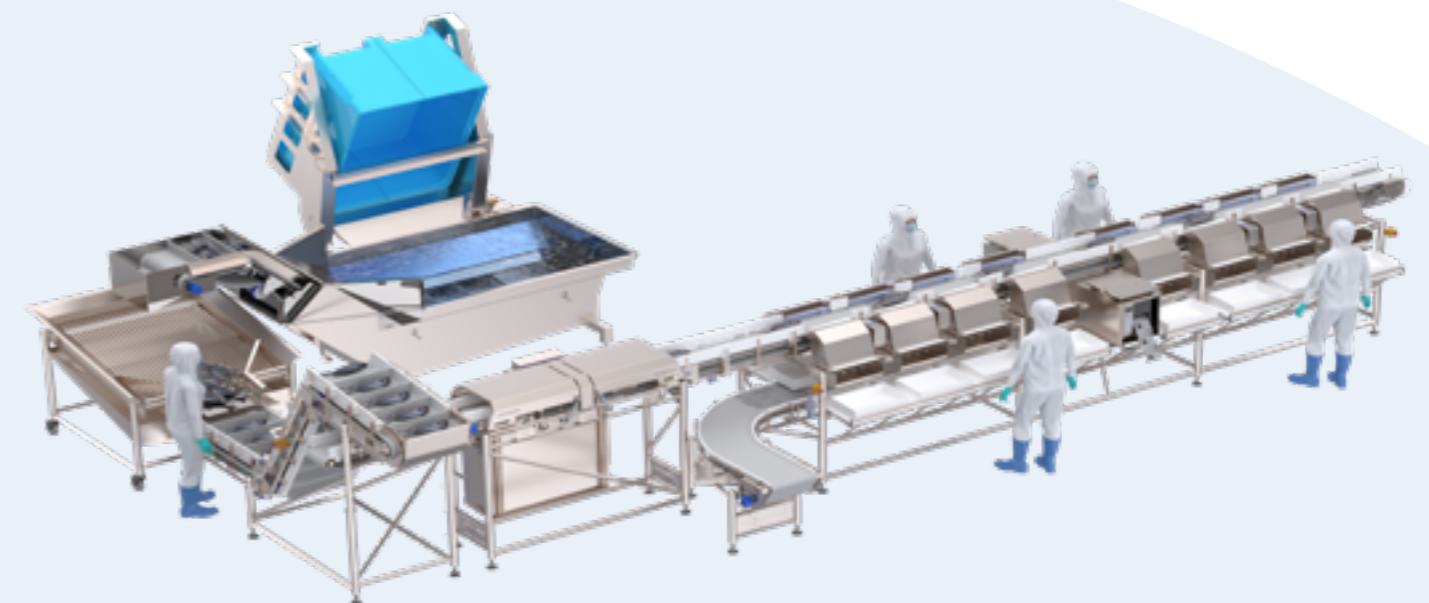
To weigh and grade accurately on-board a fishing vessel, on-board graders are equipped with active motion compensation which provides accurate readings, unaffected by the motion of the ship.



# Aquaculture

MARELEC has a broad installed base of grading solutions for seabass and seabream in aquaculture. The complete line starts from the tub lifter that drops the fish and ice into a washing tank. An elevating conveyor automatically brings the fish to the de-icing grid, where an operator places the fish into the pockets of the infeed conveyor. This pocket system guarantees the optimum spacing in-between each fish to ensure maximum capacity on the weighing unit.

The grader uses pull arms for gentle sorting of the fish into the batching bins. Boxes can be filled with a fixed number of fishes of a programmed weight range or to a total weight per box, with an absolute minimum of giveaway (intelligent batching). Once the box is full, a label with all production details is printed and the box is pushed onto the exit conveyor. MATRIX software can be connected to make detailed production reports.





# Salmon

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Yield and speed are important for any processor in the salmon industry. MARELEC offers a range of weighing and grading systems covering the reception of the fish right through to the end of the line. This means that the weight of every single fish or the total amount can be recorded at the reception. This is also possible after gutting, filleting and skinning, etc. The MARELEC equipment allows to divide the salmon flow into different sizes and qualities. At the end of the line, packing can be undertaken using tubs, boxes or bags, depending on the need. Intelligent batching is available on all machines to minimize giveaway or excess weight.

## 1 // POCKET SYSTEM

Each salmon is individually placed into a V-shaped pocket. This guarantees a constant speed and enables the separation of species or grading according to quality. The pockets can also be equipped with weighing cells, which will reduce the machine footprint significantly.

## 2 // QUALITY SELECTION SYSTEM

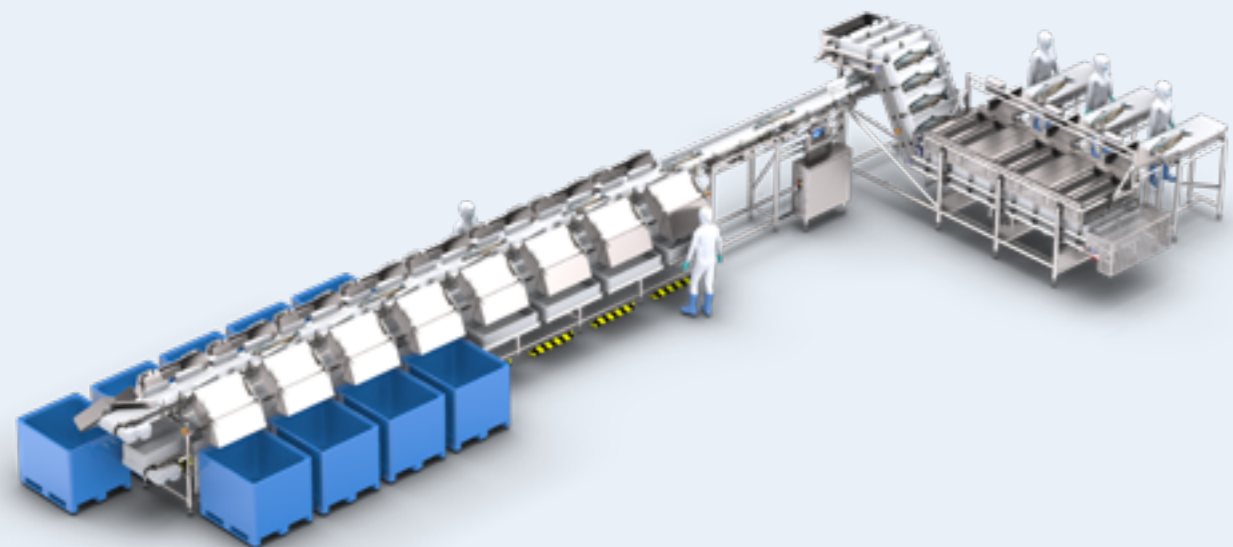
When placing a salmon into a pocket, the operator has the option to allocate a certain quality rating to that pocket, by pressing the corresponding button on the control panel which is located right above the pockets. The grader will now sort by weight, while keeping the same quality grades together.

## 3 // LOW-ANGLE BATCHING

In order to maintain the quality of the salmon, the batching bins are designed to gently receive the products. The low-angle batching can be customized according to the product state (frozen, fresh, packed, etc.)

## 4 // AUTOMATIC BOXING AND LABEL APPLICATION

When automatically filling Styrofoam boxes to a fixed weight, the fish is temporary buffered and transported to a boxing station. An extension of this system is the automatic application of box labels. Optionally, the box can be pre-weighed on a certified checkweigher so that the exact amount of fish is known prior to adding ice.



# Other applications

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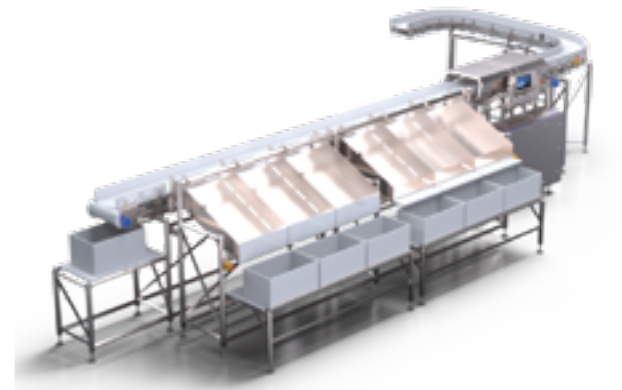
## 1 // LANGOUSTINES

To ensure that fragile products avoid damage during the fast grading process, MARELEC Grading Systems use retractable belts for gentle handling and maintaining the quality of species such as langoustines. The gentle handling is one of the key features that ensure a fast payback on the equipment.



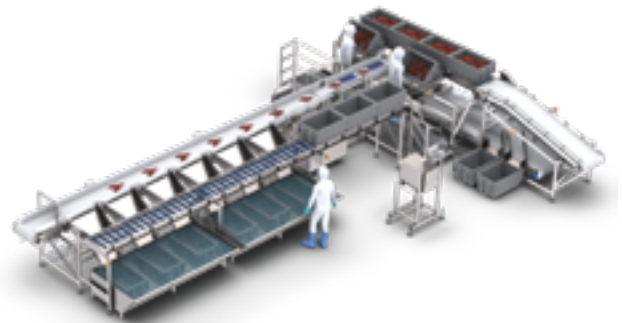
## 2 // CRAB

Valuable crabs need to be graded at high speed. Once cooked, batching bins at a low angle guarantee smooth handling. Special batching doors are designed to fill the boxes to target weight using the intelligent batching software.



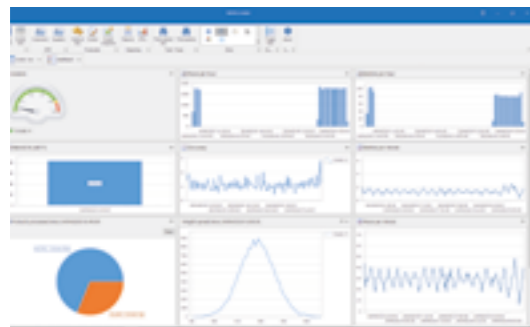
## 3 // LOBSTER

Grading of live lobsters requires specially designed custom-made solutions. Full crates, straight from the basins, are automatically transported towards the operators. Color-marked infeed belts help the operators to space the lobsters at the exact distance to ensure the grader runs at full capacity. The lobsters slide gently over low-angle exits into crates which are then placed into tanks filled with water.



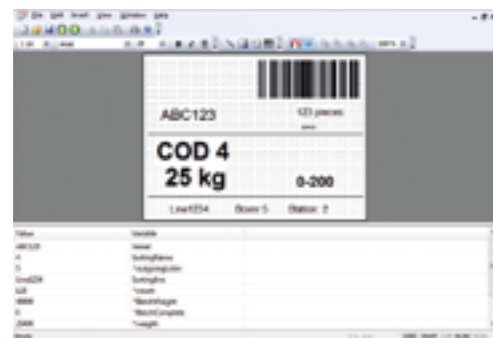
# MATRIX

Food processors continuously search for ways to stay competitive in a rapidly changing market. The food-processing industry is driven by digital transformation. Processors rely on data analyzing to define where to make improvements in their processes. MATRIX is a tool that not only gathers production data but also allows for the remote control of devices on the work floor.



The well-known KPIs such as yield, throughput, giveaway and quality have a huge effect on competitiveness and profitability. The consequences of a process adjustment can go both ways so real-time feedback is very important. MATRIX enables users to visualize those KPIs in a real-time dashboard view. With this tool, crucial decisions can be made on the spot and be evaluated immediately after implementation.

MATRIX shows the Overall Equipment Effectiveness. Uptime or availability of a processing line is one of the key factors that can be improved with MATRIX. Changes in machine settings will be stored in an event log that will inform the user of any downtime so preventive maintenance can be planned accordingly. All production data collected by MATRIX is stored in production reports that will help management to make strategic decisions.



Traceability is crucial when grading and packing. When the raw material information is entered at the start of the line and is tracked and traced through production, the appropriate label can be applied on the customer package. MATRIX includes a user-friendly label design program to customize labels. MATRIX allows the tracing of products from finished packages back to the origin of the incoming raw material.

MATRIX can monitor a single device by the use of MATRIX G program or control a whole processing facility containing both MARELEC and third-party machines by the use of the MATRIX. MATRIX is a modular system that is customized according to your needs.

# Demo

## // SEEING IS BELIEVING

MARELEC Food Technologies has created a state-of-the-art demonstration room, fitting it with all the equipment necessary to film and stream online live demonstrations. Of course, customers are very welcome to visit the MARELEC headquarters in Nieuwpoort, Belgium, to test our Grading Solutions with their own products. We strongly believe this is the best way to convince our valued customers of the superb accuracy and capacity, as well as the obtained yields, gains and fast return on investment.

Please contact the MARELEC sales team to make an appointment. We will make sure to have the ideal machine for your application available for a successful demonstration.







MARELEC Food Technologies

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