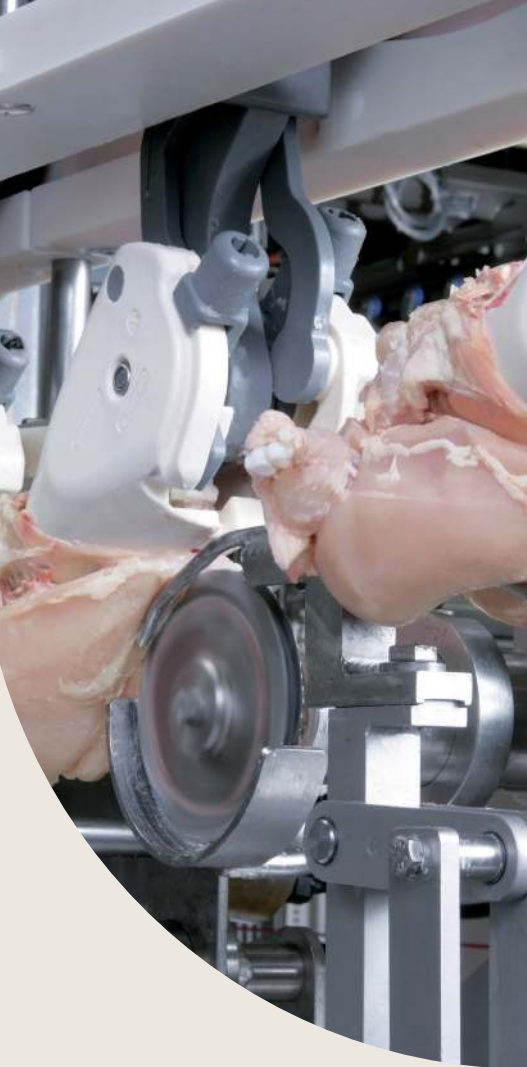




Mastering breast deboning

FHF FlexControl
front half filleting system



Deboning yield and versatility brought into effect

Processors may want to automate the front half deboning operations of medium-size and heavier broilers, and produce the widest possible range of high-quality breast meat products both for sale retail and for use in further processed, added-value items. That's why Marel developed, jointly in Europe and the USA, the FHF FlexControl front half deboning system to give processors worldwide such an automatic inline overhead system. High hourly capacity, unbeatably high yields and low manning levels set new standards in the kgs per man hour possible.



The FHF FlexControl system boasts unrivaled yields, surpassing those of the best managed manual front half deboning lines. FHF FlexControl sets impressive new levels for the number of kilograms (lbs) of meat obtained per man-hour. The system is being used by an ever-increasing number of processors around the world.

Unbeatable yield

FHF FlexControl is a system made up of processing modules installed along an overhead conveyor. The FHF FlexControl system will receive front halves with wings. Depending on customer needs, either the first and middle wing joints or indeed the whole wing can be left on front halves. Wing components are harvested separately by the system.

Deboning a front half with at least the first wing joint attached to the front half allows eye meat to be harvested with breast fillet and wings, a yield-enhancing feature unique to FHF FlexControl.

FHF FlexControl is a fully automated, modular solution that can flexibly be configured according to the processor's needs, instead of using a pre-fixed setup. Front halves stay inline in the overhead conveyor all the time, fillets and tenderloins are neatly released on a belt.

The system scrapes off back meat, which can then be harvested either separately or attached to the breast fillet. Yield from the system is further enhanced by the careful automatic harvesting of by-products such as breast and back skin, crop fat, breast tendon meat and breast cartilage.

Unrivaled versatility

FHF FlexControl is capable of producing an extremely wide range of skinless or skin-on breast meat products both with and without back meat attached, with and without tenderloins. The system will even do 'Supreme', 'Kiev' and 'Airline' products, having the first wing joint attached to the breast fillet portion.

Because the system is modular, changing from one product to another is quick and easy to do.

Optimum kg per man-hour

The combination of high throughput speeds, unbeatably high yields and low manning levels sets new standards in the kgs per man-hour obtainable.

FHF FlexControl carries out all deboning and filleting operations automatically. The only operations which have to be done manually are loading front halves onto the system and any necessary customer-specific inspection and trimming work.

✚ **Unrivaled yield and versatility**

✚ **Handles a wide range of front half weights**

✚ **Optimum kg per man hour**

PLC control

FHF FlexControl front half deboning features PLC controlled (Programmable Logic Controller) modules, meaning that microprocessors take control. This enhances performance of the FHF modules, while also being user-friendlier. PLC control provides precise tracking of the front half through the modules, ensuring a consistent job done with correct timing and stable accuracy. As the timings can be done remotely, via the screen, it is no longer necessary to stop the line and adjust the module manually. This improves the reliability of the system and benefits uptime.

See what's happening at a glance with real-time reporting. You can monitor and control the FHF FlexControl line using the HMI screen, a computer screen in the control room, or a tablet. When controlling the FHF FlexControl system with a tablet, you can walk to the module where settings need to be adjusted, and immediately check the effect both on the screen and with your own eyes.

The HMI, computer, or tablet screen can also show real-time performance reports. This lets you track important data, such as product loss per individual module, product carrier performance, and more. This allows you to react quickly to performance drops, resulting in consistently high performance and less downtime.



Control via screen

The HMI touchscreen lets you control the PLC-driven, pneumatically activated modules of the FHF FlexControl system. Entering a recipe for the weight of the flock about to be processed is straightforward. The timing of the PLC-controlled actions in the deboning line will adjust accordingly. By clicking the appropriate flock weight on the touchscreen, these FHF modules will automatically set themselves to the weight range. There's no need anymore to enter the safety zone and physically adjust the module settings.

Wireless control at your fingertips

With a tablet, you can control the FHF FlexControl system wirelessly. This gives you more freedom and efficiency on the processing floor. You can stand right in front of the machine and use the same functions as on the touchscreen. You can make adjustments on the spot in real time and see the results immediately. In case an issue arises, the system shows you which module is affected, so you can go there with the tablet and fix it directly. With this close and flexible monitoring, you achieve higher uptime, more accuracy, and a smoother process.



Fillet/Wing Harvester

Modular system layout

FHF FlexControl's modular setup allows for adaptations to special fillet requirements by retail and industrial customers in any part of the world. FHF FlexControl produces a wide range of breast meat products, with and without back meat, with and without tenderloins.

FHF FlexControl is a system made up of processing modules and uses a standard overhead conveyor with trolleys at a 152 mm pitch to transport front halves suspended from carriers at 304 mm pitch through it.

As the system is modular, not all processing options have to be specified when the system is first bought. These options can be added as and when required.

Your final choice of processing modules depends on the end products that you want to produce.

The carrier

The FHF FlexControl carrier should be seen as an all-important hand, presenting each front half to the processing modules which will debone it. Meat quality and yield will depend on front halves being positioned correctly for each step in the process.

Like a human hand, the FHF FlexControl carrier is extremely flexible. It can both rotate and move upwards and downwards.

Front halves are placed manually onto the carriers where a clamping mechanism secures them automatically. They are then transported through each of the system's modules. In front of each module, a turning station positions front halves correctly for the processing operation. For additional strength and stability, each carrier is suspended from two trolleys.

For heavyweight broilers, Marel has developed the HD cone to carry large-size front halves. The system modules won't need any additional adjustment for this.

Line monitoring and service station

Once product has been loaded onto a carrier, this carrier will be followed through the line, allowing for easy performance monitoring. The system software knows exactly what enters and leaves each module. For example, on the HMI touchscreen it is easy to see which carriers feature the highest product loss or ratchet failure. Once a defective product carrier is detected, it can be diverted to the in-line service station, where it can be replaced during a break in production.



Preparation modules

These modules prepare front halves for skinning and deboning and are mandatory in any FHF FlexControl system.

Wing Stretcher

The Wing Stretcher stretches any wings which might have become misshapen during storage. It ensures that all wings hang correctly for downstream skinning and wing cutting operations.

Neck Cutter

If product presentation is important for your market, the Neck Cutter is an absolute requirement. The module ensures that all neck stumps are trimmed to the same length.

Wing Skin Incisor

This module makes an incision to separate skin on the wings from skin on the breast and the back, so that the skin remains on wing products during breast and back skinning.

Skinning modules

Skinner

In the FHF FlexControl Skinner, Marel uses the proven technology of the AMF-i breast cap skinning module. Skinning performance can therefore be achieved at the highest possible level. While thoroughly removing the entire breast skin from the front halves, wing skin is left untouched. The structure of the skin removed remains intact, making it very suitable for further processed products. The skillfully skinned front halves are now in perfect shape for downstream operations. Their superbly smooth surface makes for an optimum visual product presentation. In this way, yield of the FHF Skinner reaches an all-time high.

Breast Skinner and Back Skinner

These two modules remove all skin from breast and back while leaving it on the wings. All skin removed retains its structure and is suitable for use in further processed products.

Neck Fat Remover

This module removes any skin or fat left in the neck and shoulder area.

Wing processing modules

Marel's FHF FlexControl system has been designed to handle front halves to which at least the first wing joints remain attached. Alternatively, the system can be fed with front halves complete with whole or tipped two joint wings. Whole wings, two joint wings or first wing joints are then cut from the breast fillet and harvested in the fillet/wing harvesting module.

Wingtip Cutter

If required, the FHF FlexControl system is also able to segment wings, in which case the Wingtip Cutter and/or the Wing Second Joint Cutter should be added to the line.

Wing Second Joint Cutter

With tips already removed, the Wing Second Joint Cutter cuts off the second joint, leaving the first wing joint to be harvested in the Fillet/Wing Harvester.

Breast processing modules

The breast processing modules form the heart of the system.

XC Fillet Trimmer

For those processors wanting to harvest rib meat separately from breast meat and/or breast fillet with abdominal fat removed.

Wishbone Remover and Shoulder Joint Cutter

Wishbones are removed automatically and tendons connecting shoulder and wing are severed, while connections to eye meat and baby tender are kept intact. Any meat left on the wishbone will be low in fat and can be used in further processed products.

Fillet Halving Module

The Fillet Halving Module cuts whole fillets in two. Both double and single-bladed halving cuts can be offered. A simple optional attachment on the Fillet/Wing Harvester allows whole fillets to be cut into two using a single blade.

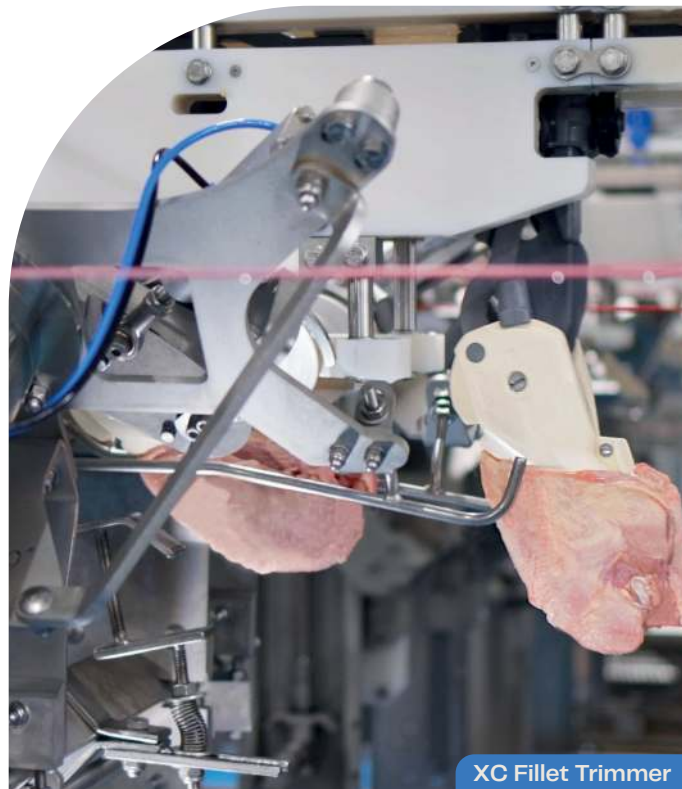
Two modules are available for performing the double-bladed cut which leaves the breast tendon on the keel bone. If you always harvest tenderloins separately, the basic module will ideally suit you. Suppose you want to harvest individual fillets either with or without tenderloin attached, and with the ability to change quickly and easily between the two options. In that case, the technically more complex module is your best choice.

Fillet/Wing Harvester

The Fillet/Wing Harvester pulls the fillets with wings as a whole from the carcass. A rotating knife then separates the two parts. The butterflies or fillets and the wing pieces drop onto separate takeaway conveyors.

Tendon Cutter

If you want to harvest tenderloins separately, this module trims tenderloin tendons to a uniform length without compromising yield.



XC Fillet Trimmer

Tenderloin Separator

The Tenderloin Separator scrapes tenderloins loose from the carcass. It leaves them partially attached to the end of the keel bone from which they are removed manually.

Keel Ribbon Harvester

The Keel Ribbon Harvester removes the breast tendon left on top of the keel bone after a double-bladed halving operation. It also scrapes any residual meat from the sides of the keel bone.

Tenderloin Harvester

This module performs automated tenderloin harvesting in steps. First, the front half enters the module's separation part where the tenderloin is separated from the sternum and the surrounding membrane is cut halfway by dynamic blades. In the second part of the module, the membrane is completely disconnected by membrane scrapers and harvested by a last set of ploughs. The module can cut very close to the wishbone in the shoulder area, resulting in various pieces of meat being cut off that can be put to good use, yielding a higher value than before.

A unique feature of this module is that its rotating blades are also capable of harvesting any remaining baby tender along with the tenderloin. The baby tender is a small piece of meat located on the coracoid bone and attached to the wing by a small tendon. Usually, by pulling on the wing, the baby tender can be harvested along with the fillet. If front halves have, however, been matured, the tendon connection may be too weak to detach the baby tender from the bone. It is therefore left behind. In this situation, static knives won't help. The rotating knives of the Tenderloin Harvester, however, come to the rescue, efficiently harvesting this piece of meat. The result is a tenderloin with an additional flap of meat attached. With this backup function for the baby tender, the Tenderloin Harvester ensures maximum yield of breast meat.



Wishbone Remover

Back Meat Harvester

You can harvest back meat either separately or attached to the breast meat. How back meat is harvested will determine which modules will be necessary.

The FHF FlexControl back meat harvesting process requires that you install either one or both of the following modules:

- Rim Fat Trimmer
- Back Meat Separator

Harvesting back meat is done in two steps.

Back Meat Separator

First, with a combination of blades and scrapers, the Back Meat Separator detaches the left and right back meat from the shoulder blades, leaving both pieces of meat hanging down from the scapula bone, ready for harvesting. The Back Meat Separator is mandatory in most FHF FlexControl systems.

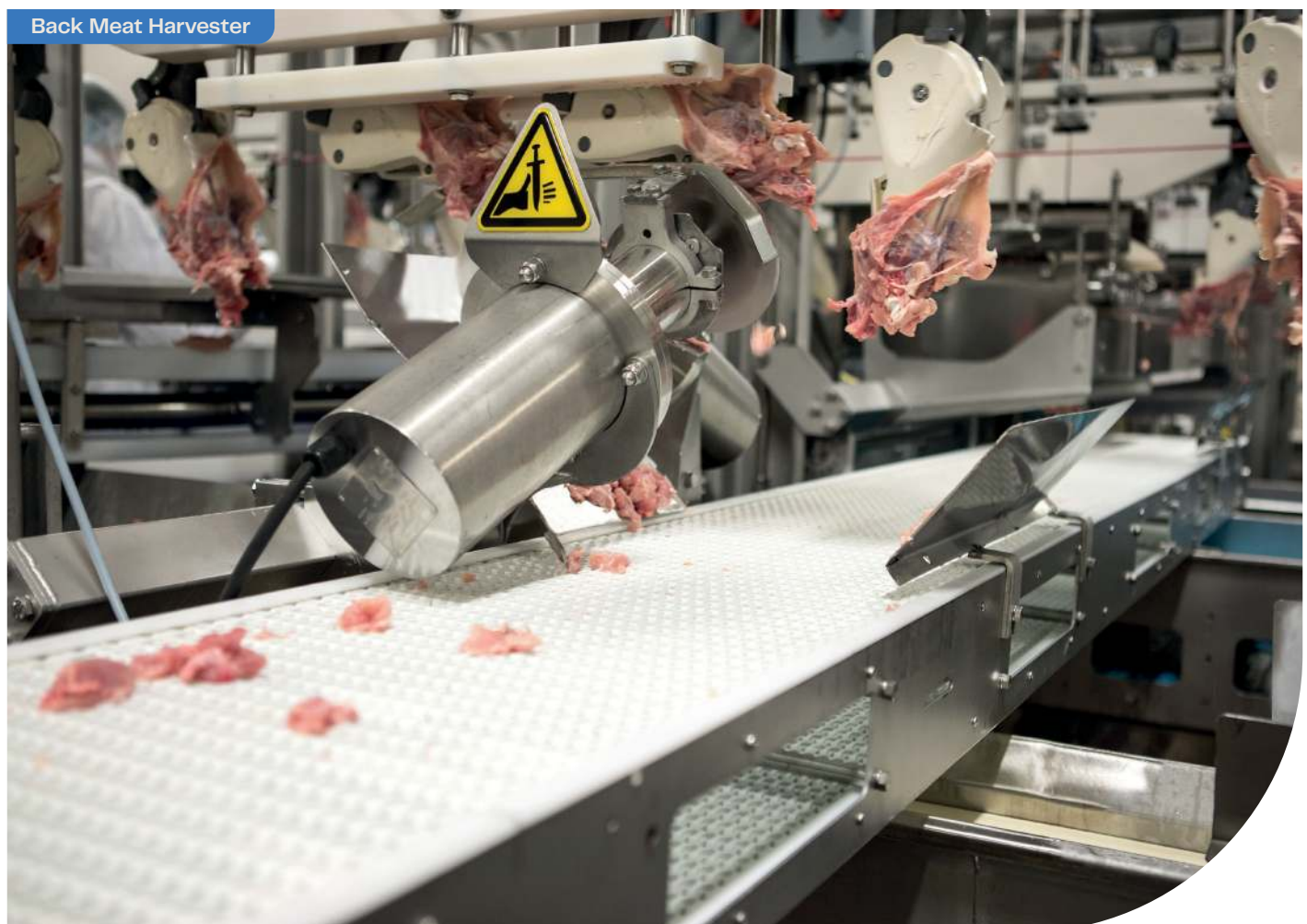
Back Meat Harvester

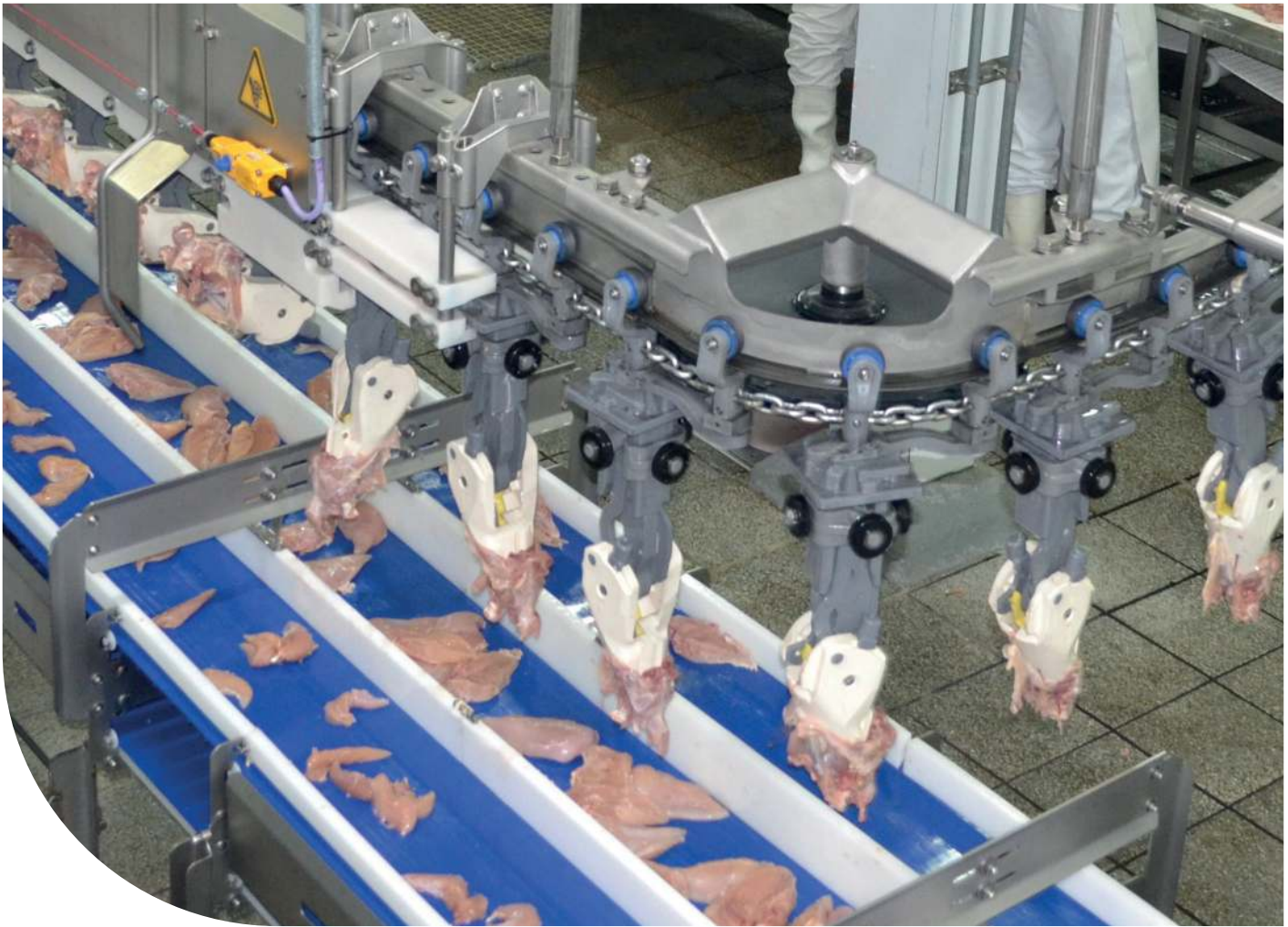
Subsequently, the two circular knives of the Back Meat Harvester accurately harvest two pieces of back meat, whose meat structure remains intact. Thanks to the ingenious construction of the knives, the cut separates the meat extremely cleanly, resulting in valuable, substantial pieces of meat, with minimal bone contamination. This FHF FlexControl module successfully preserves the structure and visual presentation of the back meat, optimizing its quality and adding significant value to it.

Now that back meat isn't ground meat anymore, it can be used as valuable source material for many more high-value purposes, even for newly developed end products.

If you want to harvest back meat separately, the following modules will be necessary:

- Fillet/Wing Trimmer
- Back Meat Harvester





Product unloading and carrier pre-washing

With all deboning operations complete, all that remains is to unload the deboned products and wash carriers in preparation for receiving new raw material.

Carrier Pre-Washer

The Carrier Pre-Washer uses non-contact nozzles to clean carriers, overhead conveyor trolleys and chain. The washer's nozzles can be connected to a central cleaning system to allow the application of detergent and disinfectant.

Trimming modules

Eye Meat Trimmer

The Eye meat trimming module trims the eye meat from the wing pit. Its knife cuts through the red parts in the wing area. Once the cut has been made, the fillet can be removed in the Fillet/wing harvesting module to separate the fillet from the reddish parts.

Rim Fat Trimmer

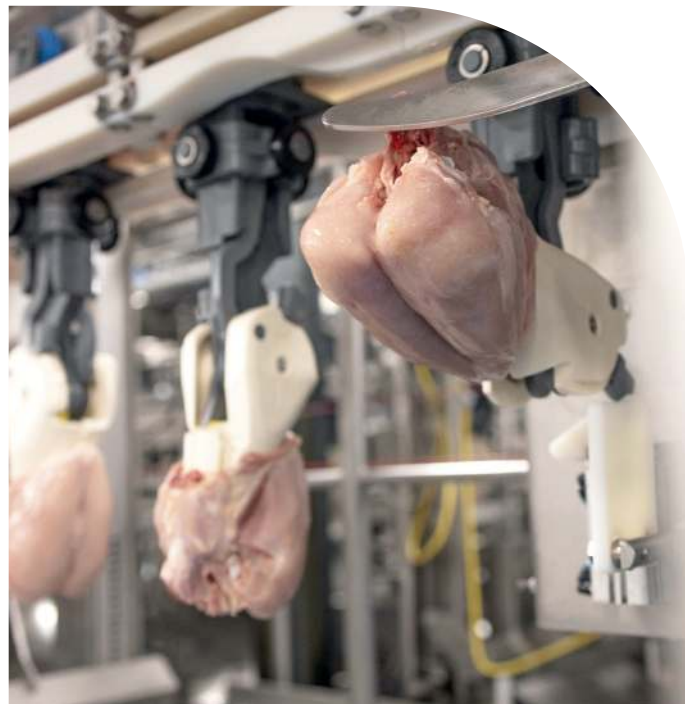
The Rim Fat Trimmer for fillets can perform multiple tasks, depending on your settings. It can cut the connection between fillet and back meat. It can reduce the amount of point fat when you process fillets without back meat. Or it can reduce the amount of delta bone when you process fillets with back meat.

FHF FlexControl Compact

There are many reasons to opt for FHF FlexControl Compact. These include achieving the best possible yield and quality, saving space, prioritizing wing cuts, managing incoming product variety, producing specific end products, and reducing dependency on labor. The choice of the most suitable modules in this system for deboning wingless front halves, aka 'footballs', also depends on how the processor operators..

For example, a filleting company currently deboning broilers on a cone line might seek higher automation levels to reduce dependency on labor. The FHF FlexControl Compact delivers the right level of deboning automation with a straightforward configuration.

Companies with budget or space constraints, will have a perfect match with the FHF FlexControl Compact. This budget-friendly solution with a small footprint uses high-quality modules ensuring premium performance right from the start.



With or without wings

A high-speed processing plant might prioritize precisely cut wings to meet specific QSR requirements, which can be done with an ACM-NT cut-up system. The remaining product, a front half without wings (football), can be adequately deboned by an FHF FlexControl Compact system.

Consistent performance

Processing plants dealing with an increasing variety of incoming products might be looking for more flexibility to handle different weight ranges. FHF FlexControl Compact consistently delivers robust, high performance, even with varying incoming product weights. The harvesting process allows operators, who can literally see every variation in the supplied product, to make immediate (and almost subconscious) adjustments accordingly.

The same product or a diversity of products

In all these scenarios, the FHF FlexControl Compact is the ideal solution. Its configuration will depend on the end products being made. If you consistently make a single product, a simpler setup suffices. If, for example, you always harvest back meat with the fillet, you can leave out the Back Meat Harvester. For greater flexibility such as producing fillets with and without tenderloin, with or without back meat, additional specialized modules ensure your line can adapt precisely to different end products.

Choose your modules

FHF FlexControl Compact only accepts front halves without wings. Regardless of the chosen configuration, the Skinner, Wishbone Remover and Fillet Halver are always included. For the remaining operations, you can select from a range of modules tailored to meet factory and market requirements. The goal is to produce all the deboned breast meat products that your customers are demanding, using fewer modules to minimize the system's footprint and stay within budget.

[With FlexControl Compact, you can set up a front half filleting system that maximizes yield and reduces the need for manual machine adjustments.](#)

Downstream processes

Fillet handling

Whether you want to pack it for sale retail or use it as input material for a further process, deboned meat from the FHF FlexControl system will have to be inspected for residual bone and, if necessary, trimmed.

How this is done will affect vital parameters such as yield, product quality, shelf life and labor efficiency. Marel offers a complete fillet handling and inspection system, which ensures a perfectly presented, bone-free end product.

StreamLine

In addition to FHF FlexControl deboning, Marel also offers extremely flexible trimming solutions. StreamLine is a semi-automated solution which sends deboned products to the workstation of an available trimming operator. The flexibility of a manual line allows processors to select those cuts necessary for achieving optimum product value, keeping loss to a minimum and perform trimming according to customer specifications.

StreamLine learns about worker performance, and then adjusts itself accordingly. StreamLine also identifies good and poor performers, and can be used to motivate people and train their skills. In this way, it succeeds in improving overall production.

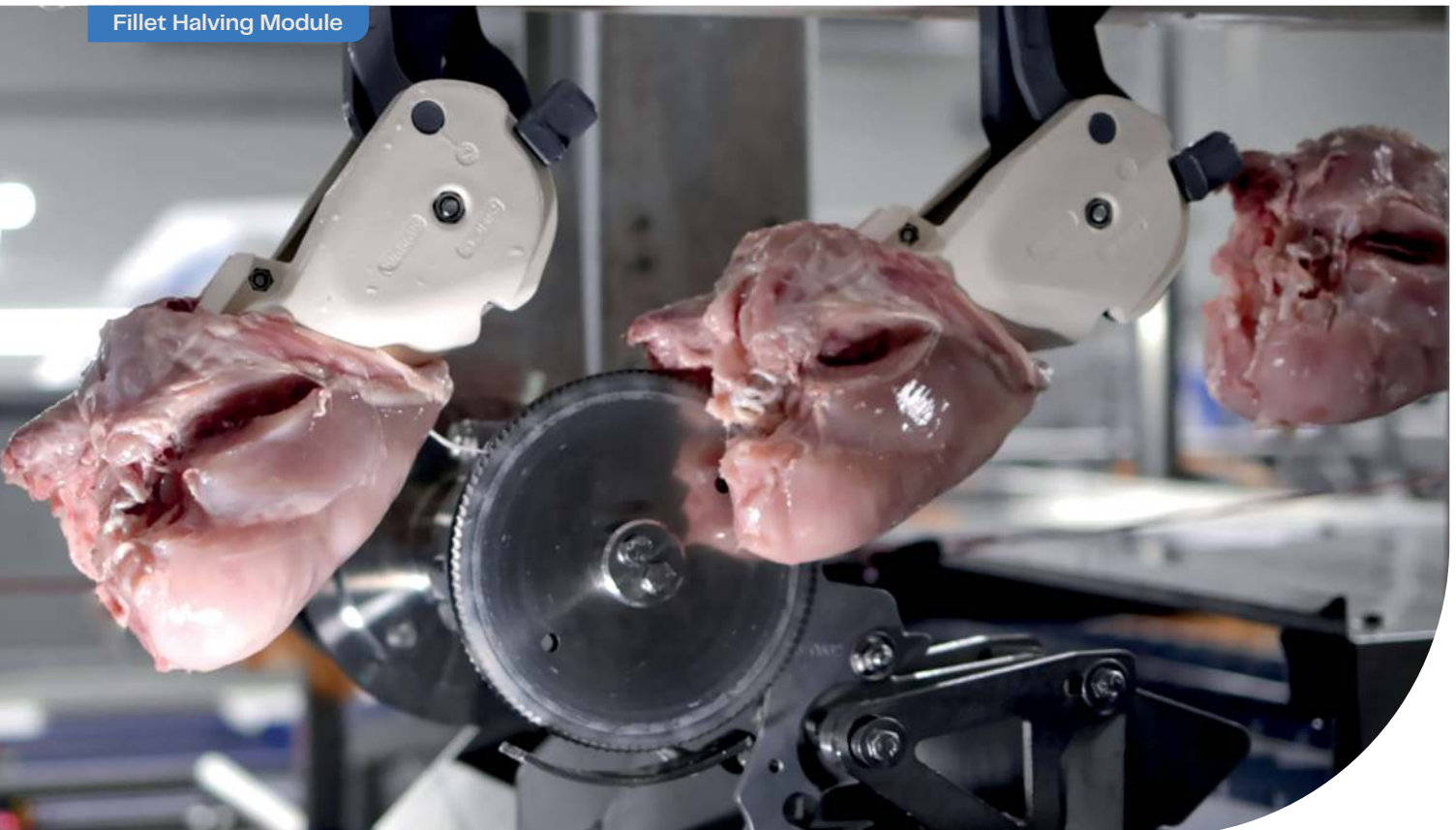
Automatic contaminant detection

For additional bone-free confidence, fillets from one or more FHF FlexControl lines can be fed to a Marel SensorX x-ray bone detection system, where any fillet still containing bone or other hard contaminants is rejected and can be reworked. SensorX keeps a continuous record of all bone contamination detected by the system. This provides valuable feedback on deboning performance, helping management to keep the FHF FlexControl system optimally set at all times.

Fillet Distribution

Marel's Fillet Distribution system can automate the inspection and distribution process, using the IRIS Fillet Inspection camera for visual assessment of every single fillet. Based on quality and weight, and with the help of ProFlow Breast Meat software, fillets can be distributed via vertically switching SystemFlex conveyor belts to their appropriate downstream destination, be it packing, bulk unloading or further processing.

Fillet Halving Module





Benefits

- ✦ Extreme modular versatility
- ✦ Able to produce a huge range of breast meat items
- ✦ Unbeatable meat yield thanks to the harvesting of back (rib), baby tender and eye meat
- ✦ Careful harvesting of valuable by-products such as skin, breast tendon meat, and crop fat
- ✦ Overhead conveyor-based system with great layout flexibility
- ✦ Modular set-up for quick and easy changeover from one breast meat product to another
- ✦ High hourly throughput, unbeatable yield and automatic operation result in optimum ratio kg per man-hour
- ✦ Seamless integration into downstream trimming, inspection and further processing operations
- ✦ If required, wing segmenting possible



- ✦ Will handle a wide range of front half weights
- ✦ HMI touchscreen control
- ✦ Recipe control per flock weight
- ✦ PLC-controlled modules for highest reliability and uptime
- ✦ Precise tracking of the front half through the modules, ensuring consistency and accuracy
- ✦ Easy line performance monitoring per carrier
- ✦ Compact version possible



“It’s amazing what the Marel FHF systems can do. We need only adjust their settings to get exactly the specific fillet products we require. The FHF’s do it all by themselves. What is more, the fillets are high-quality end products with minimal bone contents. Checking them is now much less demanding.”

Raúl Marso, president of Las Camelias, Argentina



How to set up your FHF FlexControl system?

A basic FHF FlexControl system to produce **butterflies with back meat attached but with tenderloins harvested separately** will be fitted with the following modules.

- Wing Stretcher
- Neck Cutter/Trimmer
- Wing Skin Incisor
- Breast Skinner
- Back Skinner
- Neck Fat Remover
- Back Meat Separator
- Wishbone Remover and Shoulder Joint Cutter
- Fillet/Wing Harvester
- Tenderloin Tendon Cutter
- Tenderloin Separator
- Breast Tendon Harvester
- Product Carrier Washer

For **lean half fillets**, the following modules should be added:

- XC Fillet Trimmer
- Fillet Halver (with or without tenderloin attached)

For harvesting **back meat separately from the breast fillet**, the following modules should be added:

- XC Fillet Trimmer
- Back Meat Harvester

When the system is fed with **front halves with the whole wing left on**, the following wing cutting modules can be added:

- Wing Tip Cutter
- Wing Second Joint Cutter

Capacity and weight ranges

- Up to 4,200 front halves per hour
- Front halves from broilers in the range 1200g–3000g eviscerated weight
- An LD version is available for front halves from birds in the range 900g–2000g eviscerated weight



Turkey front half deboning: FHF-XT

For turkeys, Marel has adapted the FHF-XT inline automated filleting system to the characteristics of turkey front halves.

FHF-XT's ability to fillet turkey front halves automatically is unique in turkey processing. The technically advanced, modular solution gives you maximum turkey meat yield. The system will handle both male and female turkeys. Changeover between males and females is quick and simple. This is also facilitated by the option to bypass or add modules in the line.

High quality end products

The FHF-XT turkey deboning solution brings you high-quality end products, ensuring the highest standards of hygiene and food safety. Suspended from the system's overhead conveyor, product carriers transport front halves through the system and position them ideally at each module. While passing through various processing modules and semi-automated work stations, precise skinning, cutting, deboning and harvesting operations are carried out. In this way manual operations can be minimized, resulting in a low need for personnel training.

Flexibility in turkey filleting

By integrating a well-thought-out choice of modules into the filleting line, you can excellently process turkey front halves with highest possible yield. This results in a great variety of products such as whole wings or segmented wings cut in three parts, shoulder meat with or without skin, fillet with or without tenderloin attached.

FHF-XT offers clear benefits; its modular construction allows great layout flexibility of the filleting process, which can lead to a vast variety of end products. The large diversity in filleting methods enables an adequate, tailor-made response to customer demands.

For consistently top quality end products, an FHF-XT installation can be complemented by a StreamLine system. Deboned turkey meat can be scanned using SensorX advanced x-ray technology, allowing meat to be trimmed

Benefits

- Unique, automated turkey deboning solution
- Modular set-up for optimum flexibility and yield
- Numerous end products possible
- High food safety and quality standards
- Large layout flexibility of the filleting process
- Modules can be added or bypassed
- Finest end-product quality
- Follows the speed of the cut-up system for toms and hens
- Easy changeover between males and females

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