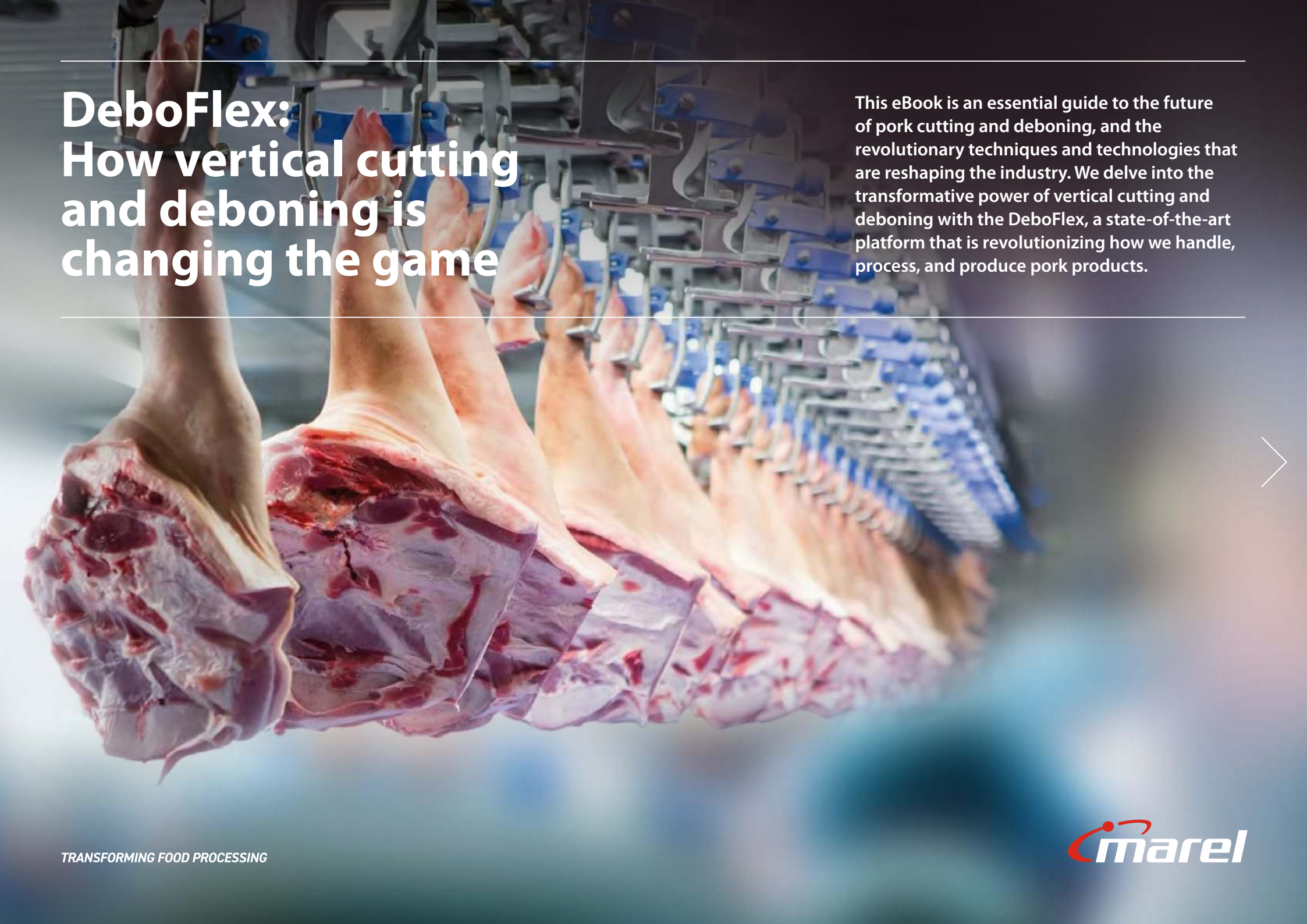
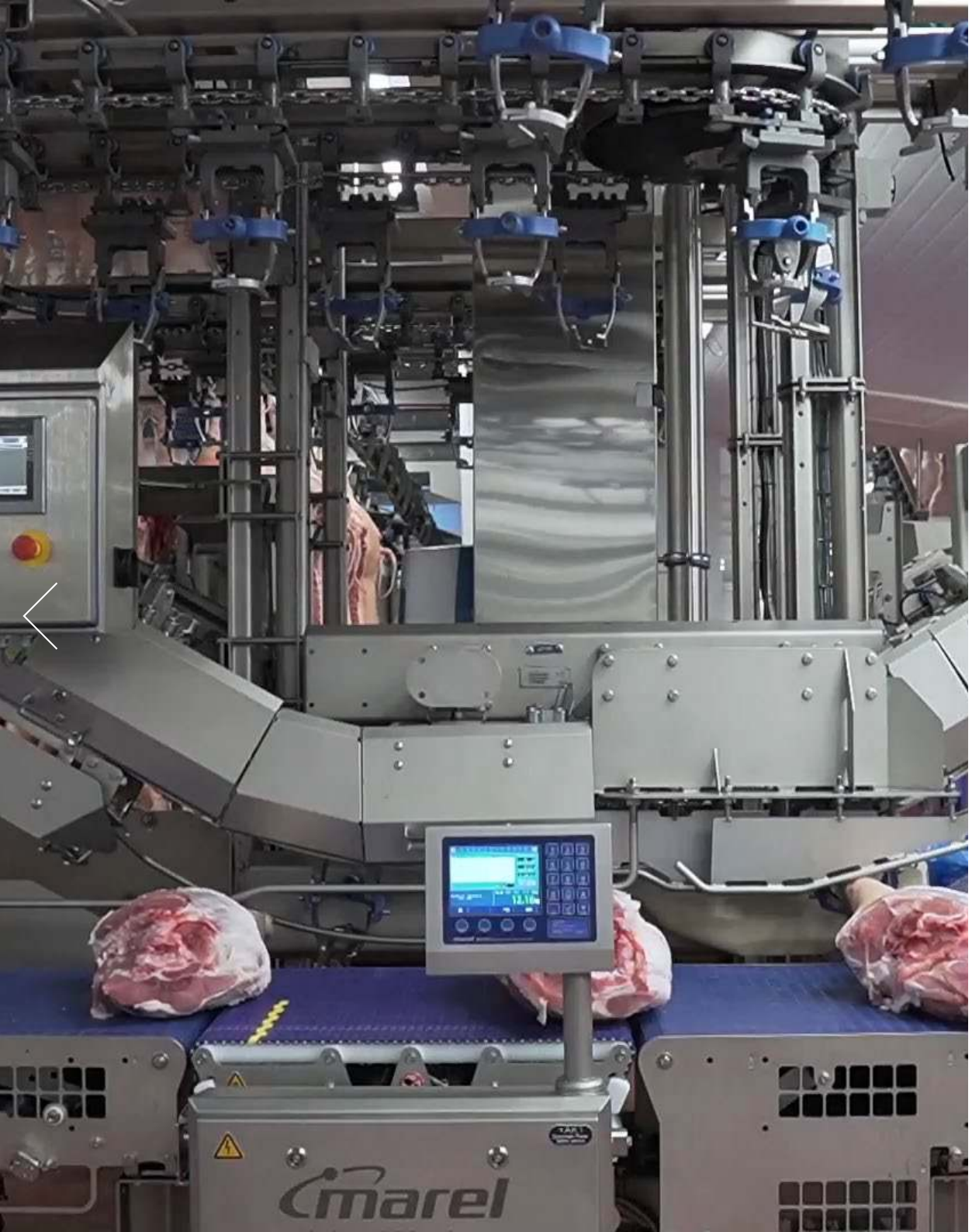
DeboFlex: How vertical cutting and deboning is changing the game



This eBook is an essential guide to the future of pork cutting and deboning, and the revolutionary techniques and technologies that are reshaping the industry. We delve into the transformative power of vertical cutting and deboning with the DeboFlex, a state-of-the-art platform that is revolutionizing how we handle, process, and produce pork products.

TRANSFORMING FOOD PROCESSING

marel



Content

Click to return to this page.

Where do you go from here?

The meat industry is an integral part of our global economy. As a pork processor, you are experiencing an increased demand for high-quality, sustainable, and affordable meat products. Meanwhile, you face rising production costs, labor scarcity and shifting consumer demands. So how do you adapt to the industry's evolving needs while growing a successful business?

In this eBook, we dive deep into the critical components of an efficient line, examine the traditional methods of pork cutting and deboning and explore the future of pork processing.

You will learn about the vertical cutting and deboning with the DeboFlex platform and its potential to transform your business by creating new opportunities for flexible, efficient, and profitable pork production. We examine the technology's components, evolution, capabilities and benefits to provide insights for integrating the DeboFlex into your operations, from assessing current production processes to measuring the success of the implementation. With real-world case studies, you will learn the successes and lessons of businesses embracing the DeboFlex revolution.

Pork cutting and deboning

We begin with the pork cutting and deboning fundamentals along your production line - deskinning, defatting, deboning, dividing, and demembraning - the necessary processes to transform a pig carcass into various pork products, including meat cuts, sausages, bacon, and other processed meats.

While each process and the existing equipment plays a significant role, the specific approach may vary depending on your desired end-product mix and customer preference. By continually improving and adapting these processes, you can enhance your production efficiency and yield to deliver high-quality pork products that meet diverse consumer demands.

The cutting and deboning process begins by dividing the carcass into primary cuts: fore-end, middle, and hindleg, using saws, cutting tools or mechanical devices designed for this purpose. This division improves organization and efficiency in handling, and each primal section offers specific cuts and contributes to a balanced product mix. What comes next are what we like to call the 5 Ds that pork goes through from carcass to customer.

The fundamentals

1 Deskinning

Deskinning is a crucial step in pork processing that involves the removal of the pig's skin. The skin, primarily composed of collagen, must be carefully separated from the underlying fat to avoid damage to the meat and fat layers using hand-held or table skinners.

2 Defatting

Defatting involves cutting fat according to product specifications, considering different applications and consumer preferences. It can be done manually, with fat trimmers or automated systems. Careful fat removal is vital to avoid excessive trimming and minimize valuable yield loss. The extent of defatting depends on specific product requirements, and there is no one-size-fits-all approach.

3 Deboning

Deboning is the removal of bones from pork cuts and can be done manually or with automated deboning systems. The choice between manual and automated deboning depends on flexibility and production volumes, with automated systems typically preferred for higher volumes. The quality of cuts remains consistent regardless of the method chosen.

4 Dividing

Each section from the primal cut is divided into smaller, more manageable subprimals for specific cuts in further processing. This is called dividing. The aim is to produce uniform meat cuts for optimized further processing. Manual methods or mechanical devices like cutting saws or automated systems can be used. Intermediate steps, like pre-cutting shanks, may also be included.

5 Demembraning

Finally, demembraning removes the thin membrane from pork cuts like the top side and tenderloins. Although the membrane can be tough and affect the meat's texture and flavor, it can be removed manually or with demembraning machines. The need for demembraning depends on product application and customer preferences, with certain products not requiring it, such as ground meat.

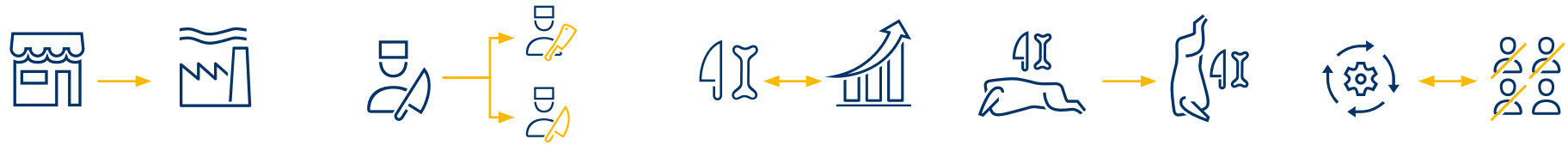
The evolution

Traditional cutting and deboning methods can be limiting in today's industry. These ways of working typically rely heavily on manual labor, with workers using knives and other tools to separate meat from bones and divide carcasses into smaller cuts.

These methods can be time-consuming, labor-intensive, and inconsistent. They create a reliance on the availability and loyalty of skilled workers, limit your ability to meet customer demands for custom orders and prevent your throughput and yield from improving. Utilizing these methods while global populations rise, worker availability shrinks, and consumer demands shift is not sustainable.

Since the 19th century, the pork cutting and deboning industry has experienced transitions that have reflected the continual drive for efficiency, higher yields, and improved product quality in the pork industry, along with a response to changing labor dynamics and market conditions.

Timeline



Late 19th to early 20th century
The Industrial Revolution significantly shifted from small, local butcher shops to large, centralized slaughterhouses and meatpacking plants.

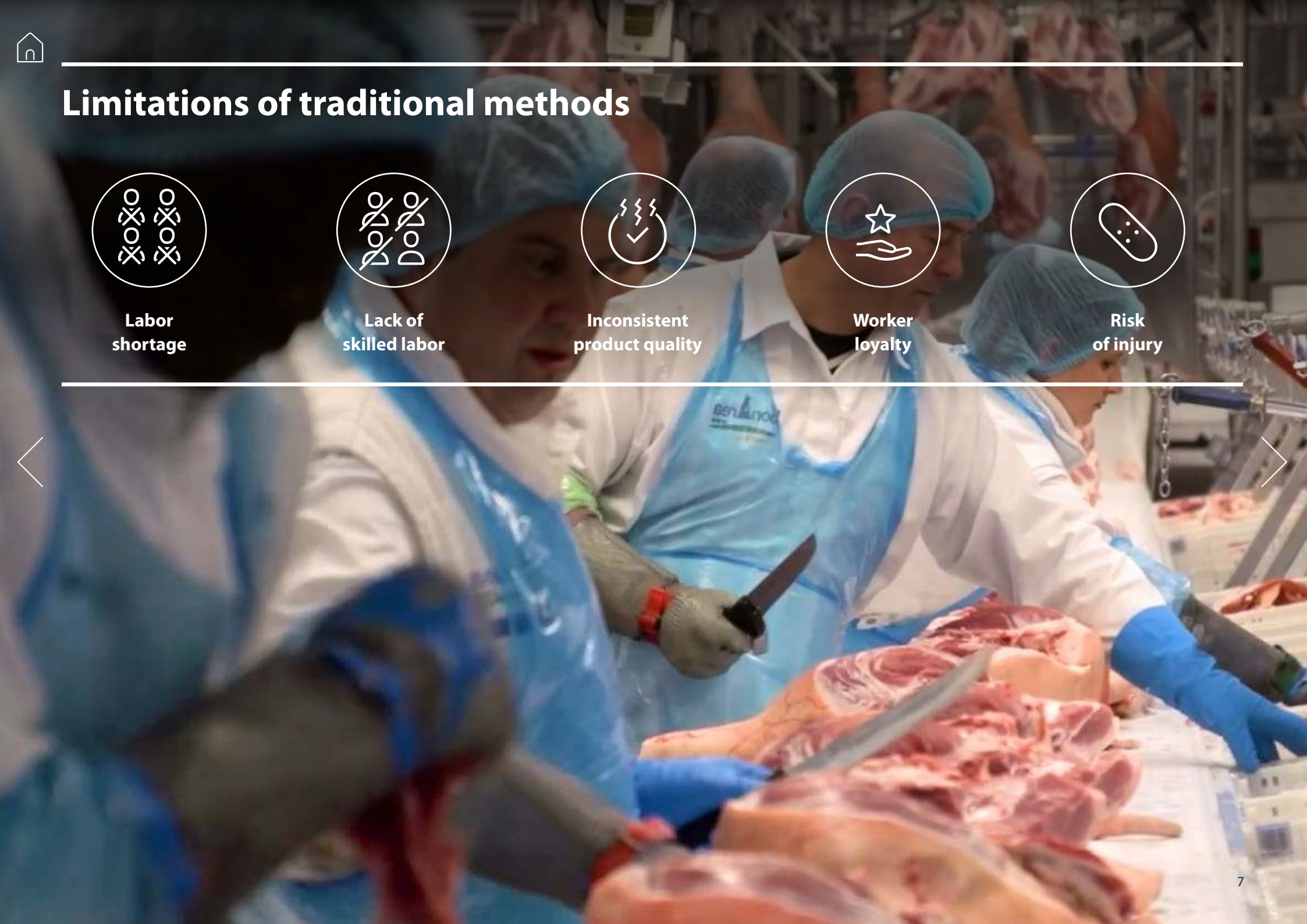
Early to mid-20th century
The deboning process went from a single butcher to being divided among several workers, each specializing in a different part of the process, improving efficiency and speed.

Mid to late 20th century
As processing plants, the highly efficient pace line deboning method became more common, allowing for high throughput.

Late 20th to early 21st century
Hanging deboning was introduced, where carcasses or large cuts are suspended from overhead rails, increasing accuracy and reducing physical strain on workers.

21st century
The introduction of automated and semi-automated systems, such as Marel's DeboFlex platform launched in 2011, marks the latest trend in pork processing, improving efficiency, yield, and product consistency while reducing the need for skilled labor.

Limitations of traditional methods



- Labor shortage
- Lack of skilled labor
- Inconsistent product quality
- Worker loyalty
- Risk of injury

Embracing change

Successful pork production requires establishing a smooth flow based on understanding market trends and adapting processes accordingly. By strategically managing the flow of pork through each processing stage, potential bottlenecks can be minimized, leading to improved productivity and reduced processing time.

Improving processes to maximize pace efficiency and minimize delays typically involve transitioning from individual efforts to collaborative teamwork.

The desired end-product mix heavily influences process optimization, guiding the allocation of resources and process organization.

Implementing advanced automation and intelligent systems further contributes to streamlining the process, reducing labor dependence, optimizing yields, and ensuring consistent quality.

These are essential for maintaining a healthy, profitable, and environmentally responsible business.

The power of gravity with vertical cutting and deboning

The key to prosperous pork processing lies in understanding market trends, optimizing process flow, adopting automation and intelligent systems, and leveraging advancements such as vertical deboning. Vertical deboning, a concept gaining popularity in the industry, offers additional efficiency and yield optimization benefits.

This innovative approach involves vertically suspending the carcass during the deboning process, allowing gravity to assist in separating meat from bones. By vertically suspending and positioning the product, steps are automated, significantly decreasing labor intensity and the required workforce while simultaneously enhancing yield. Vertical deboning systems provide better ergonomics for workers, improved utilization of space, and increased productivity due to the optimized workflow.

The DeboFlex: transforming pork cutting and deboning

DeboFlex is a groundbreaking modular platform designed to optimize your pork processing line by enhancing efficiency, sustainability, and profitability through the seamless automation and simplification of cutting and deboning tasks. It combines cutting-edge automation with ergonomic workstations, creating a highly efficient and secure work environment.

The DeboFlex eliminates process delays, ensuring pork flows smoothly through each stage, reducing wait times, and maintaining consistent production. Integrating the modular platform into your pork processing guarantees a continuous workflow, enabling efficient adaptation to market changes and production demands.

DeboFlex improves yield, throughput, and product quality by automating critical aspects of the processing workflow. It maximizes raw material utilization, championing an environmentally conscious approach that paves the way for a forward-thinking industry.

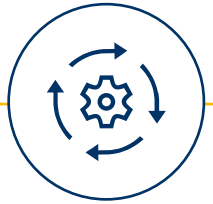
Key components

Conveyor system

The straightforward and consistent process flow of the DeboFlex provides a more efficient and precise division of carcasses. It features a state-of-the-art conveyor system that automatically positions the primal in front of an operator who focuses on one task before the product moves on in the system. This innovative conveyor system is designed for maximum efficiency and accuracy, ensuring that each carcass moves smoothly from one workstation to the next.

Workstations

DeboFlex workstations are designed to accommodate each stage's unique needs in the pork cutting and deboning process and the worker's unique size and skill, removing the need for highly skilled operators. The ergonomic height-adjustable workstations allow workers to easily perform their tasks, minimizing strain and reducing the risk of injury. It also creates a more inclusive work environment and a more attractive industry to the workforce.

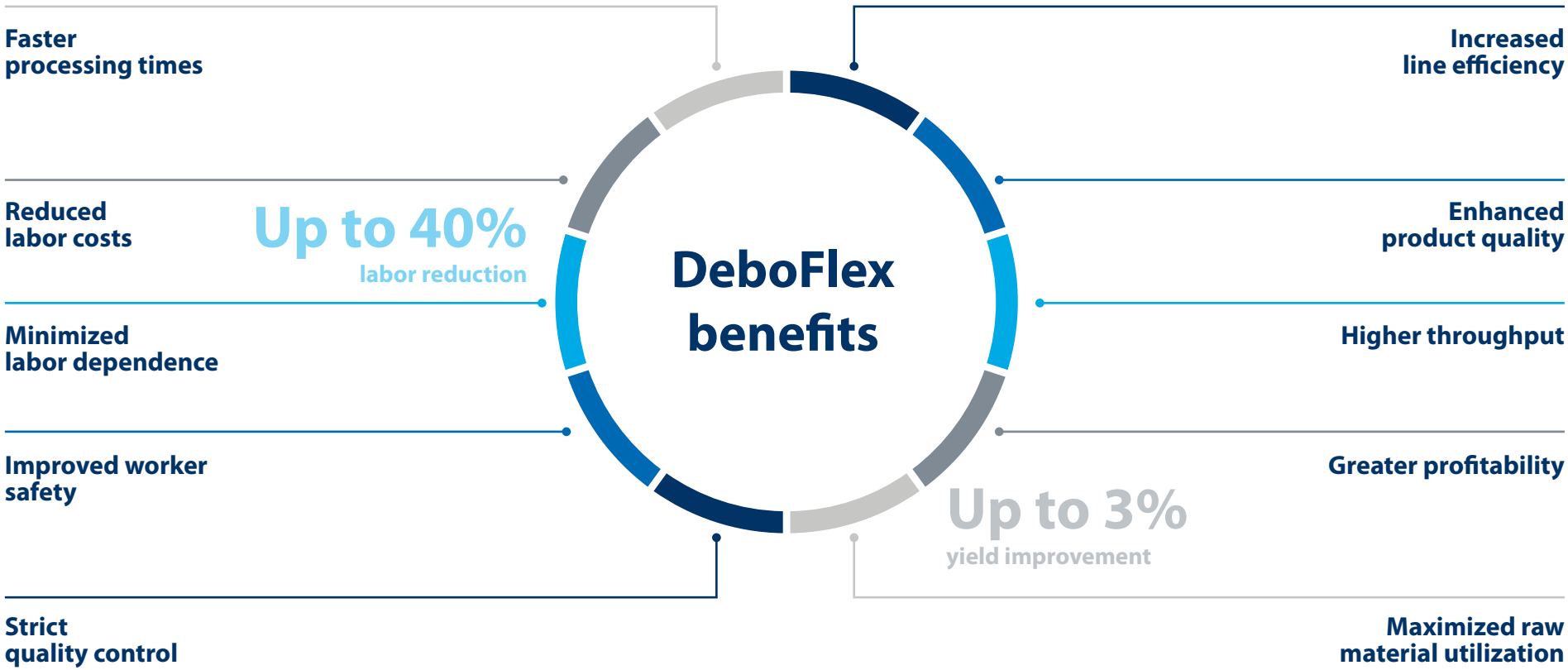


Automation equipment

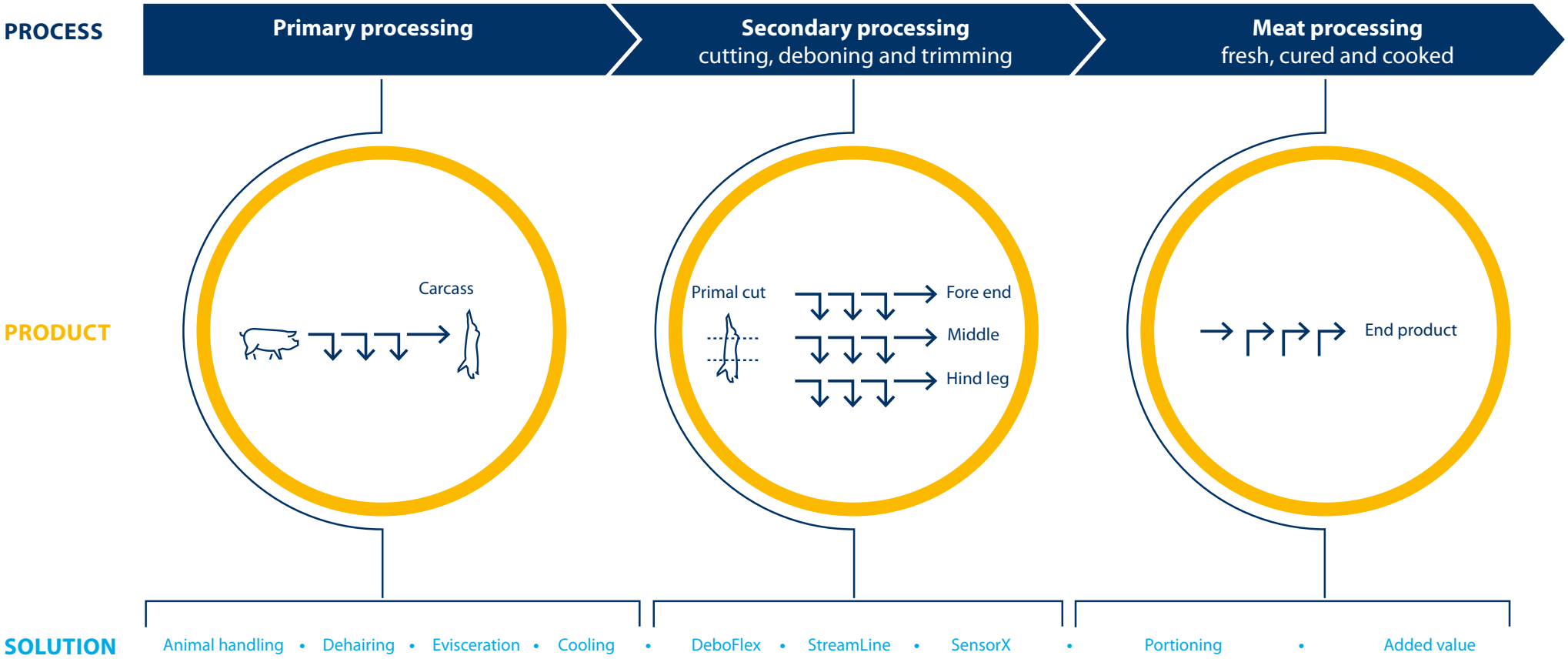
DeboFlex's advanced automation equipment simplifies and improves the deboning process. The system can accurately separate meat from bones through precise control and innovative technology, resulting in a cleaner and more consistent final product. In addition, the DeboFlex solution allows for more precise portioning and trimming of pork cuts, further enhancing product quality and minimizing waste.

Automatic positioning is also important for the automatic equipment. Because the meat is positioned correctly automatically, the module can do its job. By minimizing the reliance on skilled manual labor, DeboFlex helps to increase yield, improve product quality and reduce processing times. The result is a more consistent and efficient pork processing operation that ultimately benefits both producers and consumers.

Benefits


Faster
processing times
Reduced
labor costs
Up to 40%
labor reduction
Minimized
labor dependence
Improved worker
safety
Strict
quality control
DeboFlex
benefits
Increased
line efficiency
Enhanced
product quality
Higher throughput
Greater profitability
Up to 3%
yield improvement
Maximized raw
material utilization

Mapping product, process and solution



Implementing DeboFlex

1 Asses your current production process

Before implementing DeboFlex, it is essential to evaluate your current production process to identify areas for improvement and determine how it can best be integrated into your facility. This evaluation may involve analyzing production data, consulting with workers and supervisors, and seeking expert advice. By thoroughly understanding your current operations, you can better determine the potential benefits of DeboFlex and develop a targeted implementation plan.

2 Train your workforce

Providing thorough training for your workforce is crucial to successfully implementing DeboFlex, including educating workers on the proper use and maintenance of the new equipment, and training supervisors to manage the new workflow effectively. Investing in comprehensive training ensures that your team is well-prepared to make the most of the DeboFlex system, ultimately leading to greater efficiency and productivity.

Implementing DeboFlex

3 Adapt your facility for DeboFlex integration

Integrating DeboFlex into your facility might require existing infrastructure and layout modifications that may involve installing new conveyor systems, reorganizing workstations, and potentially upgrading electrical and mechanical systems to accommodate the new equipment. Careful planning and collaboration with DeboFlex experts will ensure a smooth integration process, minimizing disruptions to your operations and maximizing the new system's benefits.

4 Measure the success of DeboFlex implementation

Once DeboFlex has been integrated into your facility, it is crucial to evaluate the success of the implementation regularly, which may involve monitoring key performance indicators (KPIs) such as processing times, yield, product quality, and worker safety. By tracking these metrics, you can identify areas for further improvement and continually optimize your operations to maximize the benefits of the DeboFlex system. Additionally, regular evaluations can help demonstrate the return on investment (ROI) of DeboFlex, providing valuable insights into the long-term success of the implementation.

Customer story: Cranswick

Cranswick decreases labor and increases yield with DeboFlex

Cranswick Country Foods PLC processes more than 700 pigs an hour to supply a wide variety of premium end-products to retail, service and export customers. Their focus on efficiency, capability and sustainability has led them to embrace automation as a way to meet their targets and address challenges in the marketplace, such as labor scarcity.

Small steps that lead to big improvements

Cranswick's transformation began with the installation of the DeboFlex for fore-ends. "To embark on a journey of change, you have to make sure you can still do what you've always done. The shoulder solution allowed us to dip our toes into a different way without actually changing too much," says Operations Director Darren Andrew.

> *"Small steps at the very beginning to change hearts and minds from a traditional way of doing something to semi-automation has been the catalyst we've needed to push ourselves forward."*
> *Darren Andrew, Operations Director*

> *"Labor shortage is by far our biggest challenge. With the DeboFlex, several deboning tasks are automatic, which decreases the need for labor."*
> *Lee Raspin, Preston Butchery Manager*

Designed according to end-product needs

The modular design of the DeboFlex ensures new additions integrate smoothly, increasing confidence when shifting processing lines to automation. "The DeboFlex system is modular and smart, meaning that we have been able to design it according to our end-product needs," Lee Raspin, Preston Butchery Manager, says. It is an added security that the investments made today will be adaptable to Cranswicks' future requirements.

Addressing labor shortage

"Automating our production has given us tremendous benefits," explains Andrew. "Labor shortage is by far our biggest challenge. With the DeboFlex, several deboning tasks are automatic, which decreases the need for labor." Raspin has noticed similar results with the DeboFlex module for de-rinding installed in 2022, "it has meant less need for de-rinding operators and a more accurate and consistent product." This deskilling of tasks reduced Cranswick's need for skilled operators and improved product accuracy, resulting in a 3% yield increase.

The future of pork cutting and deboning

DeboFlex has evolved as new technologies and advancements have emerged within the meat processing industry. The system was initially developed to address the challenges of manual pork processing and has since incorporated more advanced automation technologies to improve efficiency, worker safety, and product quality.

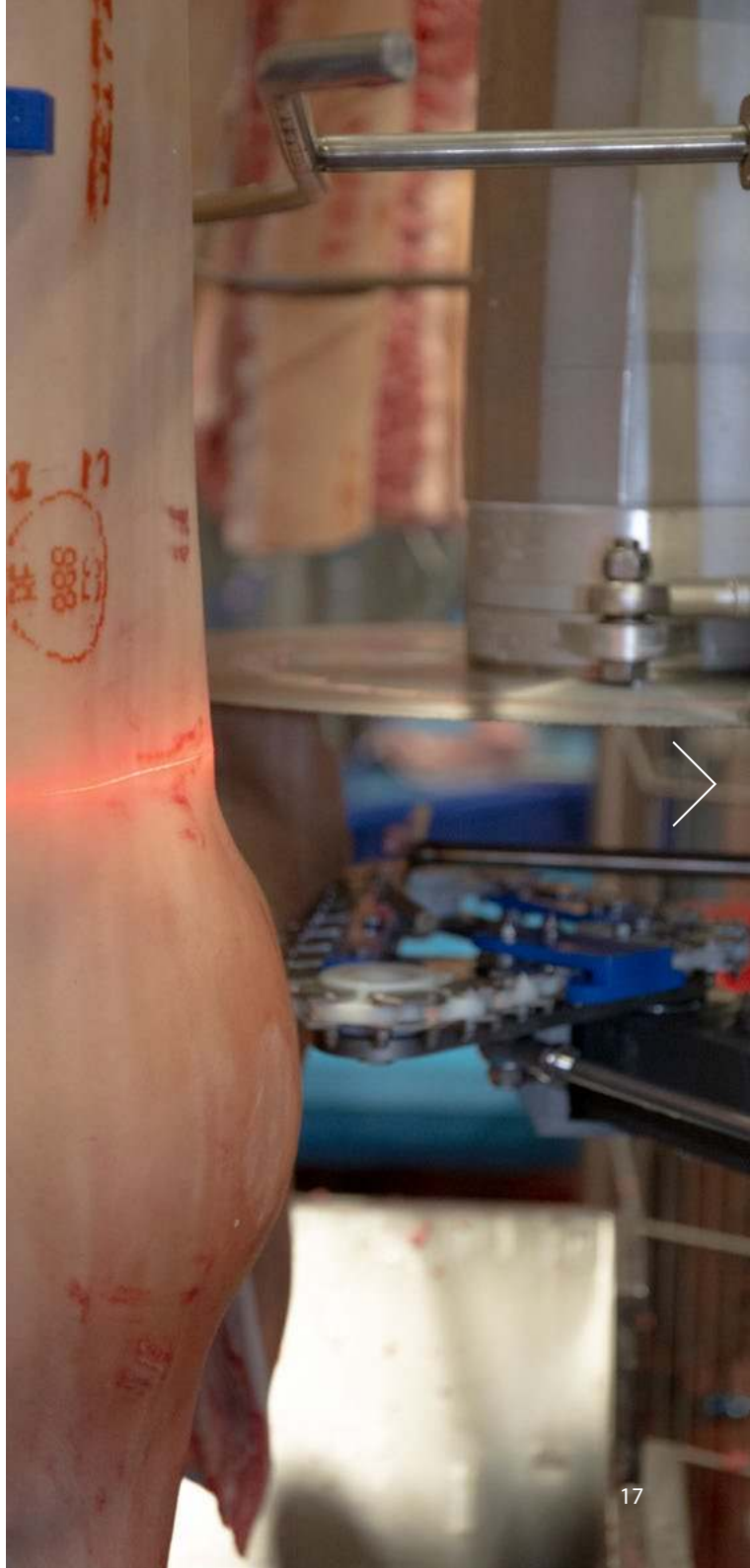
As the meat processing industry evolves, artificial intelligence (AI) and robotics will likely play an increasing role in the DeboFlex. By incorporating AI-driven algorithms and advanced robotic systems, DeboFlex can further improve efficiency, precision, and product quality while reducing reliance on manual labor. These technologies can potentially revolutionize the pork processing industry, paving the way for even greater advancements in meat production.

Innovation in sustainable meat production

Sustainable meat production is becoming increasingly important as the global demand for meat grows. DeboFlex's focus on efficiency and reduced waste can contribute to more sustainable practices within the pork processing industry. These developments will further strengthen DeboFlex's position as a leader in sustainable meat processing solutions.

Potential expansions and applications of DeboFlex

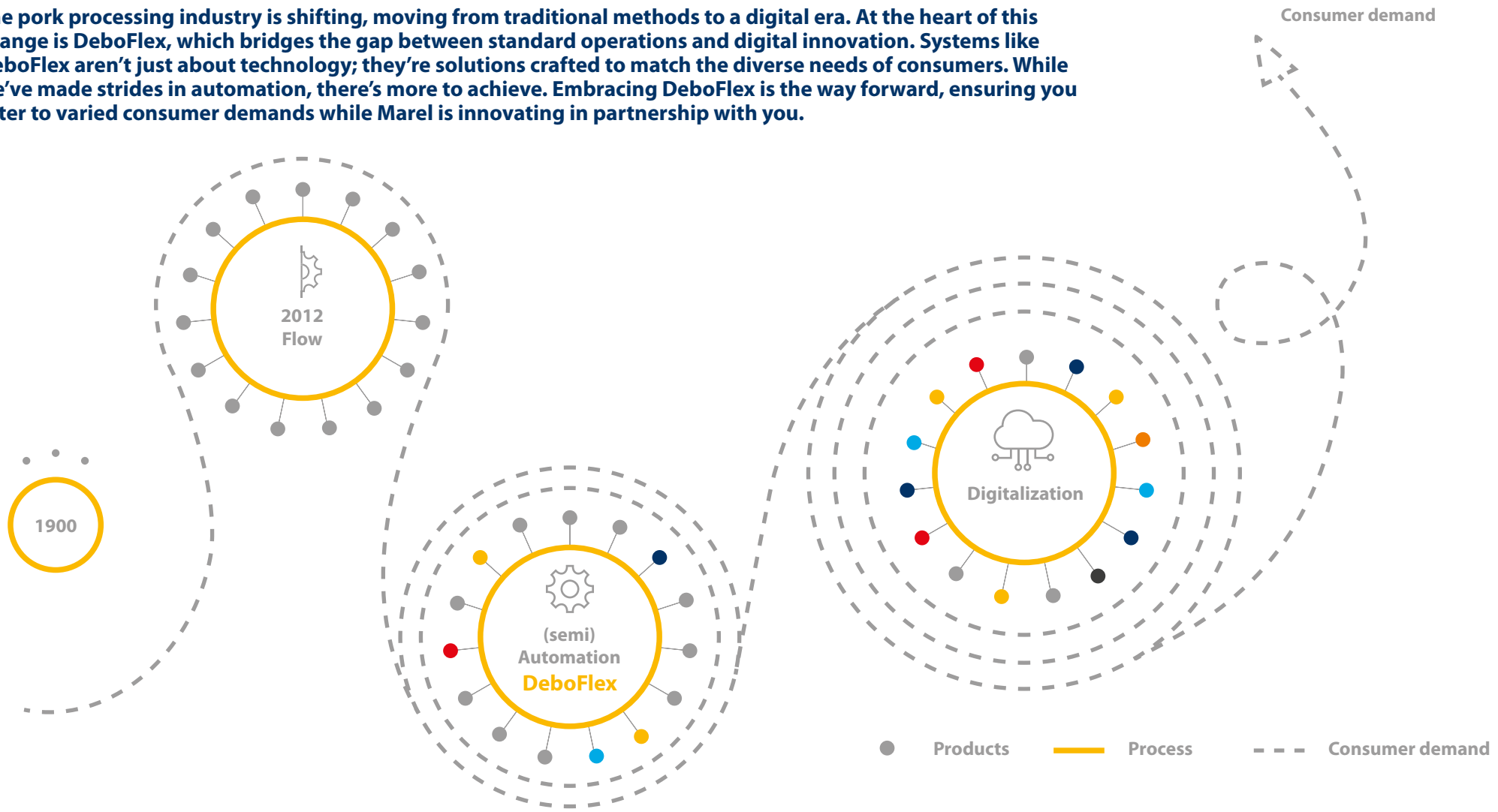
While DeboFlex has already made a significant impact in the pork processing industry, there is potential for the system to expand into other areas of meat production. By adapting the DeboFlex technology to suit the unique needs of different industries, the system could revolutionize meat processing on a broader scale. DeboFlex's automation and efficiency principles may also find applications in other sectors of the food industry, showcasing the versatility and potential of this groundbreaking solution.



Shaping integrated technologies:

meeting high variety in consumer demands with DeboFlex

The pork processing industry is shifting, moving from traditional methods to a digital era. At the heart of this change is DeboFlex, which bridges the gap between standard operations and digital innovation. Systems like DeboFlex aren't just about technology; they're solutions crafted to match the diverse needs of consumers. While we've made strides in automation, there's more to achieve. Embracing DeboFlex is the way forward, ensuring you cater to varied consumer demands while Marel is innovating in partnership with you.



The transformative potential of DeboFlex

The meat industry is at a critical juncture, with rising global demand and increasing pressure to improve sustainability and efficiency. DeboFlex represents a significant breakthrough in pork processing technology, offering a comprehensive solution to many of the challenges faced by the industry.

By combining advanced automation with ergonomic workstations, DeboFlex has the potential to revolutionize the way pork is processed, leading to increased efficiency, improved worker safety, and enhanced product quality. As demonstrated through success stories from around the world, the transformative potential of DeboFlex is evident, positioning the system as a game-changer in the meat processing landscape.

Embracing innovation and automation for a more sustainable future

Innovation and automation are essential components of a more sustainable and efficient future for the meat industry. DeboFlex embodies the spirit of innovation, showcasing the power of technology to reshape traditional processes and drive meaningful change.

By embracing DeboFlex and other innovative solutions, meat processors can work towards a more sustainable and prosperous future, meeting the growing global demand for high-quality, responsibly produced meat products.

Ready to step into the future

Are you ready to discover how the DeboFlex can transform your pork processing line?

We are in the business of transformation, innovation and inspiration. Our pork cutting and deboning experts are standing by to listen to your needs, analyze your current production and map out the potential that the DeboFlex can bring to your business.

Visit **marel.com/en/products/deboflex** to book a meeting with one of our pork cutting and deboning experts today.