



**MARLEN INTERNATIONAL**

A DURAVANT COMPANY

## WHITE PAPER

### **ADVANTAGES OF MARLEN'S ENCLOSED PIPELINE X-RAY SYSTEM**

*A unique and fully integrated vacuum pump and enclosed x-ray inspection system for boneless meat and poultry products*

Published by Marlen International



**MARLEN**  
MARLEN. REAL. SMART.

## BACKGROUND

Unlike conventional belt-style x-ray systems in use today for processing of meat and poultry, Marlen's Opti PipeChek system runs product through an enclosed pipeline, allowing full retention of both solids and liquids during the entire process. As such, "purge" that would otherwise be lost to the floor is re-absorbed by the product, resulting in net yield recovery by weight of 1.5 to 3 percent.

## SOLUTION

### Marlen designs systems to fit your needs

The Marlen Opti PipeChek System can be tailored to your company's needs by any of several different vacuum pump sizes. Marlen's equipment can pump whole muscle products at rates from 12,000 to 32,000 pounds per hour. The Opti PipeChek System gives your company the flexibility to place one or two x-ray units in series, fed by a single Marlen Opti pump. The dual x-ray configuration adds an additional level of detection, for even stricter inspection. Proprietary software developed by Marlen allows each x-ray machine to detect foreign matter independently, while ensuring accurate rejection by the integrated system, thus minimizing product waste or the need for re-work.

### Going beyond traditional bone detection technology

By using Marlen's full vacuum pump technology, air pockets in the product stream are eliminated. This allows the x-ray unit to create a more vivid image of bones and foreign matter, for more accurate detection. Since product is pushed downstream by the gentle action of the Marlen Opti twin-piston pump, everything is contained in the pipeline and flows downstream through the x-ray unit. Now even loose bone fragments can be more readily detected and rejected, unlike on traditional conveyor belt systems.

### Upping the ante in rejection control

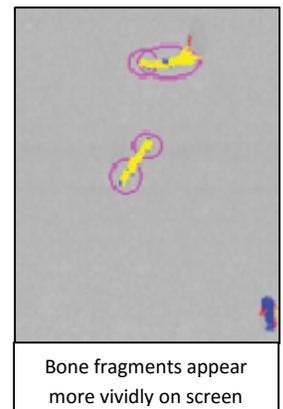
Marlen's Opti PipeChek System is designed to deliver superior bone fragment detection and rejection. Proprietary software specifically developed for Opti PipeChek enables the system to accurately reject detected bones, based on their location as determined by the system's flow rate. As a result, the overall amount of product rejected is dramatically reduced. The software's "intelligence" allows reject cycles to be completed accurately even after momentary interruptions in production!

### Redefining portion control

The Marlen Opti pump supplies a continuous and steady flow of product along with net weight portioning capability, while allowing you to x-ray your product still prior to packaging. The integration software between the Marlen Opti pump and Safeline's x-ray inspection machine is able to track foreign matter based on flow location, allowing the accurate removal of contaminants while maintaining proper portion control.

### User-friendly and easy to sanitize

The Marlen Opti PipeChek System is designed for quick and easy disassembly, cleaning and reassembly. With the x-ray unit mounted on a v-rail frame, the equipment can be separated easily for cleanup and reconnected with minimal tools.



## MAKING THE CASE FOR INSPECTING PUMPED PRODUCT VERSUS CONVEYORIZED PRODUCT

Validation tests were conducted using 60,000 pounds of split, de-boned chicken breasts from one facility. It was then refrigerated and transported to a further processing facility. The time between de-boning and inspection allowed the product to seep liquid containing protein, which was then collected in each 2,000# combo. The total weight of product both entering and exiting the inspection process was documented. Marlen’s Opti 340 twin-piston pump with vacuumizing hopper / PipeChek Plus system’s performance was compared to that of a conventional belt x-ray system. Product was inspected through the Opti 340 / PipeChek Plus system. All product rejected was manually inspected to remove bone fragments, and then passed back through the x-ray inspection process to ensure that the bones had in fact been removed. The accepted “clean” product was then inspected through the belt x-ray system. This process was then reversed, and data collected. Three belt x-ray systems were in place, each inspecting at a rate of 7,000 pounds per hour. The Opti 340 / PipeChek Plus was set up to run at a rate of 20,000 pounds per hour, to replicate the 3 belt x-rays' combined throughput.

### CASE STUDY COMPARISON RESULTS

	Opti 340 / PipeChek Plus	Conveyor System (x3)
Throughput system capacity	28,000 lb./hr.	7,000 lb./hr. each
Throughput tested	21,000 lb./hr.	7,000 lb./hr. each
Bones removed	32 bones/combo	31 bones/combo
False positives	3 false tags/combo	31 false tags/combo
Weight rejected per detection	5.5 lb./reject	3.0 lb./reject
Total weight rejected (manual inspection)	190 lb./combo	186 lb./combo
Bones missed – found by other systems	1 bone/combo	2.5 bones/combo
Product weight loss through system	0.1% (2 lb./combo)	4.5% (90 lb./combo)

## SUMMARY

In summary, the processor would experience \$1M in upfront equipment cost savings with minimal product weight loss (70,000 lbs per week saved), 3 times higher throughput than belt x-ray systems, and \$1M annual savings in product recovery and superior bone detection based on 5 times better rejection control than belt systems. Based on a two shift operation, this is a gain of \$2.4 million annually per production line.

### About Marlen International

Marlen International is a premium manufacturer of highly engineered food processing equipment and systems specializing in high quality proteins and a variety of other food products. Sold under the brand names of Marlen and Carruthers, their products have long set the standard for performance in vacuum stuffing and pumping, portioning, size reduction, thermal processing and food handling. Marlen’s engineering, design and technical experts are recognized as industry consultants and process partners, serving the world’s leading food brands through the delivery of operational excellence for over 60 years. Marlen International is a Duravant Company. For more information, visit [www.marlen.com](http://www.marlen.com).