



Olive Oil Booster

A new era of olive oil profitability



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Introduction

The Alfa Laval Olive Oil Booster system is a combination of different technologies working together to maximize oil yield and quality in oily fruit processing. The Olive Oil Booster improves decanter performance and, in synergies with the olive crusher and vertical centrifuge, enables the extraction of a significantly higher quantity of olive oil together with a higher quantity of antioxidant components (phenols).

The Olive Oil Booster can increase income without increasing operating costs. By making the oil extraction from fruit pulp easier, the Olive Oil Booster is also capable of reducing process water consumption and disposal, which in turn reduces both costs and environmental risks. Due to the high extraction rate per kilogram of olives, the Olive Oil Booster system is also efficient in terms of energy consumption.

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What is the Olive Oil Booster?

The goals of the Alfa Laval Olive Oil Booster system are to increase the oil extraction yield from the decanter with a higher quantity of antioxidant components (phenols) and to preserve more positive aroma compounds compared to traditional technology.

Processing mills for olive oil production are using malaxing technology for the mixing, heating (up to 27-30°C) and holding of the olive paste produced by olive crushers. Malaxation is necessary to enhance endogenous enzymes to release “free oil” into olive paste, which can then be extracted by the decanter centrifuge and purified by the vertical centrifuge in the following steps.

The Olive Oil Booster system is replacing traditional malaxer technology with horizontal mixing tanks under deep vacuum. From the olive crusher, the paste is sucked into the booster where deep vacuum, mixing, and holding at low temperature (15-20°C) leads to a significantly higher quantity of “free oil” with a significantly higher quantity of phenols. “Free oil” obtained by the Olive Oil Booster is easily extracted by the decanter centrifuge and purified by the vertical centrifuge. Thanks to the very low process temperature of the Olive Oil Booster, positive aroma compounds are preserved. The Olive Oil Booster can also be used in combination with traditional malaxing.

Why is this important?

In order to improve profitability for large production mills, it is essential to increase the yield of better-quality oil. It is also essential to improve the ratio between quality and yield, especially for early harvest olives. Yield obtained by common technology is often a significantly limited

in terms of achieving optimal profitability of high-quality premium olive oils. The opportunity to produce oil richer in antioxidants (phenols) can be a strong contributor to more healthy food consumption.



What are the benefits?

There are three key benefits when installing the Alfa Laval Olive Oil Booster system in an oil mill:

- **Increase the oil extraction yield** by maximizing the oil yield extraction throughout the whole harvest season, including early harvest or difficult extraction conditions. This has a strong, positive impact on revenue, with a consequent improvement of profitability thanks also to the limited influence on the operational costs.
- **Increase the oil quality** by improving the quality of extracted oil with a significant increase of phenols. The amount of phenols in the oil is extremely important for healthy food consumption, and for a longer shelf life. An oil richer in phenols can also achieve a higher market price, leading to further improvements on revenue for the millers.
- **Create value** by increasing the performance of the decanter with lower water consumption which results in a higher process capacity. The Olive Oil Booster improves the paste preparation with a significant increase of “free oil” released. This results in better performance of the decanter centrifuge, with cleaner oil at higher capacity and less water consumption (when needed). This also leads to improved performance in capacity and cleanability of the vertical centrifuge. These benefits translate into cost reduction and improved environmental sustainability.





How does it work?

The Alfa Laval Olive Oil Booster system works via a combination of thermal and separation solutions, with a Plate Heat Exchanger (PHE) and a decanter centrifuge as its core technologies. This is what makes the Olive Oil Booster a class-leading solution while maintaining the traditional process flow, as can be seen in this step by step summary:

Step 1

Crushed olives are transferred into the booster

Olives are crushed as they are in traditional oil mills. Olive paste is immediately transferred into the Olive Oil Booster at a defined settled vacuum pressure. Thanks to the vacuum pressure, there is a quick cooling down process and fast removal of oxygen.

Step 2

Booster release of “free oil” from the olive paste

Olive paste is agitated by the horizontal shaft with blades for a certain time at a settled pressure (deep vacuum) and temperature. Keeping the vacuum pressure below the boiling pressure at a settled temperature (i.e. 18°C), the olive paste is kept under boiling conditions where a certain amount of water changes its physical phase from liquid to vapor. This process of boiling olive paste at cold condition is capable of producing a bigger oil drop and a higher amount of phenol-rich “free oil” compared to traditional malaxation, with a significant increase of oil yield at higher quality. The energy necessary for this physical phase change is provided by hot water circulating into the jacket of the vacuum tank, heating the olive paste.





The small quantity of vapor produced during exposition of the olive paste to the vacuum is condensed by a plate heat exchanger, where cold water is produced by a chiller and the small quantity of condensate vapor is returned to the extraction process. Because the paste is boiling at low temperature, there is no negative effect on the amount of positive aroma compounds of olive oil.

This step of “free oil” release could be obtained entirely by the Olive Oil Booster, or by using the booster in combination with traditional malaxing.

Step 3

Separate the oil with a decanter centrifuge

The olive paste prepared by the Olive Oil Booster is fed into the decanter centrifuge where the oil is separated from water and solids, working in two or three phases. Performance of the decanter in terms of capacity, oil clarity, residual oil in the husk and quantity of dilution water (in case of three phases), is strictly dependent on the characteristics of the olive paste prepared during the previous operation.

With a traditional malaxation system, the results from “free oil” production and oil drop dimension depend strictly on many variables such as fruit ripeness,

fruit moisture, fruit variety, crushing technology, etc. The paste preparation made by the Olive Oil Booster is generally improved in terms of oil drop dimensions and production of “free oil” with respect to the traditional method. This improvement is obtained independently from fruit characteristics when compared with the traditional method.

All of this results in a significant improvement of performance of the separation in the decanter with clear advantages in the reduction of the residual oil in the husk, increase of throughput capacity, improved oil clarity and reduction of dilution water quantity when used. The improved oil clarity obtained by the decanter after the Olive Oil Booster also helps to improve performance of the vertical centrifuge for oil purification. Oil coming from the decanter with less impurities improves the vertical centrifuge’s capacity and reduces the number of the cleaning stops.

Summary

Investing in an Alfa Laval Olive Oil Booster system with a decanter results in tangible benefits to the business and to the environment. By increasing the oil yield and obtaining better oil quality, it is possible to make a real difference in terms of profitability, while also producing healthier food with improved sustainability. The Alfa Laval Olive Oil Booster ensures higher yields across all seasons regardless of the variable external conditions.

The Alfa Laval Olive Oil Booster system has been designed to minimize investment, installation and operational costs.

Where can the Olive Oil Booster be most useful?

All extraction processes related to olive oil such as:

- First extraction in batches or in continuous
- Second extraction or re-milling

The Alfa Laval Olive Oil Booster is also suitable for all processes dedicated to extraction of oil from fruit pulp like avocado oil extraction.





This is Alfa Laval

Alfa Laval is active in the areas of Energy, Marine, and Food & Water, offering its expertise, products, and service to a wide range of industries in some 100 countries. The company is committed to optimizing processes, creating responsible growth, and driving progress – always going the extra mile to support customers in achieving their business goals and sustainability targets.

Alfa Laval's innovative technologies are dedicated to purifying, refining, and reusing materials, promoting more responsible use of natural resources. They contribute to improved energy efficiency and heat recovery, better water treatment, and reduced emissions. Thereby, Alfa Laval is not only accelerating success for its customers, but also for people and the planet. Making the world better, every day. It's all about *Advancing better™*.

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