Alfa Laval in brief
Alfa Laval is a leading global provider of specialized products and engineering solutions.
Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes.
Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuff, starch and pharmaceuticals.
Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

How to contact Alfa Laval
Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

PFT00531EN 1401

Olive oil processing solutions

Sustainable innovation for batch and continuous production

Doubling capacity during harvest

Coesagro, a cooperative in Seville, Spain, faced the challenge of having to extract oil from 700–800 t/d of incoming olives during the short harvest. By installing a single line with an Alfa Laval Y10 decanter and 2 Alfa Laval high-speed separators, Coesagro was able to double its processing capacity.
The return on investment is high in terms of performance, reduced maintenance costs and savings in total cost-of-ownership.

Big, small and everything in between

Olive oil producers around the globe rely on Alfa Laval experts and specially designed equipment for every process step to help them turn their olives into the best possible olive oil – consistently and cost-effectively.

Olive oil is a delicate, natural product that can be produced in numerous different ways. The basics are the same, but each company's production specifics, processing complexities and priorities are different.

Alfa Laval capabilities to suit your needs

From smaller-scale local artisan operations to large-scale industrial operations processing olives on a high-volume continuous basis - whatever your needs, Alfa Laval can supply solutions that ensure cost-effectiveness, documented reliability and any combination of technological capabilities, product specifications and quality level that your particular operation requires.

We are one of the few companies in the world that provides equipment capable of meeting the entire spectrum of olive processing priorities and requirements – from initial defoliation to extraction and final packaging (bag-in-box filling) – for plants of almost any size, capacity and complexity.

More than the sum of the parts

Whether you need a single machine or complete process lines including installation and commissioning, you can reap huge benefits from working with a technology supplier completely familiar with all aspects of olive oil extraction, as well as the priorities of the olive oil business in different markets.

We are also experts in fine-tuning and optimizing the countless ways that different processes, technologies and equipment can be integrated to ensure more cost-effective, better-quality results that are more than the sum of their parts.

A separation method for every need

For batch as well as continuous olive oil production, deciding the right separation process depends on many factors e.g.:

- Wish to minimize water consumption (two-phase 0-15%, three-phase 10-25%)
- Frequency of batch start/stops (three-phase most suitable for fluctuating feeds)
- Appropriate by-product handling capabilities for black water and wet/dry husk.

Alfa Laval is happy to share our expertise and help make the choice that is right for the specific needs of you and your customers.

A question of advantage

The technology advantage

We put some of the world's most robust and advanced olive oil processing technology plus decades of experience and process know how at your disposal – on your own terms. This can make a big difference to what you can achieve and can give you a competitive advantage.

Better oil quality

You get the best quality oil out of the olives delivered to your processing facility, whether big or small, when you apply Alfa Laval technology and tap into our expertise. Better quality means maximum value and better profit margins, as well as greater professional satisfaction.

A lot has happened since Alfa Laval developed the first olive oil separator in the 1920s

Cost effectiveness

Using Alfa Laval high performing solutions with high capacity and maximum yield can help you reduce a wide range of costs, and to "do more with less", paving the way to significantly better profit margins. They are easy to operate, clean and maintain – with a long life time.

Energy efficiency

Energy costs and environmental impacts are increasingly important operating parameters, also playing a role in marketing/PR acceptability.

Our innovative processing solutions help you turn such challenges into sustainable and commercial advantages.

Flexibility

Alfa Laval processing equipment is designed to be versatile, and makes it easy to scale your output up or down to match changing circumstances and priorities, as well as fluctuating market forces.

Greater flexibility, e.g. from modular design and dedicated control systems, enables you to effectively align your processing profile and output with fluid commercial realities, saving money in some cases and making the most of business opportunities in others.

Additional business opportunities

You can also explore new business opportunities and revenue streams with our technology. Outside the olive season, you can use the same equipment to produce additional revenue-generators, such as avocado oil.

Upgrading and extension

When designing machinery we ensure that it is easy to integrate new equipment that upgrades your processing capabilities, or retrofit previous-generation set-ups, with a minimum of disruption or downtime.

This enables you to adhere to the most competitive cost margins as soon as technical increments and game-changer equipment become available.

World pioneer aiming at the zero-waste mill

Through close team work with Alfa Laval since 1962, Santa Tea in Tuscany was the first ever to introduce new olive oil technologies – the first centrifugal system, the first continuous line and disc crusher, and now also the Express heater and the BlueVap black water treatment.
Today, Santa Tea's two oil mills convert 10 t/h of olives into 300,000 litres of extra virgin olive oil/year, processed within 24 hours of the harvest. The owner says: "Alfa Laval helps us reach our goal of a zero-waste olive oil production."

Advanced technology for large volumes

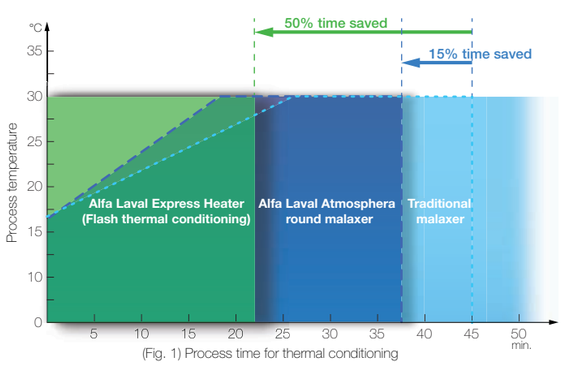
California Olive Ranch (COR) is the largest US producer of extra virgin olive oil, processing up to 80 t/h for more than 67 farmers.

Quality and freshness are essential, and in 2011 COR installed a completely new line to improve performance and reliability. Alfa Laval equipment is found at every step, from crushing, extraction using round malaxers and separation with 3 high-capacity Y10 two-phase decanters to final clarification with 6 high-speed separators.

Trendsetting innovations with proven benefits ....

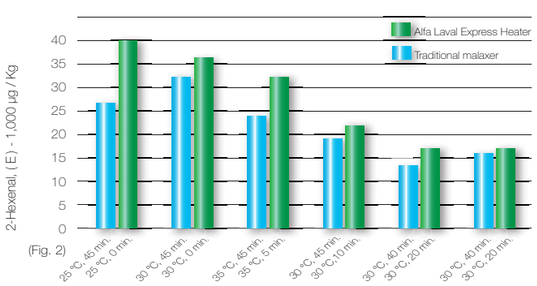
Express heater for low temperature extraction (left) and energy saving round Atmosphera malaxers (right)

Paste preparation for olive oil (batch production)



(Fig. 1) Process time for thermal conditioning

Amount of olive oil fraction positively influencing aroma and taste



(Fig. 2)

Standards others are judged by

Alfa Laval has a unique record of constant technical innovation in solutions for processing olives into olive oil since we launched the first high speed separator in 1927. We have developed and patented many technologies now considered standard throughout the olive oil industry. One example is the first continuous olive oil extraction line based on decanter centrifuge technology in the 1960s.

Ensuring maximum productivity and reliability is always in scope of our R&D, often in close cooperation with our customers. Our most recent and well proven innovations are characterized by focus on sustainability and further improving efficiency.

Round malaxers that save energy

Since 2000 we have completely redesigned the concept of malaxing by introducing modules with round malaxers (Atmosphera and RM). The cylindrical shape optimizes the malaxing process by eliminating dead spaces and maximizing the heat transfer area. This ensures quicker heating of the paste, reduced total malaxing time and less energy consumption while improving the oil quality.

Express heating for faster extraction at lower temperature – and better taste

Express heating is a completely new energy-efficient concept for paste preparation. Compared to traditional malaxing, where gradual heating, holding and mixing takes place at the same time, the express heater offers a two-step concept that enables olive oil producers to cut normal extraction time by up to 50%.

As the express heater instantaneously raises the paste temperature to the optimum value for oil extraction, but without active mixing, the subsequent enzyme extraction and mixing in a separate tank only needs a very short retention time, thus speeding up the extraction process (figure 1).

Shorter time at the right temperature has also proven to have a very positive impact on the oil quality (figure 2).

.... where efficiency and sustainability go hand in hand

High capacity two-phase Y-decanters

When introducing the high-performing, yet compact Y10 two-phase decanter centrifuge in 2010, Alfa Laval extended the boundaries by offering the largest working capacity in the history of olive oil technology.

At the same time it provides a lower concentration of residual oil in the husk. Cost saving design and enhanced wear protection ensures low maintenance costs and longer service intervals.

Smart, flexible X-decanters

Three-phase X-decanter models have been redesigned for optimum cost-efficiency with minimum waste and utilities. A new, innovative liquid outlet reduces oil loss in black water effluent to almost nothing. They can even run in both two- and three-phase separation mode. Added values are less energy consumption and better olive oil quality due to less temperature increase plus lower maintenance costs.

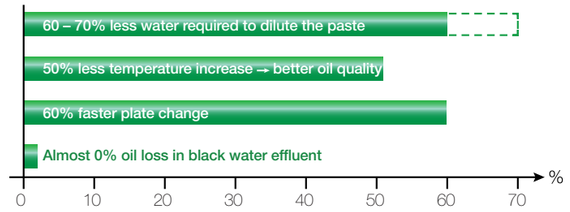
On-site effluent treatment saves disposal costs - and paves the way for better oil recovery

To meet the increasing need for disposal of black water effluent from three-phase extraction - and to optimize the re-milling process for oil recovery and reuse of by-products (see page 13) - Alfa Laval has developed a thermal separation process. The compact pre-assembled BlueVap plant turns black water into 80% clear process water that can safely be discharged to the local sewage plant, and 20% concentrate that can be mixed with husk – without any need for steam or cooling water. As the graphs show, BlueVap reduces the polluting load (COD) by 99%, and the disposal costs by > 60%. A large capacity version, AlfaFlash, is available for husk treatment plants with steam available.

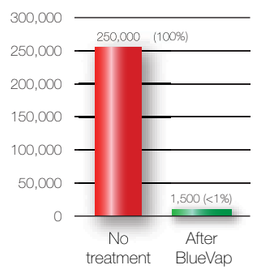
Black water (left) separated by BlueVap into clear water (middle) and concentrate (right)

Y10 decanter and round malaxers at COR (left) and BlueVap black water treatment at Santa Tea (right)

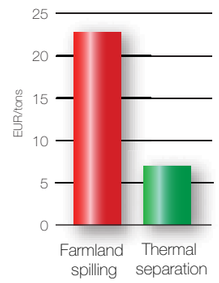
Benefits of new X-decanter outlet



Chemical oxygen demand (COD) without & with BlueVap black water treatment



Disposal costs for waste water



High capacity with bag-in-box

Solfrut in Argentina is one of South America's biggest industrial olive oil producers, with more than 500,000 trees.

In 2012, Solfrut's three Alfa Laval extraction lines were supplemented by two new lines for continuous extraction, equipped with Y10 decanters and round RM 9000 and RM 6000 malaxers as well as an Astepo bag-in-box filler. This triples capacity to a total of 37 t/h.

Complete line for private labels

Montalbano Cooperative Oil Mills, situated in the region of Tuscany, Italy, produces a wide range of extra virgin olive oil under its own brands as well as private labels.

In 2012, Montalbano installed a complete Alfa Laval process line featuring a washer, crushers, energy-saving Atmosphera malaxers, an X6 decanter and separators. Olive pits are used as fuel to supply power for the plant.

Large-scale industrial production

Key challenges when producing olive oil on an industrial scale in very large quantities often relates to economies of scale – to maintain a reliable, highly efficient, continuous production with high yield and low operating costs. On the product side a stable, consistent oil quality is desirable. Today, we also see increasing focus on minimizing the environmental impact, from a sustainability as well as a cost perspective.

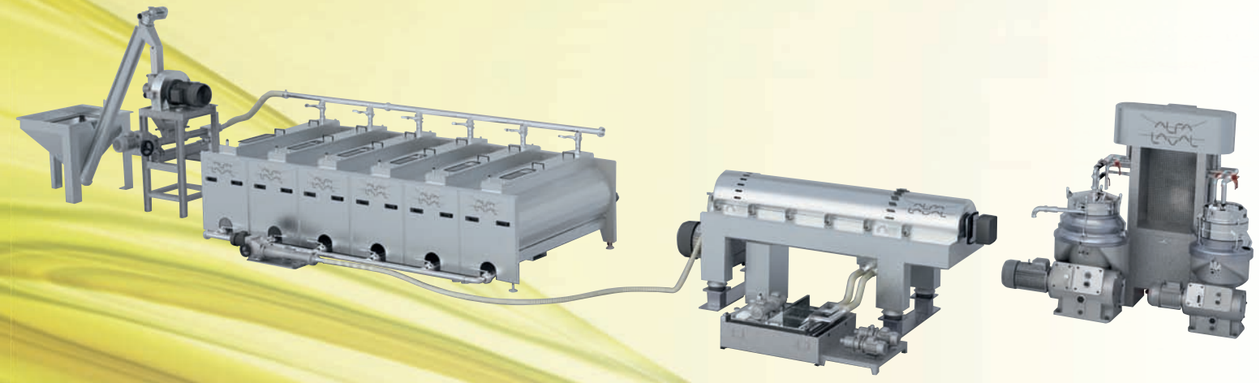
For companies that process olives on an industrial scale, Alfa Laval provides advanced high-yielding technologies that help ensure consistency, control and cost-effectiveness. Additional savings on operating costs come from reduced energy and water consumption, and low or no disposal costs.

Wide portfolio with more choices
Our wide range designed for large scale, continuous production includes a variety of washers and crushers plus three types of malaxers: Standard MAP, energy efficient round RM malaxers and the Express heater. We offer the largest-capacity equipment available for separation (Y-decanters) and high speed separators for clarification.

The compact, modular systems are designed to optimize space and facilitate easy expansion. High process flow rates and a very hardy material plus the right control systems are also crucial to ensure high reliability along with low operational and maintenance costs.

Smaller-scale production

Many olive oil producers operate on a smaller scale, focusing on batch production, artisan quality and the need to deal with locally sourced olive inputs that can vary considerably in type, volume and quality. Besides the need for efficient machinery running reliably during short harvests, flexibility and the possibility to control the process for different olive oil properties are also in scope.



Alfa Laval equipment dedicated to batch and small scale continuous production makes it much easier for you to process different-size batches of olives – with fluctuating specifications – as and when these are ready.

Flexibility to customize
Our portfolio offers maximum freedom of choice, and the flexibility to pursue new business opportunities, e.g. by processing other growers' harvests and adding bag-in-box filling.

To help tailor the right oil quality and taste, you can choose from various crushers and two different heating methods: Atmosphera malaxers and Express heaters, both with faster, more energy efficient extraction than traditional methods and a positive impact on taste (see page 4).

Separation duties are performed using three–phase X-decanters that can run in both two- and three-phase mode.

Fruit preparation

Cleaning and washing

Effective removal of leaves, dirt, stones, etc. is essential for ensuring the hygienic conditions required for high-quality olive oil. Gentle but effective washing before oil extraction also helps protect the machinery from excessive wear and tear, and to safeguard the integrity of the fruit.

To match your specific capacity requirements and the degree of automation required Alfa Laval supplies four types of washers fitted with a defoliator/deleafer.

Crushing and depitting

Paste preparation is another critical step in determining both the quantity and quality of oil obtained from an olive oil extraction line. The paste can be prepared in different ways in accordance with each producer's particular wishes, before proceeding to the subsequent malaxing stage.

Alfa Laval supplies two types of crushers – disc and hammer crushers – as well as a patented depitter.

Extraction

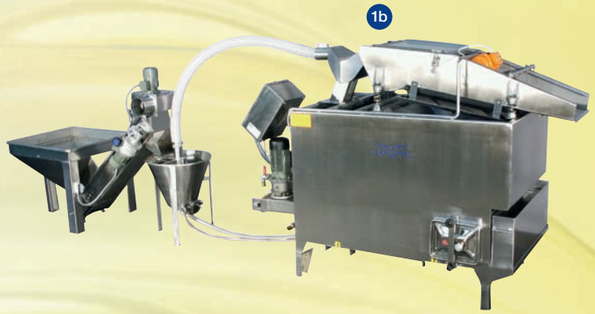
Paste preparation and oil extraction

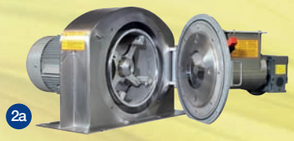
Heating, retention and mixing (malaxing) are crucial steps in the olive oil extraction process that, together with the amount of oxygen in contact with the paste, play a major role in determining the quality and quantity of the oil. The combination of time and temperature affects the enzymatic activity responsible for the release of the oil.

Alfa Laval offers four types of malaxers and heaters that fulfil these requirements for olive oil producers with different types of operation and different processing capacities.

Automation and control

Easy-to-use control systems are also essential in ensuring olive oil of high quality and consistent specifications. Alfa Laval provides a comprehensive selection of mechanical, electrical and electronic automation systems to monitor and control olive oil processing operations. These pave the way to better quality as well as set-ups that match the manpower available, and provide operational data, tracking and self-diagnostics.





The dimensions of the machinery shown are not representative.

1a Special automatic washers
Special automatic washer, fitted with a conveyor belt, automatically removes leaves, dirt, etc. from the washer.

1b Compact washers
Complete, compact washer is shown with a defoliator (left) to remove the leaves.

A standard and a special soft washer are also available (not shown).

2a Hammer crushers
Alfa Laval hammer crushers are available in four different sizes (30–75 hp). They stand out for their high throughput, robustness and reliability, and it is particularly easy to adjust throughput by changing grid size.

2b Disc crushers
Patented Alfa Laval disc crushers (30 hp) are especially suited for continuous throughput and green, spicy olive oil. Adjusting the disc spacing is easy, and any risk of paste overheating is kept to the bare minimum.

3a Atmosphera and 3b RM – Round malaxers (batch and continuous)
Round Alfa Laval malaxers are designed to provide oil of exceptional quality, with a high degree of efficiency, faster paste heating and less total malaxing time, saving energy and costs (see page 4). Atmosphera for small scale batch processing is available in capacities of 650 and 1,300 litres, and RM for large-scale, continuous production for 6,000 and 9,000 litres.

3c Standard MAP malaxers (continuous)
MAP overflow malaxer is the standard design used in several major olive-growing countries. They are ideal for continuous, high-capacity industrial processing (up to 6,500 kg per unit). The compact, rugged modular units are made entirely of stainless steel, and are fitted with a particularly efficient agitation system. Double, triple and quadruple modules are available.

3d Express heater (batch and continuous)
The express heater is a new way to prepare olive paste with instant heating and no active mixing. It offers a shortcut to much faster, high-capacity extraction with a smaller footprint and very high olive oil quality (see also page 4). Express heaters can easily be retrofitted and are available in three sizes, with capacities of up to 1,800, 3,500 and 5,000 kg.

Purification and clarification

Separation

Compact reliable Alfa Laval decanter centrifuges are specially designed for high-efficiency clarification, extraction, dewatering and classification on the first and second extraction (re-milling).

They bring you all the benefits of reliable, cost-effective operation, low water consumption, limited effluent and easy, accurate control.

Clarification

The final quality of the olive oil depends on the level of purity obtained from the final clarification. Alfa Laval high speed separators are carefully configured to provide gentle oil treatment, outstanding separation efficiency and good serviceability, as well as easy installation and operation.

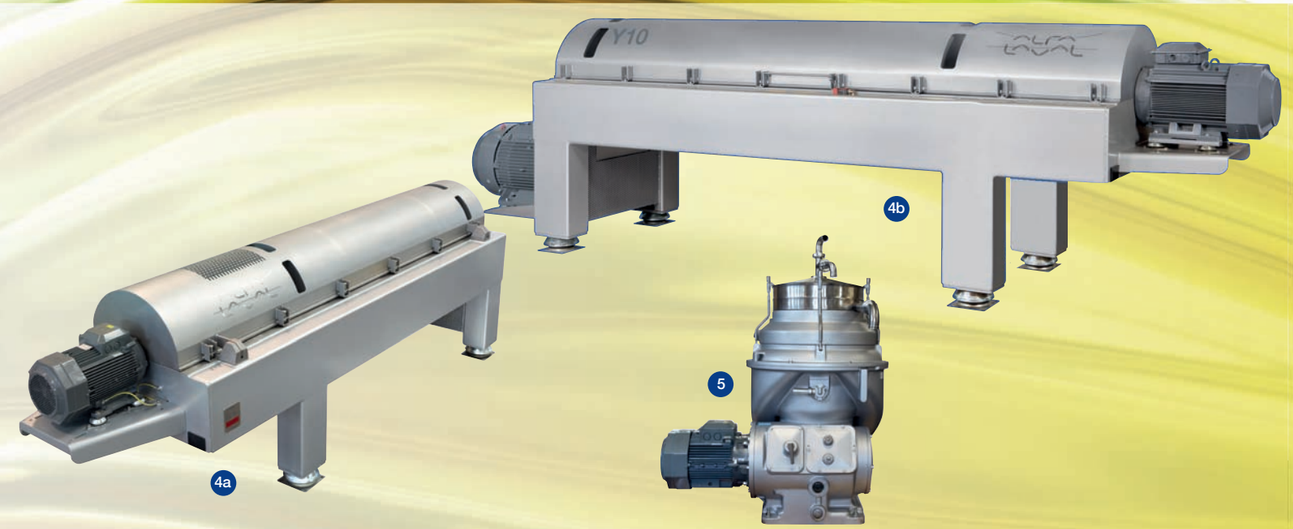
Packaging

Bag-in-box packaging is becoming increasingly popular for olive oil, because it prevents oxygen from coming into contact with the oil during storage and dispensing. This boosts product freshness and flavour consistency, while also extending the shelf life of your olive oil products.

Two types of hygienic, easy-to-operate Alfa Laval bag-in-box fillers are available, with bag sizes ranging from 1.5 litres to 20 litres. Any residual air is sucked out by vacuum, and nitrogen is injected to prevent oxidation and ensure product quality and shelf life.

Waste handling

Olive oil extraction normally results in large quantities of difficult-to-handle waste water (black water). As most municipal wastewater plants do not accept it, this is often spread on farmland - a costly exercise that also raises concern for the environment. Alfa Laval has developed a unique and efficient alternative: The thermal separation system.



4a X-series decanter centrifuges for two- and three-phase separation
The range of high-efficiency three-phase X-decanters can undertake both two- and three-phase separation, providing maximum versatility. Special design features ensure a higher level of solids dryness, low amount of dilution water and minimum oil loss (see also page 5). Four models are available with processing capacities up to 168 tons paste/day.

4b Y-series decanter centrifuges for two-phase separation
Four different sizes of Y-decanters are available, all fitted with electronic speed control to adjust the degree of clarification.
These include the large-capacity Y10 decanter centrifuge that can handle up to 360 tons paste/day, processing up to 3,500 litres of oil per hour. This is ideal for helping producers increase yield in shorter seasons.

5 UVPX high speed separators

UVPX separators are designed for separating two intermixed and mutually insoluble liquid phases of different densities, with the separated-off solids being discharged intermittently. They are used to clarify oil (two- and three-phase separation) and to recover oil from black water (three-phase).

6a Astepo Piccolo semi-automatic bag-in-box fillers
The Piccolo filler for manual infeed of up to 200 bags/hour is available with one or two filling heads plus different caps (including Bergh caps) for edible oils in bag sizes ranging from 2 litres to 20 litres.

The benefits include simplified controls, minimum maintenance and less downtime.

6b Astepo Grande automatic bag-in-box fillers
The non-aseptic Grande filler automatically deals with uncapping, filling and capping, as well as providing effective CIP cleaning for tip-top hygiene.

It can deal with inputs of as much as 14,000 litres/hour, and can also be linked up to an automatic Combibox cartoning line for maximum packaging efficiency.

7 Black water treatment with BlueVap and AlfaFlash
BlueVap is a thermal separation system for continuous treatment after three-phase extraction. It turns black water into clear water, acceptable at sewerage plants, and a concentrate that can be mixed with husk (see p. 5). The easy-to-operate plant for up to 1,000 or 2,500 l/h needs no steam or cooling water.
For larger capacity and steam, a similar process, AlfaFlash, is available.

Fair trade-certified avocado oil

In 2007, Olivado Natural Nutrition began producing extra virgin, cold-pressed oils from avocados grown by independent farmers in the highlands of central Kenya, using an Alfa Laval process line incorporating an X-decanter, 2 UVPX separators, 6 batch malaxers, washer, de-stoning & peeling unit, conveyor and control panel. Annual production amounts to 300,000 litres/year.

Regular Alfa Laval service visits ensure maximum reliability and high quality as well as long shelf life for the company's prize-winning organic and fair trade avocado oil.

Perfect decanter for husk plant

In 2012, Movialsa installed a two-phase Alfa Laval Y10 decanter at the company's husk plant in Ciudad Real, Spain. The exceptional performance of this Y-series decanter centrifuge helps deliver good profit margins because of the remarkably high feed rate as well as a high yield of olive oil recovery from the husk.

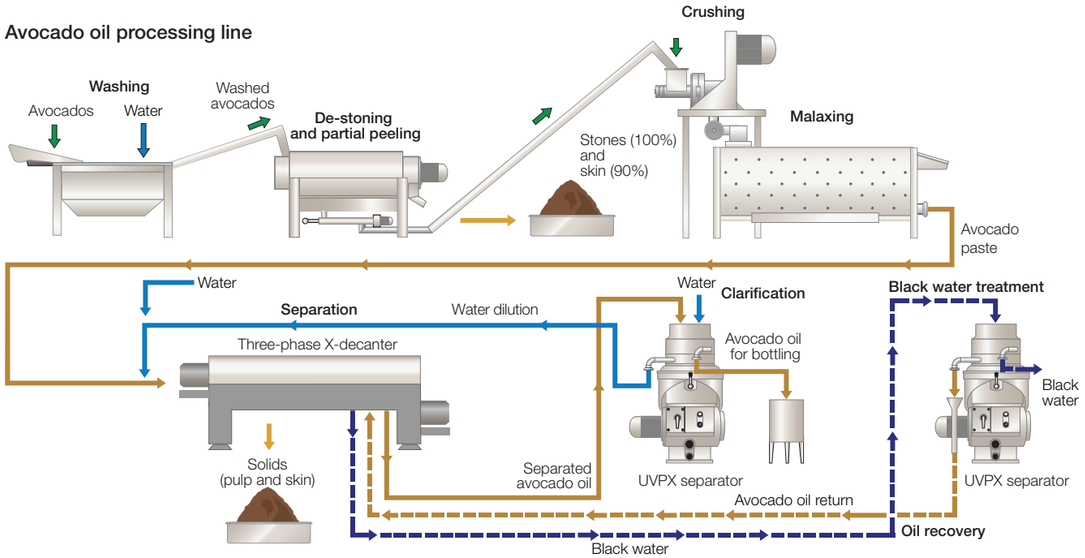
Avocado oil – diversification and opportunity

Different crops – with the same equipment
The possibility to use Alfa Laval olive processing technologies to produce both olive oil and avocado oil provides you with an additional revenue stream outside the normal olive processing season. This helps you boost your return on investment and can pave the way to important new business openings for your processing operation.

From cosmetics to food
Traditionally, avocado oil is processed from poorer quality fruit and refined into a base product for the cosmetics industry, not suitable for culinary use.

Alfa Laval has developed a completely new process to make it possible to produce cold-pressed avocado oil of substantially higher quality for use in food products, exploiting the remarkable health benefits of the avocado.

Avocado oil processing line



All you need is a special washing, de-stoning and de-skinning section to meet the particular requirements associated with avocados. You can deal with all the other extraction stages using standard Alfa Laval olive oil processing equipment.

This opens up significant new high-margin commercial opportunities for producers of avocado oil.

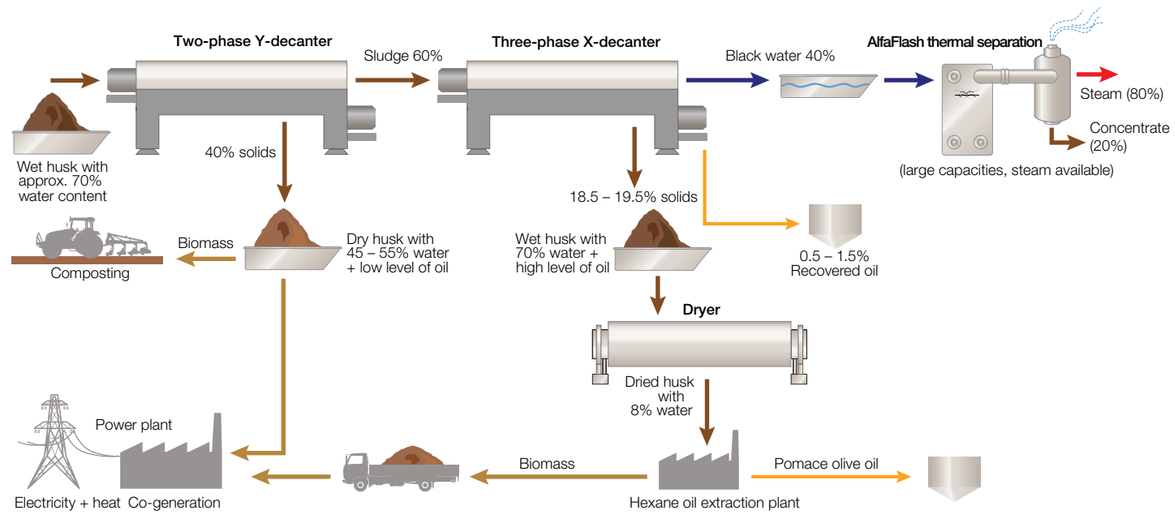
Re-milling with optimum oil recovery and minimum environmental impact

Traditionally, left-over low-grade pomace oil is recovered from wet husk after the first extraction of olive oil using energy-intensive rotary driers. This results in relatively wet husk biomass of low commercial value and a lot of difficult-to-handle black water, both costly to dispose of.

Rethinking the re-milling process
Alfa Laval has developed an innovative four-step re-milling process with low operational costs that improves the profit of the husk treatment industry.

With this process, you can also deal with growing pressures for a responsible solution to polluted water effluent from three-phase extraction plants, avoid punitive costs and optimize the processes for reusing the by-products, so that they have greater commercial value.

Alfa Laval four-step re-milling process



Benefits of "zero-impact" four-step re-milling

- The value of recovered pomace oil from physical extraction is approx. 25% higher than after chemical
- Up to 30% lower energy consumption/operating costs with 3-phase decanter and AlfaFlash than with rotary drier
- Very dry, combustible biomass; easy to transport; can be sold to co-generation plants that produce electricity and heat
- Residual concentrate after AlfaFlash rich in mineral salts etc. of high commercial value
- Clean water acceptable for sewerage plants or, in some countries, irrigation of fields

Premium hand-crafted oil from a small footprint

Montecastelli in Monteriggioni, Italy, installed an all-in-one AlfaOliver 500 extraction plant in 2006. This helps to ensure optimum quality of Montecastelli's hand-crafted artisan olive oil, which is made in very small quantities. The compact plant fits perfectly into the limited space of an 11th-century hilltop monastery in central Tuscany.

On-site service in the US

In the US, a mobile Alfa Laval service trailer is available for time-saving visits to olive oil mills across California and adjoining states.

Carrying a range of genuine Alfa Laval spare parts, this service trailer focuses on all olive oil process equipment as well as normal parts and service requirements – from olive washing through crushing, malaxing and extraction to final oil clarification.

AlfaOliver – all-in-one olive oil plant that's ready to use

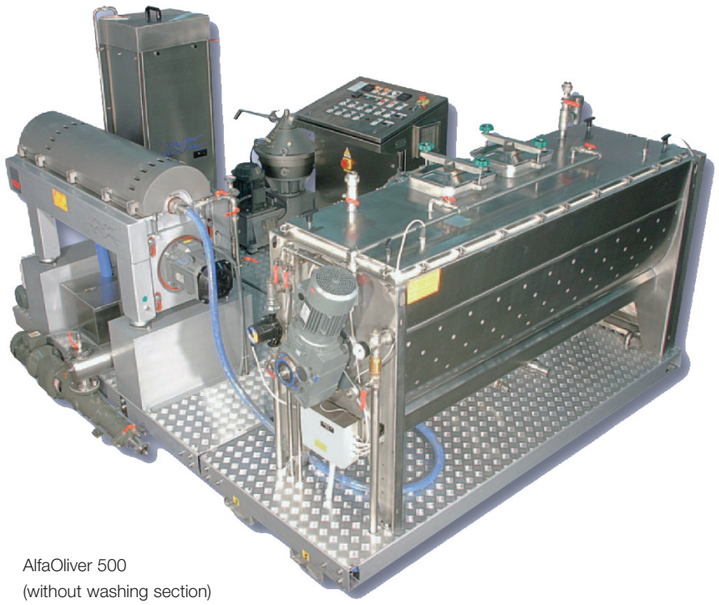
The AlfaOliver 500 is a compact, all-in-one olive oil extraction plant with a self-cleaning vertical separator, designed for use as a continuous olive oil extraction line for capacities of up to 500 kgs/hour of olives.

Best of both worlds
AlfaOliver technology gives smaller-volume producers access to the high performance and reliability of industrial-scale plants, while still providing free rein for customizing the process to obtain any required olive oil quality and production specifications.

Compact and easy to operate
All the olive oil extraction technology available from Alfa Laval is concentrated into a pre-assempled, plug'n play and easy-to-operate processing line that paves the way to continuous operation with a minimum of effort or complexity.

A complete AlfaOliver 500 plant normally only requires 35 sq m of floor space, yet provides exceptional flexibility and includes three main sections:
- Washing
- Paste preparation
- Malaxing and separation.

The washing and paste preparation sections are supplied in component form, while the malaxing/separation section is skid-mounted – pre-piped, pre-wired and equipped with its own hot water production system. The compact, self-contained design and skid-mounting make installation quick and uncomplicated.



AlfaOliver 500
(without washing section)

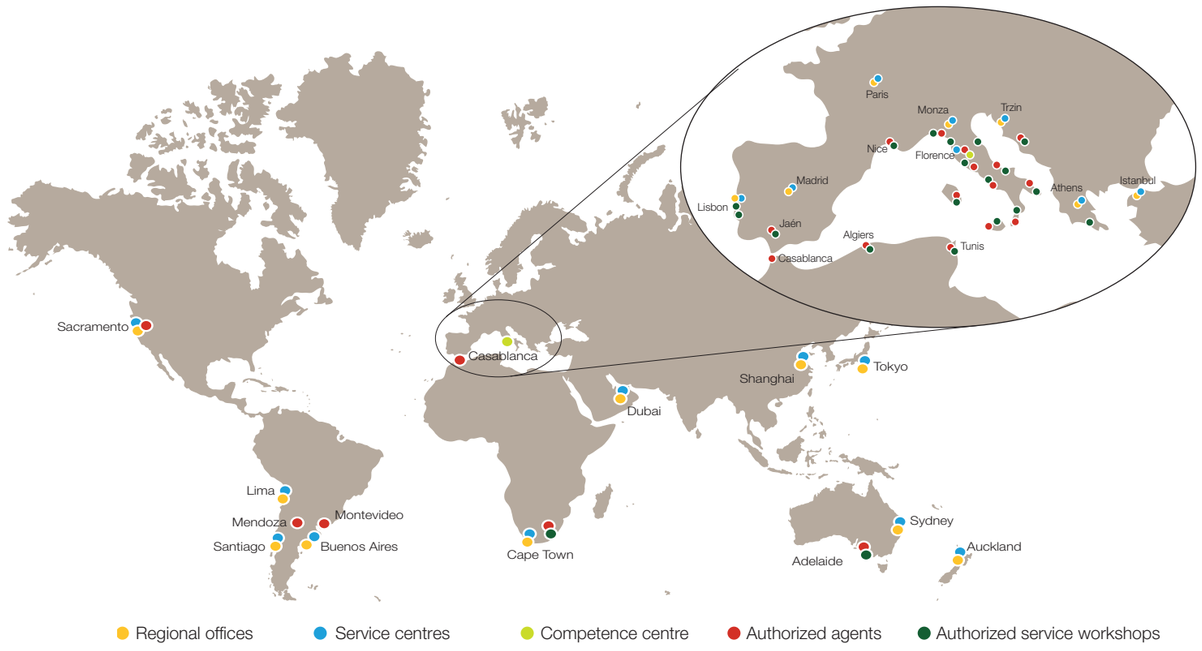
Full spectrum to achieve highest quality

For the second year in a row, Agroland is considered one of the top 10 oil mills in the world for its high quality olive oil – and one of the largest, with a processing capacity of 130 tons of olives per day.

Agroland introduced the "top quality" concept in Uruguay. To match this philosophy, the group selected Alfa Laval equipment for four process lines for extra virgin oil – one line with AlfaOliver 500, two with 4 RM650 malaxers and an X4 decanter and one with 4 RM1300 malaxers and an X7 decanter.

Expertise and services that make a difference

This is where you can get expert help with the Alfa Laval equipment you use in your olive oil production set-up



Alfa Laval's experts are ready with all the advice and support you may need regarding processing equipment for olive oil or avocado oil. We help identify the solution that gives you the best possible performance, quality and economy. We ensure that it is installed, running and integrated smoothly with your existing set-up, with a minimum of hassle or disruption.

Our competence centre and regional offices are backed by a network of authorized agents and service workshops.

Services when you need it
Our obligation to you does not stop short at delivery. Our global service network ensures that your process always runs at peak performance throughout its service life.

We can carry out maintenance when it suits you best – before or after the harvest rush, or as it fits your plans. And our technicians and spare parts can be on the spot quickly for trouble shooting and to help minimize bottlenecks or downtime.

Upgrades and improvements
We also offer expertise to help you upgrade, extend and retrofit your plant and to boost performance and quality as your needs change.