



# Olive to the heart

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**PIERALISI**  
CIRCULAR THINKING

## Traditional method

The age-old method for extracting olive oil. Before the olives are processed, any remaining leaves are removed and the fruit is washed to remove any impurities that might impart unpleasant flavours and aromas to the oil.

The olives are crushed using two or more granite wheels known as molazze, which are fixed to an axis and roll around a circular trough, breaking down the fruit and the kernels. The molazze and the base of the trough do not touch, rather they are kept just a few millimetres apart to avoid crushing the kernel too finely. This helps the oil to drain off during the later pressing phase.



The resulting paste then undergoes a process known as malaxation, during which it is stirred continuously with paddles to encourage the oil to form larger droplets, which makes it easier to separate from the other liquids in the paste. Next, the paste is spread over fibre mats, or filtration diaphragms, which are stacked in a tower on a trolley so that they can be pressed. The mats are pressed mechanically and the oil oozes out of the paste. The pressing process takes around 60 minutes. The fibres of the mats and the fragments of olive stones act as a filter, allowing only the liquids in the paste to pass through.

This effectively separates the sansa – the pomace, or solid components of the paste – from the oil and water, which collect in large decanter basins.

The liquids are pumped into a centrifuge, which separates the oil from the vegetation water and other impurities. The traditional system is a simple process, does not require process water (apart from a minimum destined to the washing operation), produces a very dry husks, operates with low power consumption, but requires a lot of manpower. The quality of the produced oil depends essentially on the correct use of the grindstones and disks, which are very difficult to clean. Bad cleaning can lead to the absorption and transmission of flavours and odours, more or less pleasant, from one batch of olives to another.

*From traditional presses to a continuous system, thanks to advances in technology*

## Continuous method

Around the 1950s the hydro-pneumatic press was replaced by a system of extraction by centrifugation, using a horizontal centrifuge well known as “decanter”. The Company VERACI, located in Florence, introduced the “PRIMOLIA®” onto the market, a discontinuous cylindrical basket centrifuge, with intermittent automatic discharge able to separate oil, water and solids. At the end of the 1960s PIERALISI transformed the “Primolia®” system into the first modern centrifugal continuous extraction system. This success was the result of years of research and represented a considerable progress compared with the system by pressing, due to costs and manpower saving.

The PIERALISI continuous system, which has been operating with great success on the international market for over half a century, is a combination of machines coordinated into a homogeneous, rational and technologically advanced production line. For the crushing of the olives the continuous system uses metal crushers equipped with a high-speed rotating body. Inside the crushers, the olives are crushed in different ways, creating deep breaks into the cells containing oil and ensuring very good centrifugal separation results with satisfactory yields.

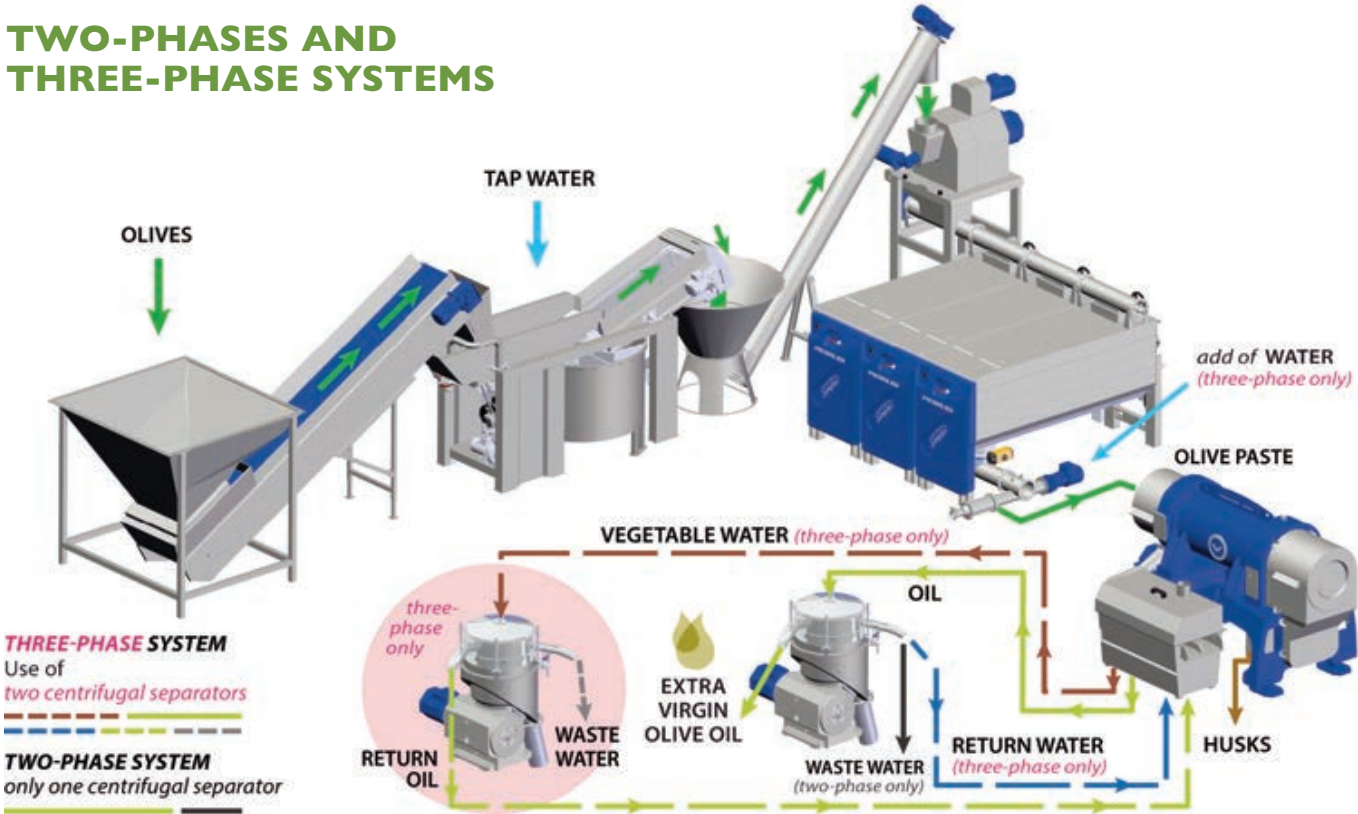
The more violent is the crushing of the olives, the deeper will be the breaking of the oil cells, with the result of a higher yield in oil and in minor components content (e.g. polyphenols).

The crushing method which foresees the use of metal crushers ensures the best preparation of the olive paste destined to the decanter, after the kneading operation, for the extraction of oil using the two or three phase method.



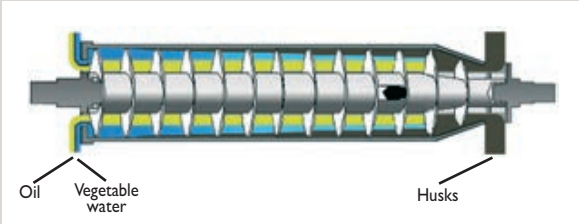
Highly flexible high-capacity, continuous oil extraction system

TWO-PHASES AND THREE-PHASE SYSTEMS



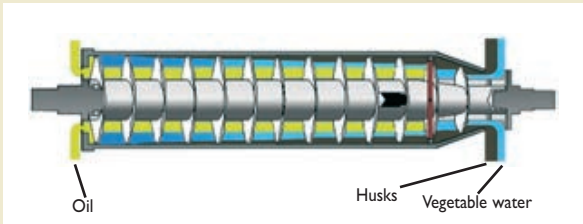
Three-phase extraction

After the kneading stage, the olive paste is conveyed into the centrifugal extractor (decanter) by a mono pump with adjustable flow-rate. Inside the decanter, the two liquid phases, oil and vegetable water, are discharged through two different outlets positioned on the same side, while the solids are discharged through a third outlet positioned on the opposite side. This separation is possible due to the addition of hot water to the inlet paste, obtaining a big quantity of vegetable water to be disposed of and husks with about 50% humidity.



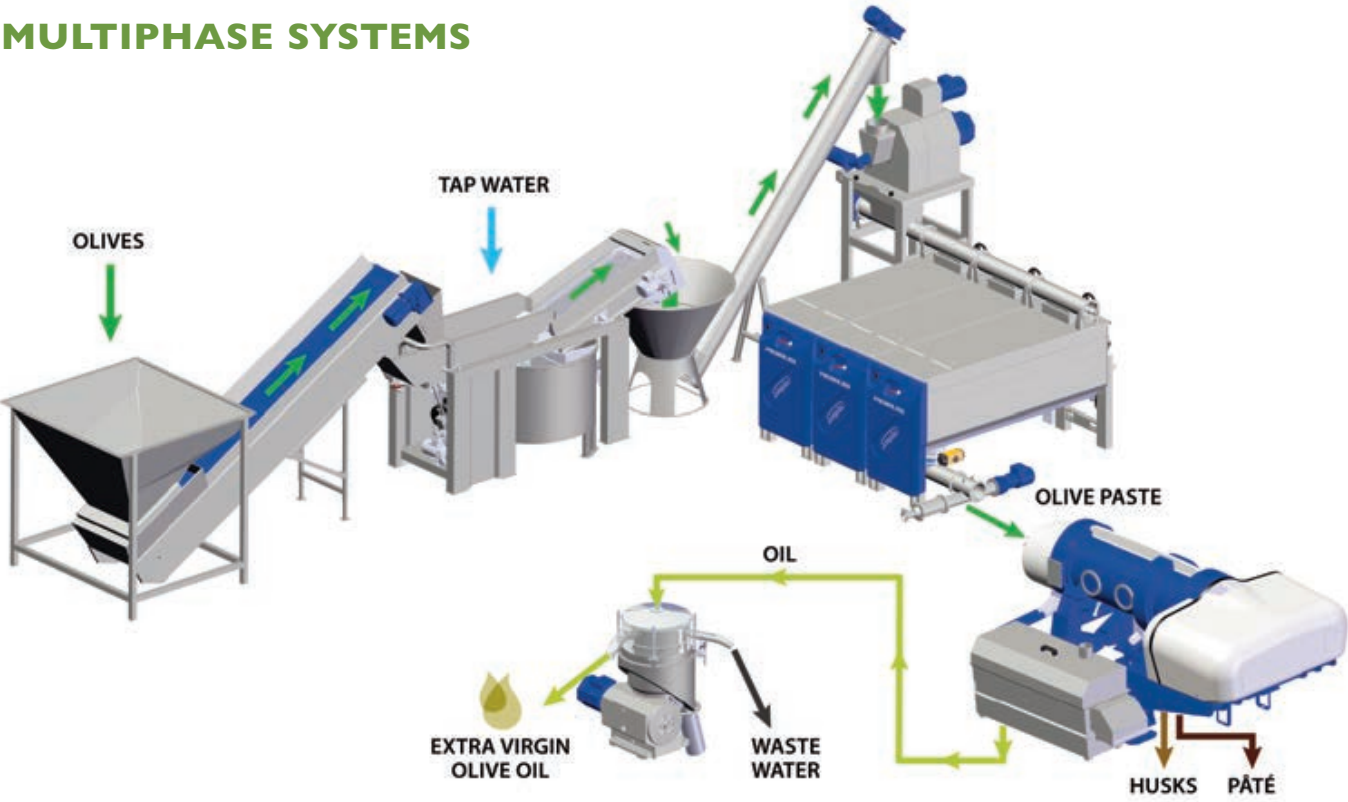
Two-phase extraction (no water addition)

In the 2-phase running process, the decanter is preset with only two outlets: one for the oil and the other for the vegetable water and husk together. With this type of extraction it is possible to reduce or eliminate completely the addition of water to the paste, with the double advantage of saving disposal costs and natural resources. The husk coming from the two-phase process has 60% humidity.





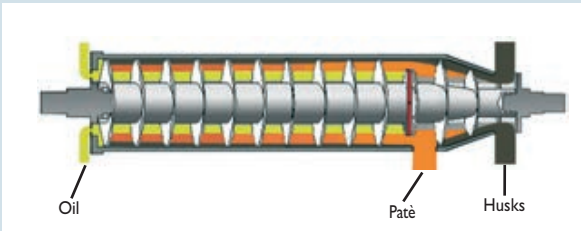
## MULTIPHASE SYSTEMS



### Multiphase extraction (no water addition)

In multiphase processing the centrifugal extractor is designed to have three outlets: one for the oil, one for the husks and one halfway for the pâte.

This type of extraction has the advantages of the processing without the addition of water (two-phase) plus the versatility of a decanter able to run both in continuous and in batch processing. Multiphase extraction gives the possibility to recover a certain quantity of husk - called "pâte" - made up of wet pulp without any traces of kernel directly inside the bowl. Multiphase running process produces a dehydrated husk similar to that from a three-phase decanter.



### Second centrifugation

In the olives processing cycle, it is possible to have an additional phase to extract the remaining oil out of the husks.

This process foresees again a kneading stage, followed by centrifugation making use of a second decanter, which can run under 2 or 3 phases. The final product is called "second extraction oil".

In case of 3-phase running, the husks, originally processed with a 2-phase system, can be dried, obtaining vegetable water to be disposed of.

### Pulp-kernel separation

The husk coming from the two-phase process, three-phase process and from the Pieralisi multiphase system can be processed by a pulp-kernel separator that allows to recover the biomass for the production of heat energy, providing greater efficiency to the entire extraction cycle.

The kernel has a great calorific value and it is requested for the supply of multi-fuel boilers, turning the cost for a by-product to be disposed of, into an added value for the miller.





## Batch processing

In case of batch processing, the oil coming from each single batch must be kept separated from all the others and identified with the owner. Therefore it is necessary to keep the olives separated during all the processing cycle. In this way each batch will be registered with its own yield and pressing costs. The target of the oil mill is to satisfy the expectations of customers who want to be sure of taking home their own oil. To reach this target, the processing plant must have all the specific characteristics to be perfectly qualified to process single batches.

To obtain a good quality oil, the plant operator must be able to check the process through updated systems for adjusting and monitoring parameters such as temperature, time, flow-rate, washing, etc. These parameters must be easily modified and adapted, if required, to the characteristics of the different batches.

## Industrial processing

In the industrial processing, the olives are selected according to variety and, in many cases, to their origin: olives picked from the plant and olives collected from the ground. A sample is taken out to determine the weight and the information is collected together with all the customer's data; then the fruits are stored together waiting for the beginning of processing. The extraction process runs without interruption and the machines are stopped only for cleaning and maintenance operations. This type of extraction process optimises the kneading volume to the maximum and reduces dead times by continuously feeding the decanter and consequently increasing the performance of the plant. With this system the adjustment of processing times and temperatures is a very simple operation, thanks to the homogeneity of the product and the continuity of the process. The kneading times are programmed during the design stage by setting the kneading section in relation to the hourly flow-rate of the decanter, and setting standard temperatures in order to reach the right temperature during the kneading process.



Molinova Serie ORO: the perfect solution for processing distinct batches of olives

*The target of the oil mill is to satisfy the expectations of customers who want to be sure of taking home their own oil*



SPI, a continuous extraction system that is ideal for non-batch specific processing



## The world of PIERALISI

The PIERALISI Group is **the only company** in the sector that can provide every client with its own **“turnkey system”**.

We design and manufacture our equipment from start to finish, producing machinery for each phase of olive processing, from destemming and washing to crushing, kneading, extraction and separation.

**PIERALISI is ISO 9001 certified.** Every one of our machines is designed and manufactured to meet strict quality and safety standards, guaranteeing compliance with key directives such as the 2006/42/EC Machinery Directive, the 2006/95/EC Low Voltage Directive, the 2004/108/EC Electromagnetic Compatibility Directive and the 94/9/EC ATEX Equipment Directive, as well as UL Standards.



When you purchase a PIERALISI system, not only are you acquiring the best machinery available, you are also stepping into a world where the client is guided through each stage of the process, from the initial estimate to the finished article. You will always **find us close at hand, ready to assist, even after your equipment** is up and running.

We provide our clients with a **full technical consultation**, identifying the system and machinery that best suits their needs and designing a tailored layout for each installation. Installation and testing are carried out by our own technicians who also guarantee responsive and effective **long-term support post sale**, including scheduled maintenance and ongoing technical assistance.

The attention to detail that goes into the design and manufacture of each item of PIERALISI machinery is also evident in the production of our own spare parts, a process that allows us to guarantee the reliability and performance of our machinery over time and, as such, guarantee the consistency of the client's own products. All of our **original spare parts** are produced to the highest standards and are covered by a guarantee.

**This is the world of PIERALISI**, where the client is treated as a partner and placed at the centre of everything we do. We organise regular workshops examining technical, legislative, management and marketing issues and in-house events where we highlight innovative new products and processes.

