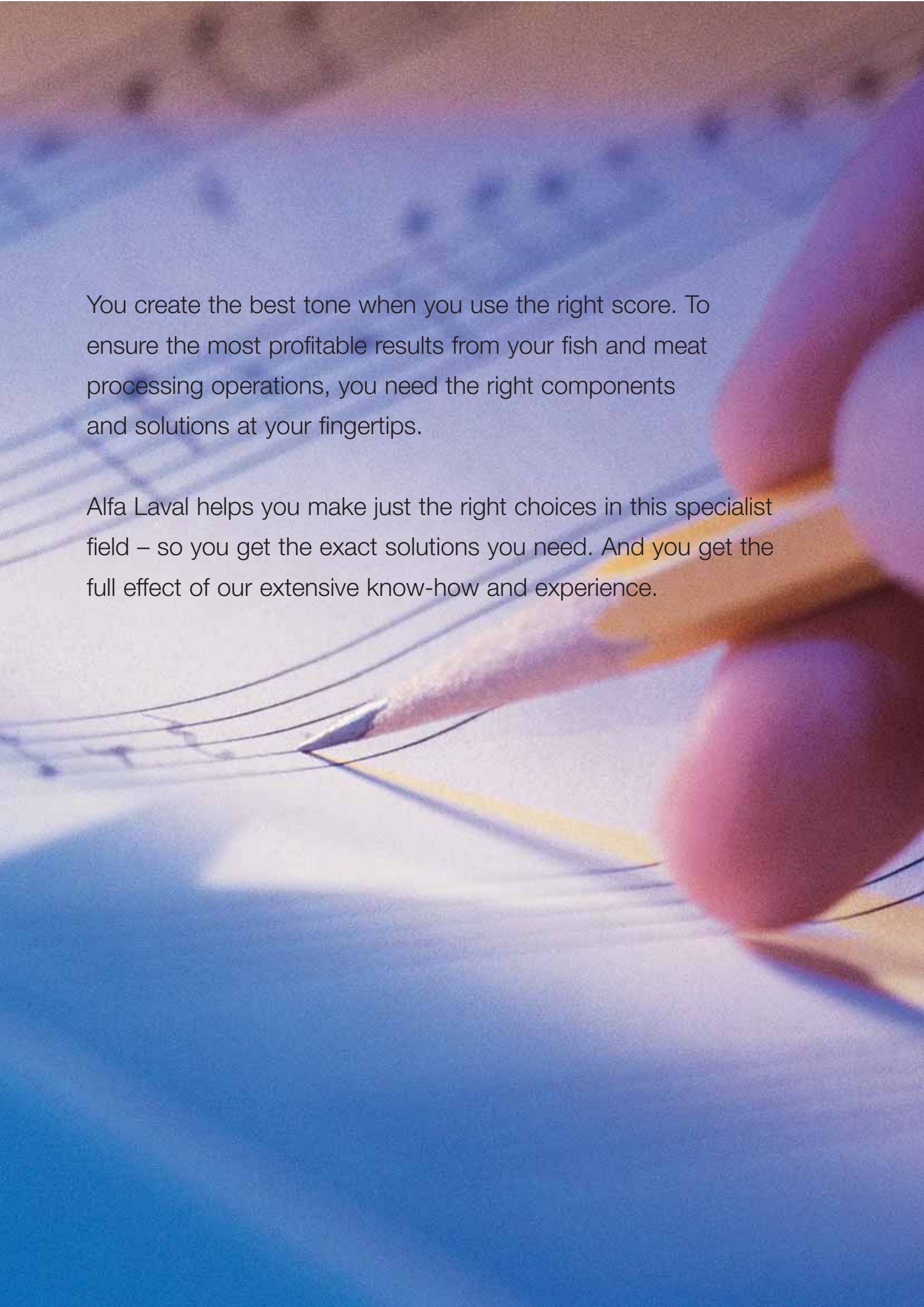




Fully tuned

Alfa Laval fish and meat processing solutions





You create the best tone when you use the right score. To ensure the most profitable results from your fish and meat processing operations, you need the right components and solutions at your fingertips.

Alfa Laval helps you make just the right choices in this specialist field – so you get the exact solutions you need. And you get the full effect of our extensive know-how and experience.



You and your company probably already know Alfa Laval as a supplier of heat exchangers and separation centrifuges.

What you may not know, however, is the extent and the depth of our experience and know-how in this specialist field, acquired from developing, installing and optimizing vast numbers of process solutions throughout the world.

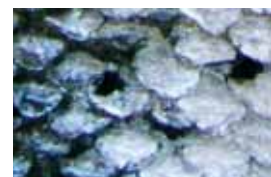
Know-how in depth

Choosing Alfa Laval as your supplier gives you a working partner that knows how to get you tip-top results in producing fish and meat by-products – because we not only focus on your equipment, but also on optimizing all aspects of the processing operations involved with your specific products.

Many companies can sell you a heat exchanger or a centrifugal separator. But Alfa Laval has the know-how and the experience to analyze your processing line as a whole – and make concrete, practical recommendations that really make a difference. In fact, it may well be that the most cost-effective solution overall can involve surprising new thinking, with surprisingly profitable results.

Just dealing with individual processing steps is often impractical and can be costly. Attempts to improve or update one particular step may have unexpected, unfortunate effects elsewhere in the overall process.

With Alfa Laval however, you will be able to move beyond the restraints and drawbacks that often stem from sub-optimized components. We have the know-how and resources to be able to deal with the wider picture, and this will normally save you time, money and frustration – as well as eliminating any unpleasant surprises.



Working in harmony

Alfa Laval is much more than the well-known supplier of equipment used in processing fish and meat by-products



The full picture

The performance figures for a stand-alone unit never really give you the full or true picture.

The easiest way to achieve the best, most profitable results in fish and meat processing is to make sure that all the components and systems work in harmony – boosting each other's efficiency rather than detracting from it.

Components or processes

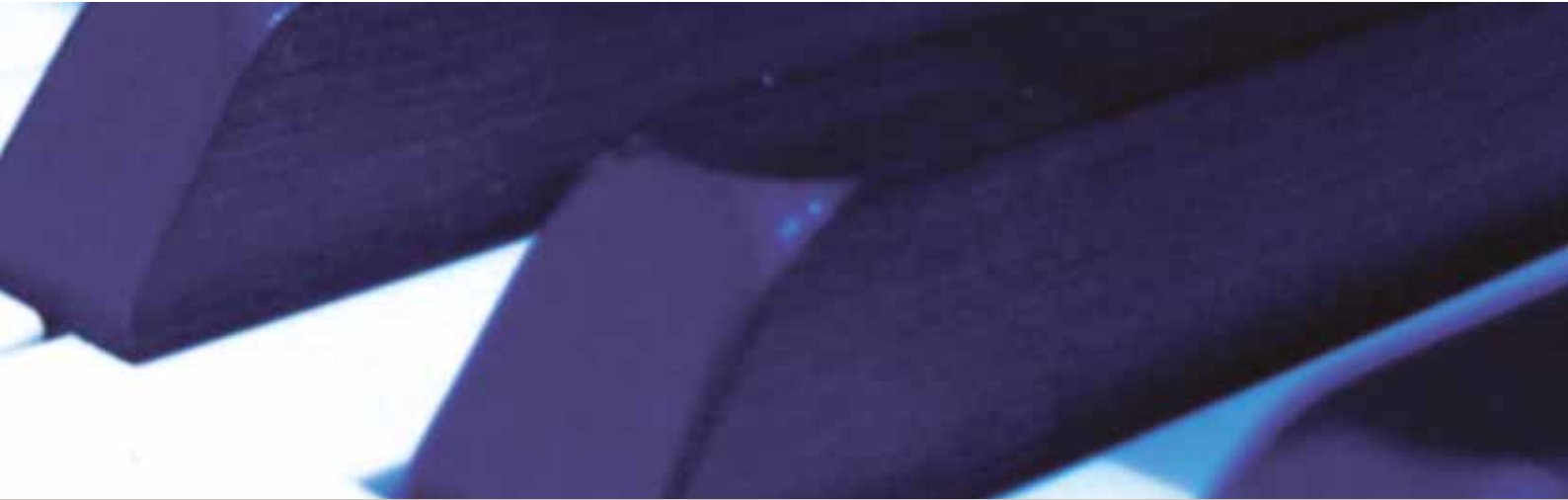
You can either purchase individual components, or make full use of Alfa Laval experience to help develop and fine-tune your entire processing line with complete, fully optimized process modules.

You will be surprised at the kinds of benefits you can reap from our proven experience and what we have already achieved in other similar installations.

To give you some ideas about how components can be combined in fully optimized configurations, we have listed a range of standard Alfa Laval process modules on pages 14–17.

External demands are getting tougher

Your customers are constantly presenting you with new and more stringent demands. Public authorities – both national and international – place growing numbers of restrictions on both your products and your processing operations as environmental considerations become increasingly important. At the same time, it is crucial to operate more efficiently as costs continue to rise.



But you do not need to search for answers to all these things by yourself. Alfa Laval is the kind of working partner that helps you deal with the challenges in your particular business. Your operations and the way you and your staff run them are, of course, unique. However, somewhere within our activities throughout the world, we have probably solved similar problems before – and practical experience makes a big difference in the fish and meat processing industries. We are here to help you.

Alfa Laval equipment is widely used for handling by-products from the fish and meat industries. Alfa Laval systems are able to process

- fish and fish by-products
- fish silage
- fish hydrolysate
- soft tissue
- trimmings
- meat hydrolysate
- bone
- poultry by-products
- blood.

Joint efforts, exceptional results

Marine Harvest is the largest producer of farmed salmon in the world, and a good example of how joint efforts pay off in new process solutions. “Offcuts from the salmon processing plant no longer go to waste, but are now processed on site in a ConDec edible oil plant,” says Andreas Kvaemer, operations manager at the Marine Harvest-owned Rygro AS in Norway.

“We produce high-quality salmon oil, and the recovered protein goes to the pig feed industry. A Contherm scraped surface heat exchanger minimizes the thermal impact of the cooking process. The ultra-short treatment time in the ConDec process boosts the quality of the edible oil significantly. Marine Harvest fish oil is unbeatable on quality, because it is so fresh,” he continues.

Operations Manager Andreas Kvaemer, Rygro AS, Norway.

In the heat of the process

Processing fish and animal raw material almost always involves heating in some form.

Processing fish and animal raw material almost always involves heating to coagulate the protein and to release the fat/oil phase, and involves heating of all the liquid phases. The products to be heated contain varying amounts of solids as well as different particle sizes and viscosities, but must always be heated gently and efficiently.

The heating equipment needed to do this is available in many forms. The Alfa Laval range of heating equipment is based on both direct and indirect heating, using hot water or steam as the heating medium. All Alfa Laval heaters are available both as stand-alone equipment and as complete modules for pasteurization, sterilization and heat regeneration.

Indirect heaters

As the leading company in the liquid-to-liquid heating field, Alfa Laval produces more than half of all the plate heat exchangers sold worldwide. Alfa Laval supplies a comprehensive range of different types, which extend from plate to tubular and scraped-surface heat exchangers.

The Alfa Laval range is based on standardized units that are easy to scale up and down in capacity. Such standardized solutions are highly cost-effective, compact and very efficient.

Plate heat exchangers

Alfa Laval plate heat exchangers are used to control heating in a continuous flow process, where the particles are relatively small and the tendency to fouling is medium to low. In the fish and meat processing industries, plate heat exchangers are mostly used for heating liquid mixtures that have a low content of coagulated proteins.

Alfa Laval plate heat exchangers can easily be scaled up and down to meet different capacity requirements. They are also available in many different materials to handle particularly challenging processing tasks.

Tubular heat exchangers

Alfa Laval Viscoline™ tubular heat exchangers are suitable for high-viscosity products or products that contain many different kinds of particles and thus involve a high risk of fouling.

The corrugated tube design creates turbulence within the product. This enhances heat transfer and ensures uniform treatment of the product. It also reduces fouling, resulting in longer intervals between cleaning. Alfa Laval Viscoline units are also available in a special design that includes a dynamic scraping function to prevent fouling.



Tubular heat exchanger, Viscoline Dynamic





Scraped-surface heat exchangers

The Alfa Laval Contherm scraped-surface heat exchanger is a space-saving design that fits well into any production line. The unit provides easy inspection, simple operation and a complete CIP capability that helps maintain product quality by reducing the risk of contamination.

Contherm scraped-surface heat exchangers incorporate special design features that make them ideal for heating high-viscosity products and products with large amounts of suspended solids – especially where rapid, gentle heating is critical due to extremely high heat transfer rates.

Direct steam heaters

Alfa Laval direct steam heaters perform a wide variety of challenging tasks in the processing of raw materials that include fish and meat products and in special applications such as heating Dissolved Air Flotation (DAF) skimmings.

Each kind of Alfa Laval direct steam heater is designed to handle a specific raw material in a continuous process flow. These heaters are customized for each particular use, with built-in temperature control linked to live steam injection. Such heaters are designed to provide rapid, consistent heating and a short holding time to ensure final products of premium quality.



Plate heat exchanger



The right force in the right place

Once heated, the components in your fish or animal raw material need to be separated.



After the fish or animal raw material has been heated, some form of separation step is normally involved. The heated product features a wide variety of different solids contents, particle sizes and viscosities. The choice of the most appropriate and efficient separation equipment depends on the nature of these solids and the size of the particles.

For products that feature a high solids content and large particles, a decanter centrifuge is the ideal choice for liquid/solid separation. In most applications, the resultant liquid phase is then processed in one or more disc stack centrifuges, depending on the specific separation requirements.

Decanter centrifuges

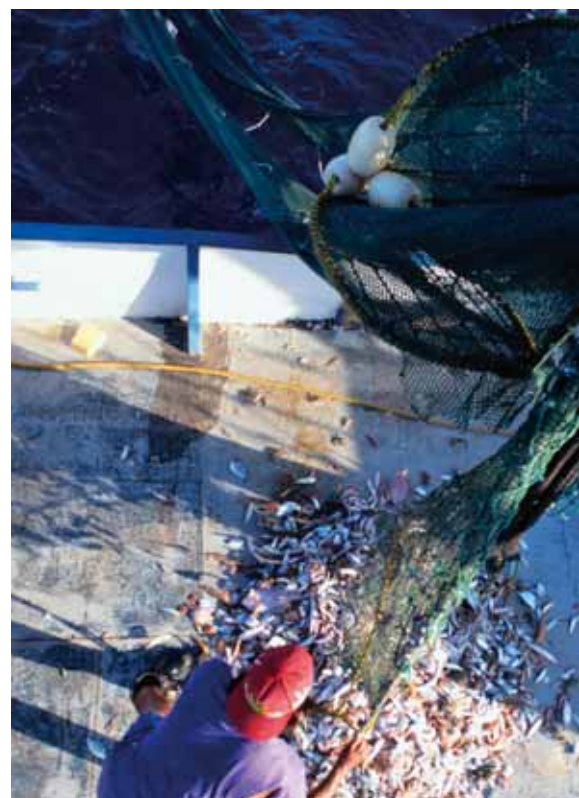
Decanter centrifuges are ideal for separating solids and liquids, achieving both good clarity of the liquid phase and low moisture content in the solid-phase discharge.

The three basic types of Alfa Laval decanter centrifuges feature

- 2-phase operation for separating solids and liquids
- 2-phase operation for separating solids and liquids, where the liquid is discharged via a paring disc
- 3-phase operation in which the feed product is separated into one solid phase and two liquid phases.

The latest Alfa Laval decanter centrifuges are equipped with the unique electric Direct Drive System. This automatically ensures a consistent level of moisture in the solids that leave the decanter.

The Alfa Laval Direct Drive System reduces power consumption and power loss, in addition to optimizing process conditions regardless of variations in the feed.



Decanter centrifuge



Disc stack centrifuges

Disc stack centrifuges are ideal for a wide range of separation tasks that involve lower solids concentrations and smaller particle and droplet sizes. This applies to both liquid/fat and liquid/solid separation. Disc stack centrifuges separate solids and one or two liquid phases from each other in one single continuous process.

The Alfa Laval disc stack centrifuges used in the fish and meat processing industries are self-cleaning separators. They enable the partial discharge of solids using a special system that opens ports in the periphery of the bowl at controlled intervals in order to remove the collected solids.

Alfa Laval disc stack centrifuges are available in three basic types, for use as concentrators, purifiers and clarifiers.

- Concentrators are normally used to concentrate the light phase of the decanted liquid.
- Purifiers polish the fats/oils by removing residual moisture and solid fines.
- Clarifiers are used for removing small amounts of suspended solids until near-zero levels are reached.

Nozzle centrifuges are also available when the handling of high levels of solids is required. These are normally only used in special process conditions.

Alfa Laval advantages

- Alfa Laval decanter centrifuges and disc stack centrifuges used in food grade applications are available with all the special features necessary for such use, including a cleaning-in-place (CIP) option and an automatic system for washing the equipment on shutdown.
- Alfa Laval decanter centrifuges and disc stack centrifuges are available in a wide range of different materials in order to meet specific requirements associated with processing raw material that is abrasive or corrosive.
- The compact, modular construction of Alfa Laval separation equipment ensures that installation is both easy and relatively inexpensive.



Disc stack centrifuge

Removing water not money

The water phase from fish and meat processing applications contains valuable soluble proteins that can be recovered.

Drying the end product is an extremely expensive approach. In most processing operations, the energy cost for removing water either for concentration purposes or as part of the production process is the largest single expense.

To deal with this, Alfa Laval provides a complete range of solutions for water removal using both evaporation and filtration, or combinations of these two processes. These are technologies that require substantially less energy than traditional drying methods.

However, cost-effective water removal is not only a question of energy costs. It also involves the engineering expertise to combine the most efficient technologies and equipment for each particular process, taking the customer's specific conditions into account.



Membrane filtration

Membrane filtration is the most recent core technology introduced by Alfa Laval. This physical filtration process is based on the difference in pressure between the two sides of a special membrane, and is used to separate molecules with different sizes and characteristics.

The feed is passed through a membrane system that separates it into two streams known as the permeate (the liquid containing particles that have passed through the membrane) and the retentate (the concentrated product).

Alfa Laval supplies both ultrafiltration and reverse osmosis solutions based on either spiral or plate-and-frame membrane filtration systems, to meet customers' particular requirements concerning product characteristics and end-product quality.

Many benefits

The benefits of membrane filtration include low production costs, low energy costs, few processing steps, high yield, a high degree of selectivity and great flexibility in handling feed liquids with different specifications and fluctuating viscosity. A membrane filtration system has a high degree of flexibility due to its modular design, making it easy to expand capacity to fit current needs.



AlfaVap evaporation systems

The AlfaVap design operates on the rising film principle, which makes it possible to undertake the evaporation of even highly viscous products as well as reaching higher concentrations than are possible using a traditional falling film or shell-and-tube evaporator.

AlfaVap cassettes feature special corrugated surfaces that create a high degree of turbulence throughout the cassette, resulting in a higher heat transfer coefficient. This high turbulence and the rising film also substantially reduce tendencies to fouling – resulting in longer intervals between cleaning cycles.



AlfaVap

The AlfaVap design is extremely compact and only one third of the height of a corresponding shell-and-tube evaporator. This means that transport and installation costs are reduced by as much as 50%.

Meeting the need for boosters

The Alfa Laval AlfaVap can also be installed as a booster unit on any type of existing evaporator to increase capacity or reduce energy consumption. It can also be used to replace other heating installations, making use of the existing structures. This usually results in increased capacity because of the high heat transfer value of the AlfaVap cassette.

ConVap

The Alfa Laval ConVap is a compact, scraped-surface evaporator specially developed for use in the processing of highly viscous, sticky or chunky products. The ConVap operates as the final evaporation stage (finisher) to achieve up to 50–80% concentrations of solids, depending on the particular product.



Space counts at Conresa

At the Conresa fishmeal plant in Spain, Alfa Laval AlfaVap and AlfaCond units are used in a two-effect evaporation system. The AlfaVap system concentrates stick water from 12% up to 40%. “We needed an evaporation system that fitted into our existing building,” says Mr Cobas. “With the unique compactness of the AlfaVap system, this became a natural choice. By contrast, a conventional falling film shell-and-tube system would have required a whole new building.”

Managing Director Juan Carlos Cobas, Conservos Reunidos, S.A, Spain

Removing odour by condensation

The vapour from drying and evaporation processes must be condensed so that it can be disposed of properly.



Most of the steps involved in removing water in conjunction with fish and meat applications include a drying and evaporation section in which water is removed by heating. The vapour produced here must be condensed so that it can be disposed of under controlled conditions, in order to deal with smells and other environmental considerations.

In fish processing and meat rendering, condensers are often used to condense vapour streams in conjunction with

- batch cookers
- continuous cookers
- evaporating systems
- spray dryers
- direct and indirect dryers.

As a world leader in the field of condensers, Alfa Laval provides a full range of different condenser types to meet all capacity, media and pressure requirements.

All Alfa Laval condensers are of the indirect type. This means that there is never any risk of contamination of the cooling water, which can thus be safely discharged into the environment.

Depending on the specific duty, the most appropriate solution can be a gasketed, cassette or fully welded type based on either plate heat exchanger or spiral heat exchanger technology.

AlfaCond

The Alfa Laval AlfaCond is a cassette condenser specially tailored for vacuum condensation duties. AlfaCond exploits the extensive cooling surface area to the maximum, making it possible to deal with vapours at very low pressure within a very compact design.

The pattern used in AlfaCond plate cassettes is designed for optimal condensation, with an asymmetrical configuration that features a large gap on the vapour side and a small gap on the cooling water side. This results in maximum heat transfer efficiency and versatility, and a minimum of fouling.

Plate condenser

Standard Alfa Laval plate heat exchangers are widely used for condensing duties requiring smaller capacities. They are often used in fully gasketed configurations, depending on the specific application.





Compabloc

The Alfa Laval Compabloc fully welded plate heat exchanger, with no gaskets, is ideal for handling high-temperature fluids. Compabloc units achieve peak performance in the area where conventional heat exchangers reach their temperature limits. The fully welded construction also means that Compablocs are eminently suited for use in corrosive and aggressive operating environments.

Spiral condenser

A spiral heat exchanger is a circular heat exchanger with two concentric spiral channels, one for each fluid. Alfa Laval spiral heat exchangers are particularly useful when a process is “dirty” or “difficult”.



Spiral heat exchanger

Fluid handling equipment

Unlike many suppliers that only deal with processing in batches, Alfa Laval focuses on continuous processing.

This means that all the process flows must be pumpable. Naturally, this requires completely dependable fluid handling equipment. Alfa Laval therefore produces its own ranges of pumps, valves and tubes so as to be able to guarantee performance according to specifications and provide customers with fully optimized processing conditions.

Alfa Laval fluid handling equipment is therefore a natural part of many of our project delivery specifications. Alfa Laval supplies a comprehensive range of centrifugal pumps that provide high efficiency and low maintenance costs. Positive displacement pumps feature a tough, innovative construction and ensure a gentle, reliable pumping action.



Alfa Laval process modules

– working in harmony

Alfa Laval modules combine the best of product know-how and processing components into optimized standard solutions.



Alfa Laval provides a range of special process modules that are prime examples of how such systems can be optimized under ideal conditions.

These modules are extremely versatile and easy to customize so they fit in with your specific processing requirements and provide you with effective, profitable solutions that harmonize perfectly with your other equipment and installations.



Their compactness also provides excellent opportunities for plant expansion or retrofitting your existing equipment.

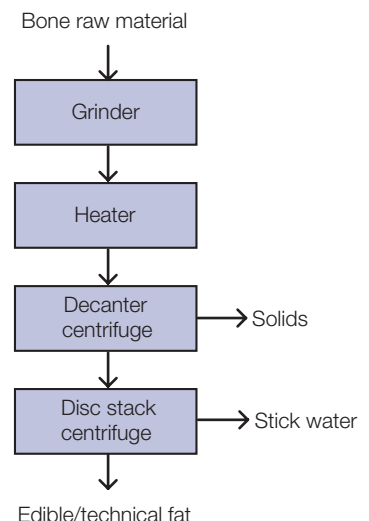
These special Alfa Laval process modules also enable you to optimize your current installations to a degree where production costs can be carefully monitored and often reduced – as well as improving the quality of your end product.

Processing bone material

For processing bones and other meat by-products, Alfa Laval provides the Centribone module. Centribone is a continuous wet rendering process that makes it possible to turn meat by-products into purified fats, with meat and bone meal, as well as bone chips, as end products, thus making it possible to boost revenue.

Alfa Laval Centribone modules are the most versatile and efficient way to process meat by-products and can handle any raw material, from fatty tissues to the best gelatine bones. The low-temperature process is a completely closed system that is also suitable for processing edible products.

Centribone process module





Processing skimmings

Meat and poultry processors have to deal with problems associated with disposal of the skimmings phase from Dissolved Air Flotation (DAF) systems.

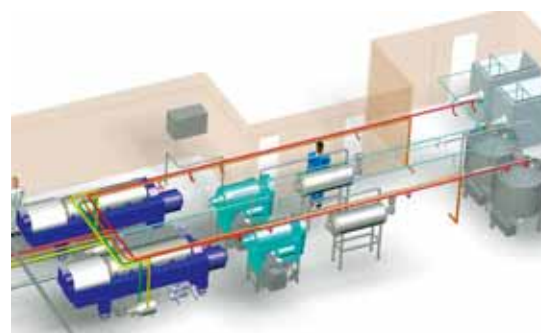
The Alfa Laval CentriSkin process makes it possible to reduce disposal costs by using centrifugal separation to extract a concentrated protein solids phase, technical fat and a recyclable water phase.

The recovered protein can constitute as much as 30% of the total volume, which makes it possible to achieve substantial savings in disposal costs. The recovered protein phase can be either sent for further processing, or used in agriculture.

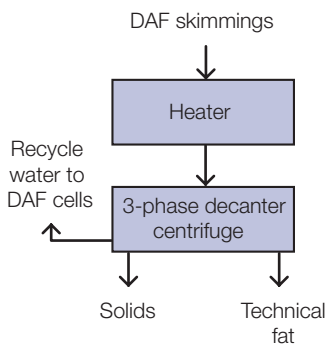
Processing blood

For processing blood, Alfa Laval supplies the CentriBlood process module. This is a continuous process for dewatering blood and is used in the production of highly digestible blood meal.

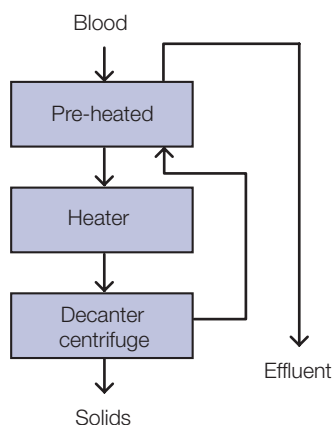
Alfa Laval CentriBlood plants are a versatile, efficient way to convert animal blood into high-quality blood meal. Mechanical and thermal pre-treatment of the blood ensures a continuous process with very high yields. Steam coagulation combined with modern de-watering techniques based on Alfa Laval decanter centrifuges results in dewatered blood that is ready for further handling or treatment.



Centriskim process module



CentriBlood process module





From waste product to clean fuel

The Alfa Laval Centrifine process makes it possible to purify fats from slaughterhouse by-products until they only contain a maximum of 0.15% impurities, by weight. After cleaning with a decanter centrifuge and disc stack centrifuge, they can then be used for technical purposes, which opens up surprising new commercial opportunities.

At the SARIA Bio-Industries plant in Malchin, Germany the purified fats from an Alfa Laval Centrifine plant are used to produce steam. "This enables us to cut down on expenditure on heavy fuel. In fact, the fat is so clean that it could also be used for the production of biodiesel," points out the production manager.

Production Manager Jörg Binnewies, SARIA Bio-Industries GmbH, Germany



Processing fats

Meat and poultry processors that need to comply with the EU technical fats directive have to comply with the requirements for maximum total insoluble impurities in the fats.

The Alfa Laval Centrifine module provides an efficient solution that guarantees compliance with this EU legislation limit. This is done by combining different Alfa Laval decanter centrifuges or disc stack centrifuges, depending on the specifications of the incoming product. Centrifine modules are available both with and without additional equipment for washing the particles.

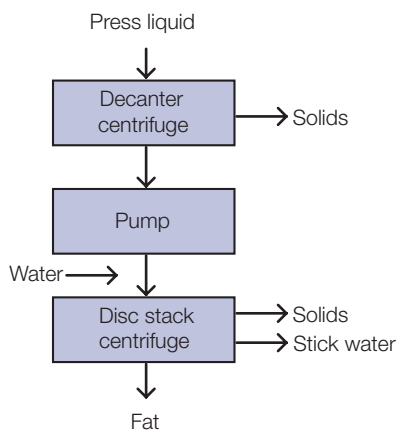


Processing fish oil and fish protein

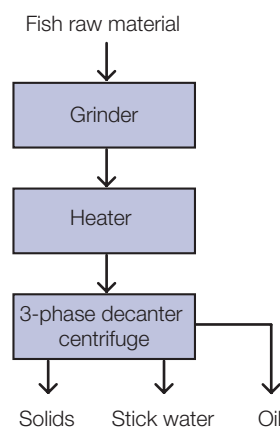
The Alfa Laval ConDec process module for high-grade fish oil and fish protein is a unique combination of Contherm heaters and an AlfaVap evaporator with Alfa Laval decanter centrifuges and disc stack centrifuges, in one single cost-effective package.

The proteins produced from fresh fish using the ConDec process are easily digested and have good biological values.

Centrifine process module



ConDec process module





Processing MDM and pre-ground meat

For cooling mechanically deboned meat (MDM) and other pre-ground raw material, Alfa Laval supplies the AlfaCool process module.

This provides a continuous, integrated process in which the product is fed to a Contherm scraped-surface heat exchanger. This rapidly and evenly cools the raw material to near freezing point with only an absolute minimum of water crystals in the end product.

The cooling medium flows in the space between the cylinder and the insulated jacket, with no contact with the product. This ensures a high heat transfer coefficient, no contamination and no air in-mix.



By avoiding the handling and energy costs associated with frozen blocks, the AlfaCool concept represents huge savings in labour handling, energy and transport costs.

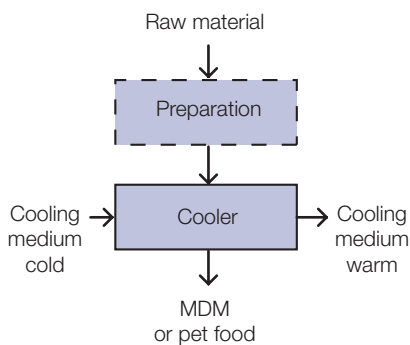


Compact cooling makes the difference

The cooling system at the Turlock plant in California, USA consists of two Alfa Laval Contherm units, which cool mechanically deboned meat from 15°C to 2°C (59°F to 36°F). As Jim Theis explains, “We wanted a continuous cooling system that would provide us with a more consistent end product of higher quality, and with a payback time of less than two years. The unique compactness of the Contherm scraped-surface heat exchanger system made this possible.”

Director of Operations Jim Theis,
Forster Farms, USA

AlfaCool process module



Protein as food



For example, proteins can be processed for their functional qualities, their taste, or as essential amino acids with nutraceutical potential.

Know-how makes the difference

With years of experience in supplying processing systems for edible products, Alfa Laval has acquired considerable know-how in the use of proteins in making specialized end products. Alfa Laval is therefore the natural choice for companies seeking to establish a working relationship with a specialist in added-value protein processing solutions.

Leftovers into high-value products

Most of the protein contained in fish and animal by-products is currently turned into protein meal, the main ingredient in animal feed.

However, fish and meat processing operations also result in many other components often thought of as “leftovers”. But there is now a growing worldwide awareness that such processes can in fact be a valuable source of protein that can be put to profitable use.

New outlook on raw materials

Alfa Laval know-how and experience can help you turn your fish and meat by-products into valuable new, customized protein fractions that represent important new business opportunities, and ways for your company to move further up the value chain.

New thinking - new opportunities

Turning valuable protein into a food ingredient or additive for human consumption, however, requires a radically new way of thinking. It demands a new business approach that breaks with tradition, and a focus on new markets for products that are primarily characterized by containing protein.





Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineered 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, foodstuffs, 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

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