

# EXPRESS

NEWSLETTER FOR PRODUCERS OF

- ANIMAL FEED
- PET FOOD
- AQUA FEED
- BIOFUEL
- WASTE PELLETS
- BIO ETHANOL

# ANDRITZ SPROUT

October 2008

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## The floating feed revolution



**Tilapia is the second-most important group of farmed fish after carp. It is farmed in at least 85 countries, with the major part of the production coming from Asia (China) and Latin America (Ecuador, Honduras and Costa Rica).**

According to the U.S. National Fisheries Institute, farmed tilapia ranked 5 on its 2007 "Top Ten" list of the most consumed fish and seafood in the United States. Each American ate 1.0 pound of tilapia in 2006. Of the ten species listed, including shrimp, canned tuna and salmon, the tilapia consumption rose most significantly.

manual labour, processing and packing compared to the large international producers. Other promising prospects include the Mexican consumers' adoption of the species in their diet, the proximity to several large consumer markets, the availability of land and sea for the farming and the national infrastructural support for aquaculture projects.

With an estimated tilapia production of 85,000 tons per year and a projected annual growth of 2-8%, Mexico ranks 8 of the world-wide tilapia production. Conscious of the necessities and future requirements for high-quality feeds for aquaculture species and also aware of the difference in which the various organisms take their feed from the surrounding environment - by flotation in the case of tilapia and by sinking in the case of shrimp - Andritz Sprout now offers the Mexican market technology and know-how for high-quality fish feed production in the aquaculture farming.



From the beginning of the new century, Mexico has been outlined as an excellent option for aquaculture development, especially as regards TILAPIA and SHRIMP farming, which is mainly due to local advantages, such as low-cost

Andritz Sprout's knowledge is based on a lifelong commitment to the customer



and a century of experience in the supply of equipment for the production of cost-effective, quality and high-performance feed. Andritz Sprout is a unique company with the ability to supply all machines in the extrusion line and with an intricate knowledge of each and every key process. Homogeneous solutions from intake to finished feed places Andritz Sprout among the leading companies in terms of extruded fish feed.

The opening in 2006 of the Andritz Sprout office in Veracruz, Mexico, makes it possible to be even closer to the customers in the Central American region and meet any need for equipment, spare and wear parts or service.

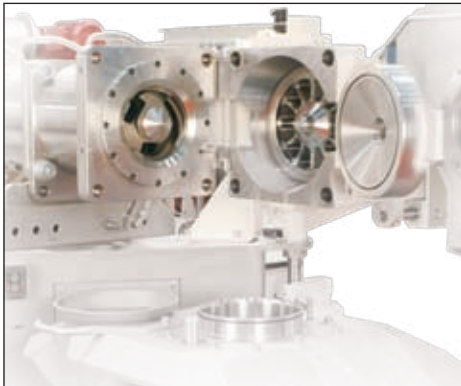
From Andritz Sprout's point of view the Central and Latin American markets are among those regions that will set the standards for the production of floating feed, and we are continuously focusing on this in order to meet the demands for high-quality fish feed.



Extruder EX617



Extruder EX920

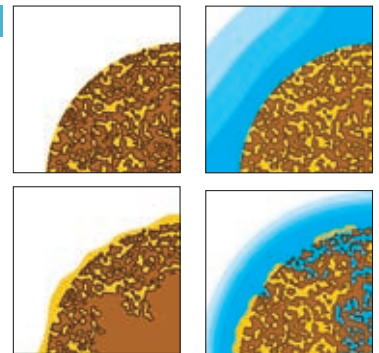


## Vacuum coating

The future will require high energy products based on protein sources having poor liquid absorption properties. This, coupled with micro liquids addition, places stringent demands on tomorrow's vacuum coating systems. Extruded pellets have a very porous inner structure. It is within the pores of this internal structure that added liquid is retained. The object of vacuum coating is to use a pressure differential to force liquids through the outer layer and deeply into the porous area of the pellet.



The Andritz Sprout system provides accurate control of vacuum pressure, liquid addition and cycle time to allow flexibility and repeatability in terms of degree of absorption and penetration.



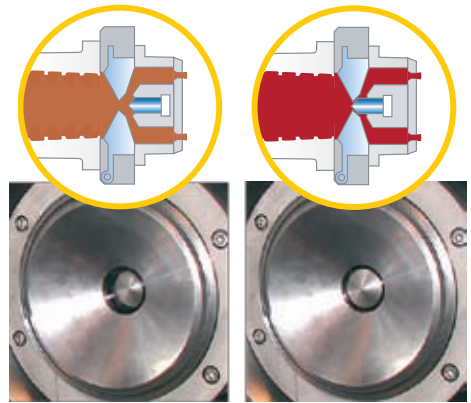
*In principle, the vacuum pressure must be as low as possible, as a high differential force will improve the oil absorption.*

*Too short time will brake the surface tension and air will penetrate into the product instead of oi.*

## SME control

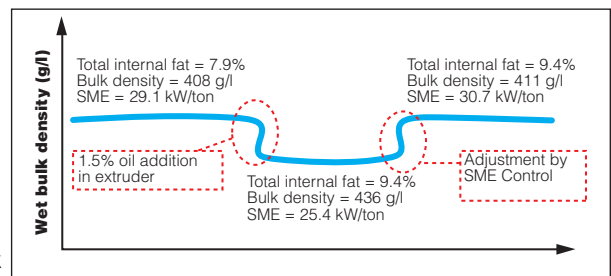
Optimum utilization of the starch in the formula is of vital importance in order to obtain sufficient expansion (bulk density). In this way the risk that the oil added in the coater will leak from the product is minimized.

The FLEXTEx system controls the SME at a level suitable for achieving the required bulk density. The SME (Specific Mechanical Energy) is adjusted by reducing the opening area at the end of the extruder with a piston.



## Inclusion of oil in the extruder (1-2%)

To control the total product weight may require between 1-2% fat in the extruder barrel. When oil is added, the SME will drop and the requested bulk density will not be achievable. The FLEXTEx readjusts the SME by means of a more restrictive compensation to achieve a bulk density of approx. 400 g/l ( $\pm 10$ )



## Die plate

To gain the required bulk density in order to obtain optimal floating properties, the die plate must be properly designed. A number of specifications must be followed, such as open area, land length and hole design.

In figure 1 the open area is defined. A total open area of 100-120 mm<sup>2</sup> per dry ton is required in order to obtain sufficient counterpressure to develop the expansion (bulk density).

In figure 2 the land length is defined. The L/D ration is the relation between hole length and hole diameter. For floating feed a total of 0.7-0.9 L/D ration is required.

Fig. 1

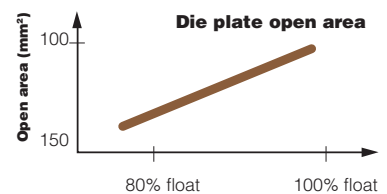
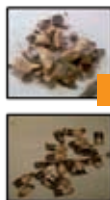
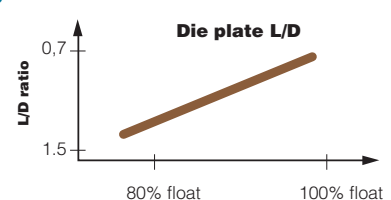


Fig. 2



*Blocked die plate with white build-up due to a combination of fish meal and starch. The white build-up often appears in the die plate and develops over time a blockage of the holes, which will result in a reduced die open area and thus change the product expansion.*

## White build-up

Development of white build-up in the extruder is a well-known problem, especially for producers of fish feed food. White build-up is caused by a combination of starch (when cooked) and fish meal from specific regions and fish species. Many attempts have been made to eliminate the problem, and only a critical selection of fish meals has been found to have an effect. However, due to

the poor availability of fish meal this is not possible for most commercial producers. By using surveillance in terms of the Bulk Density System in combination with the ECS (pressure airlock system), the production time in between the die cleaning required can be substantially extended.

# Bulk control

Two innovations in one unique tool

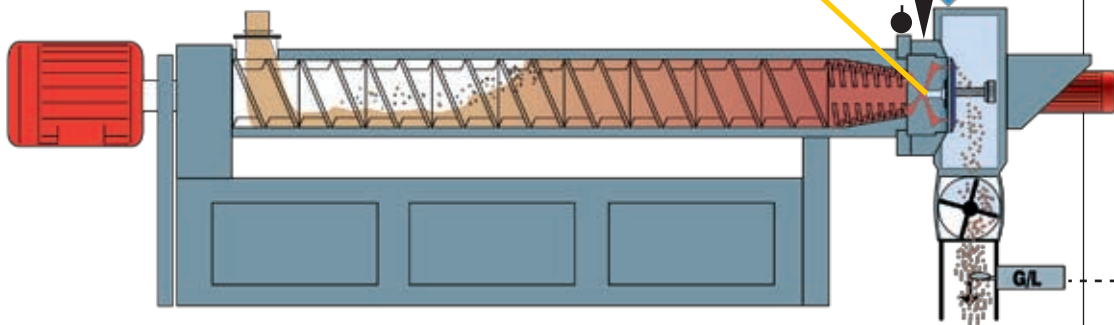
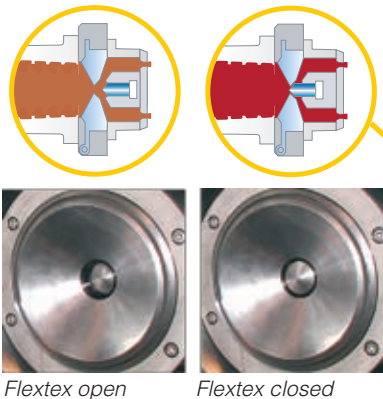
## 1 SME control device (FLEXTEX™)

A hydraulic piston located inside the extruder controls the Specific Mechanical Energy (SME) input continuously. The extruder operator can make a set point for the SME input in the extruder, and the FLEXTEX™ adjusts itself automatically. FLEXTEX™ is a well-proven technology, which has been installed in multiple extruder plants with success.

## 2 Bulk Density System (BDS™) for consistent product expansion control

The Bulk Density System consistently takes samples of the product after the extrusion. A unique measuring system makes it possible to obtain a very accurate measuring of  $\pm 3$  g/l (0,13 oz/gal).

*By combining the SME control with the Bulk Density System, a unique tool is developed. The two systems can be installed at any extruder brand independently of each other,*



Operator set point: G/L



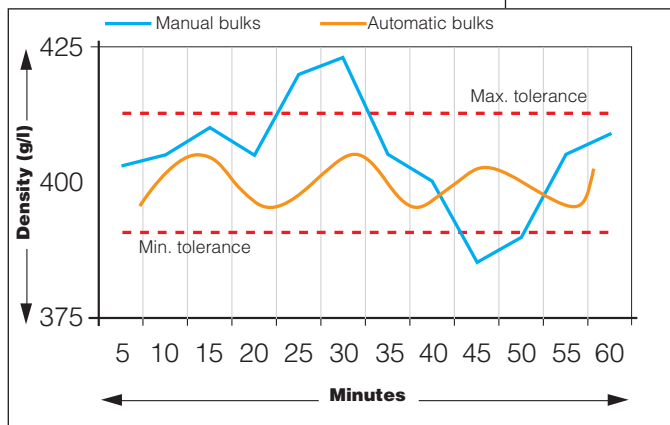
The operator uses the density set point as the most essential parameter. When the set point has been provided, an automatic adjustment will take place.

The operator has a consistent overview of the bulk density on the extruder control system. If changes in the bulk density appear, the operator will be advised through an alarm.

## Functioning

### Automatic bulk density control

The PLC receives the set point information, and by means of a PID loop the SME control (FLEXTEX) is adjusted accordingly, until achieving the desired bulk density. If the desired bulk density is not achieved, the operator will be advised.



**Improved repeatability and accuracy by means of the automatic Bulk Density System.**

## Andritz Sprout Combi-zone dryer

**Specifically designed for making high-quality fish feed and petfood, covering a variety of production capacities up to 30 TPH and product sizes from 0.8mm to 40mm**



### Combi-zone dryer advantages

- Gentle handling of products
- Drying process with respect to nutritive value
- Product size range of 0.8 - 40 mm
- Uniform drying of each pellet
- Excellent control at every step of the drying process
- Adjustable retention time

### Features

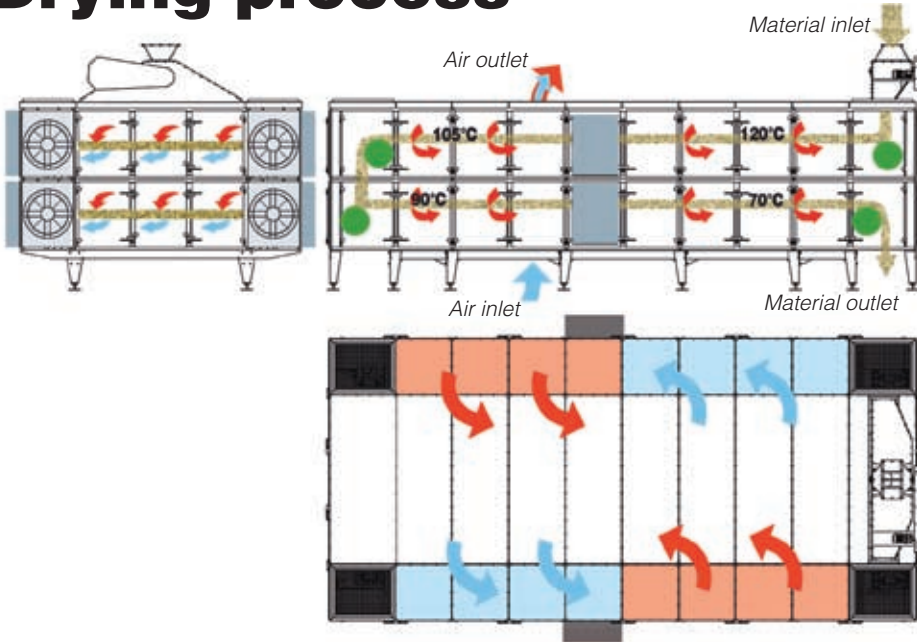
- Complete dryer housing of stainless steel
- Gentle and efficient drying
- Individual drying zones
- Temperature control in each zone (50-150°C)
- Control of drying time per deck (15-90 min.)
- Control of airflow direction for each zone
- Sanitary design with automatic cleaning system and removal of fines in each deck
- Integrated drying air system by means of direct gas-fired burners or indirect steam exchanger
- Integrated safety devices
- Easy access to operating systems for maintenance and cleaning
- Modular design for easy installation and upgrading

- Fully insulated cabinet
- Configuration flexibility, available in two belt widths and with 1-4 decks
- Several accessories and options to match specific requirements

### Multiple zones concept

The Andritz Sprout CZD W/XW dryer with multiple drying zones provides an energy-efficient dryer through better utilization of the drying air quantity available from zoned reheating of the air. In this way an optimum drying air temperature in relation to the moisture content of the product at particular stages during the drying process is achievable. In turn, this reduces the risk of tension and cracking of the product surface. Furthermore, the risk of losing heat-sensitive critical ingredients, such as vitamins, pigments, etc. is reduced. Reversed air-flow through the product and uniform air distribution over the drying area ensure a uniform drying of each pellet. By accurate control of the moisture content and distribution in the product, consistent product density is ensured, and optimum oil absorption properties during coating are achieved. The improved utilization of drying air minimizes the consumption of exhaust air, thus reducing the odour impact on the environment.

# Drying process



*Air system advantages:*

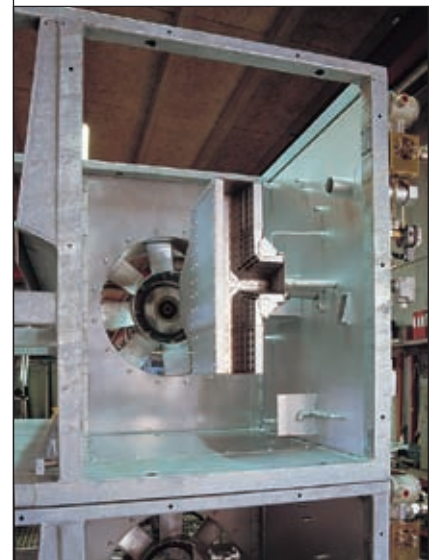
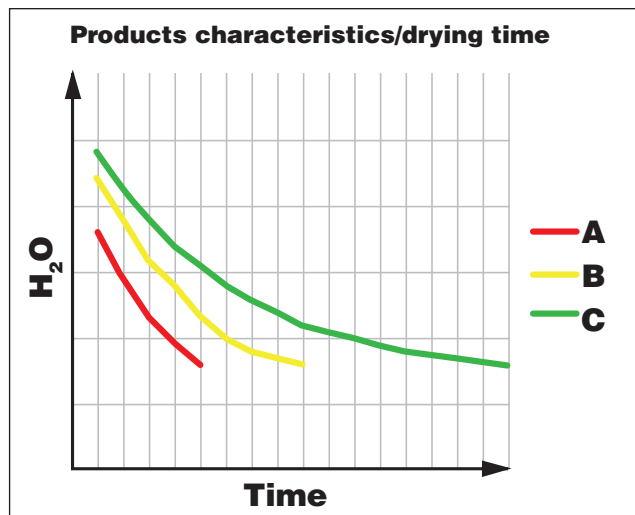
- Individual control of temperature and air flow in each drying zone
- Individual drying zones
- Control of temperature in each zone (50-150°C)
- Control of drying time per deck (15-90 min.)

- Control of air flow direction for each zone
- Optimum air cleaning possibilities by means of filter or cyclones.
- Minimized fire hazard
- Optimum flash-off for high drying efficiency
- Energy source based on customer requirements:
  - Indirect steam
  - Direct gas

**Product characteristics:**



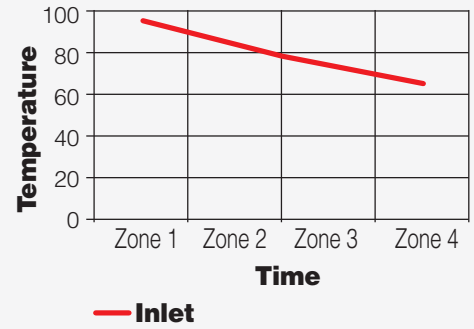
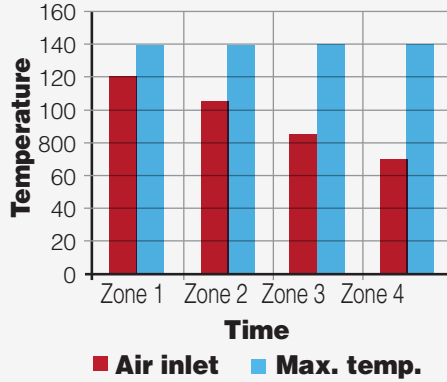
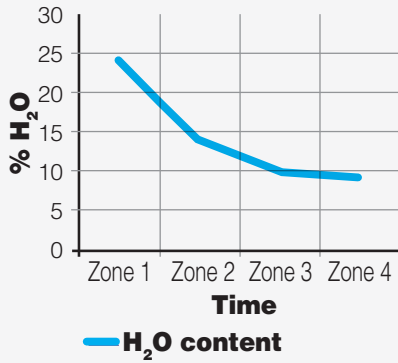
- Size**
- Texture**
- Oil level**
- Raw material**
- Moisture level**



## Moisture reduction

### Moisture reduction depends on:

- Control of drying air temperature for each drying zone (50-150°C)
- Drying air quantity (velocity) for each drying zone
- Retention time for each deck (15-90 min.)
- Product size, expansion and formula (especially fat and starch)
- Flexible zone division in accordance with dryer combinations



### Drying performance

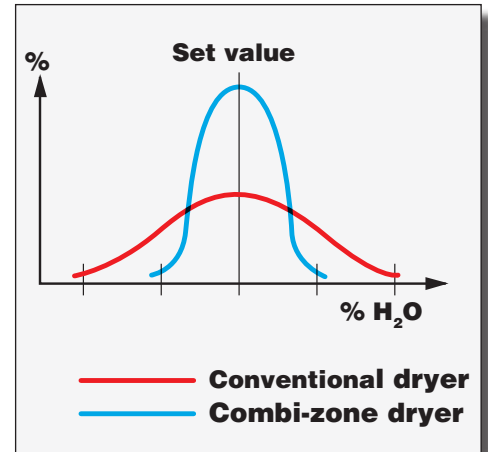
*Spread of moisture is minimized*

#### Sinking fish feed:

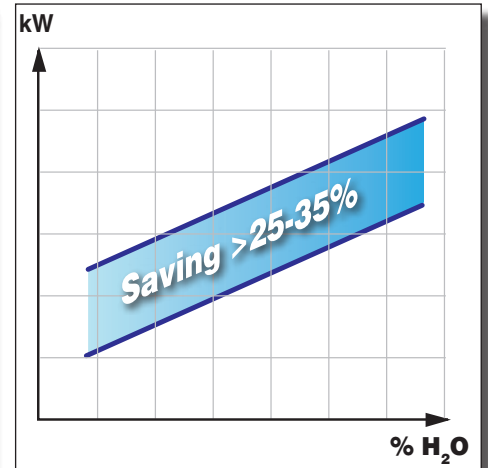
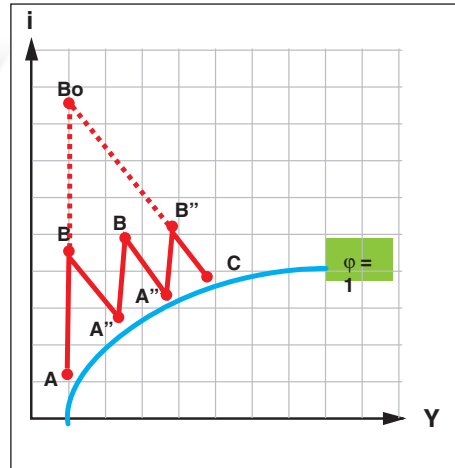
- Spread of moisture = spread of oil absorption
- Spread of moisture = spread of sinkability
- Too low moisture = floating

#### Fish feed and pet food:

- Too low moisture = loss of money
- Too high moisture = risk of mould



### Energy efficiency





# Summary of recommended parameters for producing tilapia feed

## Raw material

Starch content min. 7.5 %

Internal fat min. 9.0 %

## Grinding

<1200 micron 100 %

<700 micron 70 %

## Extrusion

Conditioner retention time 80-100 sec.

Conditioner temperature 98-99 °C

Moisture at die exit 12.5-15.0 %

Die plate open area 180-200 mm<sup>2</sup>/dry/ton

Die plate L/D ratio (hole) 1.0-1.2 mm

SME 29-33 kW/ton/net

Internal fat 0.5-1.5 %

Bulk density 400-410 g/l

## Drying

Uniformity 1.0-2.0 %

Moisture 6.0-8.0 %



Interview with Juan Carlos Petersen  
General Manager  
Salmofood S.A.

## “We need the technology and global experience of Andritz Sprout to help us compete”



### Swimming with sharks

Salmon production continues to enjoy dynamic growth, and Chilean salmon producers are world-leading. Salmofood is the only fish feed producer, which is owned and operated by Chileans. The company effectively doubled the capacity this year with the addition of a new automated production line from Andritz Sprout. In this article Juan Carlos Petersen, General Manager of Salmofood, describes how the company is competing with the large multinationals.

### Experience

I joined Salmofood seven years ago after a career in the investment, banking and finance sector. I hold an MBA degree in economics, and I was eager to manage a dynamic growing business. Salmofood was founded in the 1990's by several Chilean

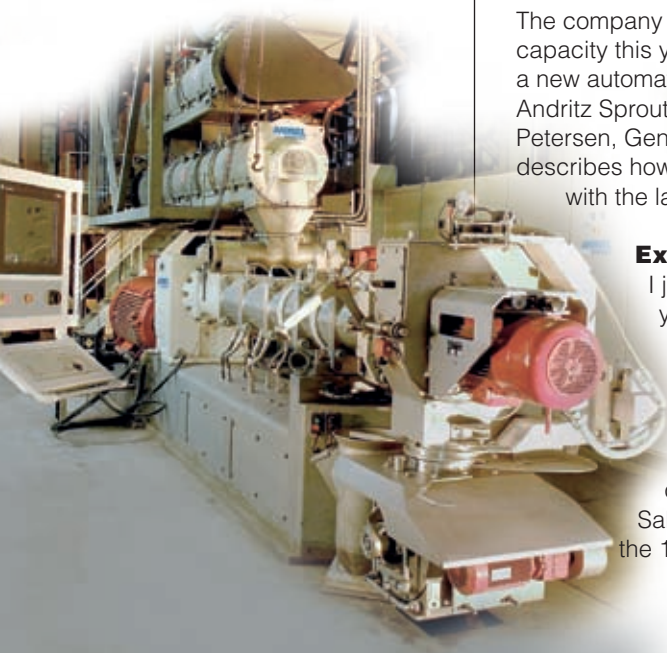
salmon producers – first to secure their own supply of high-quality feed, and then to sell feed to the national market. Over the years, the mix has changed, and now 25% of the feed is used internally and 75% is sold to market.

We are proud to be the only Chilean-owned feed producer selling to the market. However, people do not buy from us for this reason. We have to compete with other large companies in terms of cost, food safety and quality as well as sustainability.

### Challenges

Our most important concerns are safety, quality and sustainability of supply. Fish farming is based on raising carnivorous fish, which means that the fish feed consists of other fish. There are clear signs that the available raw materials (fishmeal and fish oil) will not suffice to keep pace with the demand. The industry will have to rely on other raw materials for feed production.

Feedstock alternatives, such as



plant products combined with new technologies, which improve the yield from raw materials and the overall efficiency of the production process, provide a significant increase in sustainability. Any technology employed by us has to adapt to where our quest for new raw materials takes us.

### Expanding with a third line

Since the plant started up in 1995, Andritz Sprout has supplied production technology for it. The first two production lines include Andritz Sprout extruders and are each making 10-12 tons per hour of high-quality feed. These lines produce about 110,000 tons per year.

In 2006 we made the decision to invest 15 million US\$ to renovate and expand our plant. Our target was to increase the annual production capacity to 240,000 tons, which would allow us to increase our market share from the current 10% to 15%. It is our goal to achieve the capacity to receive an order and deliver it at the farm site within 24 hours.

We looked at several potential suppliers for the new production line. Andritz Sprout presented the best proposal in terms of performance / price ratio, energy efficiency, support and commercial terms. We already knew their excellent technology and service, so the decision was an easy one.

Andritz Sprout supplied an integrated 22 t/h line, consisting of individual intake and batching systems for serial grinding, extrusion, conditioning, drying and vacuum coating in combination with downstream equipment (such as the automated packing and palletizing line) from other suppliers. The line is highly automated, so that we have considerable flexibility in optimizing formulations and sequencing production tasks. The high level of automation is also a great help in support of a consistent product quality. The new line started up in November 2007 and is running well.

### Flexibility, quality, safety and product and process traceability

We optimize the feed formulations every day on the basis of customer needs and raw material prices. The very flexible Andritz Sprout technology accommodates this with just a few inputs into the automation system.

Our feed is formulated with first-quality raw materials manufactured under strict quality control conditions. Our basic raw materials are rigorously selected and fortified with well-suited nutrients that

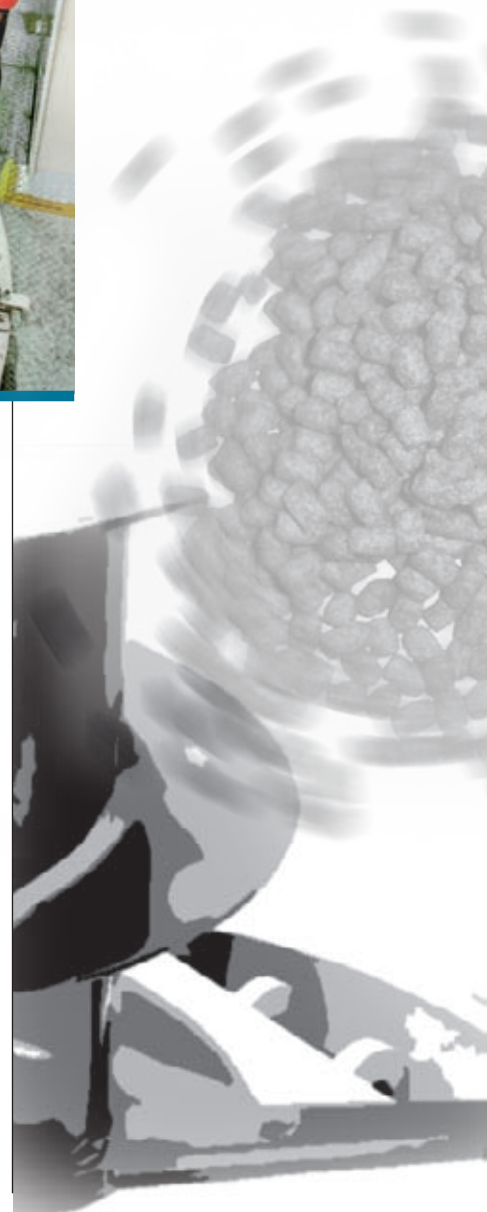
support the metabolic functions of the fish. The automation system of Andritz Sprout is providing an efficient control of the thermal processes of the line, which is essential for the protection of sensitive feed nutrients.



Food safety is paramount, and the documentation capabilities of the Andritz Sprout system provide a good audit trail, if we should ever need to go back and examine the production run. No chemicals are used – only natural raw materials. Water and oils are recovered and reused. Dust from the packing operation is recovered and recycled. Our entire production chain has a very low environmental impact.

### Andritz Sprout

Andritz Sprout has a world-class position. Their systems are very efficient in terms of yield and waste reduction. An efficient production will have a low environmental impact. We know and we trust in Andritz Sprout. It is a company with world-class technologies – and not only feed technologies (this innovation will flow to customers in all Andritz Sprout markets.) They have new technologies, which we are eager to utilize, and they offer very good support.



## Andritz Sprout service

**Andritz Sprout - global supplier to the:**

- **Animal feed industry**
- **Aquatic feed industry**
- **Petfood industry**
- **Biofuel industry**
- **Waste recycling industry**

**Excellent support for aquatic feed and petfood plants. Being able to supply equipment for an entire feed extrusion production is one thing, but being able to serve customers from nearby warehouses after the installation in terms of support and supply is yet another essential Andritz Sprout competence.**

Our worldwide presence is implemented through regional service centres that guarantee highly reliable process operations by means of close contact and support. Andritz Sprout engineers are available for plant audits and

support in order to assist the customer in identifying and ensuring a possible production increase, locating cost-saving opportunities and fine-tuning the production process.

## Spare parts

Andritz Sprout provides worldwide availability of spare parts. High-quality parts and consumables generate long life and good economy to the process plant.

Service contracts including products and support:

- Spare parts
- Wear parts
- Regular service
- On-line process support
- Process optimization
- Renovation and improvement
- Recommendations for spare parts stock
- Standby service technicians



*Andritz Sprout is a global corporate group with worldwide activities in development, production, and supply of technology and after-sales service to the feed and biofuel industries. Andritz Sprout has branches in Denmark, Holland, USA, England, Germany, France, Slovakia, Mexico, Venezuela, Chile, Brazil, Australia and China, and thus employs approx. 600 people. Furthermore, Andritz Sprout is represented by a large worldwide network of agents and distributors.*



**Please contact our local service team and learn, how we can assist you in improving your production process.**

[www.andritzsprout.com](http://www.andritzsprout.com)

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