

First Fish Feed Plant Goes Into Operation in the Maghreb



Tunisia is the second largest fish producer in the Maghreb area of North Africa, producing approximately 110,000 tons of fish annually. With an annual production of 7,000 tons, Tunisia leads the Maghreb countries in the production of fish from aquaculture. There is a strong move away from the maritime fisheries towards aquaculture.

The company Rafaha Aquaculture is the largest producer of fish from marine aquaculture in Tunisia and is active throughout the processing chain. The company is involved in hatchery and farming in net pens along the sea coast up to direct marketing of the fish. Enormous sales growth has been seen in recent years, particularly in the production of seabass and seabream. To meet the high demand for aquafeed and to bring production as well as quality management under their control, the company decided in 2011 to build their own production plant for high-quality fish feed.

After an extensive market analysis the machine and plant manufacturer Amandus Kahl GmbH & Co. KG was selected as a partner. In addition to the process and plant design for the complete line, Kahl provided close support regarding the basic formulas and the raw materials to be used as well as intensive training of the operating personnel. Theoretical and practical training was performed in the Kahl pilot plant in



Reinbek / Germany as well as locally during commissioning of the plant.

The factory is equipped with the latest KAHL process technology, the core of which is the extrusion system with the Kahl Extruder OEE and the process control system ESEP.

Production started in spring of 2013. In the production process, the raw materials undergo the process steps of weighing, fine grinding, mixing, extrusion, drying, vacuum coating, cooling and packaging.

In the first expansion stage, the factory has a capacity of 25,000 t/year; however it can be further expanded with increasing demand. Sinking, slowly sinking and floating products in various shapes and sizes can be produced.

The formulas tailored to the requirements of sea bream are characterized by low starch and high protein content. The Kahl process technology allows for the demands of local raw materials, particularly in the area of conditioning and extrusion. In preparation for extrusion, these feed mixtures are pre-cooked with a special two-stage conditioning system, according to the different starch qualities. The principal machine is the retention conditioner type VK. In this machine, the retention time of the feed is continuously adjustable between 60 and 180 seconds, using a pile-up geometry at the outlet. Depending on the feed properties, the desired retention time is determined in the formula or directly at the user interface. A correction during operation as well as automatic emptying of the retention conditioner at automatic stop of the plant is possible.

Shaping and adjustment of the pellet density are realized in the extruder type OEE. This



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machine is equipped with the hydraulically movable die which is typical for the Kahl extruder. It allows an extruder to start with an open die, which makes the critical process start and stop very easy and saves waste. Due to the automatic opening of the die, a die change can be completed within 120 seconds. This provides additional convenience, particularly since fish feed production typically requires a variety of different pellet diameters. At the same time a

high level of plant availability with a low downtime results from the rapid die change.

The hydraulic unit of the movable extruder die is equipped with a pressure accumulator, which opens the die automatically in the event of power failure and sudden plant stop, relieving the pressure area in front of the die. In the case of brief power interruptions, the extruder can be restarted without dismantling the die.

An all-encompassing modernization package could be implemented in the periphery of the vacuum coater. The complete revision of the measuring devices and the proportioning systems was the basis for control by means of a sequencer. The sequence of the individual process steps in vacuum coating can be tracked and retraced by the operator. This results in the possibility of an exact adjustment of the parameters, depending on the pellet properties or formula. This relates in particular to the important steps of liquid proportioning, vacuum breaking, sequence and the corresponding speeds of the coater. Thus, the saturation level of the liquids in the pellet, fines production and throughput can be optimized.

In light of continuous quality monitoring of the finished product, a new software system for batch traceability was installed. It allows the storage of more than 1,000 formulae and retracing of the production data. This results in a kind of "transparent" production. With the help of continuous batch marking in the process database, it can be traced at any time – for example, which production adjustment was chosen at which time. When storing the time that samples are taken, the results of the subsequent laboratory analysis can be assigned exactly on-line. This is the basis for a comprehensive quality management.

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