

Dana Feed extruder pilots spot irregularities within 30 seconds

Dana Feed is a relatively young company that specialises in manufacturing fish feed with a high level of automation. (Photos: Dana Feed)

In connection with the latest plant extension, Dana Feed in Denmark, chose to replace the existing extruder control with the advanced Extrusion Control Management System of Sprout-Matador as part of a totally new control solution for the entire plant. The ECMS can communicate with the plant control and external computer systems via a network.

By Dick Ziggers

Dana Feed A/S is a quality feed manufacturer that produces high quality, high performance diets for a range of fish species. Dana Feed is part of the Provimi Holding Group of companies and within this group there are a total of four modern fish feed factories in Greece, Denmark, Spain and Chile. Backing Provimi is Provimlux, a group of capital investors that purchased the interests of Provimi from Eridania Béghin-Say last year.

Since Dana Feed was established as a fish feed business in 1990, it has come a long way and the company now supplies a range of products for different fish species to over 20 countries from its manufacturing base and headquarters in Horsens, Denmark. This factory was newly built in 1997 and incorporates state-of-the-art manufacturing technology. A dockside location enables efficient receipt of raw materials and export of finished goods direct by boat.

Raw materials are selected with fish performance in mind. The quality of raw materials and their freshness are of paramount importance and each delivery is screened and quality controlled by the on-site laboratory.

There are many other factors beyond raw materials that can affect feed quality. The process technology that is used to manufacture the pellets has a major bearing. Even when using the highest quality raw materials, the final pellet quality (both physically and nutritionally) can be compromised if manufacturing technology is not right.

Dana Feed has a range of diets for many different fish species including salmon, trout, char, eel, halibut, turbot, wolfish, sea bass, sea bream and cod. For each species there is a range of diets. For example, for

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salmon, there is a choice of four energy levels for the fresh water stage, a comprehensive range of grower diets and two broodstock diets.

Any kind of fish feed

When visiting Dana Feed the total impression of the company is characterised by the great commitment to quality of the products by the operators and the production supervisor. Everybody knows what quality means to the company and its many customers. Since Dana Feed fish feed is exported to many countries around the world the objective of the company is simple: To satisfy any fish feed needs. So far this ambitious objective has resulted in a very comprehensive product range based on 35 basic formulas and pellet sizes ranging from 1 mm to 28 mm diameter.

The same production plant produces all variants, and consequently it is necessary to have production equipment that can meet the increasing demands.

With the PLC-based Extrusion Control Management System (ECMS) the entire extrusion process is controlled - from the loss-in-weight system, feeding system, to the outlet of the extruder. The total operator staff of six - colloquially called extruder pilots - take turns at operating the plant, which consists of two extruder lines - a Sprout-Matador EX920 installed in 1997 and an EX917 installed in 2002.

The new EX917 is mounted with an expansion control unit, ECS. From the operator computers in the control room the process is carefully monitored. All the extruder pilots are very satisfied with the control system, production supervisor Carl Ebsen says.

Frequent formula changes

Ebsen considers the data collection function a valuable tool. "No two weeks in our production plant are alike. We have frequent formula changes, two to three within an eight-hour shift, and cannot hit the same parameters twice. The system database generates

more than 2,400 formula data, which are presented topically and historically in the form of trend curves of all conceivable parameters," he says.

The control works either as a formula-related auto-start or as a semi-automatic step-by-step operation. As experienced extruder pilots, the operators usually always go to the machine to make a visual check of the pellets when production is started. The product is then adjusted from the locally placed operator panels' monitor and keyboard, which corresponds to the computers in the control room.

Cooperation partners in the development of new products

Dana Feed is an important partner in the continuous development, which is taking place within fish and shellfish farming industries in many countries. Norway, for example - one of the pioneer countries within the business - has started farming cod, to which Dana Feed supplies amongst others 28 mm large pellets.

As Carl Ebsen expresses it: "Our operators are good craftsmen, not computer nerds. Personal responsibility still plays an important role at Dana Feed. Our goal is to utilise the many functions of the ECMS control to their optimum and we are well on the way.

"Teething troubles are a thing of the past; we are not pestered by unstable operation and keep our ears to the ground". To this the operators add that they can monitor the operation from their computers all the time, and any irregularities are revealed within 30 seconds. The control also contains a service program, a good tool, which especially new operators have found useful during training.

Improved automation reduces the costs of operation

After installing the Sprout-Matador ECMS, users have observed a number of advantages when operating the new system with improved automation. With the ECMS system they obtain more flexibility in production, a reduced number of operators and standardised operation parameters. A minimum number of well-trained operators to secure constant production is required as the system provides automatic start-up and stop-down and repeatable production parameters for all formulas.

The communication with other processes, such as exchange of process parameters between key process equipment, is automatically adjusted. This provides a minimal loss of products not fulfilling specifications.



The energy requirements for each product in a production plant typically change. The new ECMS control system automatically provides information of how much energy is presently being introduced to the product. The control of the ratio between the required thermal energy (STE) and the mechanical energy (SME) is essential for the product. The ability to obtain the same ratio between energy sources for each formulation ensures consistent product quality.

Controls in network

Recent developments in key process control systems are designed to communicate with the plant control system. This exchange of information can improve both product quality and traceability.

Traceability can only be obtained by collecting information from both the key processes as well as the plant control system. This task is achieved by having the various control systems communicating via a

common network. An example of the communication between various control systems is illustrated in *Figure 1*. In this example three different key process control systems (extruder, dryer and vacuum coater) are communicating with the plant control system via the network.

In order to generate a reliable feed forwarding system, communication between the key processes and the plant control system is also required. Essential information, such as e.g. moisture of raw materials in the formulation, is forwarded to the extruder process control system.

By monitoring moisture applied in the extrusion process as well as flash-off steam generated after the extruder, total moisture content of the feed going into the dryer can be calculated. The dryer control system uses this information to control the drying parameters. ●

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