INFORMATION ON INTENSIVE FISH PRODUCTION TECHNOLOGIES
Index

04 The situation facing aquaculture
06 The Closed-loop circulation system made by Fischtechnik Germany
07 Intensive and innovative technologies for fish production in FTIE systems
08 The FTIE concept for closed-loop circulation systems
10 Description of the main components of FTIE circulation systems
14 Fischtechnik International Engineering GmbH (FTIE)
The situation facing aquaculture

Each year, the FAO Report on the State of World Fisheries and Aquaculture is increasingly urgent in tone. Many of the world’s ocean resources are already depleted or approaching depletion.

FAO warns of overfished seas

In the latest FAO State of World Fisheries Report, the United Nations urgently warns against overfishing the world’s oceans and complains about a lack of political will to take action against the threat of decimated stocks. In total, one quarter of high seas fisheries stocks are in jeopardy. More than half (52%) have already been exploited so intensively that an increase in stocks in no longer possible.

Published March 6, 2007

Increasing importance of aquaculture

The “blue revolution” is becoming increasingly important for the ocean as a natural habitat, particularly with regard to climate change, environmental pollution and the conservation of existing stocks. Global consumption of fish and seafood is rising to such an extent that aquaculture is now essential if needs are to be covered. In 2002, the quantity of fish produced by aquaculture was 40 million tonnes worldwide, equivalent to about a third of total global fish production. Some forecasts even go so far as to predict that more than half of all seafood products consumed worldwide in the year 2030 will come from aquaculture.
Diagram of a closed-loop circulation system made by Fischtechnik Germany
Intensive and innovative technologies for fish production in FTIE systems

Closed circulation systems for fish production

The driving force behind the development of closed-loop systems is, that there are fewer and fewer water resources that can be used for fisheries purposes, that strains on the environment as a result of production processes must be reduced over the long term, and that demand for fish and for aquaculture products in general is rising.

All aquatic systems excrete metabolic products into water. If left untreated, this would have far-reaching impacts on the natural environment. Eutrophication and sedimentation of solid contaminants can also cause substantial changes in the habitats of many other organisms, with all the resultant consequences. Closed-loop circulation systems with a daily water consumption of 10%-12% of the system’s volume allow the removal of metabolic products and general contaminants using mechanical, biological, chemical and physical methods.

In addition to reducing emissions, actively controlling water quality also has the advantage of optimally controlling the environment for fish. This includes water temperature, chemical and physical water parameters, the water’s microbial content, the oxygen concentration and the feeding intensity. The FTIE circulation concept is the result of more than 15 years of active work with closed-loop circulation systems.
The FTIE concept for closed-loop circulation systems

Closed-loop circulation technology for fish production offers the possibility of providing all known and commercially important fish species with an ideal environment. This is the prerequisite for ensuring that these fish grow well, stay healthy and properly process the feed given them so that they ultimately taste great. This is why FTIE supplies an entire family of circulation systems that are perfectly adapted to every conceivable application. The modules can be combined and added as required to cover every conceivable production task/capacity:

1| Pilot systems
   for institutes and universities, providing constant test conditions over long periods, thus giving the conditions for conducting a wide range of comparative tests on fish

2| Small circulation systems
   for producing fry and fingerlings, for separate farming of parent fish with light/temperature programs, for quarantining purposes and for (live fish) farming purposes

3| Basic circulation systems
   for small-scale enterprises producing between 10 and 50 tonnes of edible fish a year and wishing to use existing buildings, and which have to operate in a particularly low-maintenance and cost-efficient manner

4| High-output circulation systems
   for commercial production of large quantities of edible fish or fish products such as caviar, at annual outputs exceeding 200 tonnes a year, including optimally adapted new buildings featuring all secondary equipment, very high productivity and a high level of process reliability for fish production
<table>
<thead>
<tr>
<th>Circulation</th>
<th>Volume (water)</th>
<th>Space requirements</th>
<th>Power requirements (without heating)</th>
<th>Water requirements</th>
<th>Annual production (stock level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot system 1</td>
<td>4 m³</td>
<td>30 m²</td>
<td>1,2 kWh</td>
<td>0,2 m³/d</td>
<td>100 kg</td>
</tr>
<tr>
<td>Pilot system 2</td>
<td>10 m³</td>
<td>45 m²</td>
<td>1,5 kWh</td>
<td>0,4 m³/d</td>
<td>200 kg</td>
</tr>
<tr>
<td>Small-scale circulation system 1</td>
<td>10 m³</td>
<td>60 m²</td>
<td>3,0 kWh</td>
<td>0,6 m³/d</td>
<td>500 kg</td>
</tr>
<tr>
<td>Small-scale circulation system 2</td>
<td>20 m³</td>
<td>100 m²</td>
<td>5,0 kWh</td>
<td>1,5 m³/d</td>
<td>1,000 kg</td>
</tr>
<tr>
<td>Basic system 1</td>
<td>25 m³</td>
<td>80 m²</td>
<td>2,0 kWh</td>
<td>3,0 m³/d</td>
<td>10,000 kg</td>
</tr>
<tr>
<td>Basic system 2</td>
<td>50 m³</td>
<td>150 m²</td>
<td>7,5 kWh</td>
<td>5,0 m³/d</td>
<td>40,000 kg</td>
</tr>
<tr>
<td>High-output 1</td>
<td>350 m³</td>
<td>800 m²</td>
<td>30,0 kWh</td>
<td>25,0 m³/d</td>
<td>125,000 kg</td>
</tr>
<tr>
<td>High-output 2</td>
<td>700 m³</td>
<td>1350 m²</td>
<td>42,0 kWh</td>
<td>42,0 m³/d</td>
<td>200,000 kg</td>
</tr>
</tbody>
</table>
**Description of the main components of FTIE circulation systems**

**Fish tanks**  
FTIE has developed a wide range of fish tanks for various applications. We supply a variety of FRP tanks with up to 8 m³ water volume and different configurations to suit the specific type of use.

For tank volumes ranging between 10 and 350 m³, membrane tanks with multi-layered walls and that can be transported to your location in space-saving form are available. These tanks do not require a concrete substructure.
The main water treatment processes, namely mechanical and biological purification, are supplemented by a series of secondary processes that are always used as needed.

-> pure oxygen transmission in the low-pressure range and automatic emergency gassing with pure oxygen
-> disinfection of water with UV light and / or ozonisation
-> temperature control of water by means of heat exchangers
-> source of heat is a heat pump, heater or other type of unit
-> denitrification by combination with a vacuum degasser
-> denitrification filter
-> wastewater purification plant consisting of sludge sedimenter and sludge collector
-> automatic PC-controlled feeding system
-> handling equipment consisting of a harvesting system, fish sorting, fish counter and fish weighing machine

Fischtechnik Monitoring System (FCFM)
These circulation systems are equipped, according to your specifications, with sophisticated systems for data capture, visualisation, processing, remote transmission and alerting. All pertinent data is continuously compared with setpoint data, with alerts being issued according to importance.

drawing: Sensors and Controlling - connected in one system
Mechanical Filters

FTIE applies two proven principles for mechanical purification of water in its circulation systems, namely sedimentation and screening; sedimentation is preferred for basic purification and for sludge stabilization, whereas the screening technique is used intermediate processing and for fine purification by mechanical means.

drum filter, type II
FTIE supplies a wide range of biofilters that can be deployed with precision to meet specific needs. Drippers are used for low nitrification outputs; the active surface is 120-200 m²/m³. The filter comprises a water distributor, the biomaterial, a water collector and the air conduit.

Biofilm reactors as fluidised-bed and moving-bed reactors with a biofilter filling of 800-3,000 m²/m³ for high nitrification outputs.
Fischtechnik International Engineering GmbH (FTIE)

FTIE was established in early 2006 to handle the international operations of Fischtechnik Fredelsloh GmbH. Its objects are to design, supply and install systems for intensive fish production. Proven components are continuously advanced and assembled into highly efficient and profitable fish farms.

All FTIE workers are highly skilled and motivated, with enormous experience gathered from many years working in this field. The company has long-standing links with institutes, universities and specialised companies all over the world, thus ensuring that FTIE supplies systems contain nothing but state-of-the-art technology.

FTIE installations are synonymous for:
- advance biotechnology
- superior efficiency
- high productivity
- high product quality
- low environmental stress
**Project realisation**

The service provided by FTIE includes every step necessary to progress from the potential customer’s basic concept to a fully operational fish farm.

- **a** Advising the potential investor in defining the project concept
- **b** Preparing a preliminary project that contains the technological solution
- **c** Drafting the overall plan for the project
- **d** Realisation of the project as a joint venture, or monitoring the project as an external service
- **e** Delivering the completed engineering systems for the project
- **f** Staff training on site or in Germany
- **g** Consultation, service and general project support – as long as needed

<table>
<thead>
<tr>
<th>Objective</th>
<th>Pre-project</th>
<th>Project</th>
<th>Realisation</th>
<th>Hand-over</th>
<th>Fish production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enquiry</td>
<td>Pre-project</td>
<td>Project</td>
<td>Realisation</td>
<td>Hand-over</td>
<td>Fish production</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Real cost
- Equipment
- Accessories
- Time schedule
- Infrastructure
- Offers from subcontractors
- Staff training
- Definition of infrastructure
- Test run
- Official permits
- Calibration of sensors
- Start of production
- Building permission
- Activation of biofilters
- Warranty period

**FTIE services**

15 | FTIE Fischtechnik International Engineering