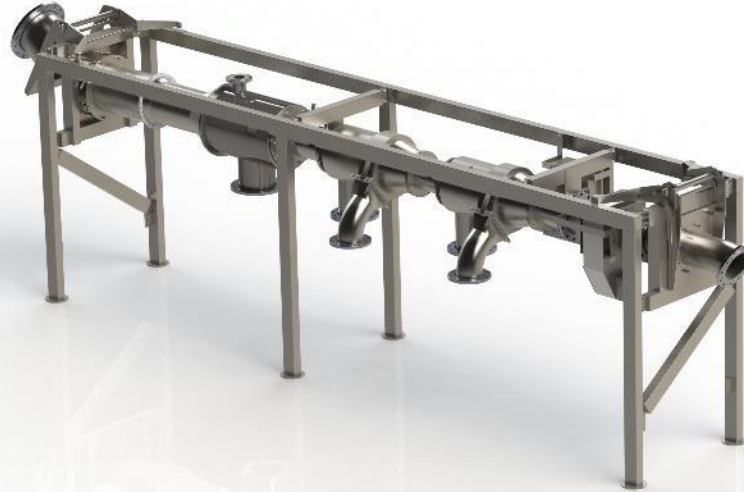


Flatsetsund Engineering AS

Contents

- Short history
- Who we are
- Products
 - Fodder cranes
 - Counters
 - Ejectors
 - Aerators
 - Delousing systems





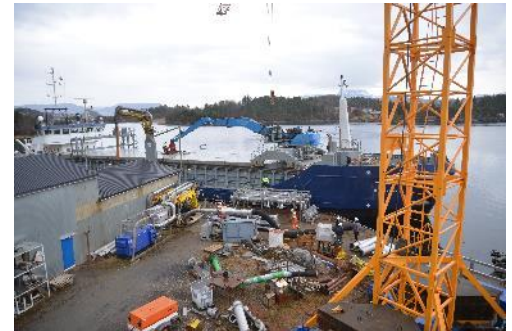
History

- Started in 1914
- Shipyard until 2002
 - Converting wellboats from about 1990
- Development and production of equipment for wellboats and aquaculture industry from 2002



Status 2018

- 25 employees
 - 4 admin and sales
 - 2 engineers
 - 4 software developers
 - 15 welders and fitters
- Modern facilities and equipment



Products



Delousing systems



Ejectors



Fish counters



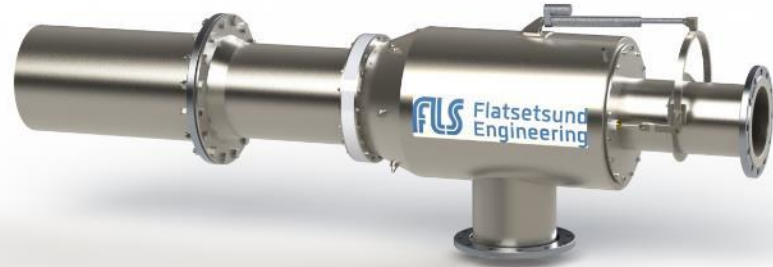
Fodder cranes



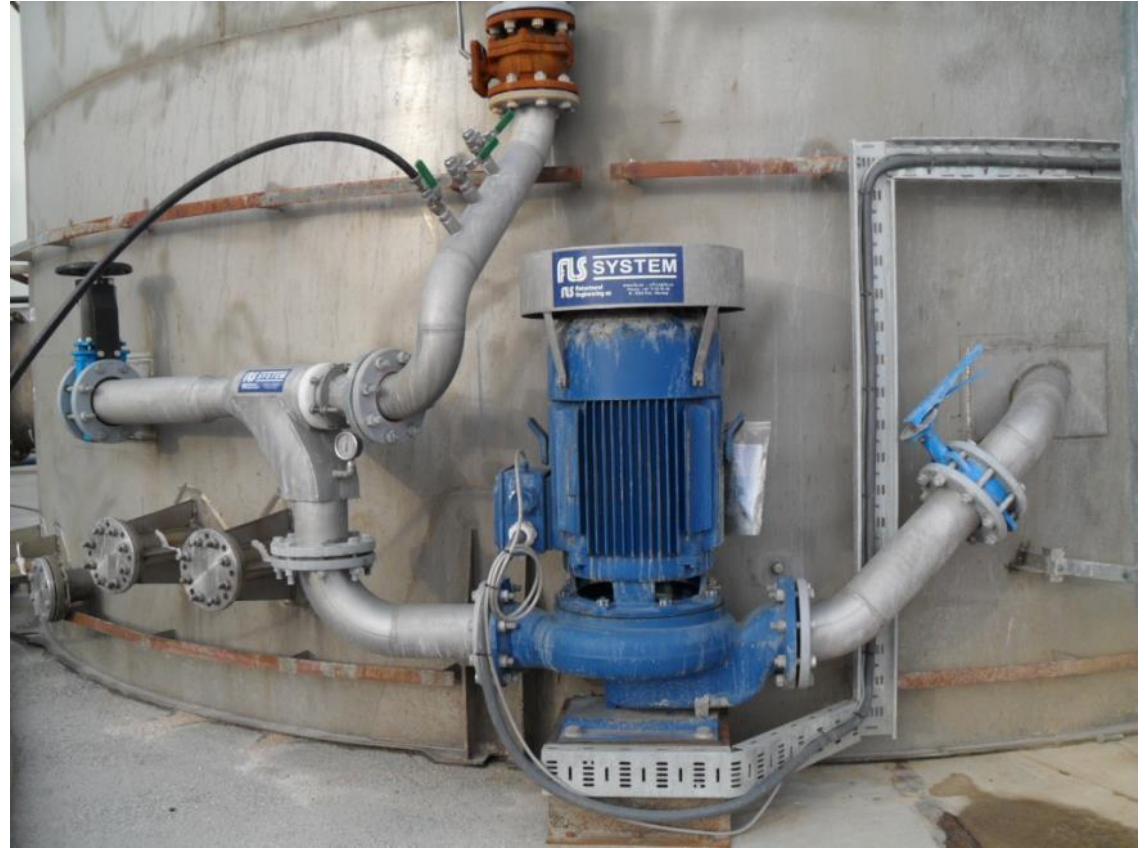
Aerators

FLS Ejectors

- Patented design
- Developed for moving live fish
- 12-500 mm nozzle diameter
- Many different areas of use
- Actuator-controlled nozzle opening

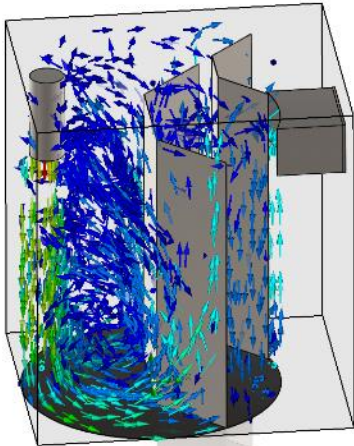


FLS Ejektor



FLS Aerators

- Ejector based water treatment
- CO₂ cleaning
- Adding fresh oxygen
- Used on wellboats and hatcheries



FLS Aerators



FLS Fish counting and weighing system

- We are almost ready with our third generation of counting and weighing systems
- Based on image processing and laser beams
- The first wet counter for wellboats
- Accuracy of 95 – 100 %



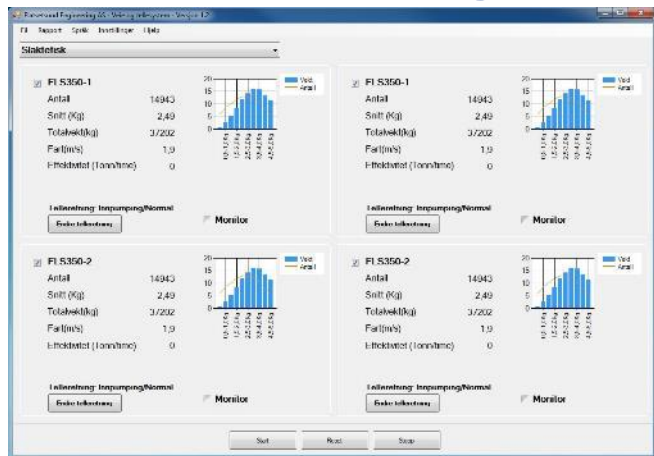
Models for mature fish counters

| Model | Max. capacity | Fish size |
|---------|--------------------------|-----------|
| FLS 250 | Approx. 60 tonnes/hour | 1 - 15 kg |
| FLS 350 | Approx.. 150 tonnes/hour | 1 - 20 kg |
| FLS 400 | Approx. 150 tonnes/hour | 1 - 20 kg |
| FLS 500 | Approx. 300 tonnes/hour | 1 - 20 kg |

Models for smolt counters

| Model | Max. capacity | Fish size |
|-----------|---------------------------|--------------------|
| SMOLT 150 | Approx. 250 000 fish/hour | Approx. 5 - 250 g |
| SMOLT 250 | Approx. 500 000 fish/hour | Approx. 30 - 300 g |

FLS Fish counting and weighing system



FLS Fodder cranes

- Range up to 30 m
- Remote control, camera monitoring and floodlights
- Hydraulic swivel bend



FLS Fodder cranes

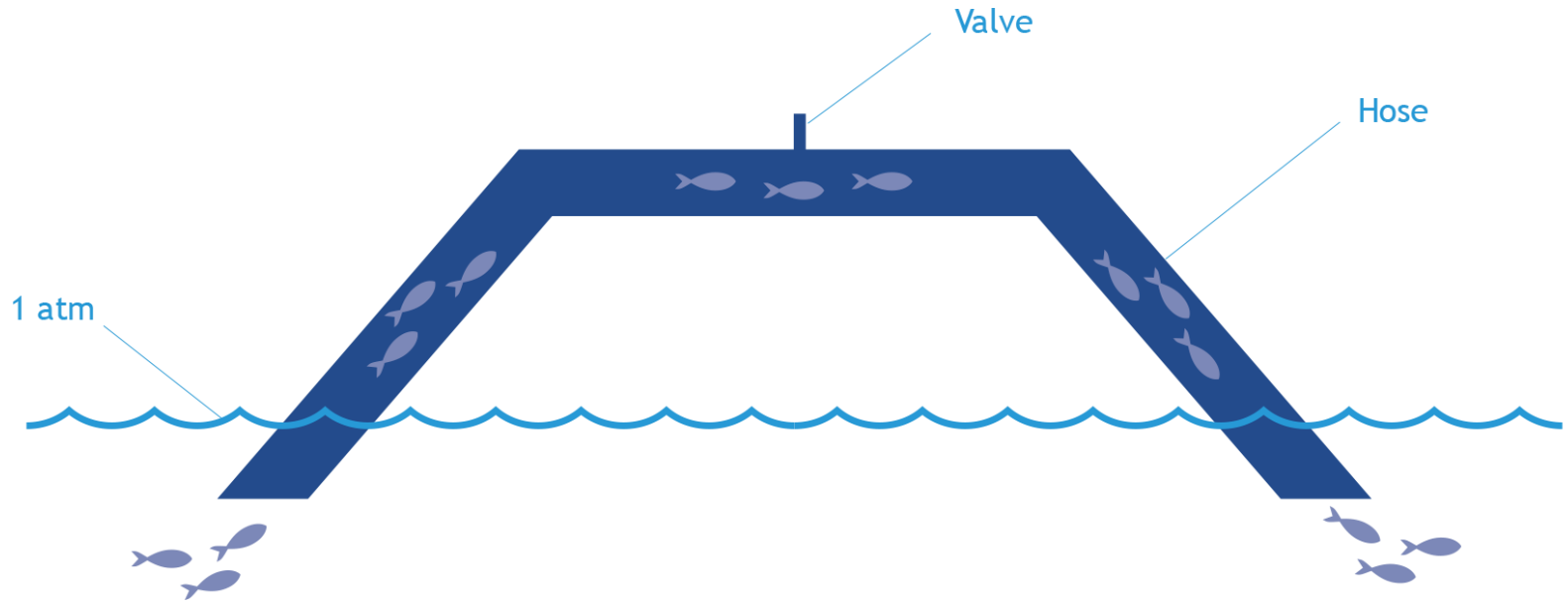


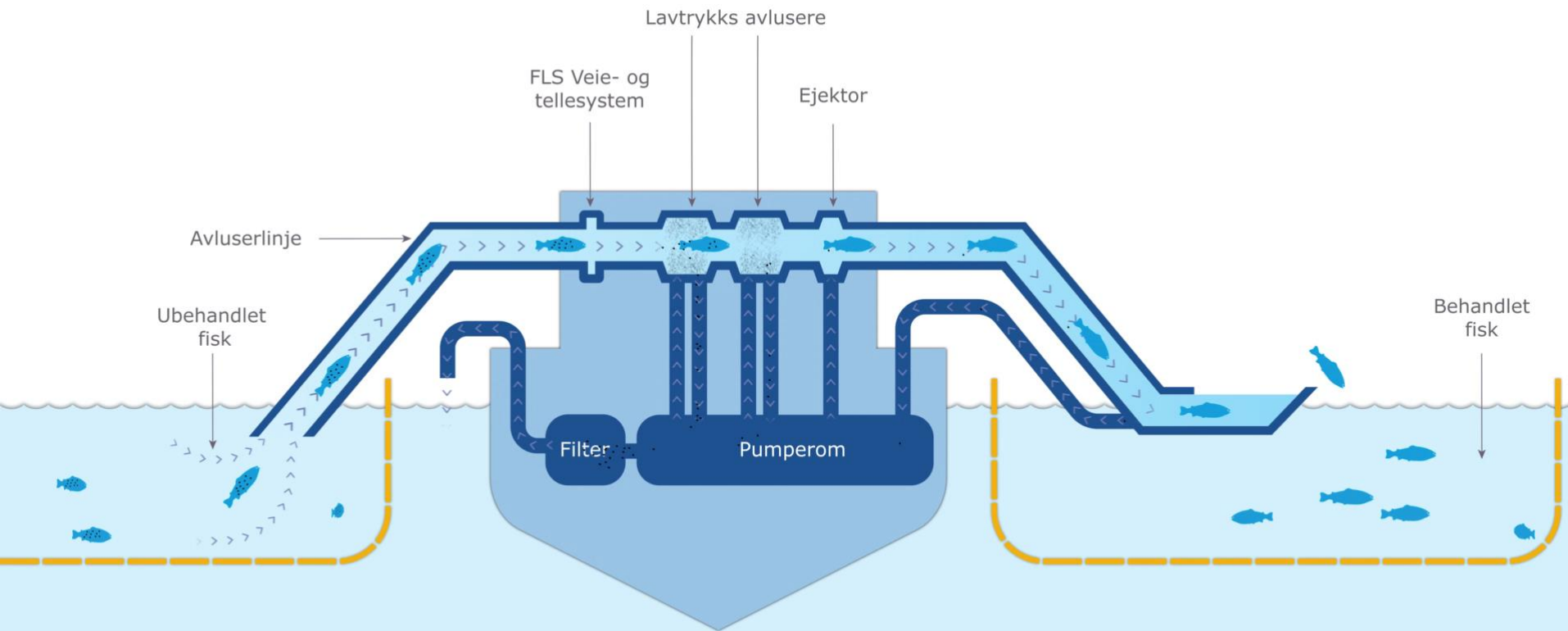


FLS Delousing System

- Fish welfare priority no. 1
- Closed system
 - No moving parts
- Designed for average fish weight 1-10 kg
- Mortality approx. 0.1%
- Gentle handling of cleaner fish
- Capacity 20-50 tonnes/hour per line

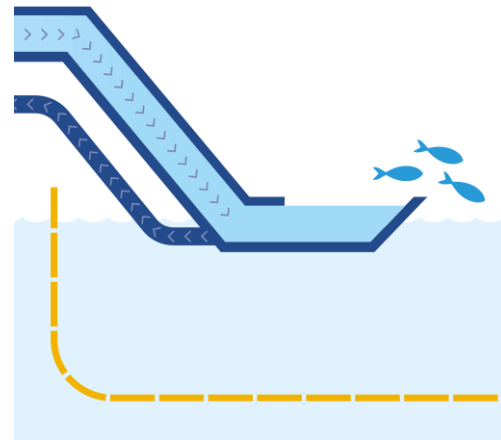
Principle





NEWS! 100% of the cleaning water is processed onboard

- All water is retained and treated on board
- Drum filter, 150 μm opening or electro filter
- Recycling ensures that all lice is gathered in the filter – also those who fall off on the way out of the system
- The new solution is more compact than the filter bags
- Required power is unchanged



patent pending



Fish welfare and environment



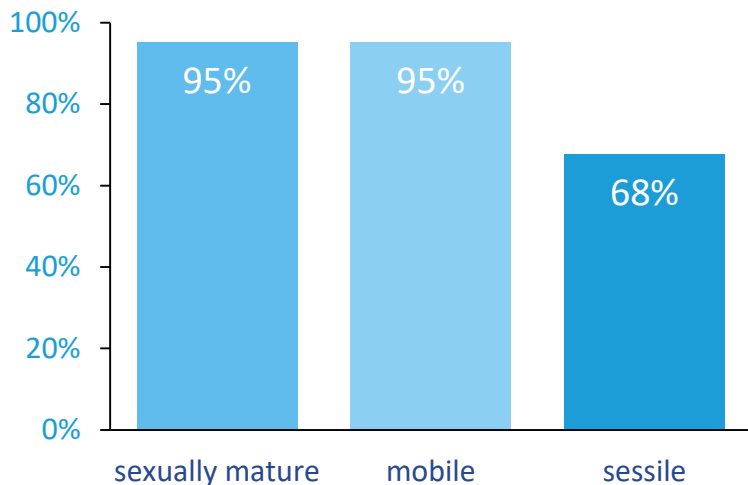
- Short treatment: approx. 2 sec.
- Transportation time: approx. 10-15 sec.

- Gentle: Low treatment pressure (0,2-0,8 bar).
- No moving parts
- No chemicals: Only seawater as a transport and treatment medium.



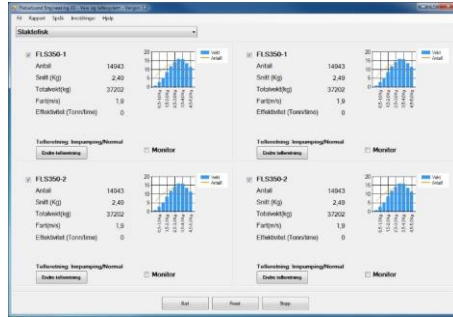
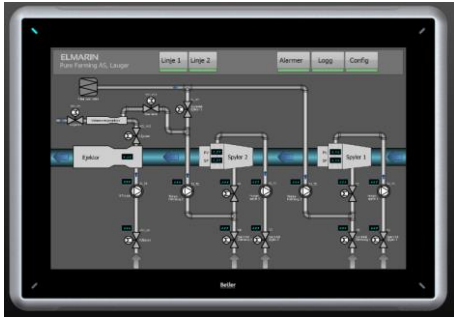
High throughput and large capacity

Delousing effect:



- Modular
- Capacity per line 20-50 tonnes/hour.
- Designed for average fish weight 1-10 kg.
- Sub-zero temperatures – no limitation
- Cleaner fish require no sorting
- Low energy consumption, approx. 80 kW per line
- Easy disinfection

User-friendly controls



- Operated from touch screen in control room.
- Camera in flushing nozzle, with monitor.
- Integrated FLS Weighing and Counting System
 - Full control of the biomass
 - External display
 - Automatically generated report
- Low noise level on deck
 - Good working environment

The cost of mortality – an example

Example: 400 tonnes salmon with average weight 4 kg (100 000 fish)

Hypothetical scenario

Mortality 14 days before treatment: 0,1 %

Mortality 14 days after: 1,5 %

Change in mortality : 1,4 %

Increased mortality is 5 600 kg

With a price of 5,50 Euro / kg and a gutted factor of 0.83, this gives a loss of Euro 25.800



Delousing with med FLS Delousing systems onboard M/S «Laugar», based on observations

Mortality 14 days before treatment : 0,1 %

Mortality 14 days after : 0,25 %

Change in mortality : 0,15 %

Increased mortality is 600 kg

With a price of 5,50 Euro / kg and a gutted factor of 0.83, this gives a loss of Euro 2.750

Difference : Euro **23 050**



Differences in eating abilities

- Same example: 400 tonnes salmon with average weight of 4 kg (100 000 fish)
- Water temperature 10 degrees celcius
- 100% feeding = Feed factor of 0,47



Hypothetical scenario

| Day | feeding level | Growth |
|-----|---------------|---------|
| 0 | 0 % | - |
| 1 | 0 % | - |
| 2 | 0 % | - |
| 3 | 50 % | 940 kg |
| 4 | 100 % | 1884 kg |

Overall growth 2824 kg

With a price of 5,50 Euro / kg and a gutted factor of 0.83, this gives an increased value **Euro 12 900**

Delousing with med FLS Delousing systems onboard M/S

| Day | Feeding level | Growth |
|-----|---------------|---------|
| 0 | 25 % | 470 kg |
| 1 | 50 % | 941 kg |
| 2 | 100 % | 1887 kg |
| 3 | 100 % | 1896 kg |
| 4 | 100 % | 1904 kg |

Overall growth 7098 kg

With a price of 5,50 Euro / kg and a gutted factor of 0.83, this gives an increased value **Euro 32 400**

Difference: Euro 19 500

Training and demonstration vessel

- M/S «Lautus»
- Owned and operated by Pure Shipping AS
- 3 delouser lines, total capacity 150 tonnes/hour
- LOA 31 m, WOA 9 m
- FLS disposes 2 single cabins
- In good condition with modern facilities
- Extensive training ensures optimum result from the first day



FLS Delousing – a proven system

- In operation on 7 vessels by September 2017 :
 - Enabler One, 4 lines
 - Artic Sea Service, 4 lines
 - Laugar, 2 lines
 - EA Luma, 3 lines
 - Aquagen barge, 1 line
 - Lautus, 3 lines
 - Aas Provider, 3 lines

Great interest in the market

Delousing figures:

2015: approx. 65 000 ton

2016: approx. 62 000 ton

2017: approx. 350 000 ton

of salmon were deloused with excellent results.



FLS Delousing system – many advantages

- Fish welfare
- A proven system
- High delousing effect
- Large capacity
- Different filter solutions
- Eco-friendly
- User friendly
- Good economy



It is important to vary treatment methods to avoid resistance. FLS Delousing systems is therefore a very good alternative to other methods on the market.

Fish welfare is priority no. 1
Economy for user is priority no. 2

Thank you for your attention

www.flis.no

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