

# Optimization of Inlet Channel to Water Filter for Fish Farming: Focusing on Efficient Flow for Improved Fish Health

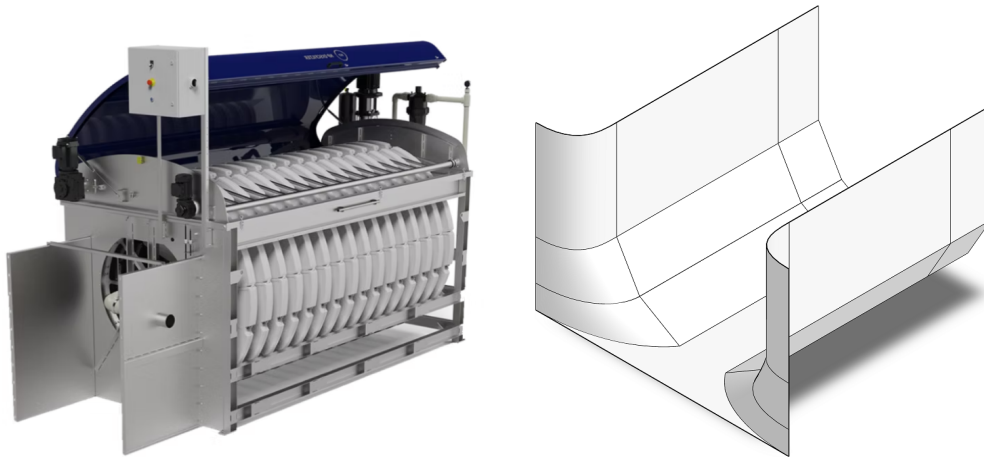


Figure: (left) Discfilter with old construction for leading water to the filter.<sup>1</sup> (right) A new design of an inlet channel to the filter.

*Inefficient flow slows down the cleaning of water to fish farms, leading to unhealthy fish and low yield. Our newly designed inlet channel optimizes the water flow by removing flow separation, reducing the pressure loss and maintaining a uniform velocity throughout the channel.*

With a growing population and increased demand for sustainable protein-based food, the fish farming industry is expected to expand. Water at fish farms is cleaned mechanically by a filter that can be two meters in diameter and four meters in length. A large volume flow is approaching the filter and an optimized path into the filter is essential. Should the water enter the filter with too much turbulence or with the wrong velocity, it could lead to the water not being cleaned at a rate necessary for the fish to survive. This project was performed in collaboration with a water cleaning company specialised in aquaculture, NP Innovation. The company currently has different sizes of channels for different sizes of filters. This project aims to develop a new universal inlet channel, with two different adapters made to fit two different sizes of filter. Furthermore, the goal is to guide the water more effectively into the channel than our analysed starting point.

It started with CFD analysis of the company's two current solutions for guiding the water into the filter, the inlet channel and the wing walls. The inlet channel consists of an adapter welded to the filter and a channel mounted onto the adapter. The wing walls are two walls guiding the water into the filter. From our analysis, it was clear that the wing walls contributed to tremendous recirculation and dead zones in front of the filter inlet. The current inlet channel did not cause as violent recirculation as the wing walls but still had space for

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<sup>1</sup> NP Innovation, "NP Discfilter" 2026 <https://www.npinnovation.se/discfilter> , (Retrieved: 2026-06-22)

improvements. Especially the separation of the water entering the inlet channel was a major area that could be improved.

The concept development phase included generating ideas in CAD, and then testing them with CFD analysis. The CFD analysis was a great tool to compare the concepts with each other, against the current inlet channel, and against the product specifications. The final concept was chosen through the concept selection phase that included concept screening, concept combination and concept scoring.

Delivered to the company is the final concept in a CAD-model. The solution decreases recirculation while maintaining an acceptable velocity for the fluid. The key geometry in our concept is a rounded inlet at the beginning of the channel, keeping the water from separating with the channel wall. The manufacturing has slightly worsened in the complexity of each channel. However, improvements were made in relation to only having one universal channel for all sizes of filters, instead of one channel for each size. While solving the problem in this master thesis, it also brings further development and opportunities for the health and safety of fish in fish-farms.