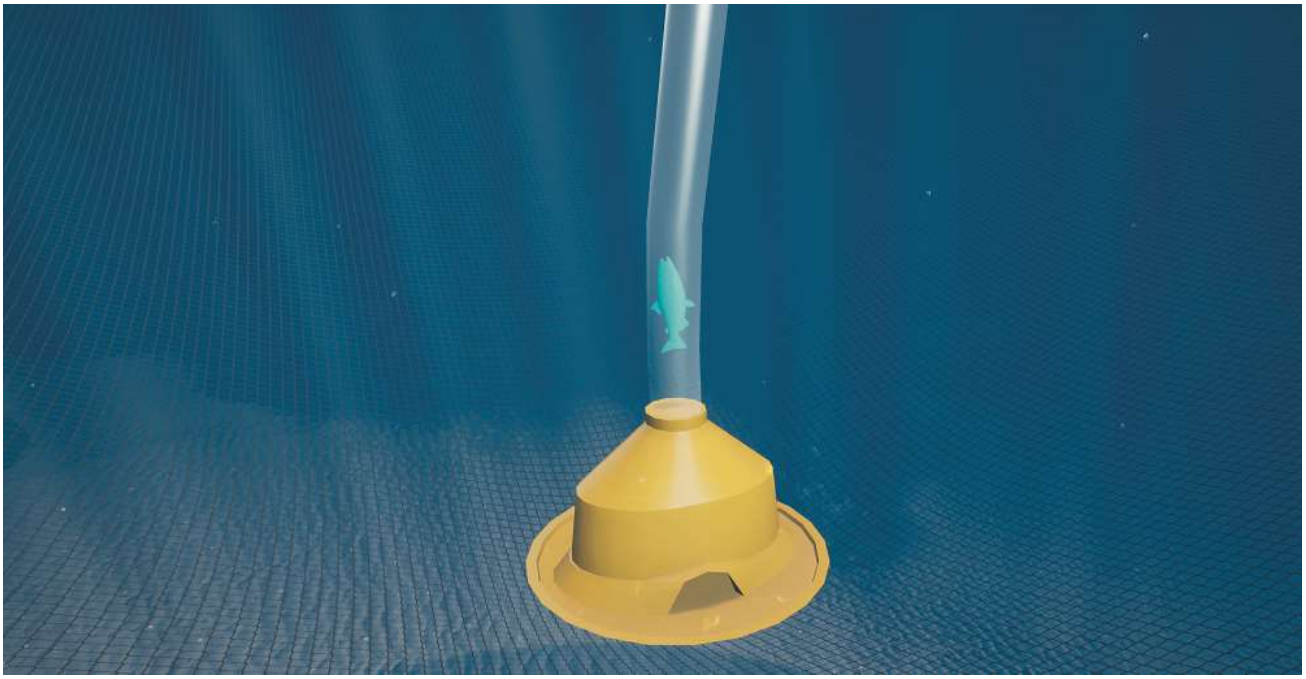
Utilising compressed air in aquaculture



The benefits of air-lift mort and sludge removal systems to aquaculturists

Fish mortalities and the accumulation of sludge are both troublesome but unavoidable by-products of aquaculture. Managing both is becoming harder as more aquaculture moves offshore and farms become bigger, deeper and located in more hostile environments. In this blog post we look at how compressed air is being used to provide an effective, efficient and reliable solution.

Fish mortalities are an unfortunate but common reality of fish farming. If morts are not regularly and sufficiently cleaned out of the pens, they can spread disease amongst the healthy fish population, potentially leading to even higher mortalities. In sea farms, this is not only an issue within the aquaculture environment, but it can impact the wider marine environment and wild fish population. The efficient collection and removal of morts from a sea pen is therefore an essential process in managing a healthy ecosystem.

Traditional mort removal

There are different methods of removing morts from sea pens. The traditional process requires divers to be dispatched into the pens to manually place the morts in baskets. These baskets are then lifted out of the water by hand.

HPC plc
Victoria Gardens
Burgess Hill
West Sussex RH15 9RQ
Tel: +44 (0)1444 241671
Fax: +44 (0)1444 247587
info@hpcplc.co.uk
www.hpcplc.co.uk

This method can be both labour intensive and time consuming, and often results in long retention times of the morts within the enclosures. This is far from ideal, because the longer morts remain in the pens the more likely they are to pass disease onto the healthy fish population.

With the future of aquaculture expected to move to locations that are deeper, larger and more exposed, the safety and practicality of using divers is becoming a bigger concern. Working at depths of up to 40 metres is without a doubt dangerous work for divers. So what is the solution?

Compressed air forms part of a new innovative solution

Air-lift mort collection systems are a relatively new and innovative solution for the effective removal of fish carcasses.

Here, compressed air plays a key role. A cone (which is a device called a Chinese hat) is installed in the deepest part of a sea pen. This is connected to a hose through which compressed air is blown. Thanks to the airlift pump principle, the morts are efficiently retrieved and transported from the bottom to the top of the sea pen, where they are dispensed into a dewatering bin on the support barge or boat.

Here the morts are separated from the contaminated water which is then discharged. The condition of the morts can be assessed and statistical analyses conducted. The morts can then be turned into silage through a process which at the same time removes any bacteria and infections. This silage can then be transported to a composting facility, where mixed with other materials, it eventually turns to soil.

Key advantages of air-lift mort collection systems

So what are the benefits of using this new technology for mort removal?

- **Safely meet challenges of offshore farming**: As a diver-less technology, you eliminate the dangers associated with the manual collection of morts - especially in remote offshore locations and hostile environments.
- **Efficient and reliable**: Removing morts with an air-lift mort collection system will be far quicker and less labour-intensive than the manual approach. This ensures that morts are not left in the sea pens for extended periods of time.
- **Assist in keeping mortalities low**: One of the great advantages of this method is that morts are removed sooner rather than later, which helps prevent the spread of disease amongst the healthy population effectively keeping mortalities low.
- **Provide better protection for the wider marine environment**: preventing the spread of disease by the quick removal of morts, also prevents the potential spread of disease amongst the wider marine environment and wild fish population.

HPC plc
Victoria Gardens
Burgess Hill
West Sussex RH15 9RQ
Tel: +44 (0)1444 241671
Fax: +44 (0)1444 247587
info@hpcplc.co.uk
www.hpcplc.co.uk

Air-lift mort collection systems and sludge removal

When it comes to the sustainability of sea pen aquaculture, another substance that should be removed is sludge. Consisting of uneaten food particles, bacterial and invertebrate growth and excreta, sludge accumulates on the bottom of the pens and is actually one of the biggest concerns for sea pen aquaculture. Why? Sludge can build up on the nets of the pens and therefore impact the flow of water, which then begins to flow around the nets rather than through them. This reduces the oxygen levels in the pens. And fish need oxygenated water to thrive and survive.

In addition, the bacteria that grows in sludge as part of its decomposition process requires and consumes a lot of oxygen. If there is not enough current, this can create an anoxic - or dead - zone below the farms, impacting all marine life.

We are now seeing the development of combined air-lift collection systems that can not only remove morts, but sludge as well. Norwegian company Lift Up, very recently introduced the first commercially available technology to do this[1]. Once the system has extracted the morts and sludge from a sea pen they are automatically divided. The sludge then goes through a filtering system on a barge. The last filter outlet contains sludge with around 10% dry matter. This is stored in a floating tank, which when full, is pumped into a boat that is then delivered to a biogas plant for gas production.

This method offers a number of advantages;

- **Help sustain the wider marine environment**: By removing a large degree of sludge - but not all of it - it has been shown[1] that you can create a sea floor where seabed organisms can thrive, even though there are a large number of fish higher up in the water column.
- **Improve the lifespan of pens and nets**: Removing sludge helps keep pens clean and durable, which assists in maintaining the structural integrity of the pens. And, when a pen is cleaner, you can also more clearly see any wear and tear that needs to be addressed and act on it faster.
- **Help maintain optimum oxygen levels for 'optimum growth conditions'**: Fish need oxygenated water to survive and grow, and the accumulation of sludge can impact the oxygen levels in the pens. So by reducing the sludge in the pens, you can help maintain optimum oxygen levels in the pens.
- **Reduce the risk of disease**: Algae can grow on sludge which can increase bacterial loads. This can cause stress and disease in the biomass, which has the potential to infect the healthy fish population as well as the wider marine environment. By cleaning out the sludge you are reducing the build up of algae growth and the potential disease this can create.
- **Contribute to the production of a clean and renewable energy source**: The sludge removed from the sea pens can be used to make biogas, contributing to the creation of a valuable product for the future.

Conclusion

As aquaculture moves further afield and farms become larger, deeper and located in more hostile environments, the dangers of mort collection become greater for divers and the workload becomes bigger.

HPC plc
Victoria Gardens
Burgess Hill
West Sussex RH15 9RQ
Tel: +44 (0)1444 241671
Fax: +44 (0)1444 247587
info@hpcplc.co.uk
www.hpcplc.co.uk

Here sophisticated mort and sludge collection systems that utilise compressed air, are leading the way in providing a safer, more efficient and more effective method of removing morts and sludge from sea pens, assisting in promoting healthy fish farm environments.

Why choose HPC KAESER for your aquaculture air compressor solutions?

HPC Kaeser offers a compressor configuration which delivers even greater reliability under the harsh conditions that go hand-in-hand with aquaculture applications.

This, in combination with increased compressor service life, means that plant hire companies and fish farmers alike can enjoy the significant advantages that HPC KAESER compressed air solutions have to offer.

HPC plc
Victoria Gardens
Burgess Hill
West Sussex RH15 9RQ
Tel: +44 (0)1444 241671
Fax: +44 (0)1444 247587
info@hpcplc.co.uk
www.hpcplc.co.uk