

# EDI Equipment in Aquaculture Aeration Systems

## Bulletin Brief

Advanced technology flexible membrane aeration systems offer significant benefits to the aquaculture industry. Properly engineered and designed systems can increase profitability and minimize potential for disastrous loss due to lack of available oxygen in the system. Labor to install, monitor, and operate can also be significantly reduced and minimized by use of high efficiency diffuser systems.

## Technical Presentation

Environmental Dynamics' high efficiency diffuser systems offer major process and economic benefits for aquaculture applications. EDI diffusers have many characteristics that deliver significant benefits to the aquaculture industry. The following specific benefits offer significant opportunities for improved "product" quality and improved production from aquaculture operations:

### Low Directional Velocity

High efficiency diffuser systems distribute the energy throughout the basin with little or no directional velocity. The diffuser systems allow fish and/or shellfish to maintain their proper positions in the basin with no energy expended to maintain location. Reduced energy utilization by the product results in much faster growth, and higher quality product.

Please compare this with systems that have very localized energy input: they create directional velocities to circulate water from a single point throughout the basin. This creates a velocity stream and the fish and/or shellfish must expend energy to offset the directional velocity of the aeration-mixing device.

### No Mechanical Damage to Product

A high efficiency diffuser basin with no moving parts will not damage "product." Systems with high speed rotating devices have the potential to mechanically damage fish or shellfish being propagated and reared in an aquaculture operation. Eliminating the mechanical damage to product increases quality and production of the product.

### Centrally Located Energy Source

Diffused aeration systems have their energy source at a central location. This centrally located aeration source produces the following benefits:

- Electrical components are all at central location for ease of access, adjustment, and maintenance. For major facilities this centralized location is very cost-effective.

- With a central station it is possible to have standby capacity online at any time to accommodate maintenance requirements of the systems and accommodate peak loadings.
- With electricity located at a centralized location there is no electrical service to the pond or aquaculture vessel. This results in safety improvement for the total systems and system operation.
- With a centralized air supply it is possible to distribute air throughout the basin and vary the air effectively simply by adjusting the system's air control valve. This adjustment can be automated or it can be manual in response to the growth of the "product" and the demands of the "product" as growth continues.

### **Uniform DO and circulation**

Diffused aeration systems create uniform DO concentrations and uniform circulation in all zones of the pond. This is accomplished because of the multiple energy-input points in the basin with low energy at any single point. By distributing the energy properly in the basin there are uniform conditions throughout which tends to provide major quality and process gains.

Low intensity aeration distributed from side to side and at full depth in the basin gives uniform growing/rearing conditions throughout the pond. Contrast this with a single point mechanical aerator where a significant amount of oxygen may be applied at a single point with high oxygen values that gradually die off as the liquid is circulated to the outer reaches of the pond.

### **No short-circuiting**

EDI diffused air low intensity aeration, which is distributed as described above, eliminates short-circuiting. Systems using the directional and mechanical aerators take inlet water and send it immediately to the outlet of the pond. This type of short-circuiting can be detrimental in flow-through systems.

### **Substantial energy savings**

High efficiency diffuser systems consistently deliver 1.5 to 2 times the amount of oxygen to the water per horsepower. As a result, systems that convert from mechanical to diffused aeration systems save 33% to 50% of the energy consumption.

### **Summary**

The total benefits of a diffused aeration system for aquaculture are substantial when the energy savings and production benefits are combined. These benefits as outlined above

demonstrate how EDI diffuser or aeration systems can be employed effectively throughout the world in the aquaculture industry.

For specific information on aeration system selection considerations, contact Environmental Dynamics, Inc. 573-474-9456.