

Case Study

Nanobubble Technology for Fish Farming & RAS Aquaculture Oxygenation



Overview

KD Farm, a progressive Recirculating Aquaculture System (RAS)-based **Pangas (catfish)** farming enterprise, aimed to optimize production efficiency, strengthen fish health, and mitigate operational risks associated with intensive aquaculture.

The integration of the NICO Nanobubble Generator marked a transformative shift in system performance, delivering consistently oxygen-rich water, improving biological conditions, and enabling measurable gains in productivity and profitability.

Project Details

- **Location:** Sonipat, Haryana
- **Client:** KD Farm (Navdeep Dhaiya Farm)
- **Date of Installation:** 20 May 2025



Pre-Installation Challenges

Prior to adopting nanobubble technology, KD Farm encountered several systemic constraints typical of high-density RAS operations:

- Inconsistent dissolved oxygen (DO) levels impacting system stability
- Elevated fish stress and mortality during peak production cycles
- Suboptimal Feed Conversion Ratio (FCR), affecting cost efficiency
- Increasing feed and energy expenditure
- Oxygen depletion during periods of high stocking density

These challenges limited the farm's ability to scale efficiently while maintaining optimal fish health and water quality.

NICO Nanobubble Solution

To address these constraints, the NICO Nanobubble Generator was deployed to infuse water with ultra-fine oxygen nanobubbles. Due to their high stability and prolonged residence time, these nanobubbles enhance oxygen transfer efficiency and distribution within the system.

This resulted in:

- Deep, uniform oxygenation across the entire water column
- Sustained and stable dissolved oxygen levels
- Improved water quality with reduced dependence on conventional aeration systems
- Enhanced system resilience under intensive farming conditions

Performance Outcomes

Parameter	Unit	Conventional System	With *NNB @ Technology
Dissolved Oxygen	mg/L	5 – 6	14 – 15
Fish Productivity	kg/tank/cycle	2300 – 2400	3100 – 3300
Stock Density	kg/tank	2400 – 2600	3300 – 3600
Fish Mortality Rate	%	Higher	Reduced by 15 – 20%
Fish Stress Level	—	Higher	Significantly Reduced

*NNB – NICO Nanobubble

Impact Analysis

The introduction of nanobubble technology delivered both biological and operational advantages:

- **Improved Fish Health:** Reduced stress levels and mortality rates contributed to more stable growth cycles
- **Higher Production Efficiency:** Increased stocking density and productivity enabled better utilization of infrastructure
- **Cost Optimization:** Lower energy requirements and improved FCR reduced operational expenditure
- **System Stability:** Consistent oxygen availability minimized risks associated with oxygen crashes

Conclusion

The integration of NICO Nanobubble Technology significantly enhanced the operational performance of KD Farm's RAS setup. By ensuring stable oxygenation, improving aquatic health conditions, and reducing input costs, the system enabled a shift toward more efficient and profitable aquaculture practices. This case reinforces the role of nanobubble technology as a critical enabler of scalable, sustainable, and high-performance aquaculture systems.