



CASE STUDY

Ensuring Quality of Hawaiian Microalgae

BioAstin and Spirulina Pacifica lines of microalgae

“No other technology that we have tested offers the power of FlowCam to assess growth and quality of algal cells in production ponds, and do it at the speed of business.”

-Charley O’Kelly, Director of Applied Research

THE CLIENT

Cyanotech Corporation produces the BioAstin and Spirulina Pacifica lines of high-quality microalgae products for health and human nutrition. They are produced in a sustainable, reliable, and environmentally sensitive operation based out of Kailua Kona, HI.

MAKING THE CASE

How do you convince the management team at a commercially-successful algae company that a novel technology like the FlowCam is going to be their best solution for pond monitoring and assessment? By showing that the technology provides answers that are faster and more accurate than before. Growth and quality monitoring of ponds requires information on the quantity of algae and the health of the culture. Optical density methods are a quick way to measure growth but lack the ability to provide images to monitor algal health. Microscopical methods show how well the algae are doing but are slow and labor-intensive, rendering the method inefficient and non-scalable. The FlowCam provides both classes of information simultaneously, at a much higher accuracy than either of the other two methods, and at a rate fast enough to allow both to be obtained and analyzed promptly and economically.



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Charley O’Kelly, Director of Applied Research at Cyanotech Corporation, had known about the FlowCam for decades. He was a Senior Research Scientist at the Bigelow Laboratory for Ocean Sciences while Yokogawa Fluid Imaging Technologies founders Chris and Mike Sieracki were developing the technology for imaging flow cytometry and producing the first FlowCams. He knew that the data from the FlowCam would greatly improve Cyanotech’s ability to assess the growth and quality of its production ponds.

O’Kelly also knew that the FlowCam was perceived primarily as a tool for academic research and was not well known in the algae cultivation industry. He saw, rather, that FlowCam had potential as a tool for this industry, that it would make critical improvements to both R&D and production at Cyanotech. To make the case, he arranged to have laboratory and production

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samples submitted to the Yokogawa Fluid Imaging Technologies lab, through the particle analysis services (PAS). All in all, he submitted 9 samples for analysis of algae populations.

O’Kelly and his Applied Research team analyzed the information from the samples. They immediately recognized that the cell growth and health data were far more accurate than had previously been achievable. Thanks to the FlowCam’s speed of operation, many more samples could be processed per day than was previously possible without hiring additional staff. They shared this analysis with the management team, and the purchase of a FlowCam resulted. This instrument is now an essential part of Cyanotech’s standard pond operating protocols and is in constant use by both the Applied Research and the Cultivation departments.

HOW FLOWCAM HAS HELPED

Cyanotech uses the power of FlowCam to count microalgae, image the organisms present in the sample, and automatically classify the organisms. The methods are leveraged as part of the routine monitoring of production cultures as well as research to identify and implement productivity improvements.

In production, FlowCam is now an essential component of daily routine monitoring. It is a key source of information on:

- How fast the algae are growing
- Whether the shape and size of the algal cells are within normal parameters
- Whether the quality of the culture is within normal parameters

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Cyanotech has had success training FlowCam users. The initial trainees, in the Applied Research department, trained other Applied Research staff, and these staff members have successfully trained others in the Applied Research, Cultivation, and Quality departments.

Additionally, staff have developed daily dashboards and other software tools to organize FlowCam data, assess its significance, and present the results across the company. These tools present critical information to decision makers in a timely and accessible form. Any issues with the cultures are quickly spotted, are better understood, and are more expeditiously addressed.

Cyanotech constantly seeks to improve its cultivation practices. In applied research, FlowCam is an essential tool for monitoring laboratory and mid-scale experiments dedicated to boost the growth rate, productivity, and quality of the algae being reared. Since the FlowCam can quickly and effectively collect information on algal shape and size, the Applied Research department can more easily design and conduct ongoing experiments. The department also seeks ways to streamline the data flow from FlowCam so that it is even better aligned with the needs of commerce.

RESULTS AND FUTURE OUTLOOK

As a publicly traded company, it’s important for Cyanotech to justify the decision to purchase a FlowCam. Considering the cost of acquiring the data from production ponds, the FlowCam purchased by Cyanotech paid for itself in less than eight months. As the accelerated research findings from FlowCam-assisted projects become integrated into Cyanotech’s production practices over the anticipated decades-long lifespan of the instruments, the return on investment will continue to increase.