



## MARINE CORPS BASE (MCB)

### Overview

Marine Corps Base (MCB) Hawaii manages the installations and natural resources located on a total of 4,500 acres throughout the island of Oahu, including Camp Smith, Kaneohe Bay, Marine Corps Training Area Bellows, Manana Family Housing Area, Pearl City Warehouse Annex and Puuoloa Range Complex. Because the base is located in a severe salt-water environment, maintaining aircraft properly is a constant challenge – one that Twin City Fan & Blower equipment helped achieve in the ongoing battle against corrosion.

### Challenge

Controlling corrosion is one of the most important ways to ensure structural integrity in an aircraft. Corrosion, unchecked, decreases the load carrying capacity of primary structures, promotes fatigue and cracking and can undermine the integrity of the entire aircraft. And while problems from corrosion challenge the aviation industry, these problems are particularly intense when an important facility is located on the Northeast side of one of the Hawaiian islands. Here, the Marine Corps Base (MCB) Hawaii maintains key operations, training and support facilities, services that are essential for the readiness and global projection of ground combat forces and aviation units. And it's here where the battle against a particularly devastating source of corrosion – salt water – is waged.

“Basically, an aircraft hangar was converted into a paint spray booth for the maintenance,” says John Hamilton, Owner of Mechanical Systems Corp., the firm that supplied the twelve adjustable pitch Twin City Fan TCVX vaneaxial fans for the project. His firm (started in 1967) serves all of Hawaii by working with contractors and engineers. “Corrosion is difficult here,” he comments, “and can cause havoc on these aircraft. The base is on the windward side of the island and extensive salt is in the air.”

Water or water vapor containing salt combines with oxygen in the atmosphere to produce the main source of corrosion in aircraft, according to the Aviation Maintenance Technician Handbook - FAA-H-8083-30, Chapter 6, which also notes: “Aircraft operating in a marine environment. . .are particularly susceptible to corrosive

## Quick Facts

### Industry

Aerospace/Defense

### Application

Spray Paint Booth

### Customer

Marine Corps Base (MCB)

### Twin City Fan Representative

Mechanical Systems Corporation

### Location

Oahu, Hawaii

### Challenge

Providing the proper ventilation equipment for a highly corrosive environment

### Solution

Twin City Fan & Blower's stainless steel adjustable pitch vaneaxial fans

### Result

Corrosion control for ongoing maintenance programs

# CASE STUDY



**Model TCVX**  
**Vaneaxial Fan with**  
**Adjustable Pitch Blades**



**Wheel Sizes**  
18" to 84"

**Performance**  
Airflow to 233,000 CFM  
Static pressure to 10" w.g.

Patented method for blade adjustment  
(U.S. Patent #4,934,904)



attacks.” For example, engine frontal areas and cooling air vents are being constantly abraded with airborne dirt and dust, bits of gravel from runways and rain erosion, which tends to remove the protective finish. Inspection of these areas should include all sections in the cooling air path, with special attention to places where salt deposits may be built up.

Chapter 9 of the UNIFIED FACILITIES CRITERIA (UFC), INDUSTRIAL VENTILATION UFC 3-410-04N, 25 October 2004 covers Spray Paint Booths, and Chapter 10 specifically addresses Aircraft Corrosion Control Hangars. The ventilation system for such structures is constructed mainly to prevent fire and explosion, as well as reducing paint overspray, help control workers’ contaminant exposure and protect the paint finishes. An aircraft corrosion control hangar must minimally comply with the requirements of NFPA 33 and with Subpart Z of 29 CFR 1910 for hazardous substances.

The standard also specifies selection of fans and motors, stating “Use explosion proof motor and electrical fixtures for exhaust fan.” Among the other requirements for fans are:

- meet design pressure and volume flow rate requirement
- have the AMCA-certified performance seal
- assure the design pressure requirement accounts for any system effects caused by non-uniform airflow into or out of the fan
- provide the necessary volumetric flow rate to maintain desired process room pressure
- ensure fan capacity meets all sources of exhaust air

## **Solution**

Six Twin City Fan 60D5 TCVX Arrangement 4 Adjustable Pitch Vaneaxial Supply Fans and Six TCVX, Arrangement 9 Exhaust Fans were selected for the project. The heart of the TCVX AXIFAN® lies in its wheel. The manually adjustable blades allow for custom-set blade positions without loosening or removal of any hardware.

TCF pointed out that the cast aluminum rotor was developed to provide the highest efficiency and lowest noise possible. Its patented method for blade adjustment allows for quick and easy performance change without the necessity of special tools.



Because of the intense salt-water environment, these fans were customized with all 304 Stainless Steel, Hamilton explained.

Other advantages for these fans include:

- Adjustable blade angles from 30 to 50 degrees
- One-piece, continuously welded housings
- Heavy-gauge, explosion-proof motor and bearing supports provide maximum strength with minimal resistance to airflow
- Airflow straightening guide vanes aerodynamically placed within the housing to minimize turbulence and aid in recovering rotative energy imparted to the air
- Flanged housings with pre-punched mounting holes as standard
- Dynamically balanced propellers for quiet, vibration free operation

### Benefits/Results

Aircraft corrosion control hangars provide space and equipment for the corrosion control processing of aircraft. Processes include deicing, limited detergent washing and rinsing, paint stripping, corrosion removal, protective coating application and painting, and finish curing and drying. “The fans put out 63,000 cubic feet per minute to help to do that,” Hamilton says. “They keep the velocity across the entire area so there’s no overspray.” Hamilton, who has been in the business for over 30 years, says that the TCF’s fans were utilized to develop the total pressure to produce the specified flow rate within that system. “These fan ratings were established from tests with the data corrected to the cross-sectional area of the fan outlet,” he adds. “They help MCB’s paint spray booth do what it was intended to do.”

Twin City Fan & Blower has the engineering and manufacturing capabilities to accommodate virtually every conceivable application. We have completed thousands of successful installations worldwide and have a proven track record for tackling the most technically complex and unique applications.

We separate ourselves from the competition by offering a greater breadth of products and quickly adapting to the needs of our customers. This is truly a testament to our company philosophy – respond to the needs of the customer, the first time, every time.



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