Advanced Engineering, Manufacturing, and Testing Solutions for Aerospace Systems

Solving Critical Operational Challenges for Complex Aerospace Systems

Concurrent Technologies Corporation (CTC) delivers comprehensive capabilities that enhance the mission performance, system integration, and long-term sustainability of military and commercial aerospace platforms. Our deep expertise in engineering and materials science enables us to deliver full-lifecycle solutions—spanning mission kit development, sustainment, and airworthiness validation—to achieve our core goal: decreased maintenance and increased flight time for our warfighters. Some of our core solutions include:

Advanced Manufacturing

- Friction Stir Welding
- Additive Manufacturing
- Tooling Solutions

Engineering Services

- Mission Kits
- Engineering Solutions for Maintenance & Sustainment
- Simulation & Digital Engineering

Test & Validation

- Material Testing & Validation
- Environmental Testing & Validation
- Airworthiness & Validation
- Coatings Systems

Why Choose Concurrent Technologies Corporation for Aerospace Solutions?

CTC is an independent, nonprofit, applied scientific research and development organization with decades of experience delivering advancements that strengthen aerospace capabilities. We have a proven track record of delivering critical solutions for both legacy platforms and next-generation systems. Our non-profit status means our focus is solely on delivering the best solutions for our warfighters and clients, without the pressures of commercial profit margins.

CTC® *Concurrent Technologies Corporation*

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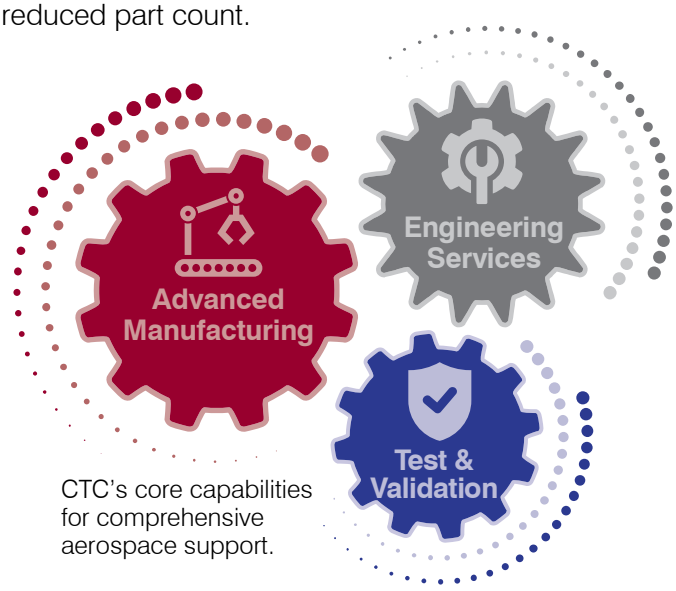
What Operational Challenges Does Concurrent Technologies Corporation Help Overcome?

Aerospace platforms face increasing demands for improved performance and reduced lifecycle cost. Our expertise targets solutions that deliver increased maintainability, mission capability, decreased weight, reduced operating expense, streamlined manufacturing processes, and reduced part count.

Our solutions address critical challenges such as:

- High Maintenance & Low Availability: Requiring excessive ground time and limiting mission readiness due to complex and time-consuming maintenance procedures.
- Structural Integrity & Lifecycle Extension: Focusing on mitigating corrosion and structural degradation to optimize performance, minimize costly repairs, and maximize the operational lifespan of both legacy platforms and long-duration new systems.
- Weight, Space, & Power Constraints: Restricting the seamless integration of multiple new technologies and advanced mission solutions into existing airframes.
- Unoptimized Lifecycle Costs: Posing significant challenges due to high fuel consumption and expensive, ongoing parts and maintenance requirements.



CTC's core capabilities for comprehensive aerospace support.

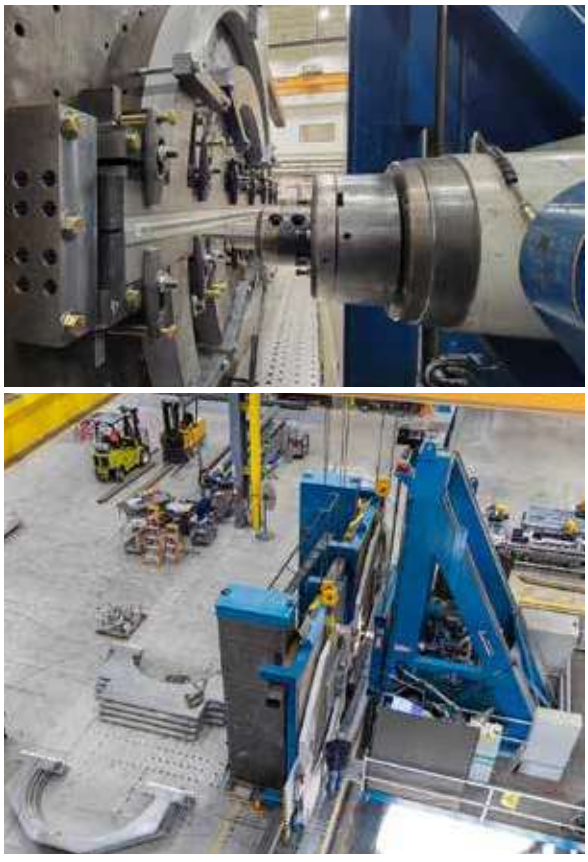
- Integration Complexity: Incorporating advanced capabilities and mission systems into legacy platforms, or engineering seamlessly integrated next-generation architectures, presents a complex challenge in balancing cutting-edge technology with airworthiness, interoperability, and functionality.
- Demanding Joining Requirements: Applying high quality joining processes meeting all required structural demands, qualification and testing requirements, and manufacturing throughput from development to full-rate production.

CTC's Approach to Aerospace Solutions

As a nonprofit organization, we deliver comprehensive solutions that address the full spectrum of aerospace challenges, from initial concept to lifecycle support. We partner with clients to develop and evaluate solutions that balance mission and performance requirements with lifecycle cost consideration.

Our approach consists of:

- Needs Translation & Innovative Design: Our subject matter experts partner directly with clients to translate operational challenges into innovative engineering designs. We focus on integrating multiple single-system mission solutions while minimizing weight, space, and power.
- Advanced Engineering Efforts: We provide disciplined engineering support, including design, analysis, computer-aided design, and manufacturing support. Our focus areas include increasing maintainability, corrosion prevention, tooling design, and mission kit support.
- Prototype & Technology Development: We provide advanced technology products and solutions for the aerospace industry, beginning with initial concept and design. We then develop, test, and evaluate the designs prior to initial production.
- Lifecycle Support & Transition: Our commitment extends beyond initial production. By utilizing advanced manufacturing processes such as friction stir welding (FSW) and precision fabrication, we significantly reduce the weight and cost of critical airframe components. We provide ongoing lifecycle support to ensure the successful, seamless transition and sustainment of new capabilities.


CTC leverages advanced manufacturing technologies, including FSW, to engineer solutions for complex aerospace applications.

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Aerospace Systems Success Stories

Developed a Single-Pass Friction Stir Welding Process for Thick-Section Aluminum

Challenge:

A high-performance aerospace structure required joining 3-inch thick aluminum alloy using a single-pass friction stir welding (FSW) process. The primary challenge was to develop and optimize the process parameters to achieve maximum weld joint strength and structural integrity.

Solution:

CTC employed a systematic, data-driven approach to design and fabricate custom, large-scale fixturing to support weld trials on our in-house FSW system. This integrated setup allowed for the rapid extraction, machining, and testing of weld samples, enabling our team to quickly analyze results and iteratively refine the weld parameters for optimal performance.

Result:

The optimized process achieved a weld joint efficiency exceeding 90% of the parent material's strength. This successfully validated a robust and repeatable manufacturing process for this demanding, thick-section application.

Capabilities Used:

- Friction Stir Welding
- Custom & Prototype Fabrication
- Materials Science & Engineering

Developed the Carriage, Stream, Tow, and Recovery System (CSTRS) for Naval Mine Countermeasures

Challenge:

The U.S. Navy required a versatile, helicopter-mounted system to quickly deploy and recover multiple mine sensors and Unmanned Underwater Vehicles (UUVs) from littoral combat ships. The primary challenge was designing a highly adaptable, modular recovery system capable of handling diverse equipment footprints while operating reliably under the demanding structural and aerodynamic constraints of an MH-60S helicopter.

Solution:

CTC developed, prototyped, and tested the Carriage, Stream, Tow, and Recovery System (CSTRS). Featuring a unique modular design, the system securely mounts to the MH-60S helicopter and provides a standardized, flexible platform engineered to support the exact deployment and operational requirements of a wide range of varying mine countermeasures objectives.

Result:

The finalized CSTRS design successfully enabled the U.S. Navy to rapidly deploy multiple mine sensors and UUVs, significantly improving response times to mine threats and providing a critical extra layer of safety for both naval crews and ships in littoral zones.

Capabilities Used:

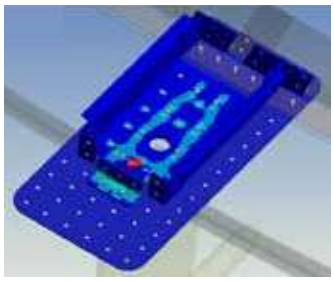
- Systems Engineering, Design & Integration
- Materials Science & Testing
- Custom & Prototype Fabrication

Enhanced Airspace Compliance and Communication for the C-130 Aircraft

Challenge:

The C-130 aircraft needed to be upgraded to operate in congested airspace. This required assessing how new equipment installations would affect aircraft structure, attaching structure, and qualification requirements across multiple aircraft variants.

Solution:



CTC performed structural, modal, and fatigue analyses for 23 installation areas, evaluating 389 unique parts and 4,409 fasteners. An iterative design-and-analysis approach ensured all modifications met performance requirements for design approval and flight qualification.

Result:

CTC validated the structural integrity of all upgraded installations, enabling integration of compliant VHF radios. The upgrades improved communication with ATC, command-and-control entities, other aircraft, and ground forces; reduced fuel consumption and unnecessary flight time by preventing unfavorable routing; increased mission availability; and enhanced warfighter safety.

Capabilities Used:

- Systems Engineering, Design & Integration
- Mechanical Design & Analysis

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Concurrent Technologies Corporation

Concurrent Technologies Corporation (CTC) is an independent, nonprofit, applied scientific research and development professional services organization. CTC collaborates with its technology transition affiliate, Enterprise Ventures Corporation, to leverage research, development, test and evaluation work to provide transformative, full life-cycle solutions. To best serve our clients' needs, we offer the complete ability to fully design, develop, test, prototype, and build. We deliver robust, technical, and innovative solutions that safeguard our national security, retain U.S. technological advantage, and ensure the primacy of American manufacturing.

CTC is a leader in quality and environmental management systems. Visit our Quality Commitment webpage for more information.

Quality Commitment | Concurrent Technologies Corporation (ctc.com)

www.ctc.com

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