Armaments Engineering Solutions

U.S. Army Photo

Providing environmental and engineering solutions from initial ideas through design/analysis, prototype testing/evaluation to production

Concurrent Technologies Corporation (CTC) uses a "design-to-production" approach, examining the entire process/system lifecycle, from environmental concerns to producibility. CTC's full-service solutions team consists of engineers, scientific experts, technicians, and project managers with in-depth experience in materials, design, analysis, rapid prototyping, testing, and manufacturing.

Innovative, Full Lifecycle Engineering Solutions

Both the Department of War (DoW) and the commercial industry can benefit from CTC's award-winning approach to armaments. The National Armaments Consortium and the DoW Ordnance Technology Consortium recognized CTC for Outstanding Technical Achievement for its groundbreaking manufacturing process that improves logistics and the end product. CTC is developing and testing prototype ammunition cartridges that:

- Increase performance
- Improve accuracy
- Reduce weight
- Reduce manufacturing footprint
- Lower the total cost of ownership

This work is building on decades of experience developing industry-leading engineering solutions that cover research and development through testing, technology transition, and implementation.

CTC *Concurrent Technologies Corporation*

Armaments Engineering Solutions

Ammunition

Developed a single-piece stainless steel cartridge case that can increase lethality, improve accuracy, and reduce cartridge weight

CTC has utilized advanced metal injection molding (MIM) processes to develop a single-piece, high-strength stainless steel cartridge case that is stronger, stiffer, and lighter than traditional brass. The metallic design allows for trade space between weight reduction and lethality with affordable costs in mass production.

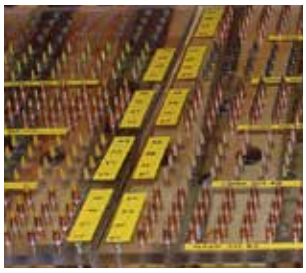
Weapon Systems

U.S. Army Photo

Novel manufacturing approaches provide more than $40 million cost savings

CTC improved the affordability of the **155MM howitzer** by converting multi-part components to single-piece titanium investment castings, including simplifying the 60-part saddle to one-part. The casting process and other innovative production processes reduced costs by $40 million for the initial-rate and full-rate production of nearly 590 guns, with proportional cost avoidance for subsequent orders.

Process Development and Optimization



Development of a coating process for steel tipped enhanced performance round (EPR) penetrators to improve their corrosion resistance

CTC is improving the environment compatibility, shelf life, and ruggedness of Army EPR ammunition through development, test and evaluation of enhanced corrosion coatings for steel tipped projectiles. Corrosion testing, rough handling, and first article testing were performed prior to technology transition and production implementation.

Manufacturing Support

Production line successfully transitioned to client facility, allowing client to meet deliverable schedule

CTC developed the **M-72 FFE production line** to assist our client with meeting their deliverable schedule for qualification units. CTC built jigs/fixtures and quality test equipment in addition to setting up a production line for preproduction/debug and LRIP/qualification. The production line was transitioned to the client facility, and CTC provided setup and training to the client's employees.

Facilities Available for a Variety of Manufacturing Activities

CTC operates two facilities in Johnstown, Pennsylvania, with more than 400,000 ft^2 of combined office, laboratory and high-bay demonstration space that meets DoW security requirements. CTC's Environmental Technology Facility offers two large high-bay spaces totaling over 130,000 ft^2 that are routinely used to develop and demonstrate advanced engineering and manufacturing technologies and to fabricate large-scale first-of-a-kind prototype structures.

Core Armaments Engineering Capabilities

Technical Engineering Services

Modeling and Simulation

- Structural FEA
- Dynamic analyses and firing simulations
- Terminal ballistics
- Fluid flow and thermal analyses
- Metal forming and manufacturing processes

Design and Engineering

- Prototype design and development, design maturation and CAD/TDP
- Product & process enhancement
- Design for manufacturability and cost reduction
- Design optimization and weight reduction

CAE Software

- Abaqus FEA
- Ansys FEA
- Fluent CFD
- JMP Statistical Analysis / DOE
- PTC Creo
- Solidworks
- Autodesk Inventor
- Catia
- SolidEdge

Technology Transition

- MRL/TRL evaluation
- Facility layout and scale up
- Cost modeling
- Technology evaluation, maturation, insertion, and transition

Material Characterization, Testing, and Inspection

Mechanical Property Testing

- Temperature ranges from −130°C to +2200 °C
- Tensile, compression, bend, shear and flexure
- Drop tower, impact and dynamic tear
- Ductility and formability
- Fracture and fracture toughness

Metallurgical Analysis

- In house PhD expertise
- Material characterization and selection/development
- Stereoscopic microscopy
- Light optical microscopy
- Energy dispersive spectrometry
- Micro and nano hardness
- Image analysis

Laboratory Testing

- High and low temperature, cyclic temperature, humidity, condensation, ultraviolet
- Cyclic corrosion, salt fog testing, accelerated weathering, stress corrosion cracking, total immersion corrosion, coating evaluation
- Chemical analysis – wet chemistry and instrumental methods
- Materials compatibility
- Test method development

Metrology Capabilities

- FARO Edge ScanArm ES
- Coordinate measuring machine (CMM)
- SpatialAnalyzer software

Prototype Fabrication and Additive Manufacturing

Metal Injection Molding

- Mold design and best practices for product design
- 110 ton injection molding machine
- Prototype solvent debind and hydrogen sinter equipment
- Secondary operations and heat treatment partners

Small Caliber Ammunition Prototyping

- Bullet/projectile fabrication and assembly equipment
- Taper presses and trimming equipment
- Cleaning, deburring, and tumbling processes
- Ammunition inspection, priming, and loading capability
- Class 10 federal firearms license

Additive Manufacturing (AM)

- Intricate net-shaped components in titanium, aluminum, corrosion resistant steel, and nickel-based materials
- SLM 280HL laser powder bed fusion capability
- Hybrid manufacturing AMBIT™ laser directed energy deposition integrated into a Haas Automation VF-11 vertical milling machining center
- VRC Gen III cold spray

Traditional Fabrication Prototyping

- Friction stir welding
- Fusion welding with certified welders
- CNC lathes and mills
- EDM

continued

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)

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