



# ***Concurrent Technologies Corporation (CTC) Overview NSRP Joint Panel Meeting***

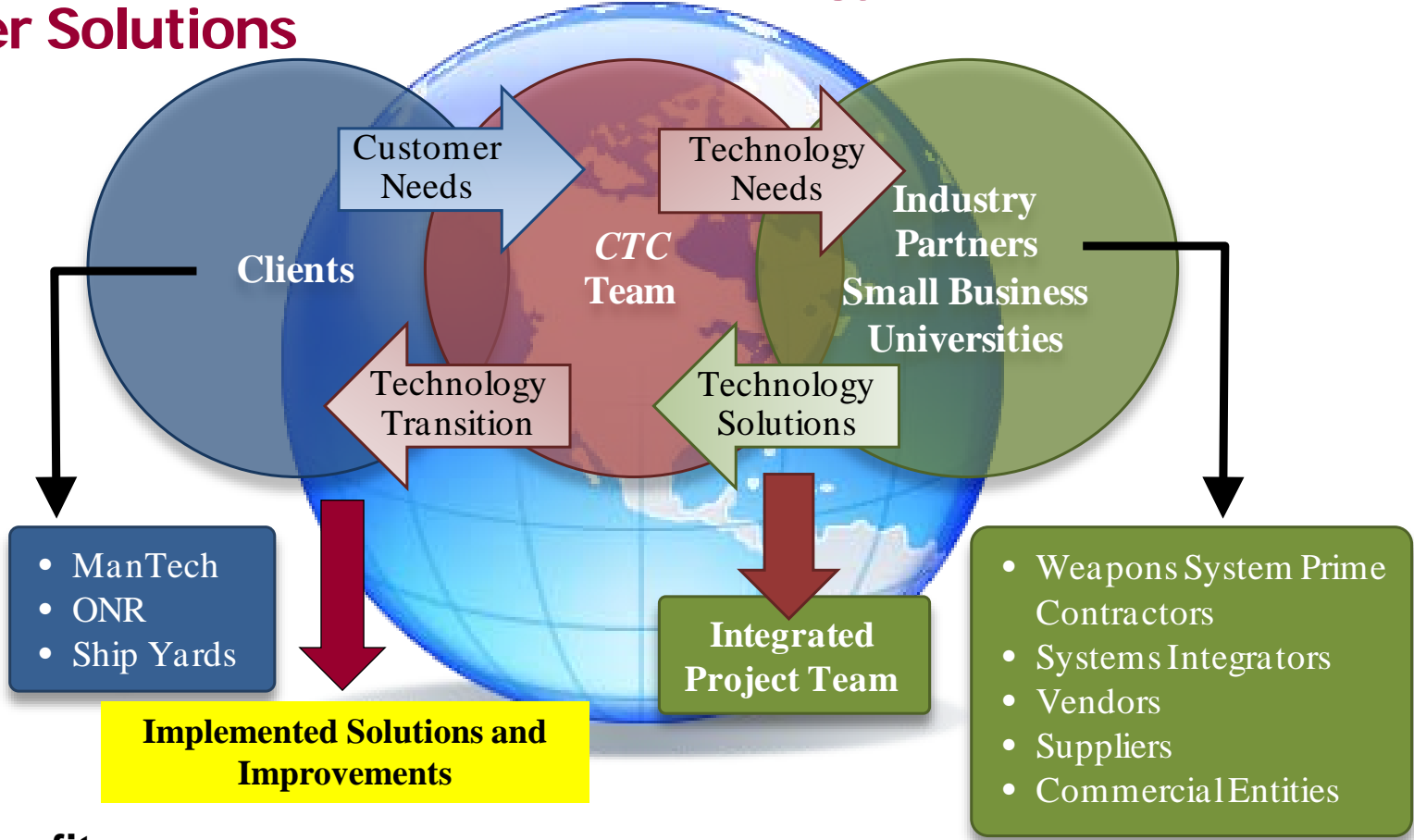
Mark Smitherman, [smitherm@ctc.com](mailto:smitherm@ctc.com), (814) 262-2340

21 April 2010

# Concurrent Technologies Corporation Overview

- Independent nonprofit 501(c)3 with over 50 locations and 1400 professionals
- Applied research and development professional services
- Systems developer/integrator
- Certifications: CMMI Level 3, ISO 9001/14001, and AS9100
- TS facility clearances, over 10 SCIFs/SAPFs and SIPRNET, JWICS and NSAnet connectivity, cleared personnel
- 190,000 square feet of factory demonstration highbay area
- Breadth across logistics, C4, intelligence, environmental, energy & manufacturing communities
- Extensive “Center of Excellence” experience and partnerships with industry, small businesses, universities and laboratories

# Research, Development and Technology Transfer Solutions



### Benefits:

- Speed, simplicity, access
- Mutual respect and opportunity
- Partner to implement new technology solutions

# CTC Locations



Small red dots indicate major cities.

## ● CTC location

Albany, GA\* • Annapolis Junction, MD • Bremerton, WA • Charleston, SC • Columbia, SC • Crane, IN • Crystal City, VA\* • Dayton, OH • Detroit, MI • East Hartford, CT • Fairfax, VA • Fayetteville, NC • Fort Leonard Wood, MO\* • Harrisburg, PA • Huntsville, AL • Jacksonville, FL • Johnstown, PA\* • Largo, FL • Ottawa, ON, Canada • Pittsburgh, PA • Stafford, VA\*

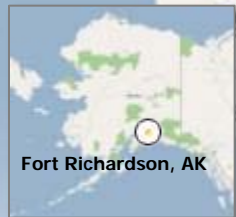
\* CTC location and CTC on-site location

## ○ CTC on-site location

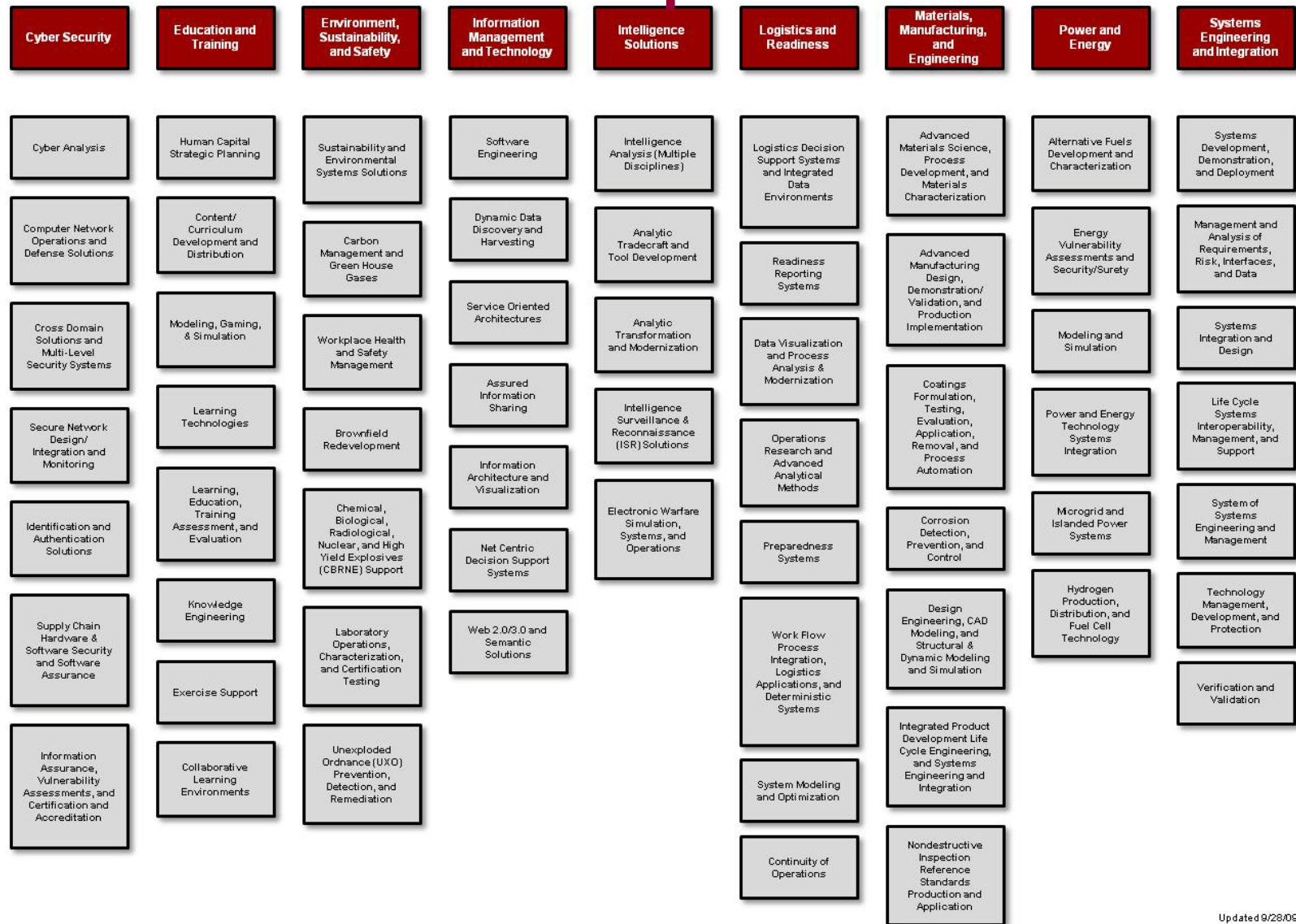
Albany, GA • Alexandria, VA • Bethesda, MD • Bloomfield, IN • Boles Acres, NM • Brussels, Belgium • Camp LeJeune, NC • Camp Pendleton, CA • Cannon AFB, NM • Eglin AFB, FL • Fort Benning, GA • Fort Bragg, NC • Fort Campbell, KY • Fort Carson, CO • Fort Dix, NJ • Fort Irwin, CA • Fort Leonard Wood, MO • Fort Lewis, WA • Fort Meade, MD • Fort Richardson, AK • Fort Warren AFB, WY • Glenwood, MD • Greenville, NC • Herndon, VA • Hurlburt Field, FL • Independence, MO • Kandahar Airfield (KAF), Afghanistan • Kaneohe Bay, HI • Lackland AFB, TX • Milan, TN • Moody AFB, GA • Nellis AFB, NV • Panama City, FL • Patrick AFB, FL • Patuxent River, MD • Peterson AFB, CO • St. Louis, MO • Suffolk, VA • Tampa, FL • Tobyhanna, PA • Virginia Beach, VA • Warren, MI • Washington, DC • Wharton, NJ • Whiteman AFB, MO • Wright Patterson AFB, OH

## ● CTC off-site location

To access the map's functionality, you must have an internet connection and be connected to the CTC network. If those conditions apply, when in Slide Show view, click on the hyperlink. When in Normal view, right click on the hyperlink and select "open hyperlink." <http://finsys.ctc.com/LocationMap/>



# CTC Core Services and Capabilities



Updated 9/28/09

# CTC Core Services

- Cyber Security
  - Education and Training
  - Information Management and Technology
  - Intelligence Solutions
  - Logistics and Readiness
- Advanced Materials, Manufacturing, and Engineering
  - Environment, Sustainability, and Safety
  - Power and Energy
  - Systems Engineering and Integration

# CTC Has Successfully Operated Center of Excellence Programs for Many Years



**Navy Metalworking Center  
(National Center for Excellence in  
Metalworking Technology)**

**National Defense Center for Energy  
and Environment**

**National Applied Software  
Engineering Center**

**Fuel Cell Test and Evaluation Center**

**System of Systems Center of  
Excellence**

**Advanced Distributed Learning**

**Voluntary Protection Programs**

# Navy Metalworking Center (NMC)

PD- Dan Winterscheidt, [winter@ctc.com](mailto:winter@ctc.com) (814) 269-6840

- Funded by ONR to develop and transition advanced metalworking technologies to naval weapon systems
- Provides for the development of enabling manufacturing technology and the implementation of this technology for the production, repair and sustainment of Navy weapon systems to support the Fleet
- Improves the affordability and mission capability of Navy systems by engaging in manufacturing initiatives that address the entire weapon system life cycle
- Transition of technology is the primary focus
- NMC is one of nine Navy ManTech centers of excellence

# CTC Capabilities vs. NMC Project Focus Areas

## CTC's Core Capabilities

Advanced Material Science, Process Development, and Material Characterization

Corrosion Detection, Prevention, and Control

Coatings Formulation, Testing, Evaluation, Application, Removal, and Process Automation

Advanced Manufacturing Design, Demonstration/Validation, and Production Implementation

Design Engineering, CAS Modeling, and Structural & Dynamic Modeling and Simulation

Integrated Product Development Life Cycle Engineering, and Systems Engineering and Integration

Nondestructive Inspection Reference Standards Production and Application

## Primary NMC Project Focus Areas of Interest

- **Metals and advanced metallic materials**
- **Metal-based composites**
- **Ceramics**
- **Metallic materials-based systems**
- **Metal/non-metal interface issues**
- **Primary metal materials manufacturing processes**
- **Shape-making processes**
- **Joining techniques**
- **Surface and heat treatments**
- **Metalworking systems engineering activities**
- **Materials characterization and testing**
- **Process design and control**
- **Product design and structural performance**
- **Environmental issues and recycling**
- **Information and data handling and transfer**
- **Manufacturing technology/industrial base infrastructure**

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# NMC Project Identification and Selection

- Extensive use of Integrated Project Teams (IPT) in all NMC ManTech projects to use “right mix” of technical skills to solve problems
- ManTech project concepts come from several sources:
  - Ship & Aircraft Program Offices
  - NAVSEA & NAVAIR Technical Codes
  - NMC & other ManTech COEs
  - Shipyards, Prime Contractors and DoD Contractors
  - Successful SBIR & STTR projects
  - Small Business Alliance Partners
- Projects are evaluated for:
  - Fit for NMC Scope
  - Technical Maturity
  - Platform Support
  - Likelihood of Implementation
  - Return on Investment

# NMC- Weld Seam Facing for DDG-1000

- A mechanized weld reinforcement removal system will reduce labor, injuries and production costs for DDG 1000
- Developed largely from existing COTS solutions
- Prototype units delivered to NGSB-GC and BIW
- Follow-up project for joint preparation and back gouging



## Partners

Naval Surface Warfare Center-Carderock Division, Bath Iron Works, Northrop Grumman Shipbuilding-Gulf Coast, Electric Boat, PushCorp, Inc.

# NMC- Low Cost FSW of Aluminum for LCS



- A production-ready, transportable FSW machine for decks and bulkheads on USN's Littoral Combat Ship (LCS)
- Joins extrusions edge-wise to form stiffened panels
- Fixed machine, moving workpiece using bobbin tool
- 30' X 40' panel size, up to 1/2" thickness
- Design is publicly available and applicable to many applications for DOD or industry

## Partners

NSWC-Carderock, ABS, Marinette Marine, Bollinger, Nova Tech Engineering, Friction Stir Link, AJT

# NMC FY10 Projects (active and pending)

- Large Diameter Pipe Mfg Improvements
- Temporary Protective Coatings
- Exothermic Welding for EMALS
- Blasting Operations Optimization
- Reduced Cost Titanium Uptakes
- Special Hull Treatment Debond Detector
- CVN Cladding Evaluation
- Prevention of Coating Damage During Hot Working

# Carriage, Stream, Tow, and Recovery System (CSTRS) for NAVAIR/MH-60S

- *CTC* is the prime contractor on the highly successful Carriage, Stream, Tow, and Recovery System (CSTRS) program as a full-service provider. Part of the Organic Airborne Mine Countermeasures program, it was developed to enable Littoral Combat Ships to respond readily to mine threats with the MH-60S Knighthawk.
- *CTC* developed and tested a flight-capable proof of concept system in 18 months, subsequently manufacturing 19 pre-production prototypes for test and evaluation. **All Navy performance criteria were met, reducing crew size from five to two, and meeting crash-load integrity requirements.**
- As a follow-on, *CTC* was tasked to design, fabricate, install, and test the Navy MH-60S Helicopter Aircrew CSTRS Trainer fabricated at *CTC*.



# Carriage, Stream, Tow, and Recovery System – Test and Training Towers



Ground Level



Platform Level

## Key Features

- 30 Feet High
- Overhead Crane
- 25' x 30' Platform
- Center Opening for CSTRS
- Hydraulic Power
- 28 VDC, 115V 400Hz
- Instrumentation
- Dynamometer Winch

- Second tower under construction will transfer to Norfolk Training Facility in 2011

# Advanced Combatant Materials (ACM) Program

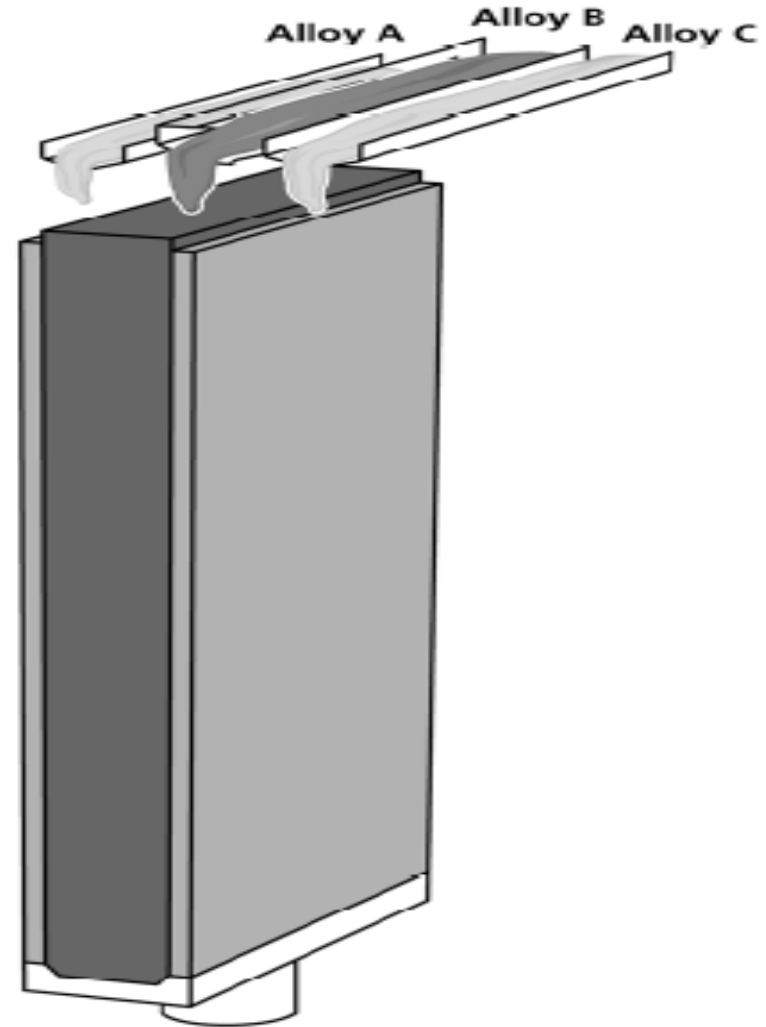
PD- Troy Tack, [tackt@ctc.com](mailto:tackt@ctc.com) (410) 489-0900

- Innovative materials, structures and manufacturing processes for future naval applications
  - NSWCCD (C. Roe, J. Mercier) as COR and teammate
- Identify, develop and transition advanced materials & processing technologies to shipbuilding
- Advance novel technologies to the point where they can:
  - Be proposed as new technology, manufacturing or application transition projects
  - Steer advanced technologies to future acquisition program needs

# ACM- Novelis Al Fusion Alloys

- Simultaneous direct chill casting of different Al alloy layers in a single ingot
- 0.25-inch plate, H116 temper:
  - 5456 core (Al-5.2wt%Mg)
  - 5005 surfaces (Al-0.76wt%Mg)
    - **10,000 lb. lots!**
- Won Phase I SBIR on 7xxx aircraft alloys

*Working with warrant holder  
Dr. Wong to link to new ship platforms*



# ACM- FSW of Steels: Novel Pin Tools, Bobbin Tools and Tool materials

Wayne Thomas' (TWI) Bobbin



Ductile welds on 12%Cr Steel



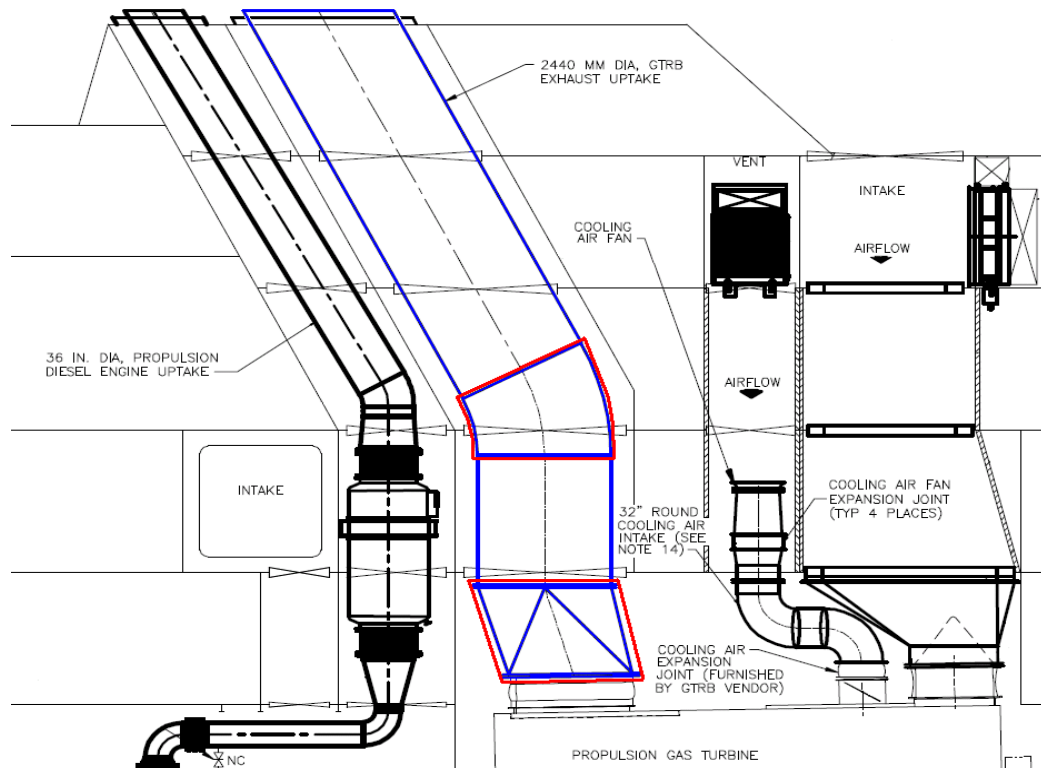
# ACM- Composite Piping for US Navy Ships

- Developed novel formulation with ITT Fiberbond Composites
- Passed numerous cert tests including blast, mechanical properties, fire, smoke & toxicity
- Current efforts on fire retardant coatings to resist flame spread
- Tremendous potential for weight reduction, corrosion resistance, total ownership cost reductions



# ACM- Ti Uptakes for LCS

- Extensive FEA subcontract to Gibbs & Cox
- Derived Ti-21S/CP Ti to replace Inconel/CRES321 baseline
- Straight substitution: **12,600 lb. weight saving**
- Cost: \$2.2 million versus \$1.9 million baseline (Ti-Fab quotation) by substitution



## ManTech Proposal

- Approach cost neutrality via down-gauging
- Develop low cost manufacturing methods

# National Defense Center for Energy and Environment

PD- Heather Moyer, [moyer@ctc.com](mailto:moyer@ctc.com) (814) 269-6474

## *NDCEE Mission Elements include:*

- **Research, Development, Test & Evaluation**
  - Serve as a national resource to address high-priority environmental, energy, safety, and occupational health issues
  - Support applied research and development, where appropriate, to address ESOH challenges and priorities
- **Technology Transfer**
  - Transition environmentally acceptable materials and processes to defense industrial activities
  - Provide training that both optimizes and supports the use of new, environmentally acceptable technologies

*The NDCEE was established in 1991 to support installations, ranges, weapons systems, and the war fighter in achieving performance advantages, enhanced efficiency, cost savings, and regulatory compliance*

# NDCEE -Scope

- Hazardous waste treatment
- Management of RCRA-type wastes
- Waste minimization
- Municipal solid waste and incineration issues
- Management and treatment of hazardous air pollutants
- Medical waste disposal
- Mixed waste management and disposal
- Remediation of contaminated sites
- Chemical and biological weapons destruction
- Recycling of materials
- Water treatment issues and water use and reuse



Cor'n Control, Ft. Hood



STAPP Bullet Catcher

- Pollution of ground and surface water
- Above ground and underground storage tanks
- Nuclear waste management and disposal
- Corrosion prevention and control
- Solvent substitution and aqueous based cleaners
- Ozone depleting substances
- Location, removal, and demilitarization of UXO
- Demanufacturing of electronic equipment for recycle and reuse (DEER2)
- Other initiatives as agreed to by the DOD and NDCEE

# NDCEE Representative Projects

- Commercialization of Technologies to Lower Defense Costs
- STAPP Bullet Catcher
- Development, Demonstration, Evaluation, & Implementation of DSOC Initiatives
- Novel In Situ Extraction Technologies for Contaminants in Groundwater
- Sustainable Painting Operations for the Total Army (SPOTA) Powder Coating
- Demonstration of a Commercial Environmental Management Information System (EMIS)
- Solid Waste Sustainability
- Development, Validation, Implementation & Enhancement of a VPPCX Capability for DoD
- TARDEC Mobility Strategic Planning
- WD-CARC Painting for Combat Vehicles Demonstration
- Life Cycle Environmental Data for Biopreferred Purchasing
- Development of a Greenhouse Gas Footprint Creation and Assessment Methodology
- Integrated Strategic Sustainability Planning California Army National Guard
- Navy VPP Support
- Regional Sustainability Initiative
- Army Sustainability Retrospective
- Zero Energy Homes for Military Installations
- Numerical Modeling of Flowformed Mortar Tubes
- Thermal Battery Productivity & Performance Enhancements
- Biobased Product Evaluations
- Solid Waste Reduction Systems
- Mission Critical ESOH
- Air Force Explosive Ordnance Disposal Support
- Sustainable Installations Initiative
- Munitions Metals & Residues Treatment for Active Ranges
- Sustainability Support for LCAAP Modernization
- Green Chemistry & Engineering Opportunity Assessment
- Reactive Information Propagation And Planning for Lifelike Exercises (RIPPLE)
- Phase II Impact Assessments & Risk Management Options: Beryllium & Naphthalene
- Magnetic UXO Recovery System
- Environmental Support & Public Involvement for FUDS
- Onsite GIS Support at TYAD
- Cadmium & Hexavalent Chromium Free Electrical Connectors
- Technical and Business Support to Joint Group on Pollution Prevention (JG-PP)
- LCC Analysis for Straw Bale Buildings
- DLA VPP Support
- CPAC Program Support to USMC Guam Transition
- Consequence Management Integration into the WMD Concept Capability Plan
- Hawaii Undersea Chemical Weapons Assessment

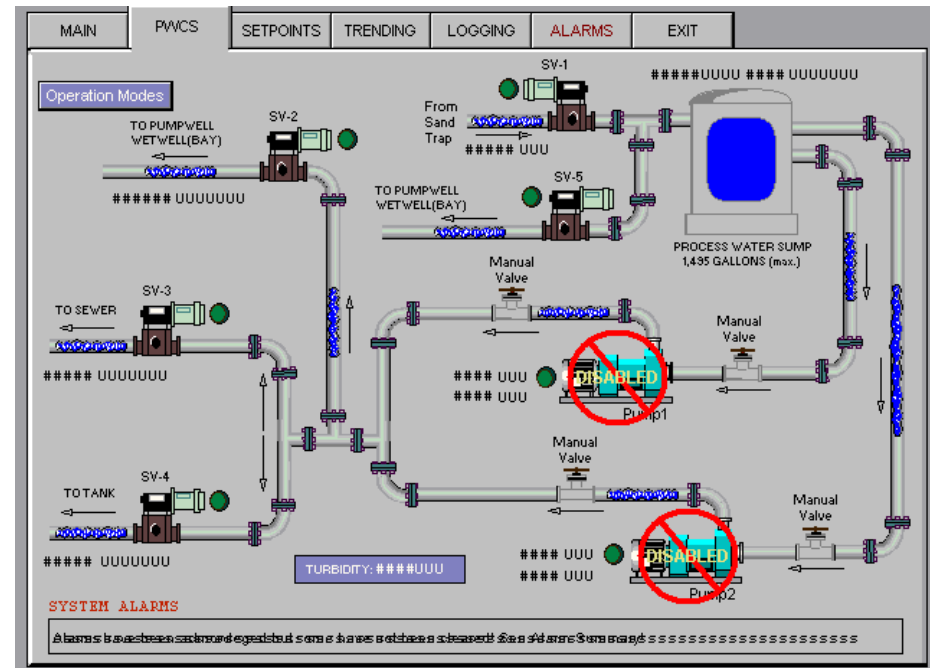
# Puget Sound Naval Shipyard – Process Water Collection System

- **Old System**

- 90+ citations from EPA
- No way to detect “Dirty” water
- Inefficient operation
- Unreliable

- **New System**

- Correlation between turbidity and copper
- Collect/Log data
- Maximize efficiency
- HMI
- Easy to use/train
- Reliability
- Centralize data



# Laser Depaint Evolution

- Handheld Applications (Beginning and Current)
- Large Component and Specialty Coating Applications (Current)
- Full-Aircraft and Specialty (Ship) Coating Removal Applications (Future)



**CTC is a leader in assisting DoD with laser coatings application removal technologies**

# Power and Energy (P&E) Competencies

- Audits & Assessments
- Strategic Planning / Guidance
- System Engineering / Technology Integration & Validation
- Research, Development, Test and Evaluation
- Modeling / Simulation
- Renewable Energy Implementation
- Energy Storage
- Smart Grids / Microgrids
- Fuel Cells / Hydrogen
- Alternative Fuels
- Zero - Energy Facilities
- Energy Efficiency & Sustainability

# P&E System Engineering & Research, Development, Test and Evaluation

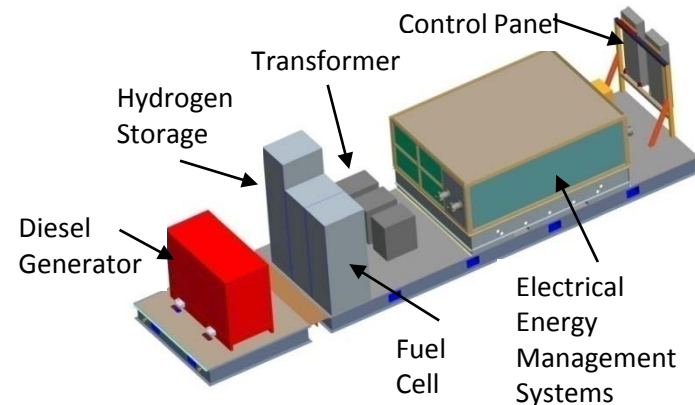
- **Hybridization and Fuel Cell Integration**

- Hybrid
  - HMMWV
- Fuel Cell
  - Air Force MB-4 Aircraft Tow Vehicle
  - Flightline Maintenance Vehicle
  - Several Towbarless Aircraft Tow Vehicle
  - Segway

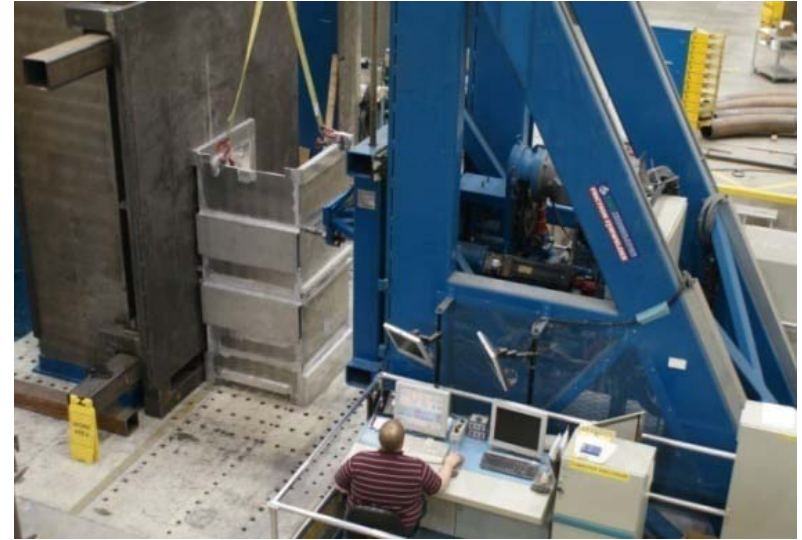


- **Smart Grids / Microgrids**

- Design, integrate, test and sustain an AC based 70 kW system
- MATLAB modeling / simulation



# CTC Manufacturing Facilities and Demonstration Areas



Concurrent  
Technologies  
Corporation

# Recent Applications

## Vehicle Applications

- Chassis Structures
- Suspension Systems
- Utility-Beds
- Trailers
- Hitches and Adapters
- Track Tensioning Systems
- Hybrid Electric Drive Integrations
- Fuel Cell Integrations
- Mobile Bridges

## Electrical/Power Applications

- Machine Control System
- Ejection Seat Yaw-Pitch-Roll Control System
- Microgrid Design
- Power System Design
- Fault/Failure Anticipation in Power Systems

## Aircraft Applications

- Airborne Sensor and Weapon Handling Systems
- Sonobuoy Launcher Systems
- Maintenance Tooling
- Production/Inspection Fixtures
- Ejection Seats

## Protection and Survivability Applications

- Blast and Ballistic Protection
- Mine Blasts
- Crash Survivability
- Damage Mitigation
- Low Observable Coatings
- Composite Armor Development and Evaluation

## Marine Applications

- Pressure Hull Structures
- Vehicle Transfer Ramps
- Palletized Weapon Systems
- Shock Loading of Welded Steel Structures
- Dynamic Loading of Composite Piping
- Sandwich Structures and Decking

## Sustainability Applications

- Wind Turbine
- Zero Energy
- Fuel Cell
- Renewable Energy

## Manufacturing Applications

- Flow Forming of Superalloys
- Developed Castings with Naval Steel Alloys and Titanium
- Friction Stir Welding Development For Aluminum Structures
- Hybrid Laser Welded Structures



# ***CTC Overview***

**Questions?**