



This workforce solution was funded by a grant awarded under Workforce Innovation in Regional Economic Development (WIRED) as implemented by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership. This solution is copyrighted by the institution that created it. Internal use by an organization and/or personal use by an individual for non-commercial purposes is permissible. All other uses require the prior authorization of the copyright owner.

Ace Clearwater Enterprises – Virtual Metalform Prototyping

HPC

Funding provided by Department of Labor, Employment & Training Administration: WIRED Initiative



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ACE Clearwater Enterprises - Virtual Metal Form Prototyping

STATUS QUO



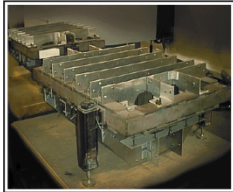
Complex Ducting Assembly
Forming - Aluminum Welding
Tube Bending - Assembly



Exotic Metal Forming
Complete Assembly
X-Ray Quality Welds - Machining



Multi-Discipline Assemblies
Forming - Spinning - Bending
Welding - Machining



Total Tool Capabilities
Design - Models - Fabrication
Qualification

Reliance on Physical Prototypes

- Limited use of computer models leads to multiple iterations of physical prototyping in order to verify that the complex formed metal components meet customer requirements.

NEW INSIGHTS

Opportunities

- Enabling HPC usage at ACE would **reduce the number of physical prototypes** used and shorten the manufacturing cycle.
- HPC expertise is a major barrier, but **small companies trust local regional universities** to provide workforce training and expertise.

Pilot Description

- ACE Clearwater Enterprises builds complex formed and welded assemblies for the aerospace and power generation industries. Key aerospace customers include Lockheed Martin, Sikorsky, Boeing, Textron/Bell, and Northrop Grumman.
- ACE provides a “build-to-design” service specializing in complex formed and welded assemblies with performance requirements that are validated using physical prototyping and limited desktop modeling.
- This pilot will demonstrate how HPC can reduce a small company’s reliance on physical prototyping and shorten the manufacturing cycle of DoD components.

Technical Approach

- ACE Clearwater will participate in design clinics at Cal. State Los Angeles, where honors students will build HPC solvers for real-world manufacturing problems with ACE professional engineers and HPC mentors from USC.
- The pilot will host MSC Software’s SimDesigner modeling and simulation package on a network of low-cost Microwulf HPC machines.
- A case study of ACE Clearwater Enterprises and an HPC supply chain potential impact analysis for the Los Angeles region will be performed.

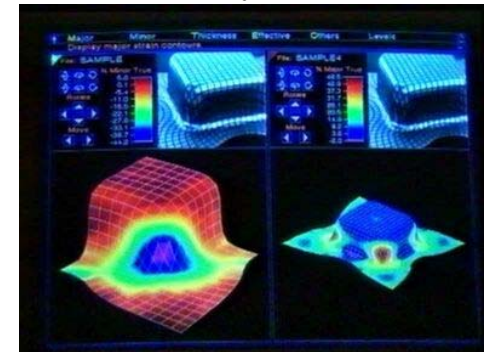
Milestones and Deliverables

- Month (April 2009)** - prototype analysis at Cal. State, L.A.
- Month 12 (July 2009)** - ACE Clearwater real world HPC “success story” case study and supply chain analysis.

QUANTITATIVE IMPACT

Impact

- Compelling real world “success” story that describes the tangible benefits and competitive gains that small companies can achieve from using HPC modeling and simulation.
- Reduction in the number of physical prototypes by 50% through HPC-driven modeling and simulation.
- Development of a trusted regional delivery mechanism for HPC workforce training thru California State programs.



HPC Demonstration

- Demonstrate virtual metal form prototyping using HPC.

END-OF-PHASE GOAL

Application Candidate #1



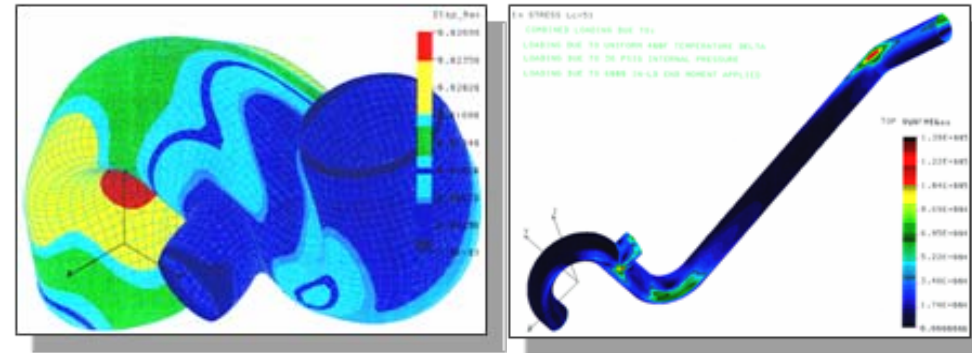
Apache IR Suppressor

- ✓ Since 1983, ACE Clearwater Enterprises Has Shipped Over 4,000 S.S. Units
 - ✓ 3 Different Configurations
 - ✓ Satisfying 65 Different Purchase Orders
- ✓ Currently ACE Clearwater Enterprises is Sole Source for F.M.S. Offload to U.K. Inco Suppressor for Apache
- ✓ Peak Production of Inconel Version Over 100 Units Per Month
- ✓ ACE Clearwater Enterprises Also Manufactures Titanium (CPT) Inlet Particle Separator - 1100 Produced



Technical Approach

- CSULA Design Clinic
 - 3 Professors (ME, EE, CS)
 - Honors Engineering Students
 - EE students will build a small HPC cluster (Microwulf)
 - CS maintain cluster software, develop web portals for ACES
 - ME students will develop models of ACES processes for HPC digital analysis using MSC Software.
 - USC
 - Mentor HPC software and hardware development.
 - Provide on-line HPC cycles to give students scaled access beyond small Microwulf clusters.
 - Movie documentary.



Cal State Los Angeles Solar Eagle-III



Experimentation Plans

- Demonstrate modeling, simulation, and analysis with HPC on a manufacturing problem to reduce the amount of physical testing in the design, engineering, and manufacturing of Titanium and/or Invar components.

