

Low Cost Virtual Reality Welder Training System

NSRP Joint Panel Meeting

21 April, 2010



GENERAL DYNAMICS
Electric Boat

Overview

- Background
- Foreground
- Current project
- Status
- Plans
- Demo



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Background

- Welding training is a big deal
 - Annual Electric Boat welder training
 - 35,000 hours
 - > \$600K
 - Shipbuilding Industry estimate
 - \$5M
 - All industries estimate
 - \$18M



Background

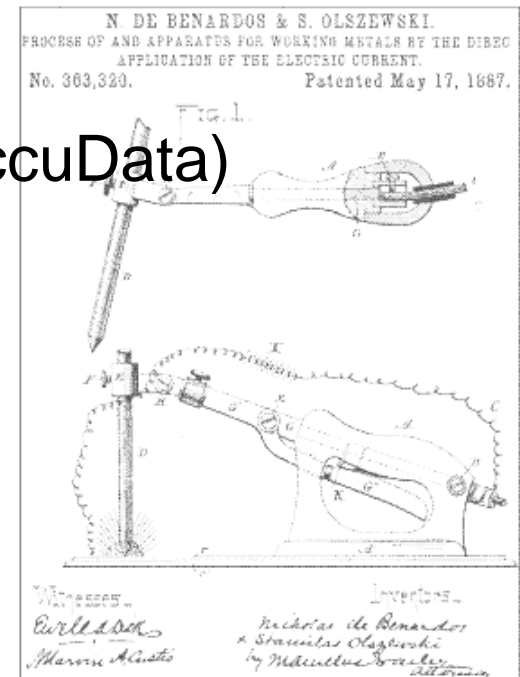
“Can’t we use virtual reality
to help train welders?”

John Holmander, 2001



Background

- 2001 Virtual Environments
 - 10 years of experience in virtual design at EB
 - Early weld monitoring
 - DataWare STTR (WeldWare, AccuData)
 - ManTech proposal, DataWare
 - Early virtual welding systems
 - TEREDES, WAVE



Benardos & Olszewski, carbon arc welding

Background

- 2003 ManTech Virtual Welder
 - VRSim, EB, EWI
 - Prototype system developed
 - Real-time neural network weld simulation
 - Real weld torch
 - 6 DOF tracking
 - Haptic feedback

Thompson, resistance welding

1800

1900

2000

Foreground

- NSRP 2008 project
 - Low Cost Virtual Reality Welder Training System
- Team members
 - Bender Shipbuilding & Repair
 - Native American Technologies
 - Electric Boat

Coffin, metal electrode welding

1800

1900

2000

Foreground

- NSRP 2008 project
 - 2 Phase, 2 year project
 - Phase 1 completed, March 2009
 - Project management issues

Oxyacetylene gas welding

1800

1900

2000

Current Project

- NSRP 2010 project
 - Phase 2 of original 2008 project
- Team members
 - Electric Boat
 - Native American Technologies

Shielded electrode (flux)

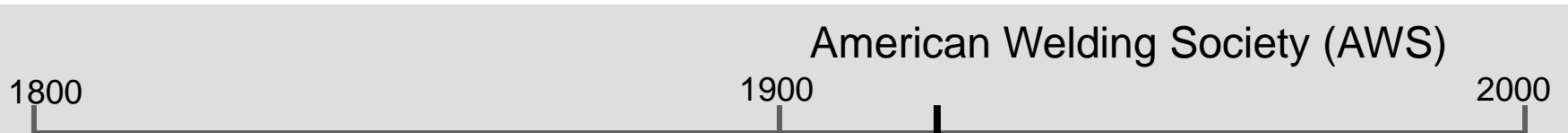
1800

1900

2000

Current Project

- Goal: low cost system
 - Target cost < \$10K



Current Project

- Key technologies
 - Robust welding simulation system
 - Based on commercial weld monitoring system
 - Real-time neural network
 - Trained with range of weld samples
 - Low cost tracking system
 - Based on gaming technology



Phase 2 Plans

- Further develop simulation model
 - Additional sample data
- Complete graphics and display
- Develop set of prototype welding units
- Deploy to shipyards for testing/evaluation
- Plans for commercialization

Kennedy, Battelle Inst, GMAW, constant voltage ps

1800 1900 2000

Demo



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Questions

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