SBIR 06-173 *Automating Ship Assembly Planning and Simulation*

Project Status Update

New Orleans NSRP Meeting

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atlantec enterprise solutions

Outline

- Company Profile
- Production Simulation and Shipbuilding
- Project Goals and Activities
- Simulation System Architecture
- Demo of Atlantec Simulation System

Company Profile

- Founded in 2000
- Offices located in Annapolis, MD and Hamburg, Germany
- Core competencies include: interoperability, production engineering, and shipbuilding
- Provides consulting and software solutions for shipbuilding under the registered trademark Topgallant®
- Topgallant® Solutions: *ERP Connector*, *Plate Production*, and *Shrinkage Management* are in use at major EU shipyards

The potential:

- Can enable shipyards to build ships virtually or electronically
  - Gain production experience
  - Reduce cost and schedule risks
  - Change Management
- Can Provide knowledge based tools that capture and maintain vital enterprise information
- Can be transformational technology, and Atlantec believes that its contagion in shipbuilding will be similar to 3D Product Model technology

Where is Shipbuilding today?

- Several yards in the US and Europe have employed production simulation for specific studies or analyses
- Only FSG (Flensburger) in Germany, to our knowledge, uses production simulation routinely on a yard-wide basis
- Up to now the major barrier has been the thousands and thousands of hours to model shipyard facilities, processes, and products

FSG Website

FLENSBURGER
Shipbuilders since 1872

- Why choose us
  - research / innovation
  - project response
  - production output
  - total quality
  - always on time
  - exclusivity
- Our Products
- All about us
- RoRo's grow
- Webcam
- Imprint
- Purchase Conditions
- Jobs at FSG
- Ausbildung/Praktikum
- Visitors Book
- Privacy Statement
- Home

Always on Time

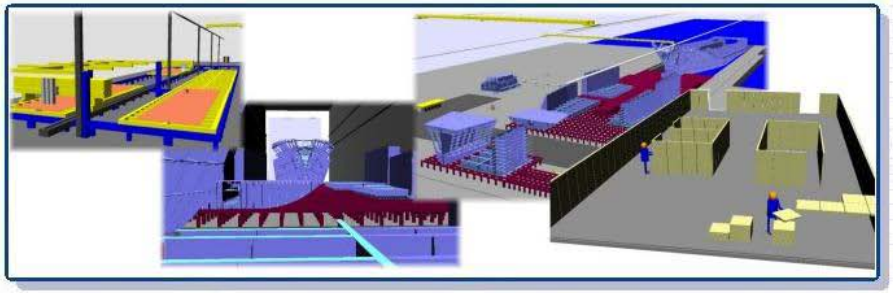
IT'S SIMULATION AND PLANNING THAT COUNTS

To maintain our tradition of punctual delivery we develop and use sophisticated planning methods and skills.

Before we start the actual building, we have already built the vessel in our computer systems many times to rule out any delays or bottlenecks.

We continually monitor and control our suppliers' activities.

Ongoing investment supports the entire planning and fabrication process.



Computer simulation of Flenburger's production flow

Project History

- Phase I Award 3/22/07 ending 9/23/07
- Phase II Award 9/30/2008
- Base Period – Will complete, December 2009
- Option 1– Funding Pending

Project Goals

- Develop an affordable and practical simulation system for shipbuilders
- Automate modeling process to reduce modeling time by 75-80%
- Enable and support simulation for routine use and on a yard wide basis
- Provide a capability to handle a broad range of simulation scenarios such as capacity and facility planning, process optimization, build strategy and project planning, bids and proposals, and planning and scheduling on a daily basis.

Project Status – Technical Readiness Level Definitions

- **TRL 1 Basic principles observed and reported:** Transition from scientific research to applied research. Essential characteristics and behaviors of systems and architectures. Descriptive tools are mathematical formulations or algorithms.
- **TRL 2 Technology concept and/or application formulated:** Applied research. Theory and scientific principles are focused on specific application area to define the concept. Characteristics of the application are described. Analytical tools are developed for simulation or analysis of the application.
- **TRL 3 Analytical and experimental critical function and/or characteristic proof-of concept:** Proof of concept validation. Active Research and Development (R&D) is initiated with analytical and laboratory studies. Demonstration of technical feasibility using breadboard or baseboard implementations that are exercised with representative data.
- **TRL 4 Component/subsystem validation in laboratory environment:** Standalone prototyping implementation and test. Integration of technology elements. Experiments with full-scale problems or data sets.
- **TRL 5 System/subsystem/component validation in relevant environment:** Thorough testing of prototyping in representative environment. Basic technology elements integrated with reasonably realistic supporting elements. Prototyping implementations conform to target
- environment and interfaces.
- **TRL 6 System/subsystem model or prototyping demonstration in a relevant end-to-end environment (ground or space):** Prototyping implementations on full-scale realistic problems. Partially integrated with existing systems. Limited documentation available. Engineering
- feasibility fully demonstrated in actual system application.
- **TRL 7 System prototyping demonstration in an operational environment (ground or space):** System prototyping demonstration in operational environment. System is at or near scale of the operational system, with most functions available for demonstration and test. Well integrated with collateral and ancillary systems. Limited documentation available.
- **TRL 8 Actual system completed and "mission qualified" through test and demonstration in an operational environment (ground or space):** End of system development. Fully integrated with operational hardware and software systems. Most user documentation, training
- documentation, and maintenance documentation completed. All functionality tested in simulated and operational scenarios. Verification and Validation (V&V) completed.
- **TRL 9 Actual system "mission proven" through successful mission operations (ground or space):** Fully integrated with operational hardware/software systems. Actual system has been thoroughly demonstrated and tested in its operational environment. All documentation completed. Successful operational experience. Sustaining engineering support in place.

SBIR Project Work and Status

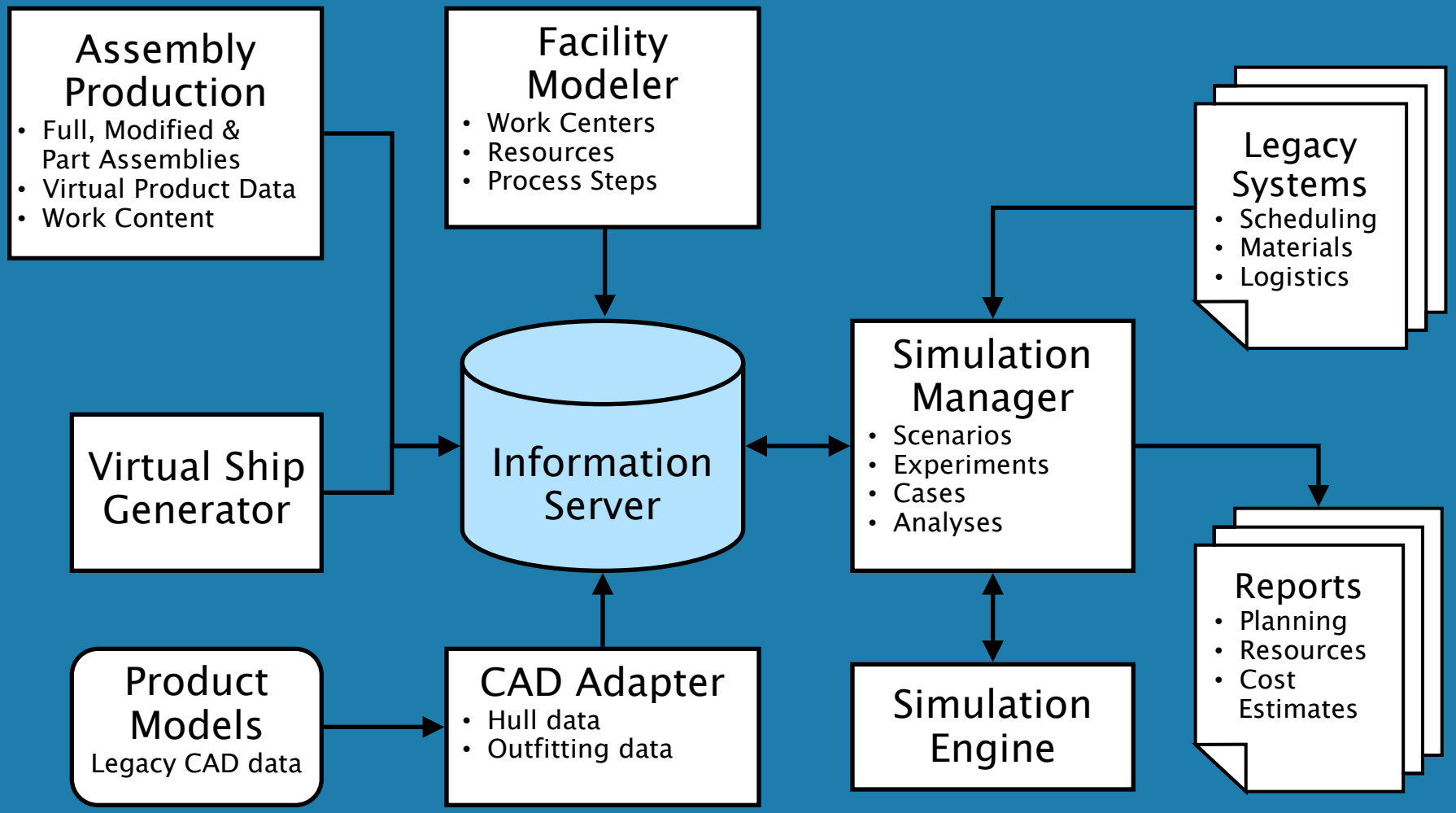
Combined Work with GD NASSCO LSMS NSRP Project

- Developed *Facility Modeler* a knowledge based system for modeling shipbuilding facilities and processes (TRL 7-8)
- Extended *Assembly Production* to access and modify assemblies from CAD systems + work content (TRL 7-8)
- Developed Virtual Product Data Capability (TRL 4)

Project Work and Status

- Evaluated potential simulation engines or products:
  - Chose Java-based product easily incorporated into existing Topgallant® architecture as plug-in component
  - Open-source product with strong user support
- Preliminary simulation management workbench completed
  - Capability to generate simple simulation models
  - Monitors facility utilization and product throughput (TRL 4) at end of base period
- Development work required to refine user interface and expand functionalities of Simulation Manager application Planned for Option 1 (TRL 6) at end of Option 1

Ship Assembly Planning and Simulation Architecture



Ship Assembly Planning and Simulation Process Model