



Panel Line Optimization through Predictive Scheduling - PLOPS



NSRP SPPT Panel Meeting
Bender Shipbuilding & Repair Co., Inc.

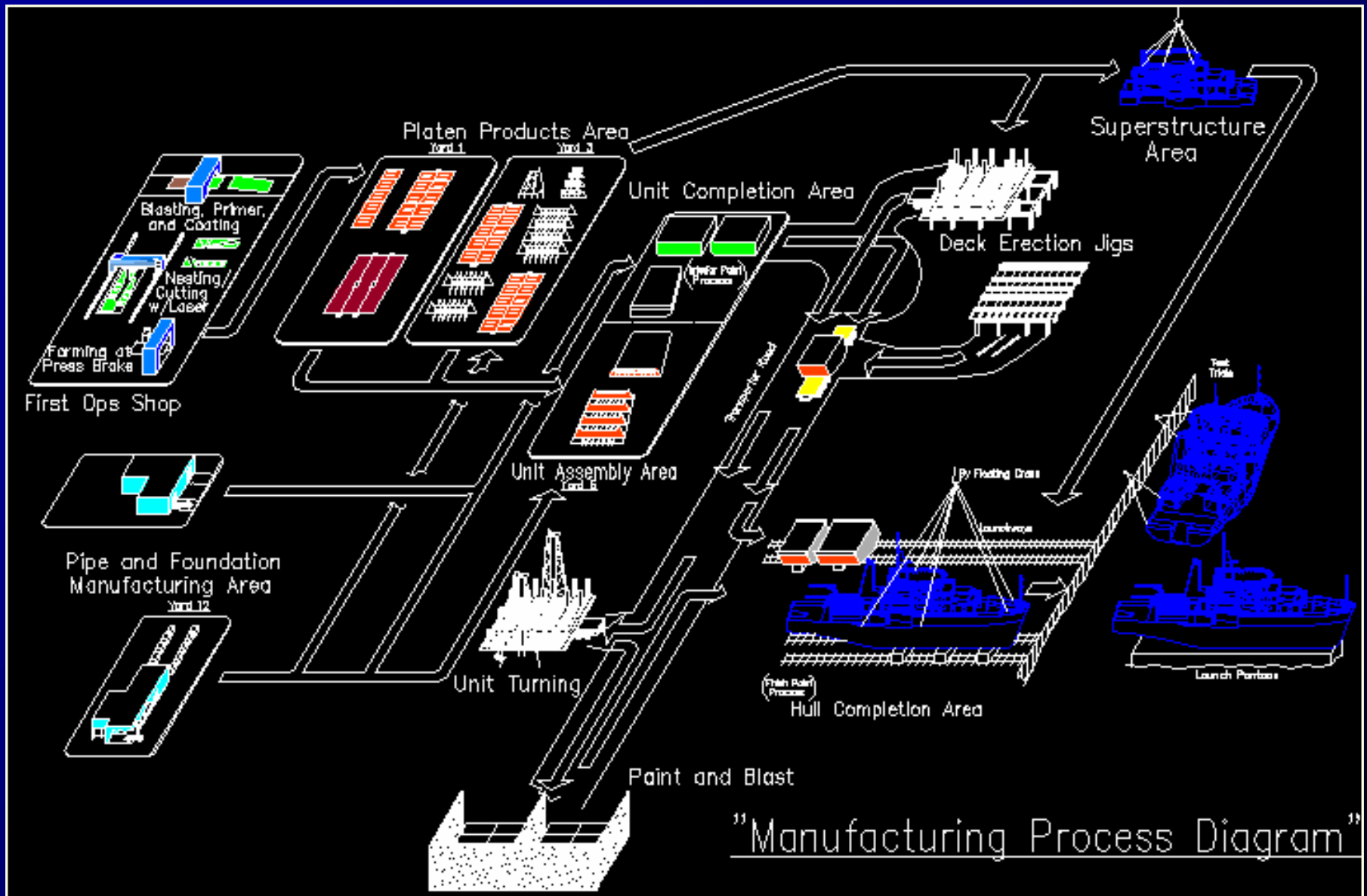


Project Concept

Use Delmia in conjunction with current ShipConstructor software to produce an optimized plan for cutting, material handling, welding, part staging and possibly manning using panel line resources and constraints and work force variations

- Use part geometry from ShipConstructor 3D model database
- Plan the use of resources for the most efficient possible throughput
- Examine parts required for the simulation model
- Provide a “shop floor” manufacturing schedule as a starting point
- All simulation based on actual 3D part/ model and cycle schedule
- Provide an integrated optimization tool for predictive panel production scheduling at the shop floor
- Pave the way for additional tools for other areas within the shipyard

Overall Manufacturing Process

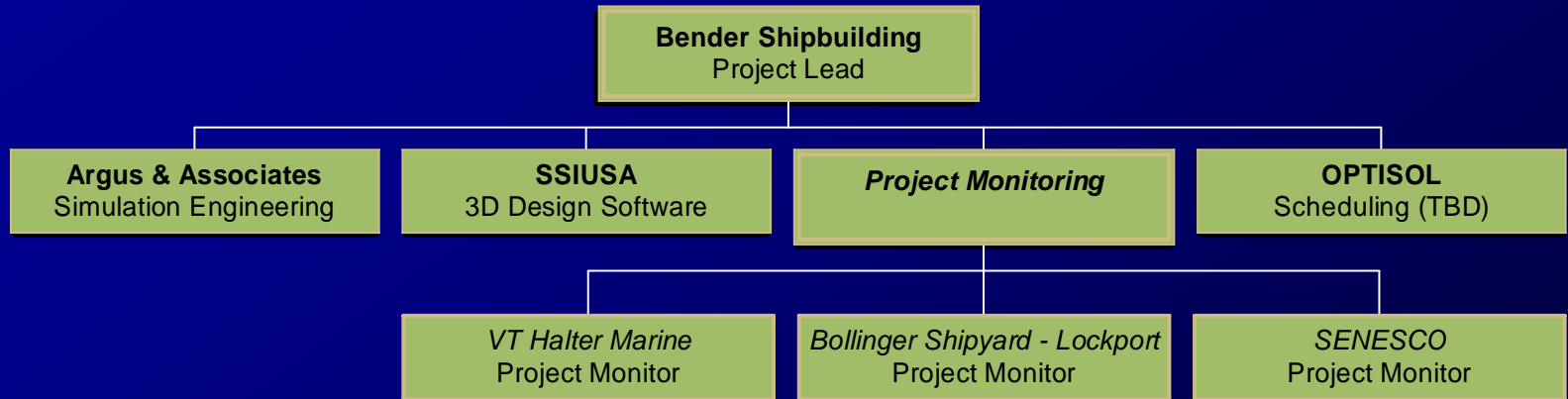


"Manufacturing Process Diagram"

Project Objectives / Goals

- Replace manual method of defining the panel production on the fly at the shop floor
- Allow for varying work sequence as needs arise
- Allow for a more accurate representation of the impact from changes
- Provide a tool for managing manpower requirements in specific areas within the panel line
- Provide a way to reduce the work-in-process (WIP) and the cost avoidance associated with excess material handling

Project Team Organization



Panel Line Optimization through Predictive Scheduling

- Phase 1
 - Define panel process
 - Define constraint combinations in the panel line
 - Define constraints for each workstation
 - Build simulation model

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- Phase 2
 - Define Work envelope & coding
 - Define part geometry info from SC database
 - Define Coding for Orientation, Nesting and Sequencing
 - Build, Test, and Evaluate System

Statement of Work

- Project Kick-off Meeting to finalize project schedule, milestones, and assist in discussions
- Bender Shipbuilding to define panel line process for each manufacturing process
- Bender Shipbuilding and Argus & Associates to define combinations of constraints within each manufacturing process
- Bender Shipbuilding with assistance from Argus & Associates to define constraints for each workstation – labor, equipment, facilities, etc

Statement of Work (cont.)

- Argus & Associates to build a simulation model from the panel line processes
- Argus & Associates with guidance from the team will define work envelope and coding for optimizing each manufacturing process
- ShipConstructor USA and Bender to define part geometry information from a 3D model (ShipConstructor) that will be used in the Delmia model

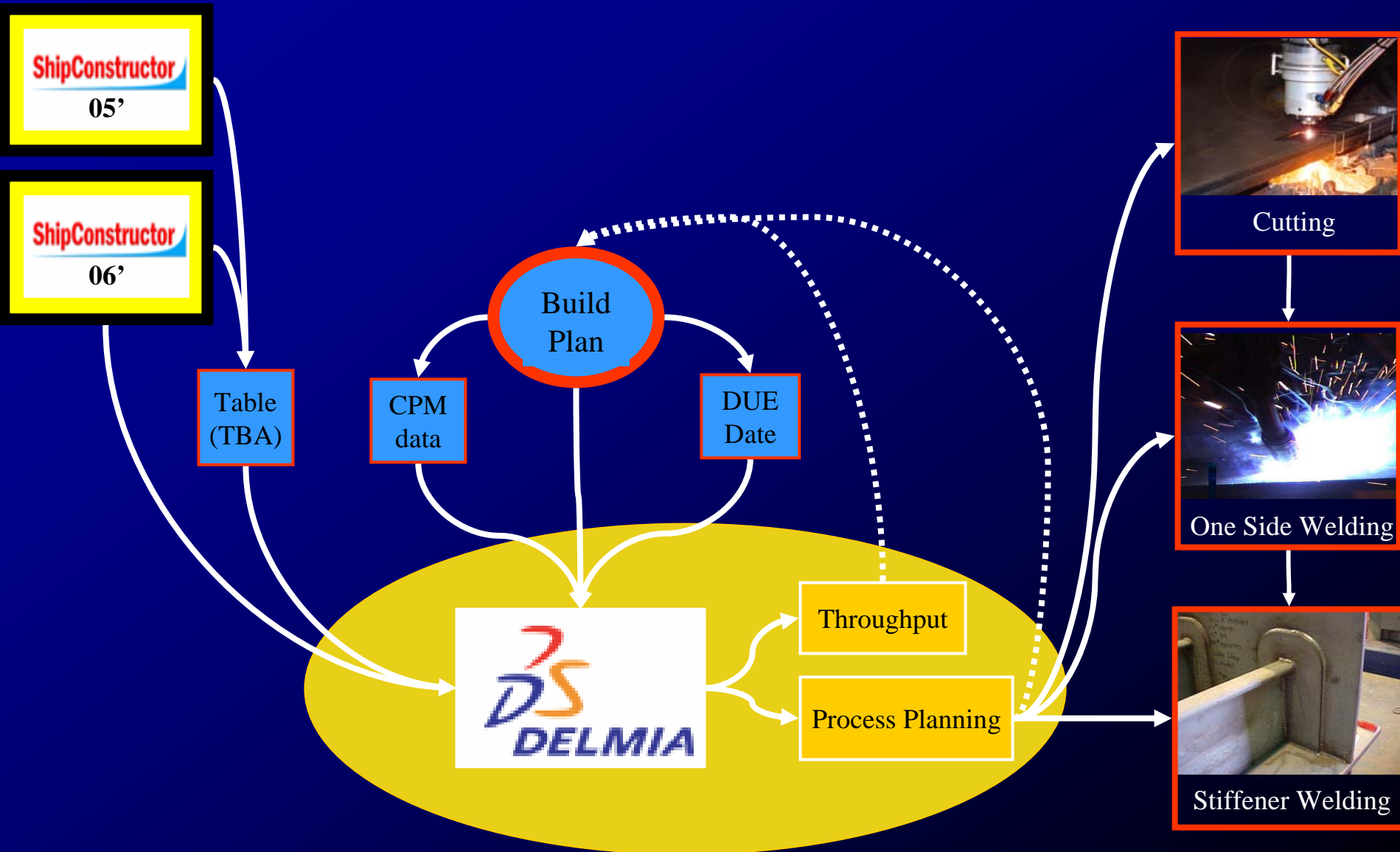
Statement of Work (cont.)

- Argus & Associates with ShipConstructor USA are to define coding to determine product orientation and nesting considering physical constraints and product sequencing from the panel geometry
- Project Team to build, test and evaluate a digital manufacturing optimization system capable of producing a work plan with consideration to various physical constraints that can be integrated into existing planning systems

Statement of Work (cont.)

- Bender Shipbuilding, Argus & Associates, & ShipConstructor to produce & submit final report
- Bender Shipbuilding, Argus & Associates, & ShipConstructor USA to prepare & deliver presentation at a suitable NSRP SPPT Panel Meeting

PLOPS Methodology



Metrics/ROI Benefit Realization

- A 50% reduction in labor hours is anticipated in the shop floor planning and scheduling
- Panel throughput should increase 20% by improving the ability to predicatively schedule and optimize panel production by reducing WIP
- A 4% reduction in labor hours is anticipated on the manufacturing shop floor
- Inventory cost in ordering / receiving / shipping / storing / handling panel parts/ consumables could effectively be reduced, but the specific potential cost reductions are not easily calculated at this time

Project Deliverables

April 14th, 2006 – Project Kick-off meeting minutes / presentation materials

June 20th, 2006 – Project Quarterly Status Report

September 20th, 2006 – Project Quarterly Status Report

October 20th, 2006 – Beta Test & Evaluate System

November 20th, 2006 – Final Report & Microsoft PowerPoint Presentation at a suitable NSRP SPPT panel meeting

Project Technical Reviews

- Project team will participate in the technical review meetings that will be held at Bender Shipbuilding in Mobile, AL and or as determined during the course of the project
- There will be two technical review meetings held in the 2nd & 3rd quarters:
 - Technical Review #1 - June 15th, 2006
 - Technical Review #2 - September 14th, 2006

Project Technology Transfer

- Results will be presented at appropriate panel-meetings and/or 2006 SPS symposia
- Results will be made available on the NSRP website
- Systems will be built for other U.S. shipyards at a discounted rate

Project Duration & Cost

- Expected Duration: The project will last 9 months
- Program Funds: \$98,300 (38% of total project cost)
- Cost Share: \$160,120 (62% of total project cost)
 - Delmia simulation software package – 1 yr
 - SC2006 license software package – 1 yr
 - Additional Labor hours required – various team members