

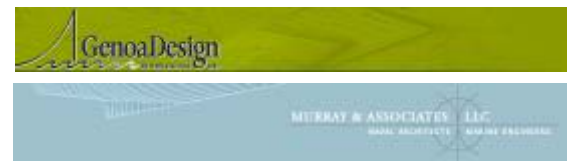
Progress Report
Second Tier Shipyard Design
Enhancement Project II
STSDEPII

PDMT Panel Meeting
September 22, 2005
Alexandria, VA

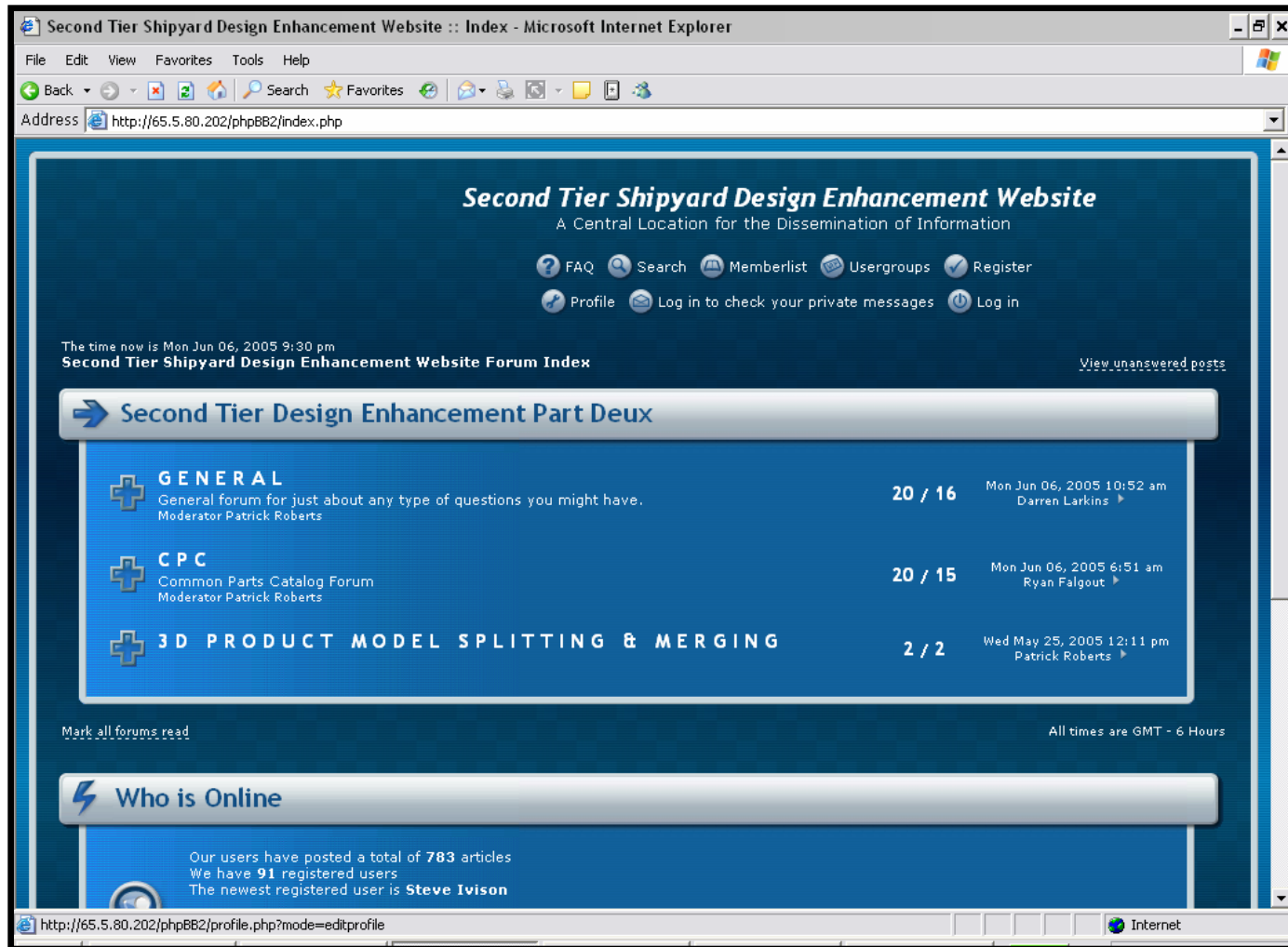
Project Overview

- Originally planned for 9 modules, 12 months
- Funded for 2 modules, 12 months
 - 12 months based on original plan for CPC development.
- Modules awarded
 - Common Parts Catalog Integration – Load parts from CPC to ShipConstructor, Part Equivalences, Bulk import/export parts into CPC, Oracle CPC version.
 - 3D Product Model Splitting & Merging - Enable several parties to work on the same project at different locations without direct connection.
- 6 Shipyards, 5 Design Agents, 2 Software Developers

Participants

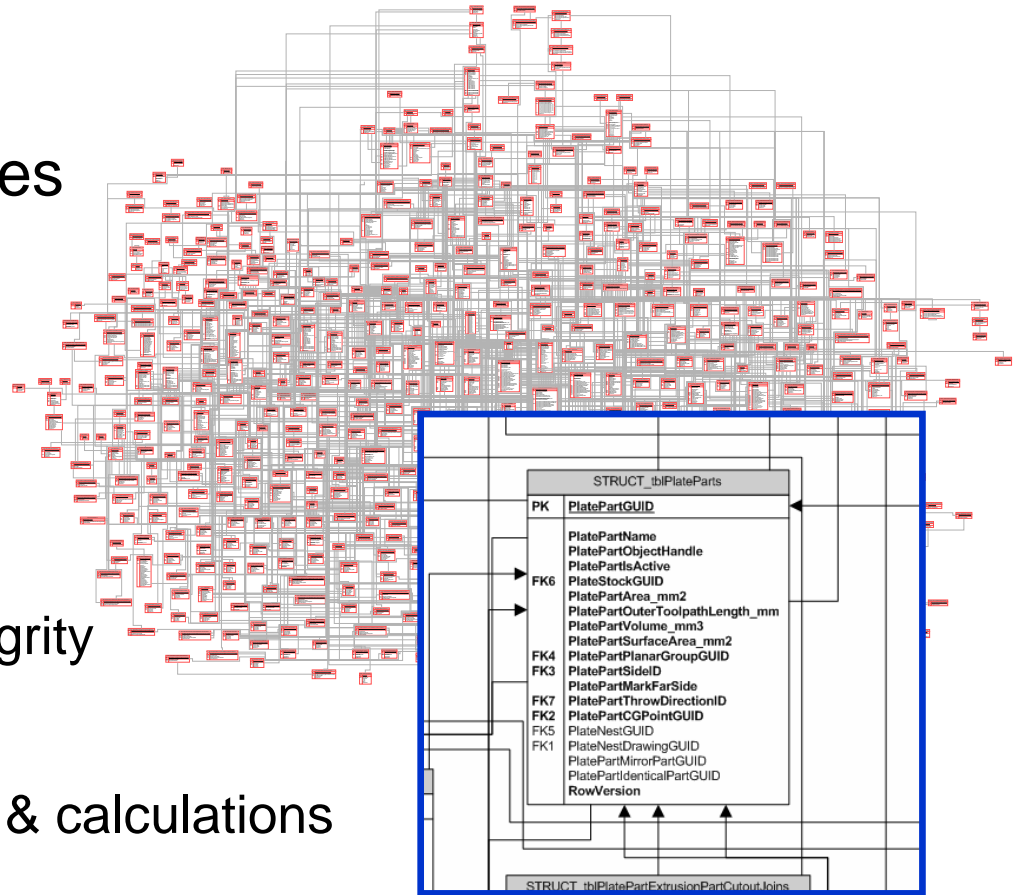


Communication Website



Database Architecture

- 610+ Tables
- 5300+ Stored Procedures
- Captures expert knowledge
- Ensures inherently data integrity
- Performs thousands checks & calculations



DB Redesign From Scratch

Reasons for redesign

- Enable CPC integration
 - Added tables, attributes (CPC part class etc.)
 - Mapping and equivalencies
- Enable Split & Merge
 - Geometry moved from DWG to DB (millions of points, lines)
 - GUIDs – unique identification across projects
- Additional Benefits
 - Opportunity to modernize all of ShipConstructor
 - Foundation for significant progress over next years
 - Increased stability
 - Better data integrity

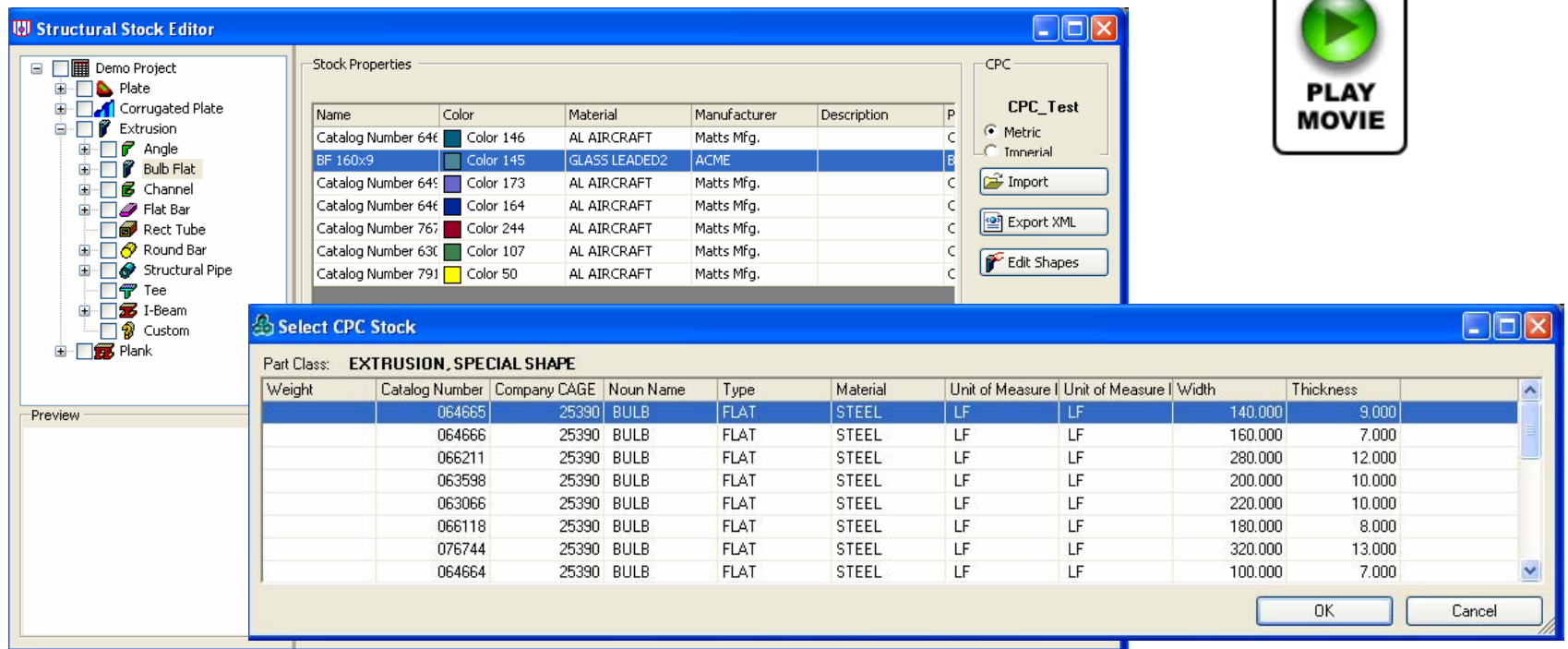
CPC Feature Overview

1. Single item creation from a selected CPC Part
2. Viewing of associated CPC Part
3. Bulk importing of CPC Parts
4. Sharing with / searching of CPC parts in other ShipConstructor projects

Task 1 – CPC Integration (ARL)

Single Item Creation

- Operates through existing Stock Editor functionality
- Structure, Pipe, HVAC, Equipment (no geometry)



The screenshot displays the 'Structural Stock Editor' software interface. The main window shows a 'Stock Properties' table with columns for Name, Color, Material, Manufacturer, and Description. The 'BF 160x9' item is selected. To the right, there is a 'CPC' section with 'CPC_Test' selected, and buttons for 'Import', 'Export XML', and 'Edit Shapes'. Below the main window, a 'Select CPC Stock' dialog box is open, showing a table of stock items with columns for Weight, Catalog Number, Company CAGE, Noun Name, Type, Material, Unit of Measure, Width, and Thickness. The 'Part Class' is set to 'EXTRUSION, SPECIAL SHAPE'. A 'PLAY MOVIE' button is visible to the right of the main window.

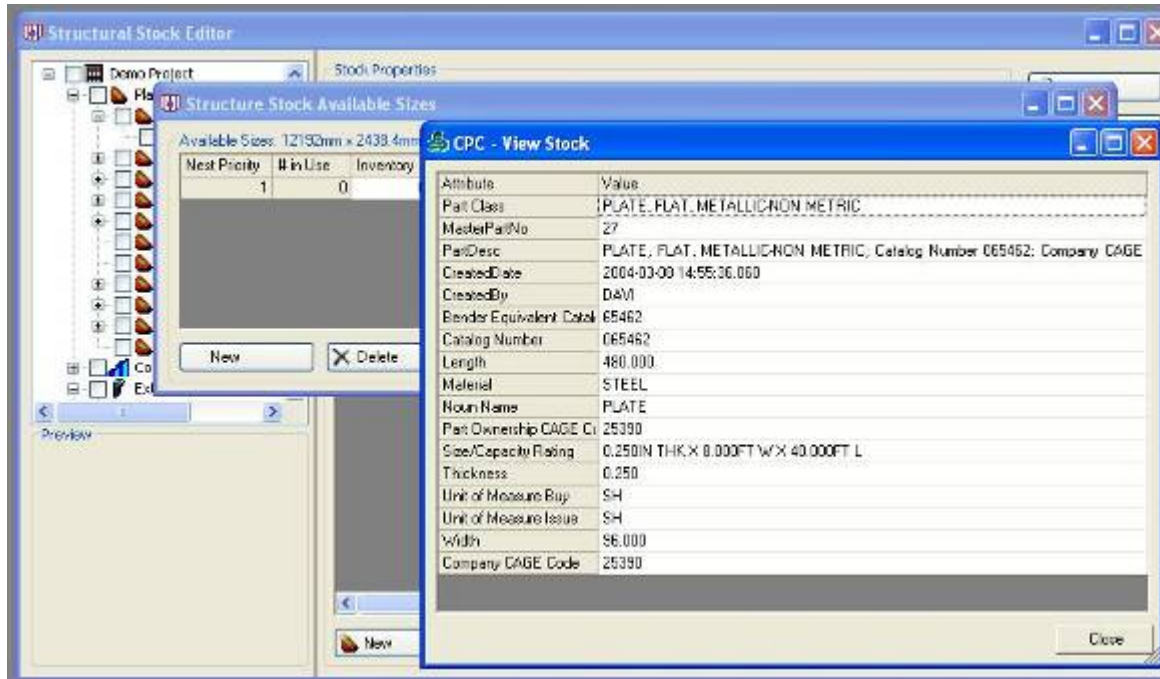
Name	Color	Material	Manufacturer	Description	P
Catalog Number 646	Color 146	AL AIRCRAFT	Matts Mfg.		C
BF 160x9	Color 145	GLASS LEADED2	ACME		B
Catalog Number 645	Color 173	AL AIRCRAFT	Matts Mfg.		C
Catalog Number 646	Color 164	AL AIRCRAFT	Matts Mfg.		C
Catalog Number 767	Color 244	AL AIRCRAFT	Matts Mfg.		C
Catalog Number 630	Color 107	AL AIRCRAFT	Matts Mfg.		C
Catalog Number 791	Color 50	AL AIRCRAFT	Matts Mfg.		C

Weight	Catalog Number	Company CAGE	Noun Name	Type	Material	Unit of Measure	Unit of Measure	Width	Thickness
	064665	25390	BULB	FLAT	STEEL	LF	LF	140.000	9.000
	064666	25390	BULB	FLAT	STEEL	LF	LF	160.000	7.000
	066211	25390	BULB	FLAT	STEEL	LF	LF	280.000	12.000
	063598	25390	BULB	FLAT	STEEL	LF	LF	200.000	10.000
	063066	25390	BULB	FLAT	STEEL	LF	LF	220.000	10.000
	066118	25390	BULB	FLAT	STEEL	LF	LF	180.000	8.000
	076744	25390	BULB	FLAT	STEEL	LF	LF	320.000	13.000
	064664	25390	BULB	FLAT	STEEL	LF	LF	100.000	7.000

Task 1 – CPC Integration (ARL)

Single Item Viewing

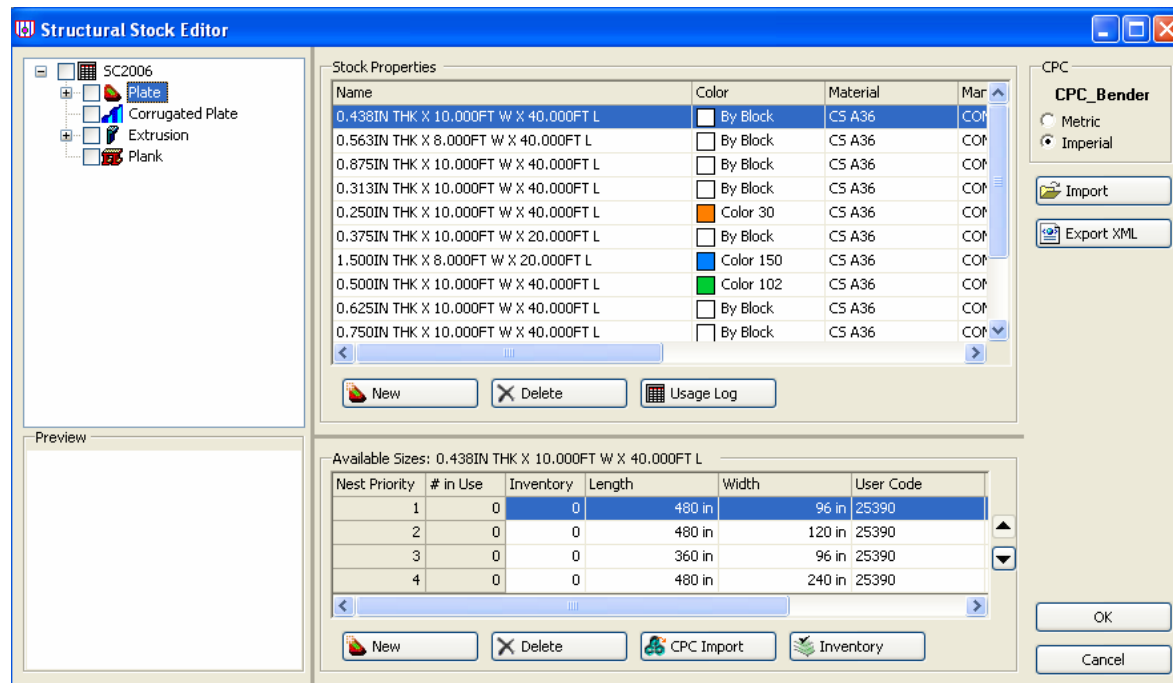
- Direct view CPC attributes from within ShipConstructor
 - No need to open any CPC application



Task 1 – CPC Integration (ARL)

Stock Libraries Bulk Importing

- Importing many CPC parts using CPC identifier
- Challenge - solving missing data problem



ARL - Work to be Done

- ShipConstructor Interface Re-structuring
 - Redesign of Structural stock library interfaces - 97% complete
 - Redesign of Pipe stock library interfaces - 75% complete
 - Redesign of HVAC stock library interfaces - 95% complete
 - Redesign of Equipment stock library interfaces - 10% complete
- Note: Functionality for import exists for each stock library module, but UI's need to be completed for each stock library.

Funded Knowledge Based Systems Tasks

- CPC Integration Development
 - Piggyback off 1st tier ISE and CPC projects
 - Leverage development from the initial 2nd Tier CPC project
- Feature implementation tasks:
 - Part **equivalencies** to be defined between 2nd tier yards
 - Bulk data **import/export** functionality
 - Development of an **Oracle-based** CPC interface to support other infrastructures (in support of Bollinger Shipyards and the LCS program)

Task 1 – CPC Integration (KBSI)

Part Equivalencies

Common Part Catalog

File Edit View Part Class Part Master Part Equivalency Documents Administrator Window Help

View Equivalent Part Assignments

Search Based On Part Description

Search

Defined Part Equivalencies (804)

Equivalent Parts				
Master Part	Master Part Cage Code	Equivalent Part Catalog	Equivalent Part Cage Code	Bi Directional Relation
2585774	64513	001981	25390	<input checked="" type="checkbox"/>
2585456	64513	001980	25390	<input checked="" type="checkbox"/>
2585138	64513	001979	25390	<input checked="" type="checkbox"/>
5656230	64513	001983	25390	<input checked="" type="checkbox"/>
2586096	64513	001982	25390	<input checked="" type="checkbox"/>
2584808	64513	001978	25390	<input checked="" type="checkbox"/>
2584166	64513	002623	25390	<input checked="" type="checkbox"/>
2586142	64513	001984	25390	<input checked="" type="checkbox"/>
6083307	64513	036419	25390	<input checked="" type="checkbox"/>
5574802	64513	024937	25390	<input checked="" type="checkbox"/>
5574900	64513	022039	25390	<input checked="" type="checkbox"/>
5575100	64513	021939	25390	<input checked="" type="checkbox"/>
5575280	64513	024938	25390	<input checked="" type="checkbox"/>
5634399	64513	026976	25390	<input checked="" type="checkbox"/>
5633900	64513	024720	25390	<input checked="" type="checkbox"/>
5636510	64513	023966	25390	<input checked="" type="checkbox"/>
5636701	64513	036682	25390	<input checked="" type="checkbox"/>
1812548	64513	001350	25390	<input checked="" type="checkbox"/>
1813188	64513	000347	25390	<input checked="" type="checkbox"/>
7777777	64513	6144616	64513	<input checked="" type="checkbox"/>

Reset Refresh Update Delete

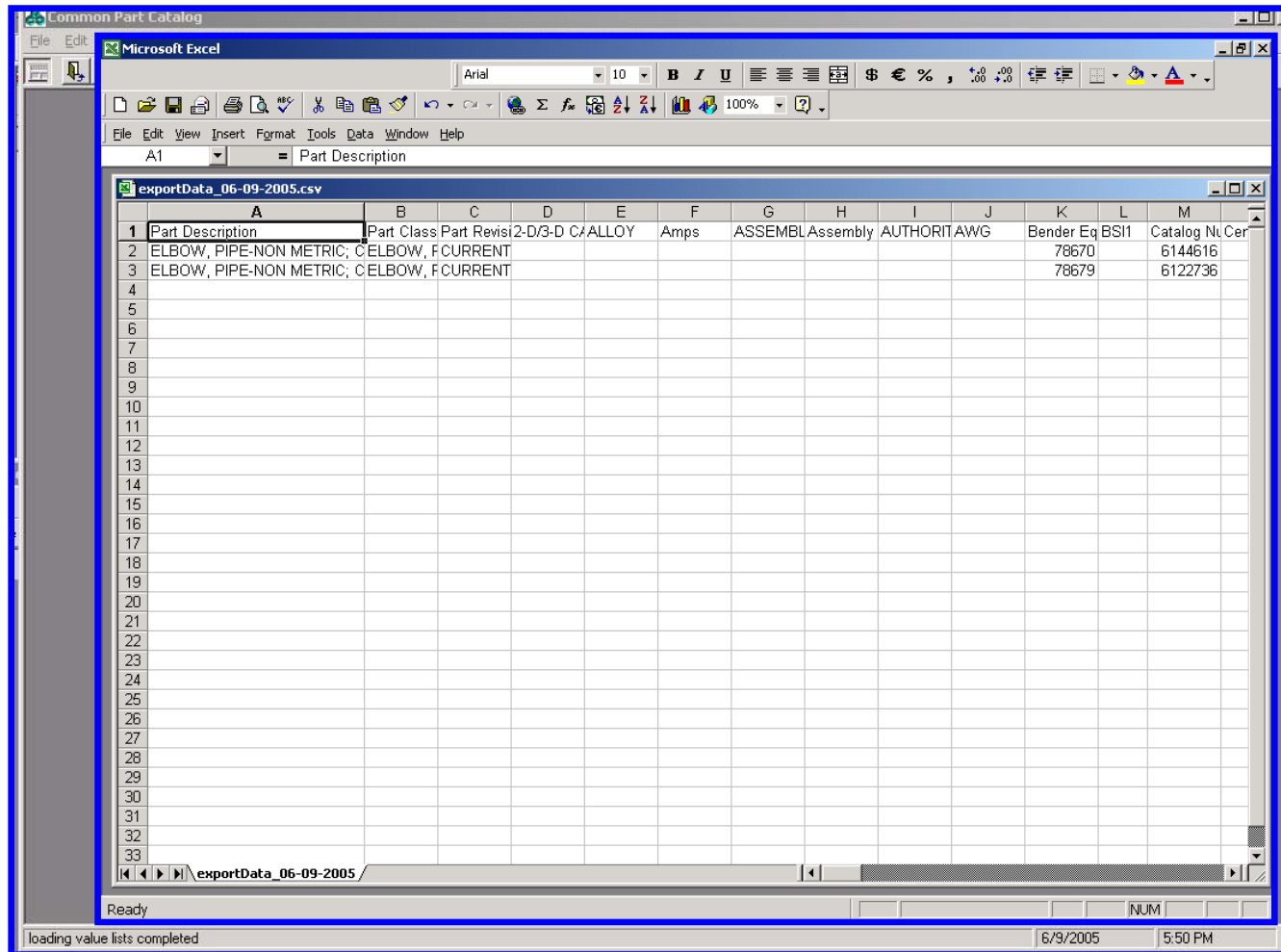
Print Print Preview Cancel Exit

Loading value lists completed 6/9/2005 6:27 PM

\\HKEY_CURRENT_USER\Software\WB and VBA Program Settings\CPC\Settings\LAYOUTS\shosur

Task 1 – CPC Integration (KBSI)

Bulk Data import/export functionality



Task 1 – CPC Integration (KBSI)

Oracle-based CPC

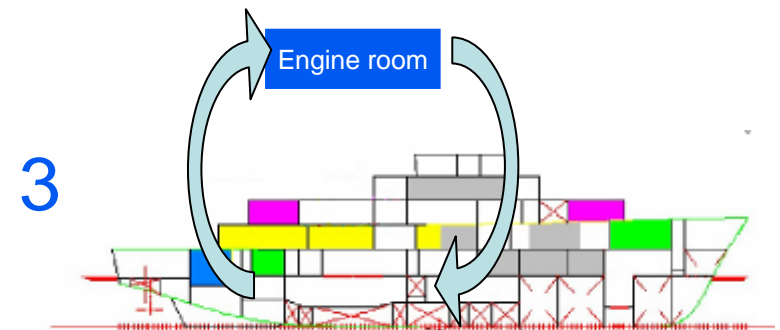
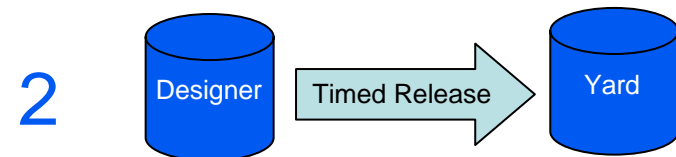
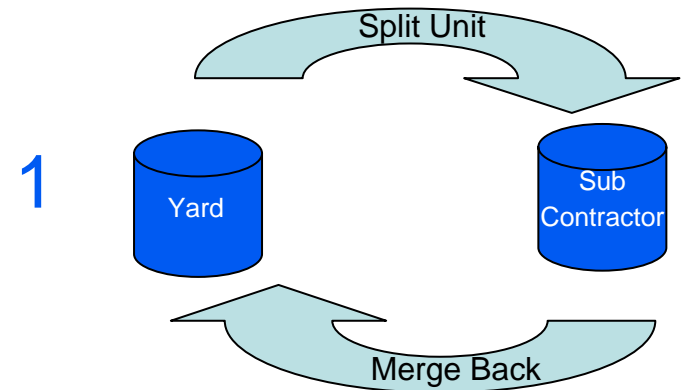
The screenshot displays the Oracle Enterprise Manager Console interface. On the left, a tree view shows the database structure under 'Network' > 'Databases' > 'ORACPC - cpc' > 'Instance' > 'Schema' > 'CPC' > 'Tables'. The 'Tables' folder is selected, and a list of tables is displayed in the main pane. The table list includes columns for Table, Tablespace, Partitioned, Rows, and Last Analyzed.

Table	Tablespace	Partitioned	Rows	Last Analyzed
APPROLE	CPCUSERS	No	4	29-Aug-2005 05:34:02 PM
APPROLEPERMISSION	CPCUSERS	No	0	29-Aug-2005 05:35:10 PM
APPUSER	CPCUSERS	No	0	29-Aug-2005 05:35:10 PM
APPUSERORGANIZATIONACCESS	CPCUSERS	No	0	29-Aug-2005 05:35:10 PM
APPUSERROLE	CPCUSERS	No	0	29-Aug-2005 05:35:10 PM
ATTRIBUTE	CPCUSERS	No	0	29-Aug-2005 05:35:10 PM
ATTRIBUTEFILTERBASEDONDS	CPCUSERS	No	0	29-Aug-2005 05:35:10 PM
ATTRIBUTEVALUEENUMERATIONS	CPCUSERS	No	0	29-Aug-2005 05:35:10 PM
AUDITHISTORYFORDOCUMENT	CPCUSERS	No	0	29-Aug-2005 05:35:10 PM
AUTOPARTEQUIVALENCYRATIOS	CPCUSERS	No	0	29-Aug-2005 05:35:10 PM
DATASOURCE	CPCUSERS	No	0	29-Aug-2005 05:35:12 PM
DOCUMENT	CPCUSERS	No	12295	29-Aug-2005 05:35:12 PM
DOCUMENTEQUIVALENCY	CPCUSERS	No	0	29-Aug-2005 05:35:12 PM
DOCUMENTREVISIONAMENDMENT	CPCUSERS	No	0	29-Aug-2005 05:35:12 PM
DOCUMENTREVSPEC	CPCUSERS	No	0	29-Aug-2005 05:35:12 PM
FILTERCRITERION	CPCUSERS	No	0	29-Aug-2005 05:35:13 PM
IMPORTEXPORTEXCPTIONS	CPCUSERS	No	0	29-Aug-2005 05:35:14 PM
IMPORTEXPORLOG	CPCUSERS	No	0	29-Aug-2005 05:35:13 PM
IMPORTEXPORTEMPLATE	CPCUSERS	No	3	29-Aug-2005 05:35:14 PM
IMPORTEXPORTEMPLATEDEFINITION	CPCUSERS	No	37	29-Aug-2005 05:35:10 PM
ORGANIZATION_	CPCUSERS	No	2	29-Aug-2005 05:35:09 PM
PARTCLASS	CPCUSERS	No	0	29-Aug-2005 05:35:12 PM
PARTCLASSATTRIBUTE	CPCUSERS	No	4115	29-Aug-2005 05:35:09 PM
PARTCLASSATTRIBUTEENUMERATIONS	CPCUSERS	No	0	29-Aug-2005 05:35:09 PM
PARTCLASSATTRIBUTESEQUENCE	CPCUSERS	No	0	29-Aug-2005 05:35:12 PM
PARTDOCUMENTASSOCIATIONS	CPCUSERS	No	0	29-Aug-2005 05:35:14 PM
PARTEQUIVALENCY	CPCUSERS	No	0	29-Aug-2005 05:35:14 PM
PARTFILTERBASEDONDATASOURCE	CPCUSERS	No	0	29-Aug-2005 05:35:12 PM
PARTMASTER	CPCUSERS	No	3709	29-Aug-2005 05:35:10 PM
PARTMASTERATTRIBUTES	CPCUSERS	No	0	29-Aug-2005 05:35:14 PM
PARTPRODUCTSTRUCTURE	CPCUSERS	No	0	29-Aug-2005 05:35:13 PM
PARTPRODUCTSTRUCTUREATTRIBUTES	CPCUSERS	No	0	29-Aug-2005 05:35:13 PM
PRODUCTSTRUCTUREATTRIBUTES	CPCUSERS	No	0	29-Aug-2005 05:35:13 PM
RETURNEDROWINFO	CPCUSERS	No	0	29-Aug-2005 05:34:14 PM
REVISION	CPCUSERS	No	0	29-Aug-2005 05:35:12 PM

Project Split & Merge

3 Scenarios

1. Co-operation sub-contractors and yards
2. Step-wise transition of project from designer to builder
3. Design variations (under consideration)
 - Example - exchange engine rooms



Major Reason for Redesign of DB

- ShipConstructor 2005 and before DB's
 - Geometric data stored in DWG's
 - Comparing and synchronizing drawings impossible
- ShipConstructor 2006 DB – geometric data in DB
 - Stocks (shapes, cutouts, etc)
 - All structure geometry (plate, stiffener) – DWG just a porthole into DB
 - Distributed systems
- Merge is now mainly a Database level process, some DWG work remains

Work Done to Date - To be Done

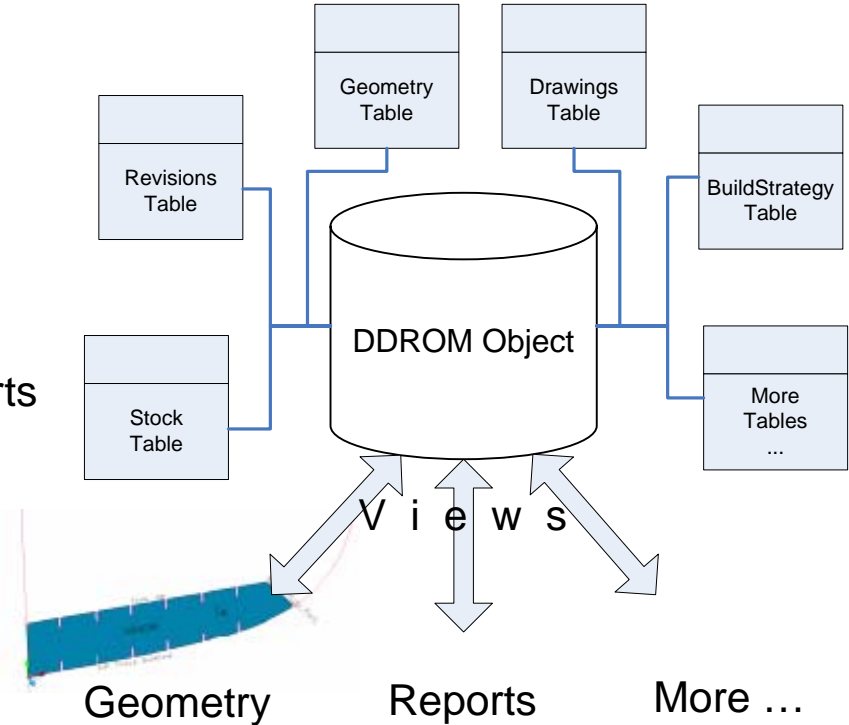
- Work done to date:
 - DB re-design 95% complete
 - Re-write of data access for all existing modules 90%
 - Massive modernization of Hull, Structure, HVAC, Pipe, Equipment, Penetrations, Nesting
 - Specifications written for Split & Merge processes
- Work to be done:
 - Some research left
 - Split & Merge for all modules (Hull, Structure, Pipe, HVAC, Penetrations, Nesting,...)
 - Lots of testing

Bonus Features

- DB redesign created several great development opportunities
- Move geometry into DB
 - Idea of relational linking geometry
 - Selective associative Database Driven Relational Object Model (DDRORM)
 - Best of associative CAD model without the head aches
 - Massive amount of work – but well worth it
- Application Programming Interface (API)
- All modules significantly modernized with major update
- Linear Optimization

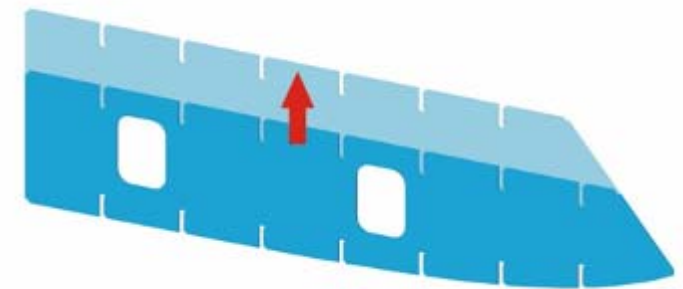
Database Driven Relational Object Model DDROM

- All geometry + attribute data stored in DB
 - + Selective Associative Model
- Parametric – but better
 - + Automatic linking
 - + No complex relationships
 - + One change drives update of many parts
- Handles 500,000+ parts
 - + Works on standard PC's

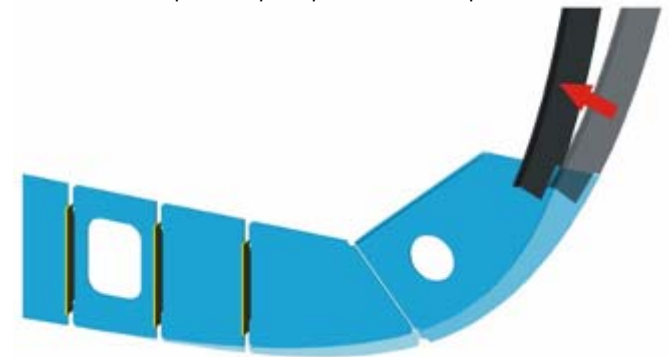


DDROM – Structure Parts

- One-Click part definition
- Automatic association
- Move deck -> updates frames
- Change stiffener size -> updates cutouts
- Significant time reduction in initial modeling and faster design change implementation



Automatic update of plate part after tank-top moved

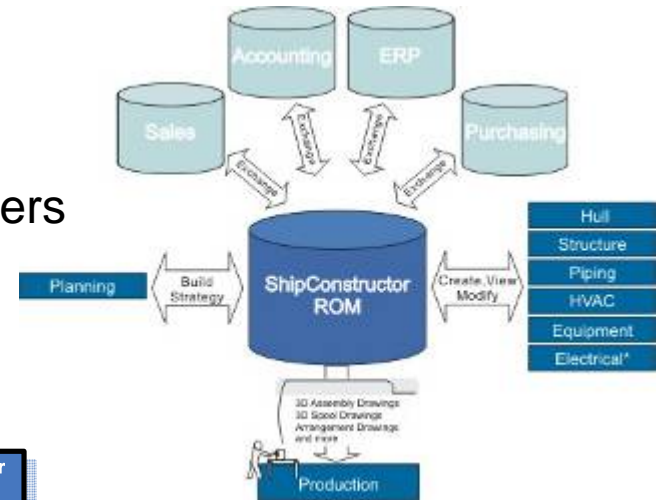
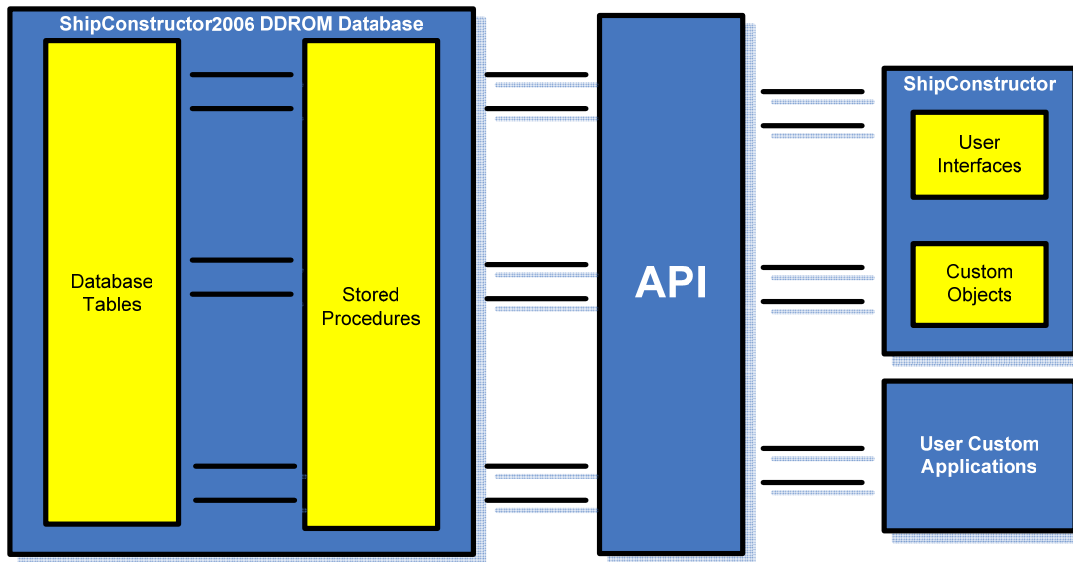


Automatic update several parts after hull trace change

Not Tasked – Bonus Features

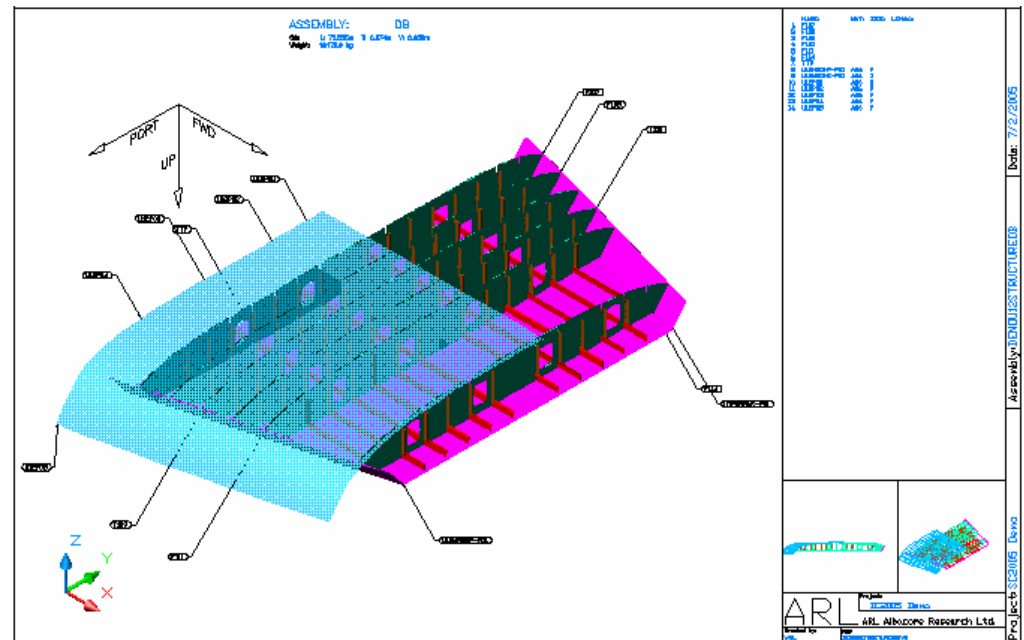
DB - API

- Creates stable interface with project DB
- Simplifies Integration for yards & 3rd party developers
- Provides safe data manipulation



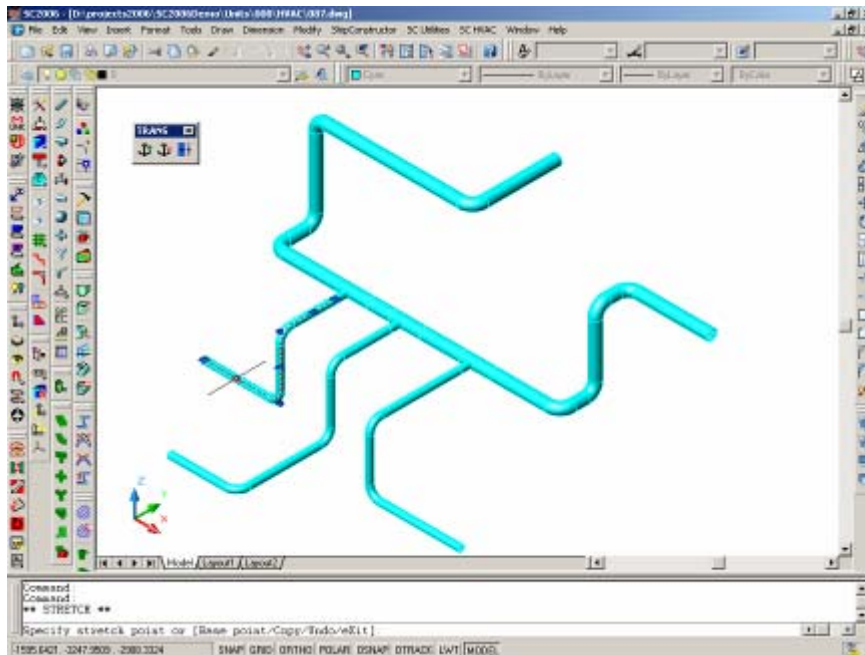
Production Drawings

- DDROM & General Transformation Solver
- Example: Rotate to production orientation



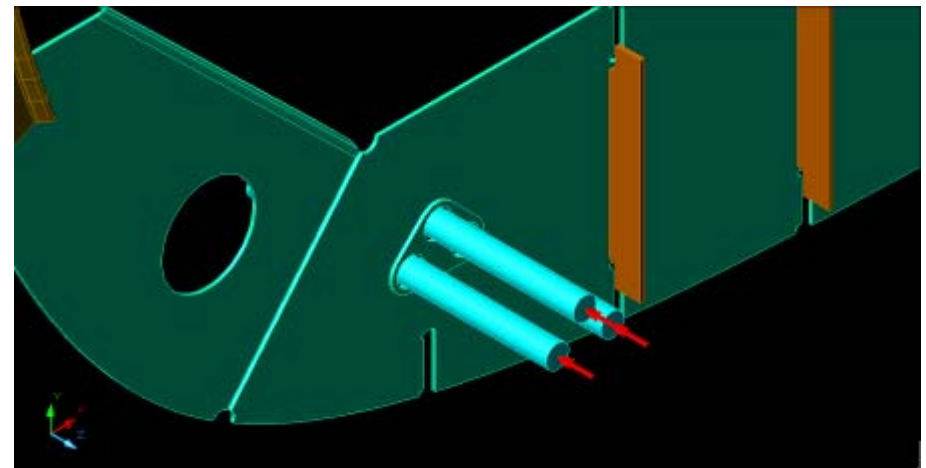
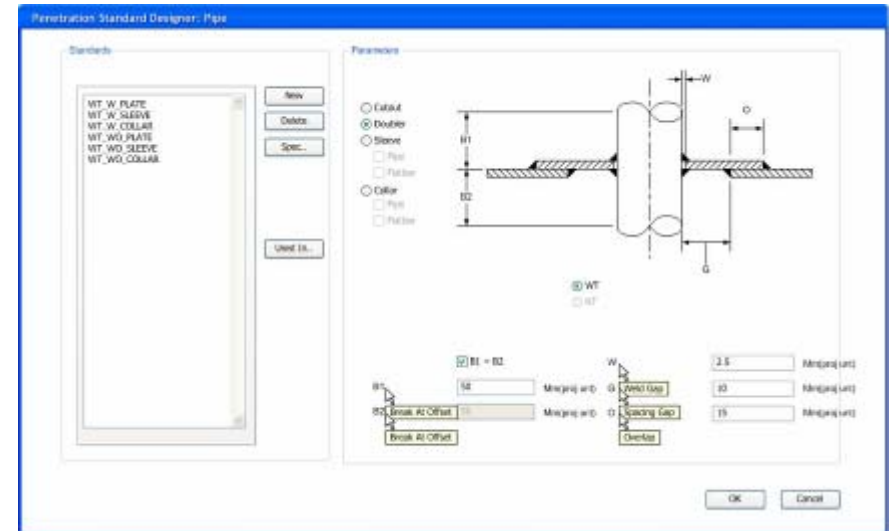
Linear Optimization Engine

- Complex Distributed systems transforms made easy
- Very predictable results through ‘intelligence’



DDRROM Penetrations

- Fully parametric
- Simpler definition (less information req.)
- Multiple penetrators for one penetration
- HVAC penetrations
- Prepared for Electrical
- DDRROM updates on structure or Pipe/HVAC change
- Doublers true structure -> nestable



Release in 3 Stages

05 Dec 16 - Stage 1

- New DB design
- Most CPC implemented
- DDROM
- All new functionality

06 Feb - Stage 2

- Version Update

06 May - Stage 3

- CPC integration complete
- Project Split & Merge
- Bonus - AutoCAD 2007 support

Project Split & Merge - May 06

- Reasons for staged release
 - Project Data structure complete and stable
 - Need test data
 - Only after version update
 - Test sites have produced 2006 data
- 06 Feb Stage 2 - Version Update
- 06 April Stage 3 - Beta1 – Split & Merge
- 06 May Stage 3 - Release

Release 1 Alpha – Beta Schedule

29 August	Alpha – Catalog editor
23 September	Beta 1 – Most modeling complete, some production output
28 October	Beta 2 – All modeling complete & production output
18 November	Beta 3 – Release candidate
16 December	Release

Thank You
Questions