Business Technologies and Ship Design & Material Technologies Joint Panel Meeting
Seattle, WA

Panel Project

Automated Label Plate Generation

NSRP Panel Project
(2019-483-005)

13 July 2023

Project Team

Lead:
ShipConstructor Software USA

Austal USA

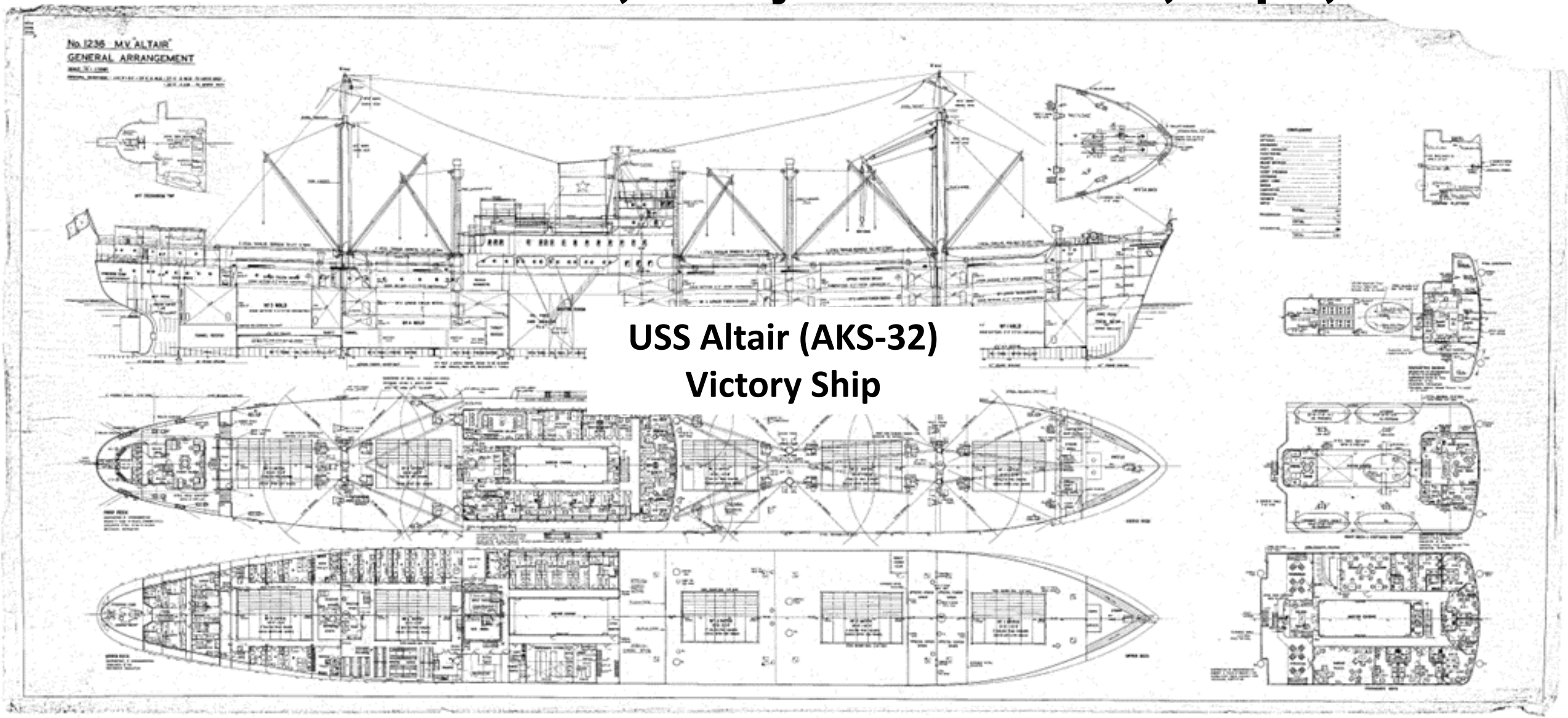
Conrad Shipyard

Fincantieri Marinette Marine

Bancroft Enterprises

Label Plates

(Label Plates, Name Plates, Placards) are throughout a vessel, in many different materials, shapes, and sizes



USS Altair (AKS-32)
Victory Ship

Problem

- The typical label plate is small in physical size; however, label plates are so often overlooked until the last throws of a project where all too often they are found to be wrong for a variety of reasons.
- Addressing label plates at the last minute usually entails expediating procurement and replacing existing with updated label plates.
- ROI varies with regards to the which hull in a class. The early hulls typically have significant label plate rework; however, the issue is present for all hulls.

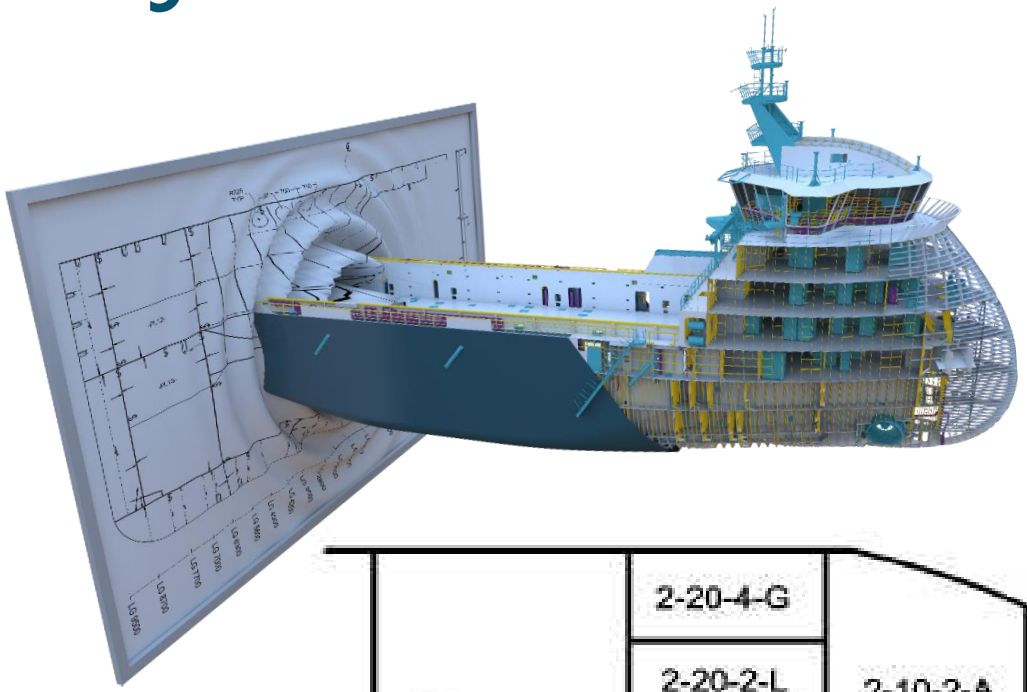
Label Plates are costly

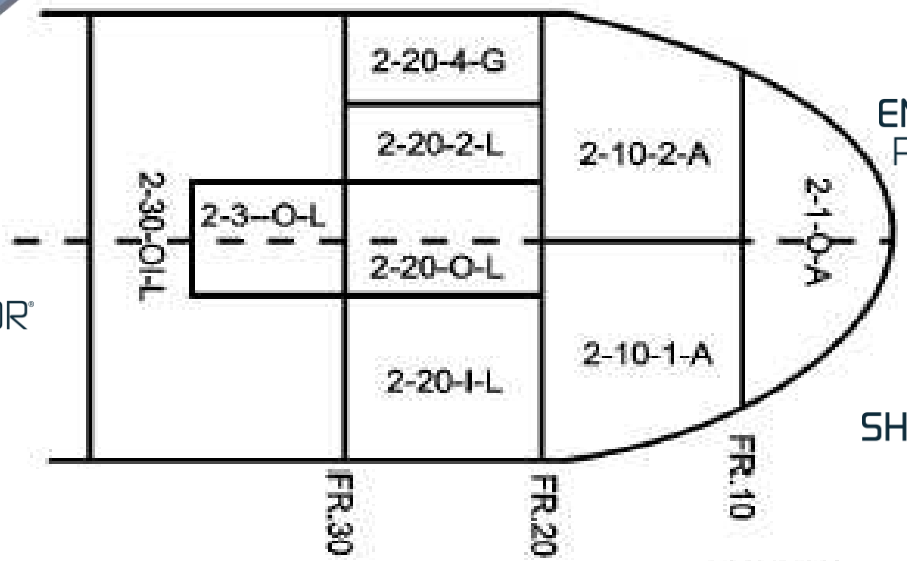
Project Goal

- Develop a process to reuse existing data already contained within the 3D design model for label plates

- This project will provide a process for passing digital data in a usable format label plate data directly to the supplier through purchasing, provide the label pate digital information to planning, QA, and production, and can be used to develop the Label Plate drawing

Project Overview





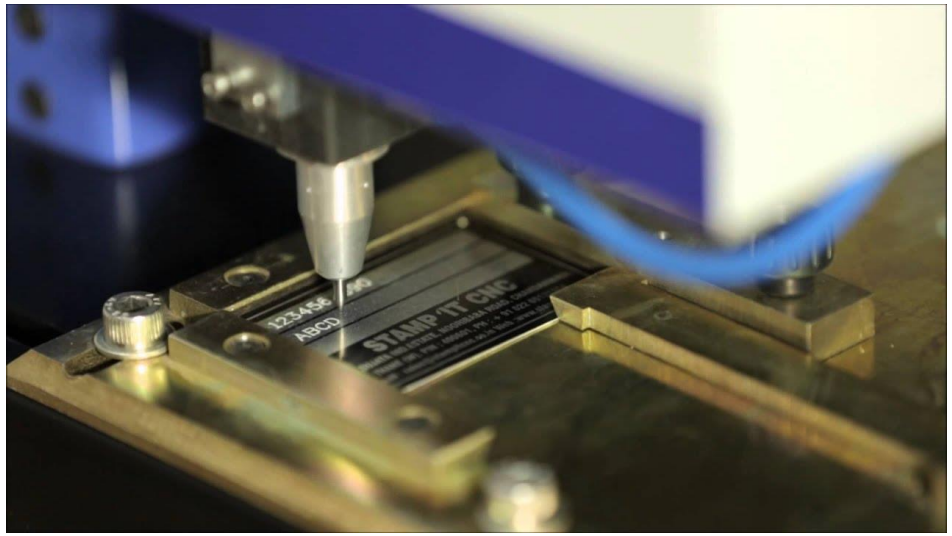
SHIP CONSTRUCTOR

ENTERPRISE PLATFORM

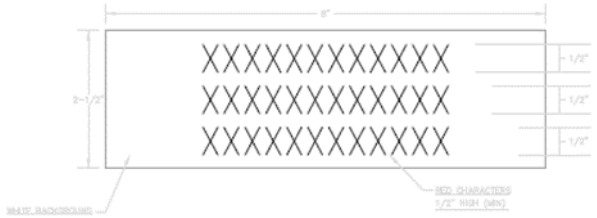
SHIPBUILDING PLM

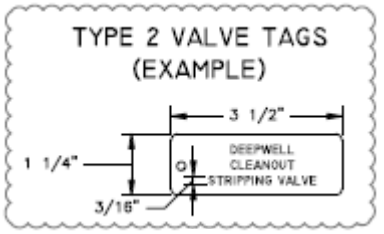
Reusing the digital data from the 3D Model to the Label Plate Manufacturer / Supplier

Dry Stores
2 – 10 – 1 – A

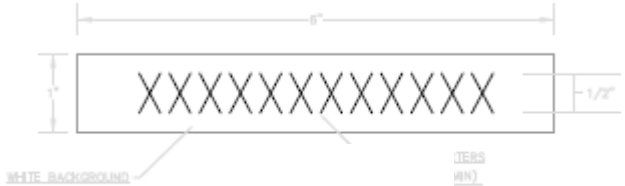


Label Plate Matrix





System / Department /	Government Pipe	Government Pipe	Government Pipe	Government Pipe	Government HVAC	Government HVAC	Government HULL	Government HULL	Government HULL	Government HULL	Government ELEC	Commercial ELECT	Commercial ELECT	Commercial PIPE	Commercial PIPE	Commercial PIPE	Commercial HULL	Commercial HULL	Commercial
Label Plate Type	Photo	Photo	Photolum	White Plastic	Photo	Photo	Decal (?)	Photo	Photo	Photolum	Photo	Phenolic	Phenolic	Phenolic	Phenolic	Phenolic	Phenolic	Phenolic	Phenolic
Material Type	CRES 316	AL	Photolum	White Plastic	CRES 613	AL	Decal (?)		SS	Photolum	AL	Phenolic	Phenolic	Phenolic	Phenolic	Phenolic	Phenolic	Phenolic	Phenolic
Label Plate Size	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS	VARIOUS
Color 1	STD	STD	STD	Black	STD	STD	Various	STD	STD	STD	STD	Black	Red	Black	Red	Red	Black	Red	
Color 2	STD	STD	STD	White	STD	STD	Various	STD	STD	STD	STD	White	White	White	White	White	White	White	
Size Row 1																			
Size Row 2																			
Size Row 3																			
Location	Pipe	Pipe	Pipe	Pipe	Duct	Duct	VARIOUS	VARIOUS	Exterior	VARIOUS	Equip	Equip	Equip	Equip	Equip	ip / Adjacent	VARIOUS	VARIOUS	
Attachment Method	Wire / Adhesive	Wire / Adhesive	Wire / Adhesive	Adhesive	Adhesive	Adhesive	Adhesive	Adhesive	Fasteners	Adhesive	Fasteners	Adhesive	Adhesive	Adhesive	Adhesive	Fasteners + Adhesive	Adhesive	Adhesive	Adhesive
Bar Code / QR Code / Unique Identifier	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

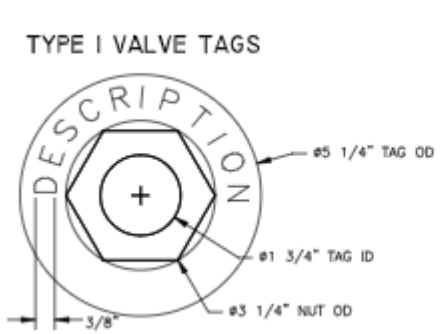


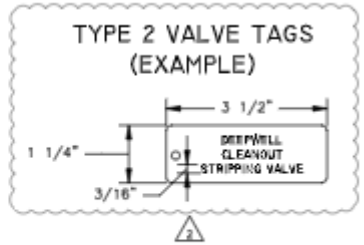
DETAIL 2–9

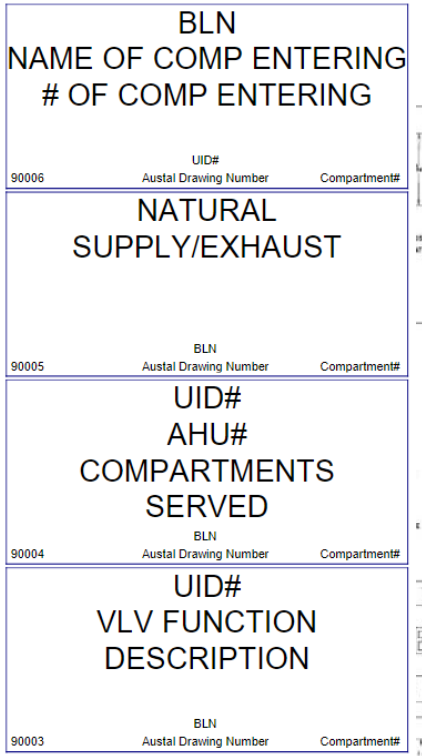
Basic Process

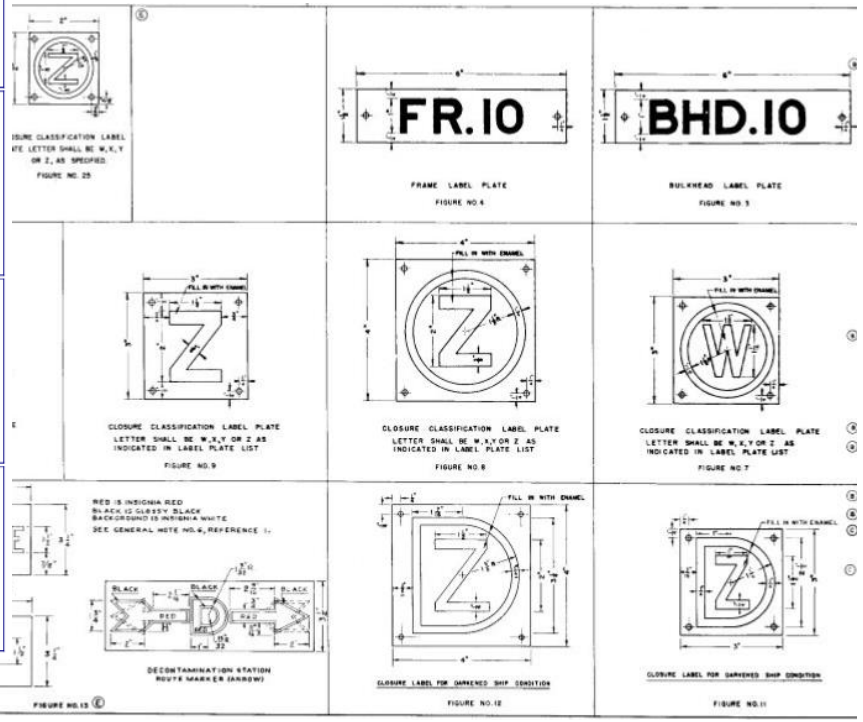
SHIP CONSTRUCTOR®

ENTERPRISE PLATFORM™









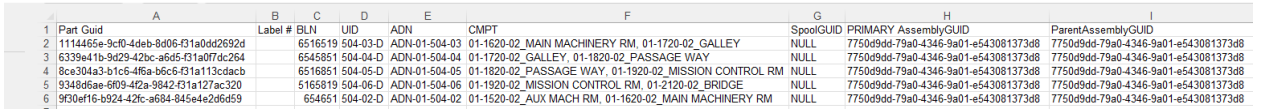
Target Use Cases

- Electrical Equipment Label Plates
- HVAC Label Plates
- Valve Label Plates
- Compartment Label Plates
- Doors / Hatches / Scuttles Label Plates

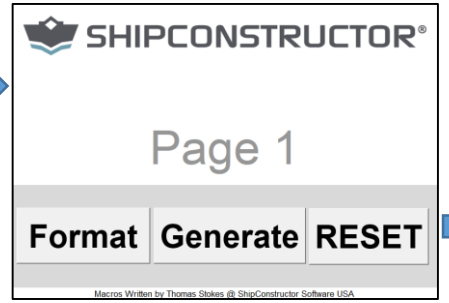
First Iteration: Compartment Labels

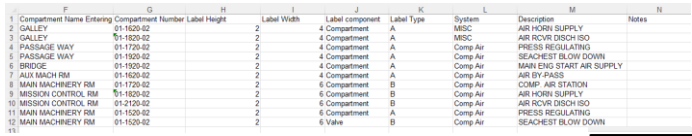
- Excel Export from PublisherLT
  - **Part GUID:** this is a ShipConstructor attribute used in finding a specific instance of any given part.
  - **Basic Locator Number:** this is a ShipConstructor User defined attribute.
  - **Compartment Name:** This is a ShipConstructor Attribute inherited from the Compartment Manager.
  - **UDA #1:** in the example we used this for Austal's Unique ID or "UID".
  - **UDA #2:** in the example we mapped this to "Austal Drawing Number" or "ADN".
  - **Label Component:** User Defined Attribute.
  - **Label Type:** User Defined Attribute.
  - **System:** Shipconstructor Attribute
  - **Description:**

- Visual Representation of the label to be photoetched on Aluminum or Stainless

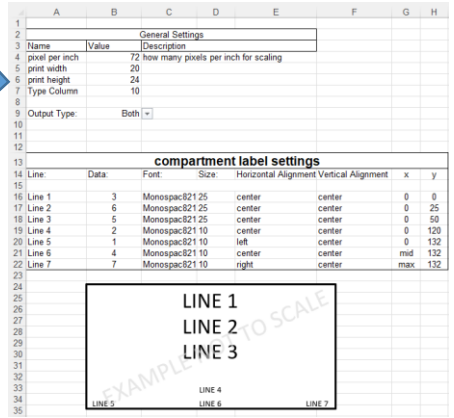


	A	B	C	D	E	F	G	H	I
1	Part Guid	Label #	BLN	UID	ADN	CMPT	SpoolGUID	PRIMARY AssemblyGUID	ParentAssemblyGUID
2	1114465e-9cf0-4deb-8d06-f31a0dd2692d		6516519	504-03-D	ADN-01-504-03	01-1620-02_MAIN MACHINERY RM, 01-1720-02_GALLEY	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8
3	6339e41b-9d29-42bc-a6d5-f31a0f7dc264		6545851	504-04-D	ADN-01-504-04	01-1720-02_GALLEY, 01-1820-02_PASSAGE WAY	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8
4	8ce304a3-b1c6-4f6a-b6c6-f31a113cdacb		6516851	504-05-D	ADN-01-504-05	01-1820-02_PASSAGE WAY, 01-1920-02_MISSION CONTROL RM	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8
5	9348d6ae-6f09-4f2a-9842-f31a127ac320		5165819	504-06-D	ADN-01-504-06	01-1920-02_MISSION CONTROL RM, 01-2120-02_BRIDGE	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8
6	9f30ef16-b924-42fc-a684-845e4e2d6d59		654651	504-02-D	ADN-01-504-02	01-1520-02_AUX MACH RM, 01-1620-02_MAIN MACHINERY RM	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8

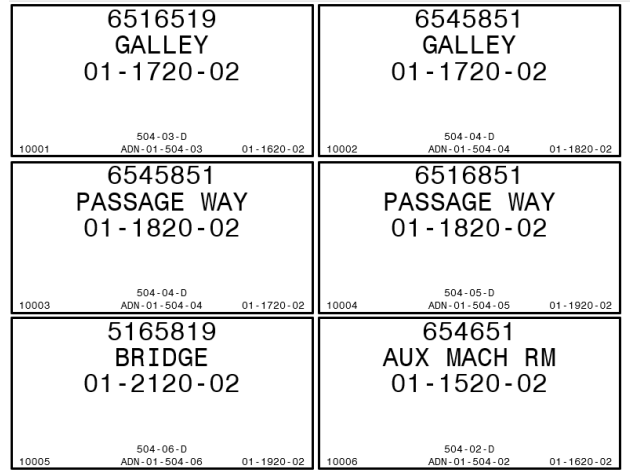




	F	G	H	I	J	K	L	M	N
1	Compartment Name Entering	Compartment Number	Label Height	Label Width	Label component	Label Type	System	Description	Notes
2	GALLEY	01-1620-02		2	4 Compartment	A	MISC	AIR HORN SUPPLY	
3	GALLEY	01-1820-02		2	4 Compartment	A	MISC	AIR RCVR DISCH ISO	
4	PASSAGE WAY	01-1720-02		2	4 Compartment	A	Comp Air	PRESS REGULATING	
5	PASSAGE WAY	01-1920-02		2	4 Compartment	A	Comp Air	SEACHEST BLOW DOWN	
6	BRIDGE	01-1920-02		2	4 Compartment	A	Comp Air	MAIN ENG START AIR SUPPLY	
7	AUX MACH RM	01-1620-02		2	4 Compartment	A	Comp Air	AIR BY-PASS	
8	MAIN MACHINERY RM	01-1720-02		2	6 Compartment	B	Comp Air	COMP. AIR STATION	
9	MISSION CONTROL RM	01-1820-02		2	6 Compartment	B	Comp Air	AIR HORN SUPPLY	
10	MISSION CONTROL RM	01-2120-02		2	6 Compartment	B	Comp Air	AIR RCVR DISCH ISO	
11	MAIN MACHINERY RM	01-1520-02		2	6 Compartment	A	Comp Air	PRESS REGULATING	
12	MAIN MACHINERY RM	01-1520-02		2	6 Valve	B	Comp Air	SEACHEST BLOW DOWN	



	A	B	C	D	E	F	G	H
1								
2			General Settings					
3	Name	Value	Description					
4	pixel per inch		72 how many pixels per inch for scaling					
5	print width		20					
6	print height		24					
7	Type Column		10					
8								
9	Output Type:		Both					
10								
11								
12								
13			compartment label settings					
14	Line:	Data:	Font:	Size:	Horizontal Alignment	Vertical Alignment	x	y
15								
16	Line 1	3	Monospac821	25	center	center	0	0
17	Line 2	6	Monospac821	25	center	center	0	25
18	Line 3	5	Monospac821	25	center	center	0	50
19	Line 4	2	Monospac821	10	center	center	0	120
20	Line 5	1	Monospac821	10	left	center	0	132
21	Line 6	4	Monospac821	10	center	center	mid	132
22	Line 7	7	Monospac821	10	right	center	max	132

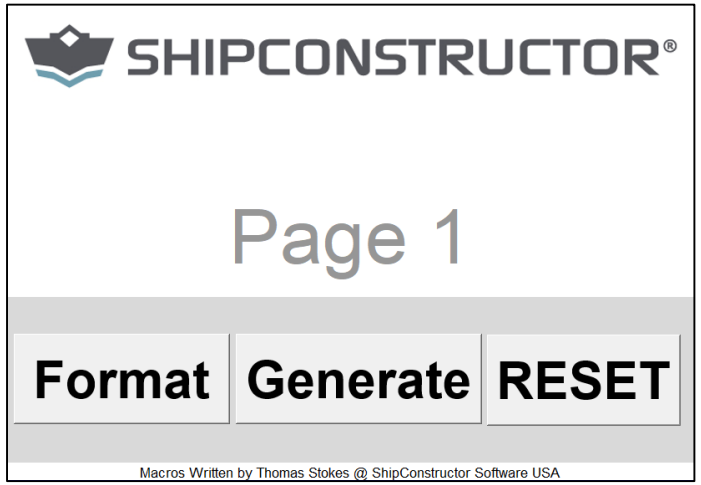


Second Iteration: Valve Labels

- Excel Export from PublisherLT
  - Raw Data

	A	B	C	D	E	F	G	H	I
1	Part Guid	Label #	BLN	UID	ADN	CMPT	SpoolGUID	PRIMARY AssemblyGUID	ParentAssemblyGUID
2	1114465e-9cf0-4deb-8d06-f31a0dd2692d		6516519	504-03-D	ADN-01-504-03	01-1620-02_MAIN MACHINERY RM, 01-1720-02_GALLEY	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8
3	6339e41b-9d29-42bc-a6d5-f31a0f7dc264		6545851	504-04-D	ADN-01-504-04	01-1720-02_GALLEY, 01-1820-02_PASSAGE WAY	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8
4	8ce304a3-b1c6-4f6a-b6c6-f31a113cdacb		6516851	504-05-D	ADN-01-504-05	01-1820-02_PASSAGE WAY, 01-1920-02_MISSION CONTROL RM	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8
5	9348d6ae-6f09-4f2a-9842-f31a127ac320		5165819	504-06-D	ADN-01-504-06	01-1920-02_MISSION CONTROL RM, 01-2120-02_BRIDGE	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8
6	9f30ef16-b924-42fc-a684-845e4e2d6d59		654651	504-02-D	ADN-01-504-02	01-1520-02_AUX MACH RM, 01-1620-02_MAIN MACHINERY RM	NULL	7750d9dd-79a0-4346-9a01-e543081373d8	7750d9dd-79a0-4346-9a01-e543081373d8

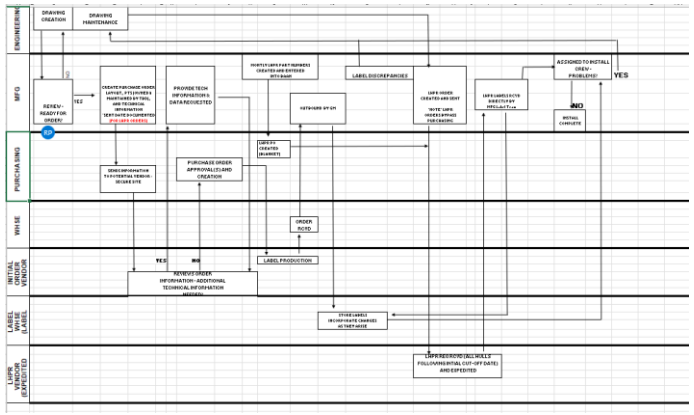
  - Formatted by Label Type



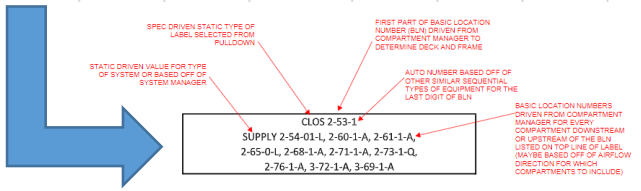
44				
45	**Comp Air**			
46	Qty	Type	Description	Notes
47	1	A	AIR BY-PASS	
48	1	B	AIR HORN SUPPLY	
49	1	B	AIR RCVR DISCH ISO	
50	1	B	COMP. AIR STATION	
51	1	A	MAIN ENG START AIR SUPPLY	
52	2	A	PRESS REGULATING	
53	1	A	SEACHEST BLOW DOWN	
54	1	B	SEACHEST BLOW DOWN	
55				
56	**MISC**			
57	Qty	Type	Description	Notes
58	1	A	AIR HORN SUPPLY	
59	1	A	AIR RCVR DISCH ISO	
60				

Third Iteration: Equipment Labels

- Much broader data requirements
  - Entire spreadsheet to manage the overall process
  - Complicated data needs including service areas



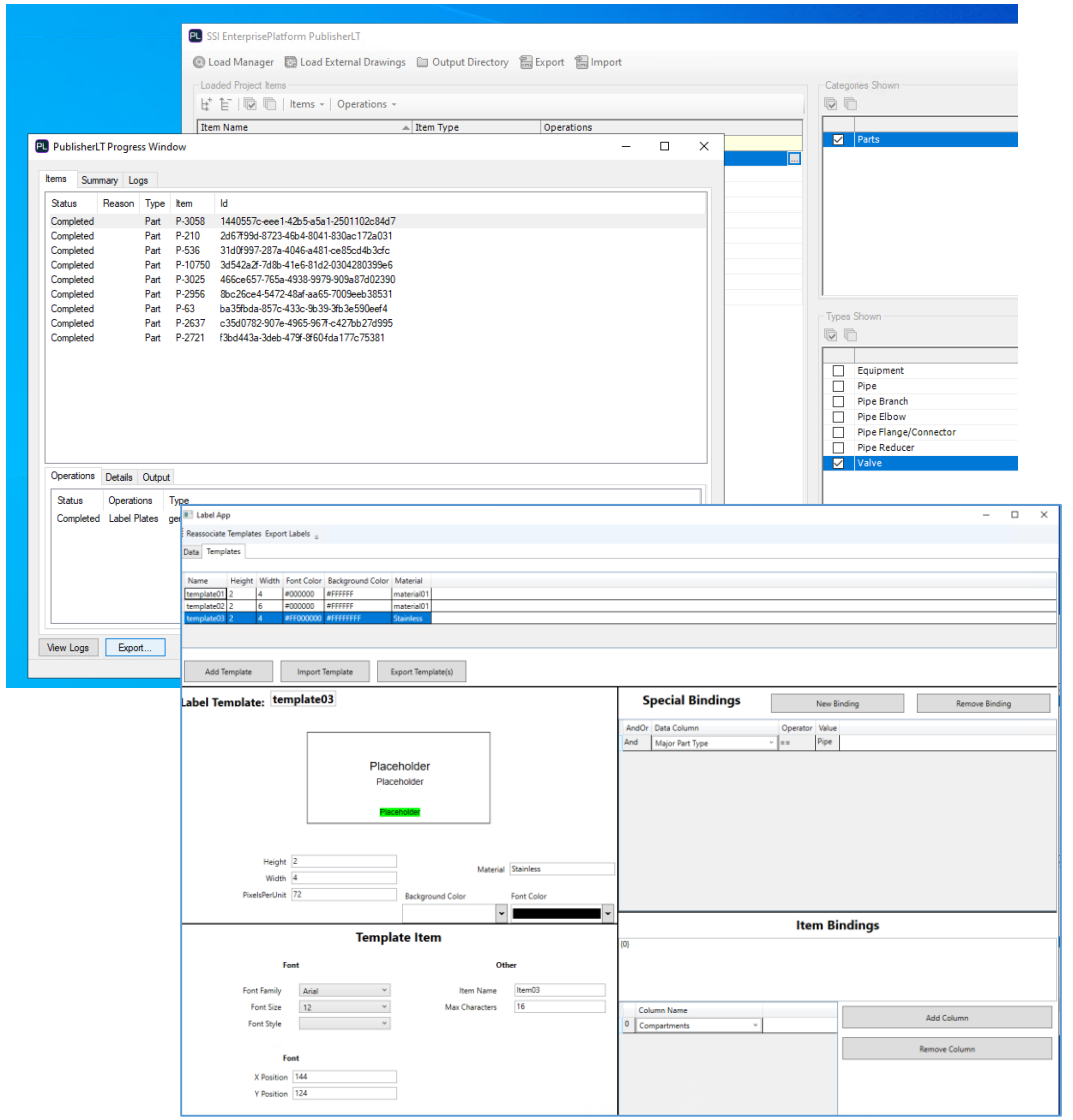
DEPT	DATE	AUTHORITY	REV	LABEL NUMBER	GRAND MODULE	COMPARTMENT	COMPARTMENT TITLE	SYS/REF	EQUIPMENT	ATTACH METHOD	INSCRIPTION	DC CLASS	SIZE CODE	MATERIAL CODE	NOTES	CHANGE	HOLES	NAVY ID	HULL APPLICABILTY
Item type	Y	Y		auto number	PH rank	Cmpt number	name	SWBS	item type	item type	BLN, Service Areas		Calc	item type				UID	



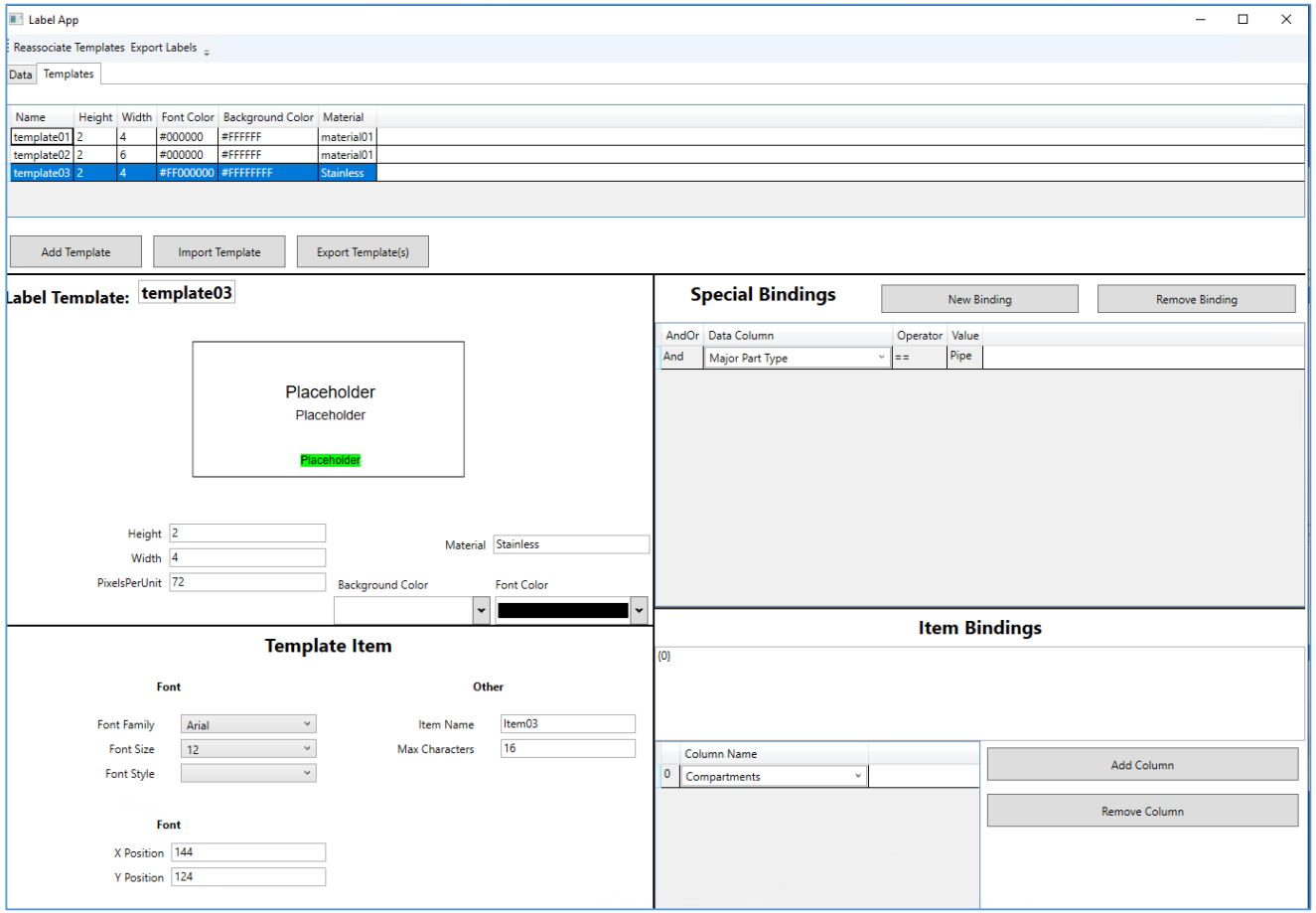
Excel wasn't going to get there, we need an app

Project Progress

- SSI evaluated the information that could be exported to provide the label plate contents
- Additional fields will require UDAs added to the model
- EngineeringUSA was contracted to assist in the development of custom application to streamline label plate generation
  - SSI found that the variety of use cases and labels required a custom solution
- EngineeringUSA delivered proof of concept application to SSI for evaluation and review
- SSI hosted Workshop for project participants to review, test, and comment at Fincantieri Marinette Marine on 25 May 2023

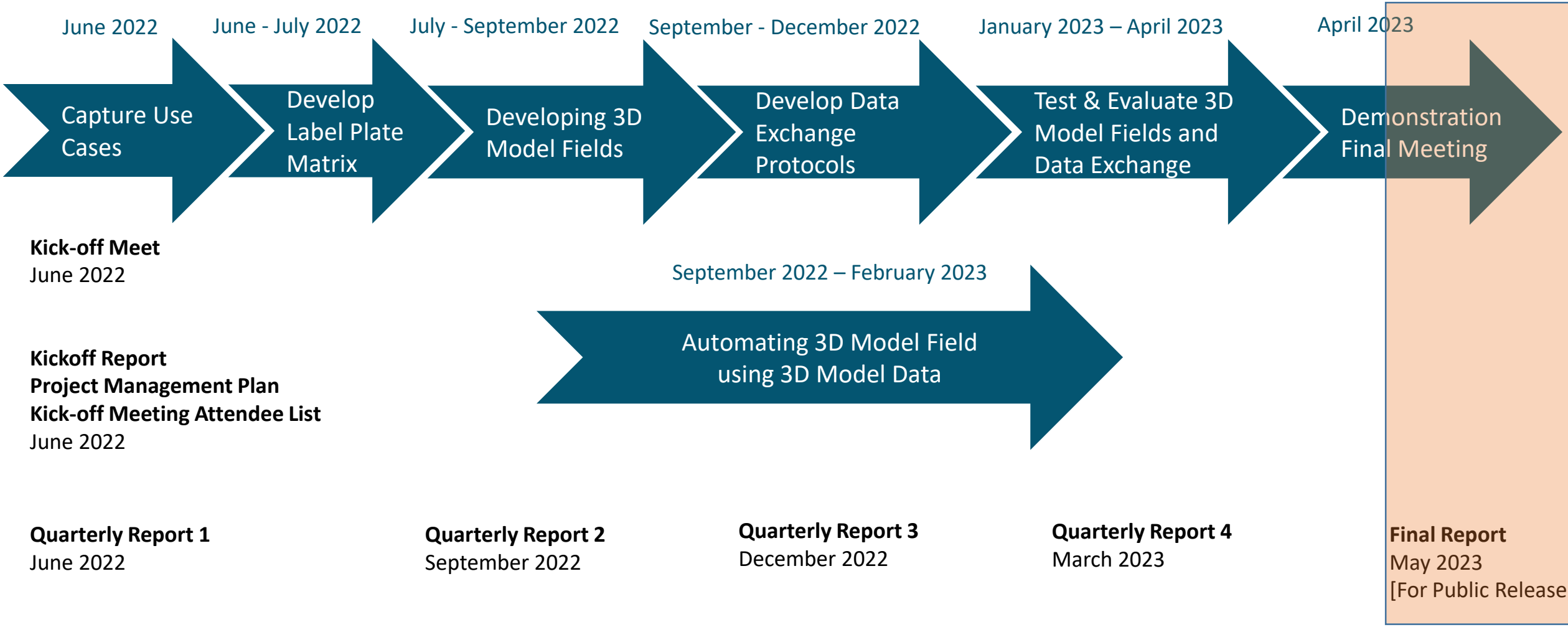


Mockup of Label Plate Application



Project Timeline

Bi-Weekly Team Meetings



Kick-off Meet
June 2022

Kickoff Report
Project Management Plan
Kick-off Meeting Attendee List
June 2022

Quarterly Report 1
June 2022

Quarterly Report 2
September 2022

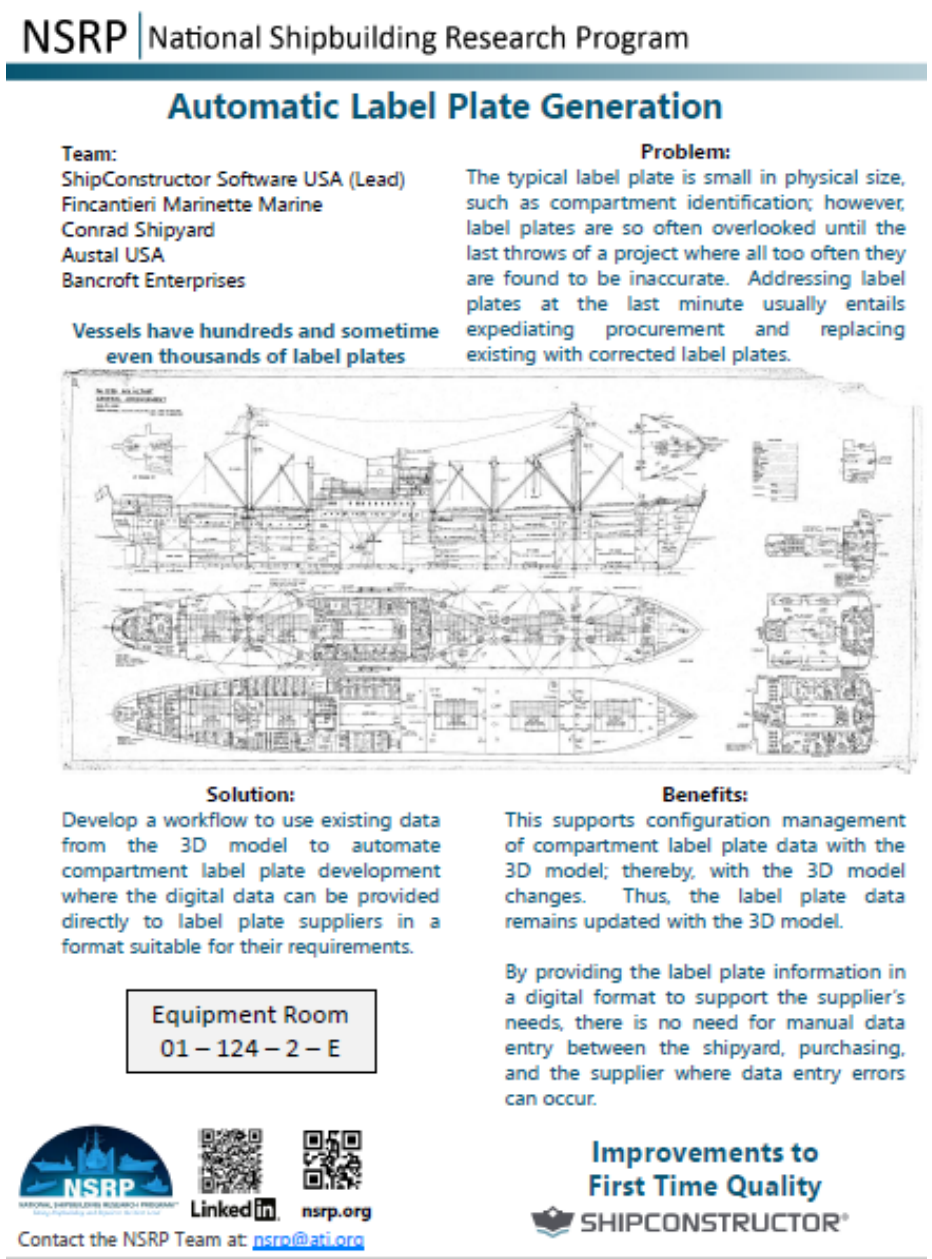
Quarterly Report 3
December 2022

Quarterly Report 4
March 2023

Final Report
May 2023
[For Public Release]

Technology Transfer Events

- ✓ Sea-Air-Space 2022 – April 4 – 6, 2022
- ✓ SDMT & BT Joint Panel Meeting – September 1, 2022
- ✓ SSI World Shipbuilding Conference – 4-6 October 2022
- ✓ NSRP All Panel Meeting – March 2023
- **SDMT & BT Joint Panel Meeting – July 13, 2023**



NSRP | National Shipbuilding Research Program

Automatic Label Plate Generation

Team:
ShipConstructor Software USA (Lead)
Fincantieri Marinette Marine
Conrad Shipyard
Austal USA
Bancroft Enterprises

Problem:
The typical label plate is small in physical size, such as compartment identification; however, label plates are so often overlooked until the last throws of a project where all too often they are found to be inaccurate. Addressing label plates at the last minute usually entails expediating procurement and replacing existing with corrected label plates.

Vessels have hundreds and sometime even thousands of label plates

Solution:
Develop a workflow to use existing data from the 3D model to automate compartment label plate development where the digital data can be provided directly to label plate suppliers in a format suitable for their requirements.

Benefits:
This supports configuration management of compartment label plate data with the 3D model; thereby, with the 3D model changes. Thus, the label plate data remains updated with the 3D model.

By providing the label plate information in a digital format to support the supplier's needs, there is no need for manual data entry between the shipyard, purchasing, and the supplier where data entry errors can occur.

Equipment Room
01 – 124 – 2 – E

nsrp.org

Contact the NSRP Team at: nsrp@ati.org

Improvements to First Time Quality
SHIPCONSTRUCTOR