



Todd Lean Ship Repair Lean Approach to Engineering and Production Processes



Eliminate Waste



Safety & Quality ♦ Cost ♦ Cycle Time ♦ Customer Service

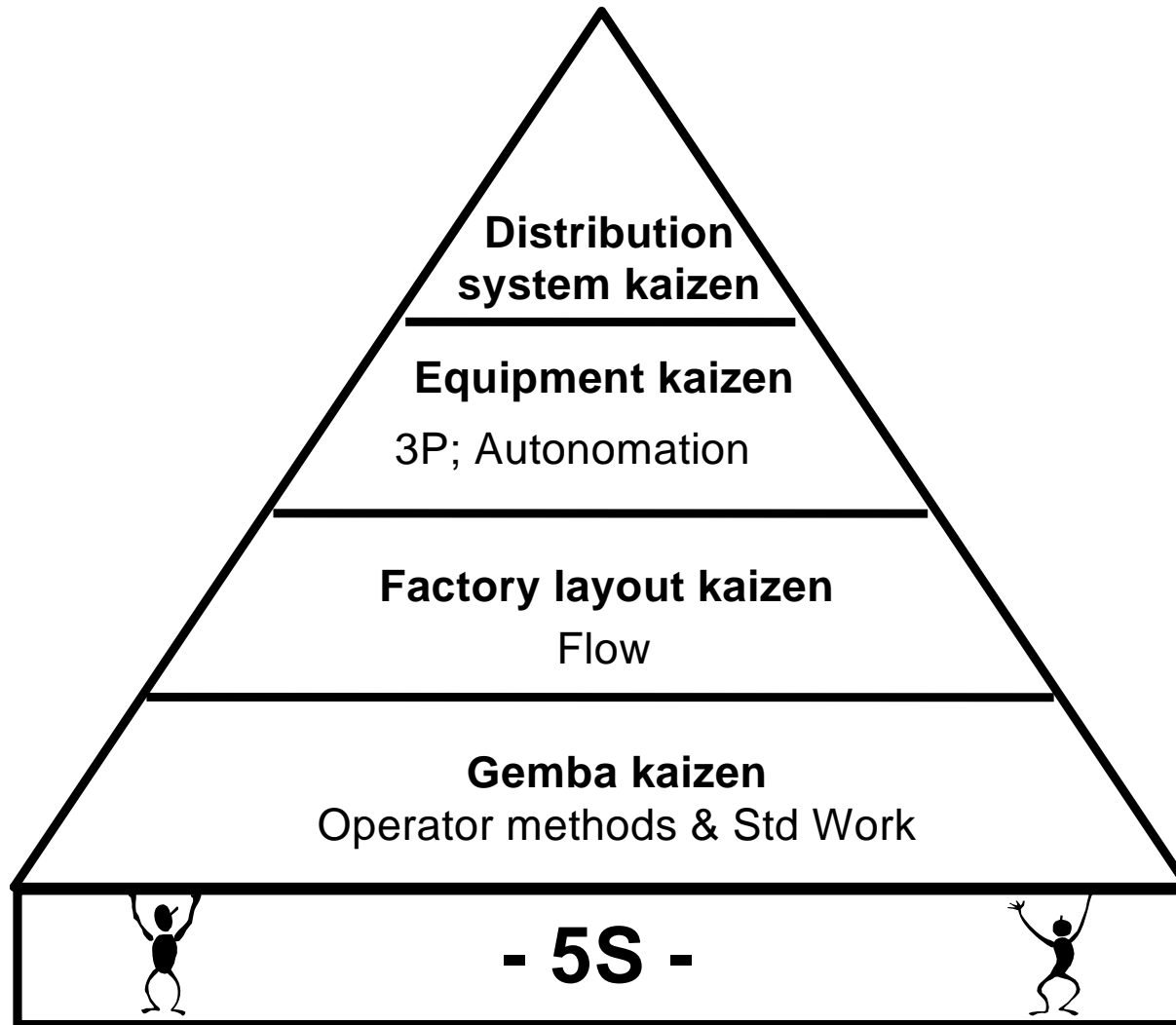


History of Lean @ Todd

Fiscal Year	# Events	Focus Area
2000	6	5S pilots (projection to ship)
2001	12	MMD Pilot, Manufacturing and Repair Shops 5S, Training, CPIs
2002 May)	30	Value Stream Mapping, Hoshin Planning, Japan Ship Repair Benchmarking, SUPSHIP joint events
2003	30	Value Stream Mapping, Shop Metrics, Standard Service Module pilots, Hoshin Initiatives support, 5S sustainment
2004	11	VSM On board value streams, 3P, On board metrics collection, “held for” notification, model line estimate evaluations, Organization changes
2005-to date	6	Polar Star Value Stream deployment with Shingijutsu oversight. Further standardizing key product/processes-SSM, Refinement of key manufacturing areas – SM, Valves



Lean Manufacturing Kaizen Sequence





Our Lean Ship Repair Goals

To Win More Work From Our Competitors

Use a Lean Approach to a More Efficient Work Product

What are the Lean Goals?

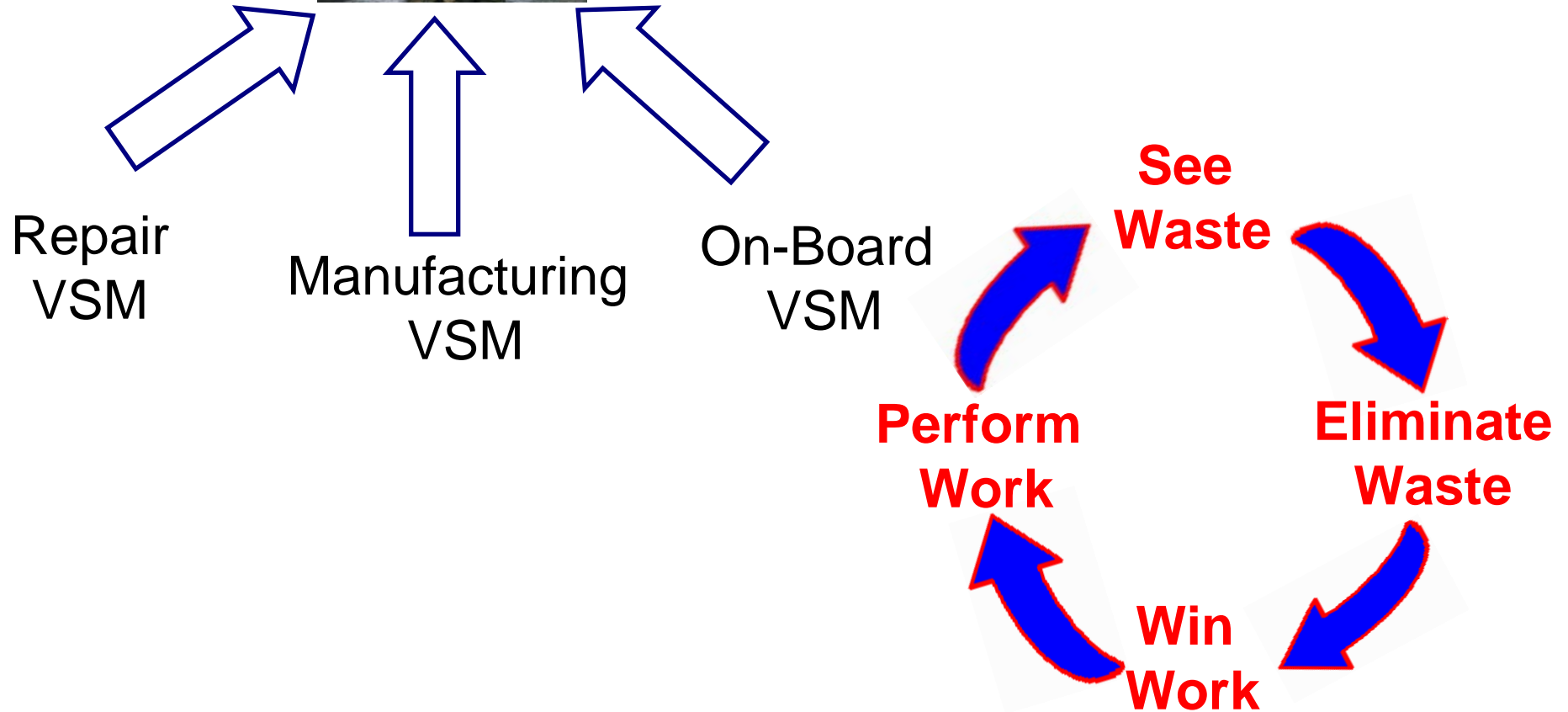
1. Make Work & Time Visible
2. Constantly Reduce Time
3. Align Initiatives to Achieve the Goals



For Production Management, Cycle time is the currency, not cost!

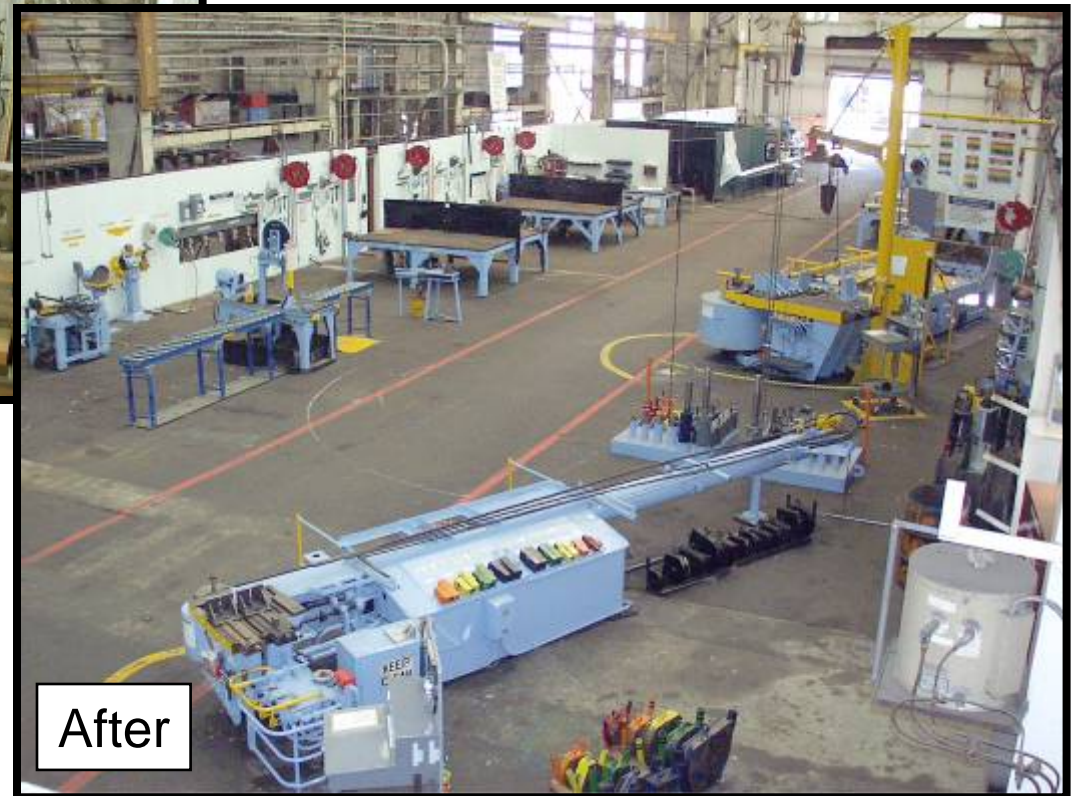


Todd Lean Ship Repair





Manufacturing 5S Example



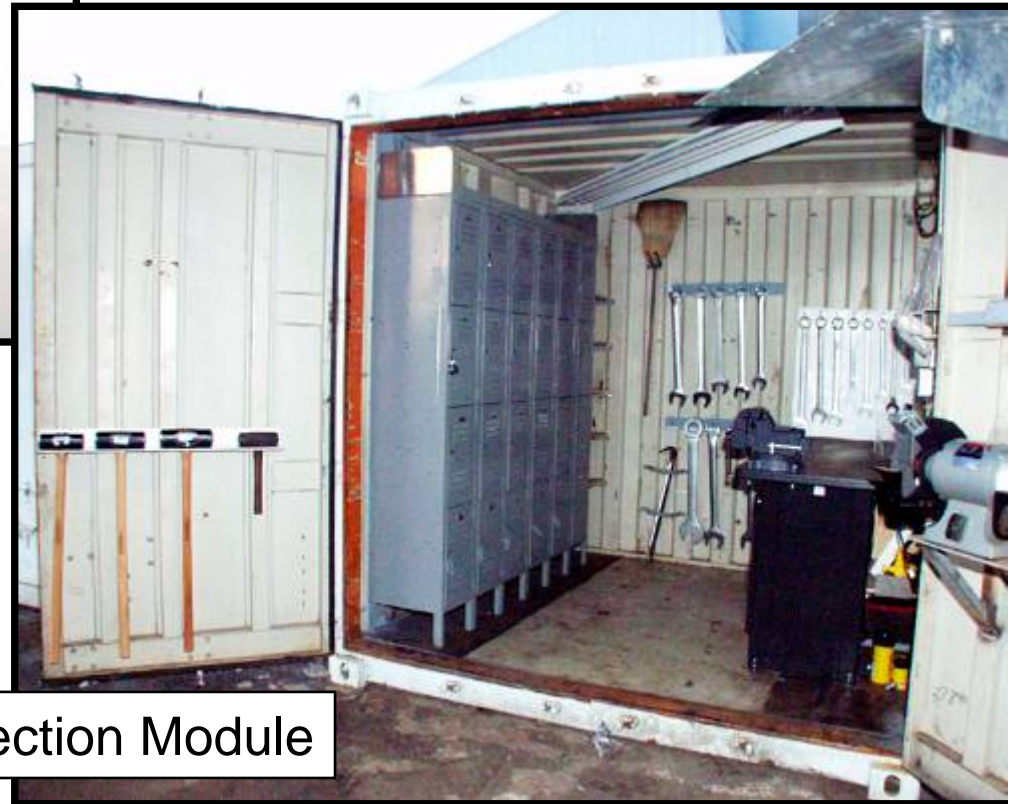
Safety & Quality ♦ Cost ♦ Cycle Time ♦ Customer Service



On Board 5S Example



Old Style "Tool Kits"

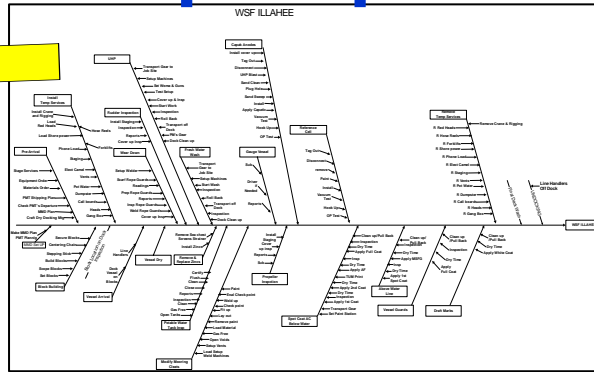
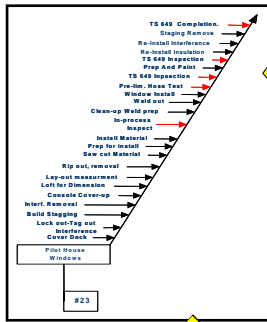


Projection Module

Safety & Quality ♦ Cost ♦ Cycle Time ♦ Customer Service

Lean Ship Repair Framework

Select Value Streams for data analysis



Project team comes together to understand SOW

Order No.	Part	Part Description	Quantity	Unit	Order Date	Order Status
101	1010	Capacitor	1	EA	09/10/2004	PLANNED
102	1020	Capacitor	1	EA	09/10/2004	PLANNED
103	1030	Capacitor	1	EA	09/10/2004	PLANNED
104	1040	Capacitor	1	EA	09/10/2004	PLANNED
105	1050	Capacitor	1	EA	09/10/2004	PLANNED
106	1060	Capacitor	1	EA	09/10/2004	PLANNED
107	1070	Capacitor	1	EA	09/10/2004	PLANNED
108	1080	Capacitor	1	EA	09/10/2004	PLANNED
109	1090	Capacitor	1	EA	09/10/2004	PLANNED
110	1100	Capacitor	1	EA	09/10/2004	PLANNED
111	1110	Capacitor	1	EA	09/10/2004	PLANNED
112	1120	Capacitor	1	EA	09/10/2004	PLANNED
113	1130	Capacitor	1	EA	09/10/2004	PLANNED
114	1140	Capacitor	1	EA	09/10/2004	PLANNED
115	1150	Capacitor	1	EA	09/10/2004	PLANNED
116	1160	Capacitor	1	EA	09/10/2004	PLANNED
117	1170	Capacitor	1	EA	09/10/2004	PLANNED
118	1180	Capacitor	1	EA	09/10/2004	PLANNED
119	1190	Capacitor	1	EA	09/10/2004	PLANNED
120	1200	Capacitor	1	EA	09/10/2004	PLANNED

Create work using templates

Create fishbone scheduling

Feedback to Estimating/Project Team/Craft

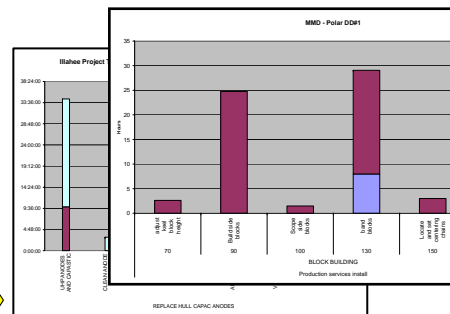
Create bar coded routers

Mechanics use wireless PC to collect process and held for time



Plant Meeting Today 18:30
Target 1550 ED17883
Actual 1289 EFF 8

Develop or update Standard Service Module

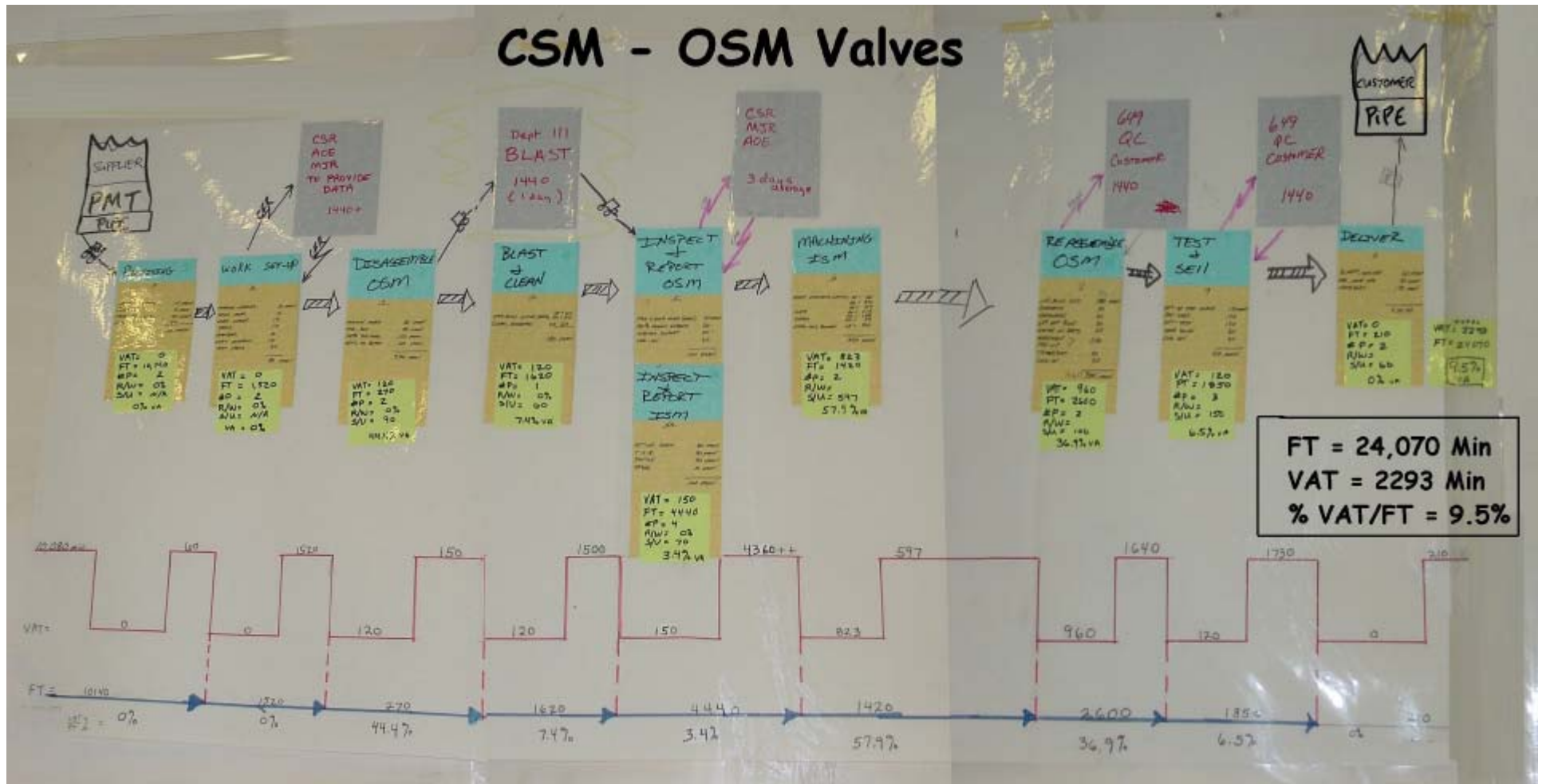


Reports generated for opportunity identification

Based on the DATA apply CTR, 3P or other lean tools to remove waste



Value Stream Map Major Product Families



Safety & Quality ♦ Cost ♦ Cycle Time ♦ Customer Service

Stabilize Our Processes – The Standard Service Module (SSM) Concept

- Document and measure standard processes that are repeatable or have inherent risk (\$) associated with them.
- To date we have created 60 SSM's.

SSM 132-01
FLOW 200/600 hr maintenance training module

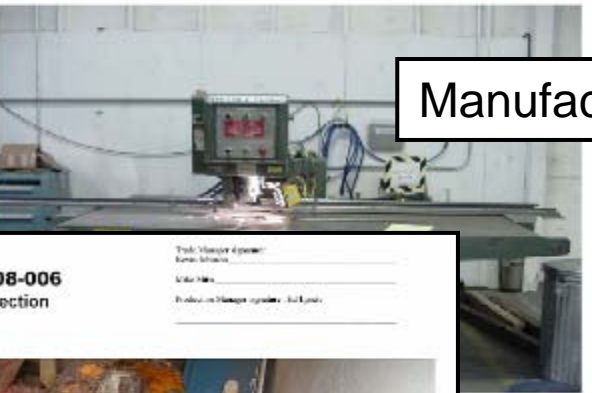
Trade Manager signature: _____
Production Manager signature: _____



Maintenance

SSM 133-103-008
SAFE OPERATION OF THE WHITNEY PUNCH


Production Manager signature: _____
Trade Manager signature: _____



Manufacturing

Customer Name	Job No.	Date	Service Type	Location
Sturgeon Service Module (SSM)	132-01	01/07/08	Flow Maintenance	Flow 200/600
Customer Name	Job No.	Date	Service Type	Location
Polar Class Re-installation of Hayward Strainers	A	02/27/05	Valve Repair	Flow 200/600
Department	Production	Trade Manager	Supervisor	Customer Name
Circoid Group	Mike Mills	Ed Lynch	Supervisor	Customer Name

Re-installation of Polar Class Hayward Sea Strainers



On board

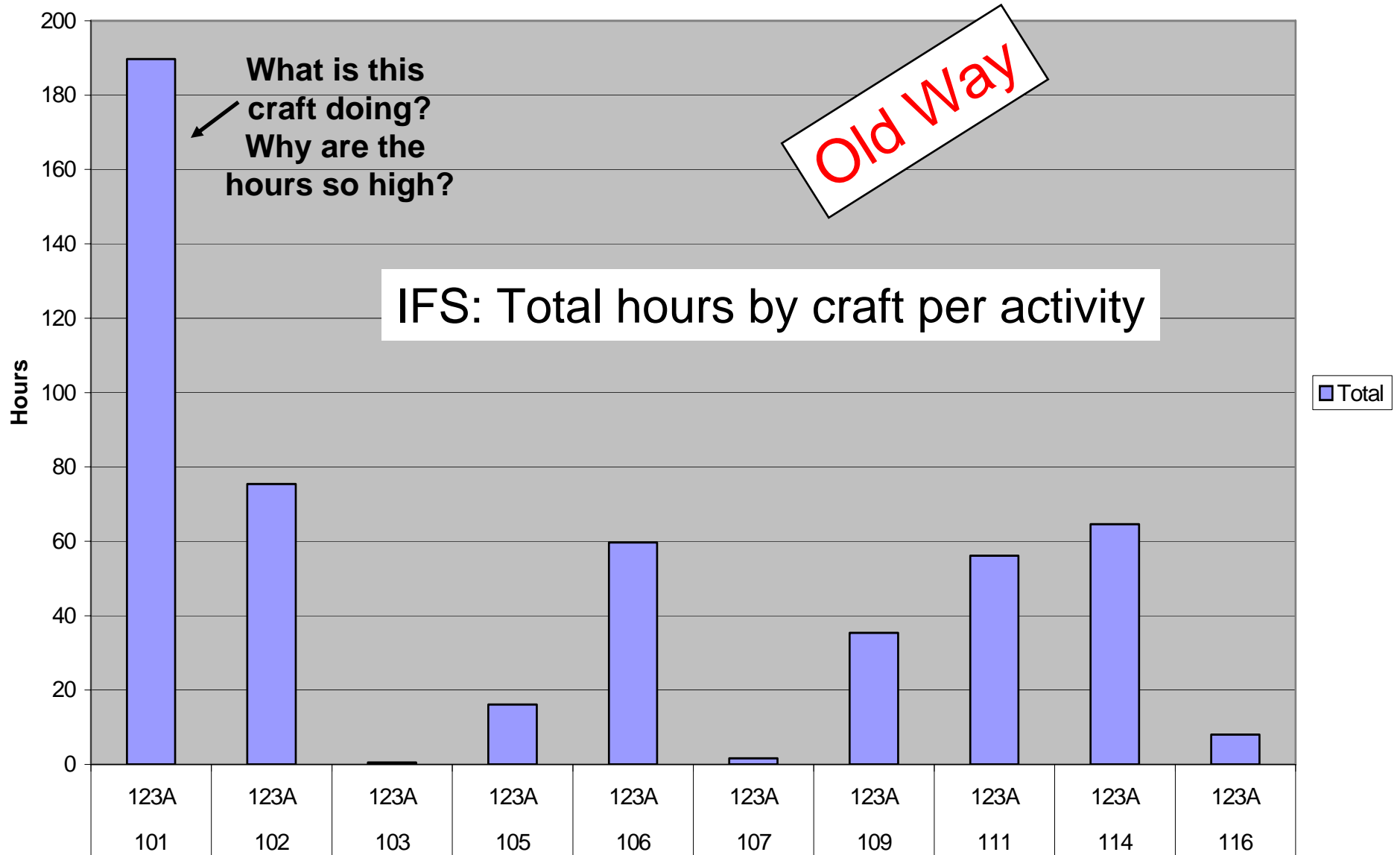
SSM 131-08-006
Valve Repair and Inspection Onboard Sioux

Trade Manager signature: _____
Production Manager signature: _____



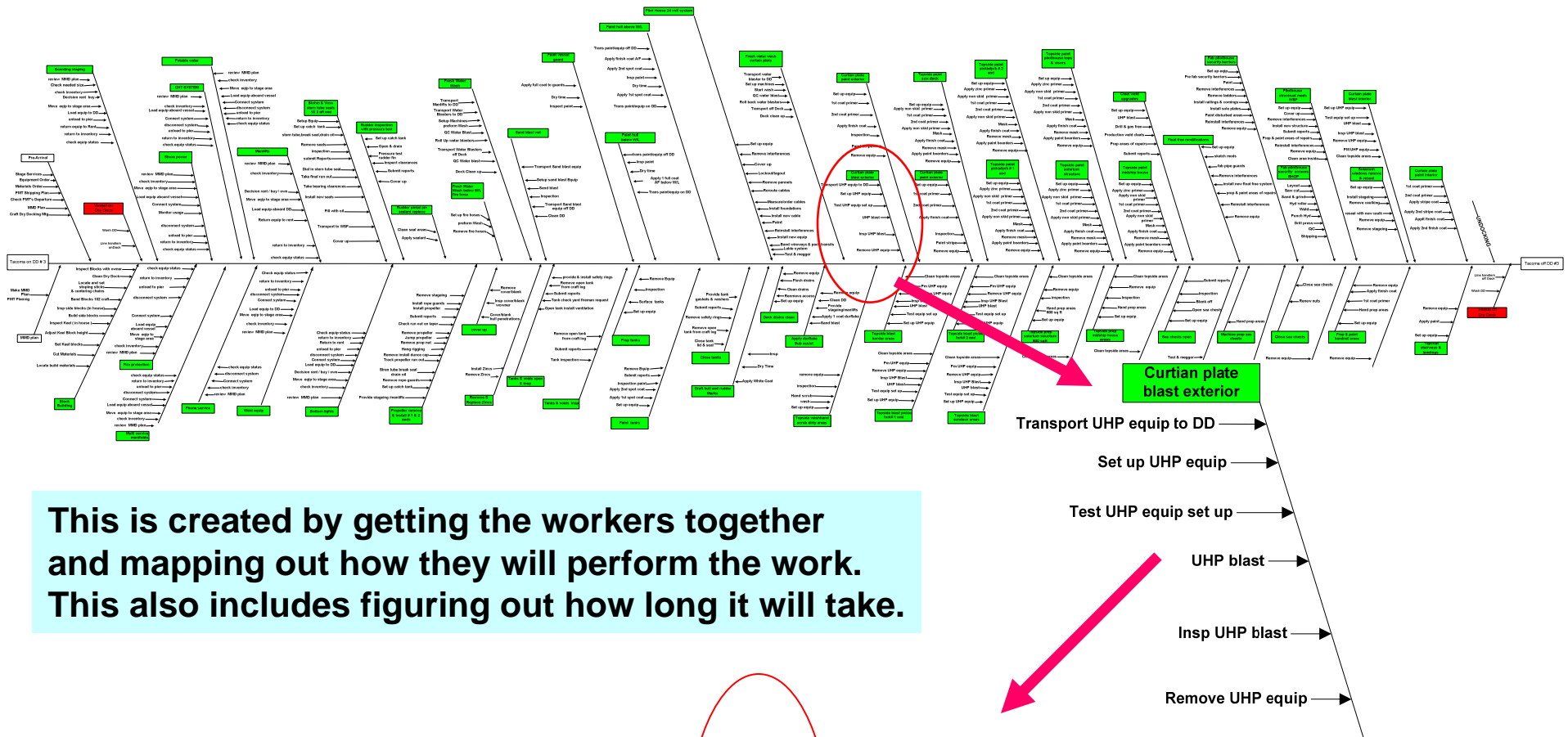
On board

Total IFS Hours for
Pilot House Window Modifications
Start of Project to 5/24/04





Lean Ship Repair Process Measurement



This is created by getting the workers together and mapping out how they will perform the work. This also includes figuring out how long it will take.

Operation No	Work Center No	Work Center Description	Estimated Process Time (Hrs)	Date Created	User Created	Date Modified	User Modified
10	4004	TRANSPORT UHP EQUIP ON DD	2	11/01/2004	MEARLES	11/01/2004	MEARLES
20	4005	SETUP UHP EQUIP	16	11/15/2004	MEARLES	11/15/2004	MEARLES
30	4006	TEST EQUIP SET UP	2	11/01/2004	MEARLES	11/01/2004	MEARLES
40	4007	UHP BLAST	64	11/01/2004	MEARLES	11/01/2004	MEARLES
50	4008	INSP UHP BLAST	1	11/01/2004	MEARLES	11/01/2004	MEARLES
60	4009	REMOVE UHP EQUIP	8	11/01/2004	MEARLES	11/01/2004	MEARLES

Safety & Quality ♦ Cost ♦ Cycle Time ♦ Customer Service



How We Collect Process Data

The fishbone is converted into a manufacturing plan, the real time process information is collected via the hand held scanner and uploaded to a server for analysis.



Todd Pacific Shipyards
ROUTER 897

Print Date: 4/13/05
Print Time: 9:49:27AM
Page 1 of 2

Rev 1

Router Information	Due Date: 3/1/05
Routing Template 173 - PIPE FABRICATE AS PER SAMPLE	Drawing Zn #1 Pallet #2
Routing Family: Fab pipe per sample	Project A6106 -STENNIS FY 05 DPLA
Process Type: Fab ppe per sample	Activity 51101 -Spce Strm Piping (Partial); replace

Router Note

ZONE #1 PALLET #2

Fab spools per sample. Use 90/10 cu-ni Cl 300 tubing w/weld cu-ni fittings.

Total spools= 20

Page # 1 THRU 20

Total Footage:	3 1/2"= 52'	3"= 13'	2 1/2"= 44'	2"= 14'	1 1/2"= 10'	1"= 27'
No. of Bends:	3 1/2"= 12	3"= 4	2 1/2"= 11	2"= 4	1 1/2"= 1	1"= 7
No. Welded Joints:	3 1/2"= 5	3"= 1	2 1/2"= 2	2"= 1	1"= 4	
No. Cuts:	3 1/2"= 8	3"= 1	2 1/2"= 7	2"= 1	1 1/2"= 1	1"= 5

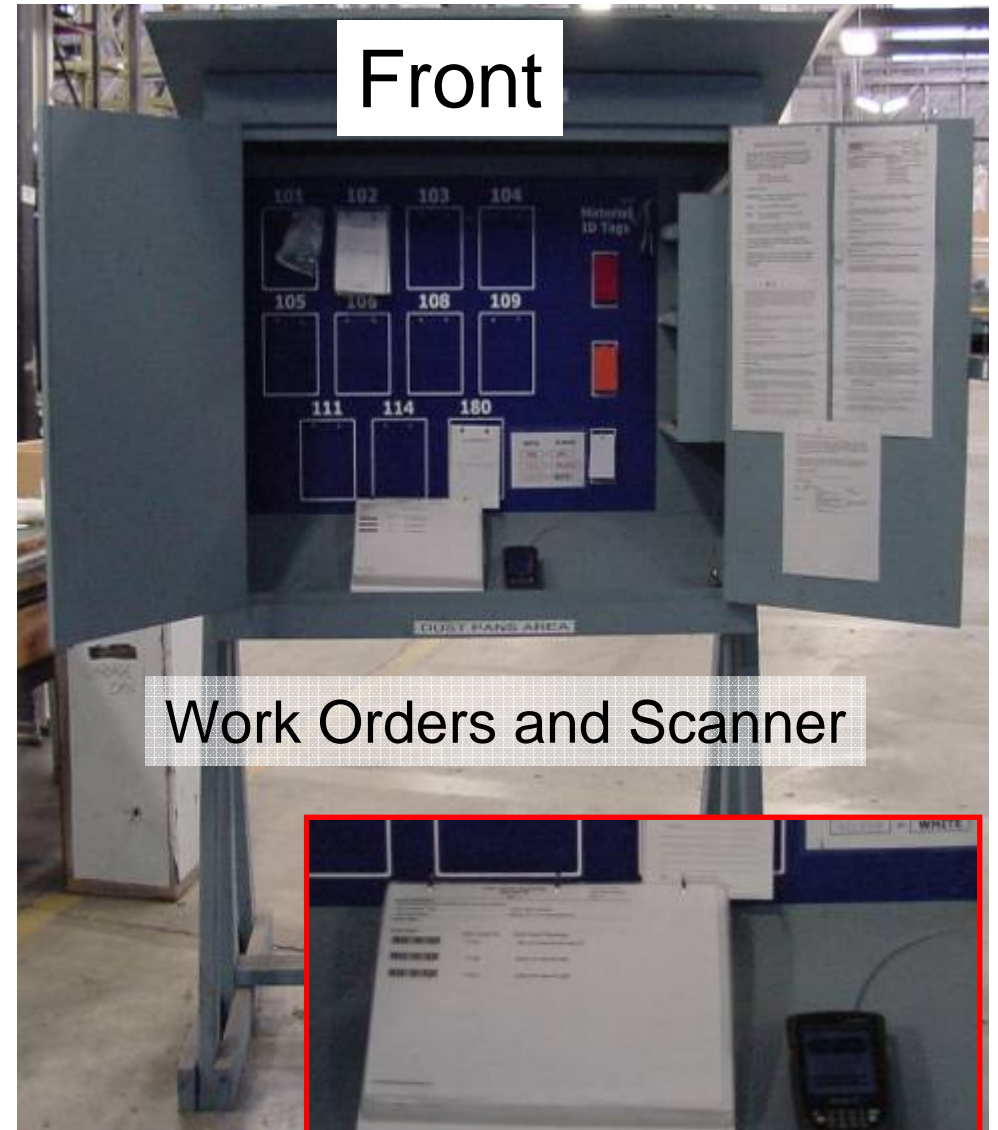
Router Detail

Barcode	Work Center No	Work Center Description
	10300	START Activate Router
	8033	SKETCH SPOOLS Measure, id mat, make sketch
	8034	DETAIL SPOOLS Add bend, fitting, & cut info
	8035	COLLECT SPOOL INFO. Pipe footage, no. of bends & joints
	8036	CUT PIPE COLLECT MATERIAL Sawcut pipe, get fittings
	8037	SET-UP BENDER Fasten die, shoes & bullets
	8038	BEND PIPE Clamp, bend, & check to sketch

C:\FS2003\Runtime\reports\R001.rpt



Call Board Layout



Cycle Time





Links Windows Yahoo! Google Kellysearch Comcast BECU NASDAQ DJI INSP ETRADE InfoSpace Scirus Todd VIP

Address http://toddisa/lca/leananalysis.aspx Go

From Date 5/20/2004 12:00 AM

To Date 5/20/2004 11:59 PM

Family All

Department All

Project All

Activity All

Drawing All

Piece All

Operation

Only Tasks On Hold All Records Only Rework No Rework

Get Results Export To Excel

Delete Selected Task

Badge	Dept	Router	Family	Project	Activity	Drawing	Piece	Op No	Operation	Start	Stop
80077	108	63	MISC	3306	128A	N/A	N/A	30	Re-install valves and joints	5/20/2004 7:09:07 AM	5/20/2004 9:54:40 A
82141	108	63	MISC	3306	128A	N/A	N/A	30	Re-install valves and joints	5/20/2004 7:09:23 AM	
80685	108	63	MISC	3306	128A	N/A	N/A	30	Re-install valves and joints	5/20/2004 7:09:38 AM	
80214	108	63	MISC	3306	128A	N/A	N/A	30	Re-install valves and joints	5/20/2004 7:09:54 AM	
33188	103	75	SAFETY/SECU...	3306	125A	8202-6...	N/A	5	LAYOUT	5/20/2004 7:10:22 AM	5/20/2004 10:53:49
34492	103	75	SAFETY/SECU...	3306	125A	8202-6...	N/A	45	WELD	5/20/2004 7:10:37 AM	5/20/2004 10:52:54
19741	101	61	MISC	3306	125A	N/A	N/A	40	Remove 1ladder from ea. pil...	5/20/2004 7:11:00 AM	
11763	101	59	MISC	3306	123A	N/A	N/A	90	Cut structure for new windows	5/20/2004 7:11:28 AM	
18223	101	63	MISC	3306	128A	N/A	N/A	10	Remove treatment tank valv...	5/20/2004 7:12:07 AM	
61408	106	47	UHP BLASTING	3306	110A	N/A	N/A	30	Demobilize Equipment	5/20/2004 7:15:31 AM	5/20/2004 8:40:00 A
69521	106	47	UHP BLASTING	3306	110A	N/A	N/A	30	Demobilize Equipment	5/20/2004 7:16:05 AM	5/20/2004 8:40:44 A
69133	106	47	UHP BLASTING	3306	110A	N/A	N/A	30	Demobilize Equipment	5/20/2004 7:16:47 AM	5/20/2004 8:40:15 A

Lean Cell Analysis Filter

From Date

To Date

December							January 2006							February		
Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat			
25	26	27	28	29	30	31	1	2	3	4	5	6	7			
8	9	10	11	12	13	14	8	9	10	11	12	13	14			
15	16	17	18	19	20	21	15	16	17	18	19	20	21			
22	23	24	25	26	27	28	22	23	24	25	26	27	28			
29	30	31	1	2	3	4	29	30	31	1	2	3	4			

Badge All Records Holds Rework Warnings

Device

Department

Family

Part Number

Project

Activity

Drawing

Piece

Operation

Lean Cell Analysis Options

Show Columns

Auto Refresh

- Badge
- Employee
- Device
- Department
- Router
- Family
- Part Number
- Project
- Activity
- Drawing
- Piece
- Operation Number
- Operation

Safety & Quality ◆ Cost ◆ Cy



Home >

Lean Cell Analysis Reports

Search for:

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Properties

Show Details

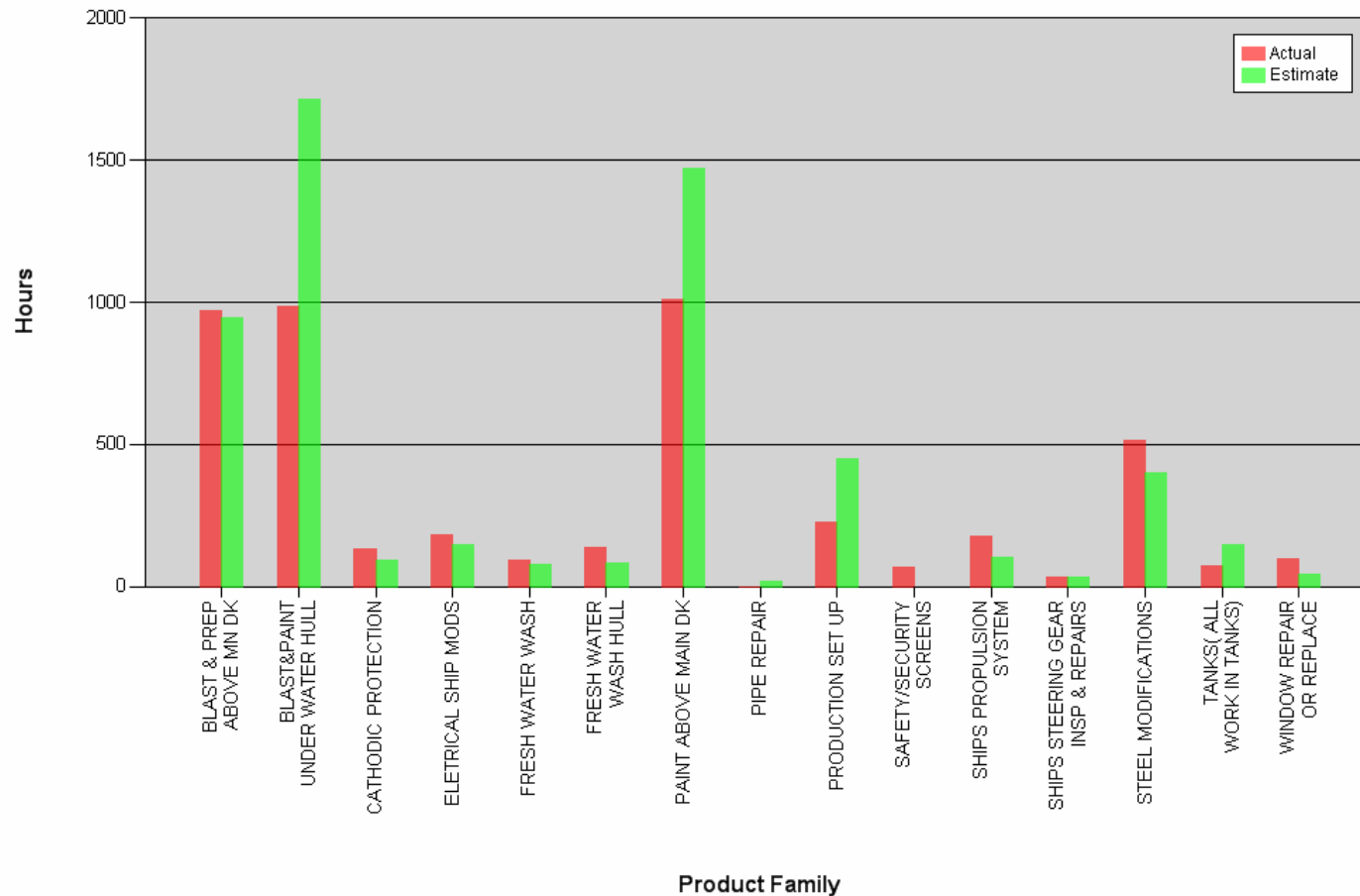
[Analysis](#) !NEW

[Estimators Reports](#) !NEW

[Device Info](#) !NEW

[Held For and Rework](#) !NEW

3352 - TACOMA Project
Actuals vs Estimates by Product Family



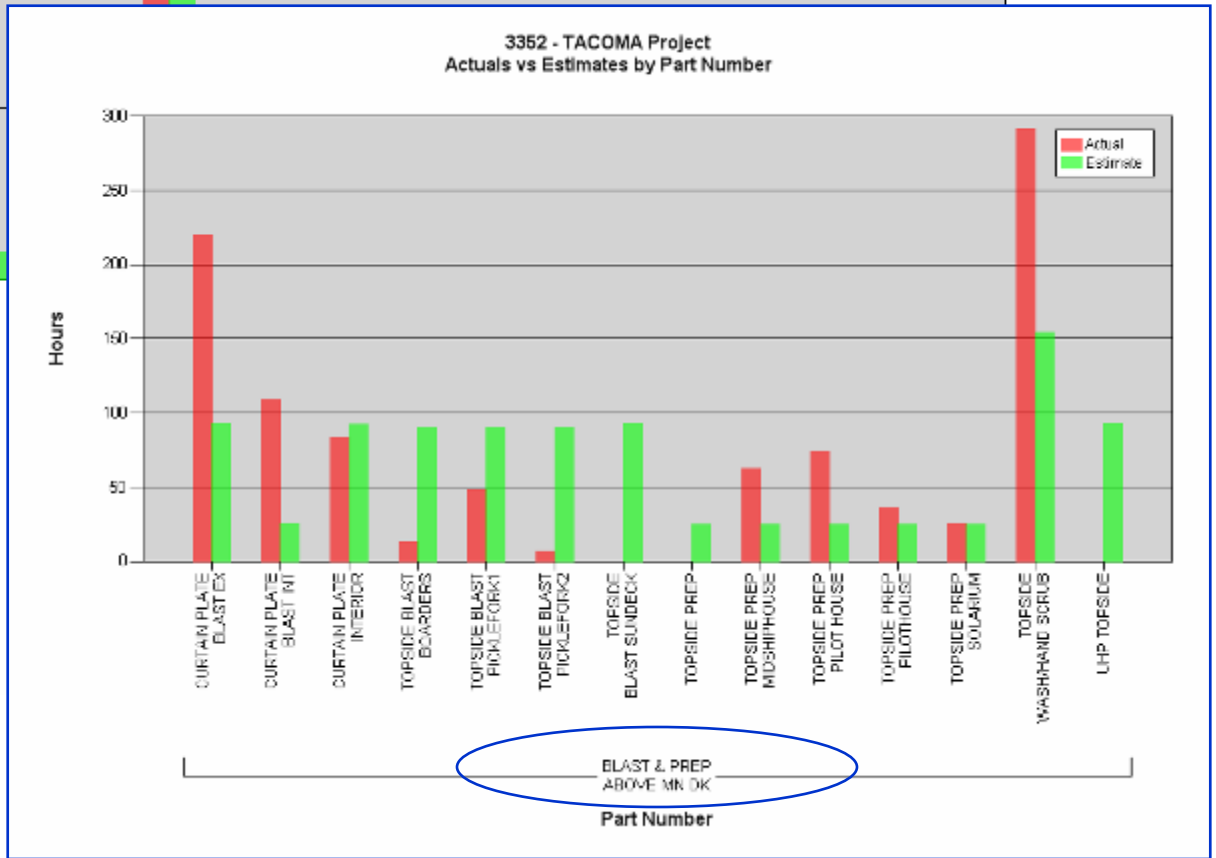
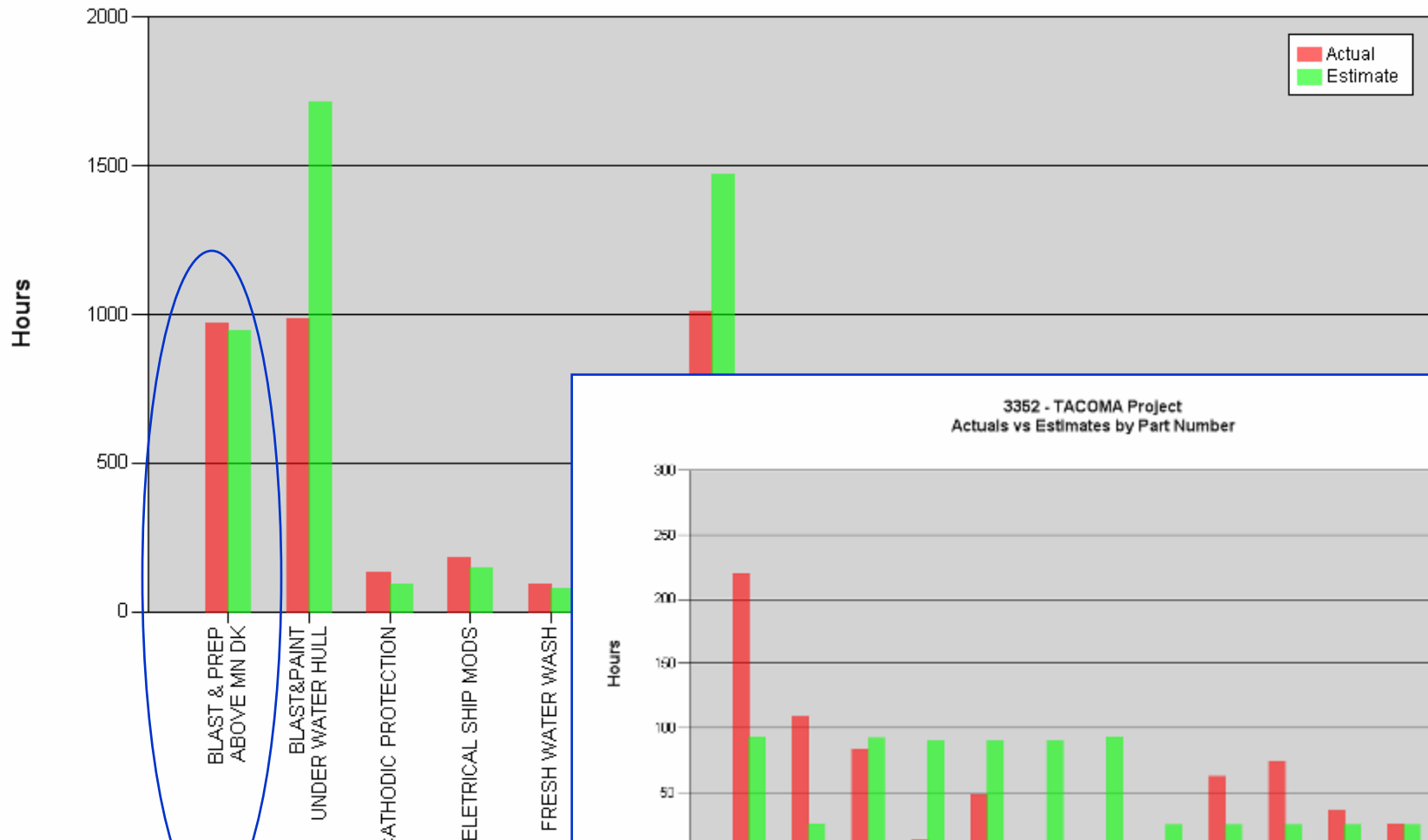
Safety & Quality ▼

Cost ▼

Cycle Time ▼

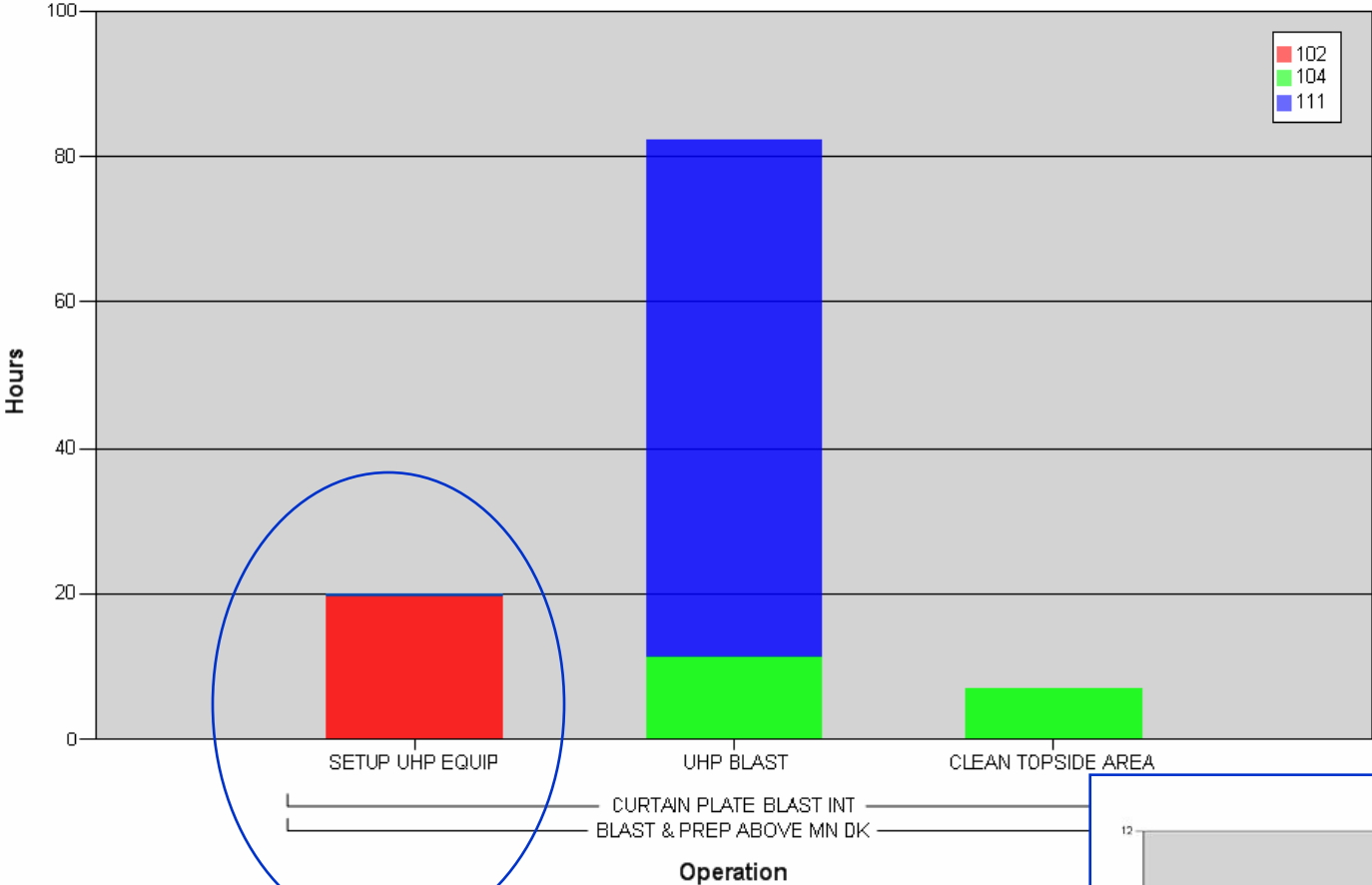
Customer Service

3352 - TACOMA Project Actuals vs Estimates by Product Family

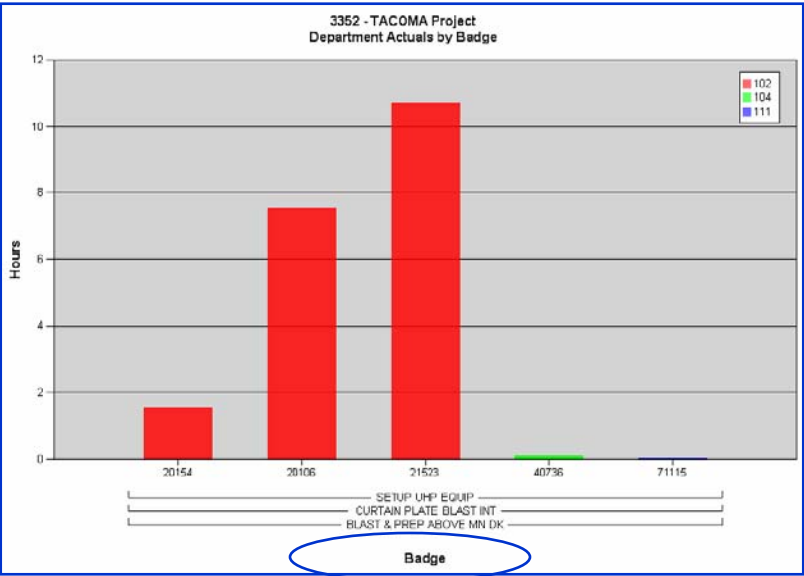


Safety & Quality ◆

3352 - TACOMA Project
Department Actuals by Operation



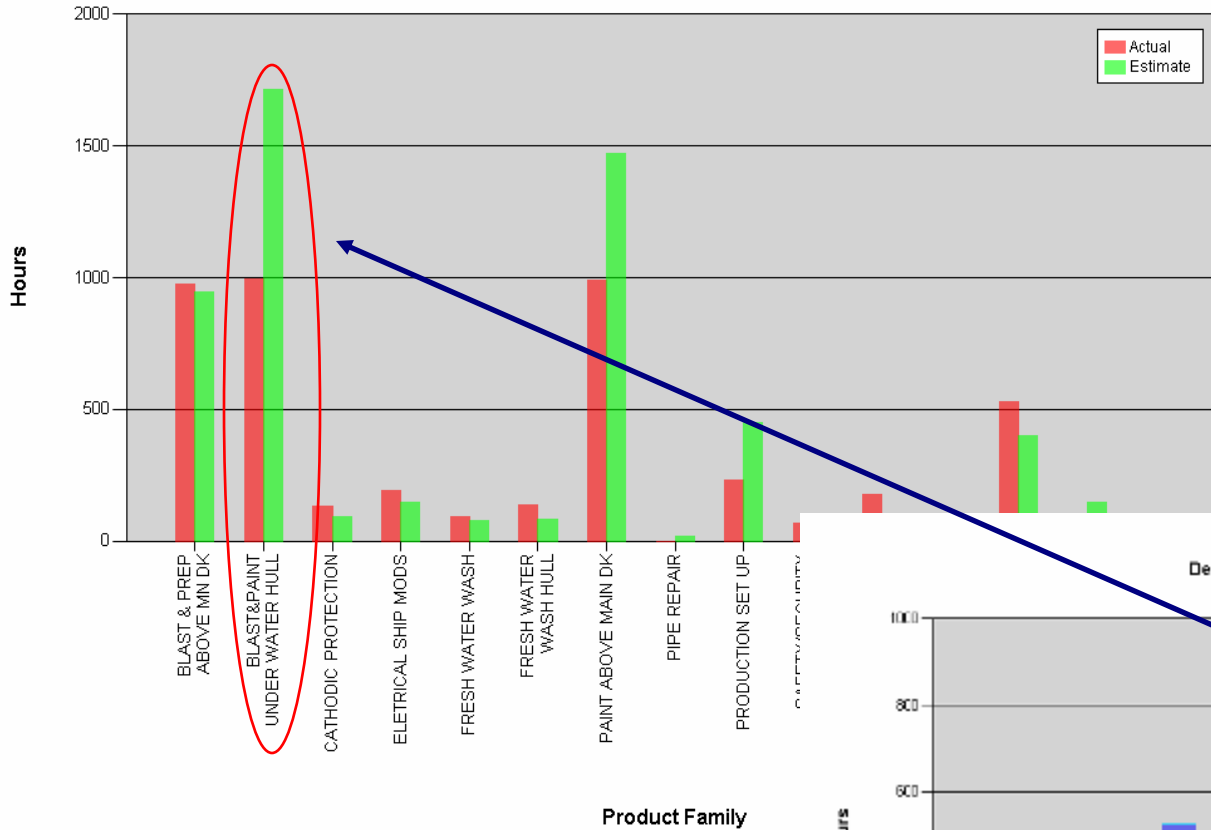
CURTAIN PLATE BLAST INT
 BLAST & PREP ABOVE MN DK
Operation



SETUP UHP EQUIP
 CURTAIN PLATE BLAST INT
 BLAST & PREP ABOVE MN DK
Badge

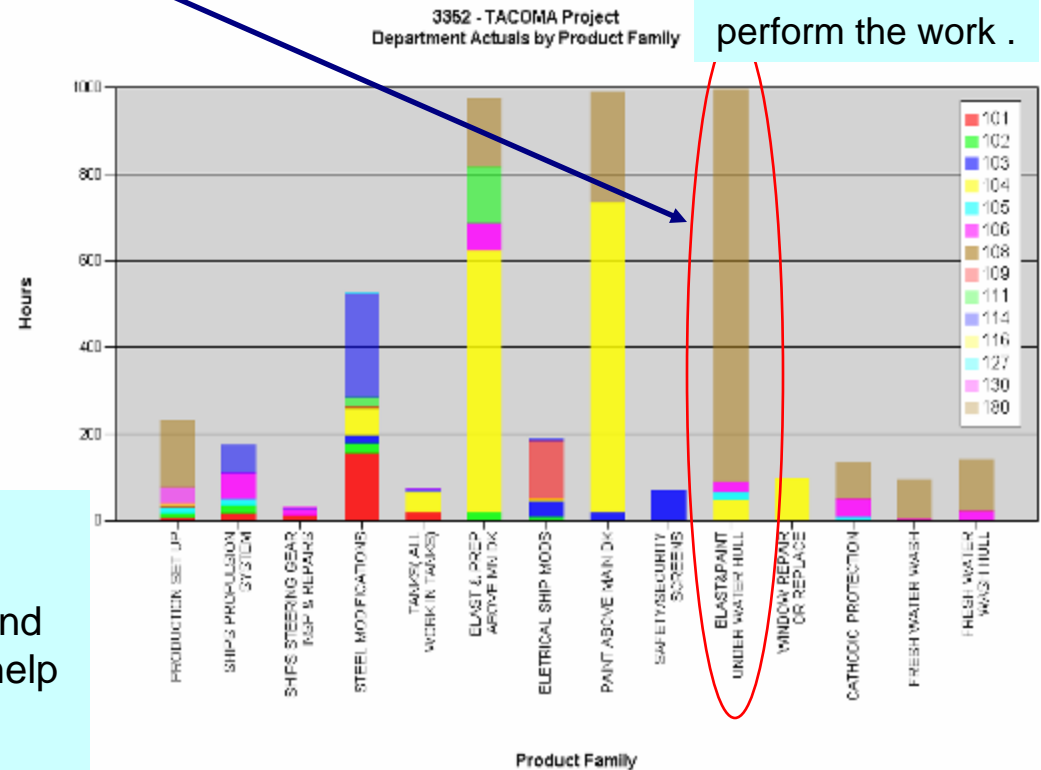
Safety & Quality ◆ **Cost** ◆ **Cycle Ti**

3352 - TACOMA Project
Actuals vs Estimates by Product Family



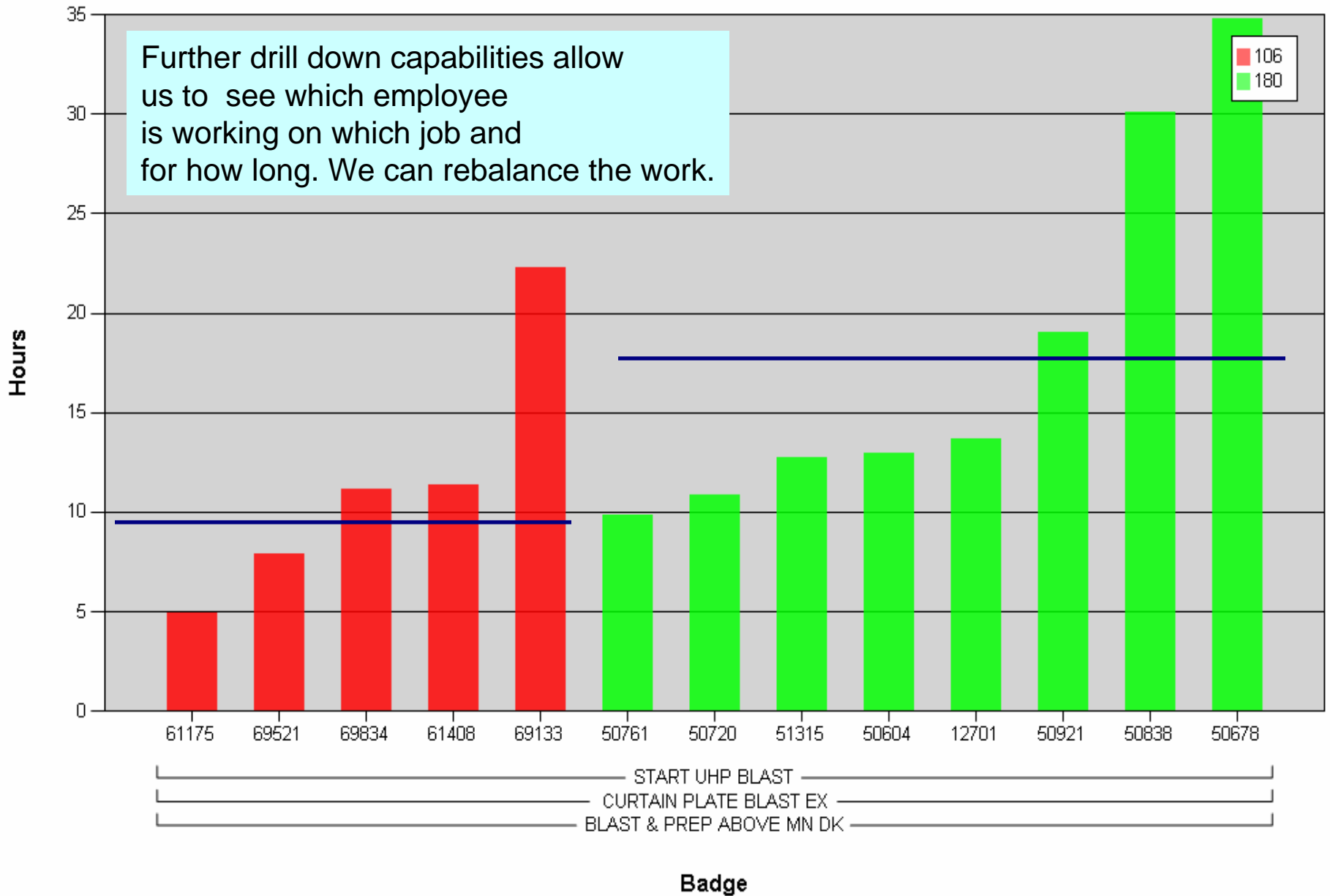
Remember, Product Families are the Major categories of work.

Breakout of which departments are used to perform the work .



The results of the scan system show that we can measure the estimated process time against the actual process time and respond quickly to problems. This information will also help with future repetitive type process estimates. **Remember, this is real time data.**

3352 - TACOMA Project
Department Actuals by Badge





Real Time Delay/Disruption Notification



Held For Weather



Held for Drawing information



Held for C.P.R.



Held for Equipment in use



Held for Tooling



Held for Equipment down



Held for Engineering

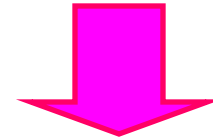


Held for Material



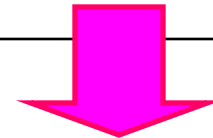
Badge: 92286
Employee: POARCH, TERRELL G
Department: 109
Router: 755
Work Center: 6019 - DECK ELECT. (HOT WORK) ON BOARD
Status: Held for Equipment in use

[More Information](#)



Blackberry device receives message real time with relevant information

Router: 755
Family: STEEL MODIFICATIONS
Project: 3359 (NOAA MacArthur II)
Activity: 15004 (Installation of Mission Deck)
Drawing: N/A
Piece: N/A
Operation: 70 - DECK ELECT. (HOT WORK) ON BOARD



The mechanic scans and transmits the "I need help" signal

Supervisor with blackberry responds



Real Time Delay/Disruption Tracking



Held For Weather



Held for Drawing information



Held for C.P.R.



Held for Equipment in use



Held for Tooling



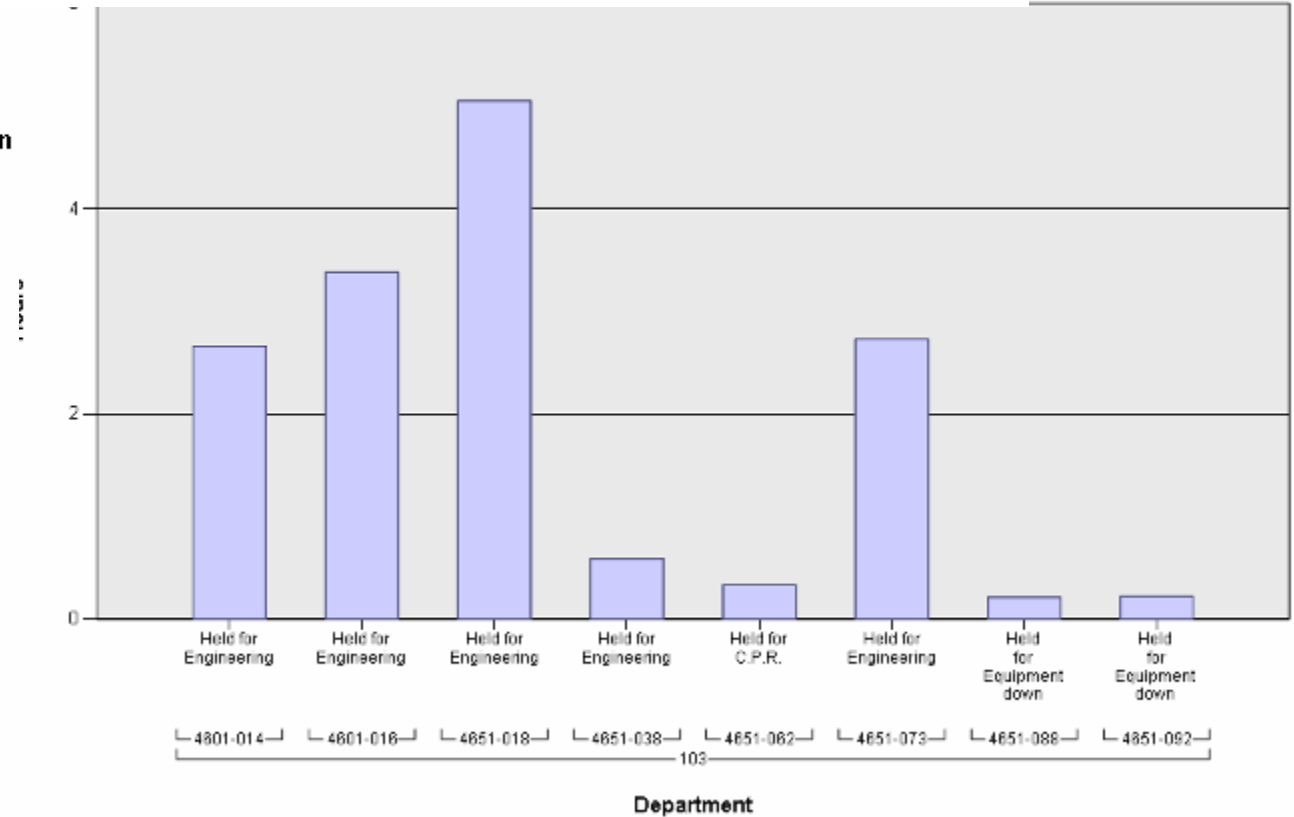
Held for Equipment down



Held for Engineering



Held for Material



Anytime we have to stop our processes and wait for something, be it parts, tools, information or whatever is not **value added** and should be put into a **hold condition** on the pocket pc's. We need to track and **eliminate** any form of delay to production.

After the hold has been eliminated it should be removed from the process.



Remember

With every pair of hands
comes a
free
brain.

Questions?