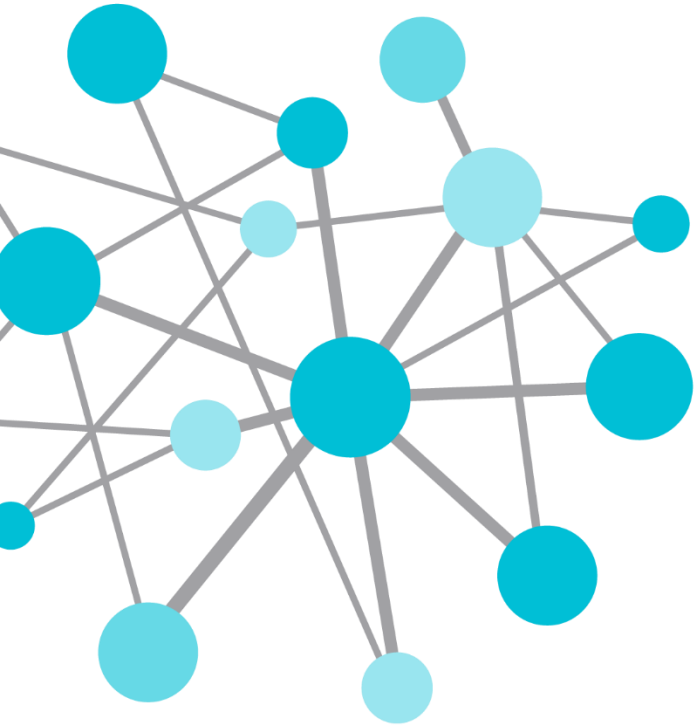


Hood Container Uses the PI System to Achieve World Class Uptime

Presented by **Chris Massie**

HOOD CONTAINER CORPORATION™

Presentation Overview

- Hood Container Corporation
- PI System Infrastructure
- Paper Machine Uptime
- Data Analysis tools
- Mill-wide Use of the PI System
- Future Plans
- Summary
- Questions

Hood Container Corporation

- Located in Waverly, TN
- Started production in 1970 as Inland Container Corporation, later became Temple Inland
- Purchased by IP in 2012 and then sold to Hood Companies

(Continued on next slide)

Hood Container Corporation

- Produces 1000 tons per day of corrugating medium:
  - 50% from Wood,
  - 50% from Recycled Paper
- Continuous operation, 24 / 7
- 1 Paper Machine, 1 Boiler, 1 Pulp Mill, 1 Recycle Plant
- 190 Employees, 40 Mgt, 40 Maint, 110 Oper

PI System Infrastructure

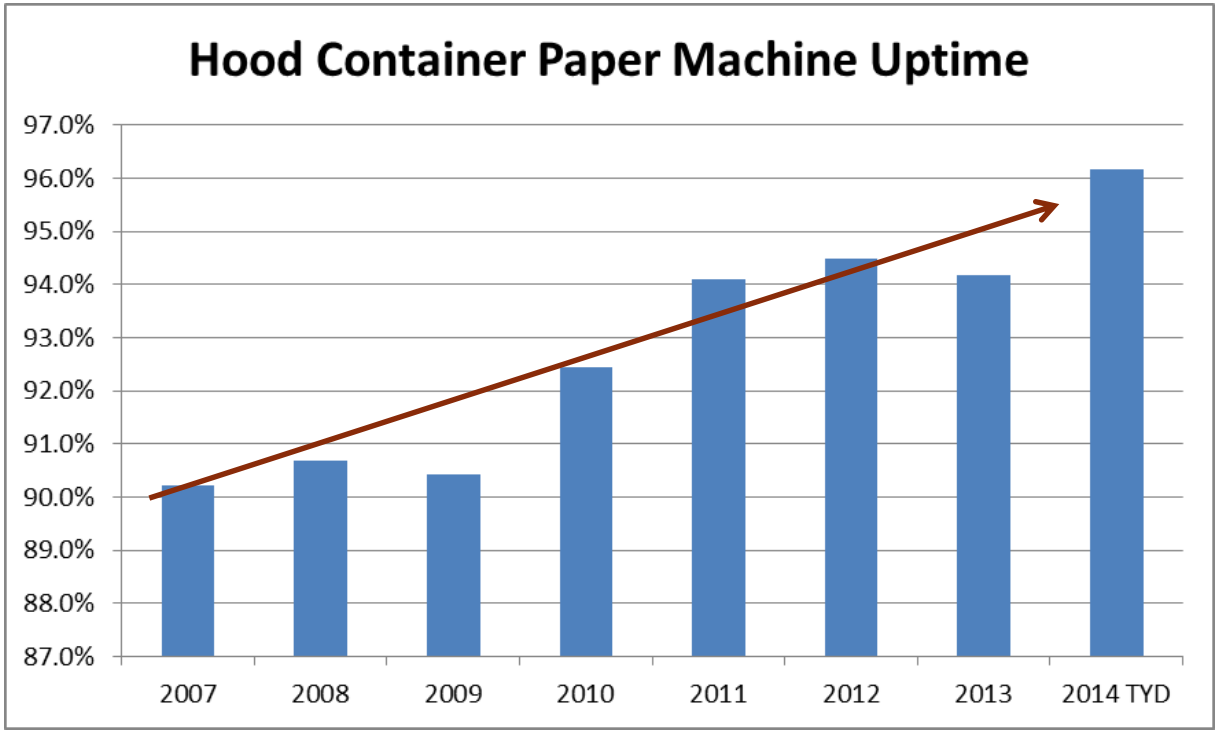
- 1 PI Server 2014, VM Windows Server 2012
- 5 PI Interface nodes
  - Bailey DSC
  - ABB QCS
  - Allen Bradley PLC
  - Manual Data Entry – PI ProcessBook
  - Panther Quality System
- 3000 PI Tags
- PI AF to a small extent, PI Notifications
- PI ProcessBook, PI DataLink – 60 instances

Paper Machine Uptime

- Key Metric for Operation
  - Reduces Cost
  - Consistency in Stable Operation
  - Equates to Higher Efficiency and Increased Production

Paper Machine Uptime

Year	Uptime
2007	90.2
2008	90.7
2009	90.4
2010	92.4
2011	94.1
2012	94.5
2013	94.2
2014 TYD	**96.2**



Paper Machine Uptime

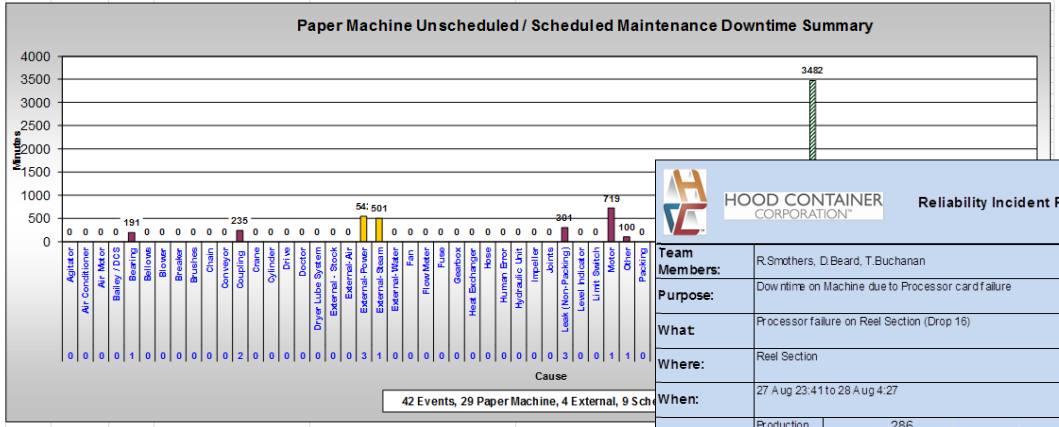
- Track and Minimize Downtime
  - Scheduled Downtime
    - Monthly (6-10 hours)
    - Annual (3-4 days)
  - Unscheduled Downtime
    - Maintenance Malfunction
    - Operator Error
    - Sheet Breaks

Paper Machine Uptime

- Use the PI System to investigate every unscheduled downtime event
  - Quantify the Total Lost Time
  - Track the Operating Conditions
  - Determine the Root Cause
  - Identify additional data points needed
- Implement preventive actions
- Follow up to ensure that corrective action is effective

Paper Machine Uptime

Downtime Summary for:	Begin Date:	1/1/2013	8298 Minutes Total, 3773 Paper Machine, 1043 External, 3482 Scheduled
	End Date:	7/1/2013	3.17% Total Downtime, 1.44% Paper Machine, 0.40% External, 1.33% Scheduled



Event	Date	Lost Time	Equipment	Cause	
1	3/13/13	191	Winder	Bearing	Winder Tension Roll Bearing Faile
					Down to Troubleshoot / Repair Iss

Component Inspection					Target	Comments
Couch Roll - Monday Days						
	Tachometer Coupling Wobbling / Moving		No		Yes	
	Inboard Bearing temperature (Gearbox Side)			F	Max 190F	
	Outboard Bearing temperature			F	Max 190F	
AC Motor	Vibration (max)			in/sec	Max .25 in/sec	
	Abnormal Noise or Vibration		OK		Abnormal	
	Cooling Air Ducts have no leaks		Yes		No	
	Base and Foundation Bolts Tight and corrosion free		Yes		No	
	Wiring Sealed at Junction Box - Undamaged		Yes		No	
	Abnormal Noise or Vibration		No		Yes	
	Gearbox Cooling Fan Running		Yes		No	
Gearbox	Vibration (max)			in/s	Max .25 in/sec	
	Temperature (max)			F	Max 190F	
	Oil Level		OK		Low	
	Water in Oil		OK		Cloudy	
U-Joint	Coupling / Shaft Running Smoothly - No Wobble		Yes		No	* Any Movement Call Coordinator

HOOD CONTAINER CORPORATION

Reliability Incident Report 29-Aug-12

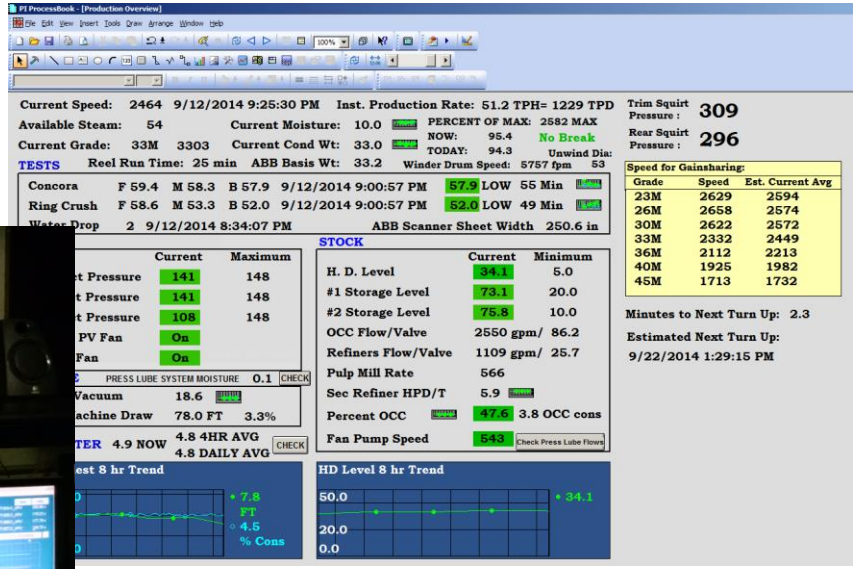
Team Members:	R.Smothers, D.Beard, T.Buchanan	
Purpose:	Downtime on Machine due to Processor card failure	
What:	Processor failure on Reel Section (Drop 16)	
Where:	Reel Section	
When:	27 Aug 23:41 to 28 Aug 4:27	
Significance:	Production Loss:	$71,500 286
	Maint. Cost:	$1,500
	Safety:	n/a
	Enviro.:	n/a
	Quality:	n/a
	Total:	$73,000

Incident Summary

Reel Section Processor faulted with a #31 error ("replace processor"). Shift Mech hadn't replaced processor in some time and was unfamiliar with the procedure. Help was called in to replace the board and reload the OS and Task. Further complications with the EStop circuit power on the Dry End Pulper prolonged the downtime due to a breaker being switched off.

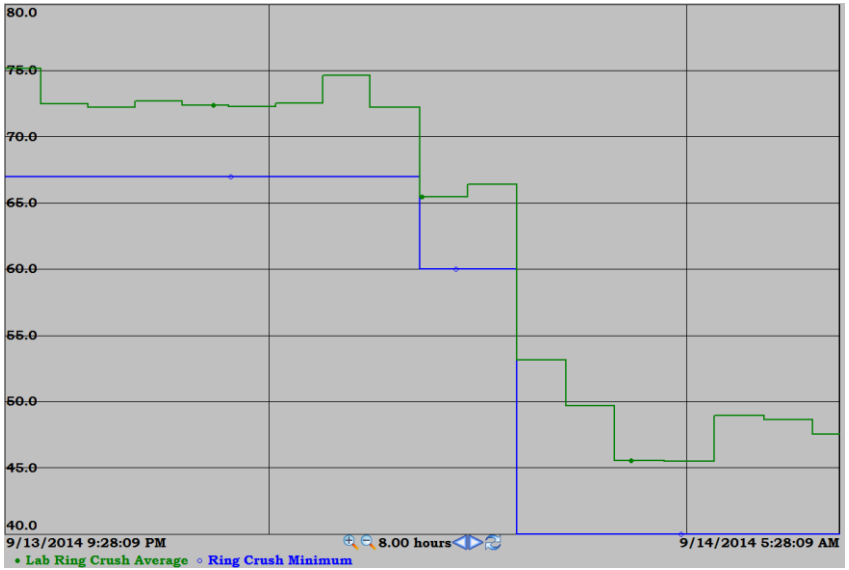
Mill-Wide Use of the PI System

- Production
  - PI ProcessBook



Mill-Wide Use of the PI System

- Quality



Roll Number	Month	Day	Reel	Winder Set	Machine Set	Position
HCS612455315	May	24	553	1	3	2
Year>	2014					
			9	Panther Reel Number		

Set 1	Average	2 Sigma	Average	2 Sigma	Max	Min
Roll 1	33.25	0.83	9.00	2.22	14.88	6.24
Roll 2	32.67	0.87	10.66	2.20	14.05	8.42
Roll 3	32.89	1.52	10.04	4.01	12.57	6.46

Set 2	Average	2 Sigma	Average	2 Sigma	Max	Min
Roll 1	33.20	0.83	8.91	2.21	13.93	6.03
Roll 2	32.61	0.86	10.44	2.25	14.32	8.25
Roll 3	32.82	1.46	9.83	3.99	12.37	6.23

Set 3	Average	2 Sigma	Average	2 Sigma	Max	Min
Roll 1	33.27	0.85	9.18	2.15	13.80	6.41
Roll 2	**32.71**	**0.87**	**10.66**	**2.06**	**13.35**	**7.76**
Roll 3	32.91	1.45	10.01	3.97	13.04	6.77

Test Data

	Previous Reel	Selected Reel	Following Reel
	552	**553**	554
Grade	33M	**33M**	33M
Shift	A	**A**	A
Concora Average	64.4	**65.6**	64.4
Concora Front	65.0	**65.7**	60.4
Concora Middle	63.9	**64.7**	64.7
Concora Back	65.7	**67.1**	70.0
Concora Minimum Spec	55	**55**	55
Ring Crush Average	54.8	**55.4**	55.5
Ring Crush Front	54.5	**54.1**	53.0
Ring Crush Middle	54.5	**55.3**	56.0
Ring Crush Back	55.5	**56.9**	57.7
Ring Crush Minimum Spec	49	**49.0**	49.0

Mill-Wide Use of the PI System

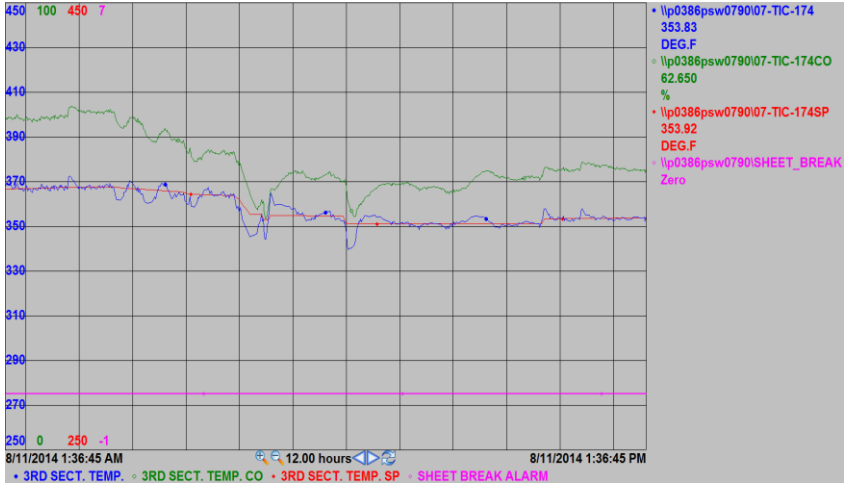
- Accounting

```
=PITimeFilterVal("'13-pv-313a'<50",Sheet1!$F$3,Sheet1!$D$3,"minutes",0,"p0386psw0790")
```

	A	B	C	D	E	F	G	H	I	J
1		30	For Historical Data				8/26/2014		Acct. Period Start	8/1/2014
2										
3				8/27/14 6 AM		8/26/14 6 AM	8/25/14 6 AM	8/24/14 6 AM	8/23/14 6 AM	8/22/14 6 AM
4	**Refuse Boiler**			Wednesday	Acct. Period Total	Tuesday	Monday	Sunday	Saturday	Friday
5	Steam Flow	24 hr average	Mpph	13-pv-313a		256.2	252.1	241.3	246.0	249.7
6		Total	Mppd			6150	6050	5792	5904	5993
7	Downtime	Downtime	minutes	13-pv-313a	230	0	0	0	0	0
8	Steam Flow < 50	Uptime	minutes		35770	1440	1440	1440	1440	1440
9	Liquor Flow	24 hr average	MLbs/Hr.	13-fic-308		0.0	0.0	0.0	0.0	0.0
10		Burn Rate	Gal/min	13-fi-308		0.0	0.0	0.0	0.0	0.0
11		Total	Tons/day		470	0	0	0	0	0
12	Gas Flow	24 hr average	MCF/hr	13-fi-gm1		12.29166667	12.8	12.3	12.3	12.5
13		Total	MCF/day	13-fi-gm2		295	306	295	295	301
14	Bark Flow	24 hr average	Mpph	13-fic-719A		81.5	80.5	79.2	77.0	79.5
15		Total	Tons/day			978	966	951	924	954
16	Oil Flow	24 hr average	Gpm	13-fi-303		0.00	0.00	0.00	0.00	0.00
17		Total	Gpd	'13-fi-303'>2.2		0	0	0	0	0
18	Ammonia Flow	24 hr average	Gpm	13-FIC-722		0.00	0.00	0.00	0.00	0.00
19	Venturi	Total	Gpd			0	0	0	0	0
20	Ammonia Flow	24 hr average	Gpm	13-FI-470		0.00	0.00	0.00	0.00	0.00
21	Absorber	Total	Gpd			0	0	0	0	0
22	Ammonia Flow	24 hr average	Gpm			0.00	0.00	0.00	0.00	0.00
23	Boiler Total	Total	Gpd		3848	0	0	0	0	0
24										

Mill-Wide Use of the PI System

- Maintenance



	A	E	F	G	H	I	J	K	L	M
1	Level Changes									
2	2/2/2012 11:30	4.00	2/2/12 15:30	Density in LB/ft^3	23.0000		Digester Diameter in inches	54.0000		
3										
4		03-CALC-TPD	03-SIC-102RPM							
5						Rate of Change in Digestor based on Level Reading				
6	Start Time	Digester PI Calculated Rate in T/D	Screw RPM	Digester Calculated Rate in T/H	Level Change in Inches	Volume Change calculation in in^3	Volume in FT^3	Lbs/Min	Tons/Hour	Input Tons/Hour
7	02-Feb-12 11:30:00	576.38	44.56	24.02	-0.8060	-1845.8473	-1.0682	-24.5686	-0.74	24.02
8	02-Feb-12 11:34:00	576.38	45.37	24.02	-0.2802	-641.7482	-0.3714	-8.5418	-0.26	24.02
9	02-Feb-12 11:38:00	576.38	46.08	24.02	0.4305	986.0361	0.5706	13.1243	0.39	24.02
10	02-Feb-12 11:42:00	576.38	45.30	24.02	-2.6670	-6108.0004	-3.5347	-81.2986	-2.44	24.02
11	02-Feb-12 11:46:00	576.38	41.41	24.02	-1.8143	-4155.2183	-2.4046	-55.3067	-1.66	24.02
12	02-Feb-12 11:50:00	576.38	36.19	24.02	2.0324	4654.6664	2.6937	61.9545	1.86	24.02
13	02-Feb-12 11:54:00	576.38	36.20	24.02	1.8602	4260.3358	2.4655	56.7059	1.70	24.02
14	02-Feb-12 11:58:00	576.38	37.25	24.02	-0.5877	-1345.9798	-0.7789	-17.9152	-0.54	24.02
15	02-Feb-12 12:02:00	576.38	37.12	24.02	0.5393	1235.1312	0.7148	16.4398	0.49	24.02
16	02-Feb-12 12:06:00	576.38	37.21	24.02	1.4815	3392.9763	1.9635	45.1611	1.35	24.02
17	02-Feb-12 12:10:00	576.38	39.75	24.02	-2.9821	-6829.5652	-3.9523	-90.9028	-2.73	24.02
18	02-Feb-12 12:14:00	576.38	39.37	24.02	-0.4799	-1098.9816	-0.6360	-14.6276	-0.44	24.02
19	02-Feb-12 12:18:00	576.38	38.20	24.02	1.9369	4435.9045	2.5671	59.0427	1.77	24.02
20	02-Feb-12 12:22:00	576.38	36.97	24.02	-1.2567	-2878.0122	-1.6655	-38.3069	-1.15	24.02
21	02-Feb-12 12:26:00	576.38	36.65	24.02	-0.8403	-1924.4059	-1.1137	-25.6142	-0.77	24.02
22	02-Feb-12 12:30:00	576.38	36.28	24.02	1.2480	2858.1628	1.6540	38.0427	1.14	24.02
23	02-Feb-12 12:34:00	576.38	36.53	24.02	-1.2770	-2924.7000	-1.6925	-38.9283	-1.17	24.02
24	02-Feb-12 12:38:00	576.38	36.25	24.02	-1.7548	-4018.7891	-2.3257	-53.4908	-1.60	24.02
25	02-Feb-12 12:42:00	576.38	35.76	24.02	-0.8282	-1896.7287	-1.0976	-25.2458	-0.76	24.02
26	02-Feb-12 12:46:00	576.38	36.29	24.02	0.2486	569.3401	0.3295	7.5780	0.23	24.02

Mill-Wide Use of the PI System

- Notifications

NCG Temp

chris.massie@hoodcontainer.com

Sent: Thu 9/25/2014 1:41 PM

To: chris.massie@hoodcontainer.com

Condenser NCG Temp > 190
9/25/2014 1:40:29 PM Central Daylight Time (GMT-05:00:00)

From: chris.massie@hoodcontainer.com
To: chris.massie@hoodcontainer.com; wayne.morgan@hoodcontainer.com
Cc:
Subject: Mill Status Report

9/25/2014 10:08:11 PM

Paper Machine
1039 TPD Rate
33M Grade
72 Minutes Lost Time Today
No . Sheet Break Now
2082 FPM Speed
2332 FPM Speed Target
2582 FPM Speed Max
33.1 lb/MSF CW Setpoint
220 psi Steam Available
3.0 % Total Draw
60 lb Concora Low
55 lb Concora Min
56 lb Ring Crush Low
49 lb Ring Crush Min
30.7 ft HD Level
566 TPD Pulp Mill Rate
11.8 % Percent OCC
42.0 % OCC Valve
19.0 in Couch Vacuum
19.0 in Couch Vacuum SP
6.7 Refining HPDPT
2.1 % Moisture 2s Front
2.1 % Moisture 2s Middle
2.4 % Moisture 2s Back

Pulp Mill
566 TPD Rate

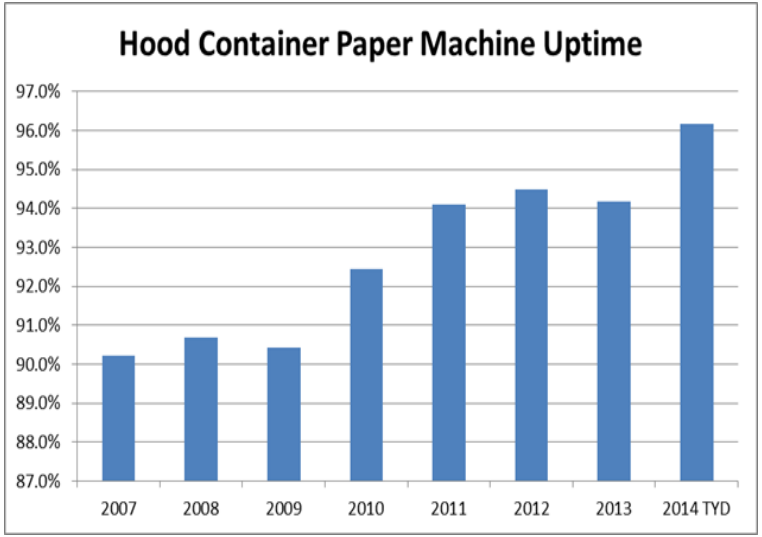
Future Plans

- Interface Nodes
  - Virtual Machines
  - Upgrades to DCS Platform
- PI AF Building

Hood Container Achieves World Class Uptime

Uptime is a key metrix in measuring paper mill excellence in operation.

HOOD CONTAINER CORPORATION™



Business Challenge

- Reduce Downtime

Solution

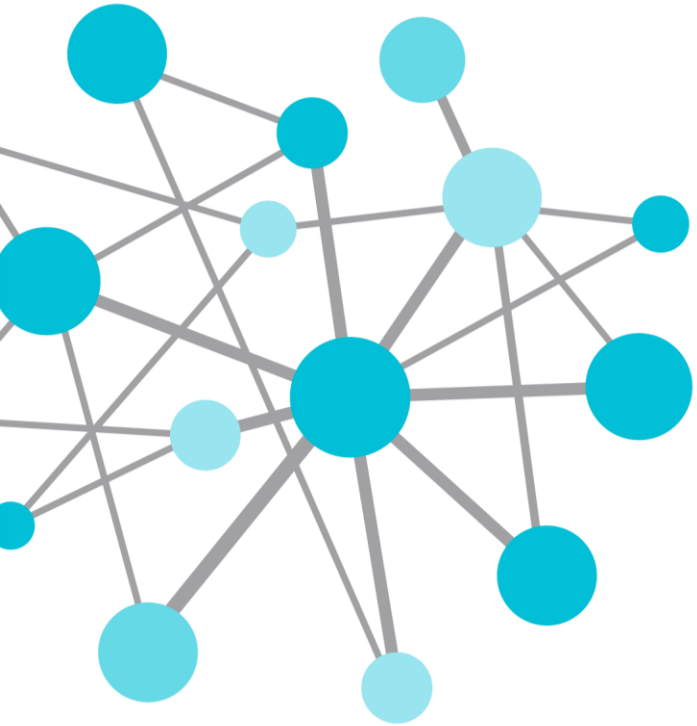
- Use the PI system as a critical piece of problem solving, data analysis, and corrective action implementation

Results and Benefits

- Lower Operating Costs
- Lower Maintenance Costs
- Better Planning and Budget Performance
- Increased Production

Chris Massie

- chris.massie@hoodcontainer.com
- Assistant Production Process Manager
- Hood Container Corporation



THANK YOU

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