



# ***Creative Brewery Maintenance***

**BA Collab Hour - May 12th 2022**



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BREWING FOR  
THE GOOD OF  
OUR COMMUNITY,  
EMPLOYEES, AND  
ENVIRONMENT.





Maine Beer Company



Do what's right.



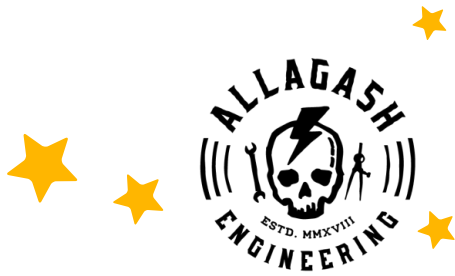
# *Hello!*

We are Seán Diffley & Jon Gagne.

Seán is the Director of Engineering at Allagash Brewing Company.

Jon is the Engineering Manager at Maine Beer Company.





Maine Beer Company



Do what's right.



# *Maintenance*

Brewery maintenance, is the process of implementing processes to reduce breakdowns, increase uptime, and promote overall reliability.



# *Some Definitions*



## **Reactive Maintenance**

Is concerned with tasks that come after a piece of equipment breaks down. The advantage of reactive maintenance is that the initial costs are significantly lower.



## **Preventive Maintenance**

A preventive maintenance (PM) strategy requires doing tasks proactively according to a usage- or calendar-based schedule.

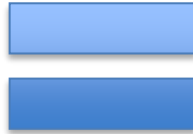
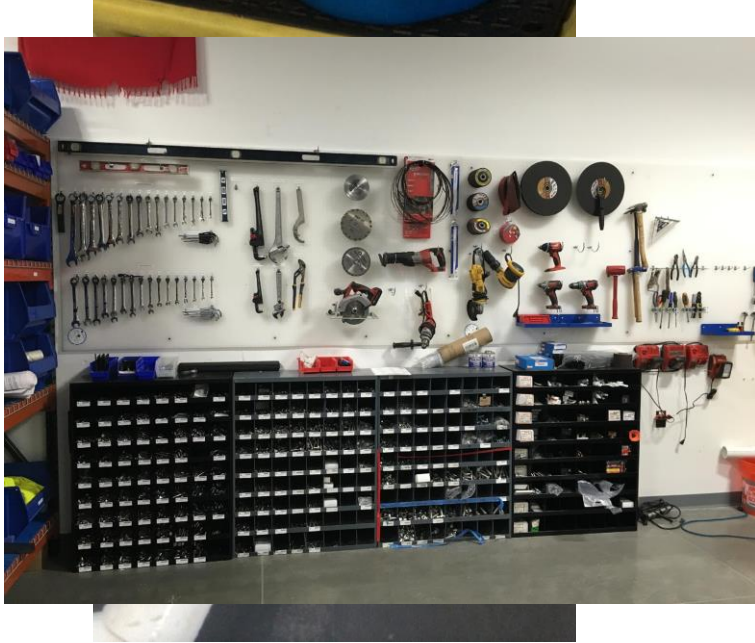


## **Predictive Maintenance**

A method of preventing the failure of expensive manufacturing equipment, by analyzing data throughout production to pinpoint unusual behavior ahead of time.



# Why is Maintenance *Critical*?





# Why is Maintenance Critical?



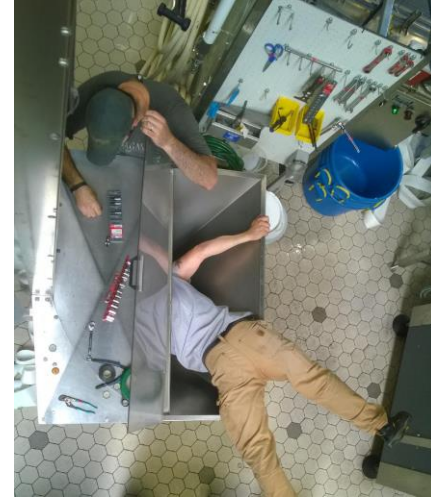
## Safety

Employee and equipment safety is the foundation of any maintenance program.



## Quality

Brewery Operations can not achieve their QC standards if their tools, systems or equipment are not at 100%.



## Reliability

When brewery equipment runs at its expected capacity, brewery operations are likewise sustained

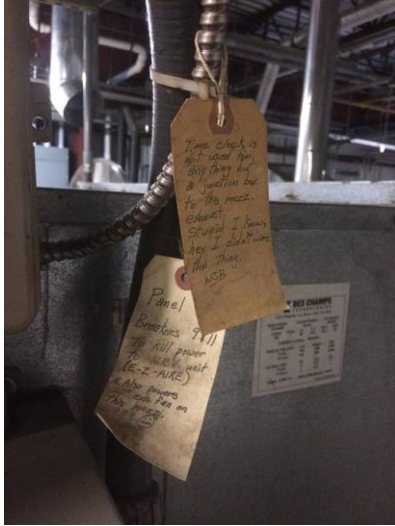




# ***Creative Maintenance Strategies***



# Maintenance Creative Strategies



## Communication

Clear and simple communication plans reduce lost time, money and productivity.



## Organization

Clean and uncluttered storage workspace saves time and money



## Standardise

Minimizing as far as possible the number of different brands and models of product used for the same task



# Communication

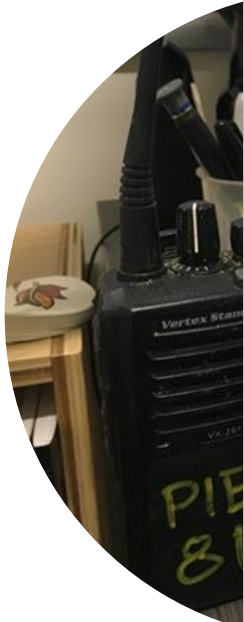
*Keep it simple - leverage technology*

- Finding People
- Routine Checks
- Communication of Work





# Communication - Finding People



 <b>ENGINEERING PHONE LIST and SCHEDULES</b>			
Name	Area	Phone Number	Schedule
Ben Baldus	Controls & Automation		Mon-Fri 8:00 - 16:30
Dan Sanford	Controls & Automation		Mon-Fri 7:00 - 15:30
Salim Raal	Controls/ Mechanical		Tu-Fri 13:00 - 21:30
Wade Hersey	Electrical		Mon-Thurs 13:00 - 23:30
Asa Korsen	Facilities		Mon-Thurs 13:00 -23:30
Oly	Facilities		Tu-Sat 6:30 - 15:00
Bob Kutch	Facilities		Mon-Fri 9:00 - 17:30
Luke Truman	Facilities		Mon-Fri 8:00 - 16:30
Charley Davis	Mechanical		Mon-Thurs 13:00 - 23:30
Sam Livingstone	Mechanical		Mon-Thurs 5:00 - 15:30
Dan Gagnon	Mechanical		Mon-Thurs 5:00 - 15:30
Liz Mycock	Admin/ Mechanical		Mon-Fri 8:00 - 16:30
Tyler Weidner	Mechanical		Tu-Fri 6:00 - 16:30
Eric Meader	Parts and Inventory		Mon-Fri 7:30 - 16:00
Travis Emery	IT		Mon, Wed 5:00 - 13:30, Tu,Thurs, Fri 5:00 - 10:00, 13:30 - 16:30 WFH
Seán Diffley	Engineering		Mon-Fri 7:30 - 16:00



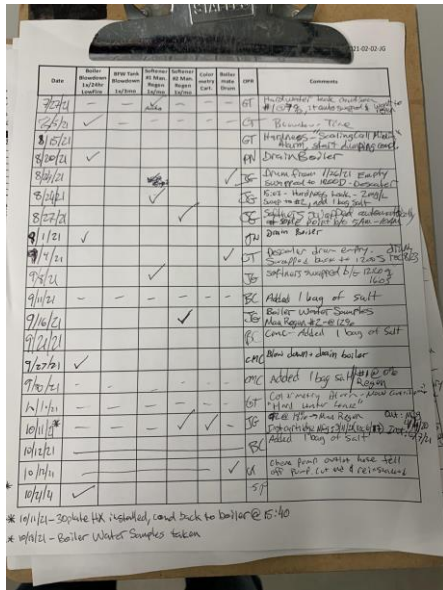




# Communication - *It's Simple*

## Easy knowledge/status sharing ideas

- Paper checksheets & logs
- Peg boards for checksheets
- Parts tagging - new vs. repaired vs. broken



Date	Boiler Description Location	Boiler Description at Site	Boiler Description at Site	Boiler Description at Site	Boiler Description at Site	Boiler Description at Site	Comments
7/24/21							Boiler description: 1st boiler inspection & repair
8/5/21							Boiler description: 1st boiler inspection & repair
8/15/21							Boiler description: 1st boiler inspection & repair
8/20/21							Boiler description: 1st boiler inspection & repair
8/24/21							Boiler description: 1st boiler inspection & repair
8/27/21							Boiler description: 1st boiler inspection & repair
9/1/21							Boiler description: 1st boiler inspection & repair
9/14/21							Boiler description: 1st boiler inspection & repair
9/15/21							Boiler description: 1st boiler inspection & repair
9/16/21							Boiler description: 1st boiler inspection & repair
9/21/21							Boiler description: 1st boiler inspection & repair
9/22/21							Boiler description: 1st boiler inspection & repair
9/27/21							Boiler description: 1st boiler inspection & repair
9/30/21							Boiler description: 1st boiler inspection & repair
10/1/21							Boiler description: 1st boiler inspection & repair
10/11/21							Boiler description: 1st boiler inspection & repair
10/11/21							Boiler description: 1st boiler inspection & repair
10/12/21							Boiler description: 1st boiler inspection & repair
10/14/21							Boiler description: 1st boiler inspection & repair
10/14/21							Boiler description: 1st boiler inspection & repair

\* 10/11/21 - 1st boiler inspection & repair could back to boiler @ 15:40  
\* 10/14/21 - Boiler Water Samples taken





# Communication - Routine Checks

## Tank Maintenance

3 Month Tank Maintenance			
Yeast Brink	Date	Conditioning Tank	Date
YB1		CT1	10/15/15
YB2		CT2	
YB3		CT3	
YB4		CT4	
YB5		CT5	
		CT6	
		CT7	
		CT8	10/16/15
		CT9	10/16/15
		CT10	10/16/15
		CT11	10/16/15
		CT12	
		CT13	
		CT14	
		CT15	

Bruckner	Date	User	Notes
B02	Mar 31, 2021, 4:45:11 PM	cdavis	replaced rupture disc
B04	Mar 15, 2022, 3:59:07 PM	mwest	tank maintenance complete
B05	Sep 27, 2021, 3:04:01 PM	dgaugon	complete
B07	Mar 15, 2022, 3:59:55 PM	mwest	tank maintenance complete
B08	Dec 14, 2021, 1:49:51 PM	dgaugon	done
B09	Mar 16, 2022, 3:50:42 PM	mwest	tank maintenance complete
B11	Mar 16, 2022, 4:00:24 PM	mwest	tank maintenance complete
B13	Dec 16, 2021, 4:57:45 PM	cdavis	Post Nuke maint. complete, swap valves
B14	Apr 5, 2021, 3:57:20 PM	cdavis	complete
B16	Jun 18, 2021, 1:42:35 PM	sraal	complete
B18	Apr 8, 2021, 9:40:30 PM	No Record	No Record

Old Cellars	Date	User	Notes
PO1	Jul 8, 2021, 4:16:63 PM	cdavis	complete
PO2	Nov 22, 2021, 8:41:28 PM	cdavis	complete
PO3	Nov 12, 2021, 5:09:24 PM	sraal	Post Nuke Maint complete
PO7	Jul 28, 2021, 10:48:50 PM	sraal	Post Nuke rebuild complete
PO8	Sep 1, 2021, 9:46:01 PM	sraal	Post Nuke rebuild complete
PO9	Mar 16, 2022, 10:27:17 PM	sraal	complete
PO10	Feb 21, 2022, 9:24:35 PM	cdavis	complete
PO11	May 25, 2021, 10:17:12 PM	sraal	Complete. Sprayball was dirty. Clean
PO14	Jul 19, 2021, 5:23:24 PM	cdavis	complete, dirty sprayball
PO15	Nov 5, 2021, 3:56:10 PM	sraal	complete
PO16	Feb 21, 2022, 9:25:41 PM	cdavis	complete
PO17	Nov 18, 2021, 9:41:39 PM	sraal	complete
PO18	Dec 9, 2021, 8:12:58 PM	sraal	Post Nuke maint. complete. Swapped
PO19	Nov 22, 2021, 8:40:12 PM	cdavis	complete
PO20	Jul 17, 2021, 4:48:15 PM	cdavis	complete
PO21	Jul 8, 2021, 1:20:44 PM	cdavis	complete
PO22	May 25, 2021, 10:17:44 PM	sraal	Complete. Sprayball was dirty. Clean
PO23	Jul 19, 2021, 5:23:24 PM	cdavis	complete, dirty sprayball
PO24	Mar 17, 2022, 12:27:30 PM	dgaugon	complete
PO28	Apr 19, 2022, 9:38:07 PM	mwest	Tank maintenance complete early d
YB03	Mar 17, 2022, 10:36:12 PM	mwest	Tank maintenance complete. Lip seal
YB07		No Record	No Record

**TANK MAINTENANCE REQUIRED NOW**

**Tank Maintenance Record**

PRV Relief Pressure: 0 psi

☐ Tank Top Cleaned

☐ Tri-Clamp Replaced

☐ Spunding Valve

☐ Side Port Gaskets

☐ Side Port Valve Rebuild

**Submit Maintenance** B06

**Last 5 Tank Maintenance Submissions**

Tank	Date	User	Notes	PRV Relief Pressure	Tank Top Cleaned	Tri-Clamp Replaced	Spunding Valve
B06	4/7/2021	sraal	Complete	14.9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B06	4/16/2020	Tweidner	Complete	14.1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



# Something > Nothing

## Start Somewhere

- Tagging, Labeling, Tracking



Lübe <span>Update checklists</span>		
	Last	Due
MLT Bottom <i>After CIP</i>	5/8	5/13
MLT Spindle <i>Check 1x/wk → grease 1x/mo</i>	4/8	5/8
MLT Internal <i>1x/mo</i>	4/8	5/8
Jet Star <i>Check 1x/wk → grease 1x/mo</i>	4/08	5/08
Mill - Lithium ONLY		
Mill - Top Auger <i>6mo</i>	<i>last only 3/1/22</i>	4-1-22
Bottom Auger <i>1yr</i>	3/26/21	3/26/22
Clean Magnet <i>1mo</i>	4/8/22	5/8/22
OUTDOOR DRAG CONVEYOR BEARINGS (69)	Quarterly	11-11-21 2-11-21
PARALLELIC RAMP HOSE: 6/15/21 BOILER WATER SAMPLES (0/0/0) 10/19/21 2/4, 2/25, 3/25, 4/17, 5/17, 6/30, 7/6 BT SIGT TUBES (6/6/20) BT 1 BT 2 BT 3 BT 31 RICE Internal: 10/13/21 RICE Bags: 4/28/22 Silo DUCTS: 10/13/21 Mill Internal: 10/1/21 Grist Bin Conus: 12/8/18 Pipe Chain Conus: 12/11/18 Mill Dust Collectors: 15 BBL Starter: 10/1/21 (a) 4/1/21 (b)		
Holding Tanks Pumped L: 4/1/22 N: 7/1/22 H: 3/24/21, 6/1/21, 10/2/21 HLT CIP L: 4/1/22 N: 7/1/22 H:		



# Start Small - Write It Down

## Build Equipment History

- Make it easy to write it down ASAP - don't forget
- Make it easy for everyone to see - communication

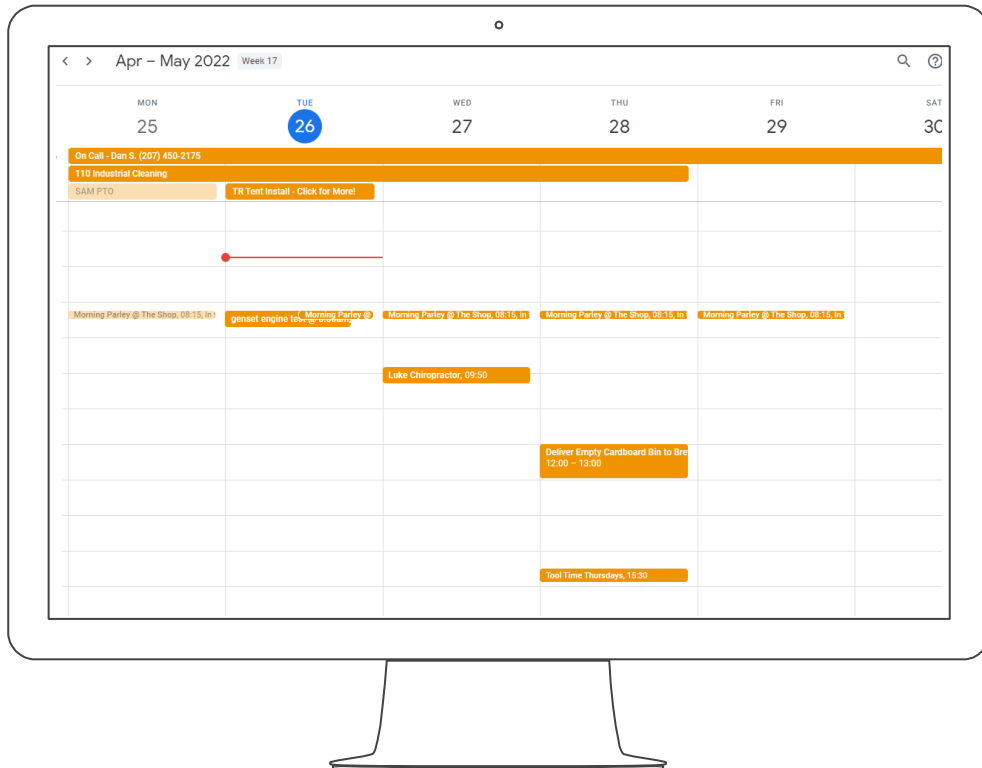
	A	B	C	D	E	F
1	<b>KHS MicroFiller</b>					
2	Date ▼	Subsection ▼	Operation Issues ▼	Action Taken ▼	Notes ▼	OPR ▼
80	3/1/22	Fill Valves 27&1		Swapped valves	valve 1 is now short-filling, so we know there is something going on in the valve itself, not the penumatic bank	DL/JL/JG
81	3/2/22	Fill valve 1	short fills	removed upper part of fill valve and replaced with fully rebuilt spare	Still leaking as of 3/3/22. Will rebuild and replace the "cage" part of the valve body first and foremost	DL
82	3/9/22	Fill valve 1	short fills	removed entire valve block and replaced with the OG 27 valve block as well and replaced deflection sleeve on vent tube	Appears to have solved the issue. Valve #1 is filling fine now, issue must have been in the valve body. Valve body S1 now needs to be cleaned and rebuilt	DL/MD
83	3/9/22	Bottle presence and bottle b	When the flag for valve 1 was reinstalled, the flag itself was a little too far out and crashed into the prox switches, destroying both	replaced torck switches with two on-hand spares that were originally used for the BH MLT.	OG switches had a range of 10mm, new switches had a range of 3mm. We had to align each of the lift cylinders with each prox switch and ensure that the flag would be read. 6 valves were unable to be read, and metallic bandaids allowed us to protrude the valve flag by one mm at a time. these need ot be removed when the correct sensors arrive	DL/JG/MD
84	4/5/22	Sight Glass Light	Unable to use, when it's turned on we get a filler error	Removed light	Currently sitting on shelf in MCC room	DL
85	4/15/22	Filler Carousel	Tons of broken bottles		it looks like the bottles are hitting the centering bell when they come off of the star wheel and onto the lifting elements. The mouth of the bottle is also dragging on the bell when it comes off the filler and onto the crowner star wheel. I think that without a height adjustment motor in place, there is no brake to stop it from falling further down	DL



# Communication - What and When?

## Maintenance calendar

Create an open and dedicated calendar for maintenance events, project info, staff availability and equipment downtime.





# Start Small - Write It Down

## Plan and Schedule

- “PM Calendar” - know when tasks are due ahead of time
- Simple sorting and filtering allows for prioritization

	A	B	C	D	E	F	G	H	I
1	BREWING, CELLAR, PIT, SAFETY, OTHER PM's				Last Updated	3/2/22 JG			
2	Last Done	Next Due	Area/Dep	Machine	Part/Acti	Frequency	Description	History	sv
42	12/1/17	1/1/18	Pumps	PP4 Peristaltic	Roller Inspectio	Annually			
43			Pumps	PP5 Cellar Blow	Vane Inspectio	6 Months			
44	12/1/17	12/1/18	Pumps	PP6 Centrifuge	Mech Seal	Annually			
45	12/1/17	12/1/18	Pumps	PP101 MicroFill	Mech Seal	Annually			
46	2/27/18	2/27/19	Pumps	PP101 MicroFill	Casing Gasket	Annually			
47	9/17/21	3/27/22	Packaging	Combikeg	Steam Filter	6 Months	Change out filter and send removed filter out for ultrasonic cleaning. Filter #1 & Filter #2 - keep track of how many times each has been cleaned		
48	11/15/21	5/15/23	Packaging	MicroFiller	Jetter Pump	18 Months	Change out Jetter Pump and send removed pump out for rebuild. Pump #1 & #2 - keep track of how many times each one has been rebuilt	10/22/20,10/27/21,11/	
49	10/14/21	4/14/22	Grain Handling	KICE	Filter Bags	Annually	Change out Filter Bags with new ones		
50	7/16/18	7/16/19	Grain Handling	KICE	Air Dryer Desicc	Annually	Pull Dessicant out and restore it in the oven - see procedure in Wilkerson manual		
51	10/14/20	4/14/21	Grain Handling	KICE	Intake Pipe Wor	6 Months	Open up and inspect intake pipe work from Silos in the spring and fall	10/14/20,4/14/21,10/1	
52	1/25/21	1/25/22	Brewhouse	Calandria	Inspection	Annually	Get in kettle and inspect condition of clandria and cleanliness of tubes	2/15/19,1/25/21,	
53	12/10/21	12/9/22	Utilities	Boiler	Internal Inspect	Annually	State Required Internal Inspection, Boiler must be shut down, cool and opened up	12/17/18,12/12/19,12/	
54	6/11/21	6/1/22	Utilities	Boiler	External Inspect	Annually	State Required External Inspection, must test low water cut off, boiler needs to be running	6/21/19,8/11/20,6/11/	
55	1/26/21	8/26/21	Utilities	Boiler	Boilermate Che	7 Months	Usually need new drum of Boilermate Anti-Scale chemical every 7 mo.	5/12/20,	
56			Utilities	Boiler	Colormetry Cart	5 Months	Usually need new Colormetry cartridge every 5 mo.		
57			Utilities	Boiler	Boiler Air Filter	6 Weeks	Usually need new air filters every 6 weeks		
58			Utilities	Boiler	Feedwater Tanl	Annually	Pull, inspect, and clean		
59	3/30/21	3/1/22	Utilities	Backflow Preve	BFPV-1 Fire Sys	Annually	High Tech Fire Protection		
60	3/12/21	3/1/22	Utilities	Backflow Preve	BFPV-2 Product	Annually	Nason		
61	3/12/21	3/1/22	Utilities	Backflow Preve	BFPV-3 Office	Annually	Nason		
62	3/12/21	3/1/22	Utilities	Backflow Preve	BPFV-4 Tasting	Annually	Nason		
63	3/12/21	3/1/22	Utilities	Backflow Preve	BPFV-5 Irrigati	Annually	Nason		



# Organisation

*Keep it simple - leverage technology*

- Organise your parts
- Organise your space
- Organise your work





# Organise your *Inventory*





# Organise your *Inventory*





# Organise your *Space*





# Organise your Work



seconds ago

\$ A

F

Serial/Size

DN50

DN50

DN50

DN100

DN80

DN100

DN50

DN50

DN25

DN65

DN50

DN50





# Start Small - Tag & Track

## Build Equipment History

- Tag/Label individual components that require maintenance
- Know when and how often something needs maintenance
  - i.e. - Manual valves, sight glasses, stationary and loose cellar parts



	A	B	C	D	E	F
1	Valves	Valve #	Location	Year	Size	Comments
96	<u>Tru-Flo</u>	T1	Spare	2018	2"	
97		T2	Spare	2018	2"	
98		T3	Spare	2018	2"	Replaced disc and screw 5/20/21
99		T4	Spare	2018	1 1/2"	
100		T5	Spare	2018	1 1/2"	
101		T6	Spare	2018	1 1/2"	Replaced handle and screw 1/25/22. Back in cellar
102		T7	Spare	2018	1 1/2"	
103		T8	Spare	2018	1 1/2"	
104		T9	Combikeg Pump	2018	2"	
105		T10	<b>Maintenance</b>	2018	2"	Out of Service, hex screw broke off in disc
106		T11	Cellar Pump	2018	2"	Out of Service, hex screw broke off in disc
107		T12	Cellar Water Drop(FV1)	2018	1 1/2"	
108		T13	Cellar Hose (FV1)	2018	1 1/2"	
109		T14	Spare	2018	2"	
110		T15	Centrifuge Pump	2018	2"	Placed on Centrifuge Pump, previously on shelf
111		T16	Spare	2018	1 1/2"	
112		T17	Dosing Pump Outlet	2018	1 1/2"	
113		T18	Spare	2018	1 1/2"	
114		T19	Spare	2018	1 1/2"	
115		T20	Spare	2018	1 1/2"	



# Start Small - Tag & Track

## Build Equipment History

- Another example - hose inspections
- Simple things can prevent major problems



	A	B	C	D	E	F	G	H	I	J	K	L	M
1		MBC BREWERS HOSE INVENTORY & INSPECTION DATA											
2													
3													
4	Mark	Hose	Hose Brand	Length	Diameter	Month	Year	Color	In Service?	Comments	Usability	Last Condition 1, 2, 3, 4	Inspection Notes 2021 Q4
21		17	Vintner Reserve EPDM	18	1 1/2"	June	2021	Grey w/ Yellow	Y	OMNI		1	
22	Mark	19	Vintner Reserve EPDM	25	2"	June	2021	Grey w/ Yellow	Y	OMNI		1	
23	Mark	20	Vintner Reserve EPDM	20	2"	June	2021	Grey w/ Yellow	Y	OMNI		1	
24	Mark	21	Vintner Reserve EPDM	20	2"	June	2021	Grey w/ Yellow	Y	OMNI		1	
25	Mark	22	Vintner Reserve EPDM	20	2"	June	2021	Grey w/ Yellow	Y	OMNI		1	
26	Mark	28	Continental Vintner	10	1 1/2"	September	2019	grey w/ purple	Y				
27		29	Vintner Reserve EPDM	18	1 1/2"	June	2021	Grey w/ Yellow	Y	OMNI		1	
28	Mark	30	Continental Vintner	25	1 1/2"	September	2019	grey w/ purple	Y				
29	mark	31	Continental Vintner	25	1 1/2"	September	2019	grey w/ purple	Y				
30		32	Purple Snake	4.5	1 1/2"	September	2019	red	Y	for bottling pump outlet			
31		33	Continental Vintner	10	1 1/2"	June	2020	grey w/ purple	CIP	From PRC		4	Marked CIP only march 2021. Puckered ends, mir
32	Mark	CV1	Continental Vintner	18	1 1/2"		2015	grey w/red	Y				
33	Mark	CV3	Continental Vintner	15.5	1 1/2"		2015	grey w/ purple	Y				
34		N1	Novabrew	25	1 1/2"	April	2018	burgundy	Y	For yeast process only		4	EndoN: 0:08 Black spots, 0:18 Gross blemish, 0:5
35		N2	Novabrew	25	1 1/2"	April	2018	burgundy	Y	For yeast process only		4	Minor puckering on one side. IDK what theother
36		N3	Novabrew	15	1 1/2"	April	2018	burgundy	Y	For yeast process only		4	N3Bore: 0:33 black spotting, 0:39 blemishes, loo
37		N5	Novabrew	5	1"	November	2018	burgundy	Y	For yeast process only		4	puckering, black spotting and blemishes through
38		P1	Purple Snake	10	1 1/2"	June	2020	red	Y				
39		P2	Purple Snake	20	1 1/2"	June	2020	red	Y				



# ***Standardise***

## ***Keep it simple - run lean***

- Inventory consolidation
- Tool standardisation opportunities
- Standardise prints and drawings





# Standardise - Rebuild Kits

## *Keep it simple - run lean*

- Parts List with Quantities
- Tool list
- Mechanical drawings and or Instructions



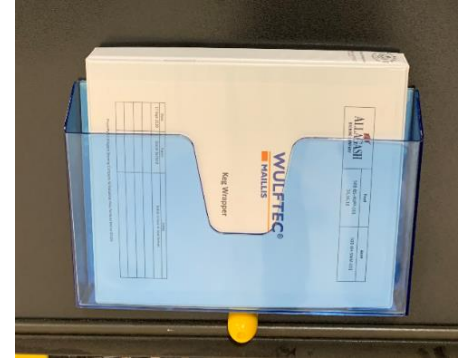
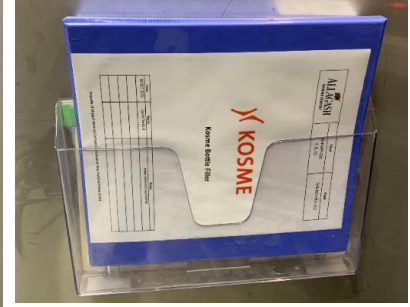


# Standardise - Schematics

Before:



After:





# Thanks!

## Any questions?

You can find us at:

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[engineering@mainebeercompany.com](mailto:engineering@mainebeercompany.com)