Kaizen/Project Report Out

June 28, 2018

Report Out

by

David Babcock

618 Productivity Status Update

Knapheide Manufacturing 618 High Hour Production Line

April 2018

Team Members:

Ron Hageman	Assembly Manager
Matt Sly	Plant Superintendent, 3rd Shift
Dyllon Howard	618 Coach, 2nd Shift
Tim Vandenburg	618 Coach, 1st Shift
Carson Noble	Manufacturing Engineer
Dave Babcock	Process Excellence Leader

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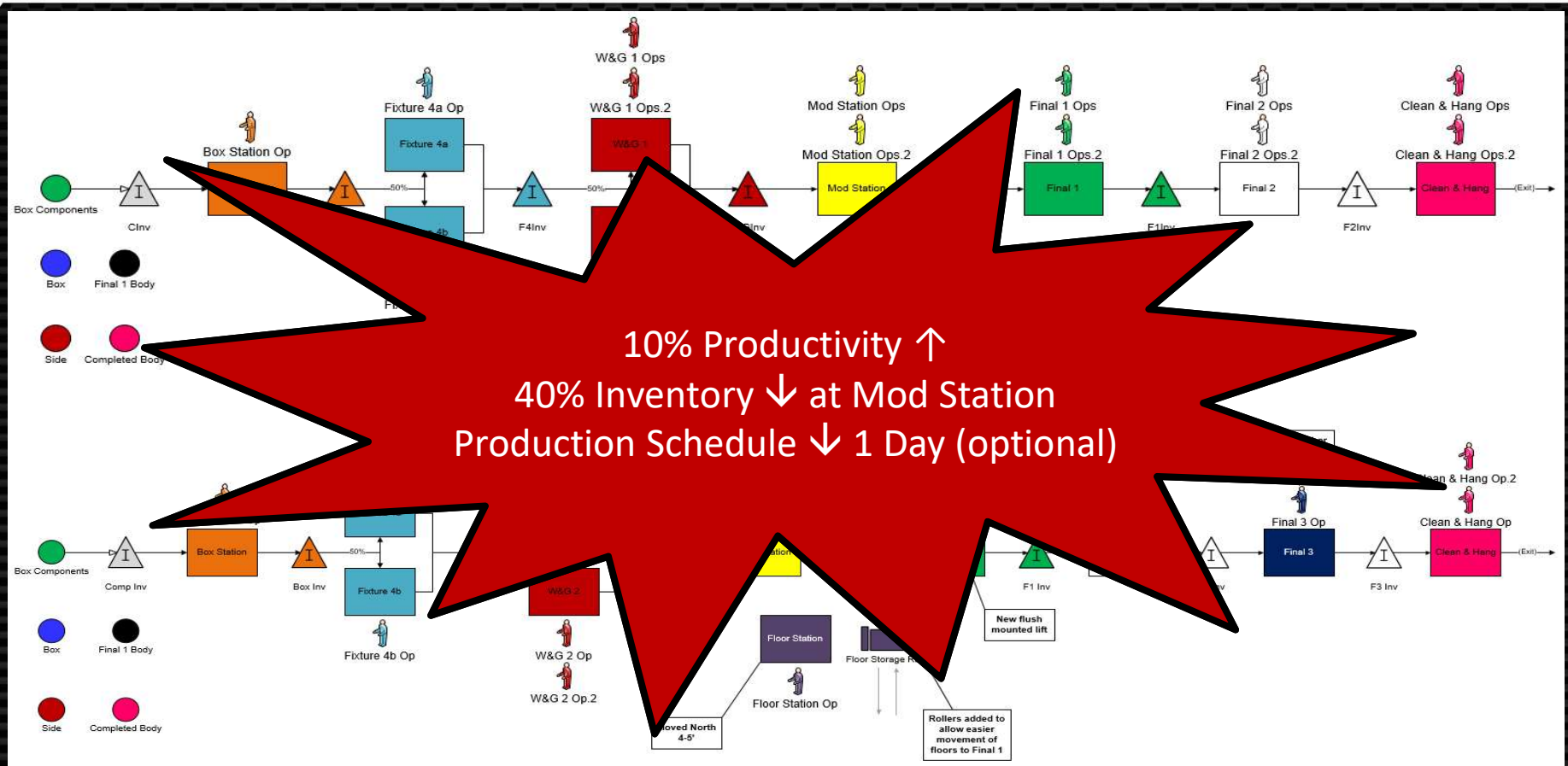
618 Productivity Status Update

Situation	618 Productivity has been down due to the increase in SMO's this year. As a result, more high hour bodies are being pushed through 618 causing a bottleneck at Final Assembly.
Objective	Alleviate bottleneck at 618 Final Assembly by adding Final Assembly capacity and load balancing Final Assembly.
Lean/Six Sigma Tools used	Project Charter, Brainstorming, Process Mapping, Simulation, Affinity Diagrams, Run Charting, Performance Trending, Cost-Benefit Analysis
Key Wastes or Problems found	• **Delivery** – Bottleneck at Final Assembly creates wait time upstream • **Delivery** – High hour bodies in Final Assembly with standards in queue propagates bottleneck • **6S** – Clutter in Final Assembly area creates difficulty moving sides around large bodies at Final • **6S** – 617 roof storage prevents access to 618 side tracker for Final Assembly off-load
Accomplished Actions during event (Results)	• Developed plan for expanding Final Assembly to 3 stations (match 608/617) • Modified 618 weldment routings to split between 618 & 609 after 618 Door Station • Aligned on event to move re-work off production lines to free up movement space on lines
Follow Thru Actions	• Identify solution for balancing Final Assembly – in-floor hoist option not feasible • CAR for expanding Final Assembly (move floor station, remove rollers, install lift) • ME led project to move re-work off production lines – will lead to 6S events across all lines
Sustainment	• Update Work Instructions for 618 once new Final Assembly station installed • 6S events needed across all production lines once re-work location defined (timing TBD)

Measure	Goal	Before Event	After Event
Productivity	10% Productivity ↑	76%	86% (target)



Current Layout - 6 day week (133.5 hours)

Scoreboard (Avg. Reps)

Name	Total Exits	Average Time In System (Min)	Average Time In Operation (Min)
Box Components	1,914.00	23.72	14.37
Box	473.70	99.11	57.53
Side	236.10	68.72	45.40
Final 1 Body	119.20	978.69	64.71
Completed Body	101.80	630.23	135.37

Proposed Layout* - 5 day week (111.25 hrs)

Scoreboard (Avg. Reps)

Name	Total Exits	Average Time In System (Min)	Average Time In Operation (Min)
Box Components	1,596.00	23.68	14.34
Box	393.60	100.24	57.61
Side	194.70	68.71	45.36
Final 1 Body	107.00	616.05	59.73
Completed Body	99.00	310.99	155.64

618 Routing & Planning SOP's Report Out

Knapheide Manufacturing 618 High Hour Production Line
May 2018

Team Members:

Samantha Robertson	618 Planner
Victor Norton	609 Planner
Jeremy Evans	PIC Manager
Dyllon Howard	618 Coach, 2nd Shift
Matt Sly	Plant Superintendent, 3rd Shift
Ron Hageman	Assembly Manager
Bill Greving	Manufacturing Engineer/Costing
Doug Weese	609 Coach, 1st Shift
Dave Babcock	Process Excellence Leader

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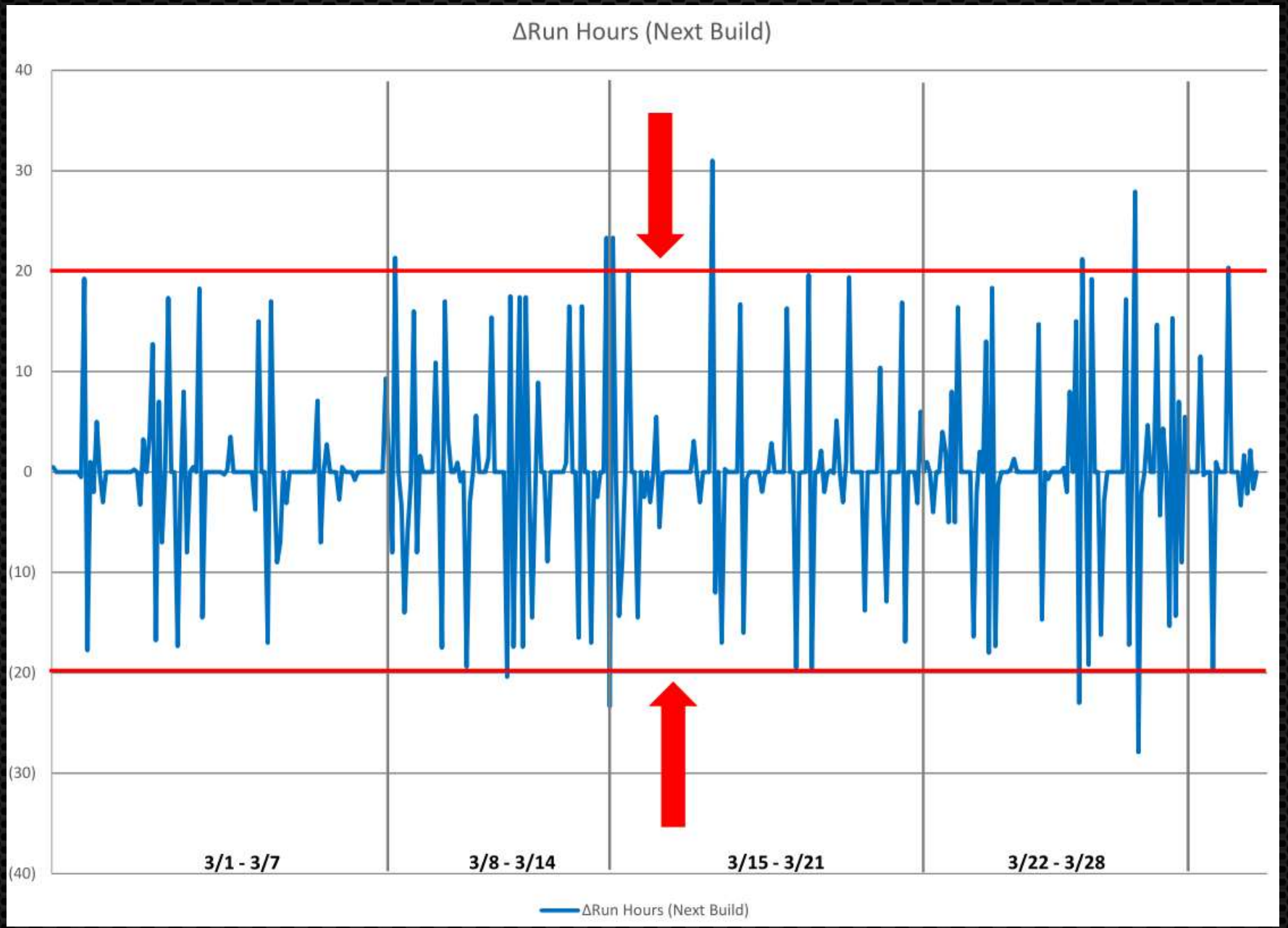
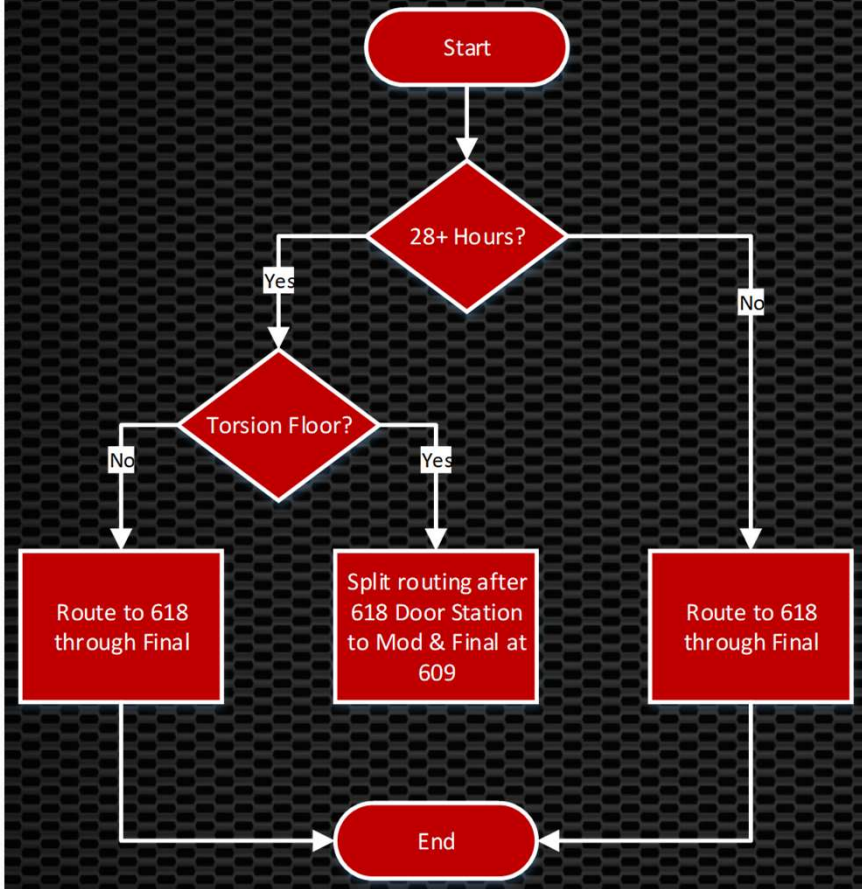
618 Routing & Planning SOP's Report Out

Situation	618 Productivity has been down due to the increase in SMO's this year. As a result, more high hour bodies are being pushed through 618 causing a bottleneck at Final Assembly.
Objective	Alleviate bottleneck at 618 Final Assembly by off-loading sides post-Door Station to 609 for Mod & Final Assembly. Essentially adding Mod/Final Stations for 618 to utilize.
Lean/Six Sigma Tools used	Project Charter, Brainstorming, Process Mapping, Simulation, Affinity Diagrams, Run Charting, Performance Trending, Cost-Benefit Analysis
Key Wastes or Problems found	• **Delivery** – Bottleneck at Final Assembly creates downtime upstream • **Delivery** – High hour bodies in Final Assembly with standards in queue propagates bottleneck
Accomplished Actions during event (Results)	• SOPs & updated routings for off-loading assembled sides after Door Station to 609 • Planning specific weldments in more manageable order quantities for load balancing
Follow Thru Actions	• SOP's approved and Controlled Document in Doc Library – **in progress** • Training developed for Coaches & Planners on SOP execution – **after SOP approval**
Sustainment	• Validate split routing sustainable – verification run needed – 2 weeks out due to 609 capacity

Measure	**Goal**	**Before Event**	**After Event**
Productivity	10% Productivity ↑	76%	86% (target)


ΔRun Hours (Next Build)
40
30
20
10
0
(10)
(20)
(30)
(40)
3/1 - 3/7
3/8 - 3/14
3/15 - 3/21
3/22 - 3/28
ΔRun Hours (Next Build)

AS400 Routing



AmeriGas & United Rentals

Amerigas weldments (numbers below) will be planned in orders of **3** (reduced from 6).

Amerigas Weldments
32459750
32469080

United Rentals weldments (numbers below) will be planned in orders of **3** (reduced from 10).

United Rental Weldments		
32860700	32860890	33174440
32513540	32874160	33170640
32407780	32805510	32860700
32789590	32914770	33192300

CMW Hoist Install Time Savings

Knapheide Truck Equipment Centers & Distributors

May 2018

Team:

Brooks Bainter	NPD Strategic Buyer, Purchasing
Beth Katenin	Product Manager, Marketing
Jake Ludwig	Product Support Service Coordinator
Doug Roberts	Production Manager, 5th Street
Raymond Boone	Installer, 5th Street
Lamor Hickman	Continuous Improvement Intern
Dave Babcock	Process Excellence Leader

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CMW Hoist Install Savings Report Out

Situation	Knapheide and CMW have worked together to develop a new electrical dual acting hoist to replace the current hoists sourced by KTEC's and Knapheide distributors. This opportunity was identified as a cost savings and install improvement opportunity by the Supply Chain group.
Objective	Realize material and install time savings vs current electrical dual acting hoist on the market today.
Lean/Six Sigma Tools used	Time Studies, Cost-Benefit Analysis, Engineering Design Validation
Key Wastes or Problems found	• KTEC's installing scissors into sub-frame prior to mounting unit on chassis • Cutting & re-welding 'support ears' on sub-frame • Unwiring and rewiring of pump controller unit • Engineering drawing modifications flagged during Validation installation
Accomplished Actions during event (Results)	• CMW mounts scissors into sub-frame as part of 'Level 1 Install' for KTEC's – **33 min savings** • Bolt-on 'support ears' vs cut & weld – **21 min savings** • Quick connect controller – **15 min savings** • Engineering drawings updated – ensure seamless transition to CMW for KTEC/Distributors
Follow Thru Actions	Quality Spot checks on CWM hoists – ensure all reflect Engineering updates
Sustainment	Update Install code to reflect 1.15 hour reduction – L. Sprinkle Install code updated **6/28,** Pricing update effective **7/1**

Measure	**Goal**	**Before Event**	**After Event**
Install Time	1 hour install savings	6.5 hours (sub-frame mount)	**5.35 hours (sub-frame mount)**
Knapheide Total Value	$275,000 ($230/length)	$0 total value	**$414,000 total value**

Current Case - 9' - Rugby 'Lvl 0 Install'		
Hourly Variable Labor Rate (KTEC)	$	30
Install Time Savings (hours)		0
Purchase Price	$	1,665
Volume (2017)		404
Annual [illegible]bor Savings	$	
Annual Mate[illegible]t	$	
Total Cost	$	
Hourly Varia[illegible]		
Install Time Saving[illegible]		
Manufacturing co[illegible]		
Sales cost[illegible]		
Volume (2017)		
Savings/ to KTEC (per hoist)	$	
Annual Labor Savings (KTEC)	$	
Annual Gross Profit (KMAN)	$	[illegible]8
Annual Material Savings (KTEC)	$	6[illegible]660
Total Value Proposition	$	125,846

Current Case - 11' - Rugby 'Lvl 0 Install'		
Hourly Variable Labor Rate (KTEC)	$	30
Install Time Savings (hours)		0
Purchase Price	$	1,902
Volume (2017)		413
Annual La[illegible]gs	$	-
Annua[illegible]ost	$	785,526
Tot[illegible]	$	(785,526)
	$	30
		1.15
		[illegible]50
	$	1,575
		413
Sav[illegible](per hoist)	$	327
Annual La[illegible]avings (KTEC)	$	14,249
Annual Gross Profit (KMAN)	$	51,625
Annual Material Savings (KTEC)	$	135,051
Total Value Proposition	$	200,925

TOTAL VALUE PROPOSITION

$414,000

(Labor, Material Cost, KMAN Net Revenue)

Option - Venco 516 dual acting 'Lvl 0 Install'	
Hourly Variable Labor Rate (KTEC)	$ 30
Install Time Savings (hours)	0
Purchase Price	$ 1,664
Volume	23
Annual Labor Savings (vs Rugby Lvl 0)	**$ -**
Annual Material Cost	**$ 38,272**
Total Cost	**$ (38,272)**

Option - Venco 520 dual acting 'Lvl 0 Install'	
Hourly Variable Labor Rate (KTEC)	$ 30
Install Time Savings (hours)	0
Purchase Price	$ 1,849
Volume	26
Annual Labor Savings (vs Rugby Lvl 0)	**$ -**
Annual Material Cost	**$ 48,074**
Total Cost	**$ (48,074)**

Future Case - CMW vs Venco 516 dual acting	
Hourly Variable Labor Rate	$ 30
Install Time Savings (hours)	1.15
Manufacturing cost	$ 1,388
Sales cost	$ 1,500
Volume (2017)	23
Savings to KTEC (per hoist)	$ 164
Annual Labor Savings (KTEC)	**$ 794**
Annual Gross Profit (KMAN)	**$ 2,576**
Annual Material Savings (KTEC)	**$ 3,772**
Total Value Proposition	**$ 7,142**

Future Case - CMW vs Venco 520 dual acting	
Hourly Variable Labor Rate	$ 30
Install Time Savings (hours)	1.15
Manufacturing cost	$ 1,450
Sales cost	$ 1,575
Volume (2017)	26
Savings to KTEC (per hoist)	$ 274
Annual Labor Savings (KTEC)	**$ 897**
Annual Gross Profit (KMAN)	**$ 3,250**
Annual Material Savings (KTEC)	**$ 7,124**
Total Value Proposition	**$ 11,271**

Option - Champion S615 dual acting 'Lvl 1 Install'	
Hourly Variable Labor Rate (KTEC)	$ 30
Install Time Savings (hours)	0
Purchase Price	$ 1,904
Volume	50
Annual Labor Savings (vs Rugby Lvl 0)	**$ -**
Annual Material Cost	**$ 95,200**
Total Cost	**$ (95,200)**

Option - Crysteel 510 dual acting 'Lvl 1 Install'	
Hourly Variable Labor Rate (KTEC)	$ 30
Install Time Savings (hours)	0
Purchase Price	$ 1,579
Volume	60
Annual Labor Savings (vs Rugby Lvl 0)	**$ -**
Annual Material Cost	**$ 94,740**
Total Cost	**$ (94,740)**

Future Case - CMW vs Champion S615 dual acting	
Hourly Variable Labor Rate	$ 30
Install Time Savings (hours)	0.25
Manufacturing cost	$ 1,450
Sales cost	$ 1,575
Volume (2017)	50
Savings to KTEC (per hoist)	$ 329
Annual Labor Savings (KTEC)	**$ 375**
Annual Gross Profit (KMAN)	**$ 6,250**
Annual Material Savings (KTEC)	**$ 16,450**
Total Value Proposition	**$ 23,075**

Future Case - CMW vs Crysteel 510 dual acting	
Hourly Variable Labor Rate	$ 30
Install Time Savings (hours)	0.25
Manufacturing cost	$ 1,450
Sales cost	$ 1,575
Volume (2017)	60
Savings to KTEC (per hoist)	$ 4
Annual Labor Savings (KTEC)	**$ 450**
Annual Gross Profit (KMAN)	**$ 7,500**
Annual Material Savings (KTEC)	**$ 240**
Total Value Proposition	**$ 8,190**

Option - Venco 516 single acting ' Lvl 0 Install'		
Hourly Variable Labor Rate (KTEC)	$	30
Install Time Savings (hours)		0
Purchase Price	$	1,553
Volume		190
Annual Labor Savings (vs Rugby Lvl 0)	**$**	-
Annual Material Cost	**$**	**295,070**
Total Cost	**$**	**(295,070)**

Future Case - CMW vs Venco 516 single acting		
Hourly Variable Labor Rate	$	30
Install Time Savings (hours)		1.15
Manufacturing cost	$	1,388
Sales cost	$	1,500
Volume (2017)		190
Savings to KTEC (per hoist)	$	53
Annual Labor Savings (KTEC)	**$**	**6,555**
Annual Gross Profit (KMAN)	**$**	**21,280**
Annual Material Savings (KTEC)	**$**	**10,070**
Total Value Proposition	**$**	**37,905**

Single Acting not Dual Acting – CMW better motor

Project 50 Kitting/Hitch Updates

Knapheide Truck Equipment Centers & Distributors

2018

Team:

Beth Katenin	Product Manager, Marketing
Mark Rose	Supervisor, Service Body & Platform Engineering
Kent Birt	Project Manager, Product Engineering
Dave Babcock	Process Excellence Leader

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Correcting Kits/Practice	Ford	GM	Dodge
Short	-	-	-
696	10 mins	5 mins	5 mins
6108	5 mins	10 mins	5 mins
6132	5 mins	5 mins	5 mins

Bumper/Rail	Ford	GM	Dodge
Short	-	-	-
696	10 mins	10 mins	15 mins
6108	20 mins	10 mins	30 mins
6132	20 mins	10 mins	30 mins

Hitch	Ford	GM	Dodge
Short	-	-	-
696	-	50 mins	50 mins
6108	50 mins	50 mins	50 mins
6132	50 mins	50 mins	50 mins

Cutting Chassis	Ford	GM	Dodge
Short	-	-	-
696	-	-	-
6108	-	15 mins	-
6132	-	-	-

Pre-Punched Marker Light/License Plate Braket	Ford	GM	Dodge
Short	-	-	-
696	10 mins	10 mins	10 mins
6108	10 mins	10 mins	10 mins
6132	10 mins	10 mins	10 mins

Totals	Ford	GM	Dodge
Short	-	-	-
696	30 mins	75 mins	80 mins
6108	85 mins	95 mins	95 mins
6132	85 mins	75 mins	95 mins

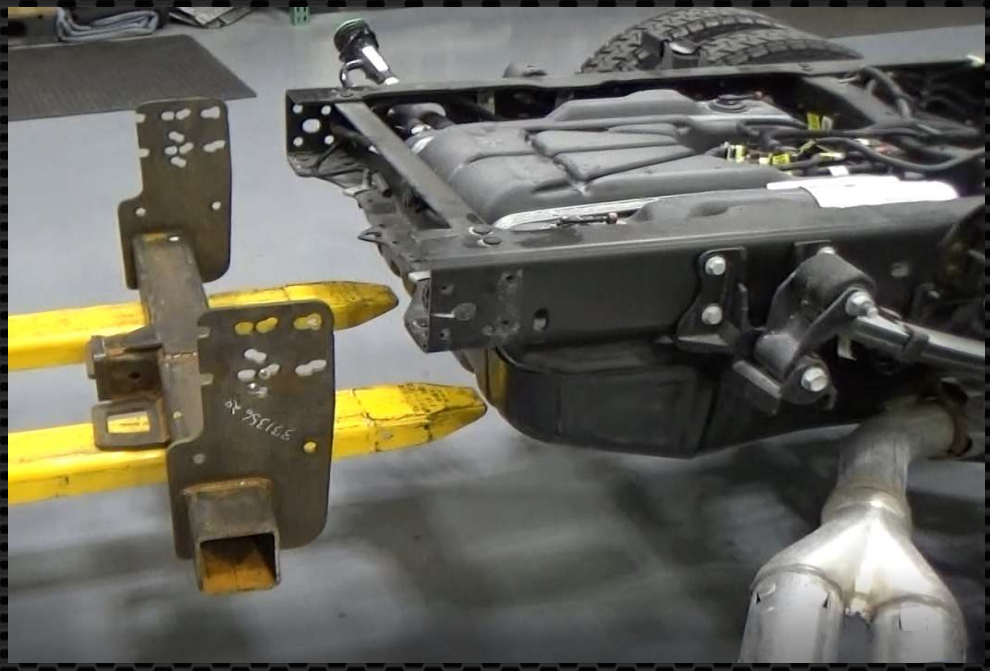
Best Case Cost - Fully Bolt On Design		
Hourly Variable Labor Rate	$	30
Install Time Savings (hours)		0.8333
Manufacturing cost (target)	$	93
Sales cost	$	112
Volume (non-56 UBs)		6000
Gain/Loss to KTEC (per hitch)	$	(0)
Annual Labor Savings	$	149,994
Annual Gross Profit	$	111,600
Annual Gain/Loss to KTEC	$	(960)
Total Value Proposition	$	260,634

Current Case Cost - Fully Bolt On Design		
Hourly Variable Labor Rate	$	30
Install Time Savings (hours)		0.8333
Manufacturing cost (current)	$	130
Sales cost	$	156
Volume (non-56 UBs)		6000
Gain/Loss to KTEC (per hitch)	$	(45)
Annual Labor Savings	$	149,994
Annual Gross Profit	$	156,000
Annual Gain/Loss to KTEC	$	(267,360)
Total Value Proposition	$	38,634

KTEC Cost		
Buyer's Hitch cost	$	81.44
Variable Labor (per hour)	$	30
Current Hours		1
Current Cost	$	111

current cost - 18K design

20% markup - per Marketing



Report Out

by

Christy Frankel

Red Oak PGNB install time reduction

Knapheide Truck Equipment Company Red Oak, TX
Week of 6/4

Team Members
Hardie Harris – Vice President
Tim Pike – General Manager KTEC Red Oak
Russ Boozer – QC Manager/Design Engineer
Andy Price – Platform Installer
Mark Rose – Supervisor, Service Body and Platform Standard Engineer
Joey Underhill – Senior Product Designer
Christy Frankel – Process Excellence Leader

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Red Oak PGNB install time reduction

Situation	Red Oak mounts significant number of goose neck bodies and will be impactful if there is a reduction in installation time from 4.5 hrs.
Objective	Reduce install time on PGNB-96 bodies by at least 30 minutes.
Lean/Six Sigma Tools used	Time Study Standard work DMAIC
Key Wastes or Problems found	No standard work and lack of point of use tools
Accomplished Actions during event (Results)	• Modified mounting brackets as they were being installed backwards • Communicated the need to follow provided install instructions • Deviation submitted to Quality to implement change in factory immediately • Updated the drawing for all 9' PGN A/B/C models to have the gusset moved from the front cross member to the second • Yearly savings of $38,000 based off of 2017 figures
Follow Thru Actions	• Follow up time study to guarantee the standard work instructions are being followed and install time has been reduced • Update TEQuote • Update Fleet price • Training on standard work
Sustainment	• Audit the process • Document in Training Tracker

Measure	**Goal**	**Before Event**	**After Event**
Install time	<4.5 hrs.	4.5 hrs.	4 hrs.

Improve toolbox mounting bracket install time

Knapheide Truck Equipment Company Red Oak, TX
Week of 6/4

Team Members
Hardie Harris – Vice President
Tim Pike – General Manager KTEC Red Oak
Russ Boozer – QC Manager/Design Engineer
Andy Price – Platform Installer
Mark Rose – Supervisor, Service Body and Platform Standard Engineer
Debbie Pursifull – Strategic Buyer (KTEC)
Christy Frankel – Process Excellence Leader

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Improve toolbox mounting bracket install time

Situation	Toolbox mounting bracket change from top install to side bolt on install to prevent water entering toolbox.
Objective	Reduce install time by at least 30 minutes
Lean/Six Sigma Tools used	Time Study Standard work DMAIC
Key Wastes or Problems found	• No standard work • Lack of point of use tools
Accomplished Actions during event (Results)	• New part number set up for side installation • The new part number is 80041100 • Follow-up install time validation is complete
Follow Thru Actions	• Update TEQuote • Update Fleet price • Update Standards • Purchasing working with supplier to obtain the best price for the bracket.
Sustainment	• Audit the process • Document in Training Tracker

Measure	**Goal**	**Before Event**	**After Event**
Install time	<2 hrs.	2 hrs.	1 hr.

MPV Ladder Rack install

Knapheide West Quincy

Team Members

Richard Pfleging – General Manager

Adam Stark – Team Leader

Adam Scott – Installer

Chuck Barnes – Installer

Christy Frankel – Process Excellence Leader

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MPV ladder rack install time

Situation	MPV ladder rack installation exceeding allotted install time and need to be reduced
Objective	Reduce install hours by at least 45 min.
Team Members	Richard Pfleging (Sponsor), Christy Frankel (Leader), Adam Stark (Green Belt), Adam Scott and Chuck Barnes
Lean/Six Sigma Tools used	Time Study and Standard Work
Key Wastes or Problems found	• No standard work • Work space needs to be altered to have a better work flow • The bolts, nuts and washers are being handled multiple times • The installers are sharing tools when bolting the ladder rack to the vehicle • All parts are being laid out on the table before install • All holes in the parts received are having to be bored out • Holes that are being bored are not being touched up
Accomplished Actions during event (Results)	• Reorganized work station layout • Adequate tools purchased for both installers • Moved to a one piece flow process
Follow Thru Actions	• Update work instructions • Work with Supply Chain to have nut and bolts sent in bulk
Sustainment	• Audit the process • Document in Training Tracker

Measure	Goal	Before Event	After Event
Install time	2.25 hrs.	3 hrs.	2.25 hrs.

Report Out

by

David Kasza

Standardize 608 box station parts

Location: KMAN

Date: May 14 – May 21 2018

Team Members

Carson Noble – Manufacturing Engineer
Ryan Blue – Fab Materials
Dave Tanner - Purchasing
Jeremy Evans – PIC
Jennifer Brown - Purchasing
David Kasza – Process Excellence Leader

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Phase 1 Standardize 608 box station parts

Situation	• Currently parts for all but 1 model (8 parts) are kitted for 608 box station • Kitting small batch orders is more time consuming than assembly at box station
Objective	• Eliminate kitting required for orders that run on production line 608 • Phase 1: Identify the highest volume UBs and the parts required to build for KanBan replenishment at 608 Box station
Team Members	Dave Kasza, Ryan Blue, Carson Noble, Dave Tanner, Jeremy Evans, Jennifer Brown,
Lean/Six Sigma Tools used	• DMAIC project, Measure and Analyze.
Key Wastes or Problems found	• Duplicate parts for outsource vs. Fab formed panels • Unbalanced work flow between kitting and box station
Accomplished Actions during event (Results)	• Identified highest volume product families up to 17.5K units annually • 44 panels identified to build 5 highest volume models • 100% of box station parts organized for KanBan delivery setup.
Follow Thru Actions	• Move to Phase 2: Material storage, handling and delivery to 608 box station • Planning UB reshuffle
Sustainment	• Do not go back to kitting the orders for 608 box station

Measure	**Goal**	**Before Event**	**After Event**
	No kitting	All but 8 panels kitted	100% of parts identified for KanBan

537 KanBan Commonly Used Parts

Location: KMAN

Date: May 1 – May 4 2018

Team Members

Lance Jones – Plant Superintendent
Matt Smyser – Coach
Ed Spoonmore - Coach
Robert Buckalew - Coach
David Kasza – Process Excellence Leader

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537 KanBan Common parts to kit shed

Situation	• Many parts for production are not on pick lists and therefore are not kitted. • The parts are consumed without a replenishment system in place leading to shop delays.
Objective	• Create a system that eliminates shop delays associated with running out of the identified common parts from the kit shed
Team Members	Dave Kasza, Ed Spoonmore, Lance Jones, Matt Smyser Logan Buckalew
Lean/Six Sigma Tools used	• DMAIC project • KanBan, Just in time.
Key Wastes or Problems found	• Upon startup of CCU 537 production ran out of multiple common parts before requesting for replenishment. • This caused delays which negatively impacted productivity
Accomplished Actions during event (Results)	• Identified 11 parts not kitted but required for production. • Created KanBan cards, trained the employees and coaches on use of the system. • Requested initial stocking levels then turned it loose for the process owners to manage.
Follow Thru Actions	• Create signoff sheet for tracking employee training for use of KanBan
Sustainment	• Training and Audit

Measure	**Goal**	**Before Event**	**After Event**
	No shop delays	3 shop delays in 2 weeks	No shop delays since

Before

After

636(Trim) and 607(Side Assembly) Improvements

CI Interns

Jamie Howell

Lamor Hickman

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636 Trim Center Improvements

15 Prioritized action items to improve tool and material flow

1	Part Presentation and organization to the wire line.	2
2	Part Presentation and oganization to the (2) PGN Stations	2
3	Part Presentation and oganization to the mod stations.	2
4	Part Presentation and oganization to the misc stations.	2
5	Part Presentation and oganization to the plug and caulk and final inside line.	2
6	Tool Organization on low hour line.	1
7	Tool Organization on wire line.	1
8	Tool Organization on high hour line.	1
9	Tool Organization on PGN stations.	1
10	Tool Organization on mod stations.	1
11	Tool Organization on misc station.	1
12	Tool Organization on final line.	1
13	Tool Organization in plug and caulk.	1
14	Tool Organization in side assy unhang.	1
15	Organize how we are seeing parts coming to the Trim Center (SFC) and coordinating Parts to arrive at the same time.	1

Identify current tools used at all Trim stations with qty., pictures and storage method

Review the list in detail with all three shifts for the right choice of tool for the job.

Assign a location for every tool with storage standardization between all Trim stations

CRESCENT WRENCH 10"	1	Located in a drawer with assorted other wrenches.	
VISE GRIP 7"	1	Located in a drawer with assorted pliers.	
5/32" T-ALLEN	1	Located in a completely unorganized drawer.	

607 Side Assembly Improvements

5s tools at all Side Assembly stations

Identify tools used at all 14 stations

RC3 Tailgate robot		QTY	NEED	SHARE
	PIPE CLAMPS	1		
	2" ANGLE HEAD GRINDER	1		
	WIRE WHEEL	1		
	HARDWHEEL	1		
	VICE GRIPS	1		
	SCISSOR	1		
	6" SCRAPER	2	1	
	3" SCRAPER	1	1	
	BAND CUTTER	1		
	HAMMER	1		
	90 DEG DIE GRINDER	1		
	DA GRINDER	1		
	BALL PEEN HAMMER	1		
	CRESCENT WRENCH	2	1	
	ALLEN WRENCH SET LG	1		
	ALLEN WRENCH SET SM	1	1	
	T-HANDLE 1/8" ALLEN WRENCH	1		
	BLACK RUBBER MALLET	1		
	BOX CUTTER	1		
	FLAT HEAD SCREW DRIVER EXRTA LONG	1		
	CAULKING GUN	1		
	TAPE MEASURE	1		
	5" GRINDER	1		
	HAND CHISEL	1		
	VISE GRIP CLAMPS	4	2	
STEAK RACK ROBOT	4" CLAMPS	3		
	WIRE WHEEL	1		
	BALL PIN HAMMER	1		
	FLAT HEAD SCREW DRIVER EXRTA LONG	1		
	HAND CUTTER	1	1	
	HAND CHISEL	1	1	
	6" SCRAPER	1		
	ALLEN WRENCH SET LG	1		
	ALLEN WRENCH SET SM	1		
	HARD WHEEL	1		1

Implement shadow boards for tools - currently being fabricated

Organize tools on the new board

Created and posted daily audit sheet for house keeping.

Steel UB Improvement Plan

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Steel UB Improvement Plan - Summary

- Ecoat, Assembly, Side Assembly, Paint and Trim are consistent historical constraints

- Ecoat limits number of UBs possible per shift, and at times constrains output
- Side Assembly has peaks and valleys – constraining loads at times
- Paint is outsourced and is constraint at times, causing planned delays
- Assembly runs 6 days a week, and constrains capacity every week
- Number of associates in area is a constraint
- Trim has been historical constraint

Areas to review/summarize

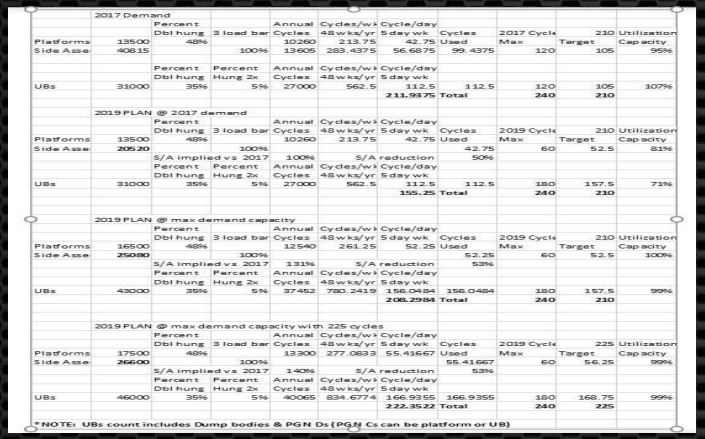
- Ecoat
- Side Assembly
- UB Assembly
- Paint
- Trim

Areas not reviewed

- Fab
- Platform Assembly
- Dock
- Kit Shed
- Indirects

Constraint Analysis

Ecoat Capacity



2017 Demand										
		Percent Dbl hung	3 load bar	Annual Cycles	Cycles/wk 48 wks/yr	Cycle/day 5 day wk	Cycles Used	2017 Cycle Max	210 Target	Utilization Capacity
Platforms	13500	48%		10260	213.75	42.75	42.75			
Side Asse	40815		100%	13605	283.4375	56.6875	99.4375	120	105	95%
		Percent Dbl hung	Percent Hung 2x	Annual Cycles	Cycles/wk 48 wks/yr	Cycle/day 5 day wk				
UBs	31000	35%	5%	27000	562.5	112.5	112.5	120	105	107%
						211.9375	Total	240	210	
2019 PLAN @ 2017 demand										
		Percent Dbl hung	3 load bar	Annual Cycles	Cycles/wk 48 wks/yr	Cycle/day 5 day wk	Cycles Used	2019 Cycle Max	210 Target	Utilization Capacity
Platforms	13500	48%		10260	213.75	42.75	42.75			
Side Asse	20520		100%				42.75	60	52.5	81%
		S/A implied vs 2017		100%	S/A reduction		50%			
		Percent Dbl hung	Percent Hung 2x	Annual Cycles	Cycles/wk 48 wks/yr	Cycle/day 5 day wk				
UBs	31000	35%	5%	27000	562.5	112.5	112.5	180	157.5	71%
						155.25	Total	240	210	
2019 PLAN @ max demand capacity										
		Percent Dbl hung	3 load bar	Annual Cycles	Cycles/wk 48 wks/yr	Cycle/day 5 day wk	Cycles Used	2019 Cycle Max	210 Target	Utilization Capacity
Platforms	16500	48%		12540	261.25	52.25	52.25			
Side Asse	25080		100%				52.25	60	52.5	100%
		S/A implied vs 2017		131%	S/A reduction		53%			
		Percent Dbl hung	Percent Hung 2x	Annual Cycles	Cycles/wk 48 wks/yr	Cycle/day 5 day wk				
UBs	43000	35%	5%	37452	780.2419	156.0484	156.0484	180	157.5	99%
						208.2984	Total	240	210	
2019 PLAN @ max demand capacity with 225 cycles										
		Percent Dbl hung	3 load bar	Annual Cycles	Cycles/wk 48 wks/yr	Cycle/day 5 day wk	Cycles Used	2019 Cycle Max	225 Target	Utilization Capacity
Platforms	17500	48%		13300	277.0833	55.41667	55.41667			
Side Asse	26600		100%				55.41667	60	56.25	99%
		S/A implied vs 2017		140%	S/A reduction		53%			
		Percent Dbl hung	Percent Hung 2x	Annual Cycles	Cycles/wk 48 wks/yr	Cycle/day 5 day wk				
UBs	46000	35%	5%	40065	834.6774	166.9355	166.9355	180	168.75	99%
						222.3522	Total	240	225	

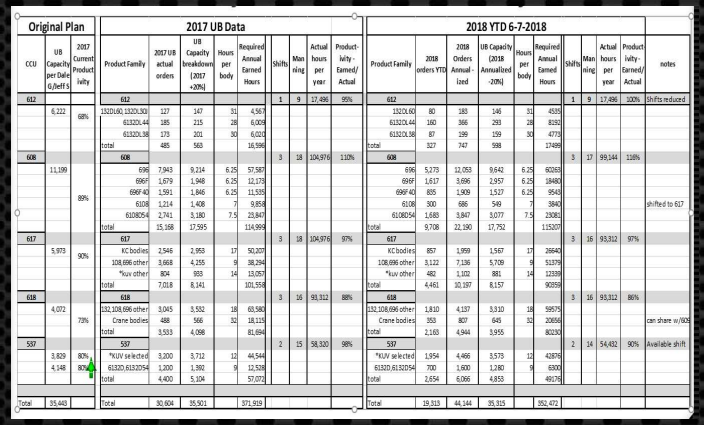
*NOTE: UBs count includes Dump bodies & PGN Ds (PGN Cs can be platform or UB)

Side Assembly Loadbar Capacity

Side Assembly	Unique Part Numbers	Quantity of Parts/Yr	Total Sq Ft of Parts/Yr	Load Bars/Yr	Avg Sq ft/part	Avg Vol/part
All Side Assembly Hung	7,426	378,466	2,950,476	51,641	7.80	50.96
Option B	709	183,746	1,528,082	22,775	8.32	259.16
All Side - Option B	6,717	194,720	1,422,394	28,866	7.30	28.99
PCP Outsourced Today (Projected annual) (For comparison only)	59	22,107	480,054		21.72	374.69

Costs Option B	
KMAN current costs	$845,257
Outsource (Powder Coat)	$1,226,599
Net Annual Cost added	$381,342

Assembly Capacity



Original Plan			2017 UB Data									2018 YTD 6-7-2018									
CCU	UB Capacity per Date (Left S	2017 Current Productivity	Product Family	2017 UB actual orders	UB Capacity breakdown (2017 +20%)	Hours per body	Required Annual Earned Hours	Shifts	Manning	Actual hours per year	Productivity - Earned/ Actual	Product Family	2018 orders YTD	2018 Orders Annualized - 20%	UB Capacity (2018 Annualized -20%)	Hours per body	Required Annual Earned Hours	Shifts	Manning	Actual hours per year	Productivity - Earned/ Actual	notes
612			612					1	9	17,496	95%	612						1	9	17,496	100%	Shifts reduced
	6,222	68%	1320L60, 1320L30	127	147	31	4,567					1320L60	80	183	146	31	4539					
			61320L44	185	215	28	6,009					61320L44	160	366	293	28	8192					
			61320L38	173	201	30	6,021					61320L38	87	199	159	30	4775					
			total	485	563		16,596	3	18	104,976	110%	total	327	747	598		17496					
608			608									608						3	17	99,144	116%	
	11,199		696	7,943	9,214	6.25	57,587					696	5,273	12,053	9,642	6.25	60263					
			696F	1,679	1,948	6.25	12,178					696F	1,617	3,696	2,957	6.25	18480					
		89%	696F 40	1,591	1,846	6.25	11,535					696F 40	835	1,909	1,527	6.25	9543					
			6108	1,214	1,408	7	9,858					6108	300	686	549	7	3840					shifted to 617
			6108054	2,741	3,180	7.5	23,847					6108054	1,683	3,847	3,077	7.5	23085					
			total	15,168	17,595		114,998	3	18	104,976	97%	total	9,708	22,190	17,752		115207					
617			617									617						3	16	93,312	97%	
	5,973	90%	KC bodies	2,546	2,953	17	50,207					KC bodies	857	1,959	1,567	17	26640					
			108,696 other	3,668	4,255	9	38,294					108,696 other	3,122	7,136	5,709	9	51379					
			*kuv other	804	933	14	13,057					*kuv other	482	1,102	881	14	12339					
			total	7,018	8,141		101,558	3	16	93,312	88%	total	4,461	10,197	8,157		90359					
618			618									618						3	16	93,312	86%	
	4,072	73%	232,108,696 other	3,045	3,532	18	63,580					232,108,696 other	1,810	4,137	3,310	18	59575					
			Crane bodies	488	566	32	18,115					Crane bodies	353	807	645	32	20656					can share w/608
			total	3,533	4,098		81,694					total	2,163	4,944	3,955		80230					
537			537					2	15	58,320	98%	537						2	14	54,432	90%	Available shift
	3,829	80%	*KUV selected	3,200	3,712	12	44,544					*KUV selected	1,954	4,466	3,573	12	42876					
	4,148	80%	61320,613205A	1,200	1,392	9	12,528					61320,613205A	700	1,600	1,280	9	6900					
			total	4,400	5,104		57,072					total	2,654	6,066	4,853		49576					
Total	35,443		Total	30,604	35,501		371,919					Total	19,313	44,144	35,315		352,472					

Paint Capacity

	Plan		2017
Current Paint Output (2017)	12,817		12,817
KUV (painted in KTEC)	5,200		
2 at a time/best practices	1,538		
Add 1 new paint booth	5,385		
2 at a time/best practices (inc S building)	2,154		
Total	27,094		12,817
Bodies	40,000		30,000
% Bodies Kman can paint	68%		43%
5th Street	5,000	5th street	5,000
Capacity from South building	5,385		
	37,479		17,817
Total Quincy Capacity % Painted	94%		59%

Summary

- Ecoat – repurpose cycles from Side Assembly to UB cycles (convert system from 50% cycles to UB to 75% cycles to UB. Capacity increases by 50%.
  - Capital estimate $1M (?) – need quote from TTX. Conveyor & flow updated. Add a hang station for S building Assembly
- Side Assembly – strategically select parts for outsource – platform reduces peak/valleys. Annual cost increases - $381k per model.
  - Kaizen to modify selected parts to be more strategic/purposeful using model as guideline
- Assembly – nothing required until exceeding 40,000. $1.4M needed to exceed 40k
- Paint - $660k to meet increasing demand. Capital might increase once we decide paint booth to repurpose to powder coat to not exceed VOCs

Quality Green Belt and Black Belt Projects

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Green Belt projects

Name	Mentor	Project Title	DMAIC Status
Joe Wray	David Bell	PCON Improvement Project	I & C
Brad Denton	David Bell	Element On-Time Delivery	A & I
Allen Pruett	Greg Miller	KUV Improvements: Leaks & Other	C
Justin McCarl	Allen Pruett	Artic Fox Rework	I
Richard Pioch	David Bell	Amazon Build Quality Checks	D
Riley Pryor	Allen Pruett	IPO Item Required Questions/Answers	D
Greg Doscher	David Bell	Distributor Paint Instruction Sheet	A
Jeriah Rabb	David Bell	Engineer & Coach Weld Training, Lab	M
Jeriah Rabb	David Bell	Weld Lab Revamp	I
Craig Myers	Allen Pruett	Artic Fox Rework	I
Rocky Murry	Joe Wray	Seam Sealing Training	D
Ken Roach	David Bell	Nonconforming Material Control Process Revamp	A
Jake Ludwig	David Bell	Coating Performance Process - Suppliers	A
Riley Pryor	Allen Pruett	Chassis Check in App	D
Cory Cottrell	Joe Wray	Processing Product with Rust Standards	D
Joe Wray	David Bell	Aluminum UB Leak Issues	A & I
Tom Rush	David Bell	Element Supplier Issue Tracking	D
Justin McCarl	Allen Pruett	High Impact Customer IPO Review/tracking process	D
Bryan Robertson	Joe Wray	Landscaper(PLB) Issues	D
Steve Gereke	David Bell	Aluminum Paint Timing 24hr cure/Flexing	D
Teresa Fessler	Greg Miller	Supplier Part level vs engineering level	D
Rus Windmiller	David Bell	Documentation and Training Tracker for South Building	D

Black Belt Projects

Name	Dept.	Mentor	Project Title
Allen Pruett	Quality Assurance	David Bell	Process for Electrical Upfits for Fleet
Joe Wray	Quality Assurance	David Bell	Assist 10 People to Green Belt
Teresa Fessler	Quality Assurance	David Bell	Kit Shed Back Order/Lost Parts/Wrong Parts

NEVER SETTLE!

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Q&A