

Doing More with Less



Better Payback with Reduced Agitation

Subaru of Indiana Automotive, Inc.



SLA



New Paint Shop



Paint Shop Tunnel

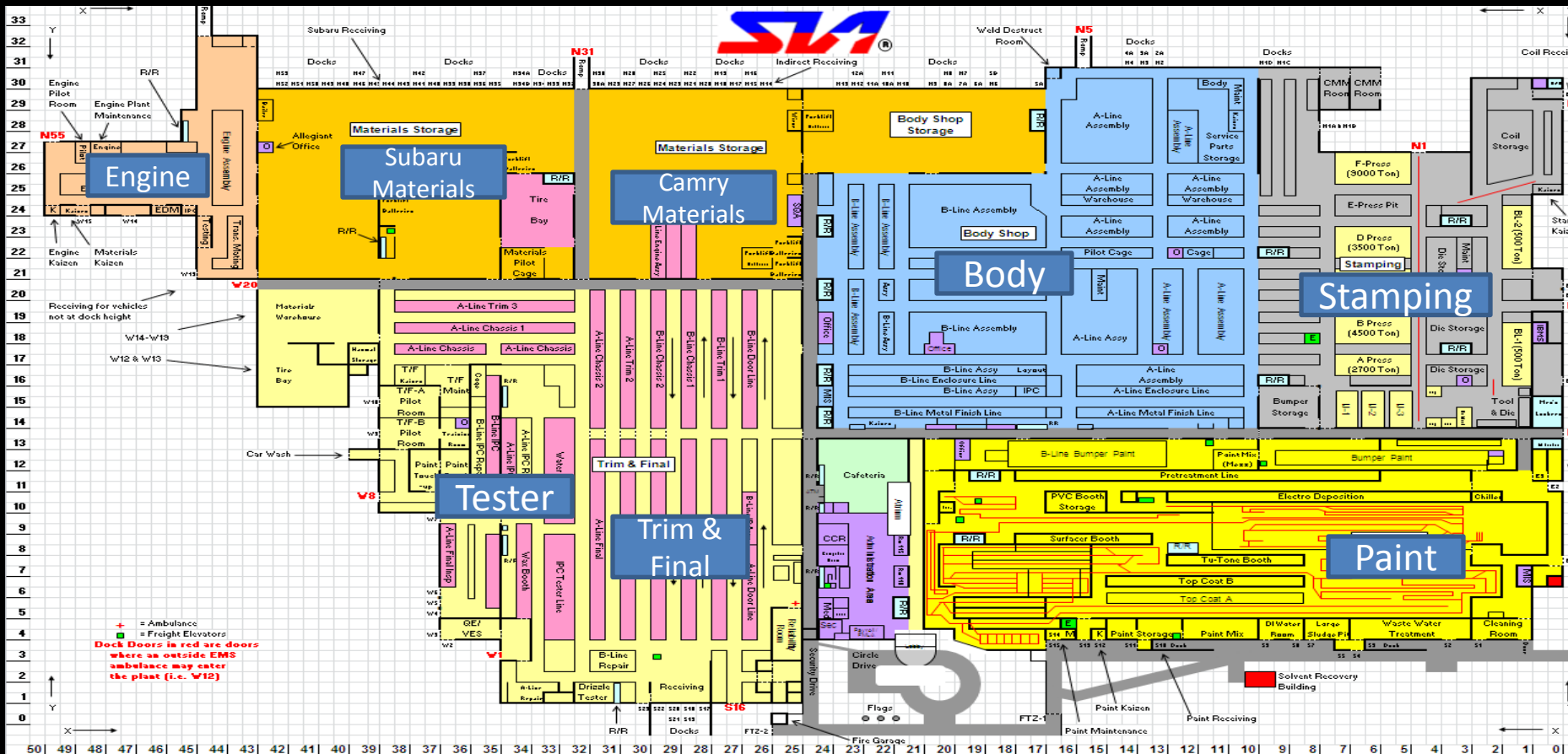


Engine Assembly Section Expansion



New G-Line Press Pit

Plant Layout—5-stage process

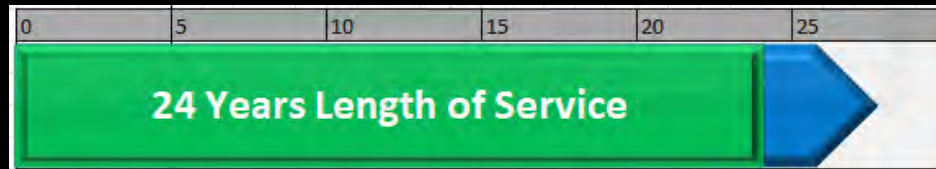


Introduction of Team



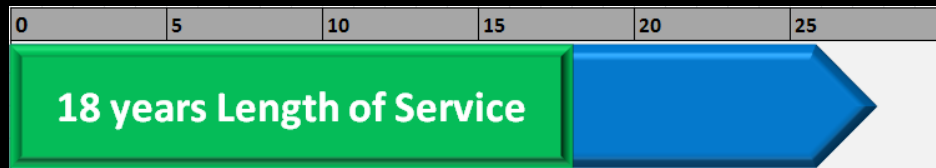
Ted Jones

1st Shift T/L Mix Team



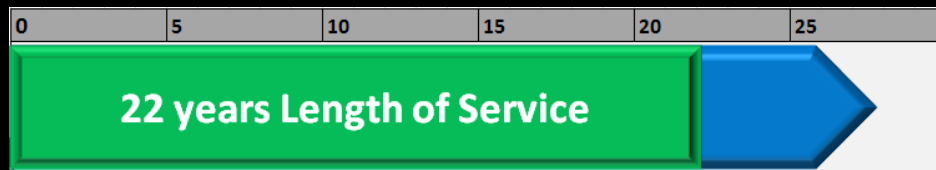
John Reamer

3rd Shift Maintenance



Shane Gebhard

**1st Shift T/L Training
Safety Coordinator**



Introduction of the Working Area



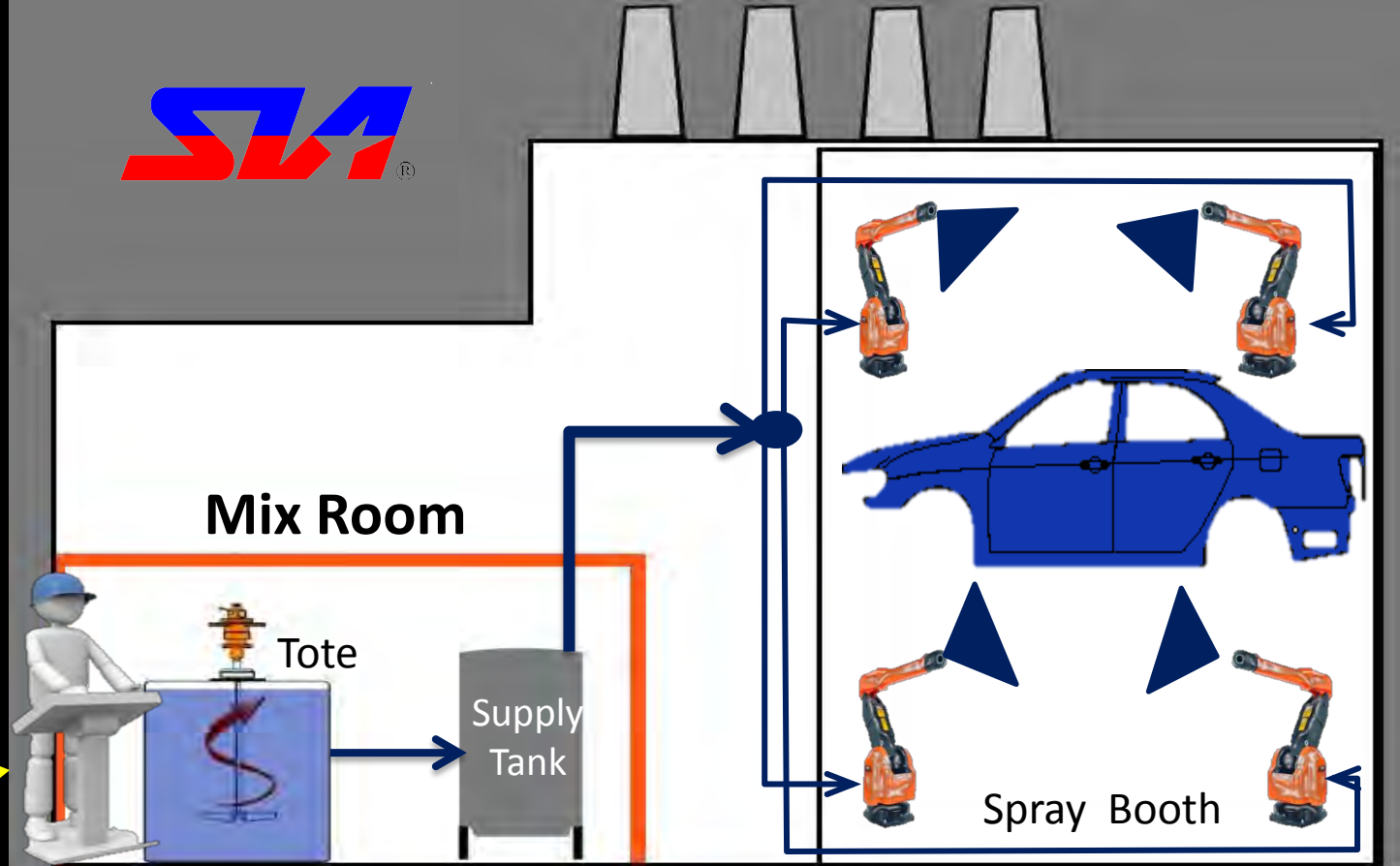
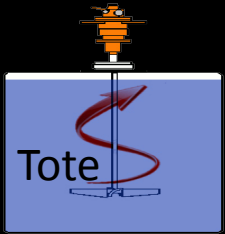
Main Mix of Paint Shop

Introduction of Work Detail

Paint vender
truck



Paint material
in tote

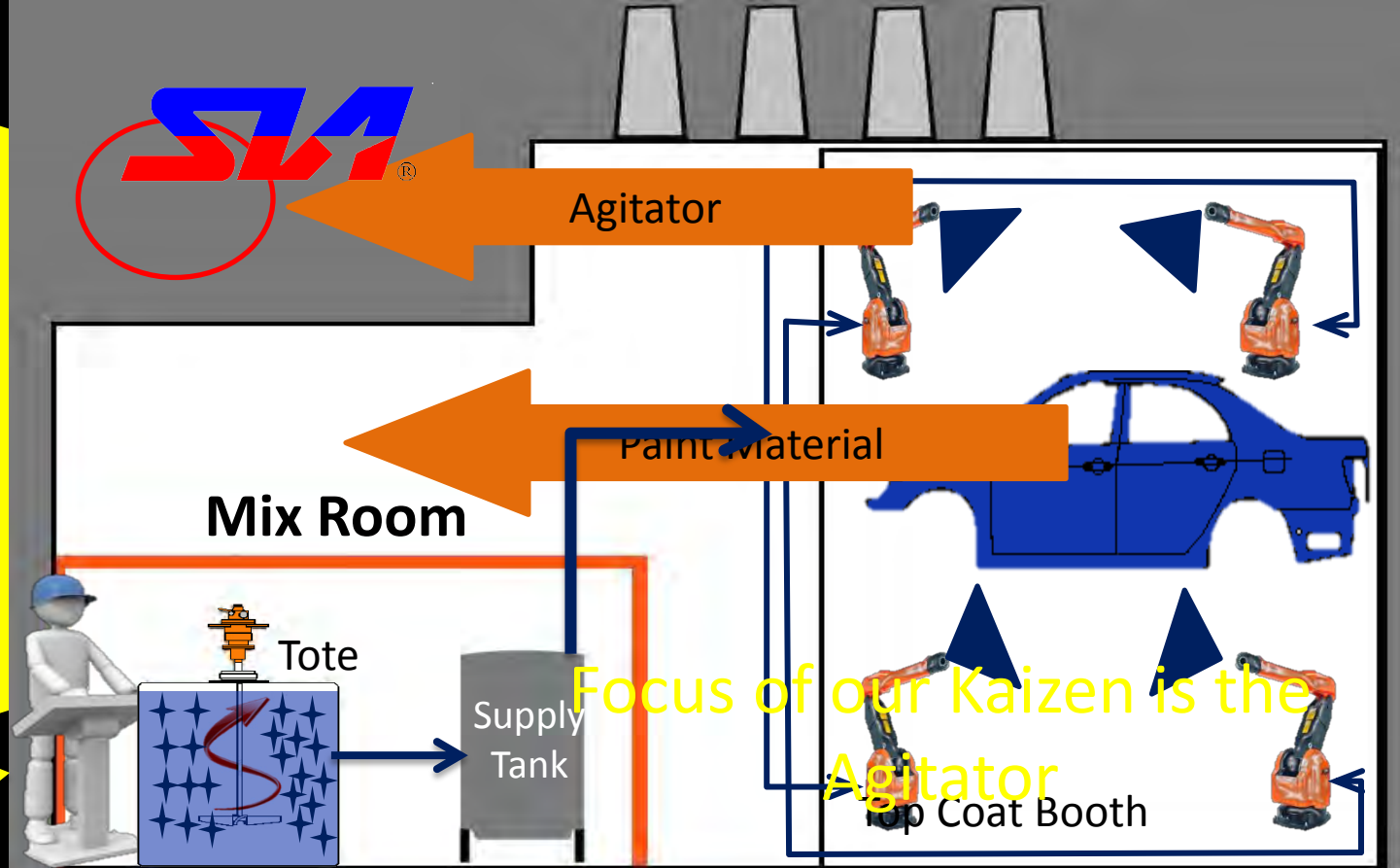
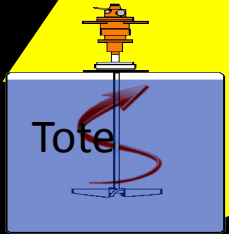


Introduction of Work Detail

Paint vender
truck



Tote material
in tote



Agitator

Paint material

Mix Room

Tote

Supply
Tank

Focus of our Kaizen is the
Agitator

Top Coat Booth

Kaizen Reason

High cost and safety issue in agitator

① High Energy cost (air usage)

\$276,545 / year (4.1% of all paint energy)

② High TPM cost

\$24,360 / year

(parts - \$13,608 Manning - \$10,752)

③ Safety issue

1 first aid (01/25/2013)

High Energy Cost

With Circulation and Agitators running 24/7, Mix room uses more air energy than any other processes.

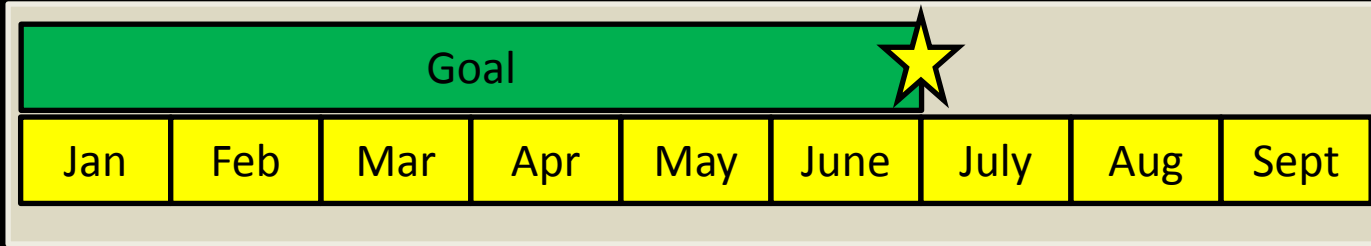
■ Running condition of other processes in paint

		1 st Shift	0-2 Hrs.	2 nd Shift	6 Hrs.	1 st Shift
Paint Booth Conveyor, Oven		run		run		run
Paint Mix Room	Circulation	run				
	Agitator	run				

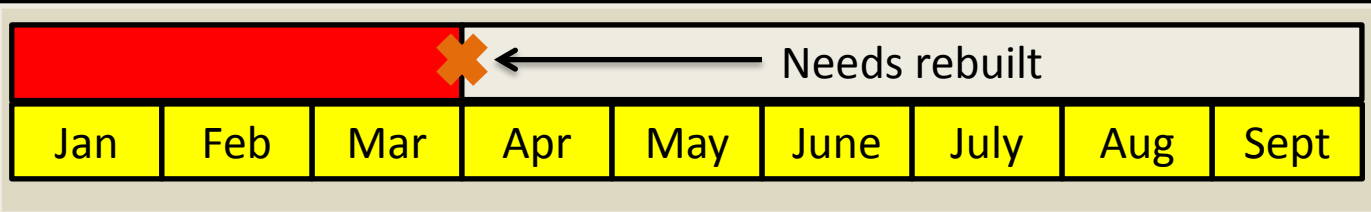
High TPM Cost

Agitator part life

■ Initial plan (vendor result) : 6 months



■ Actual life : 3 months



Safety Issue

First Aid while performing agitator connection on 1/25/2013.

SIA Incident QUICK Report

Section:	Paint	Group:	Mk Team	Station:	Main Mix
Group Leader:	Chris Corso	Incident Date:	1/25/2013	Time:	5:15 PM
Injury Type:	Pinched	Body Part:	L digit 5	Area:	X: 14 Y: 5
Mark one: <input checked="" type="radio"/> Associate <input type="radio"/> Temporary		OSHA Recordable:	Y or <input checked="" type="radio"/> N	Lost Time:	Y or <input checked="" type="radio"/> N

BEFORE



Tote agitator shaft requires lifting into position and then twisting to drive position. After the shaft is in the drive position the team member will release the coupler and remove his hands. The coupler did not hold and the shaft fell down onto the team members finger.

DESCRIPTION

Team members finger was caught between the agitator shaft and tote when he released the coupler to remove his hands.

AFTER



Pinch point

COUNTERMEASURE

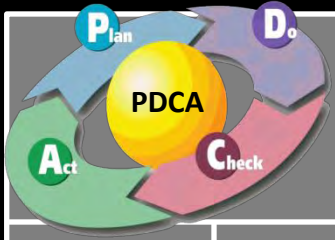
Team members to keep fingers pulled in close to their palms to prevent exposing fingers in pinch point.




Kaizen Target

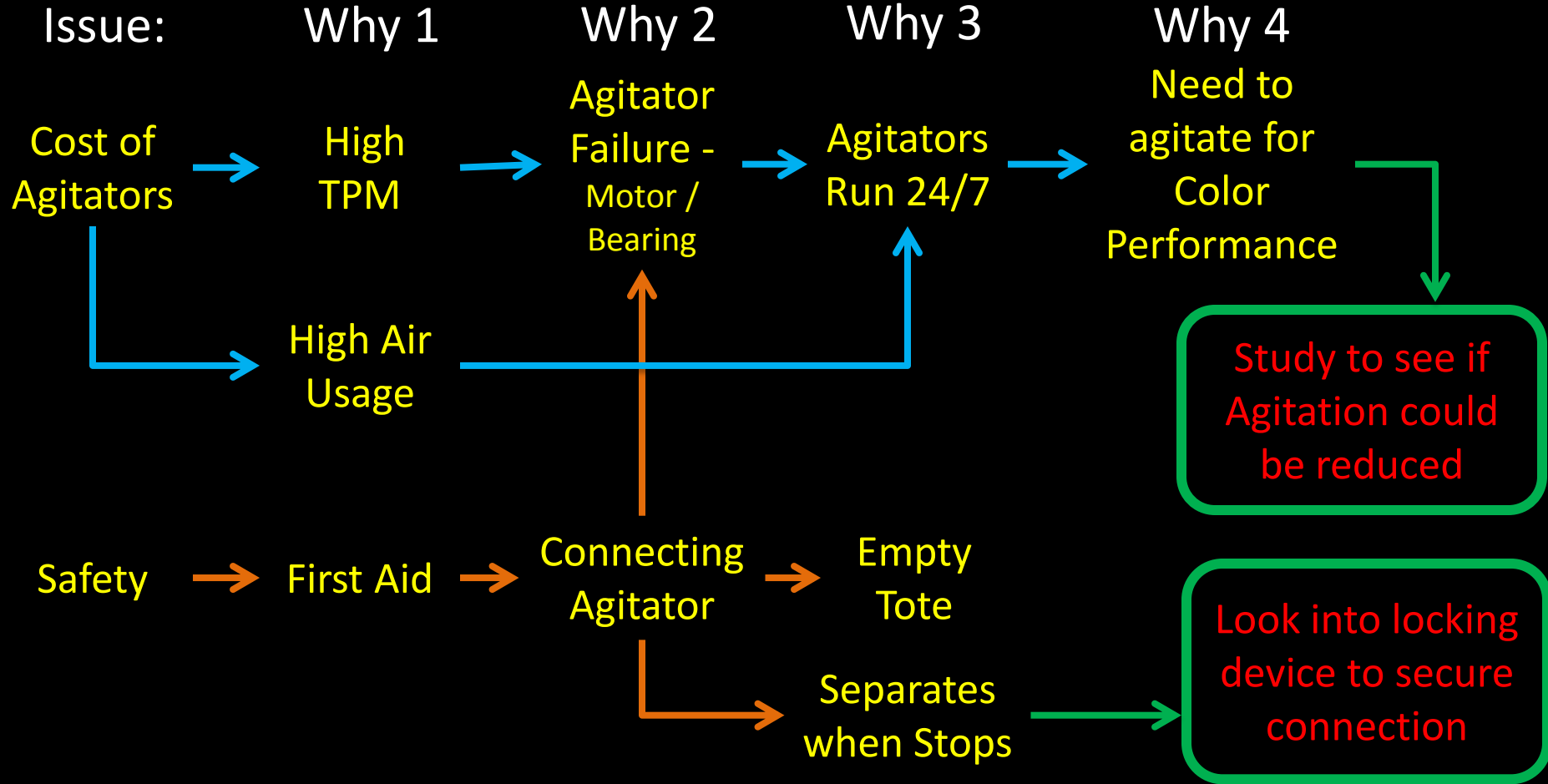
	Before	Kaizen Target
Energy cost	\$6,776,319 / year Gas and Electric	\$136,000 / year Reduction (2%)
TPM cost	\$24,360 / year	\$12,000 / year
Safety issue	1 first aid (1/25/2013)	“ zero “ first aid

Kaizen Plan (Schedule)



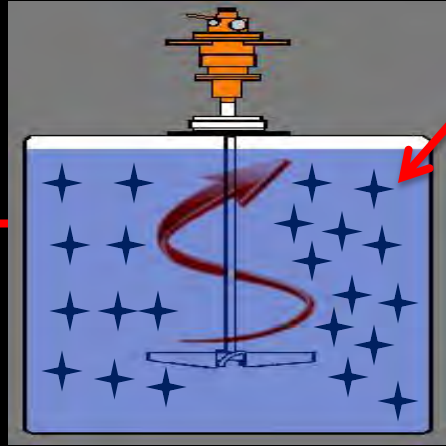
		2013									
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	
Plan	5-why analyze	●————●									
	Study how to kaizen		●————●								
Do	Kaizen				●————→						
Check	Check benefit						●————●				
Act	Path forward							●————→			

Kaizen Plan (5-why analyze)



Purpose of the Agitator

Normal (Agitation)

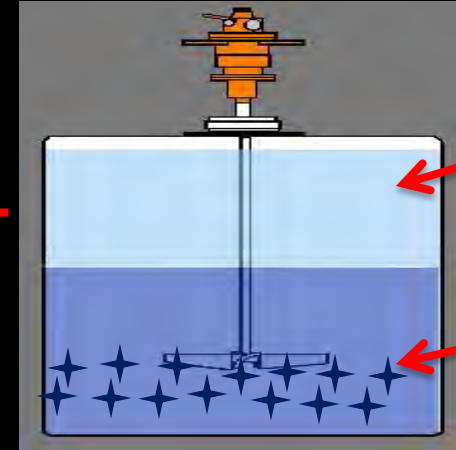


Pigment /
Resin Mixed



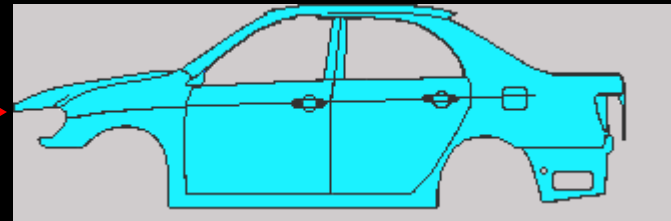
Standard Color

No Agitation



Resin

Pigment



N/G Color

Paint Material in Mix Room

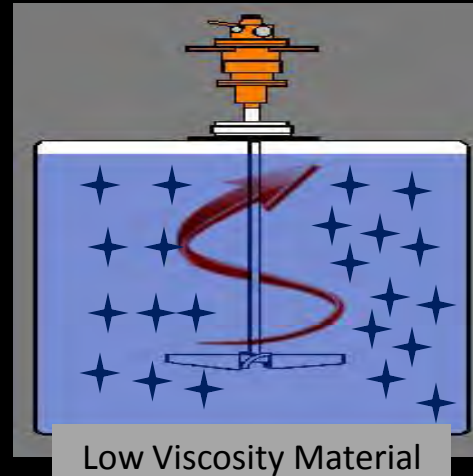
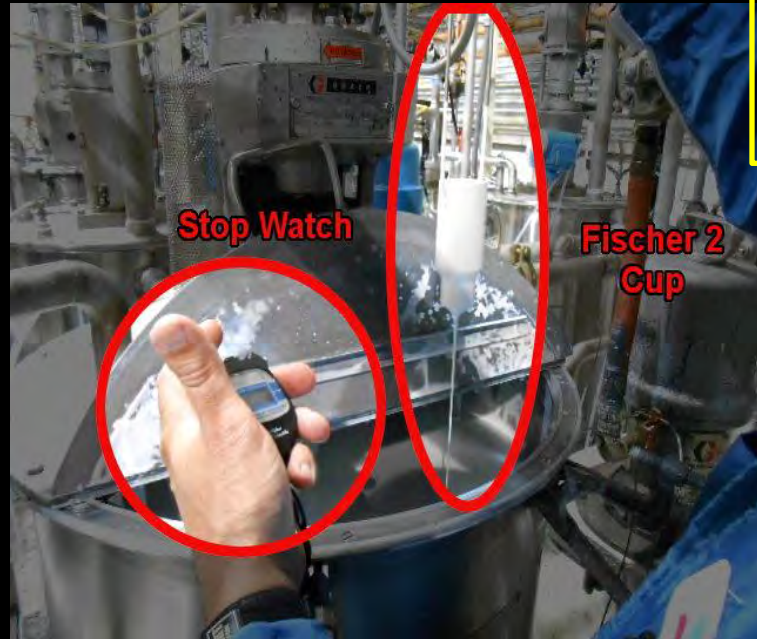
Paint Material		Material Type	Time Line	Viscosity (Fischer 2)	Number of Systems
Surfacer		Solvent Borne	1989 – Present	42 Seconds	3 Systems
Top Coat	Clear Coat	Solvent Borne	1989 – Present	35 Seconds	4 Systems
	Base Coat	Solvent Borne (previous)	1989 – 2008	21 seconds	N/A
		Water Borne (current)	2008 – Present	90-100 seconds	23 systems

What is connection with viscosity?

Viscosity = Low \longleftrightarrow High




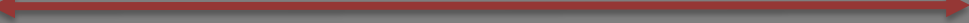
Paint Settlement = High \longleftrightarrow Low

Agitation need = More \longleftrightarrow Less






Kaizen Plan (Study Kaizen Item)

Study results showed: Lower viscosity materials needed agitated 2 hours before initial use, They then required agitation 24/7 to maintain color.

Material	Type	Initial Use	After initial agitation:
			Sunday  Saturday
Surfacer	Solvent-borne	2 hours	
Clear Coat	Solvent-borne	2 hours	
Base Coat	Water-borne	2 hours	

Kaizen Plan (Study Kaizen Item)





Higher viscosity materials still needed the 2 hour initial agitation, but continuous agitation was no longer needed.

Material	Type	Initial Use	After initial agitation:						
			Sunday	Monday	ON OFF	ON OFF	ON OFF	Friday	Saturday
Surfacer	Solvent-borne	2 hours	Off						Off
Clear Coat	Solvent-borne	2 hours	Off						Off
Base Coat	Water-borne	2 hours	Off						Off

Agitators can run for 1 hour on, 1 hour off during the week, shutdown during the weekend and still maintain color.

Kaizen Content

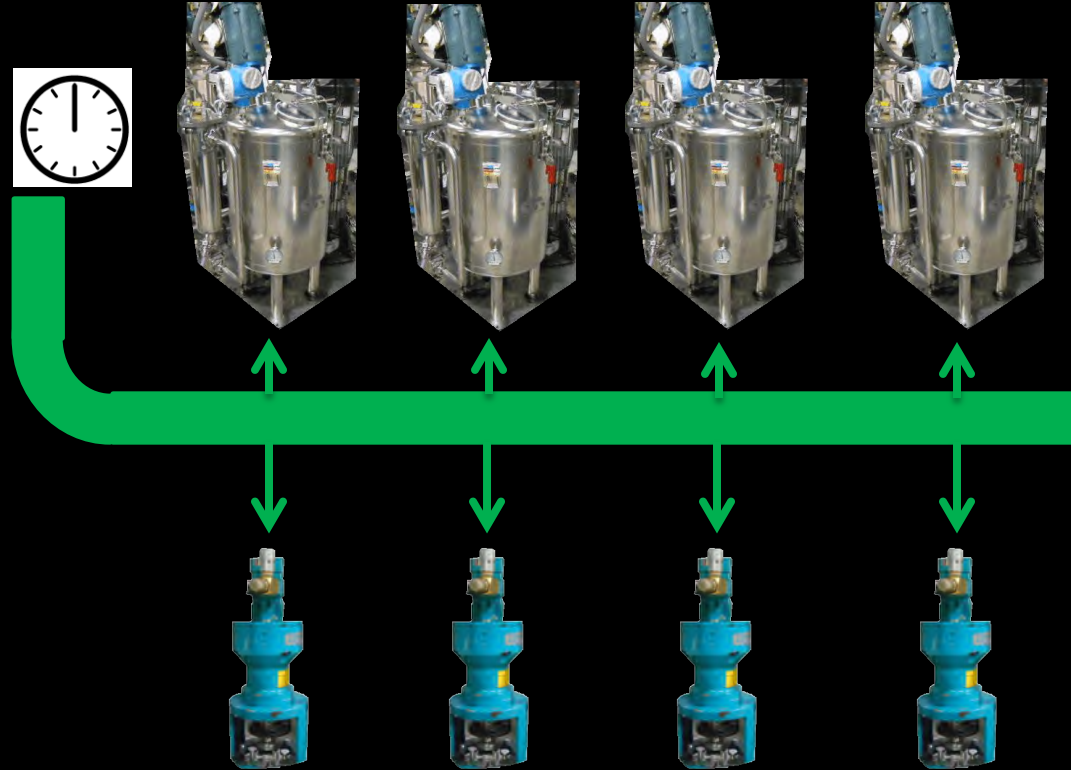
Study how to turn agitators on / off

	How To	Issue	Judge
Idea 1	Turn on / off each agitator by associate (Study by only Mix team)	 <ul style="list-style-type: none">■ Change agitator speed■ Miss turning on and off■ Increase associate overtime	X
Idea 2	Turn on / off air valve for agitators by associate (Study by only Mix team)	 <ul style="list-style-type: none">■ Miss turning on and off■ Increase associate overtime	X
Idea 3	Turn on / off air valve for agitators automatically (Study with Maintenance) (No Investment)		

Kaizen Content

Before:

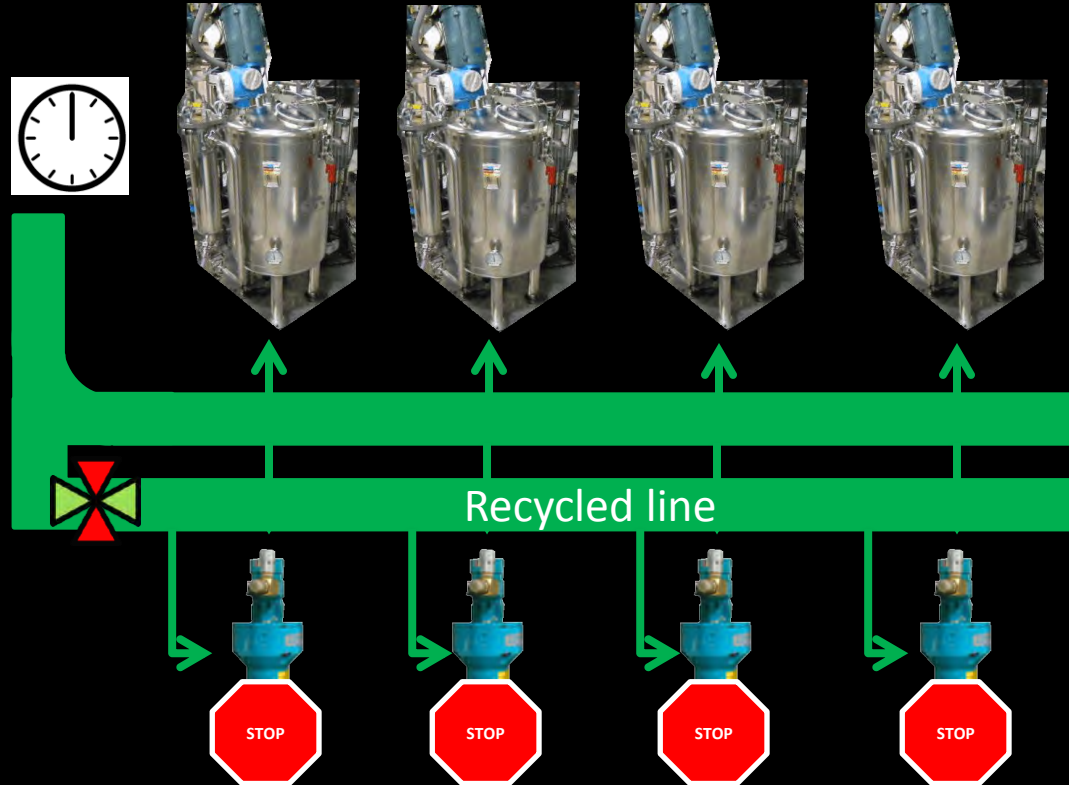
- Single air line supplied both the mix systems and agitators.



Kaizen Content

After:

- Use recycled line to feed agitators independently, control with an electronic valve.

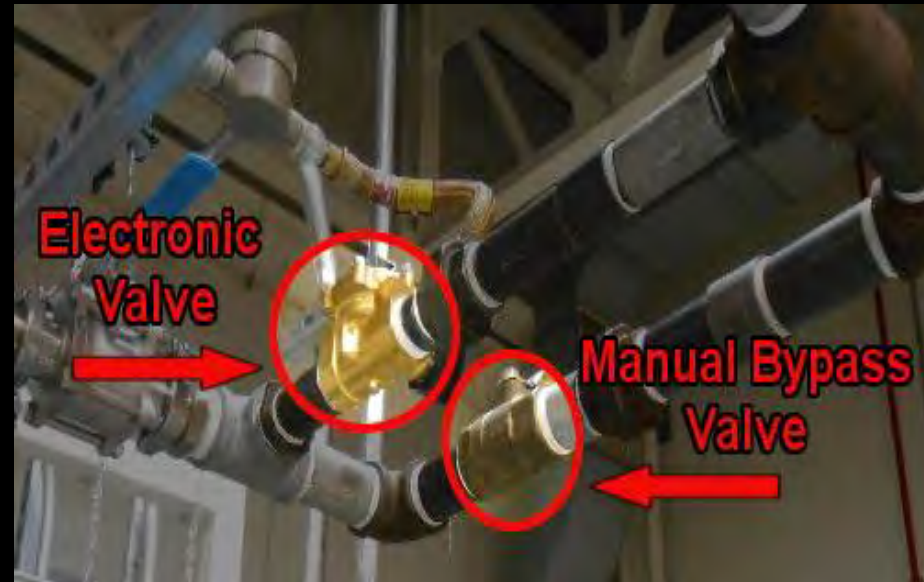


I-Fix computer system connects to the electronic valve and controls on/off automatically .

The image shows a computer monitor displaying a software interface for a power distribution unit (PDU) management system. The interface is organized into a grid of 16 system status cards, arranged in 4 rows and 4 columns. Each card represents a different PDU or system component and displays various metrics such as voltage, current, power, and status. The top-left card is highlighted with a red rectangle. The bottom of the screen shows a navigation bar with buttons for 'Home', 'System', 'Device', 'Report', 'Setting', 'Help', and 'Exit'.

The cards are labeled as follows:

- System #1** (Highlighted): Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #2**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #3**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #4**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #5**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #6**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #7**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #8**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #9**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #10**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #11**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #12**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #13**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #14**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #15**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.
- System #16**: Voltage: 110.0V, Current: 10.0A, Power: 1100.0W, Status: Normal.

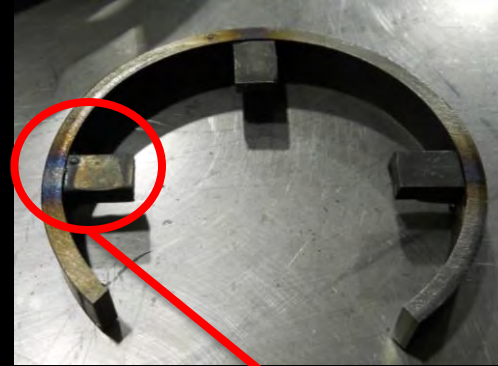


Kaizen Content (Safety)

Safety Concern With Disconnect



Locking Collar



Kaizen Benefit

		Before Kaizen(2012)	Kaizen Target	Savings After Aug 2013	Savings after Kaizen completion
Energy Cost	Main Mix Room	\$185,936/ yr	\$136,000 / year	-\$53,627/yr	North side systems -\$53,627/yr
	Bumper A Mix	\$31,082/ yr		-\$19,125/yr	
	Bumper B Mix	\$59,527/ yr			-\$36,626/yr
TPM Cost		\$24,360/yr	\$12,000 / yr	-\$15,244/yr	TPM cycle (3 → 9 months)
Safety Issue		1 First Aid	"Zero" First Aids	"Zero" First Aids / OSHA's	

Path Forward



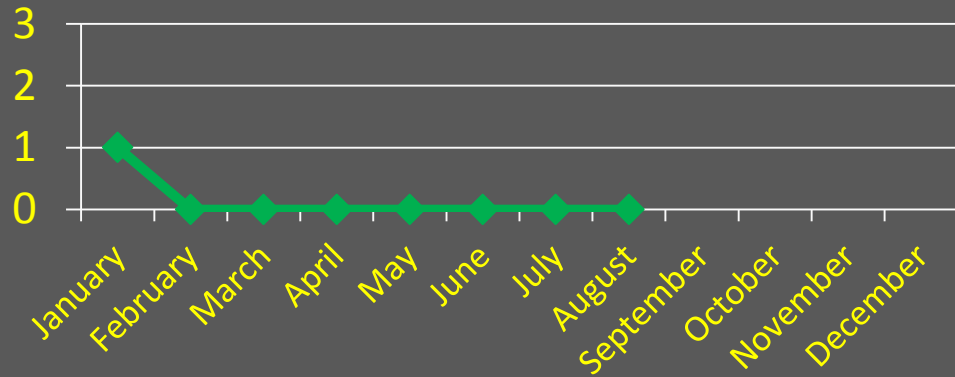
	2013					2014	Cost Savings:
	Aug	Sept	Oct	Nov	Dec	Jan	
South Side Main Mix	✓						\$53,627.00/ Year
Bumper A Mix Room	✓						\$19,125.00/ Year
Bumper B Mix Room		✓					\$36,626.00/ Year
North Side Main Mix						✓	\$53,627.00/ Year
Shut down one compressor on weekends						✓	\$207,969/ Year

Summary

Kaizen Savings After Full Implementation: **\$386,218.00 / Year**

An Improved Safety Record:

First Aid From Agitator



Potential Patent of Kaizen:



Summary

Energy Usage:

2.4% Reduction

4,637,175
kWh/year



Environmental Impact:

Reduction of **3.5 Million**
pounds of CO₂.

Equal to planting **480 Acres**
of trees.

