Core Plug Removal System Claremont, NC

PPSA – Safety Innovator



# **Project Overview**

- A kaizen was held to look for opportunities to make removing core plugs from rolls safer
- Participants included:
  - Rollstand Operators Donna Landis, Erin McCullough
  - Press Operator Robert Bradley
  - Shipping Manager Donna Huffman
  - Maintenance Techs Jack Heavner, Larry Lackey
  - Harmax Rollcon Rad Briley, Jake Unrau
  - Divisional Safety Manager Patrick Lyon
  - Safety Manager Kyle Mayberry



# **Project Background**

- Initial problems started being introduced around May 2018 in Claremont Folding
  - An employee in Claremont had a soft tissue injury to their wrist from knocking core plugs out manually by hand using a 18lb bar that was approximately 5-6' long
  - Across Westrock, many employees have reported injuries that were recordables due to removing the core plugs manually. Injury severities include fractured fingers

#### <u>Goals</u>

- Find a safer, more ergo friendly way to complete the needed tasks so we can reduce/eliminate any future injuries.
- Eliminate the task of removing core plugs



## Business Case - Strain Index (Athletic Trainer)



#### Strain Index Scoring Sheet

Date:	5/14/19	Task:	Roll Tender-Core Plugs	
Company:	WestRock-Claremont	Supervisor:		
Dept:	Press-1243	Evaluator:	Margaret Shreitah	_

Risk Factor	Rating Criterion	Obse	rvation		Multiplier	Left	Right
	Light	Barely noticeable or relaxed effort (BS: 0-2)			1		6
Intensity of Exertion (Borg Scale - BS)	Somewhat Hard	Noticeable or definite effort (BS	3				
	Hard	Obvious effort; Unchanged fac	6	6			
	Very Hard	Substantial effort; Changes ex	9				
	Near Maximal	Uses shoulder or trunk for force	13				
Duration of Exertion (% of Cycle)	< 10%	Calculated Duration of Exertion (from inputs below)			0.5		
	10-29%	User Inputs Left Right			1.0		
	30-49%	Total observation time (sec.)	60	60	1.5		
	50-79%	Single exertion time (sec.)	4	4	2.0	3	3
	≥ 80%	Number of exertions during observation time	12	12	3.0		5
	Calculated Duration of Exertion (%) 80.0 % 80.0 %			2000			
	< 4	< 4 Calculated Efforts Per Minute (from inputs above)			0.5		
F	4 - 8		Left	Right	1.0		1.5
Efforts Per Minute	9 - 14	1 1	de la companya de la		1.5	1.5	
Minute	15 - 19	1	12.00	12.00	2.0	1.0	
F	≥ 20	1			3.0		
	Very Good	Perfectly Neutral	1.0	2	2		
Hand/Wrist Posture	Good	Near Neutral	1.0				
	Fair	Non-Neutral	1.5				
	Bad	Marked Deviation	2.0				
	Very Bad	Near Extreme	3.0				
	Very Slow	Extremely relaxed pace			1.0	1	1
	Slow	Taking one's own time	1.0				
Speed of Work	Fair	Normal speed of motion	1.0				
	Fast	Rushed, but able to keep up	1.5				
	Very Fast	Rushed and barely/unable to ke	2.0				
	<1				0.25		0.25
F	1 < 2				0.50	0.25	
Duration of Task	2 < 4				0.75		
Per Day (hours)	4 ≤ 8				1.00		
	> 8		1.50				
Results Key		3 < SI < 7	Job is probably safe Job may place individual at increased risk for distal upper extremity			14	14
			disorders Job is probably hazardous				

#### Notes/ Comments

1243 Press: Every two hours employee knocks out 6 rolls = 12 core plugs. Over course of 12 hour shift, That equal approx. 36 rolls = 72 core plugs being popped out during each shift. Although the task is only performed during a small part of the day, the force require for grip, pushing and pulling places a maximum stress on the upper extremity. That combined with the wrist being deviated during the force movements places the hands and wrists in a very compromised position. Note: not taken into concideration the amount of time it takes to knock core plugs out that are stuck or hard to get out. Our ATC Strain Index easily shows that the tasks is hazardous





# RULA (Athletic Trainer)



Question? The Ergonomics Center of North Carolina 3701 Neil Street, Raleigh, NC 27607 1-800-ON-4-ERGO

www.TheErgonomicsCenter.com

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#### **Current Process**

- Majority of plants use a metal bar ranging from 4-6 feet in length with a weight of 10-20 pounds
- The metal bars have approximately a 3 inch head on the end that is used to beat in/out on the plug
- Once the plug is loose in the core, the bar is used to pry the plug out of the core





#### Trials



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### Trials









# Kaizen Agenda

- Process flow map for making and handling of the rolls
  - Mills (Demopolis and Covington)
  - Claremont
- 6 M's (Man, Method, Machine, Materials, Mother Nature, Measurement)
- Improvements
  - Future State (brainstorming)
  - Hierarchy of Controls
    - Elimination
    - Engineering
    - Substitution
    - Administrative





# 6M's, Fishbone, Prioritizing, Multivoting

Variable	Measu	urement	Method		Machine	Man	Materials	Mother Nature
1	Core specs		Standard for removing plugs		Making plugs	Gender	Core removal devices	
2	Plug specs		When plugs are entered		Making cores	Size	Cores	Moisture
3	Clamp specs - PSI		Transportation (truck, rail, hu	umped cars)	Insertion of cores - offline	Physical ability	Plugs	Water damage
4	Tension on mill mad	chines	Time clamped		Chucks on paper machine		Paperboard	Temperature
5	Removal devices		Tension of paper to core		Winder		Bands - Metal	Transit
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# Conclusion

- After a lot of work, it was determined that we could not eliminate the task
- All our current efforts led to us still manual tools to beat or pry the plugs from the rolls



# **Opportunity Knocks**

- During a visit to Claremont from Harmax, Rad Briley came in to help us find a more effective solution for handling rolls
- During our conversation, I was allowed to share my passion with Rad on how we were trying to find a safer way to remove the core plugs
- Current kaizen information including tools and methods used and failures and successes was shared with Rad and Harmax
- Immediately Rad and his team became engaged with Claremont and our desire to find a way to engineer out the task



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## Core Plug Tool Overview





#### Insert Tool Into Core

Insert device into core. Ensure the yellow core puller flap enters far enough to drop down.





#### Once Inside Core Plug





# Removing The Plug

To remove plug, hold the activate button and either the cylinder in or out button.



Always stand to the side and NEVER directly behind the device.

Pulsing the cylinder out button by presses and releases multiple times is recommended over just holding the button. You are more likely to break a jammed core by holding the button the whole time. Press and release, press and release, etc.





#### Core Breaking – Kick Back Countermeasure



To help fail safe, we have added an aluminum piece that requires the operator to stand to the side of the device to ensure they are out of the line of fire.







#### Over Head Trolly and Tool Balancer





### Error Proof the Design

A piece was added to the top of the rail that forces the tool to rest on the bottom side of the core plug opening. This will ensure the tool is properly positioned

Notice the piece forces the tool to be positioned on the bottom of the plug opening. This ensures the black foot does not impeded the plug from coming out.





A Pneumatic Regulator Valve was added to reduce the air pressure from 120psi to 50psi. So far, the device is working well at the lower psi setting.





# **Final Design**







# Using the Tool





# Using the Tool





## **Employee Testimimonial**





#### Westrock's Values

#### <u>Values</u>

- Integrity. We never one time tried to cut any corners or hide any of the challenges we faced,
- Respect With showing respect to our fellow workers across multiple departments, Westrock Plants and Harmax, we were able to assemble a team of multi-talented individuals to find solutions to engineer out a very high ergo risk task
- Accountability All parties involved pulled their weight and ensured we never gave up until a solution was achieved
- Excellence We have not only made the task safer but easier was well. Carts were added to place the plugs on after being removed. This eliminated the trip hazards and ergo risks of bending over to pick up the plugs



# Westrock's Behaviors

#### **Behaviors**

- Communicate The Why When involving Harmax, this behavior was so effective that the solution was even better than anyone could have imagined.
- Align Goals This was a cross functional team and the final design was created by people who would possibly never have to complete the task of removing cores, but they did it because of the importance of the safety.
- **Empower** Our employees were empowered to design, manufacture and commission the equipment with no involvement of the management team.
- **Recognize and Reward** We have been rewarded in that we have found a way to make a needed task safer. This continues to boost our safety culture. "Claremont really does care about my safety"



# **Special Thanks**

- Jack Heavner and Larry Lackey Helping in anyway needed to make the process happen and with the install of the equipment and tracking system.
- Gerry O'Hanlon, Jeff Henderson, Patrick Lyon 110% support from day 1 with our issues of removing core plugs
- Covington Mill Mike Wade and Team have attended kaizens, allowed visits and set up calls to help with the issues we were dealing with.
- Joplin Wes Gamble and the Joplin team have been working with the tool as well. The team has provided feedback on the pros and cons to help us make adjustments to our system.
- Harmax Rollcon Rad Briley, Evan Hodgkinson, and Jake Unrau. This team had designed exactly what we needed and provided great support along the way. I would highly recommend this company to everyone...

Removing core plugs has been an issue for Claremont Folding for quite some time. This proves that dedication, teamwork, and commitment will pave the way to yes!



# Conclusion

- The core pulling device is now being installed in many Westrock sites.
- The success of the tool has not only been shared within our division, but Westrock in its entirety.
- We want to continue to share the tool with others, even our competitors to keep them safe as well.
- No matter what the challenge, commitment, dedication, and care for your employee will help you to "Pave the way to yes".

