



Building Leadership Excellence



Operational Excellence Success Story

PMT

“The right Shoe Press”

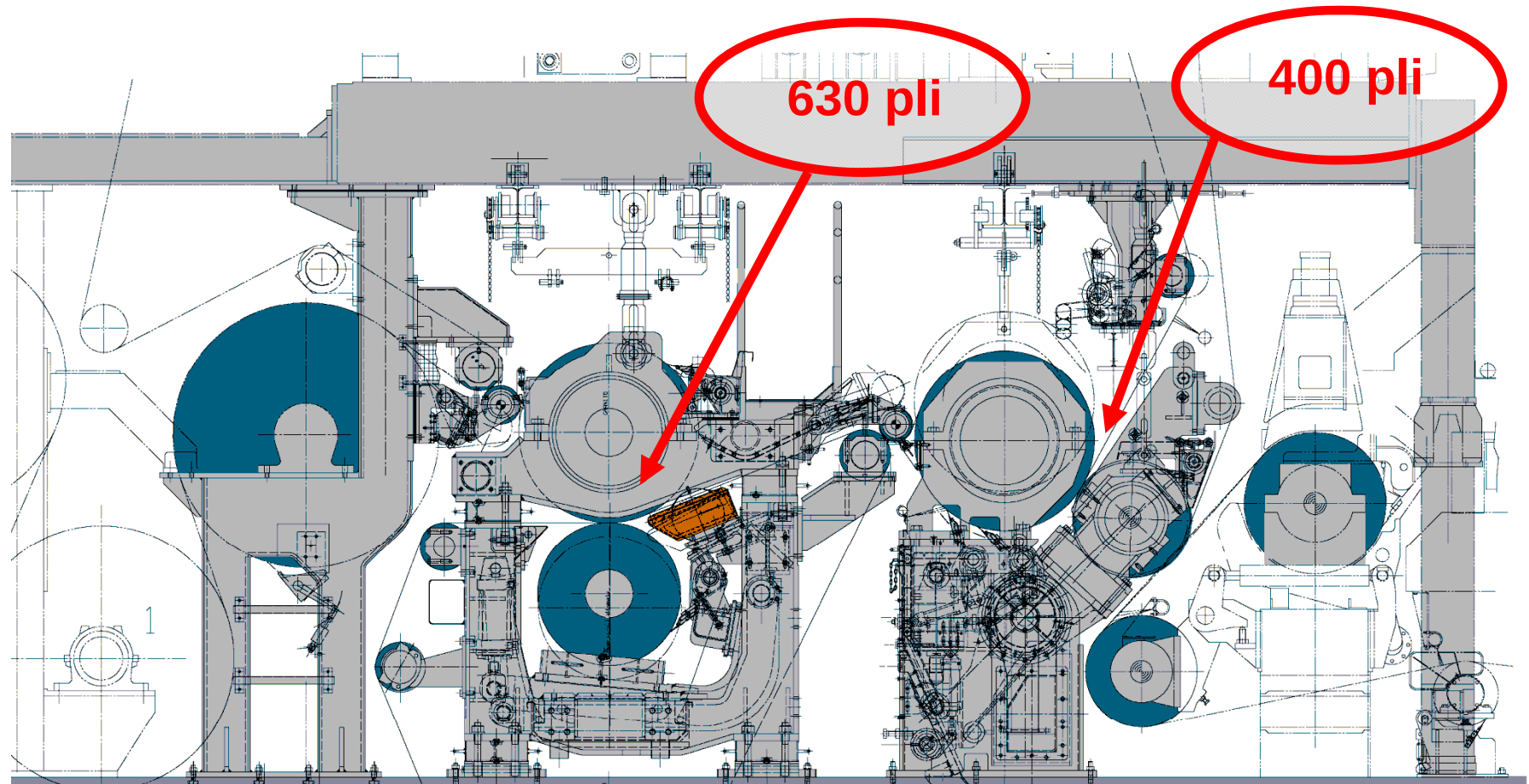
Valter Canelli

May 1-4
PaperCon 2011
Northern Kentucky Convention Center

RETHINK PAPER:
Lean and Green

Mill Overview

- Fine Paper
- Wire 148 in
- Speed 1970fpm
- Pap. De Clairefontaine #5



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Production Overview

		before		
		Reel speed	Thickness	
	g/m ²	ft/min	mils	
Laser print	100	1475	4.1	
Notebooks	90	1640	?	
Copy color	80	1675	4.3	
Envelope	90	1525	4.8	
Envelope	120	1245	6.3 - 6.6	
Offset	200	690	?	
New grade	270	na	na	



Mill Targets

		before		✓ Production ✓ Smoothness ✓ Two sidedness ✓ Bulk ✓ Flexibility
		Reel speed	Thickness	
	g/m ²	ft/min	mils	
Laser print	100	1475	4.1	
Notebooks	90	1640	?	
Copy color	80	1675	4.3	
Envelope	90	1525	4.8	
Envelope	120	1245	6.3 - 6.6	
Offset	200	690	?	
New grade	270	na	na	



Problem Description

- To justify a Shoe Press Investment



Problem Description

- Main Paper Properties

PROFILES	STRENGTH PROPERTIES	PRINTING PROPERTIES	DIMENSIONAL PROPERTIES
CD BASIS WEIGHT	MD/CD RATIO	FORMATION	STABILITY
MD BASIS WEIGHT	SCT , RCT	SMOOTHNESS	CURL
CD MOISTURE	BURST	SURFACE STRENGTH	SHRINKAGE
MD MOISTURE	CONCORA (CMT)	INK ABSORPTION	BULK / DENSITY
FIBER ORIENTATION	Z - STRENGTH	GLOSS	CALIPER
CALIPER	STIFFNESS	POROSITY	COCKLING
	INTERNAL BONDING	BRIGHTNESS	
		OPACITY	
		SHEET SYMMETRY	



Problem Description

PRESS INFLUENCE

- Main Paper Properties

PROFILES	STRENGTH PROPERTIES	PRINTING PROPERTIES	DIMENSIONAL PROPERTIES
CD BASIS WEIGHT	MD/CD RATIO	FORMATION	STABILITY
MD BASIS WEIGHT	SCT , RCT	SMOOTHNESS	CURL
CD MOISTURE	BURST	SURFACE STRENGTH	SHRINKAGE
MD MOISTURE	CONCORA (CMT)	INK ABSORPTION	BULK / DENSITY
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CALIPER	STIFFNESS	POROSITY	COCKLING
	INTERNAL BONDING	BRIGHTNESS	
		OPACITY	
		SHEET SYMMETRY	



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Problem Description

Important for NOT-printed Packaging Grades

- Main Paper Properties

PROFILES	STRENGTH PROPERTIES	PRINTING PROPERTIES	DIMENSIONAL PROPERTIES
CD BASIS WEIGHT	MD/CD RATIO	FORMATION	STABILITY
MD BASIS WEIGHT	SCT , RCT	SMOOTHNESS	CURL
CD MOISTURE	BURST	SURFACE STRENGTH	SHRINKAGE
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CALIPER	STIFFNESS	POROSITY	COCKLING
	INTERNAL BONDING	BRIGHTNESS	
		OPACITY	
		SHEET SYMMETRY	



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Problem Description

Important for Writing & Printing Grades

- Main Paper Properties

PROFILES	STRENGTH PROPERTIES	PRINTING PROPERTIES	DIMENSIONAL PROPERTIES
CD BASIS WEIGHT	MD/CD RATIO	FORMATION	STABILITY
MD BASIS WEIGHT	SCT , RCT	SMOOTHNESS	CURL
CD MOISTURE	BURST	SURFACE STRENGTH	SHRINKAGE
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	INTERNAL BONDING	BRIGHTNESS	
		OPACITY	
		SHEET SYMMETRY	



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Problem Description

- General Shoe Press Advantages:
 - ✓ + Dryness
 - ✓ + Bulk
 - ✓ + Paper Strength



Problem Description

- Shoe Press Issues:
 - ✓ Investment Cost (ROI)
 - ✓ Impact on Paper Quality



Problem Description

- Why is it difficult to justify the Shoe Press investment?:
 - ✓ Weight Issues
 - ✓ Existing Crane Limits
 - ✓ Building Loads Limits
 - ✓ Dimensions Issues
 - ✓ CD Interchange ability
 - ✓ Diameter
 - ✓ Rebuild Down Time



Problem Description

- Why is it difficult to justify the Shoe Press investment?:
 - ✓ Felt Marking Issue
 - ✓ Roughness Two-Sidedness Issue



Solution Strategy

- ✓ Long NIP Residence Time → +++ Felt Marking
- ✓ NIP Specific Pressure → + Felt Marking

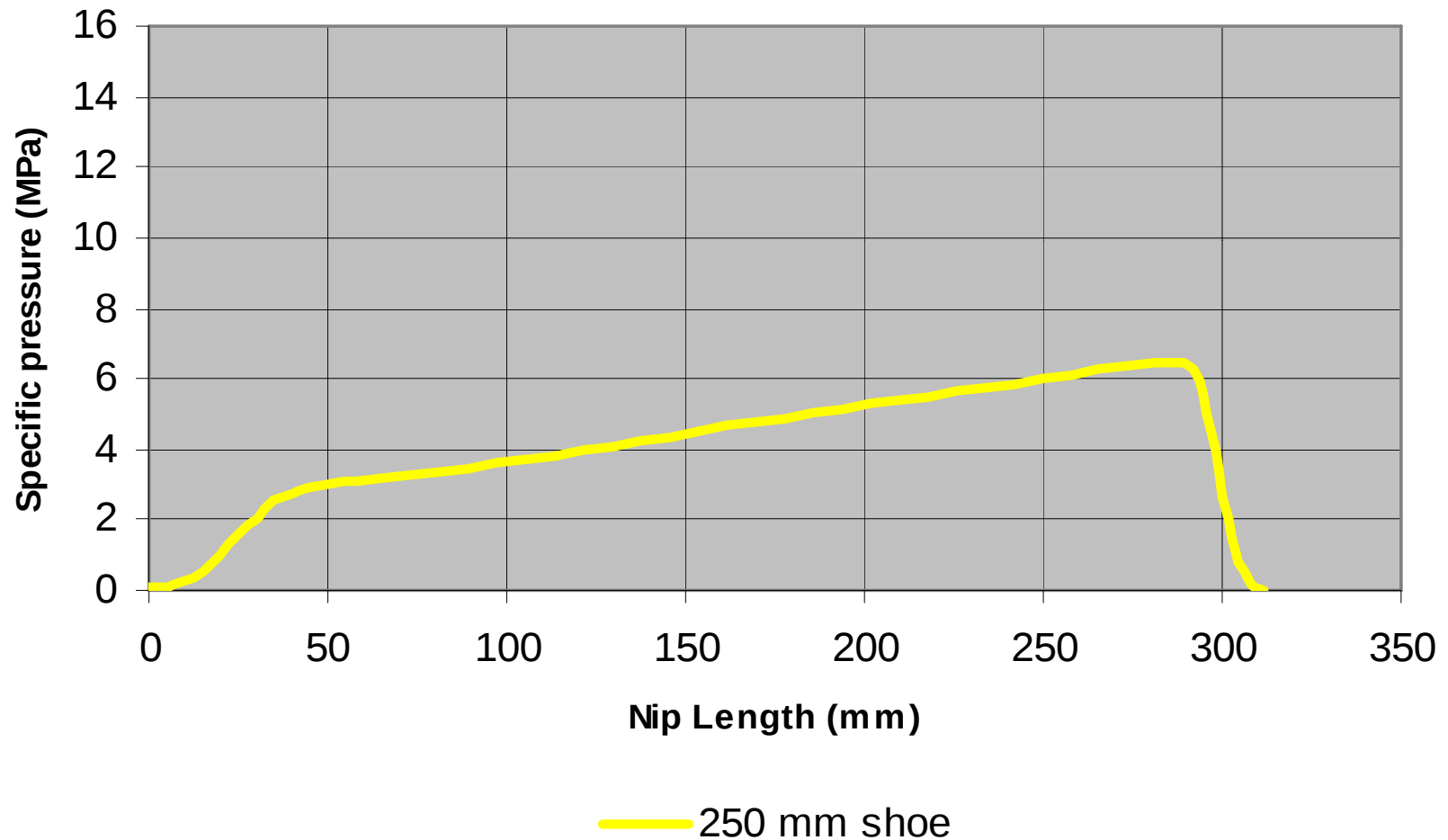
✓ → A Shoe Press with a Shorter Shoe



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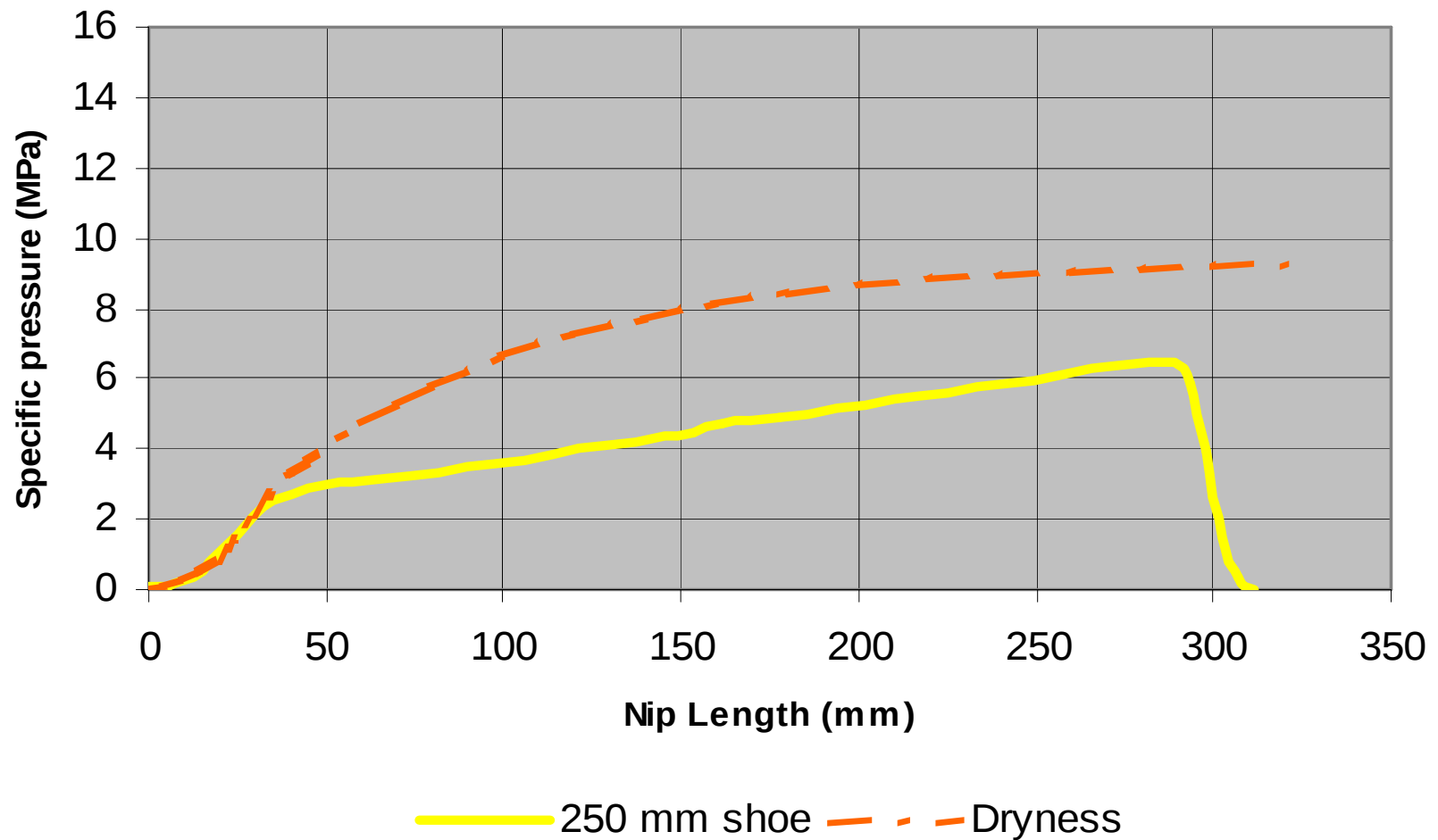
Solution Strategy

- Machine Direction NIP Profile



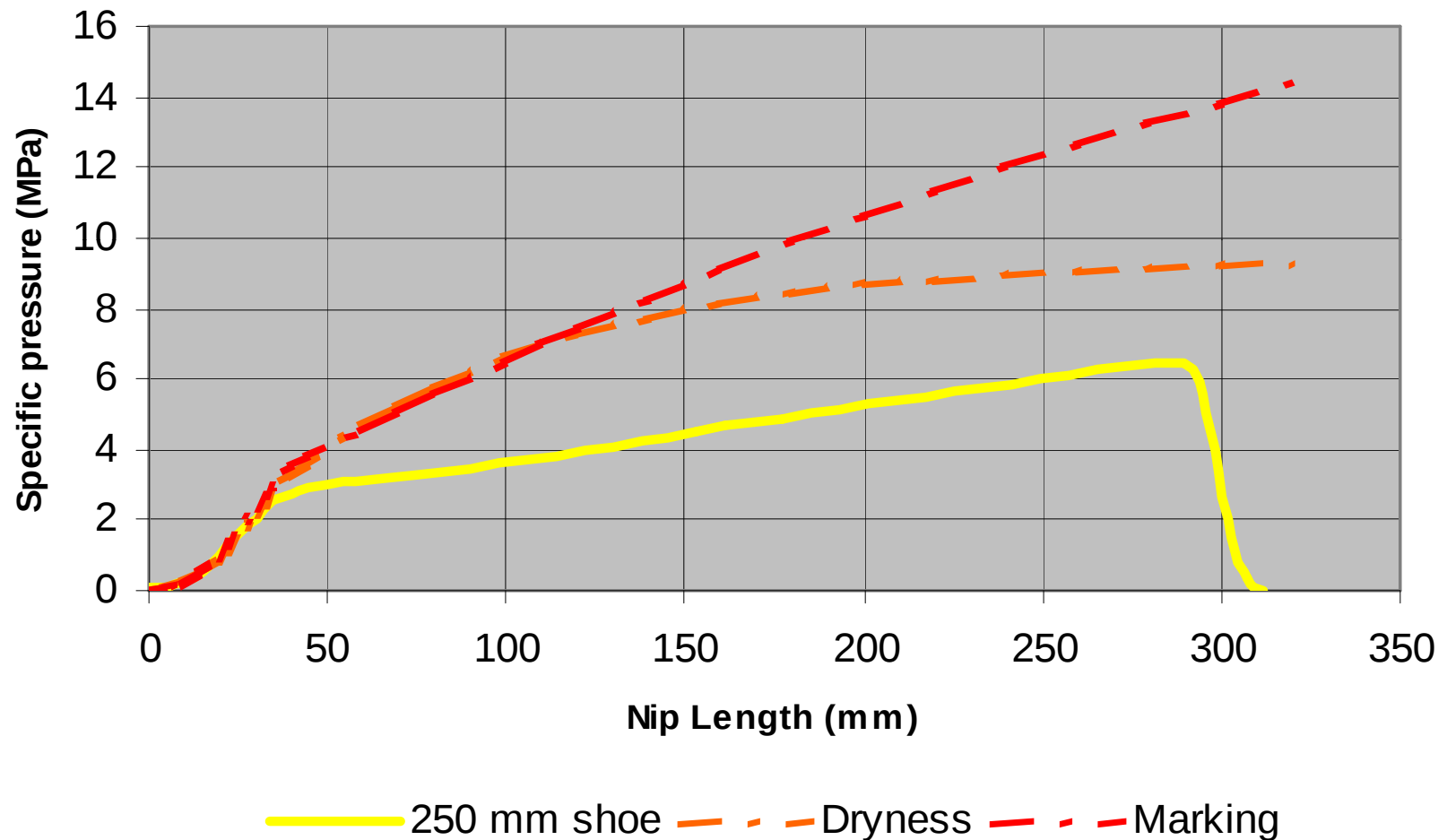
Solution Strategy

- Machine Direction NIP Profile



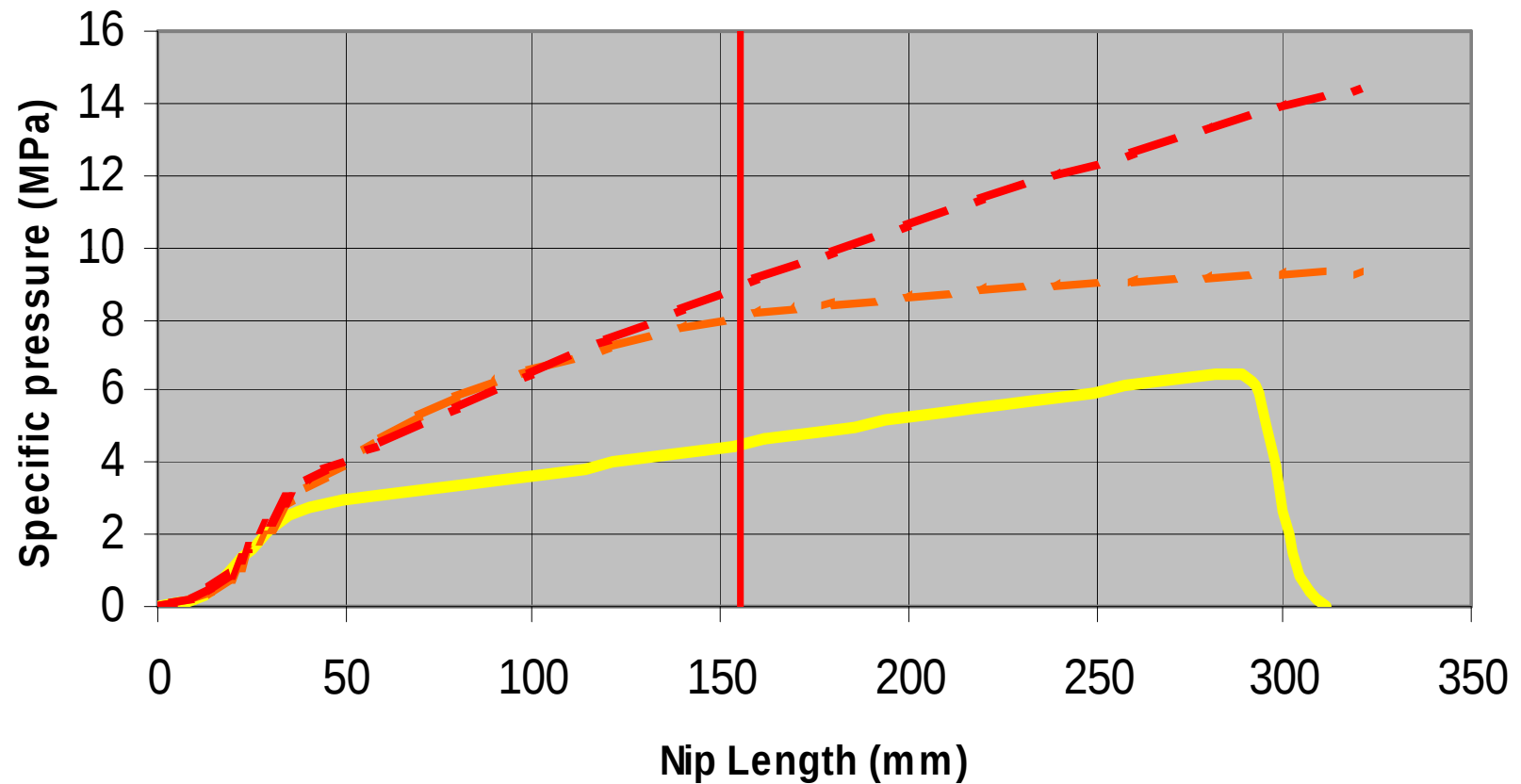
Solution Strategy

- Machine Direction NIP Profile



Solution Strategy

- Machine Direction NIP Profile



— 250 mm shoe - - - Dryness - - - Marking

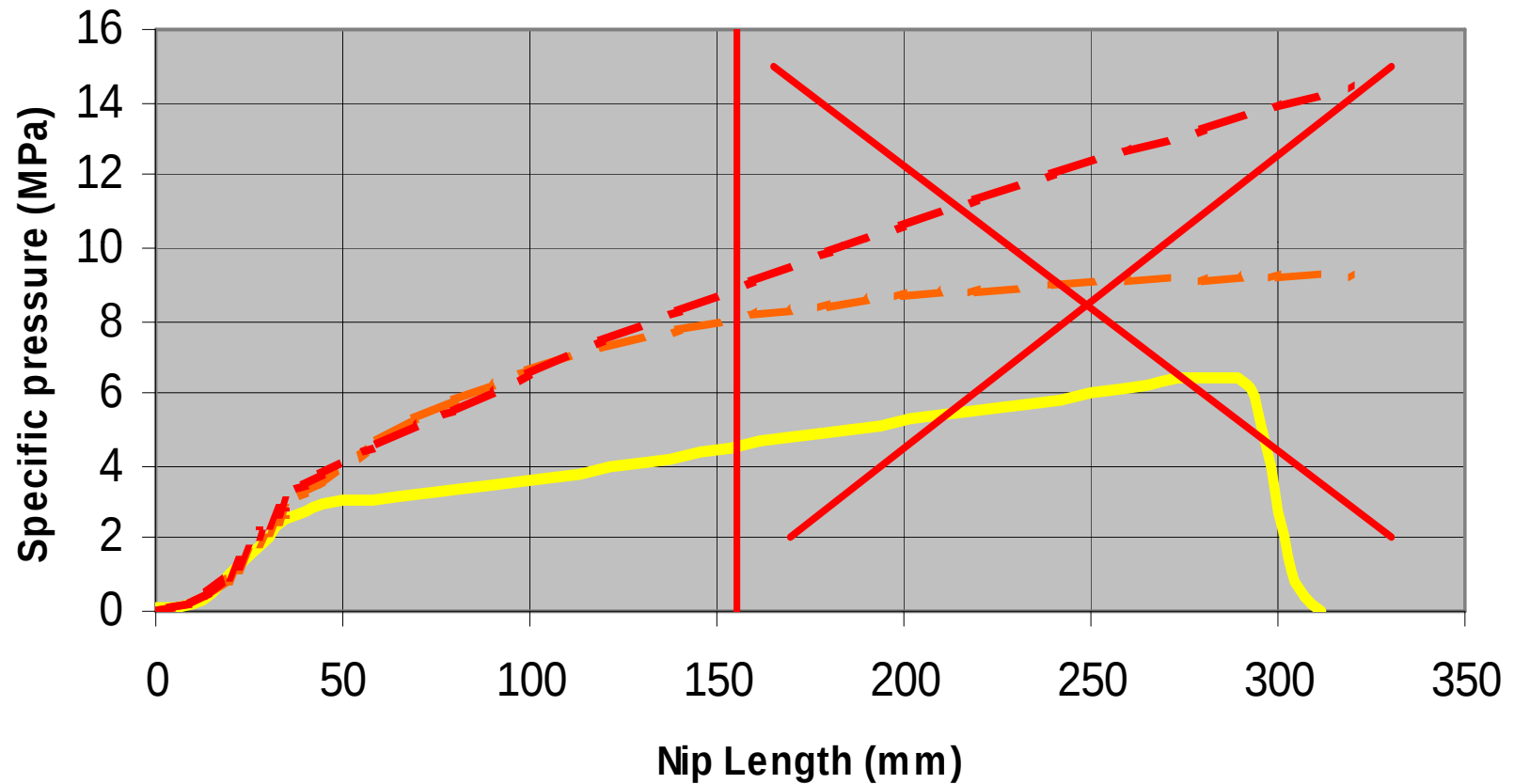


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Solution Strategy

- Machine Direction NIP Profile



— 250 mm shoe - - - Dryness - - - Marking

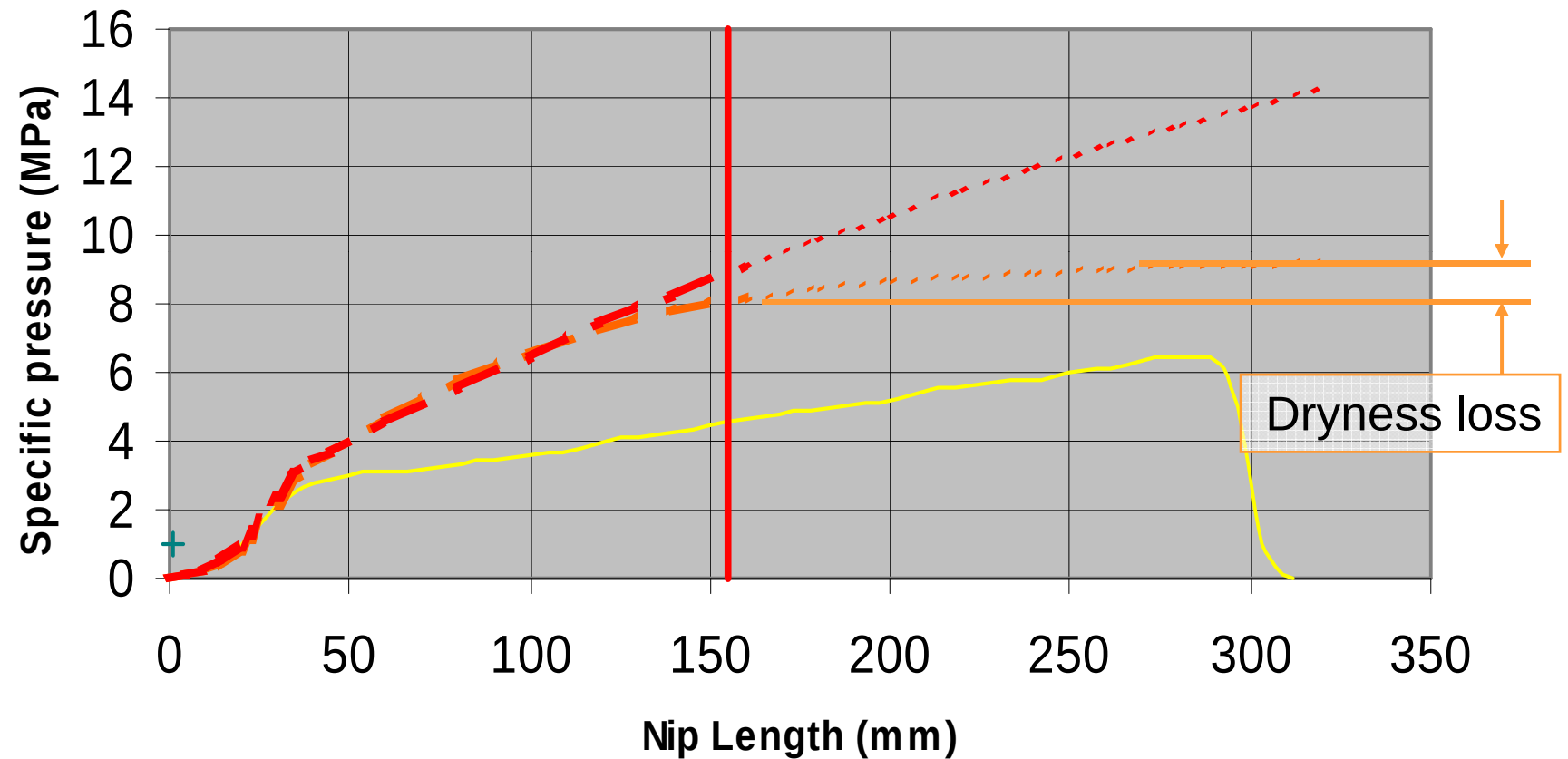


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Solution Strategy

- Machine Direction NIP Profile



— 250 mm shoe

- - - Dryness

- - - Marking

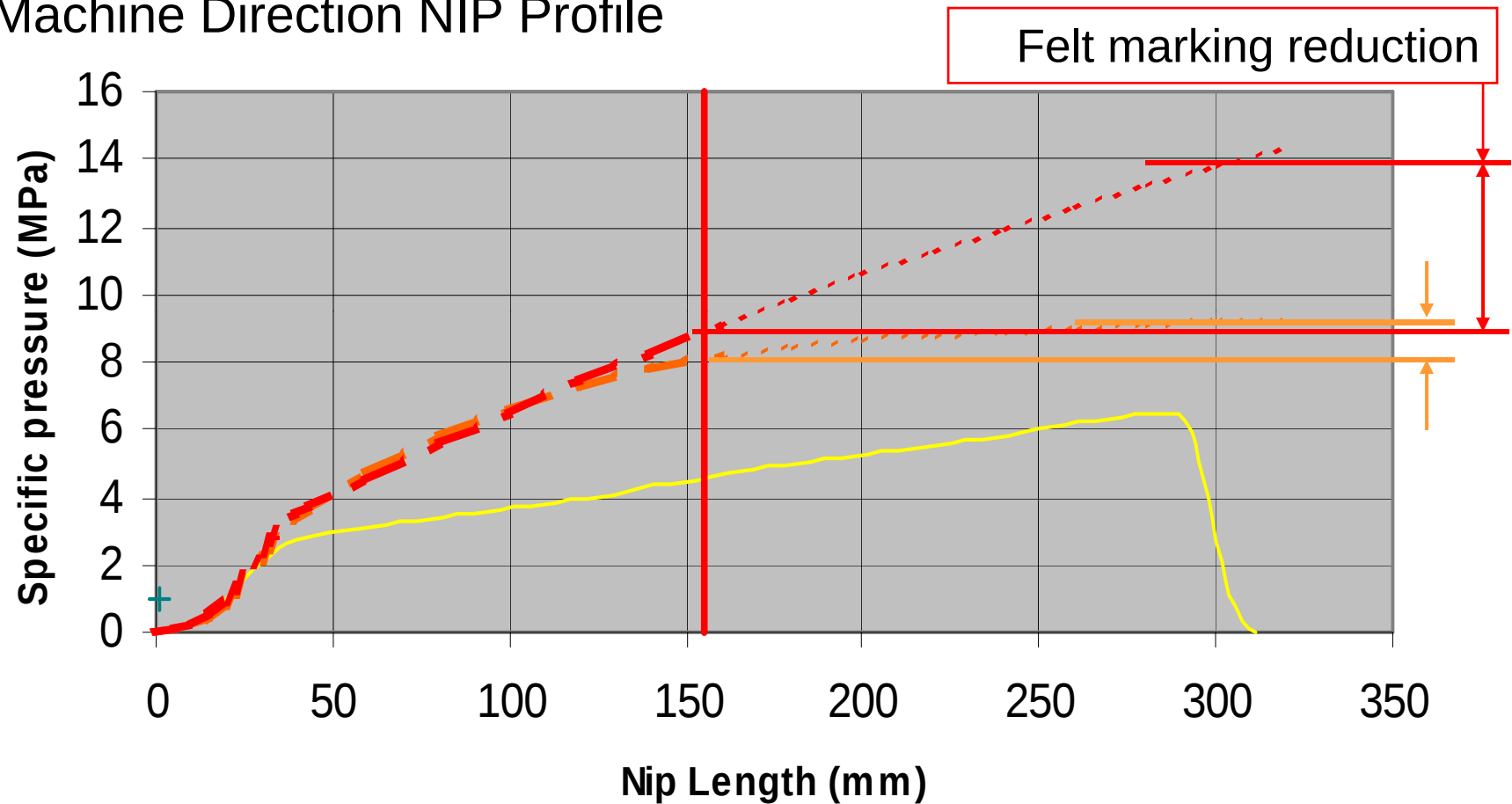


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Solution Strategy

- Machine Direction NIP Profile



— 250 mm shoe

- - Dryness

- - Marking

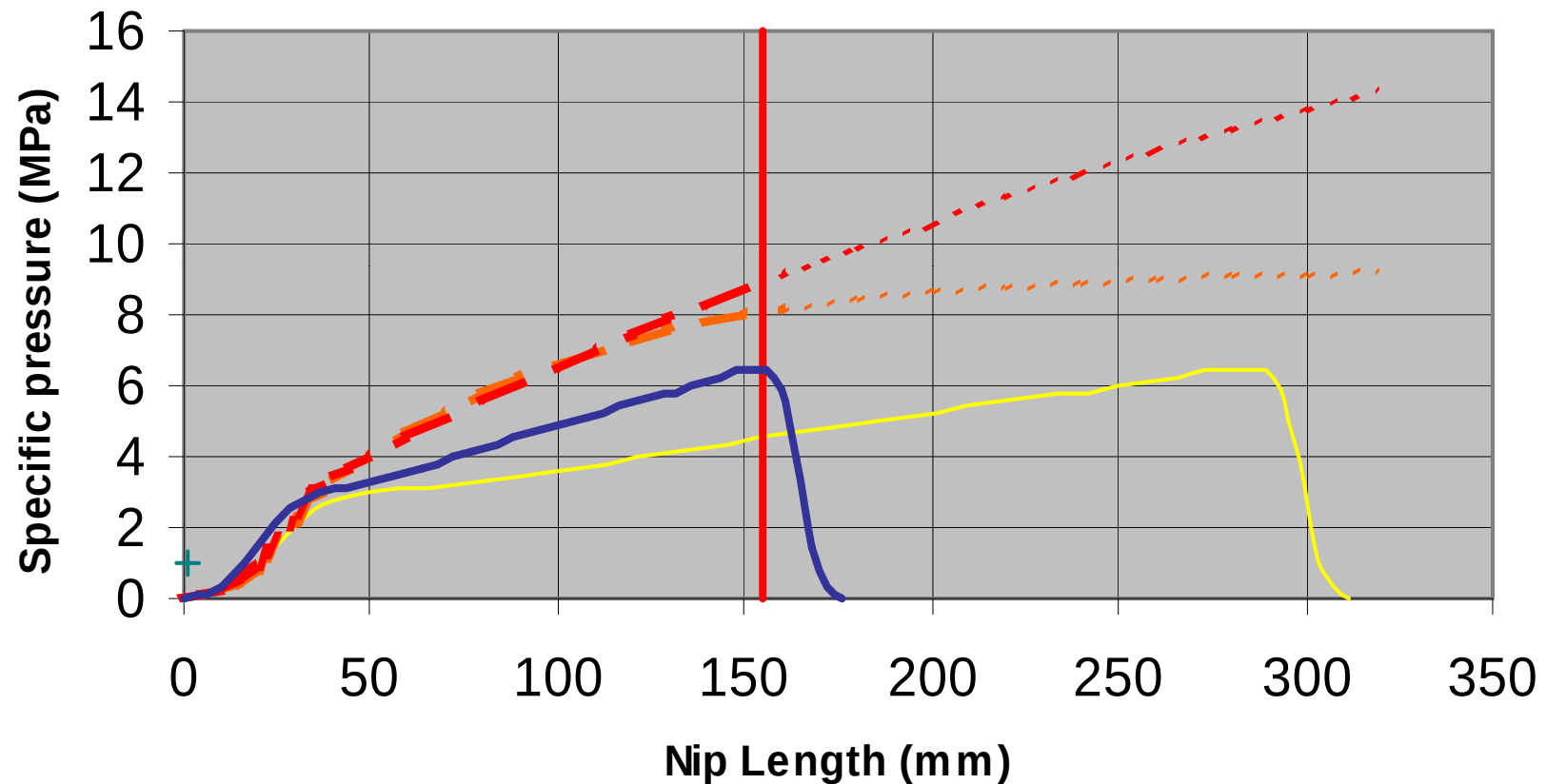


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Solution Strategy

- Machine Direction NIP Profile



— 250 mm shoe - - - Dryness - - - Marking — 125 mm shoe



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Solution Strategy

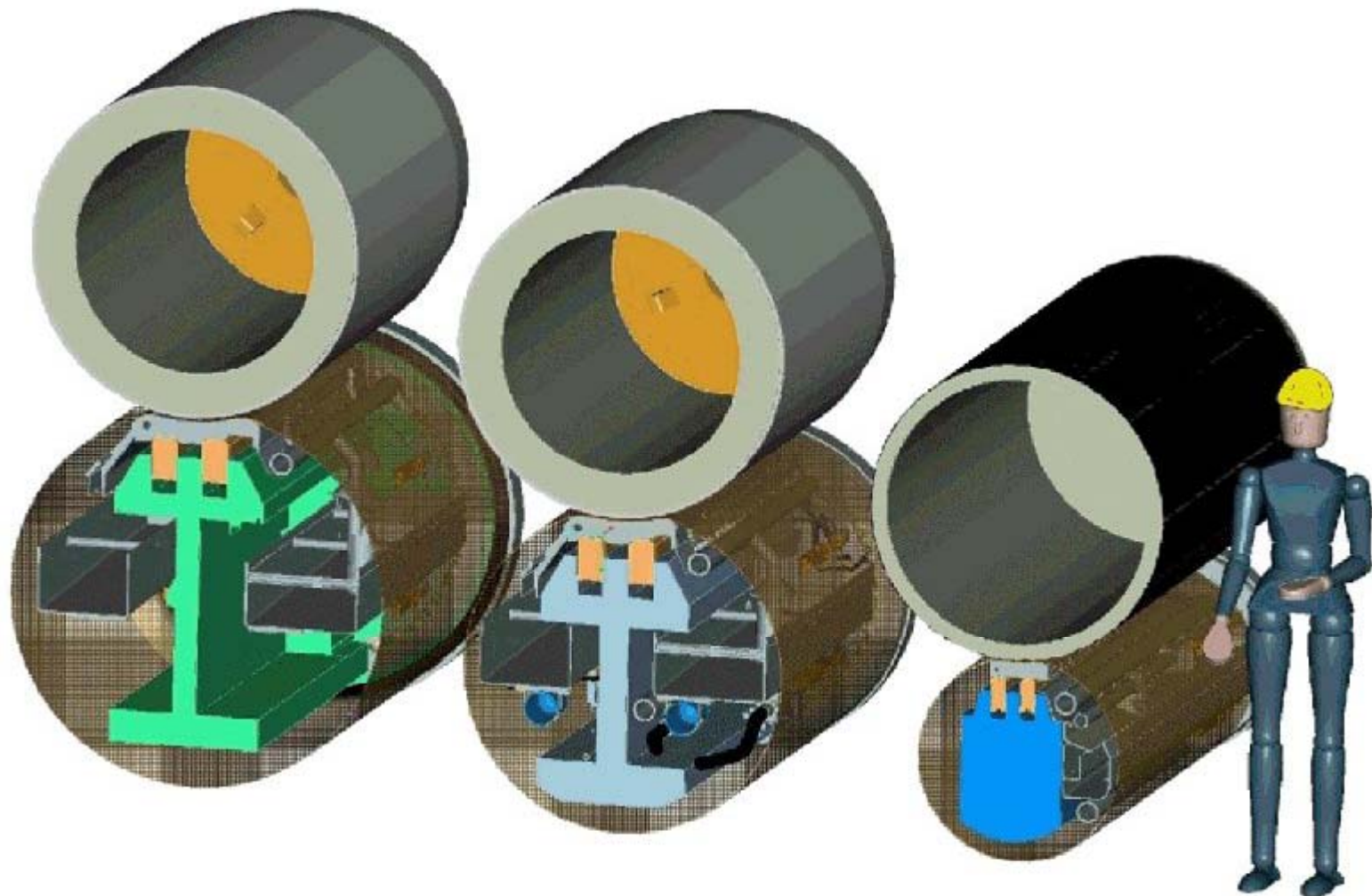
- ✓ Long NIP Residence Time → +++ Felt Marking
- ✓ NIP Specific Pressure → + Felt Marking

✓ → A Shoe Press with a Shorter Shoe

- ✓ With a shorter shoe we can achieve same specific pressure at a lower total NIP
- ✓ Lower total NIP makes the shoe press lighter
- ✓ A lighter shoe press reduces the total investment cost



Solution Strategy

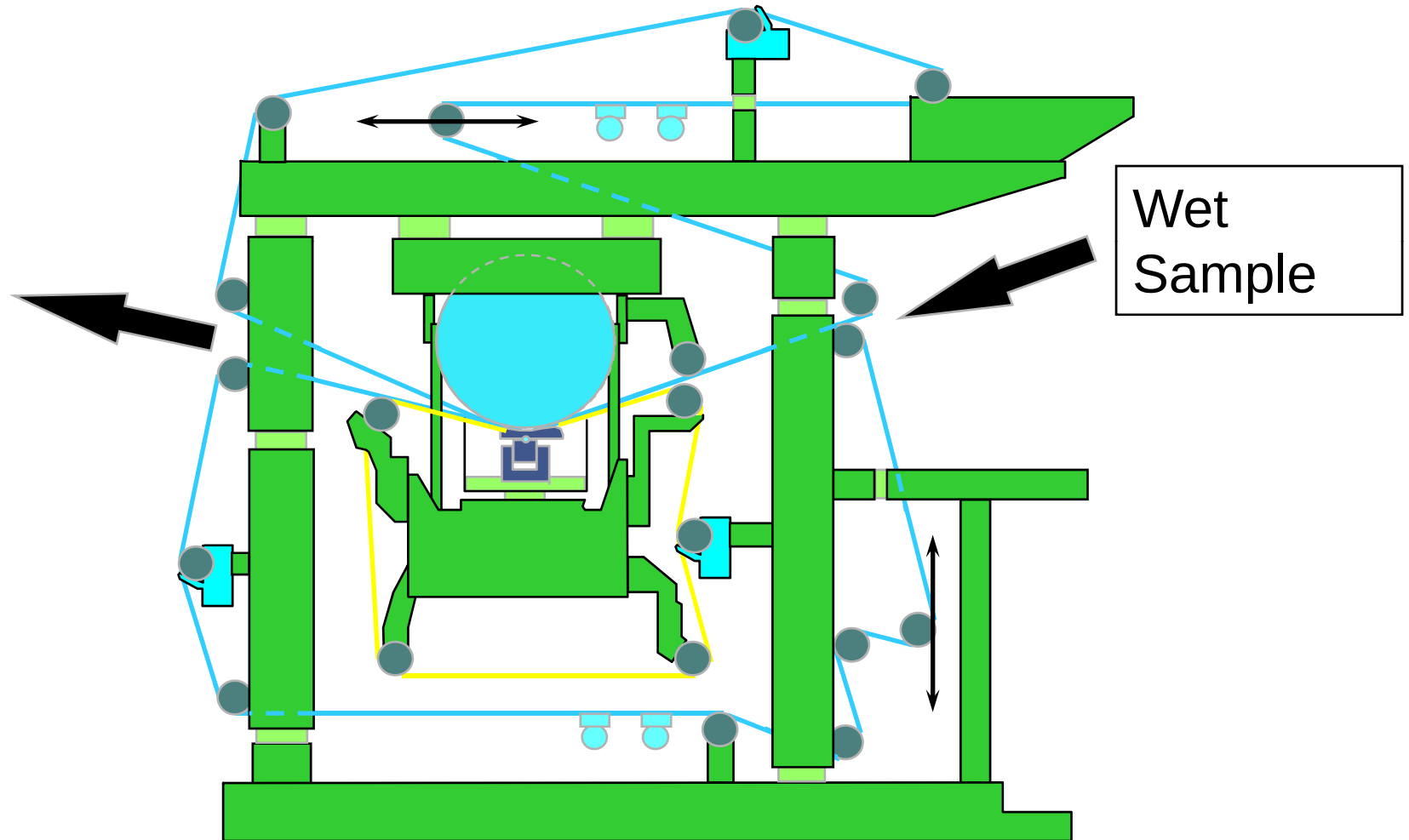


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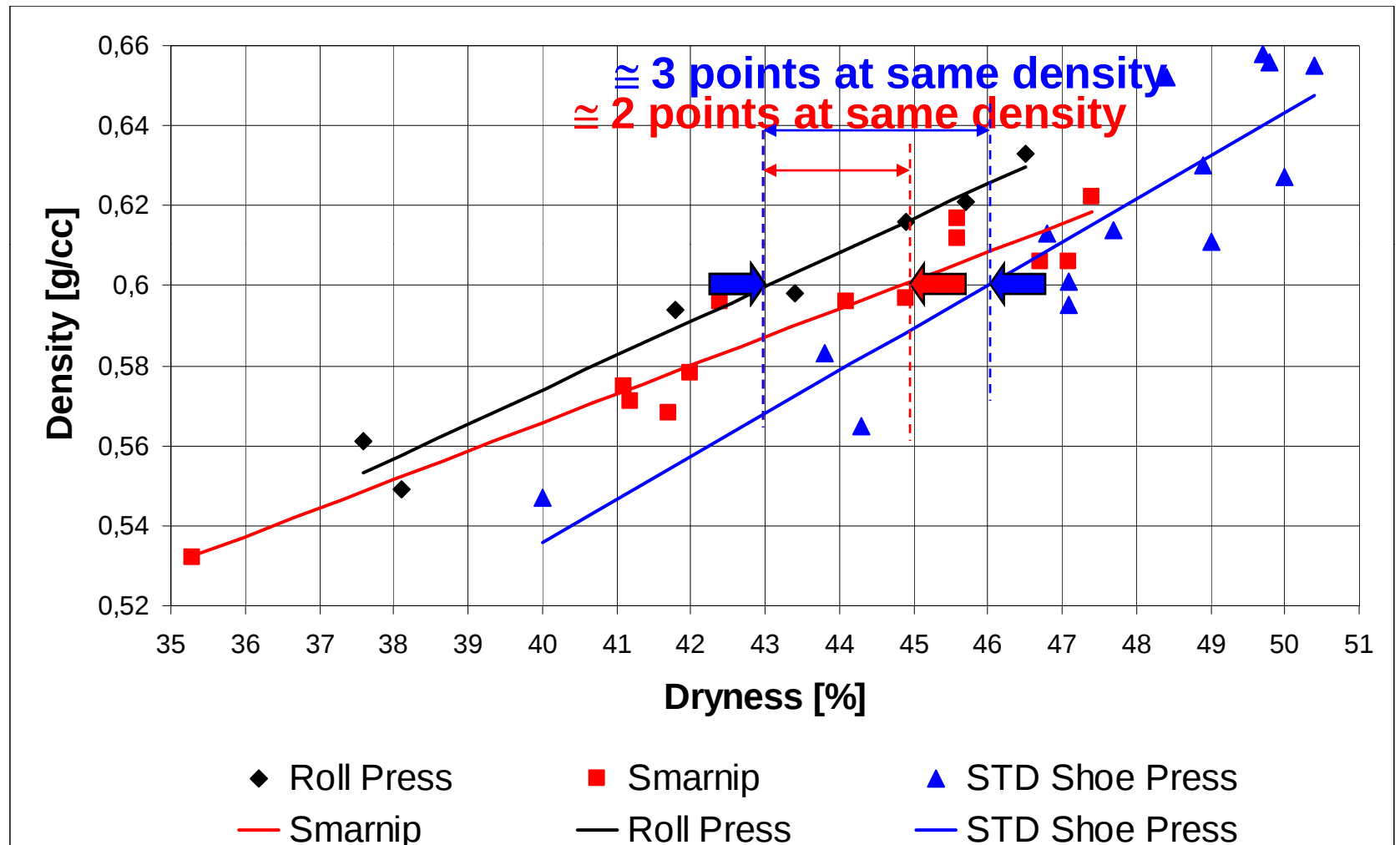
Implementation

- Pilot Hand Sheet Trials



Implementation

- Pilot Hand Sheet Trials

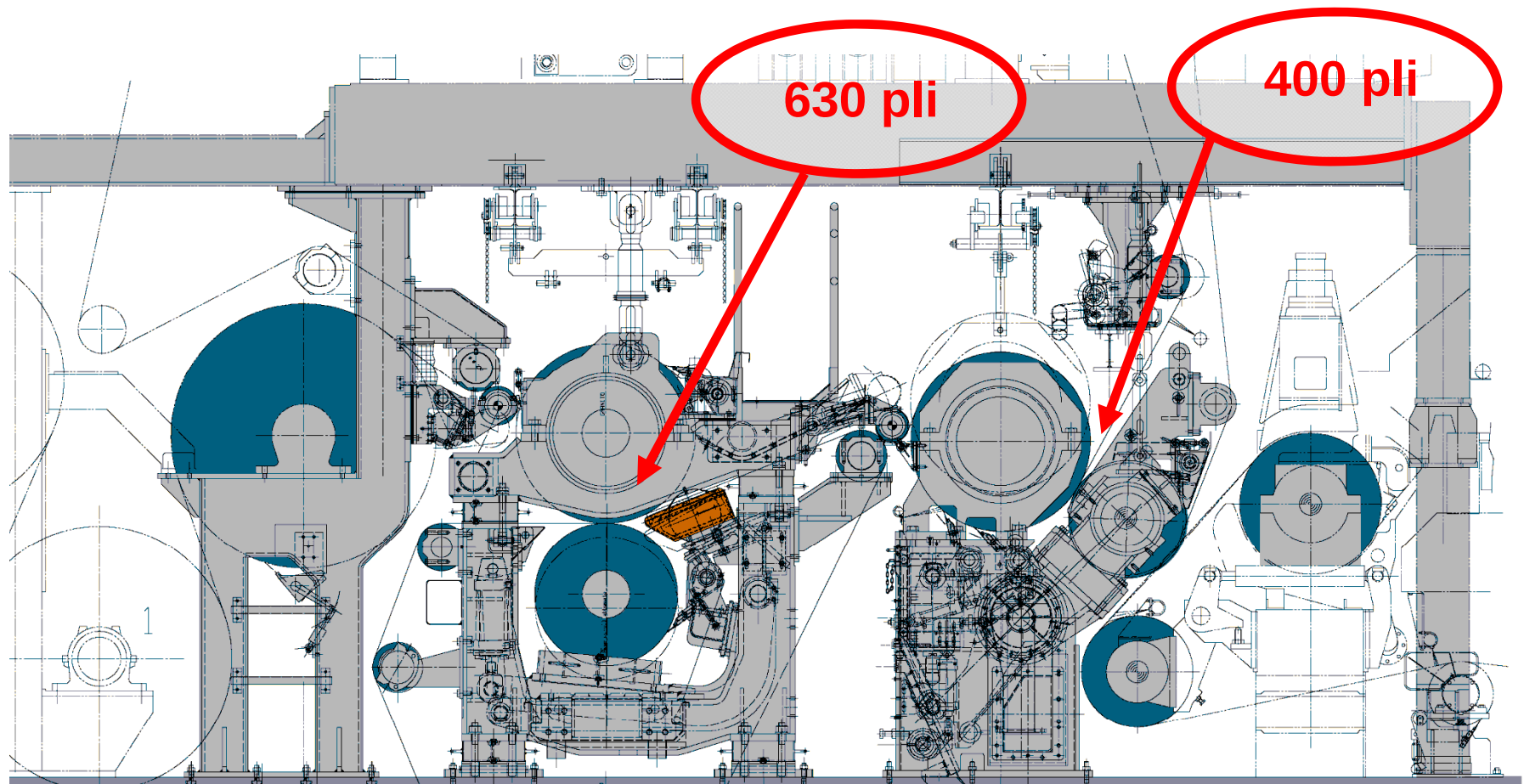


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Implementation

- before

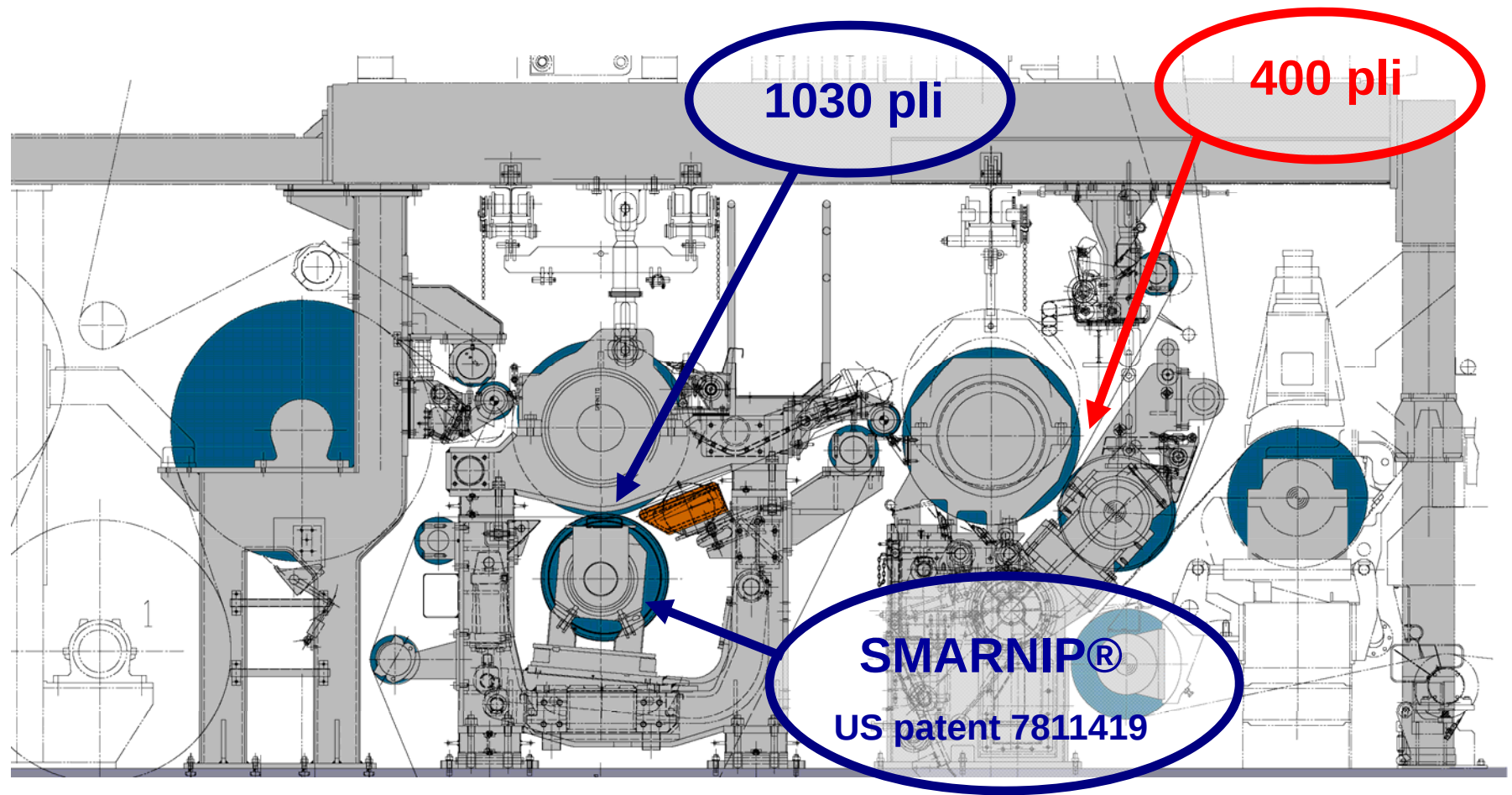


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Implementation

- after



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Success

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		Reel speed	Thickness	
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Envelope	120	1245	6.3 - 6.6	
Offset	200	690	?	
New grade	270	na	na	



Success

		before		after		Average production increase (1 year)
		Reel speed	Thickness	Reel speed	Thickness	
	g/m ²	ft/min	mils	ft/min	mils	%
Laser print	100	1475	4.1	1581	4.2	7.0
Notebooks	90	1640	?	1765	=	7.5
Copy color	80	1675	4.3	1840	4.1 – 4.6	10.0
Envelope	90	1525	4.8	1555	4.9	2.0
Envelope	120	1245	6.3 - 6.6	1309	6.6 – 6.8	5.0
Offset	200	690	?	690	=	0
New grade	270	na	na	145	?	Na
Total average production increase (1 year): 7.5% more						
Steam consumption: 6% less						



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Success

		before		after		Average production increase (1 year)
		Reel speed	Thickness	Reel speed	Thickness	
	g/m ²	ft/min	mils	ft/min	mils	%
Laser print	100	1475	4.1	1581	4.2	7.0
Notebooks	90	1640	?	1765	=	7.5
Copy color	80	1675	4.3	1840	4.1 – 4.6	10.0
Envelope	90	1525	4.8	1555	4.9	2.0
Envelope	120	1245	6.3 - 6.6	1309	6.6 – 6.8	5.0
Offset	200	690	?	690	=	0
New grade	270	na	na	145	?	Na
Total average production increase (1 year): 7.5% more						
Steam consumption: 6% less						



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Success

- ✓ + 10% Production increase
- ✓ - 6% Steam Consumption
- ✓ + Bulk
- ✓ + Flexibility



Success

- Blanket Life
 - ✓ Average speed 1640fpm
 - ✓ Average NIP 800pli

Blanket number	Days on machine	Millions Nip cycles	Reason for removal
1	706	207	Annual shut down



Success

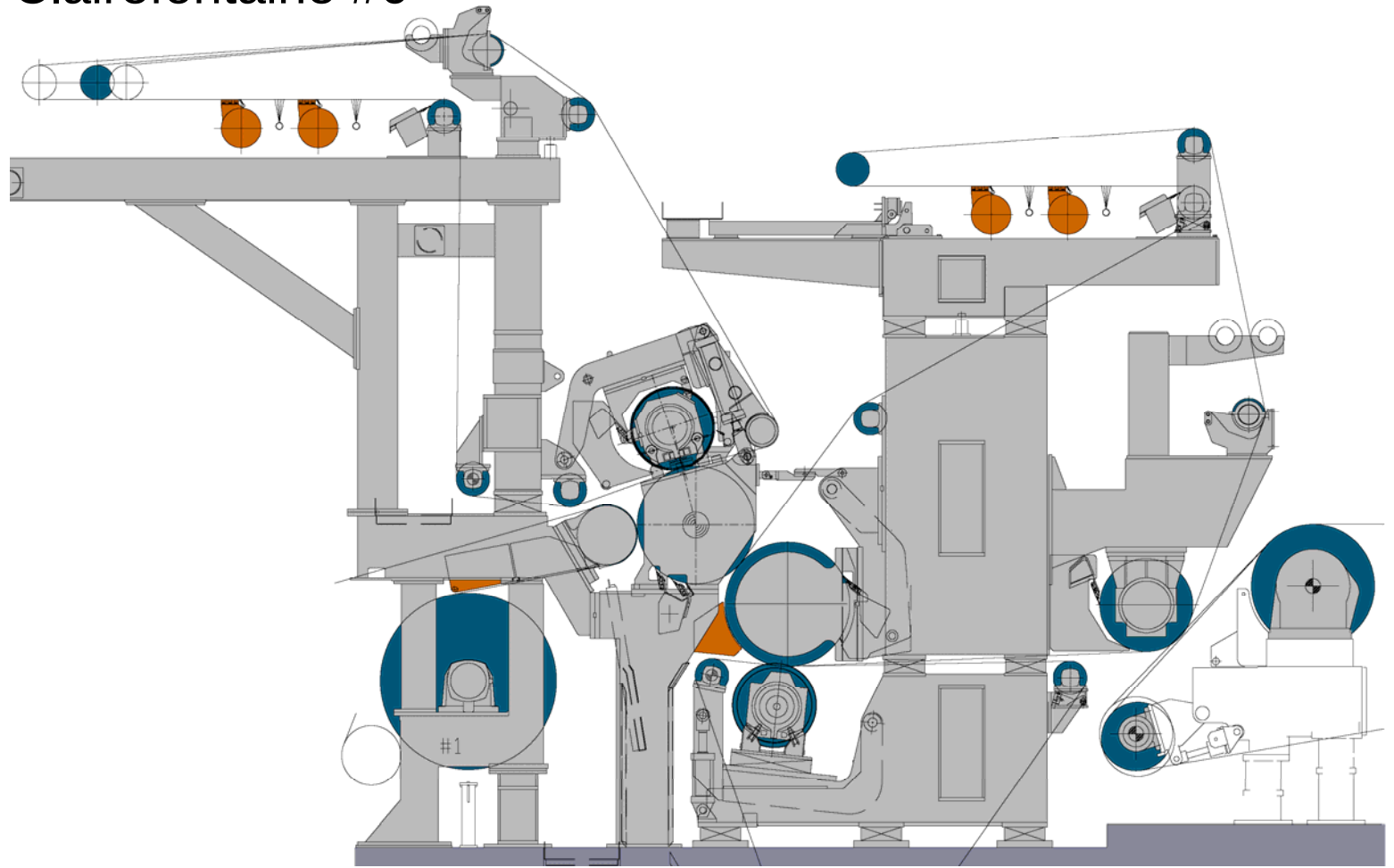
- Blanket Life
 - ✓ Average speed 1640fpm
 - ✓ Average NIP 800pli

Blanket number	Days on machine	Millions Nip cycles	Reason for removal
1	706	207	Annual shut down



Mill Overview

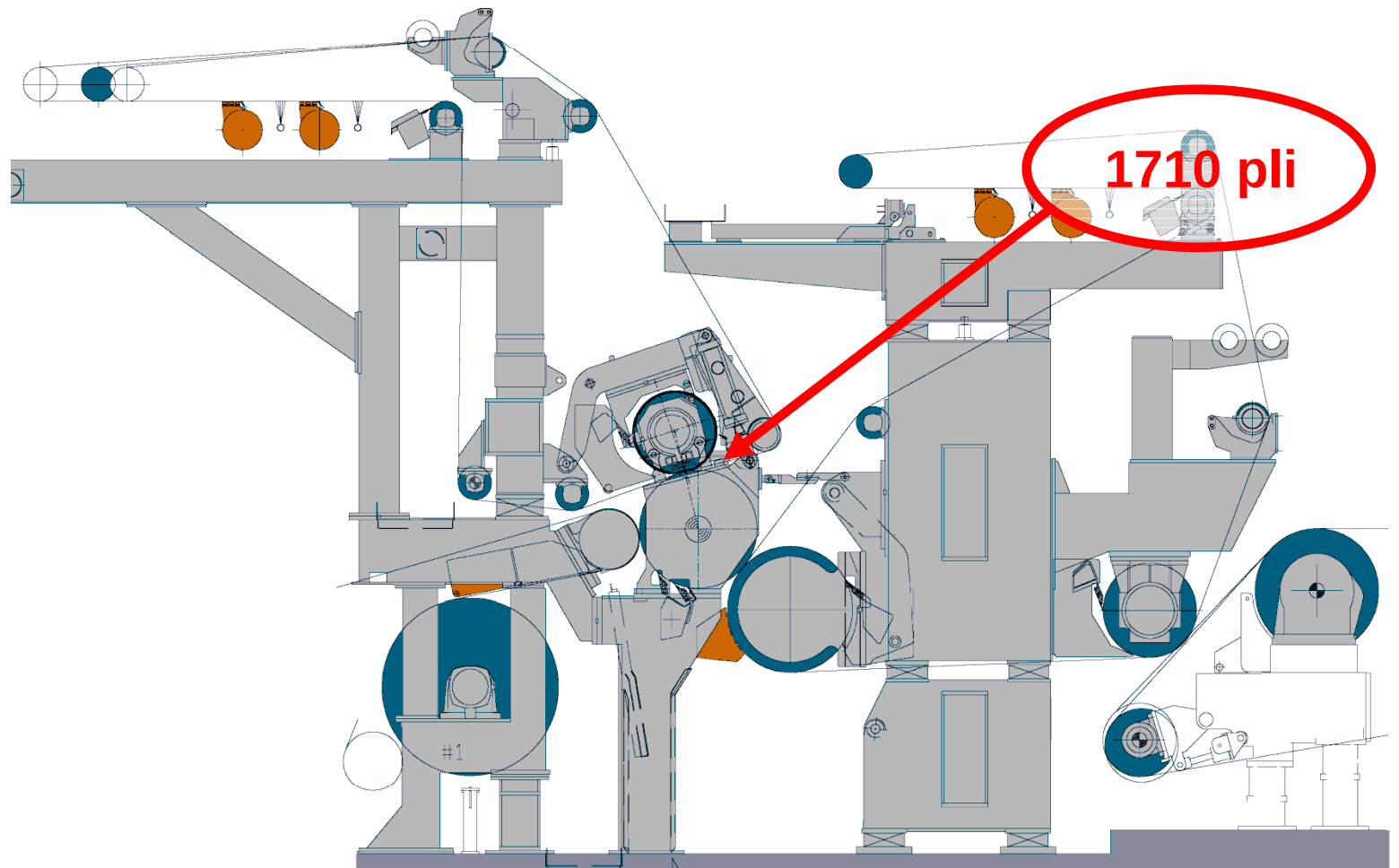
- Fine Paper
- Wire 158 in
- Speed 3610fpm
- Pap. De Clairefontaine #6



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Implementation



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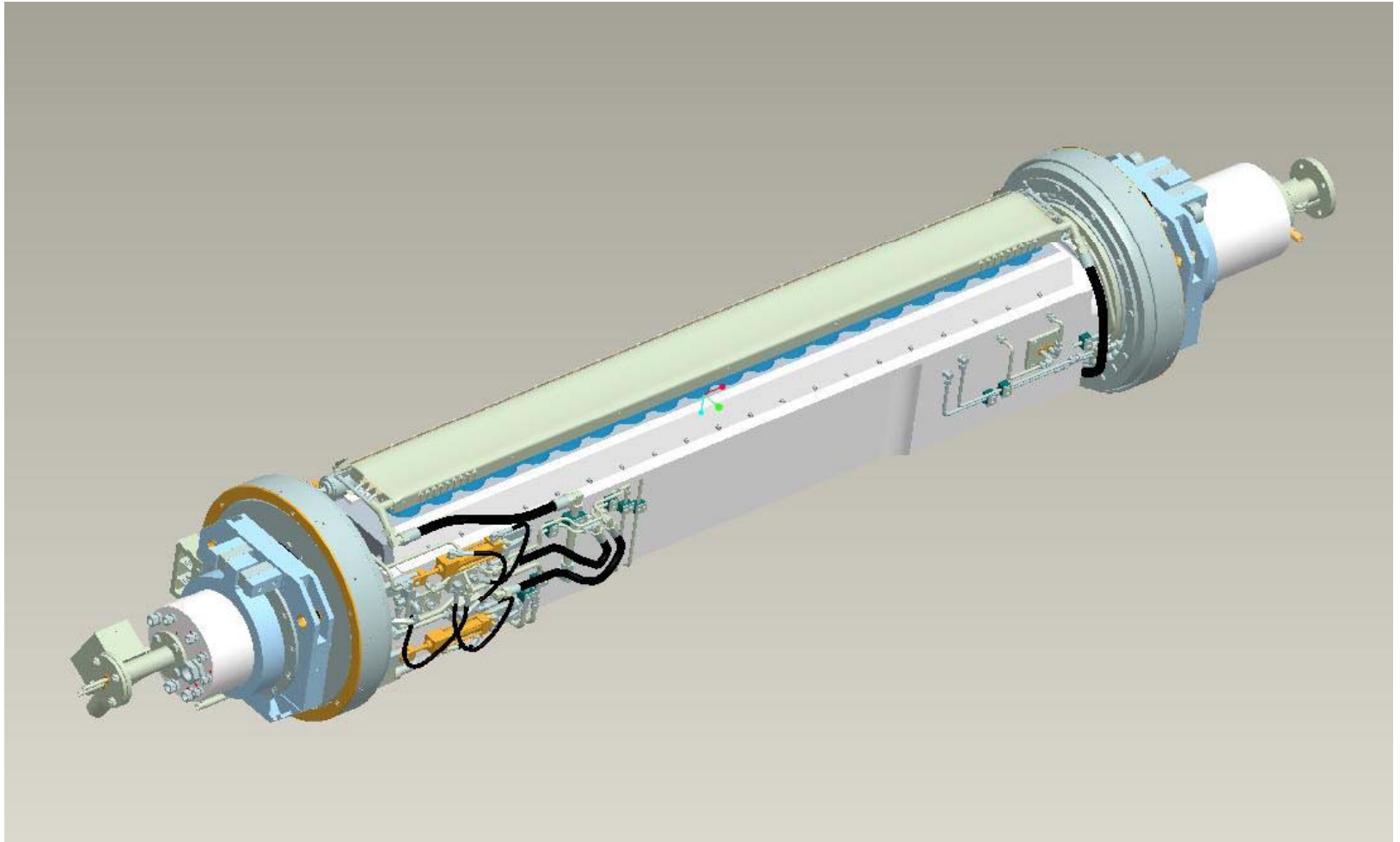
Success

- ✓ + 20% Speed increase
- ✓ + Smoothness
- ✓ + Bulk → 2.5% less raw material for same paper caliper



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Success



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Success

- Sizes: 28 – 30 – 44 in



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Features

It is a roll with the shoe press features

- ✓ Longer nip profile (more dewatering)
- ✓ Better MD nip profile (gentle - no rewetting)
- ✓ Flexibility (no crown issues)
- ✓ Better moisture CD profile

It is a shoe press with less negative points

- ✓ Possibility to simulate a roll nip
- ✓ Interchangeable with a roll
- ✓ Less space required (reuse of frame)
- ✓ Lighter (no issues with crane, building,...)
- ✓ Longer blanket life



Conclusion

- ✓ **1980** Standard shoe press has been originally designed (by Beloit) for **Board** applications, targeting dryness and densification
- ✓ **1994** first Shoe Press application on **Fine Paper**, without adapting the concept
- ✓ **2003** PMT patented the **SMARNIP**[®] (US patent 7811419) for bulk sensitive grades (Fine Paper, Board, Sack Kraft...)
- ✓ **2011** The SMARNIP[®] is a proven product
 - ✓ (14) references
 - ✓ On different grades
 - ✓ In Europe and Asia

