



# Sheet Stealing in Press Sections

Practical experience with a common  
sheet-felt separation phenomenon

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# Sheet Stealing – practical experiences

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3. Theoretical Considerations
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# Sheet Stealing – practical experiences

## 1. Introduction

Sheet Stealing in press sections:

A common sheet-felt separation phenomenon in graphic-, board- and packaging paper machines

What makes Sheet Stealing possible?

during running conditions:



Source: Smurfit Kappa

linerboard machine, 900 m/min

during threading:



Source: Stora Enso

board machine, 600 m/min

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# Sheet Stealing – practical experiences

## 2. Definitions

Sheet Stealing is a sheet-felt separation phenomenon, where the sheet leaves the intended ideal sheet course.

### Case 1: single-felted press nips

Following the press zone **the sheet does not follow the roll surface of the press roll**, which would otherwise ensure further sheet transfer.

### Case 2: double-felted press nips

Following the press zone **the sheet does not follow the felt**, which would otherwise ensure further sheet transfer.



# Sheet Stealing – practical experiences

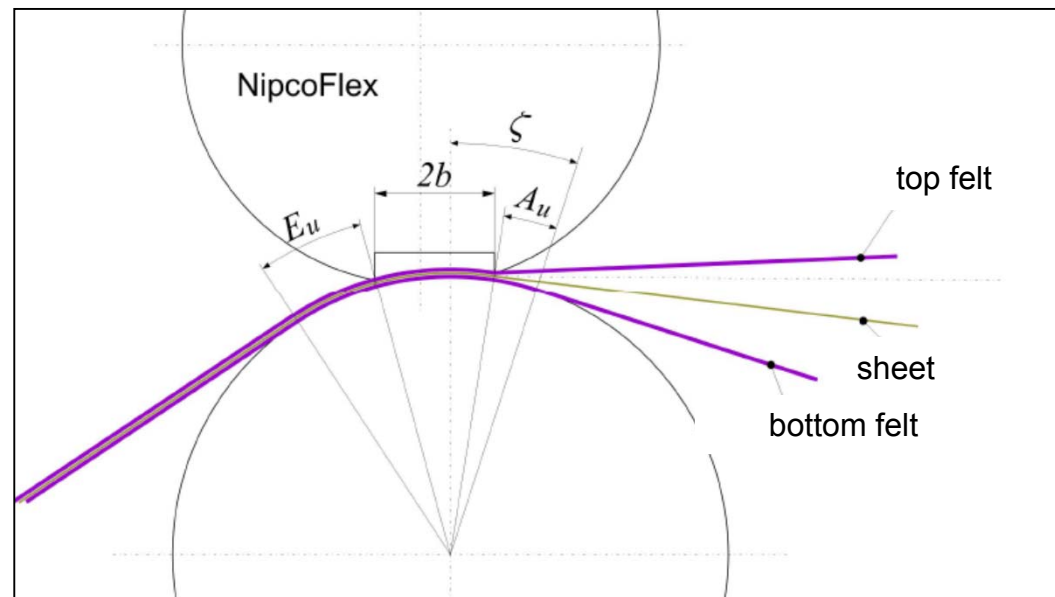
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# Sheet Stealing – practical experiences

## 3. Theoretical considerations

### Terminology:



Source: G.Steiner, Sheet Stealing – a sheet-felt separation phenomenon

$Eu$ .....ingoing felt wrap

$Au$ .....outgoing felt wrap

$\zeta$ .....wrap angle

$2b$ .....nip width

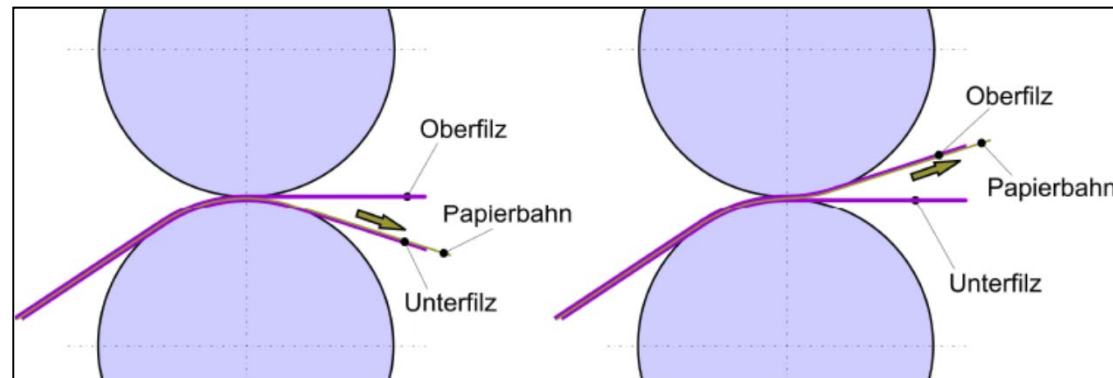


# Sheet Stealing – practical experiences

## 3. Theoretical considerations

Sheet Stealing in literature: FEKETE E., GADDY D.

- inip-geometry effect:  
sheet follows the higher wrapped felt



- felt surface effect:  
sheet follows the finer, smoother, wetter felt
- paper surface effect:  
wetter paper surface follows the felt

Source: Fekete E., Gaddy D., The pitfall of double felting, Paper Age 113, 1997 S. 22 -23

# Sheet Stealing – practical experiences

## 3. Theoretical considerations

common reason for Sheet Stealing: (subjective)  
**vacuum in outgoing press nips caused by felt  
and sheet expansion**

major factors producing this vacuum:

- outgoing felt wrap
- machine speed
- material properties of press felts
- press felt designs
- water content of press felts
- ...

trouble shooting:

vacuum in felt must be reduced before sheet-felt separation



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# Sheet Stealing – practical experiences

## 4. Case Histories

Sheet Stealing in the Hamburger Containerboard Group:

on almost all paper machines regardless of:

- machine supplier
- grade of ply (single- to four ply)
- single layer, double layer
- furnishing
- press felt designs
- speed range
- ...

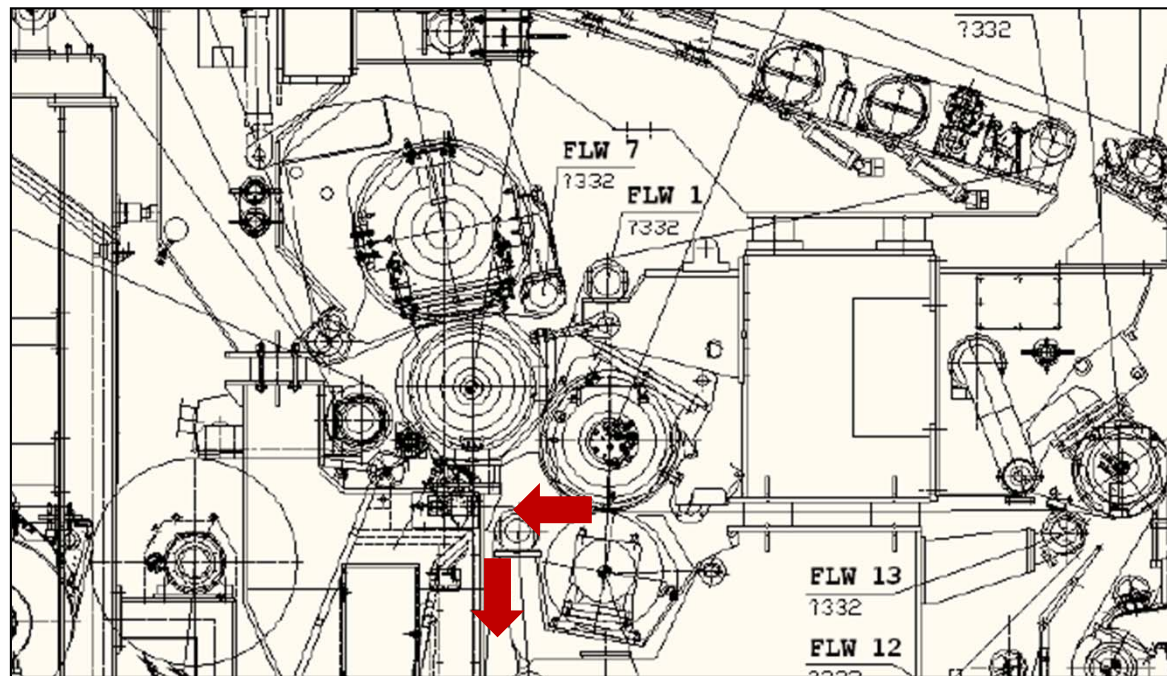


# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 1: machine 1, machine supplier A  
three-nip press with shoe press in third position

**Sheet stealing at bottom felt**



Source: machine documentation Hamburger Containerboard



# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 1: machine 1, machine supplier A

### Sheet stealing at bottom felt – periphery

- change in vacuum system:  
power of holding zone was reduced – a result of energy saving measures
- increased machine speed approx. 100 m/min
- new pick-up felt causes problems with the first sheet threading through the press section

### short term solution:

- take off uhle boxes of pick-up felt, open low pressure showers – felt should be made wetter



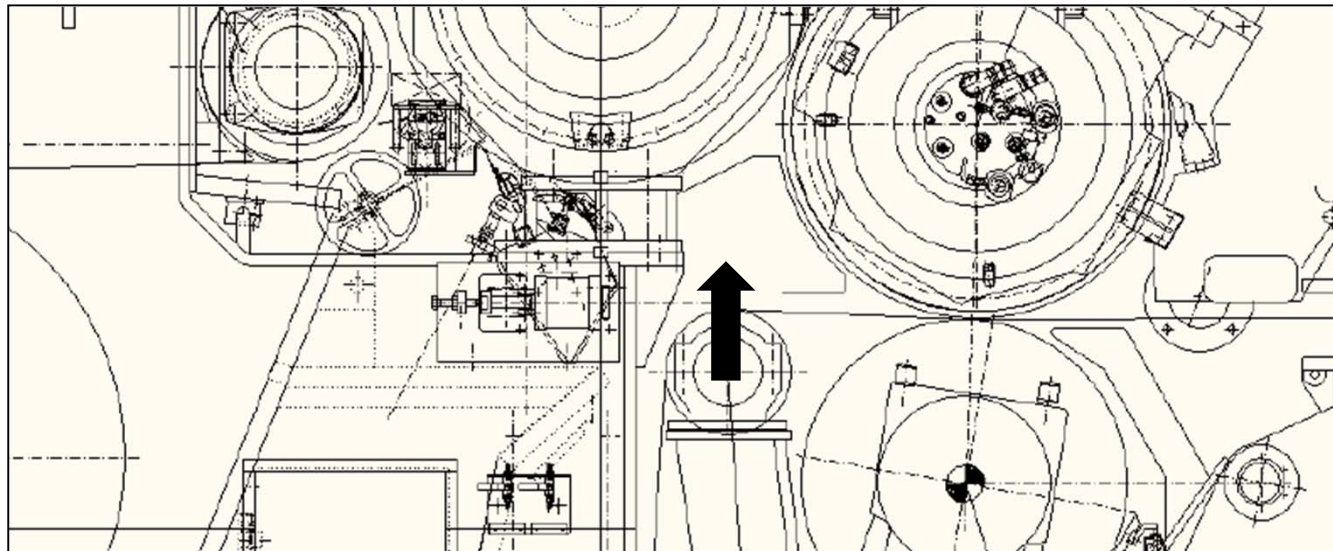
# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 1: machine 1, machine supplier A

Permanent solution:

- remove outgoing felt roll of bottom felt when wrapping of bottom felt on the counter roll is enlarged

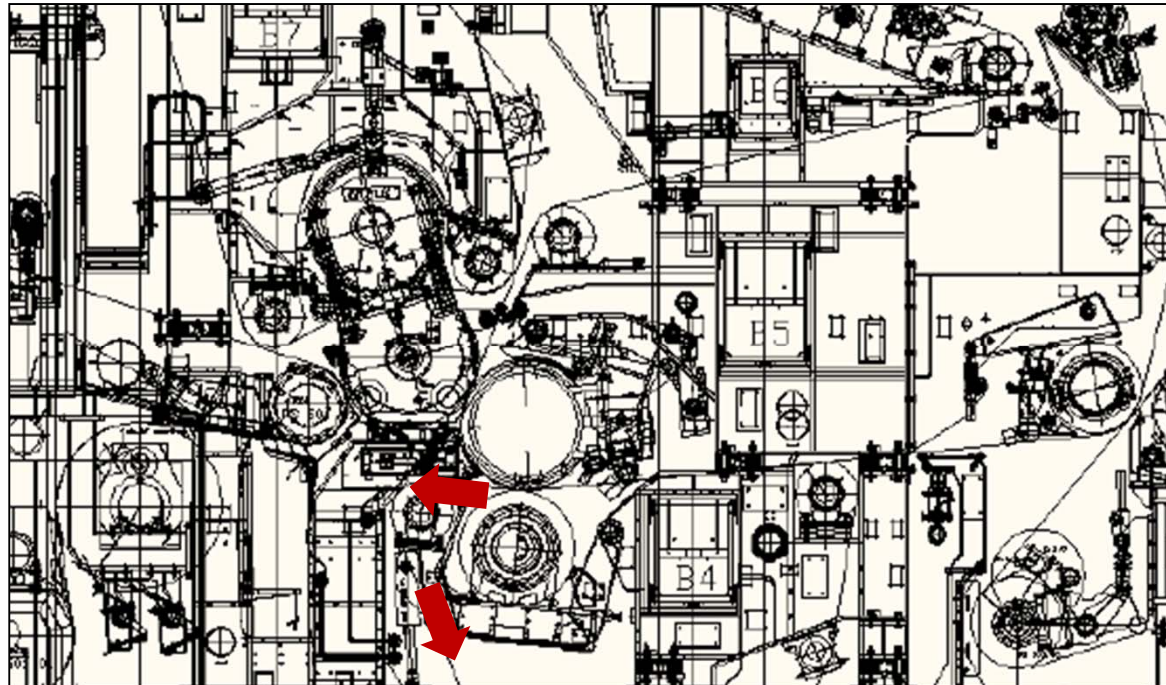


Source: machine documentation Hamburger Containerboard

# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 2: machine 2, machine supplier B  
three-nip press with shoe press in third position  
sheet stealing at bottom felt



Source: machine documentation Hamburger Containerboard



# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 2: machine 2, machine supplier B

sheet stealing at bottom felt – periphery:

- fast running machine
- increased machine speed approx. 200 m/min
- new pick-up felt causes problems with the first sheet threading through the press section



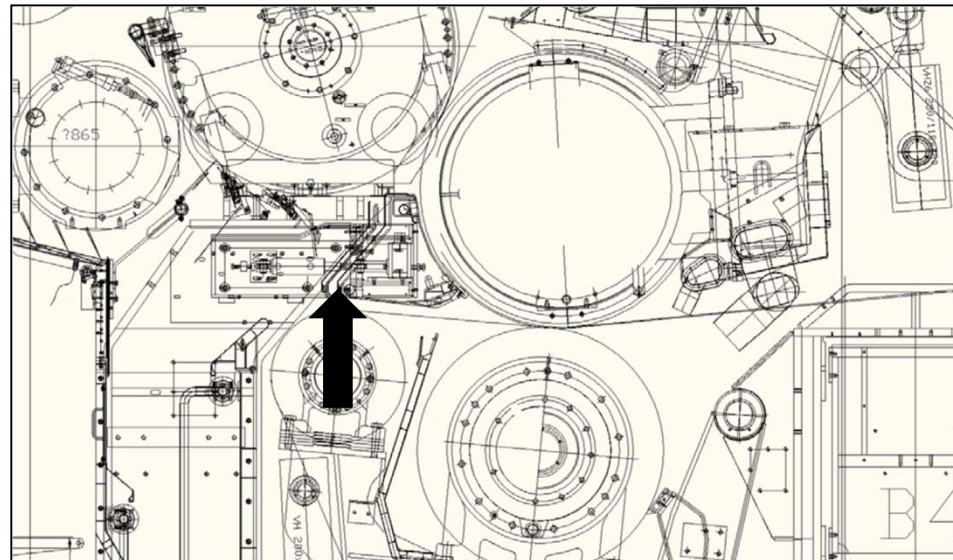
# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 2: machine 2, machine supplier B

permanent solution:

- remove outgoing felt roll on bottom felt wrapping when bottom felt on the counter roll is enlarged

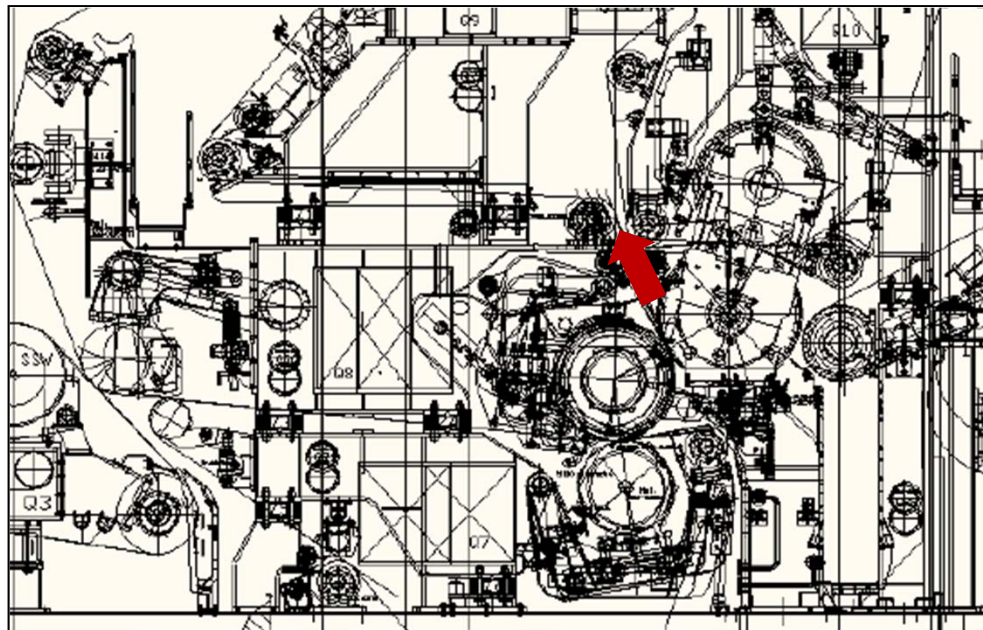


Source: machine documentation Hamburger Containerboard

# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 3: machine 3, machine supplier B  
three-nip press with shoe press in third position  
paper edges tended to run with pick-up felt after second press



Source: machine documentmation Hamburger Containerboard

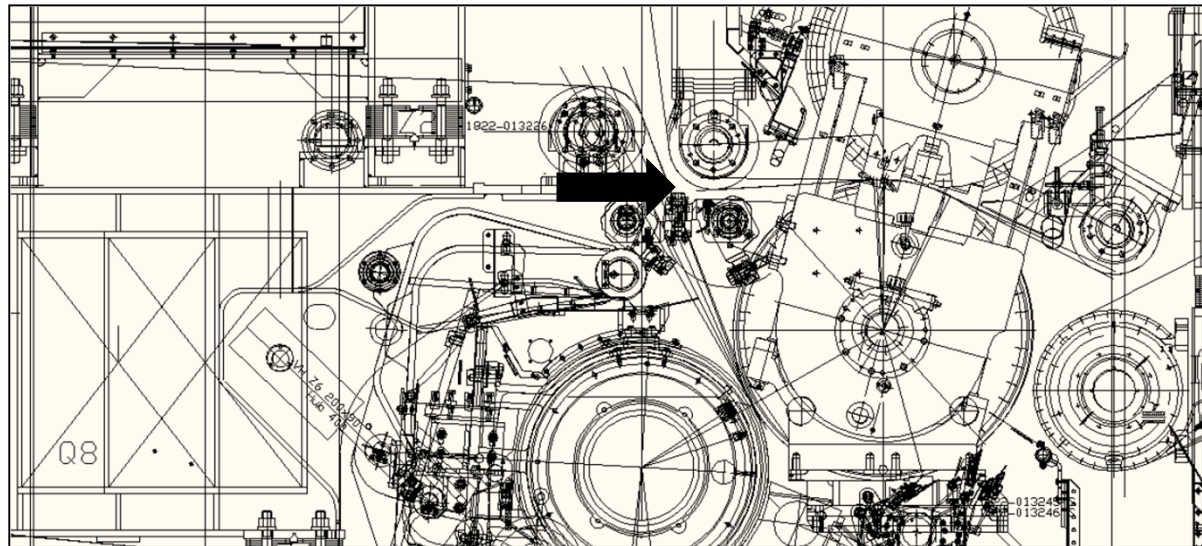
# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 3: machine 3, machine supplier B

permanent solution:

- remove outgoing felt roll of pick-up felt when pick-up felt on the counter roll is enlarged



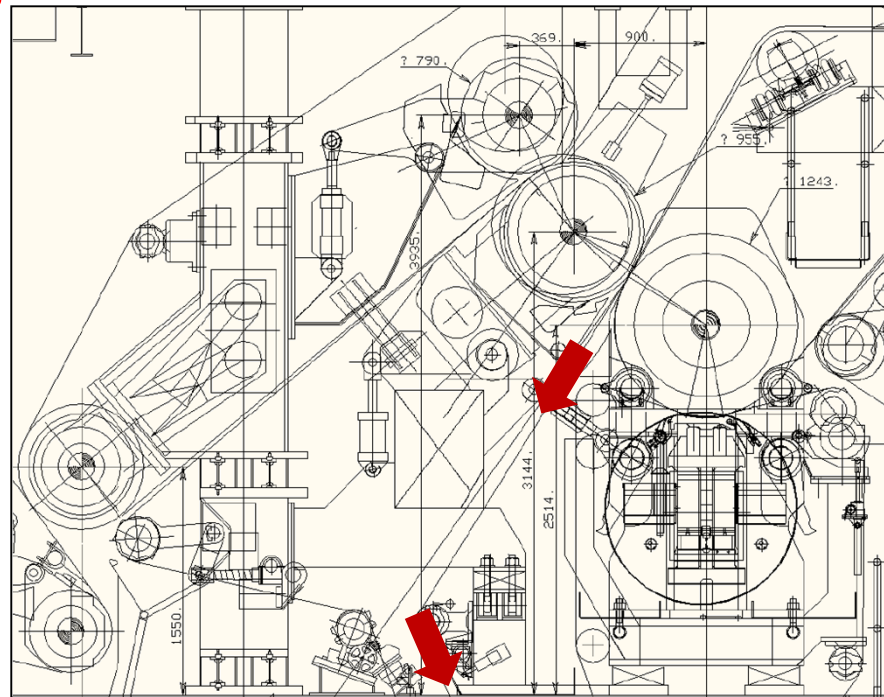
Source: machine documentation Hamburger Containerboard



# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 4: machine 4, machine supplier C  
inverted three nip press with shoe press in third position  
sheet stealing on first bottom felt



Source: machine documentation Hamburger Containerboard



# Sheet Stealing – practical experiences

## 4. Case Histories

Case History 4: machine 4, machine supplier C

sheet stealing with first bottom felt – periphery:

- change of first felt roll after second nip  
felt roll with bigger diameter  
→ reduces the outgoing wrap of first bottom felt on the counter roll
- increase of machine speed approx. 200 m/min

„short term“ solution:

- reinstall felt roll with smaller diameter

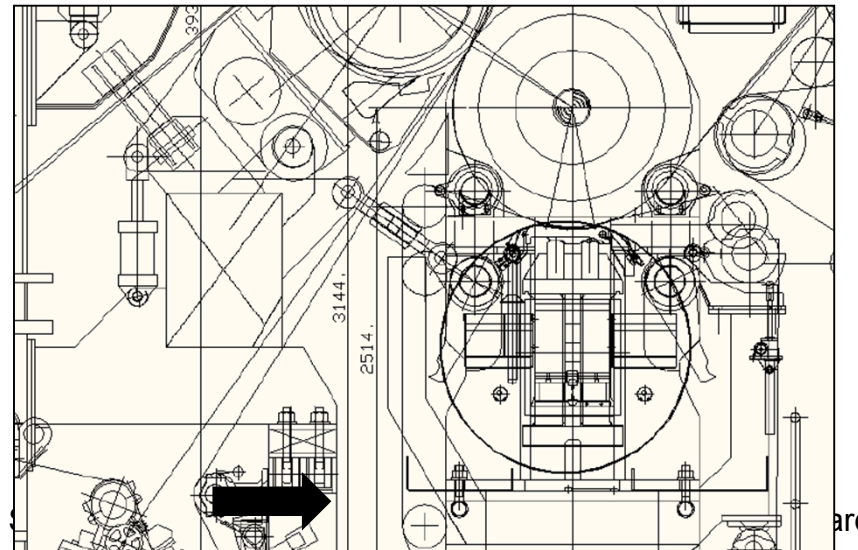
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## 4. Case Histories

Case History 4: machine 4, machine supplier C

permanent solution:

- Remove outgoing felt roll of first bottom felt wrapping when bottom felt on the counter roll is enlarged



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# Sheet Stealing – practical experiences

## 5. Conclusions

In general:

1. Correctly chosen outgoing press geometries define the separation line of felts at such a distance from the nip that a vacuum generated by felt expansion is already reduced.

So that the sheet does not follow the felt, the **felt must be wrapped wide enough on the counter roll!**

2. **The faster the machine speed the bigger the outgoing felt wrap has to be!**
3. **Installations of suction boxes for sheet-felt separation** can be **avoided by correctly chosen outgoing press geometries!**



# Sheet Stealing – practical experiences

## 5. Conclusions

Hamburger internal:

1. **For future projects correct and adequate felt wrapping** has to be taken into account **at an early stage in the design phase!**
2. **Standard concepts have to be adapted to needs** if necessary!



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## 6. Summary

1. Sheet Stealing is a common sheet-felt separation phenomenon where the sheet leaves the intended ideal sheet course.
2. Vacuums in press felts in outgoing press nips are caused by felt expansion.
3. If vacuum levels in press felts are high enough, and persistent for a long enough time period, sheet stealing can occur.
4. Sheet Stealing can be avoided by correct and adequate felt wrapping. Felt wrapping on counter rolls has to be the correct size to ensure reduction of the vacuum generated by felt expansion.
5. For future projects (i.e. new plants) sufficient possibilities for variable wrapping must be put in place.



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