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Kruger

First Industrial Flotation Column in a Paperboard Recycling Plant

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Outline

- Introduction
- Objectives
- Experimental
- Results
  - Laboratory flotation column at mill site
  - Mill flotation column
- Conclusions
- Acknowledgements

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Introduction

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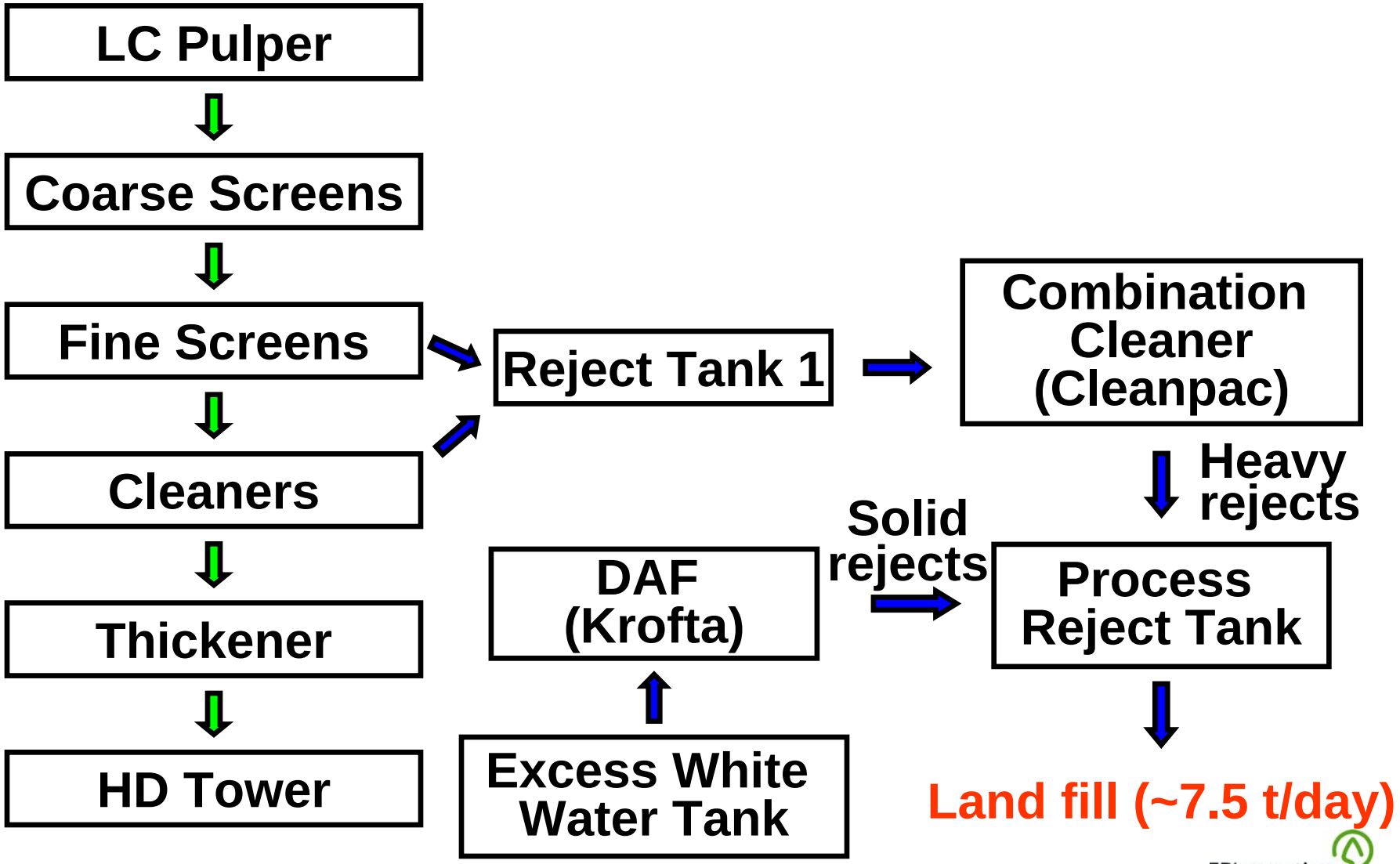
Kruger, Place Turcot
— Paperboard Recycling Plant Flow Chart



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Paperboard Recycling Process

- Flotation is not used in board mills
- But there is a definitive trend to include it in the separation steps:
  - *Doshi, M. R. et al, Proceeding of TAPPI Fall Technical Conference, October 26–30 (2003).*
  - *Galland, G. et al, Rev. ATIP, 51(4/5):185–192 (1997).*
  - *Lee, H.L. et al, Appita Journal, 59(1):31–36 (2006).*
  - *Delagoutte, T. et al, Rev. ATIP, 60(4):14–24 (2006).*

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Limitations of Installation of Flotation Cells in OCC Recycling Process

- High flotation loss
- Large floor space requirement

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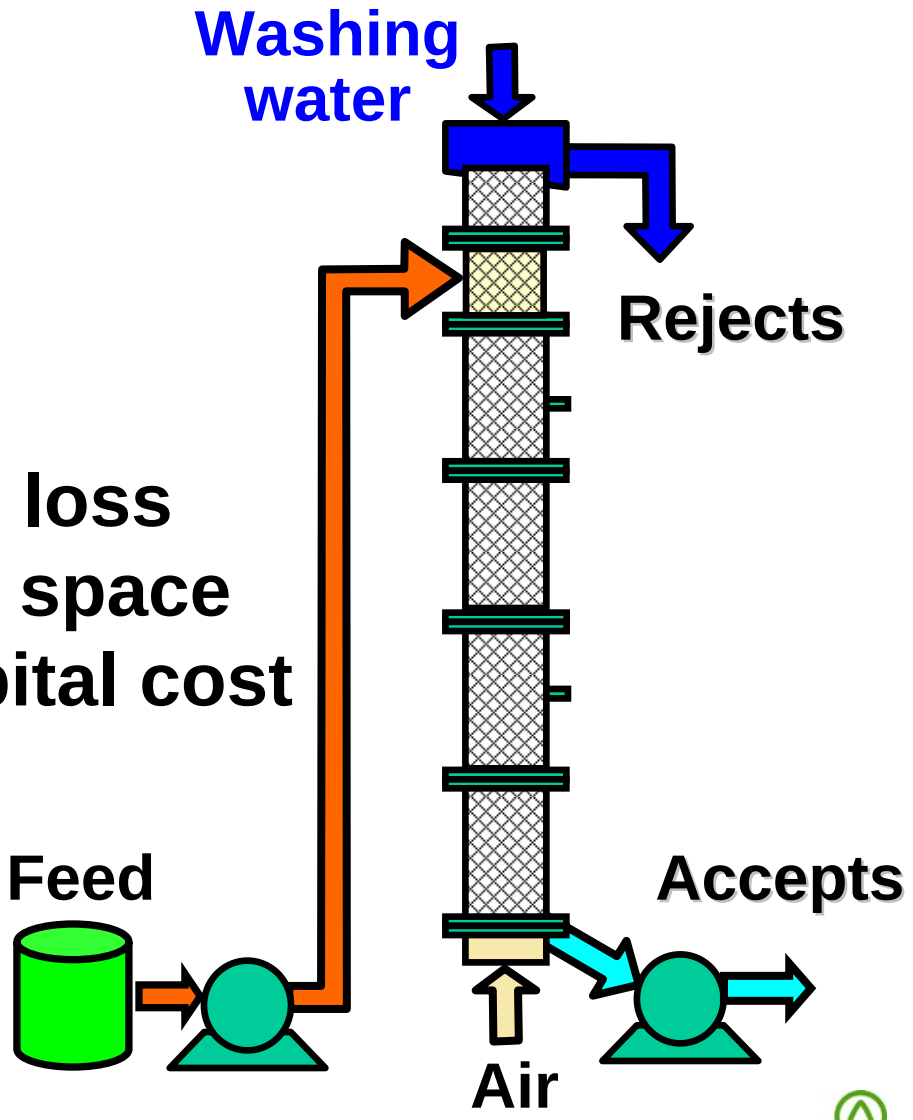
Column Flotation

- Little fibre loss
- Less floor space
- Lower capital cost



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Objectives

- Use column flotation technology in the pulp and paper industry to recover fibres from reject streams
- Explore its applicability to clean pulps

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Experimental

- 10 cm x 4.65 m (lab) / 0.6 m x 6 m (mill)
- Operations
- Characterizations
  - Macrostickies and waxes
  - Extractives
  - Flotation loss
  - Fibre length distribution
  - Strength properties
- Control of flotation column

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Results

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Laboratory Flotation Column at Mill Site

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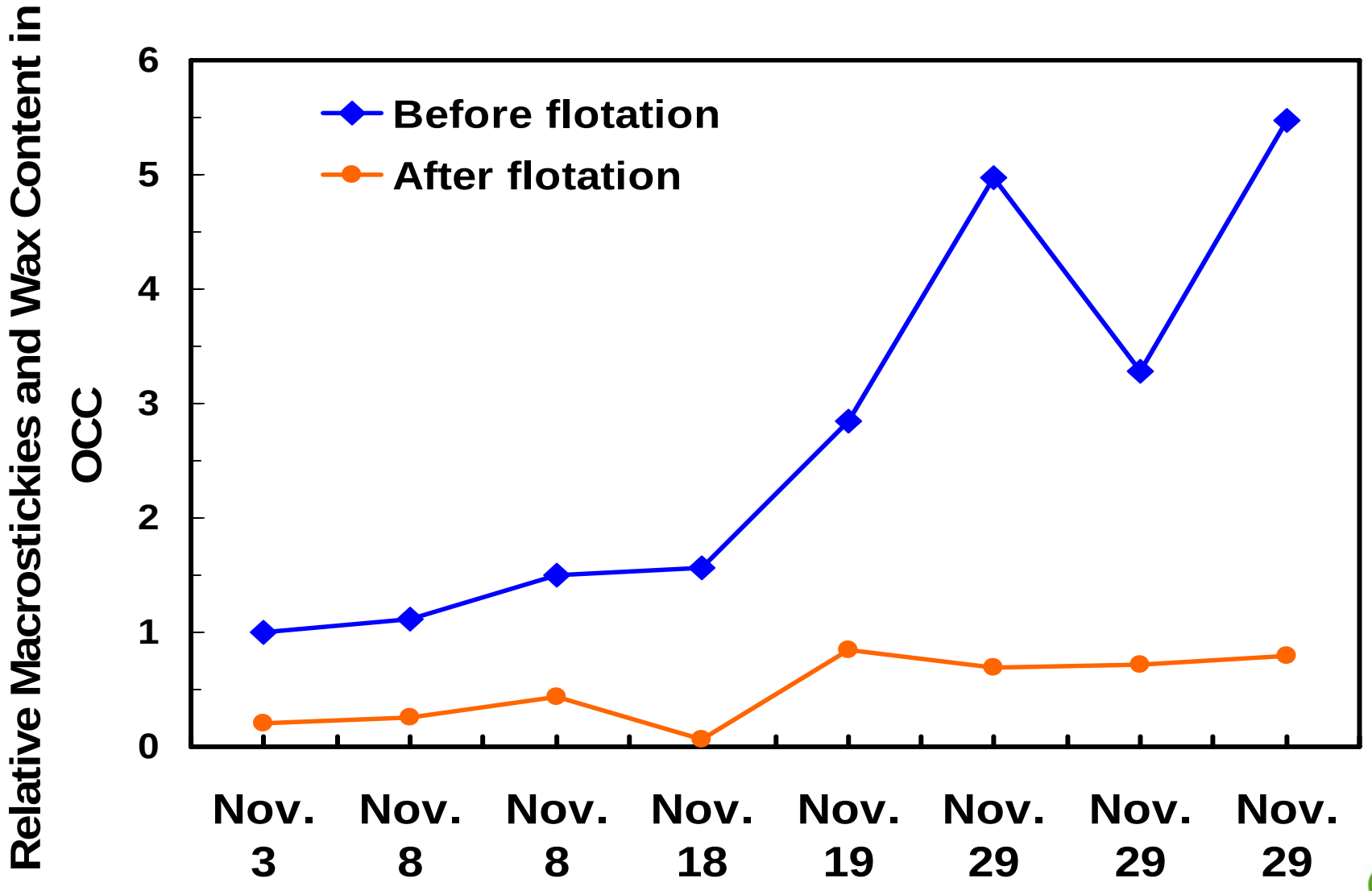
OCC Recycled Pulp



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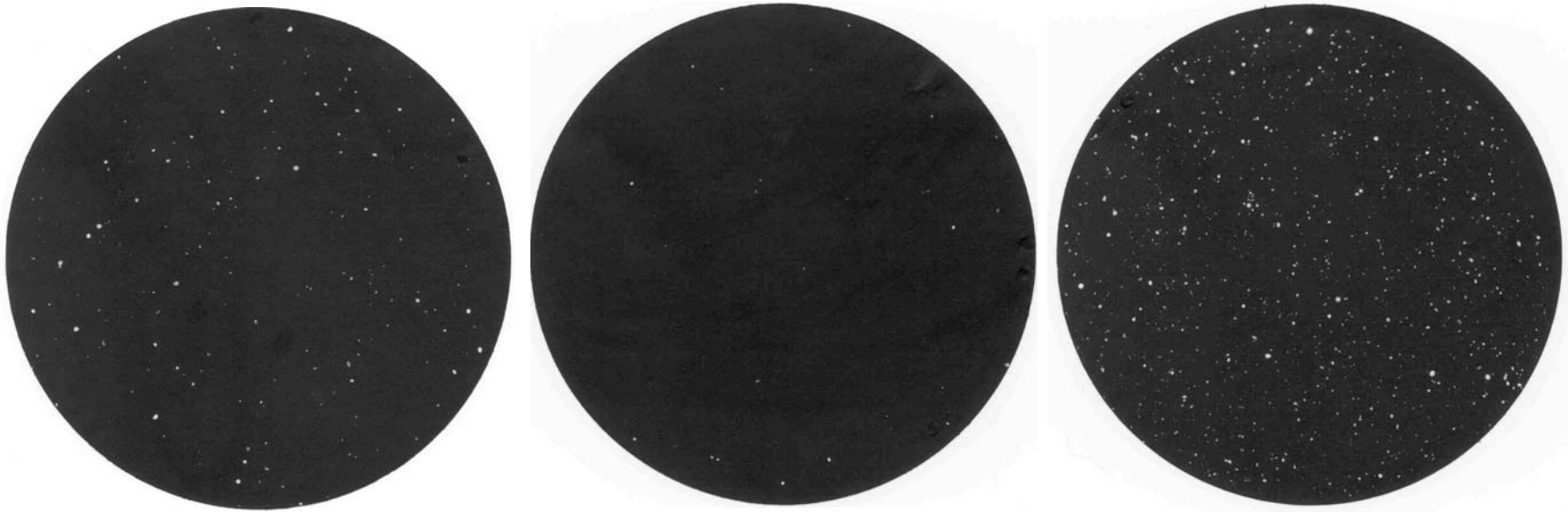
OCC Recycled Pulp



Before flotation | Flotation accepts | Flotation rejects

White spots represent macrostickies and wax in 1 g handsheet

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Column Performance on OCC pulp

Characterization	Removal, %
Macrostickies and wax	70-85
Filler	15
Chloroform extractives	30-35
Flotation loss	< 2

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Column Performance on OCC Pulp

Physical Properties	Changes, %
CSF	+4
Burst	+3
Tensile	+2.3
Scott Bond	+5

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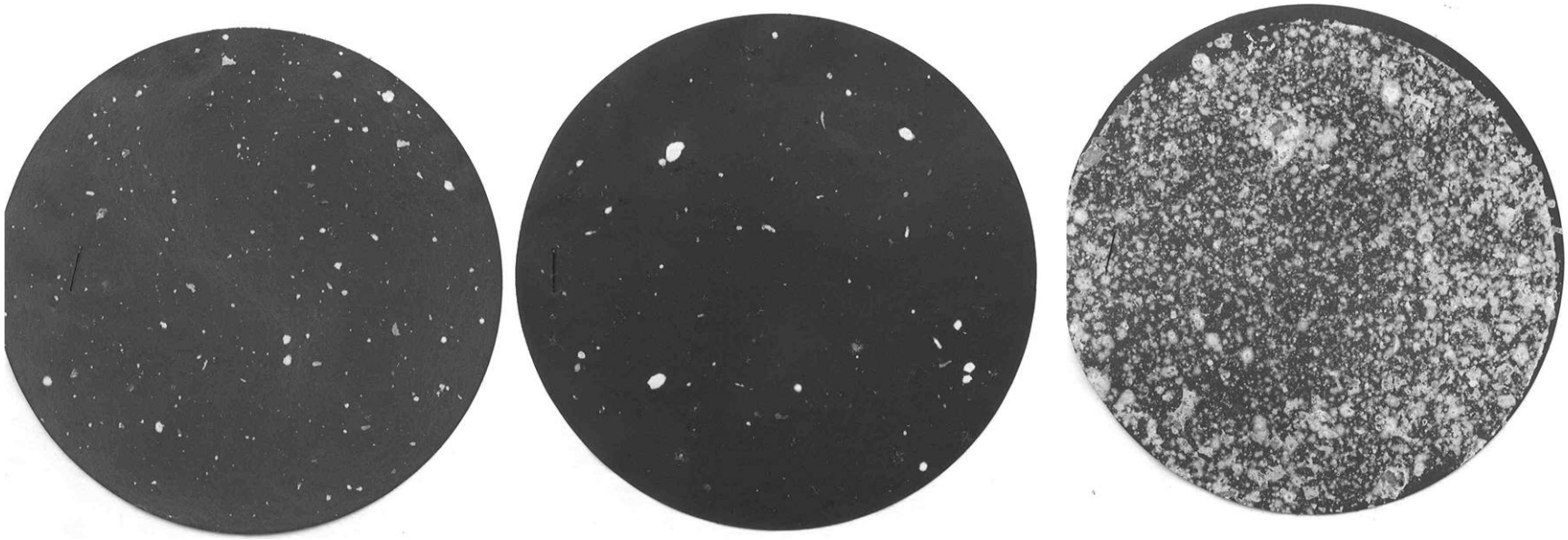
Process Rejects



Feed **Accepts** **Rejects**

Larger particles of macrostickies and waxes were less floatable than smaller ones

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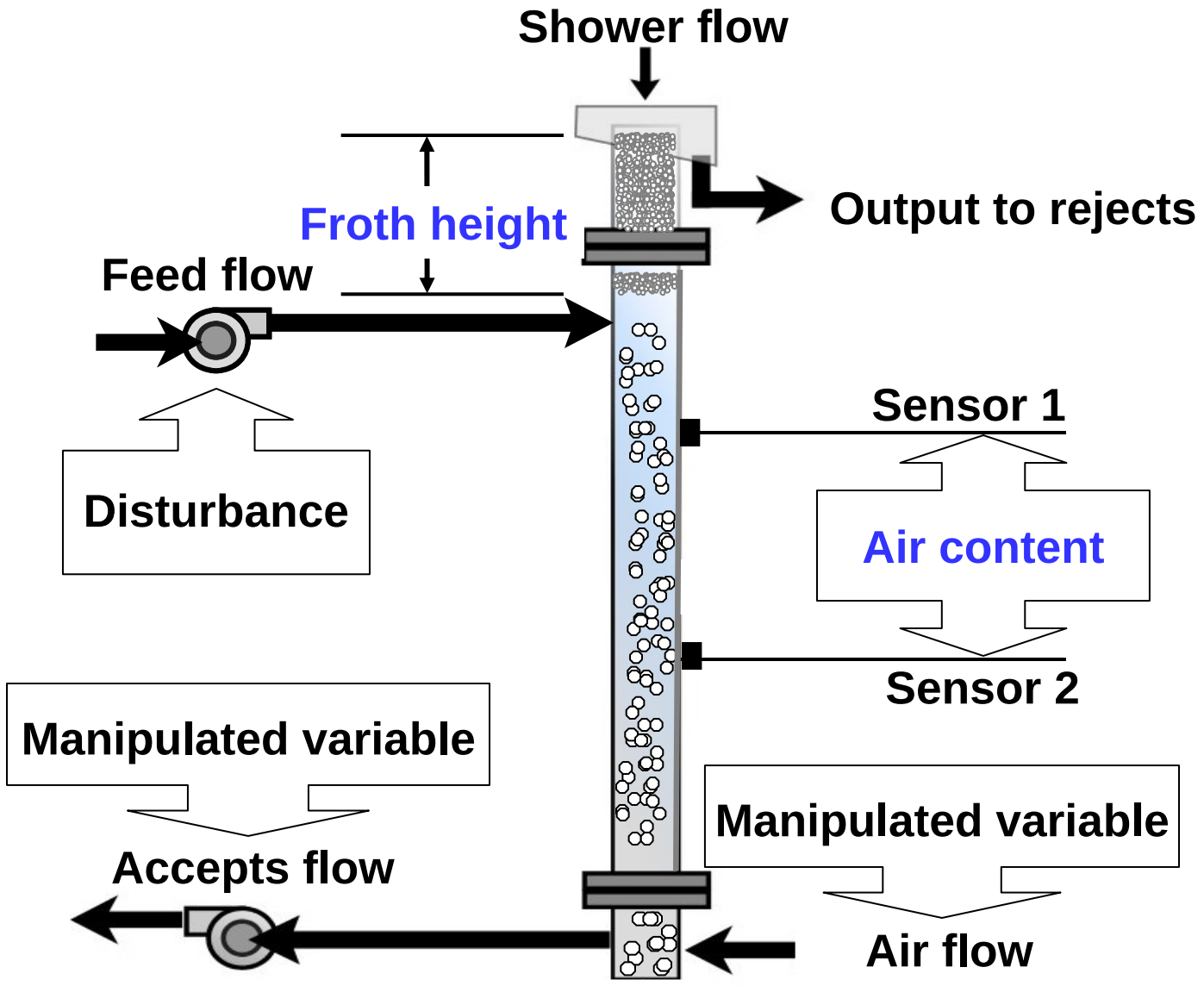
Control of Laboratory Flotation Column



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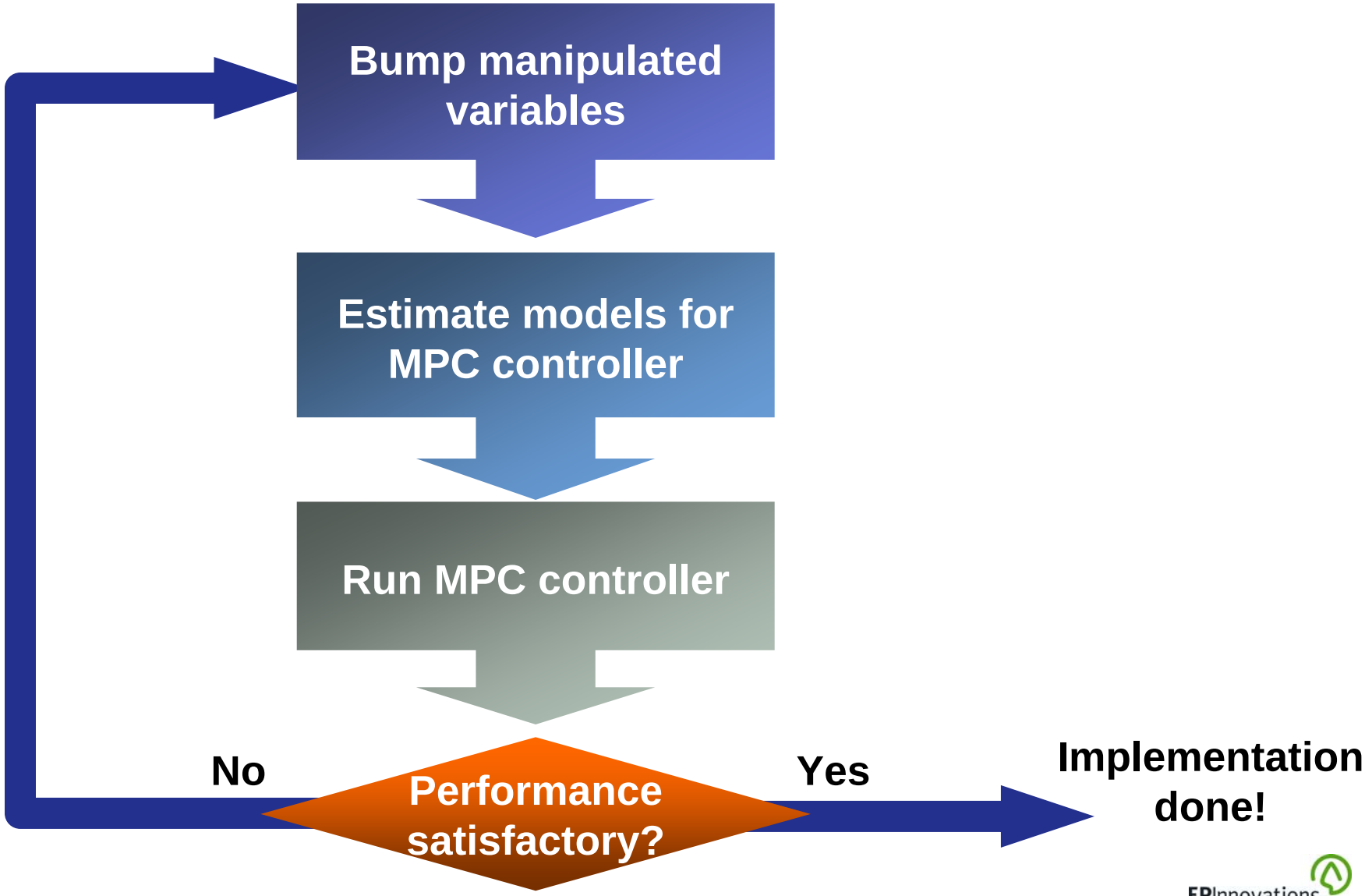
Model Predictive Control (MPC)



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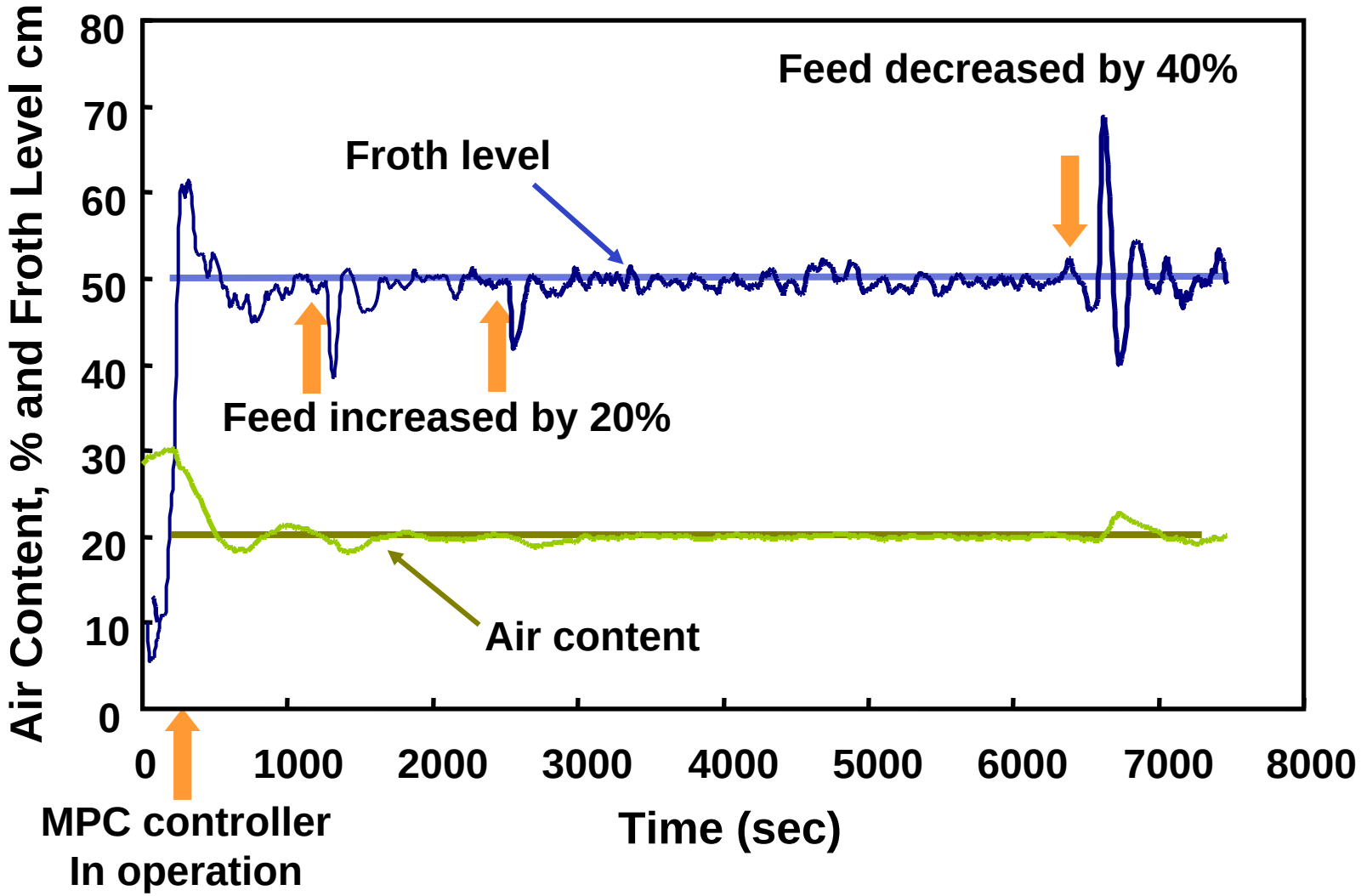
Performance of MPC Controller



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Summary of Laboratory Column

- Column flotation was very effective for removal of macrostickies, wax, fillers, and organic extractives
- Fibre loss was low
- Improved pulp physical strength
- Developed control system to reduce variations in froth heights and air content in the column.

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Mill Flotation Column (0.6 m x 6 m)

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Construction & Start-up of Mill Column

- Collaborative work between Paprican and the mill
- Paprican supplied column designs, P & I diagrams, mill training and automatic control
- Mills supervised the construction and ran the tests

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Progress

- Successful start-up in March 2006
- Automation in May 2006
- Evaluation of macrostickies removal efficiency and flotation loss in OCC pulp and reject stream

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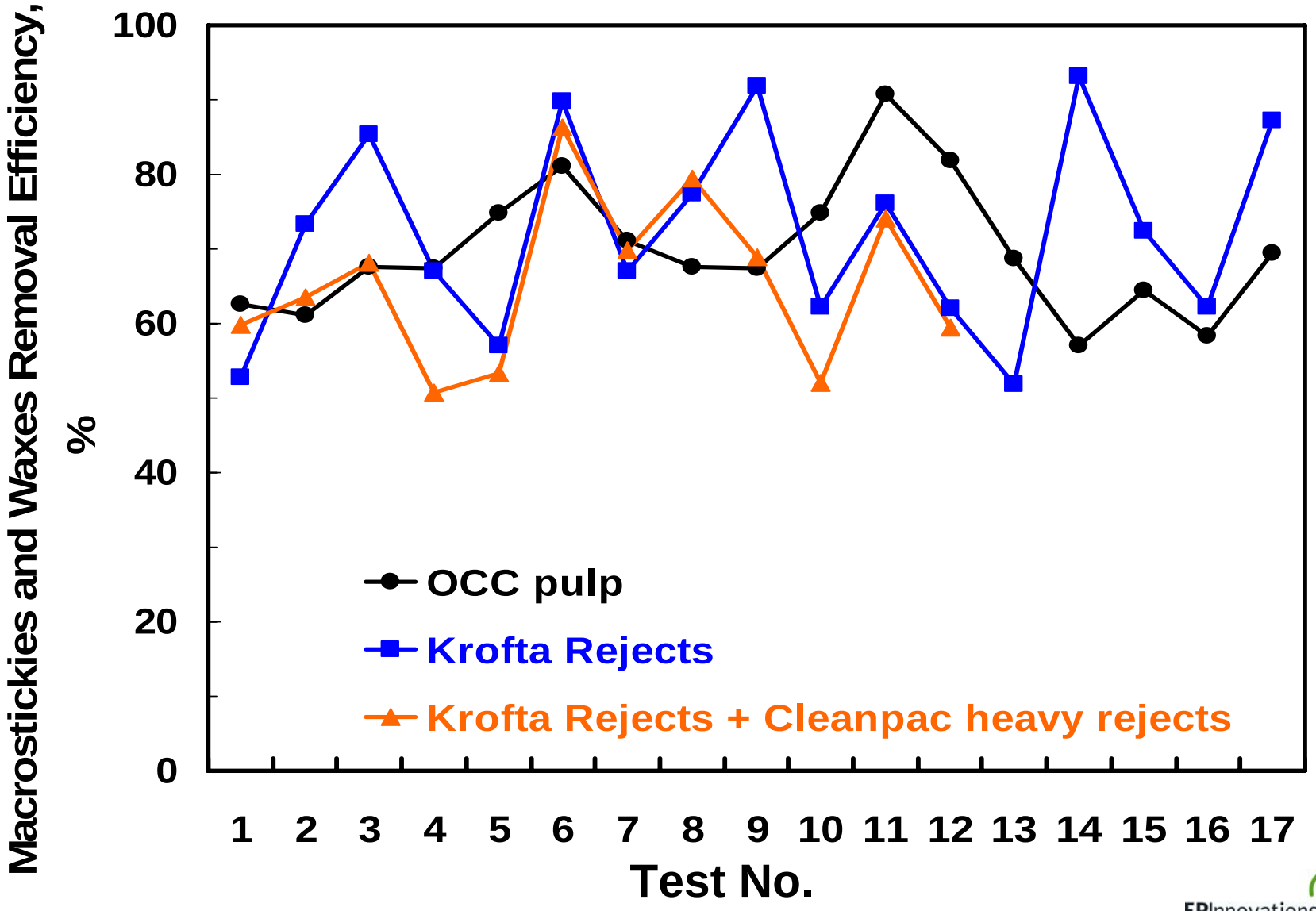
Mill Flotation Column Performance



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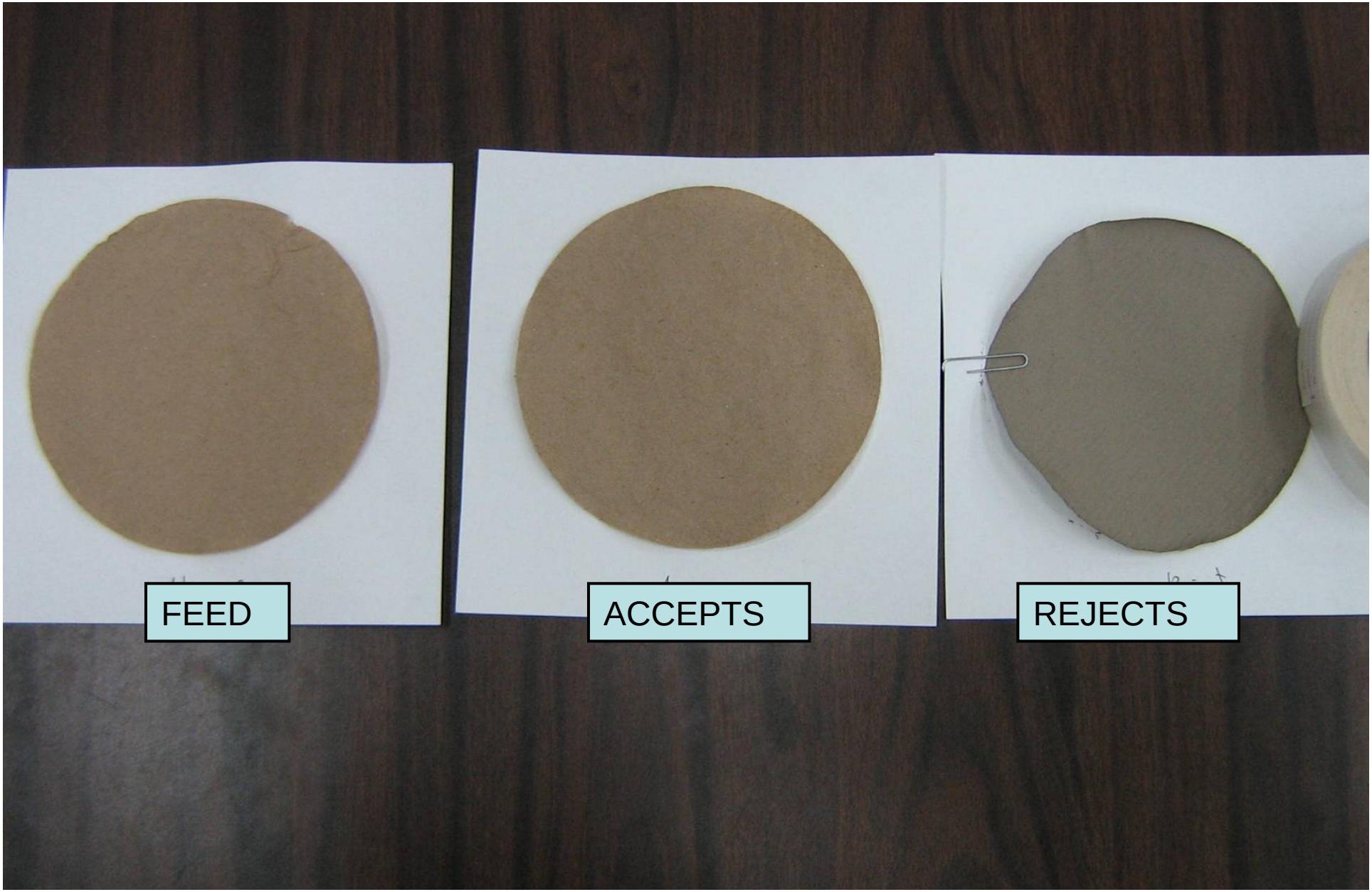
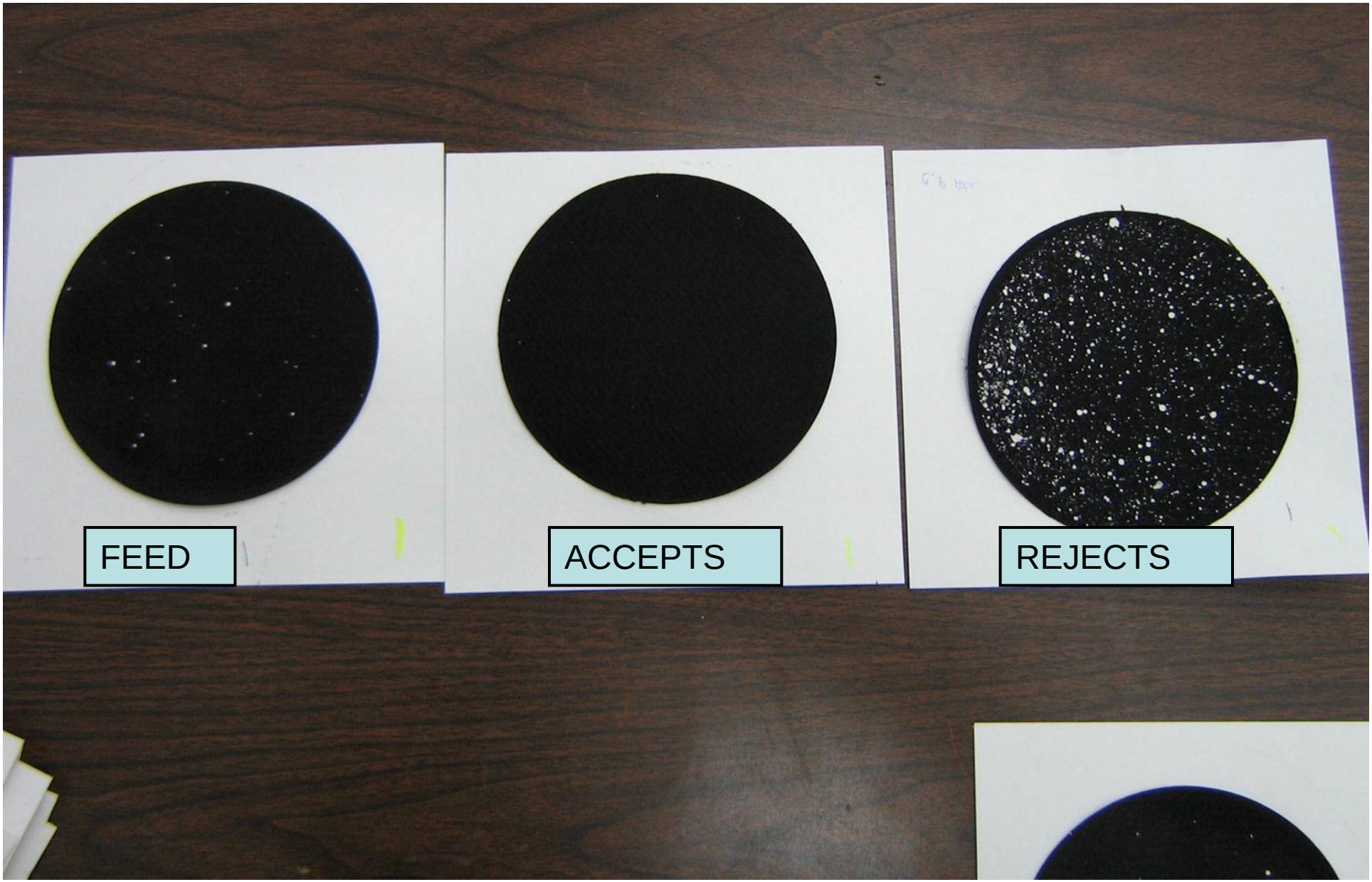
Mill Column Flotation OF OCC Pulp



Macrostickies



Summary of Mill Flotation Column

	OCC Pulp	DAF Rejects	Process Rejects
Experimental	20 tests + 5 trials	15 tests + 5 trials	14 tests
Efficiency, %	60 - 90	55 - 85	45 - 75
Ash removal, %	25	27	19
Fibre loss (%)	2-4	5-10	5-10

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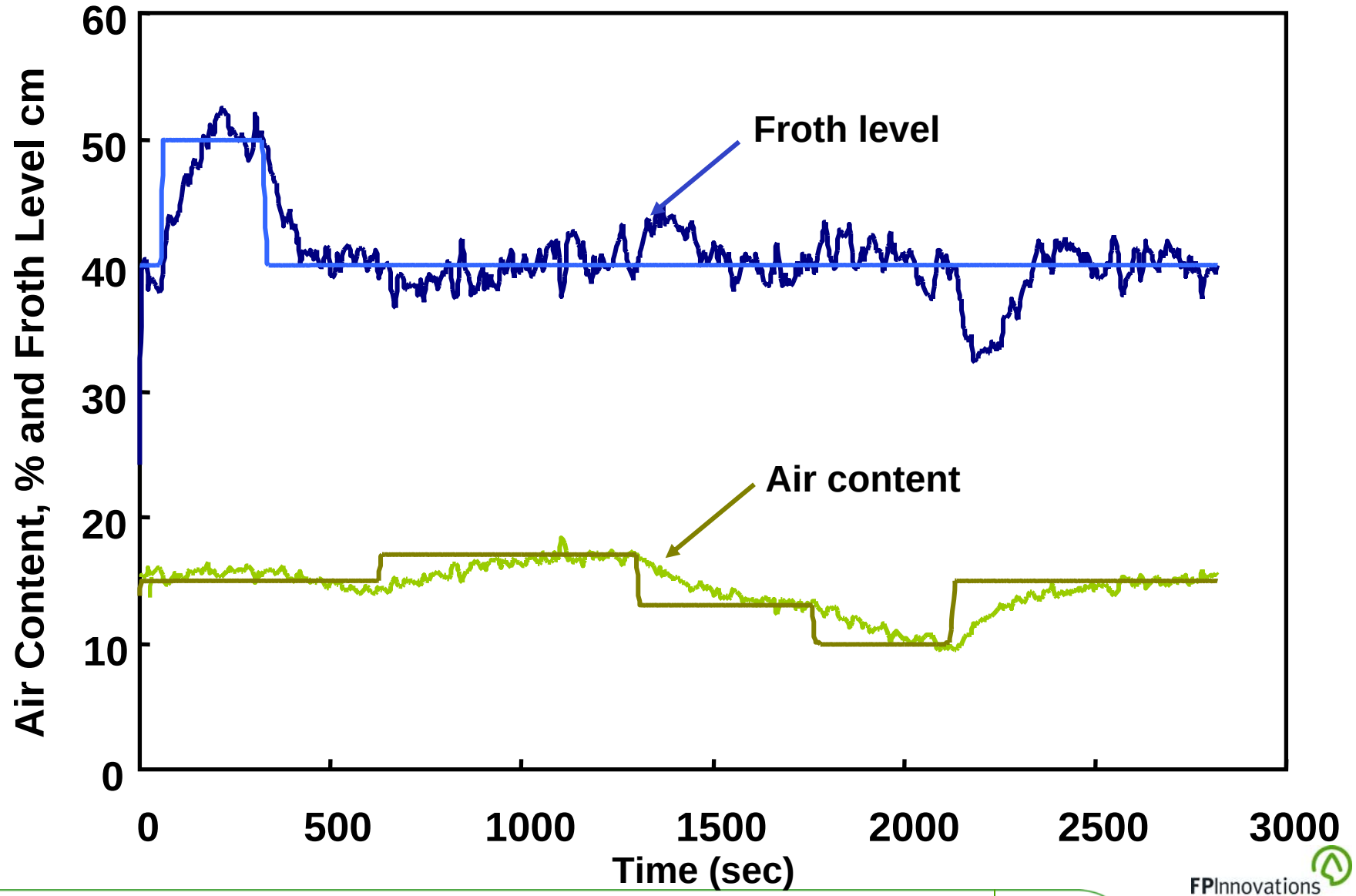
Control of Mill Flotation Column



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Status of Mill Flotation Column

- Used as R&D unit
  - To establish long-term performance of the column
  - To better determine the impact of returning treated rejects in the main OCC pulp line
- Currently, full time operation for the recovery of 2.5–3.0 t/d of fibres from Krofta rejects.

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Conclusions

- Mill built a flotation column (0.6 m x 6.0 m)
- Mill already achieved design target on stickies removal and material loss
- The recovered materials from Krofta rejects had no negative impact on paperboard machine operation
- The column is operating full-time to recover 2.5-3.0 t/d of fibres from Krofta rejects
- Automatic control of froth level and air content greatly improved operation

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Acknowledgments

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