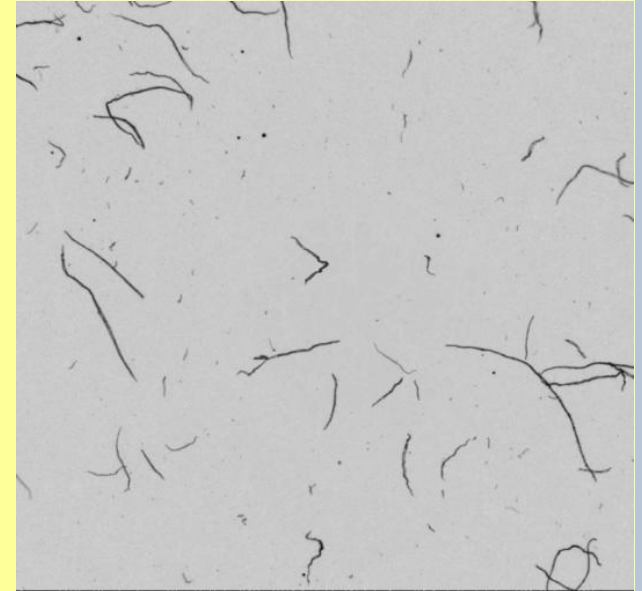


NEW TECHNOLOGY OF PACKAGING PAPERMAKING WITH FINES TRANSFER



M. Sc. Eng. Honorata Gruszka

Promoter- PhD DSc PAWEŁ WANDELT, professor

Fibrous raw materials and pulp technology division

Institute of Papermaking and Printing

Lodz University of Technology in Poland



PLAN OF PRESENTATION

- Introduction
- Thesis of work
- Aim of work
- Materials
- Methods
- Results
- Conclusions
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INTRODUCTION

Amount of waste paper pulp used in the paper production increases systematically, negatively affecting drainability of the stock and quality of paper. Currently used fractionation of OCC pulp combined with refining of the “long-fibre” fraction is not satisfactory enough for present and future needs.



INTRODUCTION

According to the analysis carried out by a paper mill in Poland, main reasons for deterioration of OCC quality and increased ash content include:

- increasing utilization rate of recycled fibres,
- non-existent inflow of primary fibres to the cycle,
- increased content of contaminants in recovered paper caused by higher collection of recovered paper from households,
- increased content of so-called „dead starch”.



INTRODUCTION

„The effect of dead starch” has a particular impact on the content of organic substances in OCC. It is a problem that has been noticed in Poland’s paper mills not long ago as it has a negative effect on the OCC processing. The tendency to reduce a basis weight of containerboard deteriorates its strength properties.



INTRODUCTION

To compensate for this, the paper mills increase consumption of starch which will be dissolved in water and carried to circulating water and effluents in the next cycle reducing efficiency of recovered fibres. It is responsible for serious financial losses and runnability difficulties as well as it increases the amount of contaminants loading waste water treatment plant.



INTRODUCTION

Some facilities count with increased consumption of the virgin pulp on packaging paper, which is called simply "The Kraftliner Renaissance".



THESIS OF WORK

It is possible to propose a new packaging paper product technology based on appropriate land use fines fraction without loss of raw materials and the deterioration of the paper.



AIM OF WORK

Practical and scientific aims of work were analysis of change possibility of paper production technology (The Institute of Papermaking and Printing patent).

Fibrous raw materials and pulp technology division developed and then verified the concept of management of separated fines in a main product neither as a by-product nor undesirable waste.



MATERIALS

In this study, I analyzed chemical and mechanical virgin pulps and various waste paper:

- Birch BKP – Birch Bleached Kraft Pulp,
- Pine BKP – Pine Bleached Kraft Pulp,
- Pine UBKP – Pine UnBleached Kraft Pulp,
- Spruce SGW – Spruce Stone GroundWood,
- ONP – Old Newspaper.



MATERIALS

Pine UBKP – Pine UnBleached Kraft Pulp



Pulp



Fibers picture



Final product



METHODS

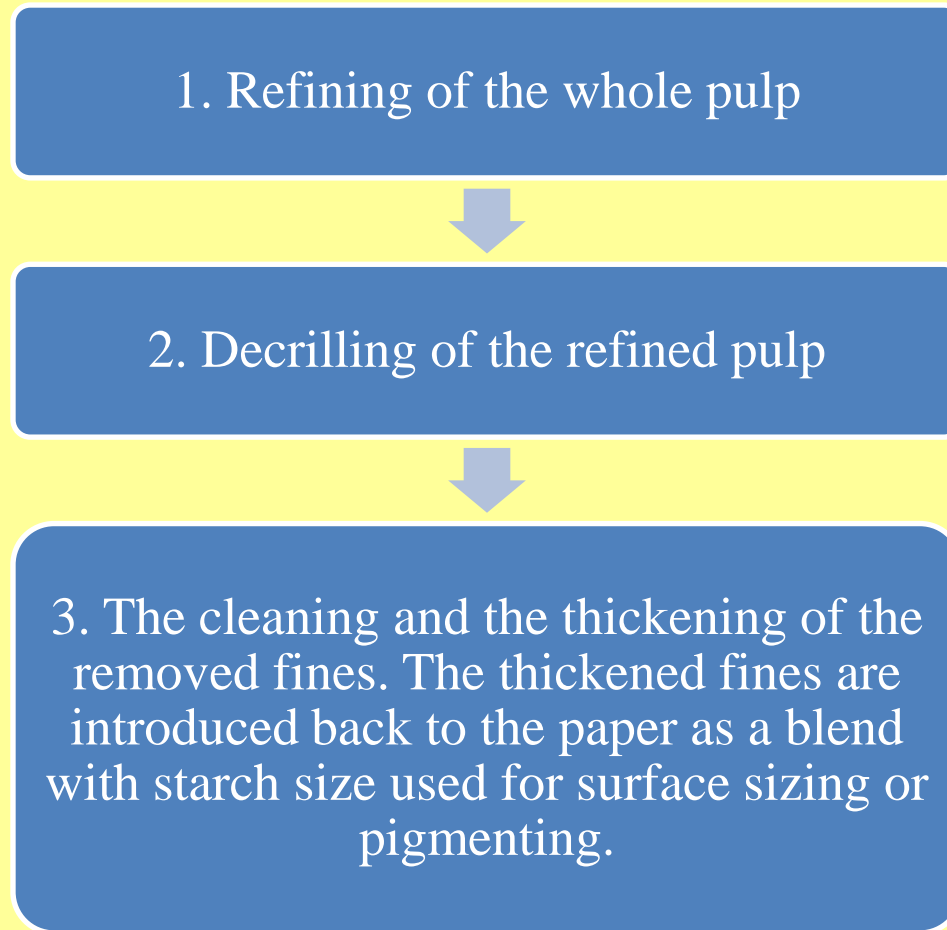


Fig. 1. Diagram of new concept packaging papermaking



METHODS

- The refining of the whole pulp for improving paper properties,
- The decrilling of the refined pulp to proper degree for reducing its drainage resistance,
- The cleaning and the thickening of the removed fines. The thickened fines are introduced back to the paper as a blend with starch size used for surface sizing or pigmenting.



METHODS

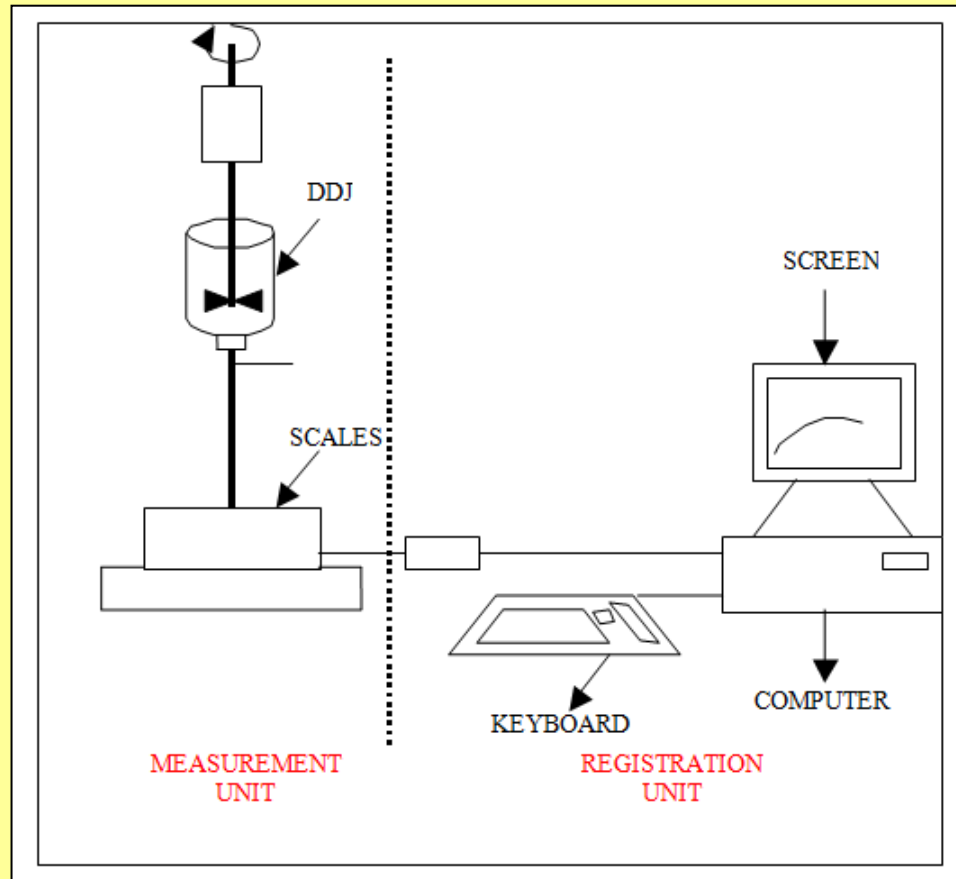


Fig. 2. Apparatus for fractionation



RESULTS

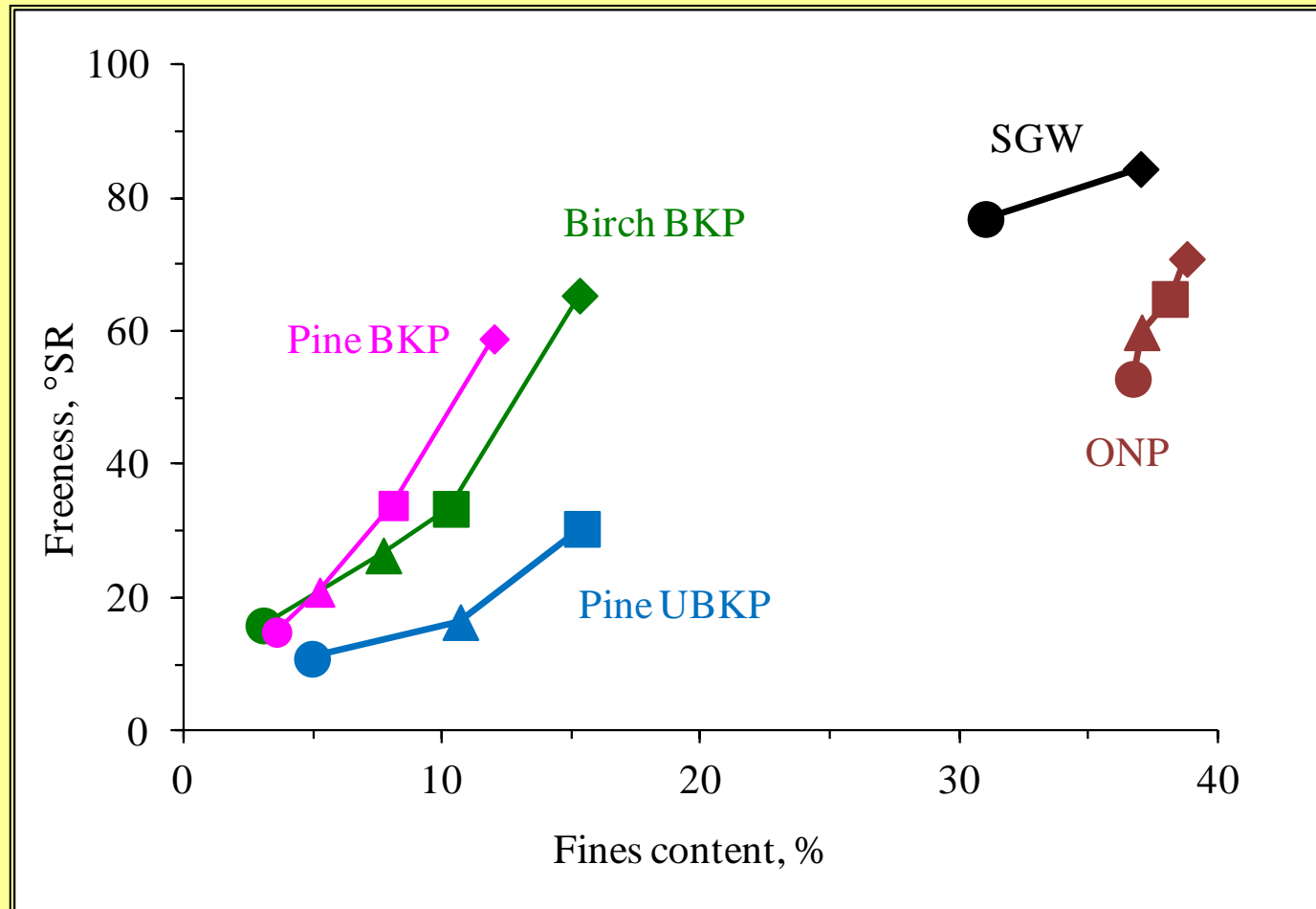


Fig. 3. Comparison of the effect of fines content on freeness of various tested pulp grades, diversified by beating degree



RESULTS

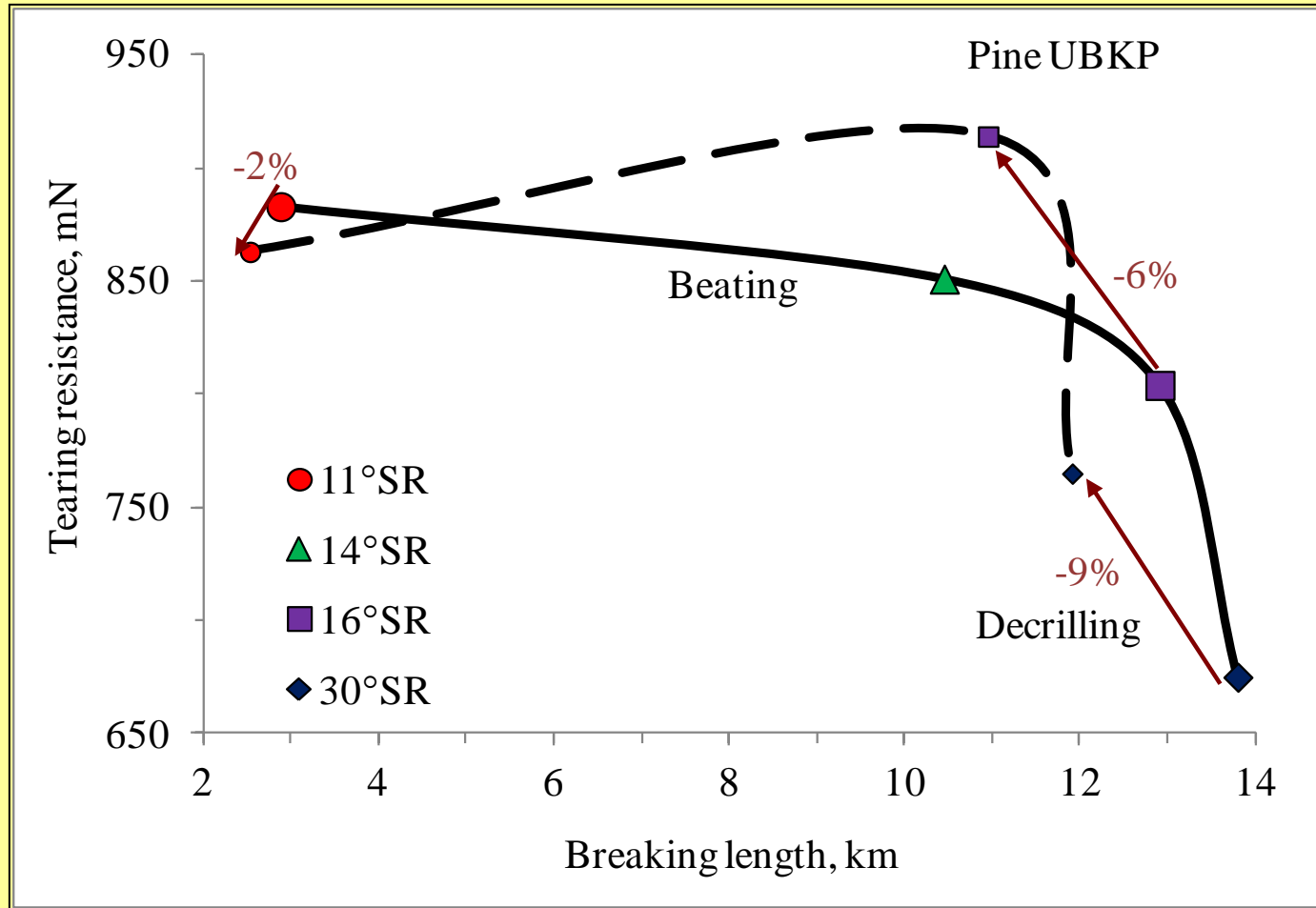


Fig. 4. Improvement possibility of strength potential of pine high-yield kraft pulp through beating (B) and fines removal (B-D)



RESULTS

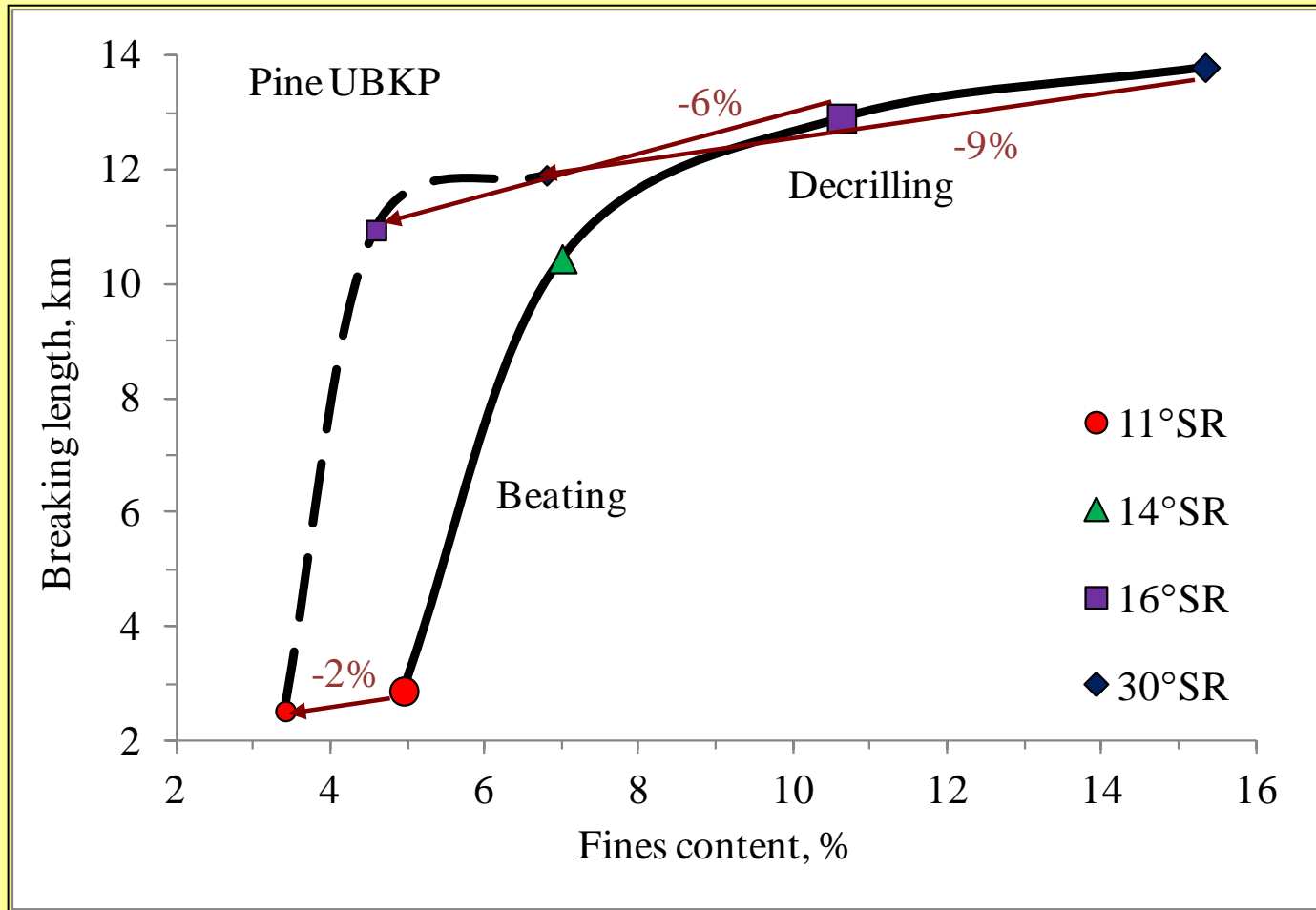


Fig. 5. The effects of beating and subsequent decrilling of the pine high-yield kraft pulp on the paper breaking length vs. fines content relationship



RESULTS

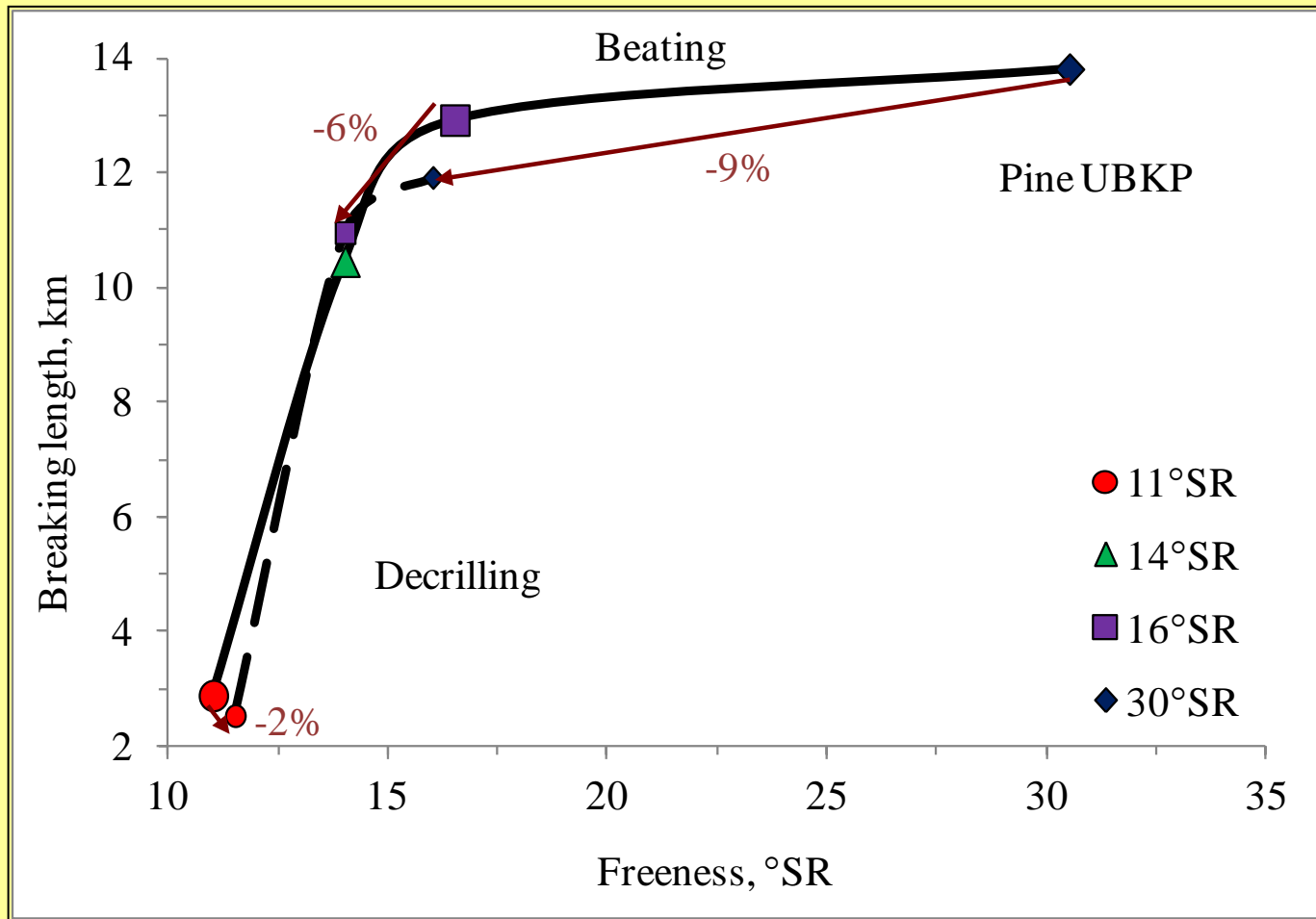


Fig. 6. Improvement possibility of paper breaking length through pine high-yield kraft pulp beating (B) and maintaining its low freeness through fines removal (B–D)



RESULTS

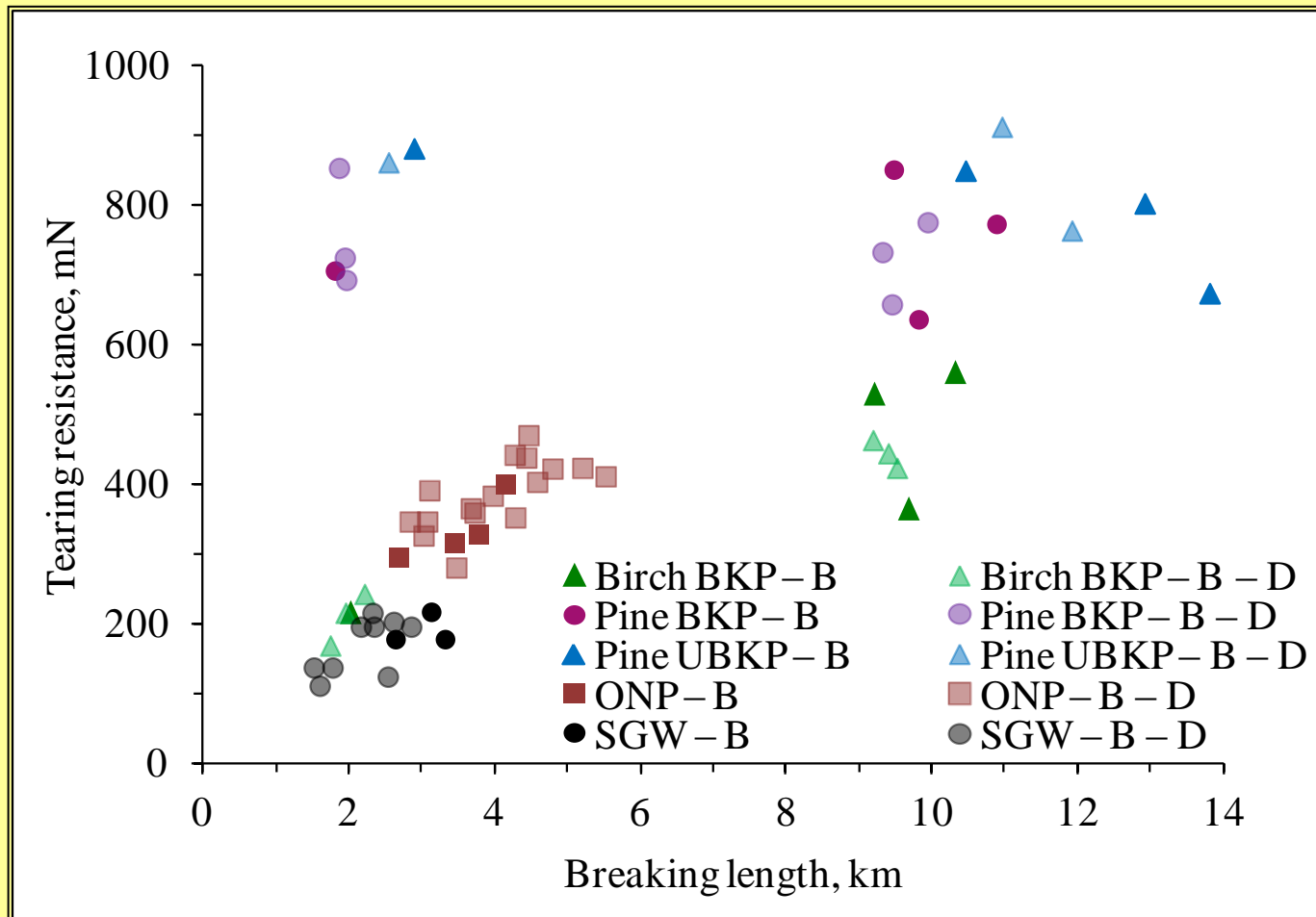


Fig. 7. Improvement possibility of strength potential of different pulp through beating (B) and fines removal (B-D)



RESULTS

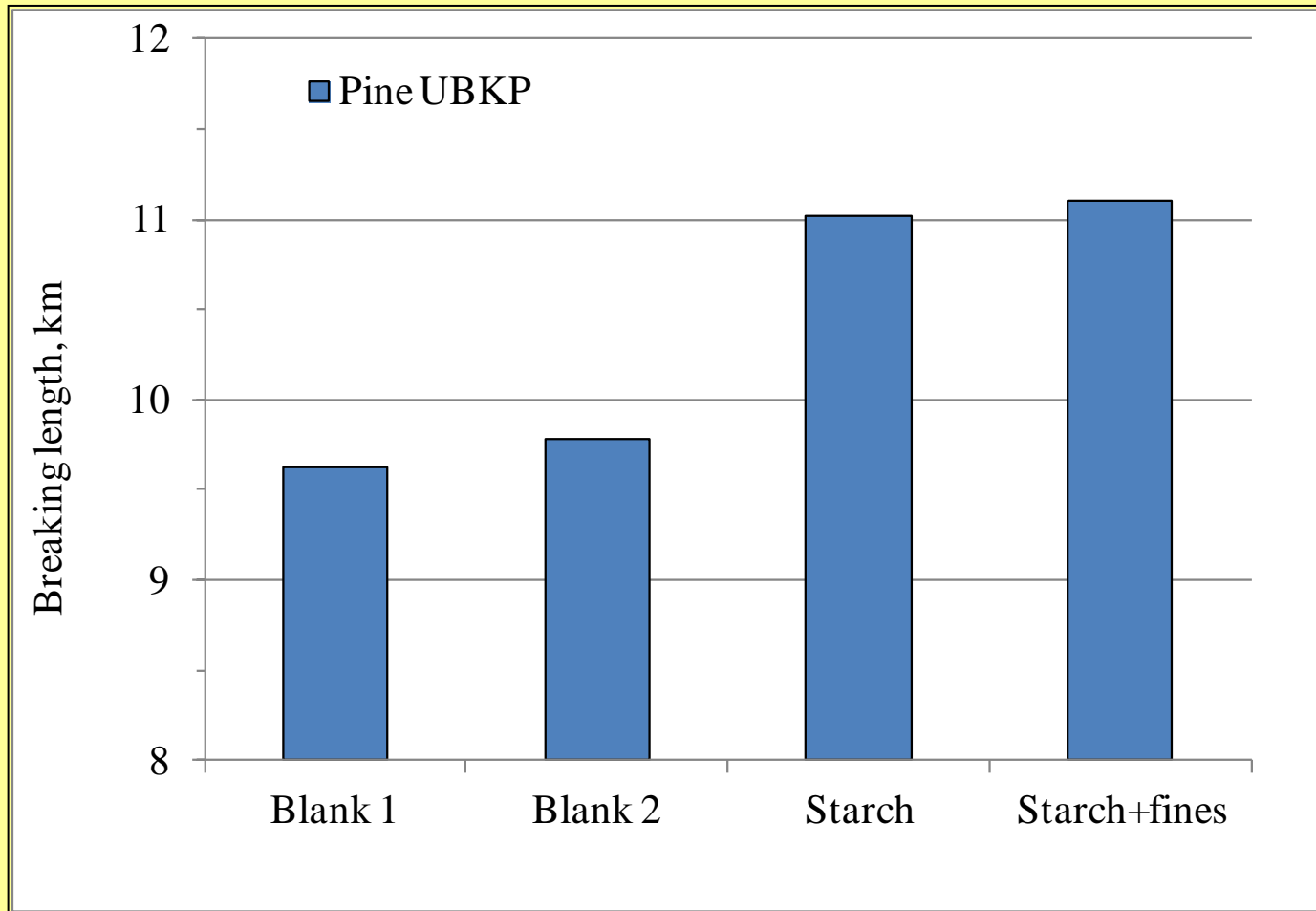


Fig. 8. Effect of paper surface sizing with and without fines addition on its breaking length (Pine UBKP)



RESULTS

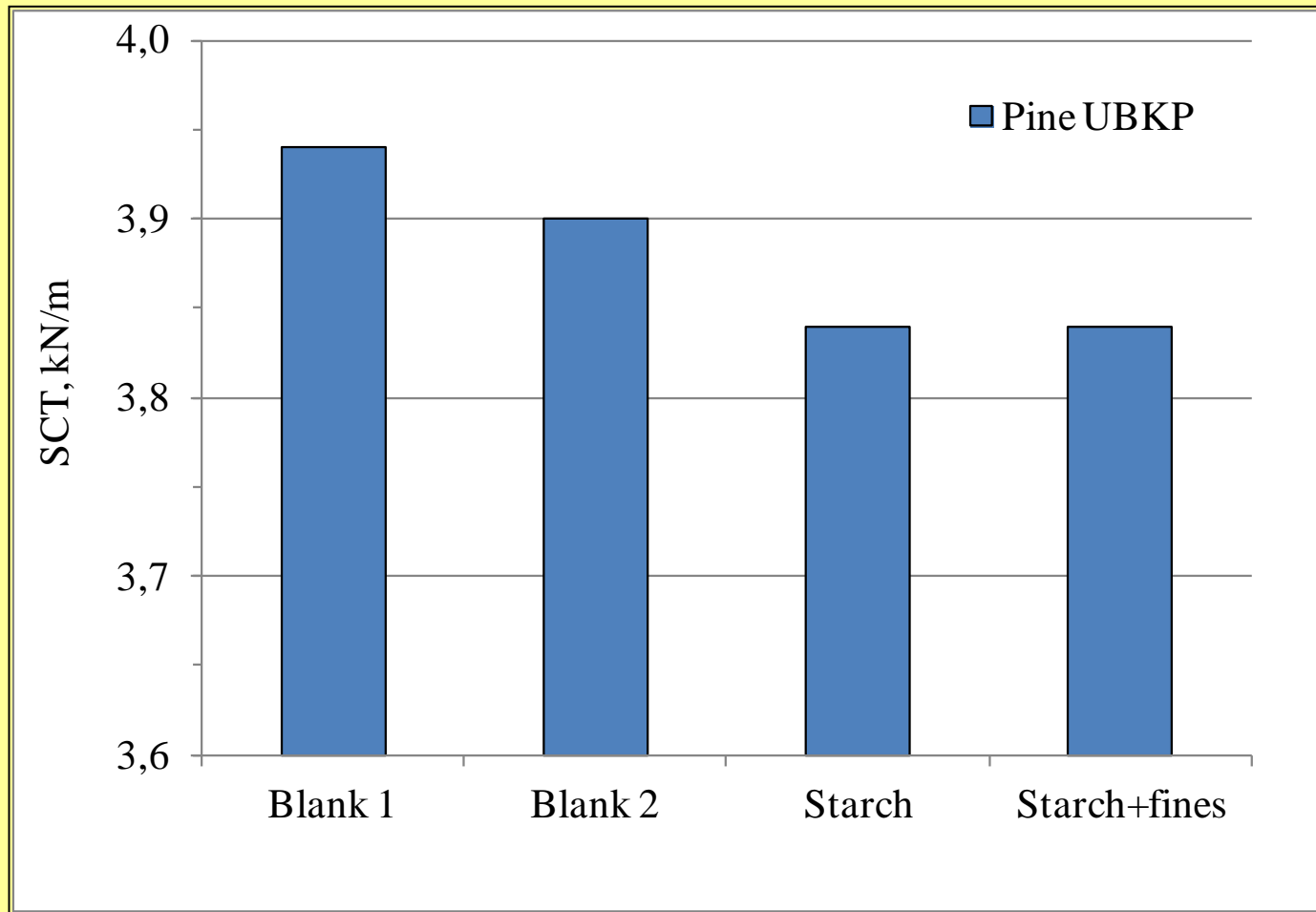


Fig. 9. Effect of paper surface sizing with and without fines addition on its stiffness (Pine UBKP)



RESULTS

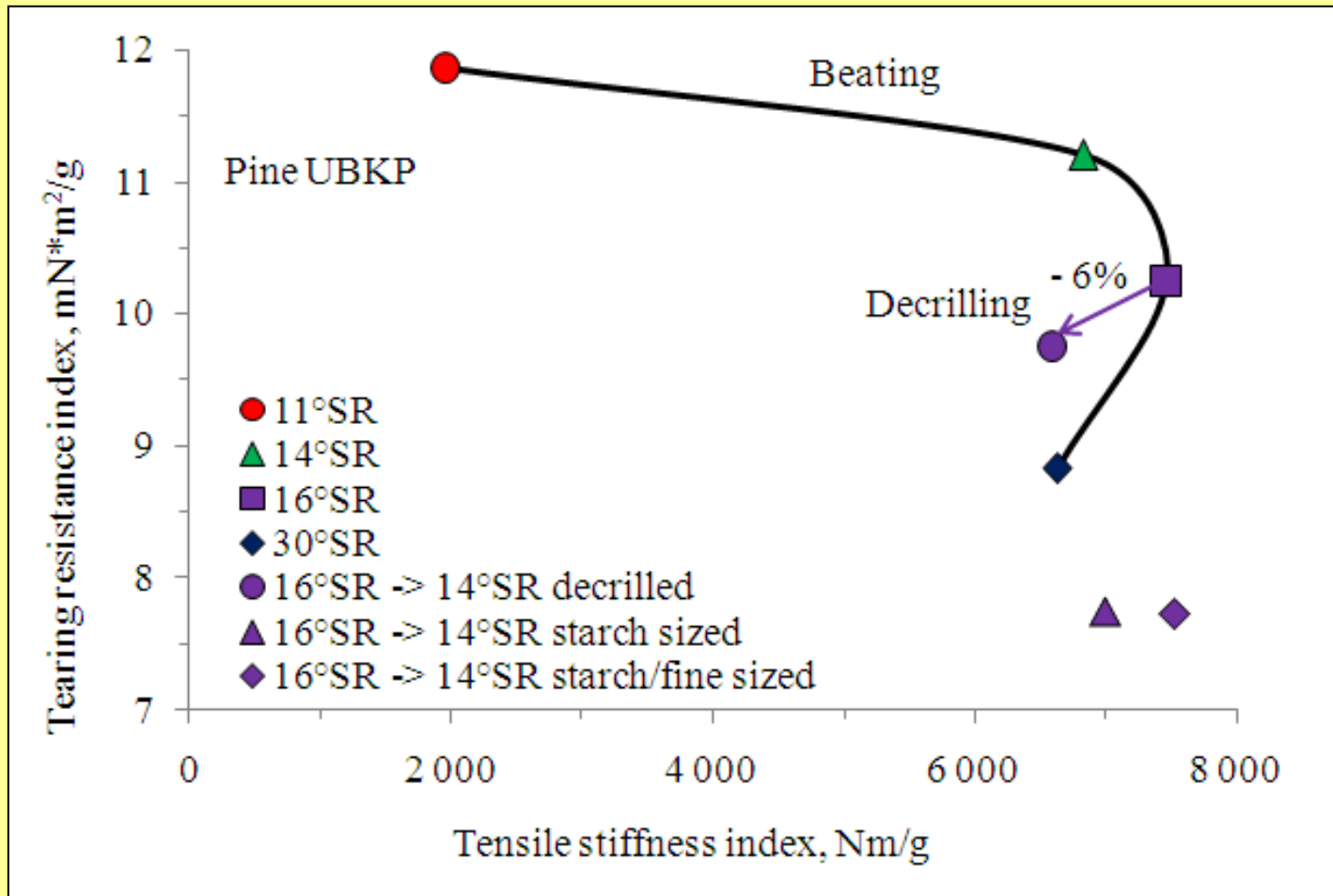


Fig. 10. The effect of beating, decrilling and surface sizing (blend with starch and starch&fines) on strength potential of pine high-yield kraft pulp



CONCLUSIONS

1. This unique and simpler solution is proposed consisting in proper management of the fines content by controlled removal of required fines portion, making possible to upgrade the pulp and paper by refining and transfer the fines to outer layers.
2. According to this new strategy the separated fines bypass the wet-end of the paper machine ensuring its high productivity and at the same time improving quality of the paper.



CONCLUSIONS

3. The results indicate that the new strategy of paper upgrading based on proper fines controlling and managing is applicable and beneficial for many grades of papers.
4. The main benefits are as follows:
 - improved drainability of pulp making possible to keep high productivity of the paper machine,
 - high degree of wastepaper utilization,
 - the strategy is universal and can be applied in production of various papers from virgin fibres as well as waste papers.



REFERENCES

- Gruszka H., Wandelt P.: „Papermaking with fines transfer. Effect of pine high-yield kraft pulp refining and decrilling on its drainability and quality of the packaging papers”, Polish Paper Review 68, 9, 565 (2012).
- Gruszka H., Wandelt P.: „Papermaking with fines transfer. Effect of bleached kraft pulp refining and decrilling on its drainability and quality of the printing and writing papers”, Polish Paper Review 68, 8, 483 (2012).



REFERENCES

- Gruszka H., Wandelt P.: „Possibilities of pulp drainability improvement through fines management”, XVII International Papermaking Conference Materials PROGRESS'11, Łódź 20-23.09.2011.
- Wandelt P., Tarnawski W.Z., Perlińska-Sipa K.: „Possibilities for upgrading OCC pulp by its refining and fines management”, Paperi Puu 87, 4, 265 (2005).



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