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New Refiner Segments Technology

Optimizing Fiber Quality and Energy Consumption in Refiner Mechanical Pulp

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- Theoretical Background
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- Summary

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TRENDS IN REFINING DEVELOPMENT AREA

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Trends

- Higher production
- Lower energy consumption
- Control of refiner process
- Hardwood refining

Segment Development

- Improved process equipment
- Pre-treatment and feeding
- Measurement inside the refiner and development of refiner models

Electricity Cost

- The importance of the electricity cost is further aggravated by the fact that the user is being charged real time prices for electricity which, together with fewer new power plants, has made the price of electricity highly volatile and all the time increasing.

Refiner Optimization

- New controls
- Hard and soft sensors

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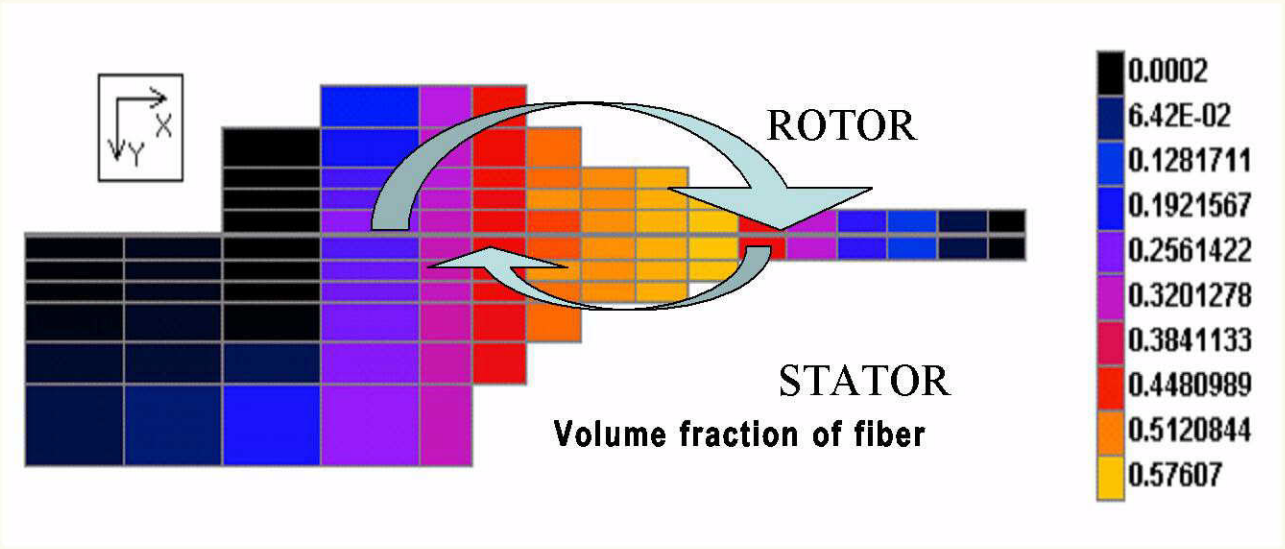
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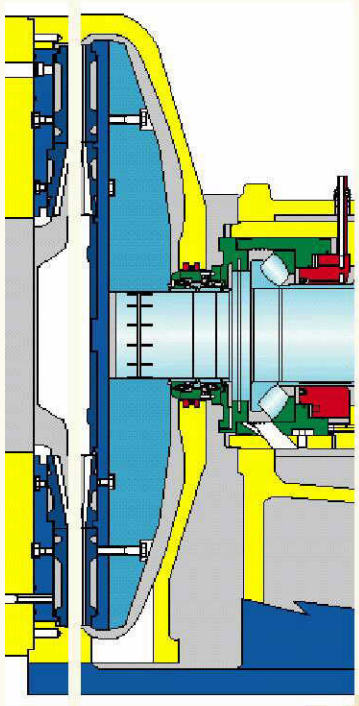
THEORETICAL BACKGROUND

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Theoretical Background

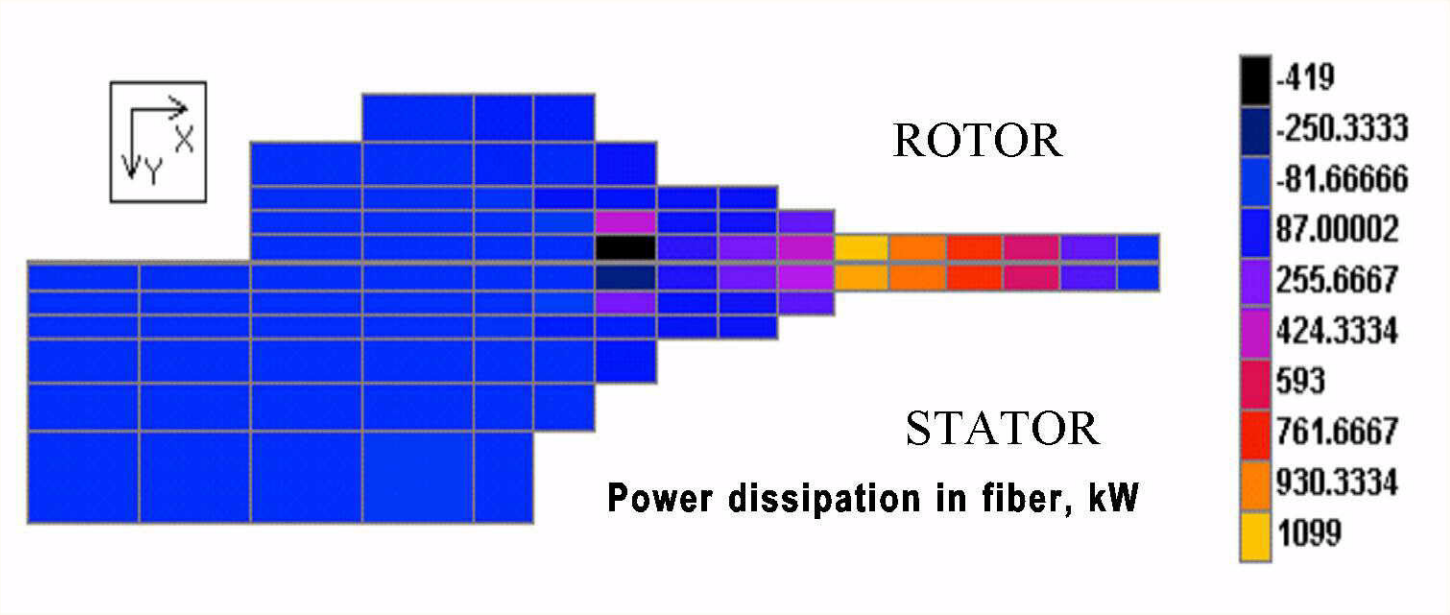




REFINER FEED → REFINER HOUSING

3. Härkönen E., Ruottu S., Ruottu A., Johansson O.: A theoretical model for a TMP-refiner. International Mechanical Pulping Conference. Stockholm, Sweden, 9-13 June 1997, pp. 95-102

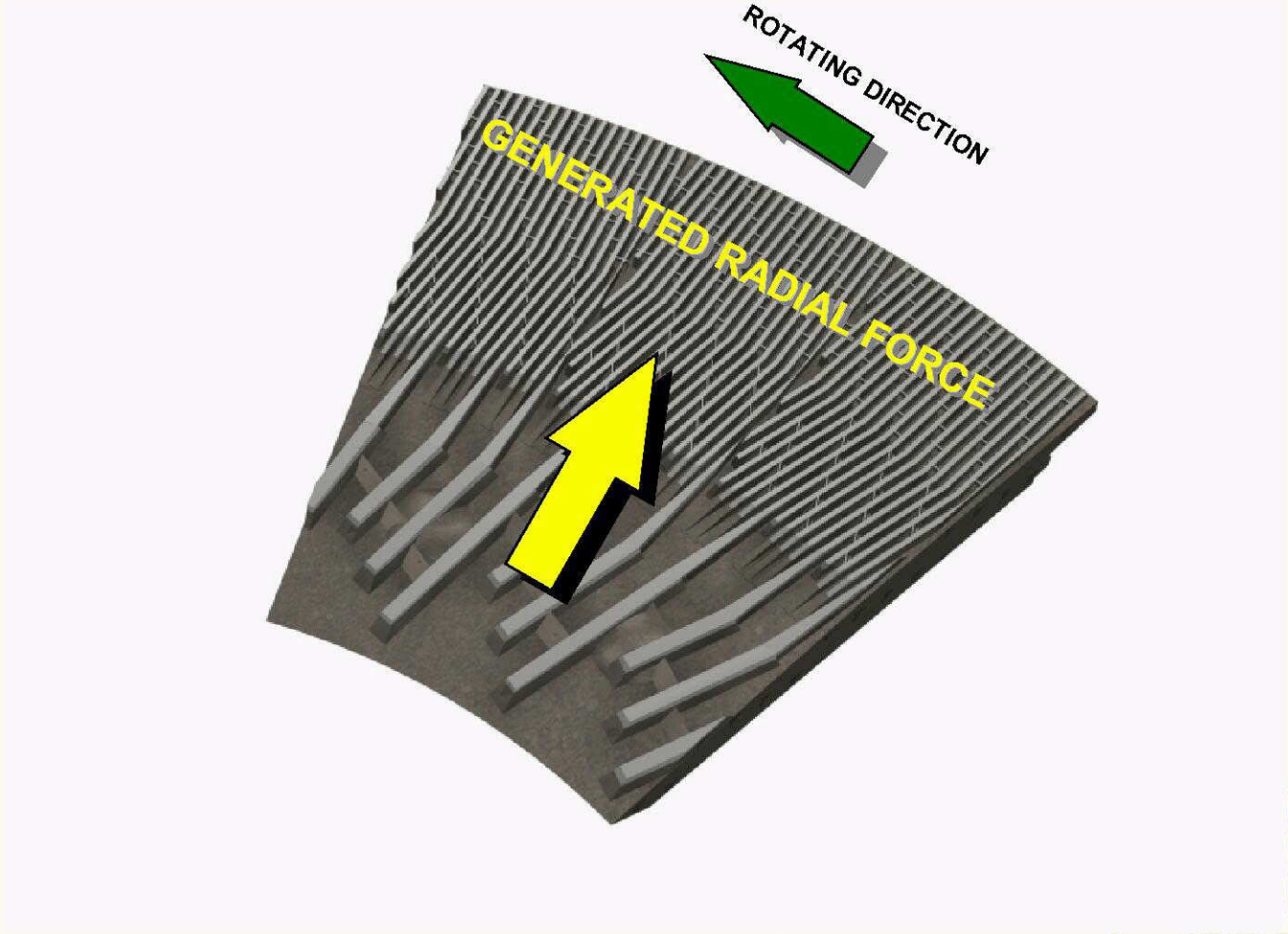
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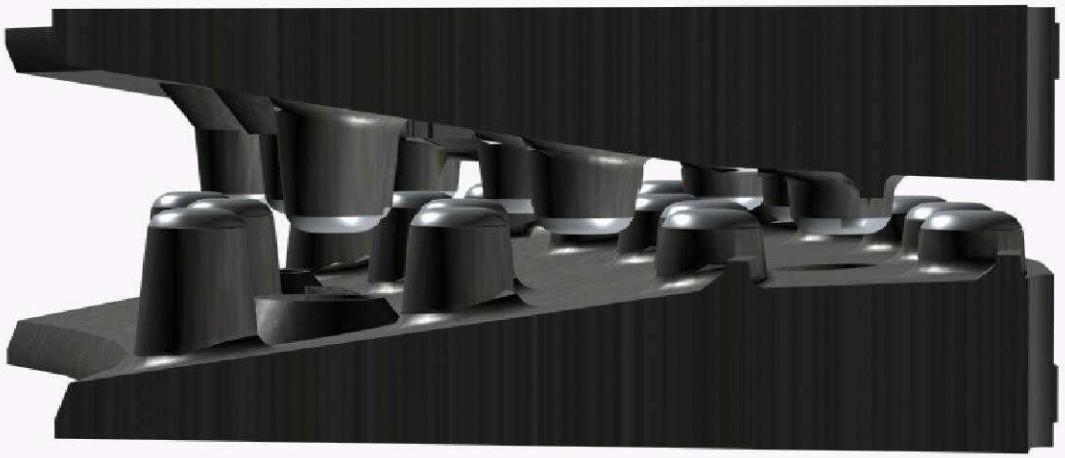
Refiner Geometry



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Refiner Geometry



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SHORTER RESIDENCE TIME IN DIFFERENT REFINER PROCESSES AS A TOOL TO REDUCE ENERGY CONSUMPTION

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SHORTER RESIDENCE TIME IN DIFFERENT REFINER PROCESSES AS A TOOL FOR REDUCING ENERGY CONSUMPTION

RESULTS FROM THE CD76 REFINER LINE AT THE NSI SKOGN MILL, NORWAY

	Standard	Low Energy
SEC (kWh/BDMT)	1850	1720
Freeness (ml)	150	150
Kajaani Fiber Length (mm)	1.75	1.74
Density (kg/m^3)	400	407
Tensile Index (Nm/g)	39	40.5
Tear Index (mNm^2/g)	8.5	8.5
Light Scattering Co. (m^2/kg)	52	51

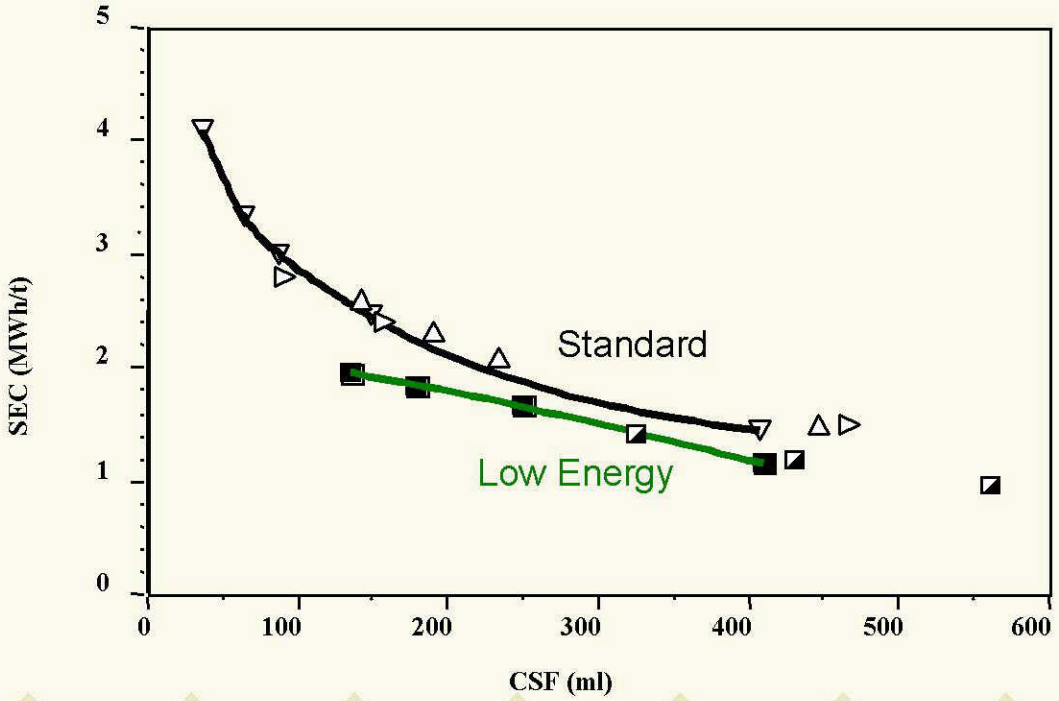
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SHORTER RESIDENCE TIME IN DIFFERENT REFINER PROCESSES AS A TOOL FOR REDUCING ENERGY CONSUMPTION

RESULTS FROM THE RGP44 SINGLE DISC REFINER LINE AT KCL, FINLAND

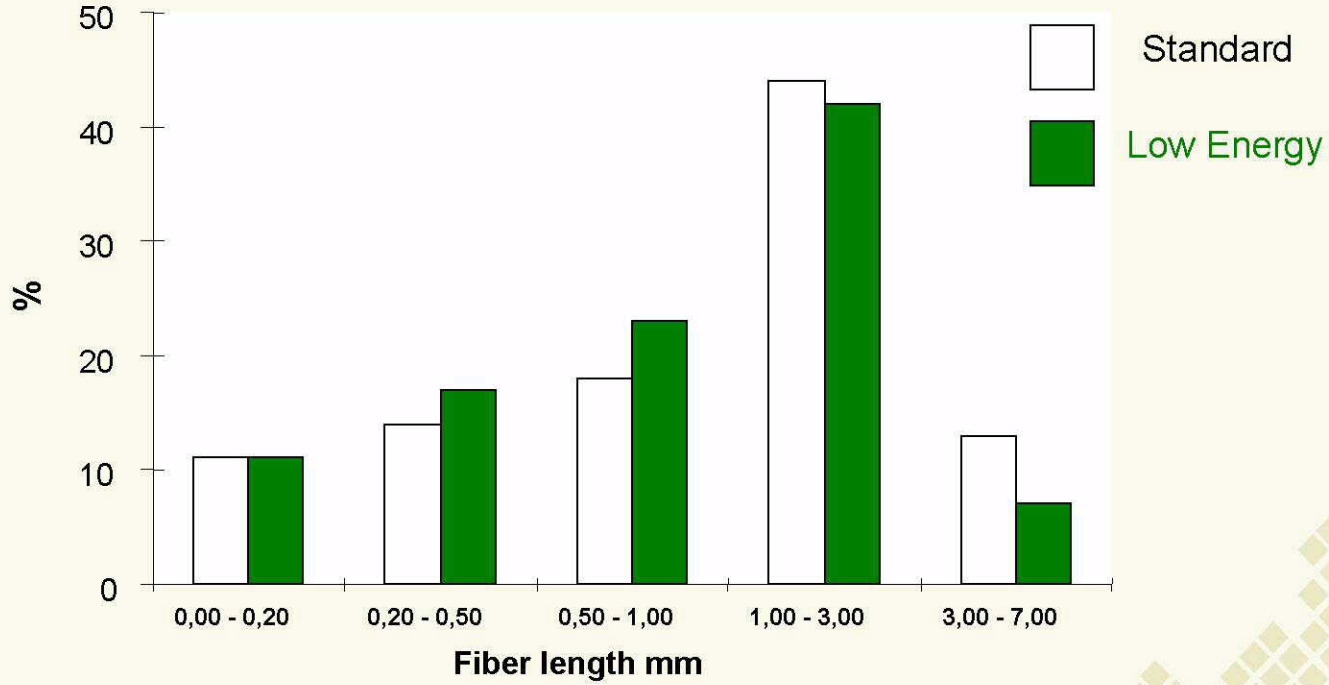


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SHORTER RESIDENCE TIME IN DIFFERENT REFINER PROCESSES AS A TOOL FOR REDUCING ENERGY CONSUMPTION

RESULTS FROM THE SINGLE STAGE RSA1300 DOUBLE DISC REFINER AT THE STORA ENSO FORS MILL, SWEDEN



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HIGH REFINING TEMPERATURE AND SHORTER RESIDENCE TIME IN THE PRIMARY STAGE REFINER

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HIGH REFINING TEMPERATURE AND SHORTER RESIDENCE TIME IN THE PRIMARY STAGE REFINER

RESULTS FROM THE RGP44 SINGLE DISC REFINER LINE AT KCL, FINLAND

	Standard	Low Energy **3 bar**	Low Energy **5bar**
SEC (kWh/BDMT)	2200	1900	2200
Freeness (ml)	175	175	175
Fiber length (mm)	1.8	1.8	1.85
Density (kg/m^3)	400	400	420
Tensile index (Nm/g)	37	37	39
Tear index (mNm^2/g)	8	7.5	8.5
Light scattering co. (m^2/kg)	55	55	54
Brightness (%)	61.5	62	60.5

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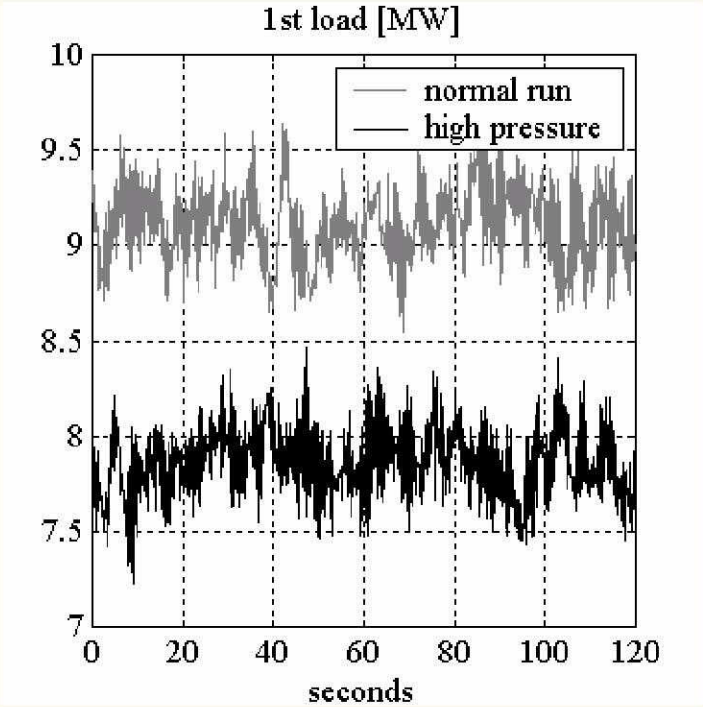
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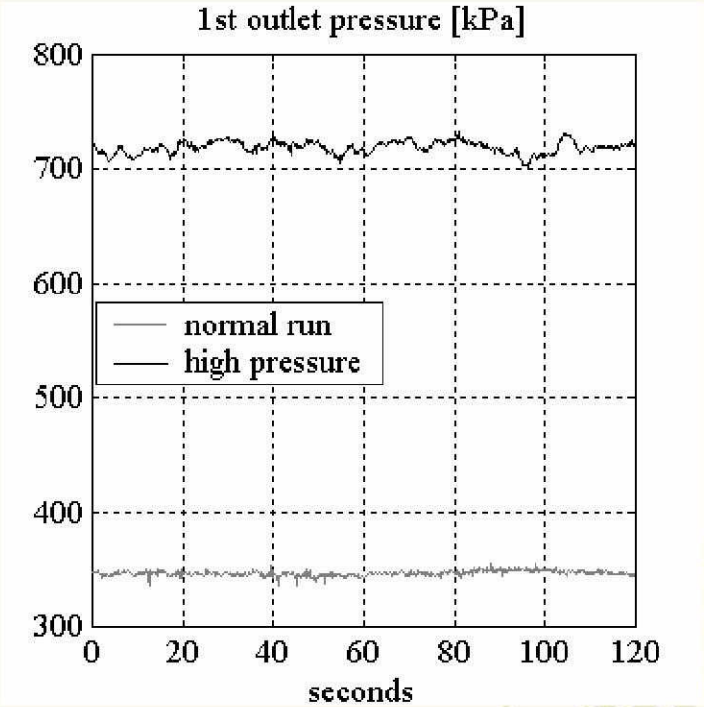
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HIGH REFINING TEMPERATURE AND SHORTER RESIDENCE TIME IN THE PRIMARY STAGE REFINER

RESULTS FROM THE SD65 SINGLE DISC REFINER LINE AT THE UPM-KYMMENE KAJAANI MILL, FINLAND

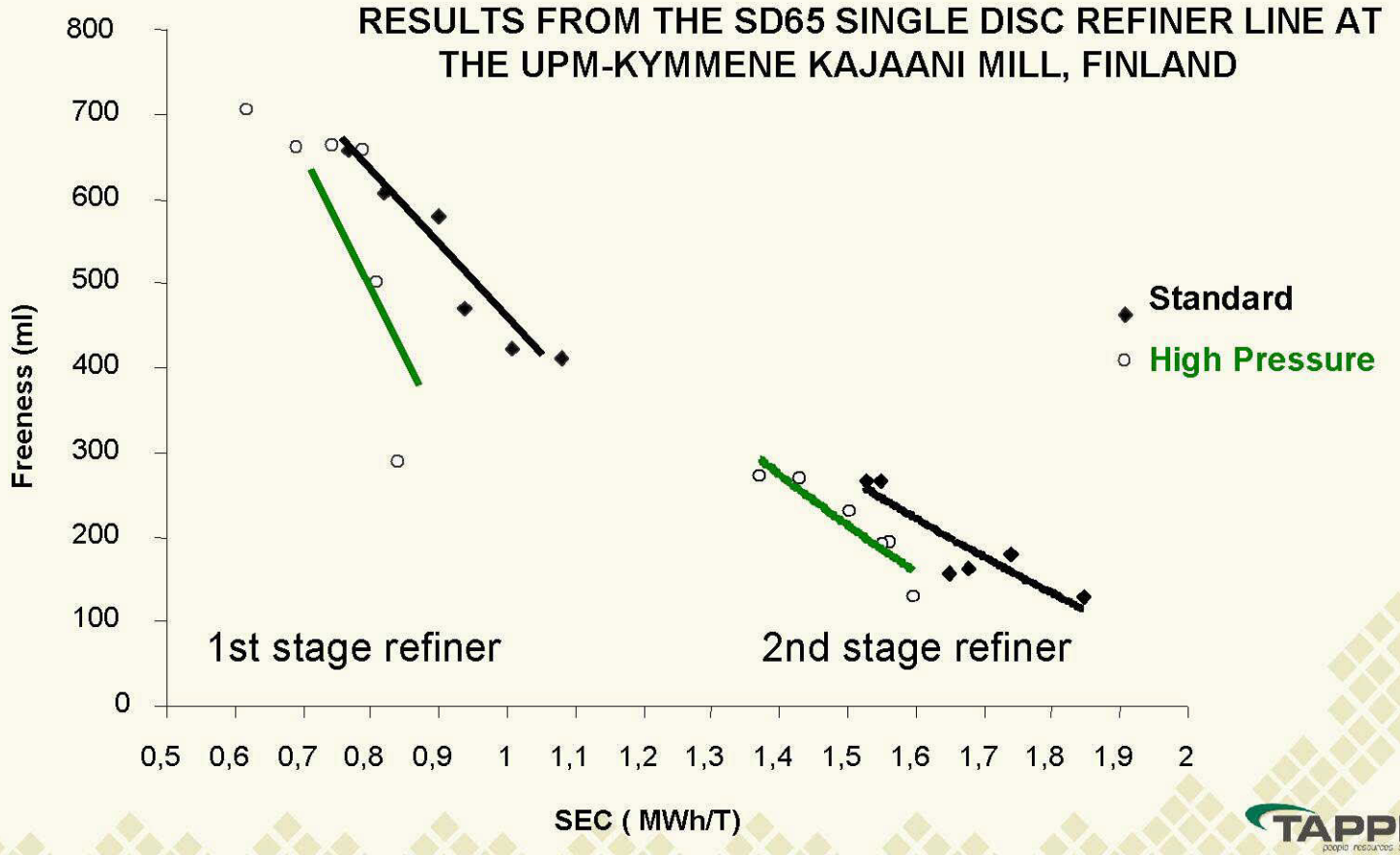




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HIGH REFINING TEMPERATURE AND SHORTER RESIDENCE TIME IN THE PRIMARY STAGE REFINER

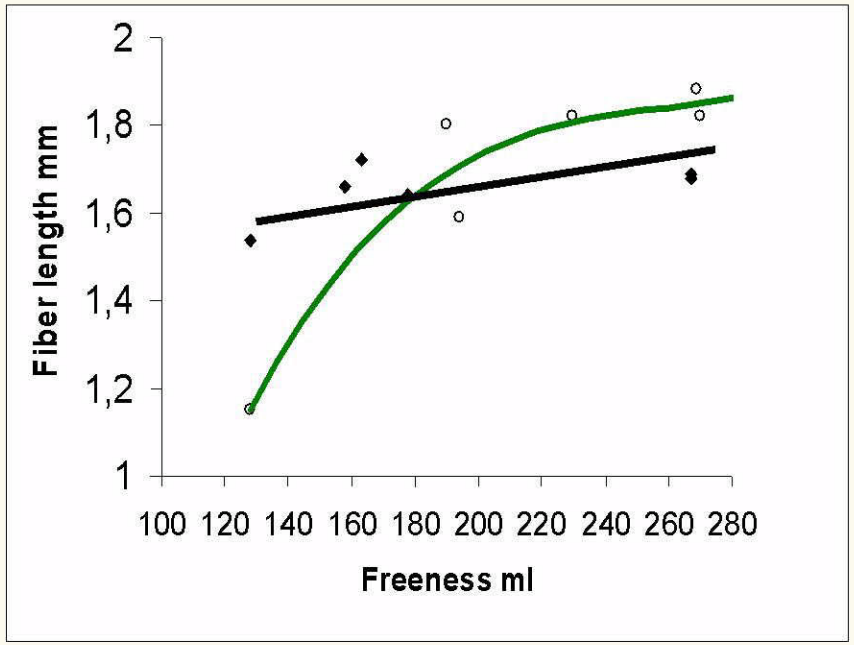


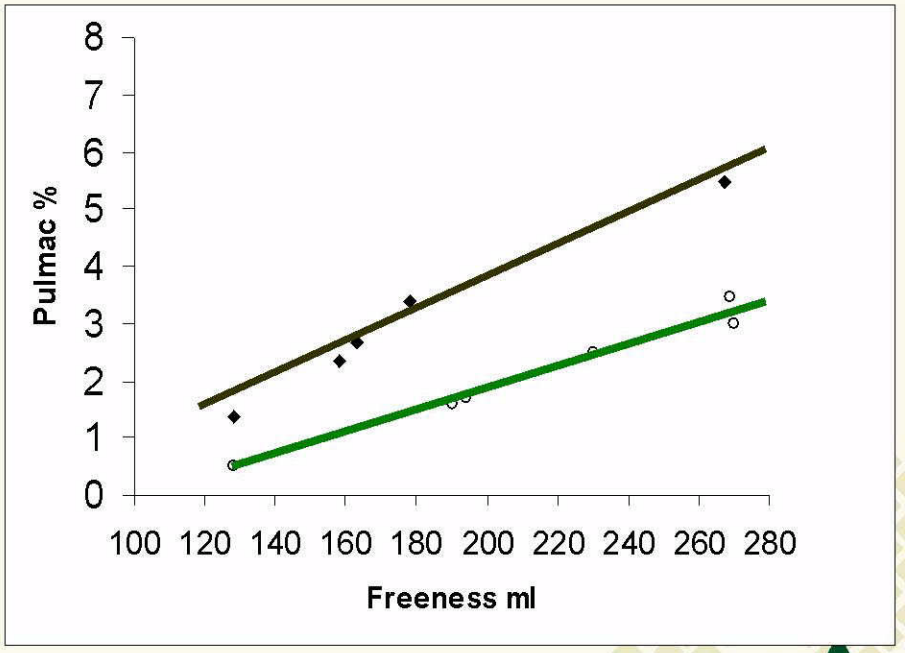
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HIGH REFINING TEMPERATURE AND SHORTER RESIDENCE TIME IN THE PRIMARY STAGE REFINER

RESULTS FROM THE SD65 SINGLE DISC REFINER LINE AT THE UPM-KYMMENE KAJAANI MILL, FINLAND





◆ - Standard ○ - High Pressure

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CHANGING THE SEGMENT GEOMETRY IN THE DEFIBRATION STAGE

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CHANGING THE SEGMENT GEOMETRY IN THE DEFIBRATION STAGE

RESULTS FROM THE SD65 SINGLE DISC REFINER LINE AT THE UPM-KYMMENE JAMSA RIVER MILL, FINLAND

	Standard	Maximum Defibration
SEC (kWh/BDMT)	2180	2370
Freeness(ml)	128	120
Fiber length (mm)	1.63	1.70
Shive content (%)	1.08	1.02
Tensile index (Nm/g)	38.6	39.6
Tear index (mNm^2/g)	8.3	8.6
Light scattering co.(m^2/kg)	52.0	50.8

CHANGING THE SEGMENT GEOMETRY IN THE DEFIBRATION STAGE

RESULTS FROM THE SINGLE STAGE RGP65DD DOUBLE DISC REFINER AT THE STORA ENSO KVARNSVEDEN MILL, SWEDEN

	Standard	Maximum Defibration
SEC (kWh/BDMT)	1560	1620
Freeness(ml)	150	150
Shive content (%)	0.24	0.17
Tensile index (Nm/g)	35	37
Tear index (mNm^2/g)	7.2	7.4
Light scattering co.(m^2/kg)	49	49

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SUMMARY

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- Trial segments presented in this paper give logically similar results from different refiners in different locations
- By changing the primary refiners segment design, it is possible to optimize fiber quality and energy consumption

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