Latest Sizing Solution for Fine Paper

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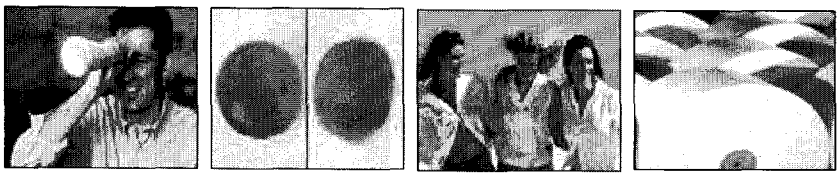

Latest Sizing Solution for Fine Paper
Seoul

David Li – Marketing Manager-Sizing, APAC
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Water & Paper Treatment

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Sizing paper with chemical additives

Internal Addition

To Reduce
Fiber Wettability

Rosin Sizes - Dispersed Rosin Sizes
- Rosin Soap Sizes
Cellulose Reactive Sizes - AKD, ASA
Wax Emulsions

Surface Treatment

To Reduce
Fiber Wettability

Cellulose Reactive Sizes
Wax Emulsions

To Reduce
Pore Radius

CMC
SMA Copolymers
Starches
SAE Emulsion

Sizing, brings about a reduction in the capillarity and hydrophilicity of the cellulose, thus, make it possible to control the penetration of fluid.

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Drivers of Fine Paper

Apart from **cost saving** and **machine runnability**, some paper makers are also doing the follows to differentiate their paper products from others' :

- MAKING HIGH ASH CONTENT PAPER
  - Surface area, alkalinity/hydrolysis
- HIGH WHITENESS PAPER
  - PCD, Retention performance

WHAT SHALL WE DO FOR PAPER MAKES AS A SUPPLIER?

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Market Trend of Sizing

Acid ➡ Neutral:

— Corrosion, Alum, Filler selection;
(AKD, ASA, Cationic rosin dispersion)

Internal ➡ Surface:

— Cost reduction, Runnability Improvement
(Promoted AKD, SAE, Liquid AKD based)

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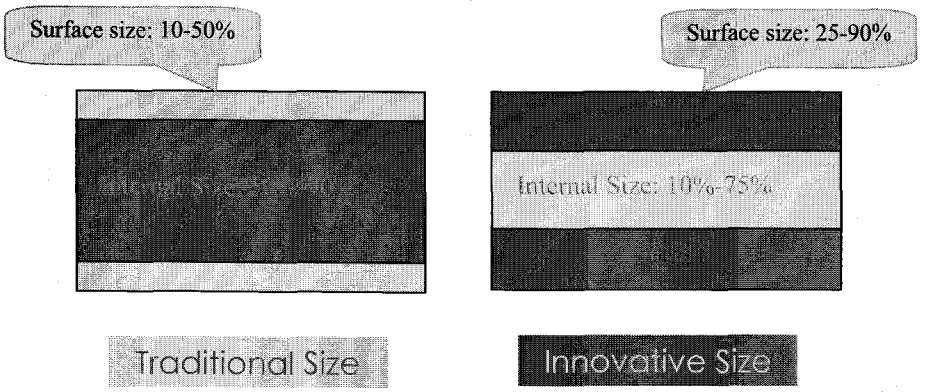
From Internal to surface – Sizing contribution



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Advantages of surface sizing

- Strength properties picking resistance, reduction of linting;
- 100% yield of sizing agent no retention problem;
- Decrease of sizing costs as the basis weight increases;
- Reduce the wet end deposit issue & improve machine runnability less wet end size;
- Enable higher ash content loading & High whiteness paper especially for fine paper;
- Improve the two-sideness in terms of hydrophobicity;
- A wide range of polymer sizing agents flexibility;
- Improve the printability
- Effect/performance

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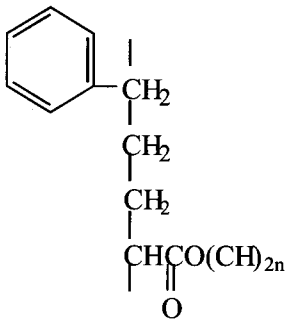
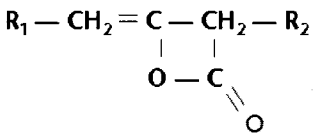
Surface Size Comparison

Traditional–SAE



Dipole-dipole interaction;
Good film-forming, less hydrophobic

Innovative- Reactive surface size



Covalent bonding;
More hydrophobic

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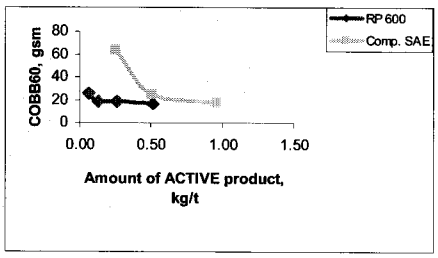
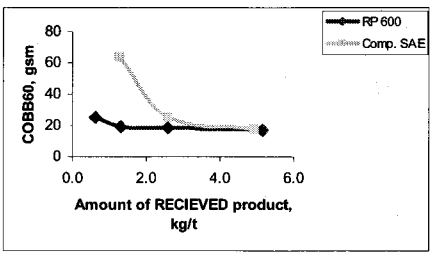
COBB – Raiprint 600 vs. SAE





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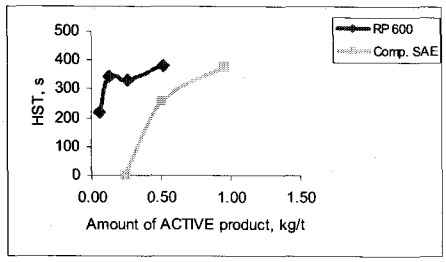
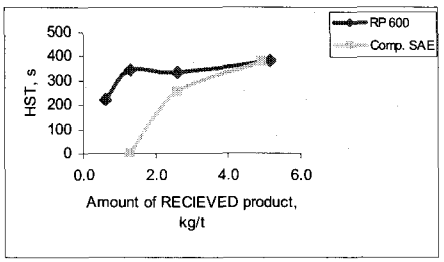
HST - Raiprint 600 vs. SAE





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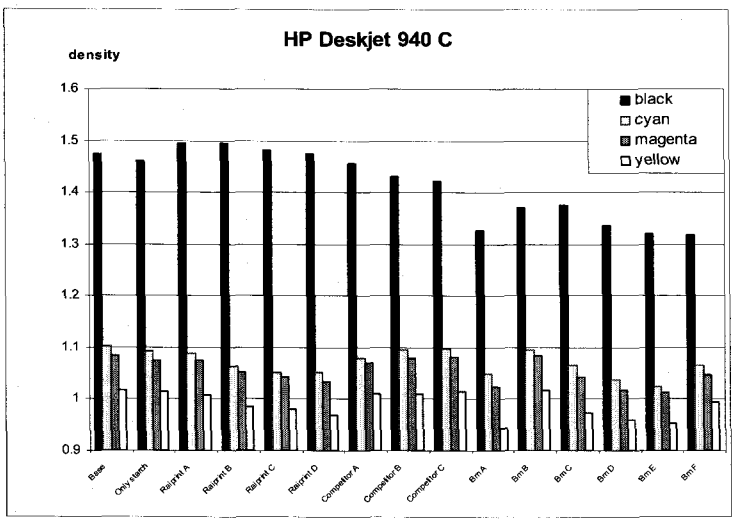
Ink Jet Printability



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Strengths & Weaknesses against traditional HSS

Product	Ciba® RAIPRINT® 600	SAE or SMA Surface Sizes
Strengths	• High hydrophobicity • Cost/performance • Low foaming	• Good film forming • Improves toner adhesion • Reduces ketone migration • Well established
Weaknesses	• Toner adhesion or converting issues not yet faced • Less film forming • No ketone barrier	• Lower hydrophobicity • Foaming (especially SMA) • Low solids (SMA) • Cost/performance

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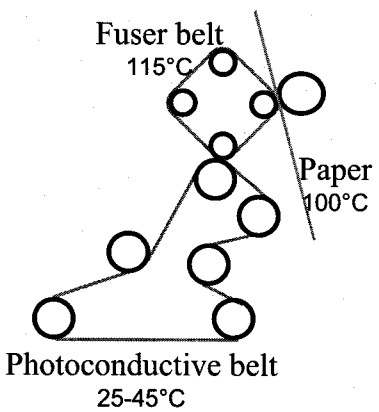
Océ Standard Copy Press



- In a conventional copier, the toner is transferred from a photoconductive drum to the paper by strong magnetic forces induced by high voltage.
- In Océ copiers, the 'drum' is a photoconductive belt.
- Transfer and fusing of toner onto paper occur in one step.

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Problems Caused By AKD

Standard Copiers

- Ketones can be transferred from paper to the Fuser Belt.
- Fuser in direct contact with the Photoconductor - so ketones can be crystallised on to the (low temperature) Photoconductor.
- Areas with ketones can be charged but not discharged, which gives a shadowy background.
- Melting point of AKD and ketones is the critical factor.

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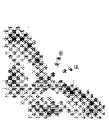
Comments By Océ

Standard Copiers

- Worst paper is that surface-sized with conventional AKD.
- **Conventional AKD in the surface is NOT allowed.**
- Fillers may have a 'binding' action on ketones (adsorption?)
- Fatty acids decompose the Fuser Belt.
- Stearic acid crystallises rapidly.
- If <1.2mg/g ketones on Fuser Belt after 20 000 copies, a life-time of several '00 000 copies is expected.



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Ciba® RAIPRINT® 600

Innovative surface size

Based on liquid wax

Reactive surface size

Patent technology (Case number 23120)

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Technical features

- **General**
  - Ciba® RAIPRINT® 600 is a new, cellulose reactive hydrophobic surface sizing agent applied as an additive in the size press
  - The product is designed to give a high degree of sizing and is primarily designed for neutral/alkaline paper making conditions
  - Ciba® RAIPRINT® 600 is designed for use in all grades of uncoated fine paper (copy, bond, offset, envelope)
- **Product information**

State:	white dispersion
Viscosity:	<100 cP
Dry solids:	20% +/- 0,5%
pH:	3,5-4,5
Charge:	Amphoteric

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Value propositions

1. Reduce total sizing costs *Improve total size cost balance – internal/surface*
2. Reduce wet end size usage *Cost, wet end flexibility, reduce deposits, bring sizing to surface*
3. Improve printability *Increase hydrophobicity, improve holdout*
4. Help facilitate higher filler loadings *More efficient sizing with higher surface area base sheet*
5. Improve machine cleanliness/runnability *Less wet end ASA – less hydrolyzate, fewer deposits*
6. Improve the two-sideness *regarding hydrophobicity*

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Potential users

- Uncoated or coated Fine Paper
- Using ASA/AKD as the internal size;
- Have deposit/runnability issue;
- Using SAE/SMA product as the surface size;
- Willing to reduce the overall sizing cost;
- Ash content >20% or may wish to increase it further;
- Wants to make high whiteness grade

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Case Study 1 - Raiprint 600

Fine Paper Machine
AKD as Internal Size

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Trial Background

- WFU; Copy and Offset
- Production 285.000 t/a, 36-37 t/h, speed 1200 m/min
- Current Sizing Concept
  - AKD as an internal size
    - 0,3 % (20% AKD) for Copy Grades
    - 0,6 % (20% AKD) for Offset
  - B*** 400DS as a hydrophobic surface size (Styrene Acrylate)
    - 0,6 % (as received) for Copy Grades
- Aim of the trail was to reduce the sizing costs
  - By replacing B*** 400DS
  - By decreasing the dosage of internal size

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Raiprint 600 Trial

- Raiprint 600 was added into the surface size service tank.
- 0,6 % of SA-type HSS was replaced by 0,25 % of Raiprint 600 at the beginning.
- Dosage of Raiprint 600 was then reduced from 0,25 % to 0,17 % and 0,15 %.
- Dosage of internal size (AKD) was constant at 0,3 % (as received) during the trial.

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Results

- No runnability problems
  - No foaming
  - Film on size press was normal
- Friction of paper was on same level or even higher than Raiprint 600
- Sizing was improved with Raiprint 600 compared to situation before the trial
- No changes in toner adhesion

According to sizing values it is possible to replace 0,6 % competitors SA-type HSS with about 0,2 % of Raiprint 600.
The hydrophobic surface sizing (HSS) cost was reduced at least by 50 %

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Ciba Raiprint 600

Case Study 2 - Raiprint 600

Fine Paper Machine
ASA as Internal Size

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Case study 2

MACHINE DETAILS

Locations: CHINA

Machine Type - Gap Former

Machine Speed - 1650 m/min (65tph)

Grade - Uncoated Fine Paper (Copy, Offset)

Furnish - Acacia and Eucalypt

RETENTION & DRAINAGE AID SYSTEM

Percol 182 - 0.210 kg/t

Telioform M100 - 0.200 kg/t

Telioform B1030 - 2.30 kg/t

FPAR - 35-40%**WW Solids Set Point** - 0.35%

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Trial background and aims

Sizing system before the trial:

Wet end Size: 1.0 kg/t ASA

Surface size: 2.5 kg/t SAE

Cobb 60 s Target: 24 for copy paper

Ash content: 26% GCC

Aim: To reduce the ASA dosage, and overall sizing cost; improve the two-sideness.

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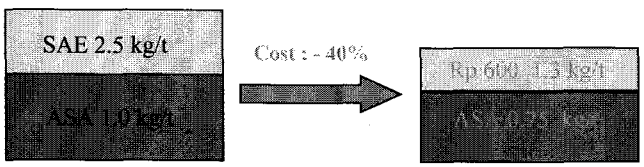
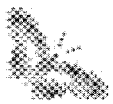
Results and summary

- Raiprint 600 was added into the suction side of pump for surface starch service tank.
- With the same Cobb value, internal ASA dosage was reduced from 1.0 kg/t to 0.75 kg/t, while surface size dosage was decreased from 2.5 kg/t to 1.3 kg/t paper.
- 2-sideness was also improved according to the Cobb of top/btm.
- Another benefit is that Cobb is more consistent/controllable when high whiteness grade is made.





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Some Raiprint 600 results worldwide

Grade	Pre-trial Int.size	Results Int.size	Pre-trial HSS	Results Raiprint 600
Envelope 80-100gsm Porosity 500-600 ml/min	ASA 1,2 kg/t	ASA 0,7 kg/t **- 40%**	SA, 2,3 kg/t	1,7 kg/t **- 26%**
Pre-print 80 gsm Porosity 800-900 ml/min	ASA 1,2 kg/t	ASA 0,85 kg/t **- 30%**	SA, 2,3 kg/t	2,1 kg/t **- 10%**
Office 60-80 gsm Porosity 600-700 ml/min	ASA 0,8 kg/t	ASA 0,65 kg/t **- 20%**	SA, 2,0 kg/t	1,0-1,4 kg/t **- 30 - 50%**
Office 80 gsm Porosity 800-900 ml/min	AKD 0,6 kg/t	AKD 0,6 kg/t	SA, 6,0 kg/t	1,5 -2,0 kg/t **- 70% -75%**
Office 80 gsm Porosity 700-800 ml/min	ASA 1,7 kg/t	ASA 0,9 kg/t **- 45%**	Only Starch	1,5 kg/t

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Thank you!

Q&A

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