New PCC based Specialty Pigment for Specific Use in Newsprint Paper

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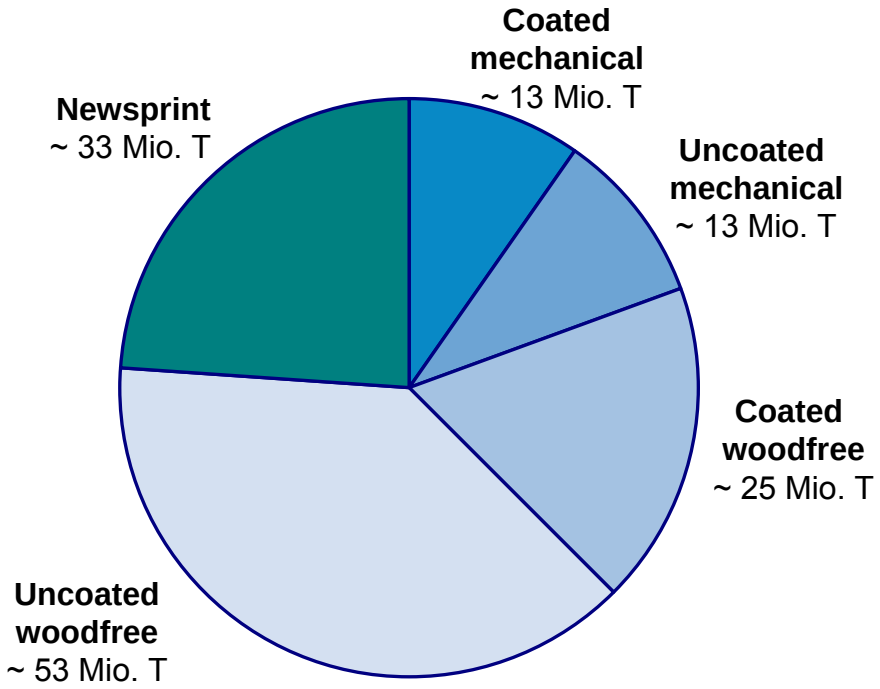
- **Graphical papers, current trends in newsprint**
- **Printing technology / inks for newsprint**
- **Good reasons for use of $CaCO_3$ in newsprint**
- **Print strike through / print show through**
  - **important influencing factors**
  - **impact of pigments on print through** (Lab study)
- **Omyasorb 8000 specialty pigment, commercial experience**
- **Summary / conclusion**

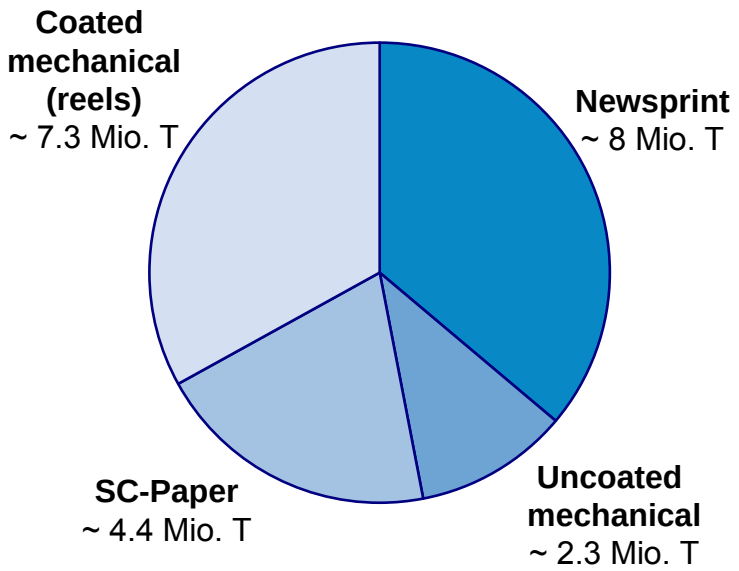
Printing & Writing Paper Production 2009



“World”

~ 137 Million tons

Source:: Pöyry Terminal



“Europe”

Mechanical

~ 22 Million tons

Quelle:: CEPI

Current trends in Newsprint, Europe

Newsprint paper today

Mix of PM‘s
with different production capacities

PM’s, large capacities

Standard newsprint

- wide, fast, new PM’s
- 100 % de-inked pulp
- located in densely populated areas
- lower basis weight
- increased print densities
- increased multi color printing

PM’s, average / smaller capacities

Improved paper qualities

- higher brightness
- higher opacity
- Heat-Set
- SC-C

Applied Printing Technologies for Newsprint

- Globally about ⅔ of all publications are printed in offset

Cold-Set (mostly applied)

- Drying by absorption / diffusion
- Ink with low viscosity fractions

Flexo print

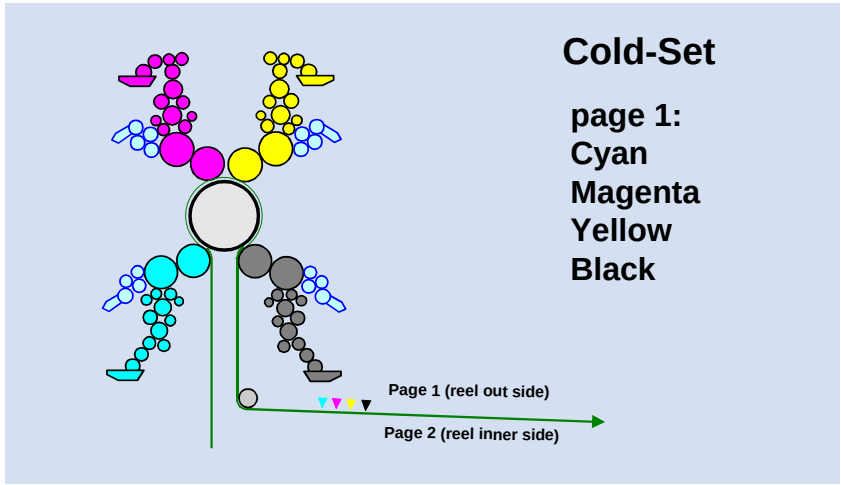
- Drying by evaporation
- Low viscosity inks

Waterless offset printing

- High viscosity inks, temperature
- High surface strength required

Ink-Jet

- Integrated ink jet
- Personalization



Cold-Set Printing Ink Compositions

Composition

Binders (rosin, linseed oil, soja oil, starch and bee wax),
Fillers and color pigments

Purpose of binders

Coverage of ink pigments, to fix them onto the paper surface and to protect them from mechanical abrasion

Typical composition

	Heat-Set	**Cold-Set**	
		black	**color**
Pigments	12 – 20	**20 – 25**	**15 – 25**
Rosin	25 – 35	**8 – 10**	**20 – 25**
Vegetable oil	5 – 15	**0 – 12**	**15 – 25**
Mineral oil	25 – 40	**~ 60**	**20 – 30**
Additives	5 – 10	**1 – 5**	**1 - 5**

Source: Printing Technology; H.Ull^rich

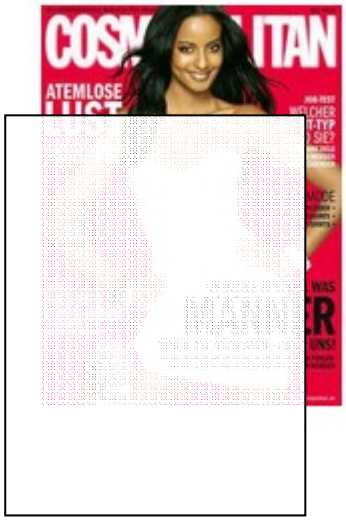
Cold Set Print Show / Strike Through Mechanism

- Cold-set ink pressed into paper surface
- Solid components (pigments and resin) remain on paper surface
- Low viscosity components (mineral and vegetable based oil) separate from the ink layer by diffusion, adsorb on fiber and pigment surfaces
- Excessive low viscosity components migrate (time depending) in direction paper back side, thereby increasing local transparency
- Specialty pigments and / or higher proportions of regular fillers offer additional absorption potential in order to immobilize the excessive low viscosity portions

Print show / strike Through „Print through“

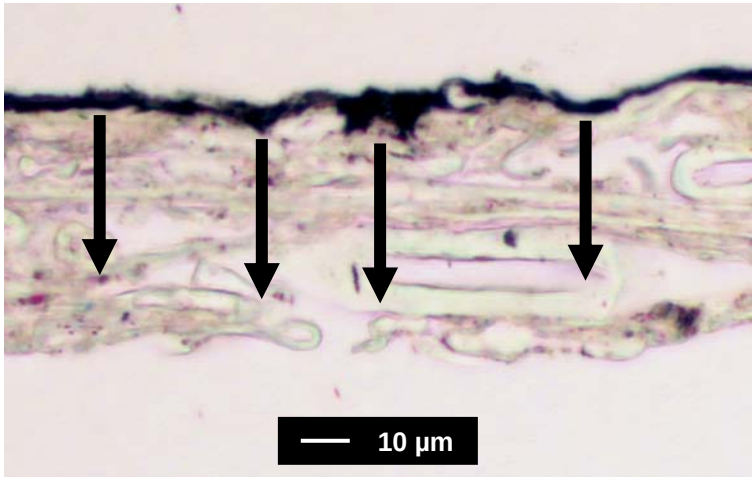
Print show through

Image, which is visible through a sheet of unprinted paper covering a printed surface.
Print show through strongly influenced by sheet opacity



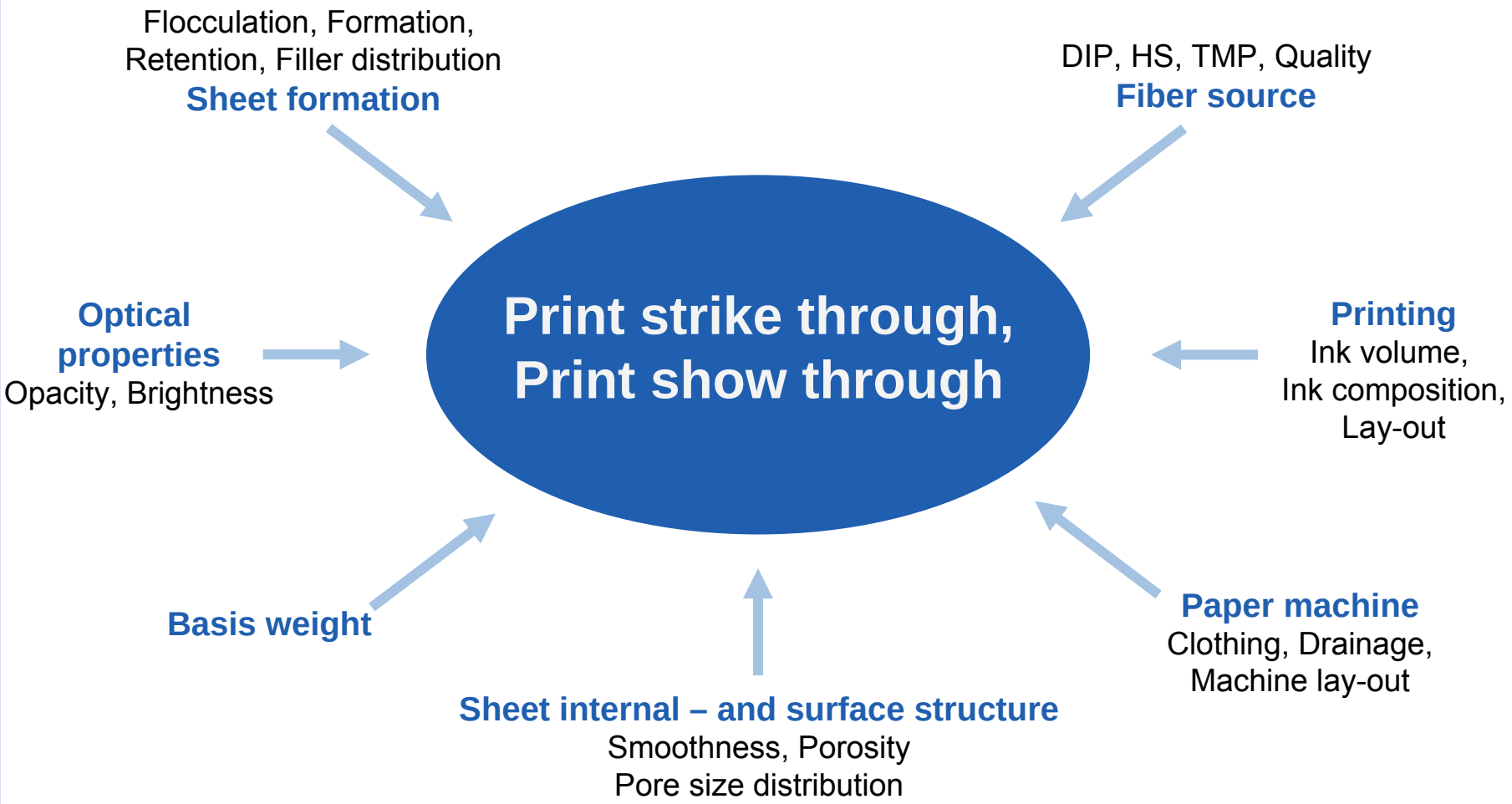
Print strike through

Diffusion of low viscosity fractions into the sheet towards the sheet back side (f time)



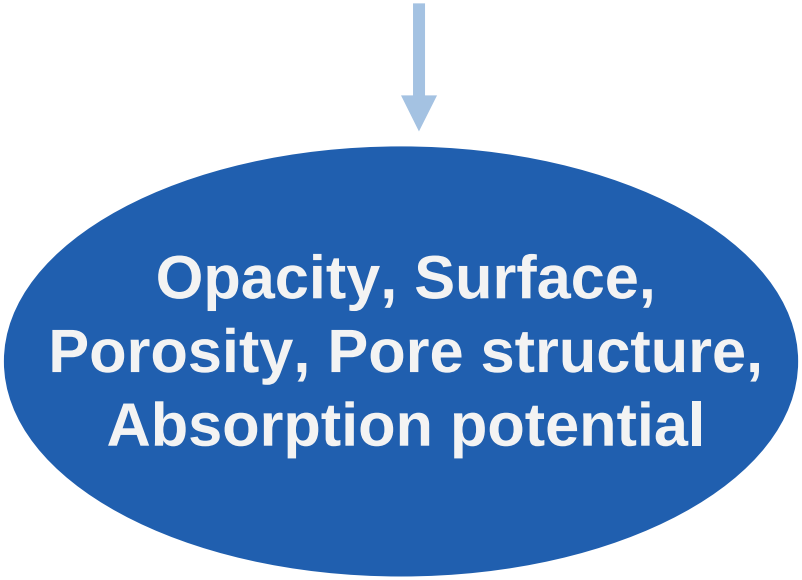
Show through / strike through
= print through

Print strike / show through - Important influencing Factors

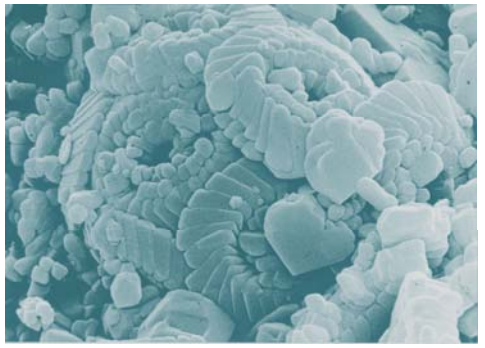


Print strike / show through - Influence of Pigments

Primary, Secondary,
Specialty Pigments



Advantages of $CaCO_3$ as Primary Filler in Newsprint



- Increased brightness and opacity
- Improved smoothness (PCC)
- Improved ink absorption = less smearing
- **Reduced print strike / show through**
- Reduction of paper quality fluctuations due to DIP related pigment loading variations
- Cost reduction (Fiber replacement, bleaching, drying)
- **Current pigment loading in newsprint paper 2 - 20** (24) **%**
  Primary filler addition in DIP containing newsprint 0 - 7 %
- **Secondary pigment: ex DIP**
  Primary fillers : $CaCO_3$ (Chalk, GCC, PCC) Clay
  Specialty pigments: Mg Al Silicate, calcined clay, Omyasorb

Influence of Pigments on Print strike / show through

Basis weight: 42.5 g/m²

Fiber furnish: 100 % DIP

Pigment loading:
Secondary ex DIP
13.4 % (5.3 % $CaCO_3$ / 8.1 % Clay)

Primary filler:
2 und 4 (8) %

Retention aid: 0.04 % PAM

Wet press applied: 0.42 MPa

Surface roughness: 4 PPS

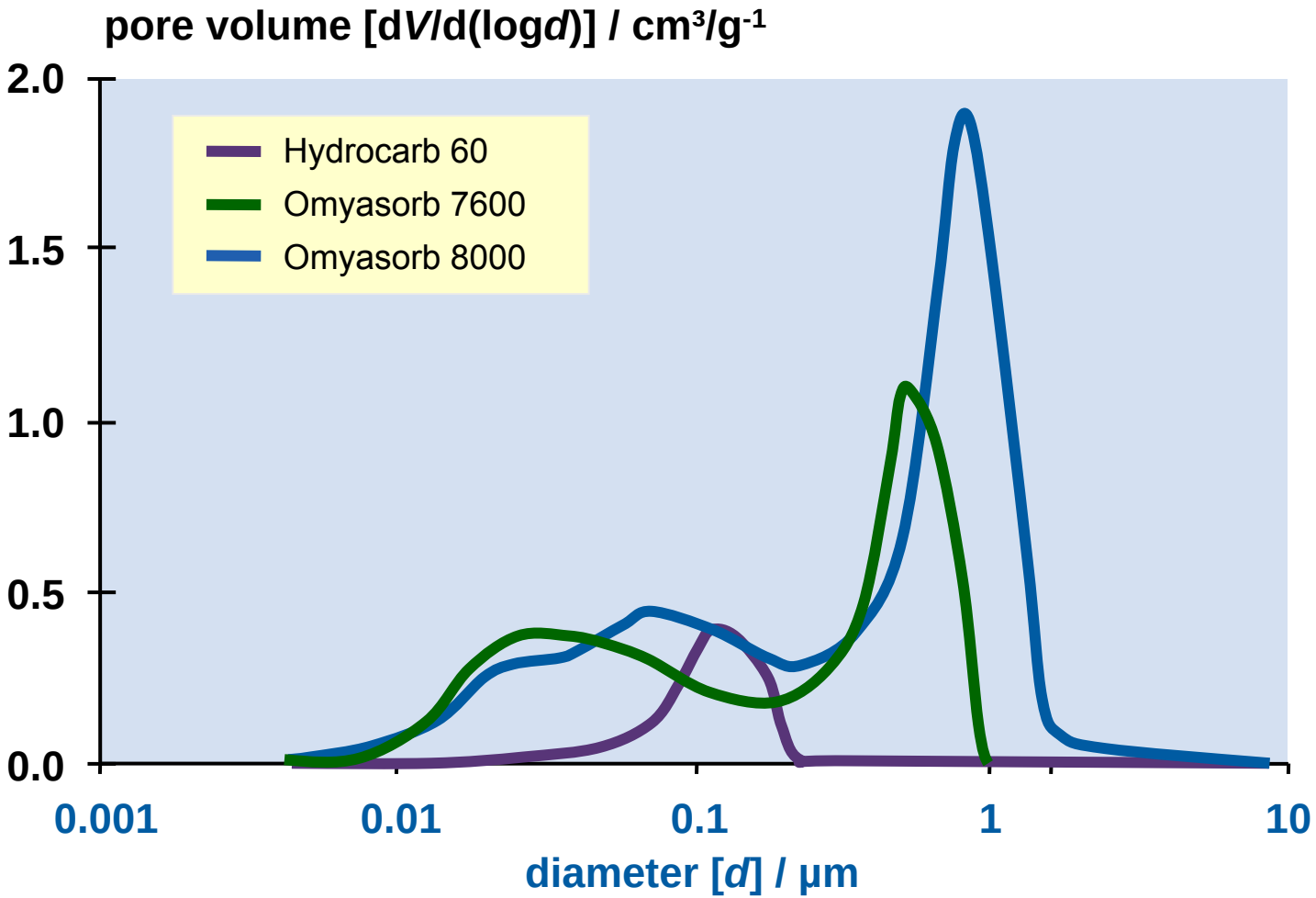
Lab study

Pigment Data

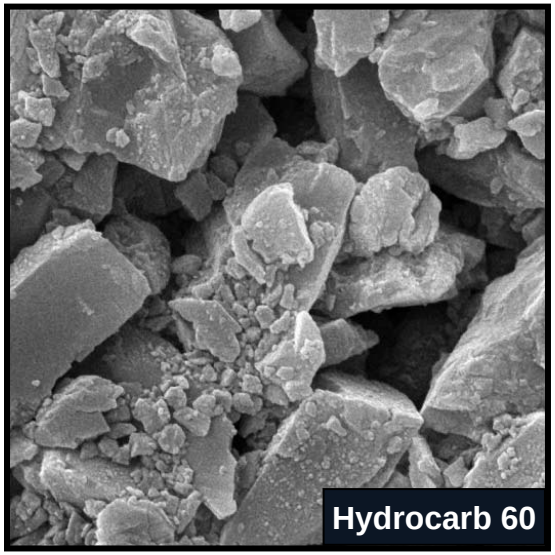
		Hydrocarb 60	Omyasorb 7600	Omyasorb 8000
Spec. surface area	m^2/g	7	50	48
Sedigraph 5120				
< 2 µm	%	62	66	69
< 1 µm	%	38	37	29
MTD d_{50}	µm	1.45	1.40	1.50
Brightness R-457	%	95.0	94.6	96.2
Solids	%	75	40	37
Viscosity Brookfield	mPas	120	560	150
Total Intr. Hg Vol.	cm^3/g	0.16	0.74	1.16
Oil Absorption	g/100 g	~ 20	~ 55	~ 90

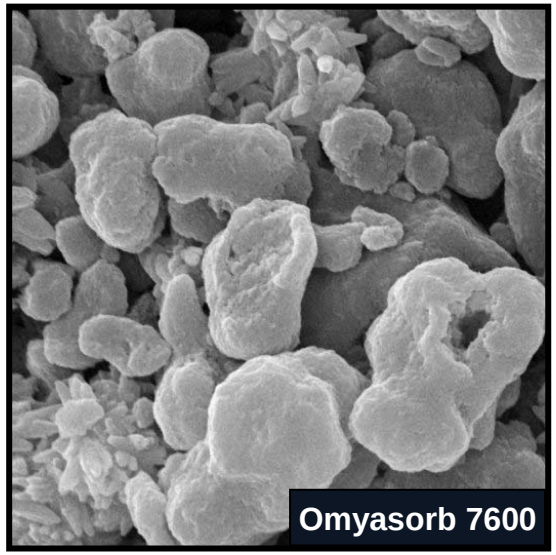
MTD = Mittlerer Teilchendurchmesser

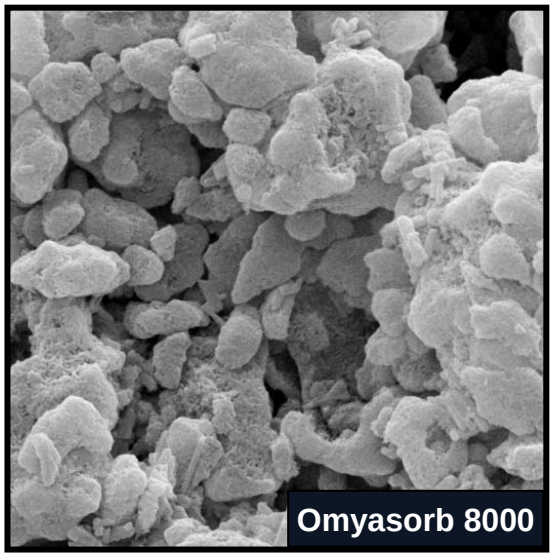
Pigment pore size distribution (Mercury Porosimetry)



Pigment Morphologies



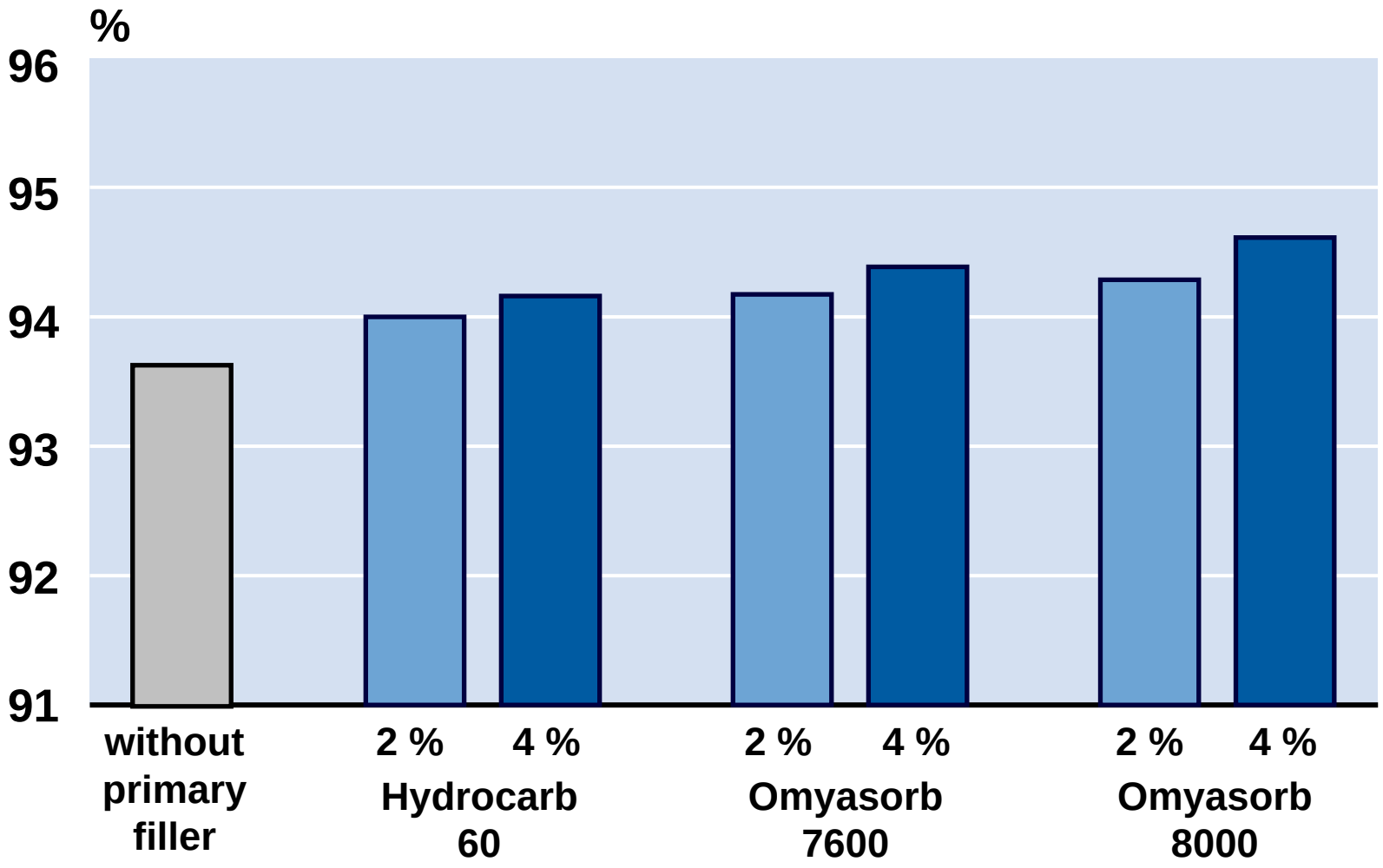




4 µm

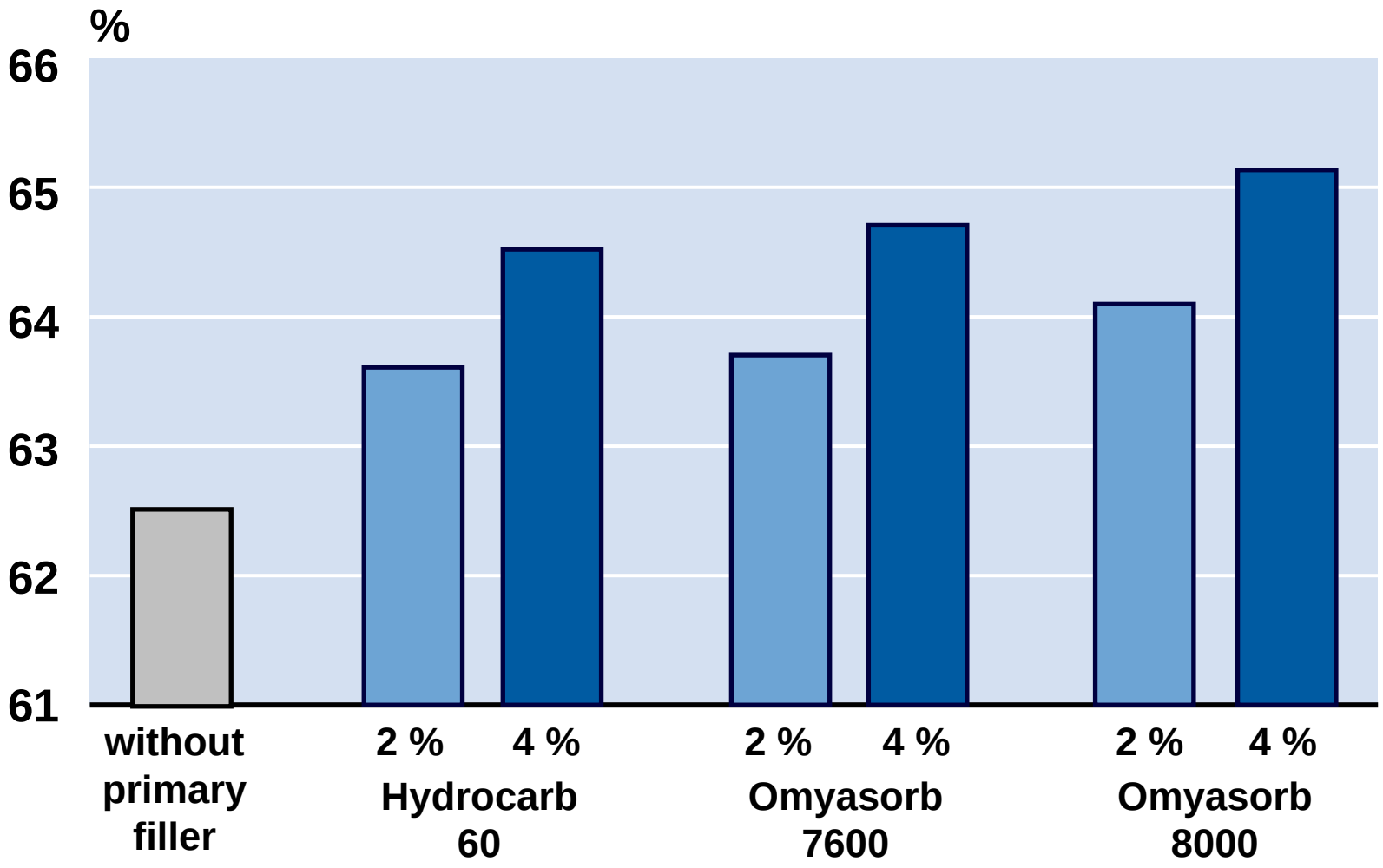
Opacity at 42.5 g/m²

Lab study



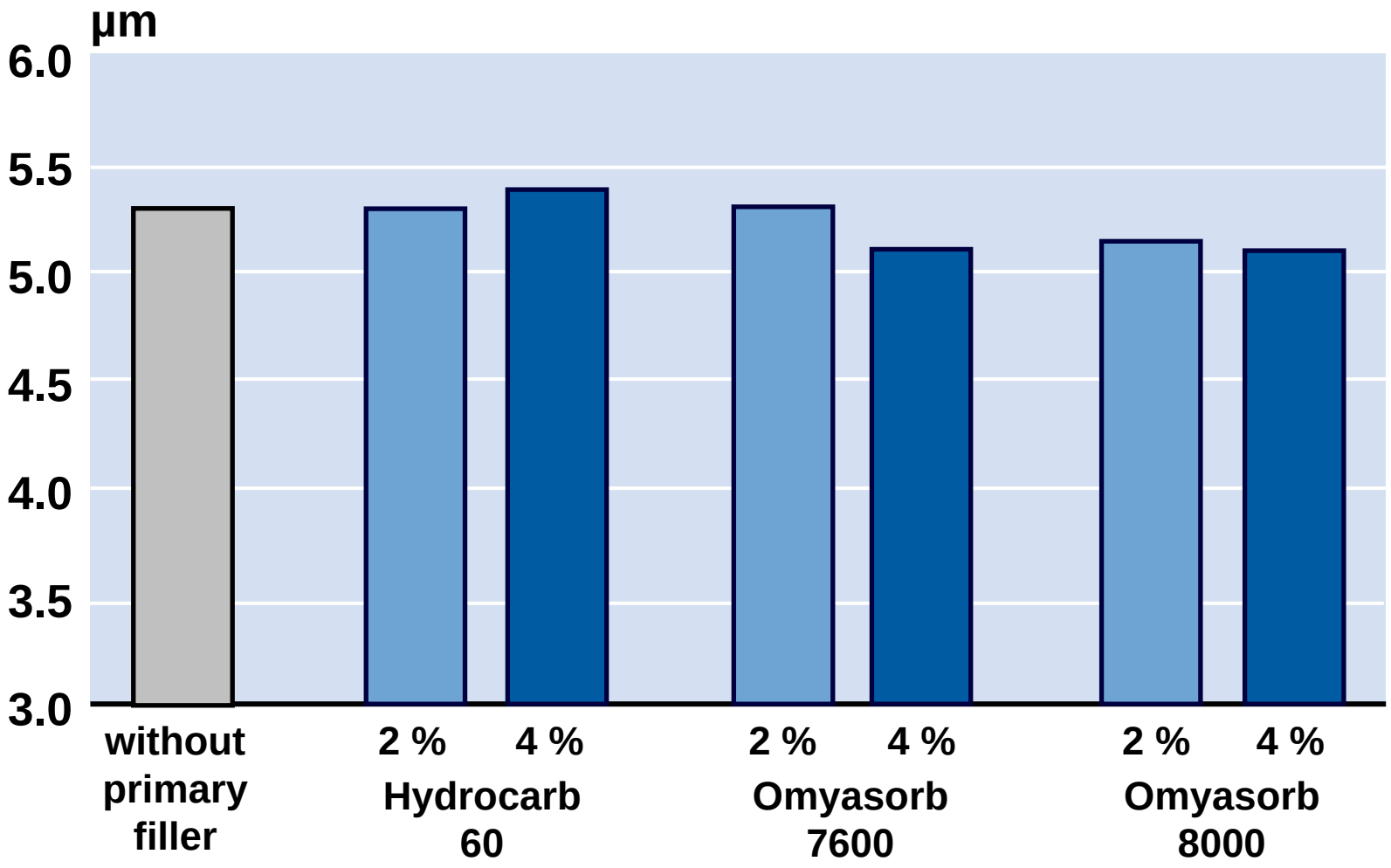
Brightness R-457

Lab study



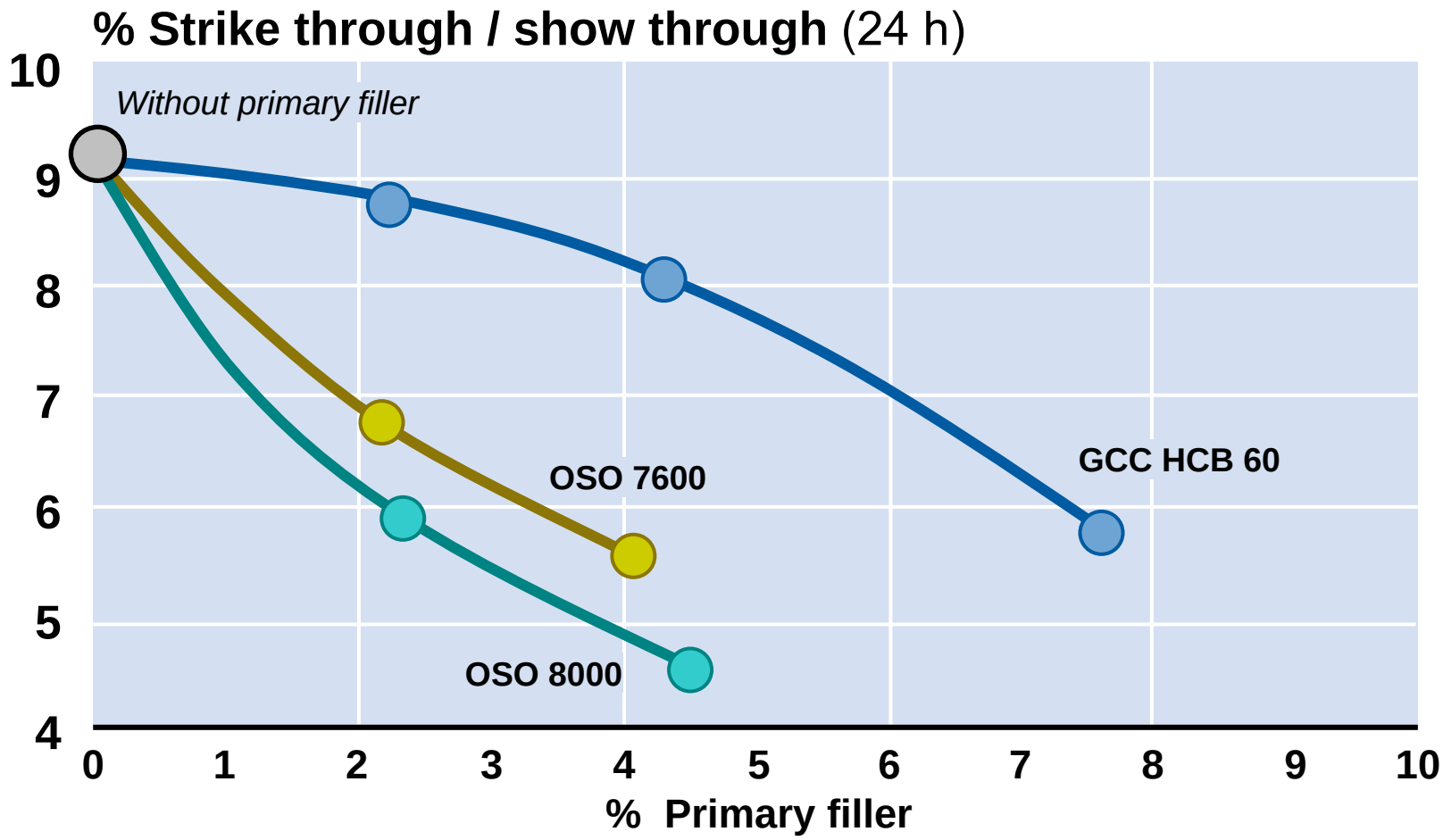
Roughness PPS (1.0 soft)

Lab study



Print strike through / show through

Lab study



Omyasorb 8000 in Newsprint, Commercial Experience

Production:
> 40 tons/h

Basis weight:
42.5 – 45.0 g/m²

Fiber furnish:
100 % DIP, 18 % Pigment ex DIP

Specialty pigment: (~ 1 %)
Mg Al Silicate
Omyasorb 8000

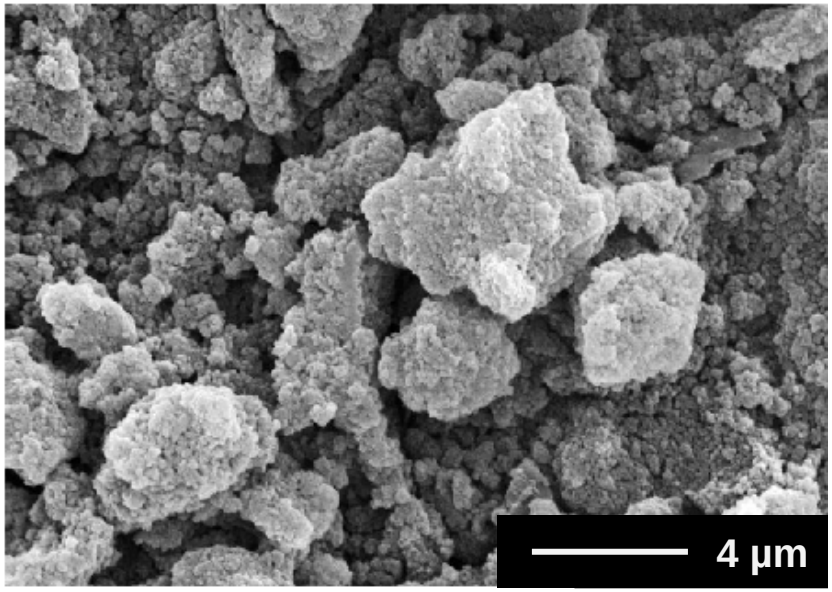
Retention system:
Polyamine / PAM

Other additives:
ATC / cationic starch

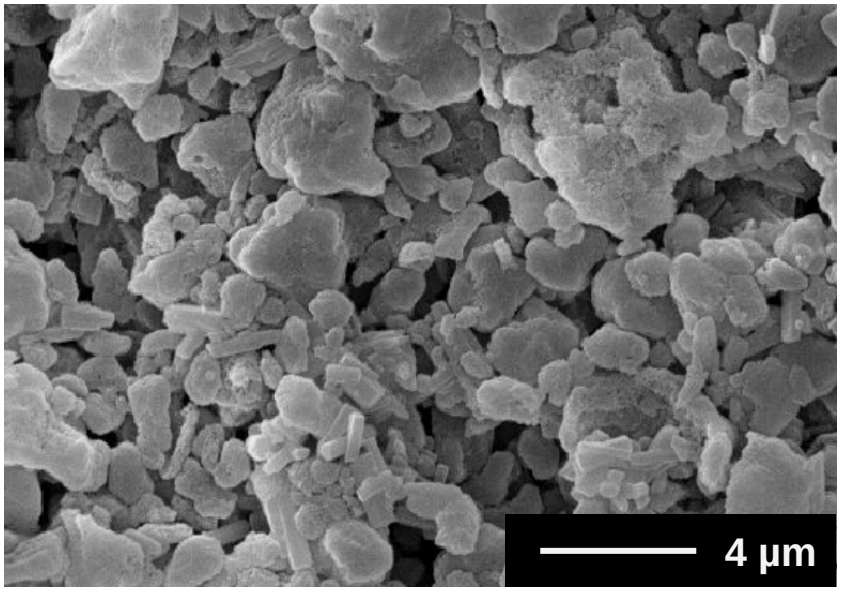
Pigment data (Commercial trial)

		Mg Al Silicate	Omyasorb 8000
Spec. Surface area	m^2/g	73	58
Sedigraph 5120			
< 2 µm	%	82	67
< 1 µm	%	63	32
aps d_{50}	µm	0.70	1.48
Brightness R-457	%	97.0	96.5
Solids	%	30.0	35.5
Viscosity Brookfield	mPas	60	190
Tot. Intr. Hg Vol.	cm^3/g	1.22	1.24
Oil absorption	g/100 g	~ 89	~ 84

Mg Al Silicate and Omyasorb 8000 (5000 x)

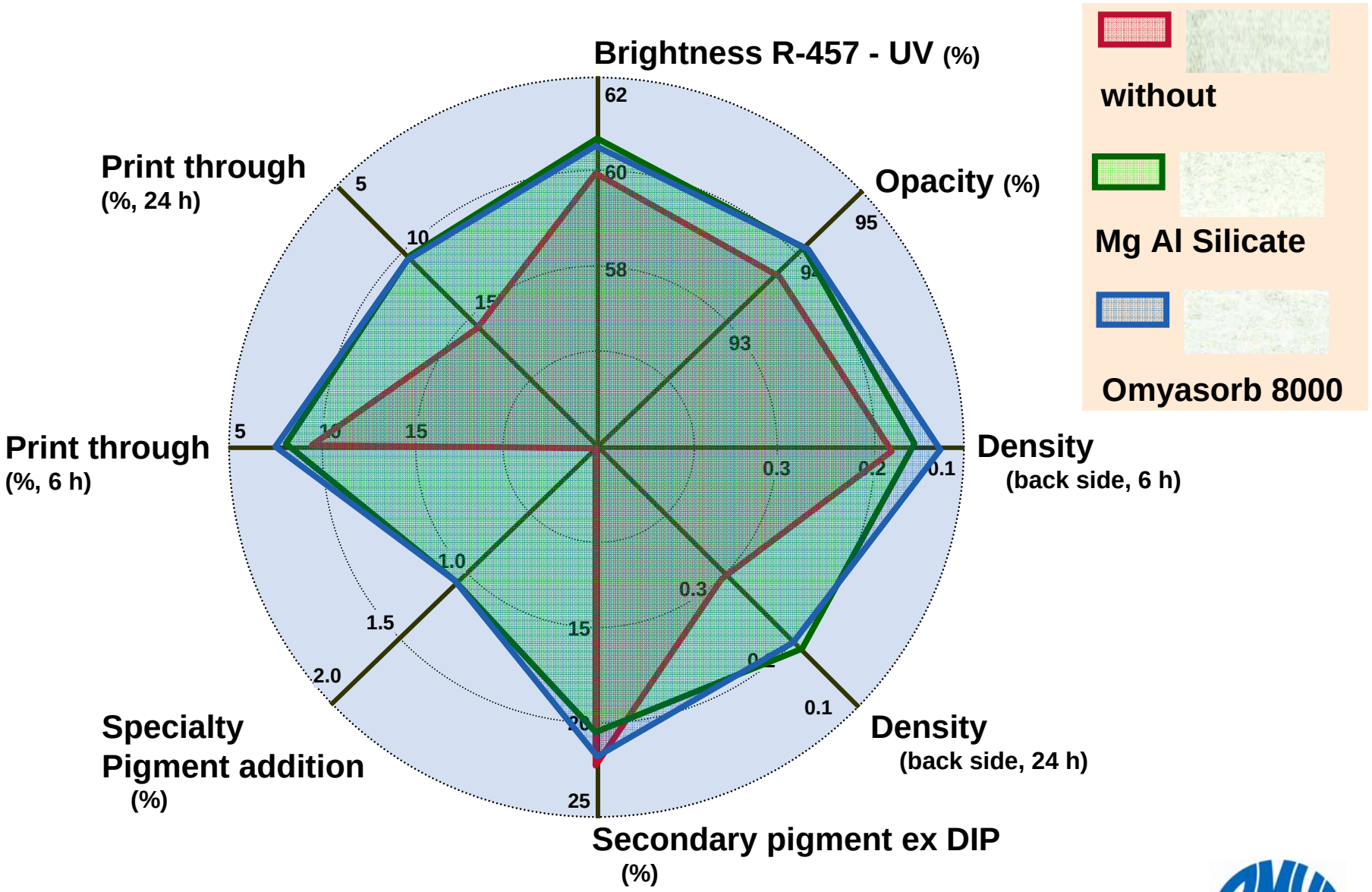


Mg Al Silicate



Omyasorb 8000

Results, Commercial trial with Omyasorb 8000



Summary: **Commercial Trail with Omyasorb 8000**

- **Basis weight**
  42.5 g/m^2
- **„Wet end“ System / Runnability**
  unchanged good
- **Brightness / Opacity**
  slightly increased like with Mg Al Silicate
- **Short period trial**
  Strike through / show through
  similar reduction like with Mg Al Silicate
- **Longer period trial**
  confirmed promising results of short trial
- **Economical consideration**
  Saving potential: ca. 1.7 Euro/ton paper

Summary / Conclusion

- Current trends in newsprint (Europe)
- Print through / important influencing factors
- Omyasorb 8000 = newly developed specialty pigment based on PCC
  - High specific surface area
  - Particular pore size distribution
  - High absorption capacity
- Omyasorb 8000 application
  - Increased brightness and opacity
  - Significantly reduced print through
  - Simple and safe application
  - Potential saving vs other specialty pigments

Omyasorb = new specialty pigment for newsprint (standard / improved) **and other low basis weight graphical papers**

Do You Have Any Questions