

## Case study – 2: Graphic Paper

# Cationic Starch and Filler Content optimization: from Lab to Industrial

Production: Graphic Paper

Fibers: Mix LBKP / BCTMP / (Broke)

Basis weight: 190 g/m<sup>2</sup> / 250 g/m<sup>2</sup> after coating

Output: 30 tp/h

Standard I.B.: 200J/m<sup>2</sup>

Chemicals Standard Dosages:

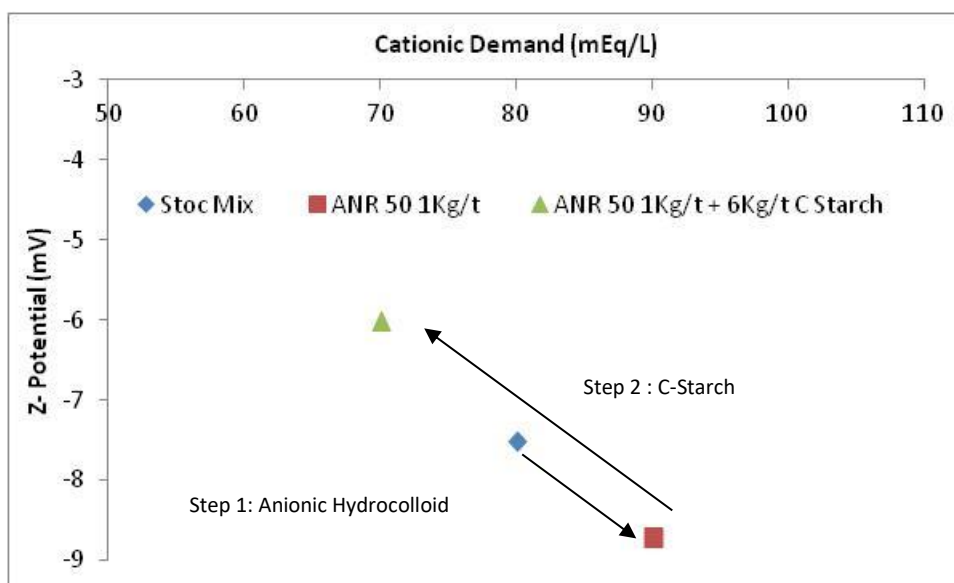
Cationic Starch: 0.60%

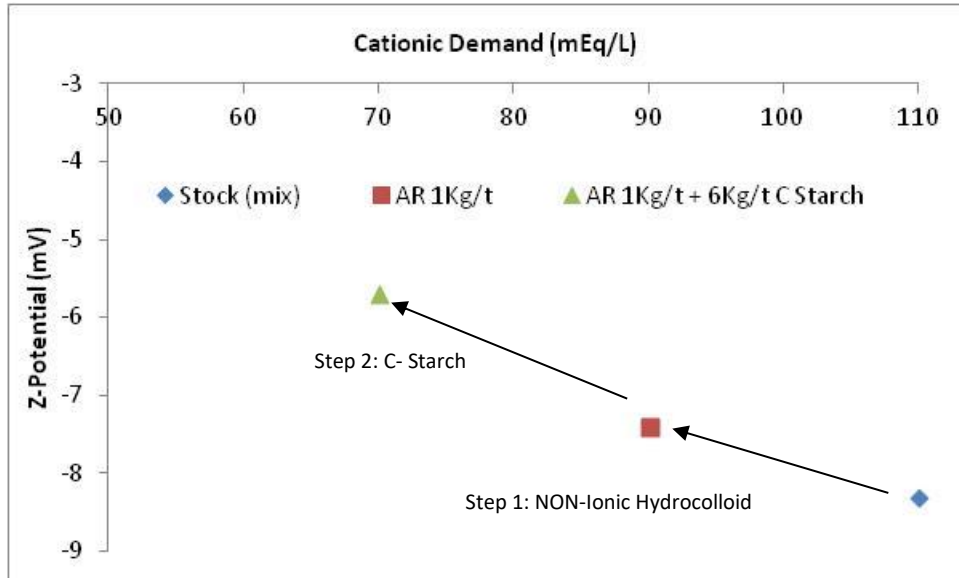
### TARGET:

Reduction of Cationic Starch and cycle optimization:

### LAB TEST:

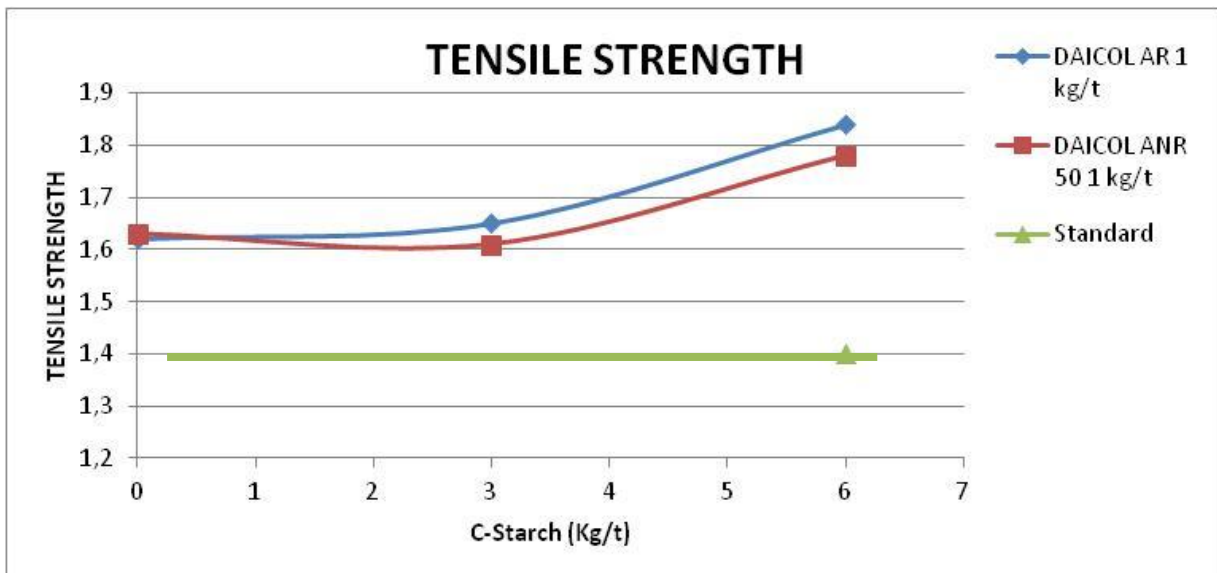
Working on raw material directly from the plant we performed survey and electrochemical characterization using NON-Ionic and Anionic Lamberti Hydrocolloids in Customer Laboratories:

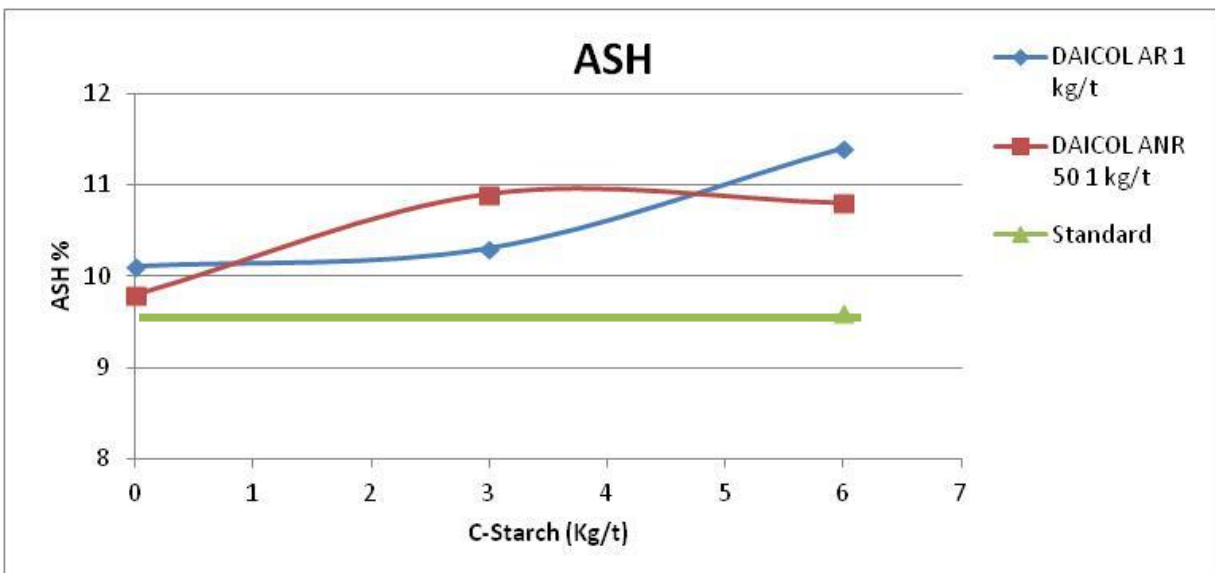
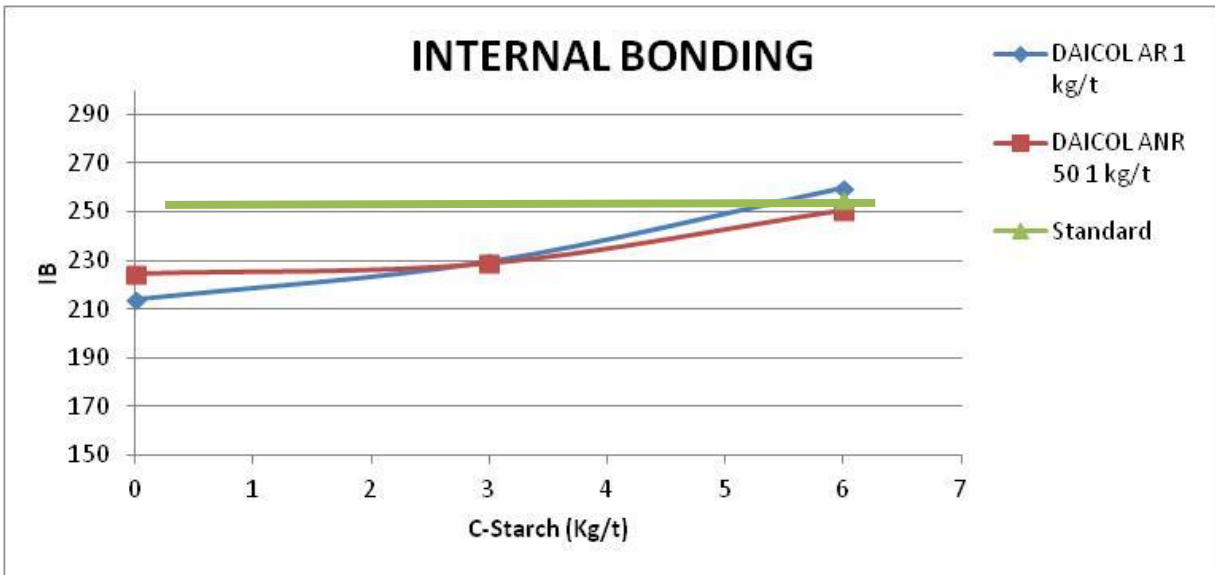




Delta of Z-potential after addition of 6 kg/t of Cationic Starch (step 2) is **+ 2.7 mV** using our anionic hydrocolloid, while delta of Z-potential is **+ 1.7 mV** after addition of NON -Ionic hydrocolloid.

**Anionic hydrocolloid seems to enhance fixation of Cationic Starch.** Test with hand-sheets are summarized in the following graphs:



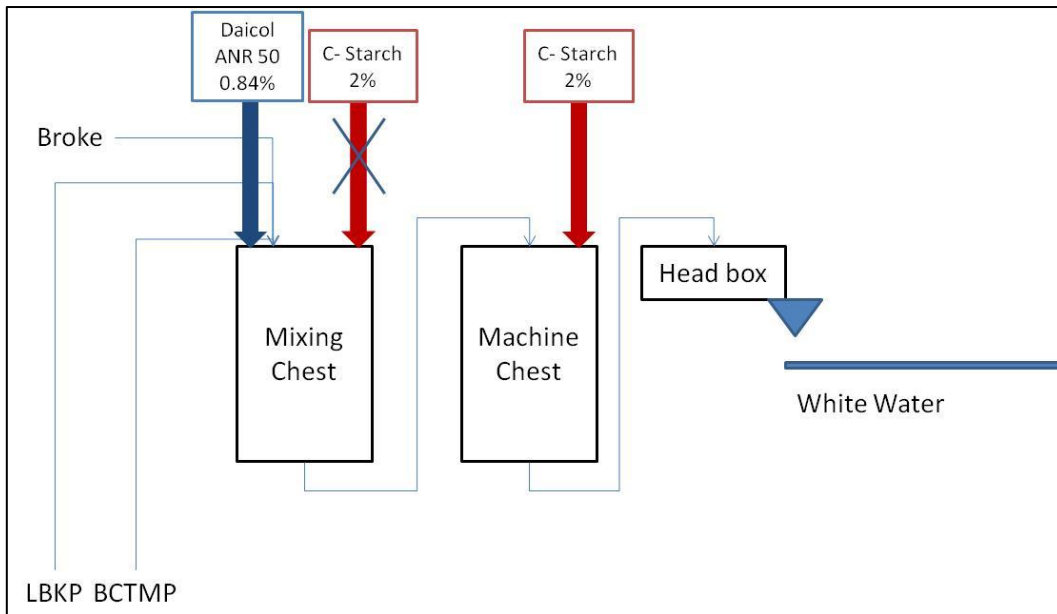


From mechanical characterizations we can see that both DAICOL AR (NON-Ionic) and DAICOL ANR 50 (Anionic) have a very good impact on tensile strength parameter compare to the standard condition (from +30 % to +15 % of increase).

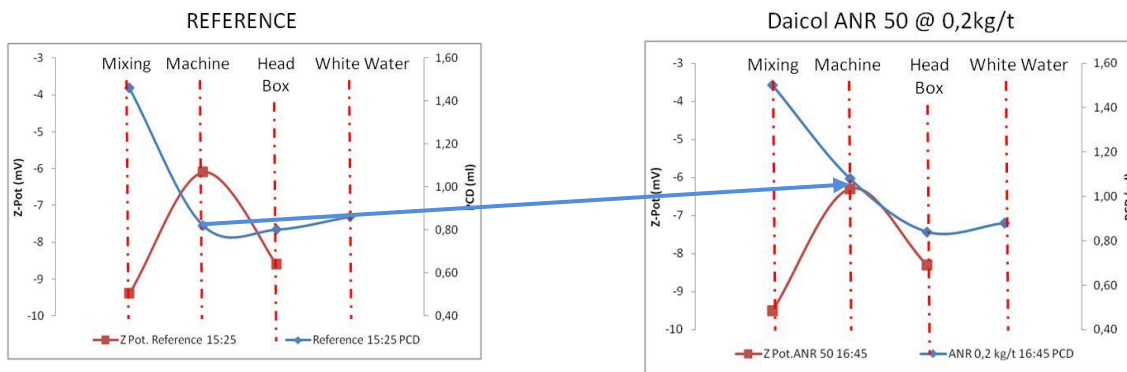
Internal bonding results are lower than standard when Cationic Starch is reduced for both our hydrocolloids, but we also have to consider that **ash content** in the samples where DAICOL AR and DAICOL ANR 50 are added **are always higher than the standard** with only Cationic Starch and the ash content highly influence the value of the internal bonding.

**INDUSTRIAL TEST:**

We choose to add our Anionic hydrocolloid dissolved at 0.84% solid content in PM Mixing Chest with a dosage of 0.2 – 0.4 Kg/tp.

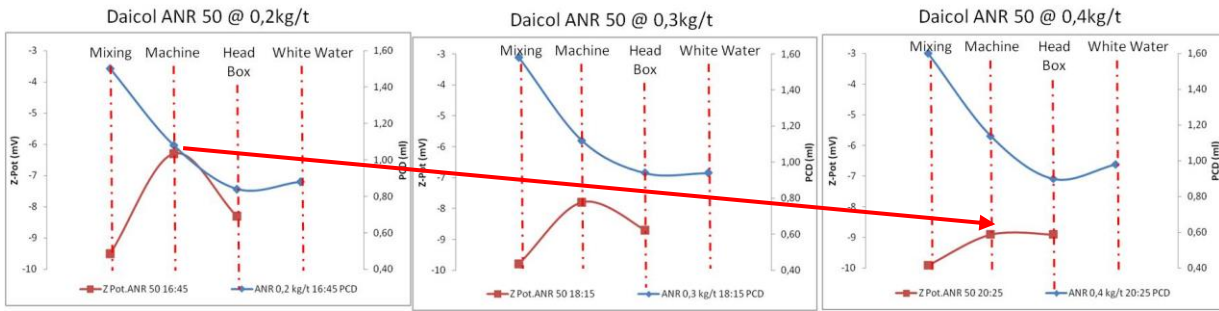


Monitoring of electrochemical parameters are reported in figure:



The main effect of a small addition of Daicol ANR 50 is on PCD of Machine chest. Cationic demand increase from 0.82 mL to 1.08mL while in the other sampling points PCD remain almost the same. Daicol ANR 50 adsorbed on fibers result in a better fixation of cationic starch as seen during laboratory evaluation.

Increasing dosage of Daicol ANR 50 we can see the effect mainly on Z-Potential, in particular on the machine chest, see figure below.



From the analysis of Z-potential and PCD values during trial, we can see a first effect of Daicol ANR 50 as “fixing agent” of cationic starch. Further additions of Daicol ANR 50 show a good fixation of the product (minor impact on PCD values, higher impact on Z-Potential) that help to keep the strength of the paper, despite a quite high increase of the ash content in the paper.

## ACHIEVEMENTS:

### Resume Industrial Trial – average 0.3 kg/t of Daicol ANR 50

- Cationic Starch: Reduction from 6.2 kg/tp → 3.9 kg/tp → **-35%**
- Ash: Increase from **31,5% → 33,3 %**
- Porosity from **34 s → 40 s**
- Tensile (kgf/15mm): **13,6 → 13,05 Spec >12**
- I.B. (ft-lb/1000) **235 → 210 Spec > 200**

**Paper produced with a low quantity of cationic starch keep all the parameters in spec despite a higher content of ashes in the base paper.**