

Advanced Bleach Plant Controls Can Uptime be High with No Operator Intervention?

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Yes!

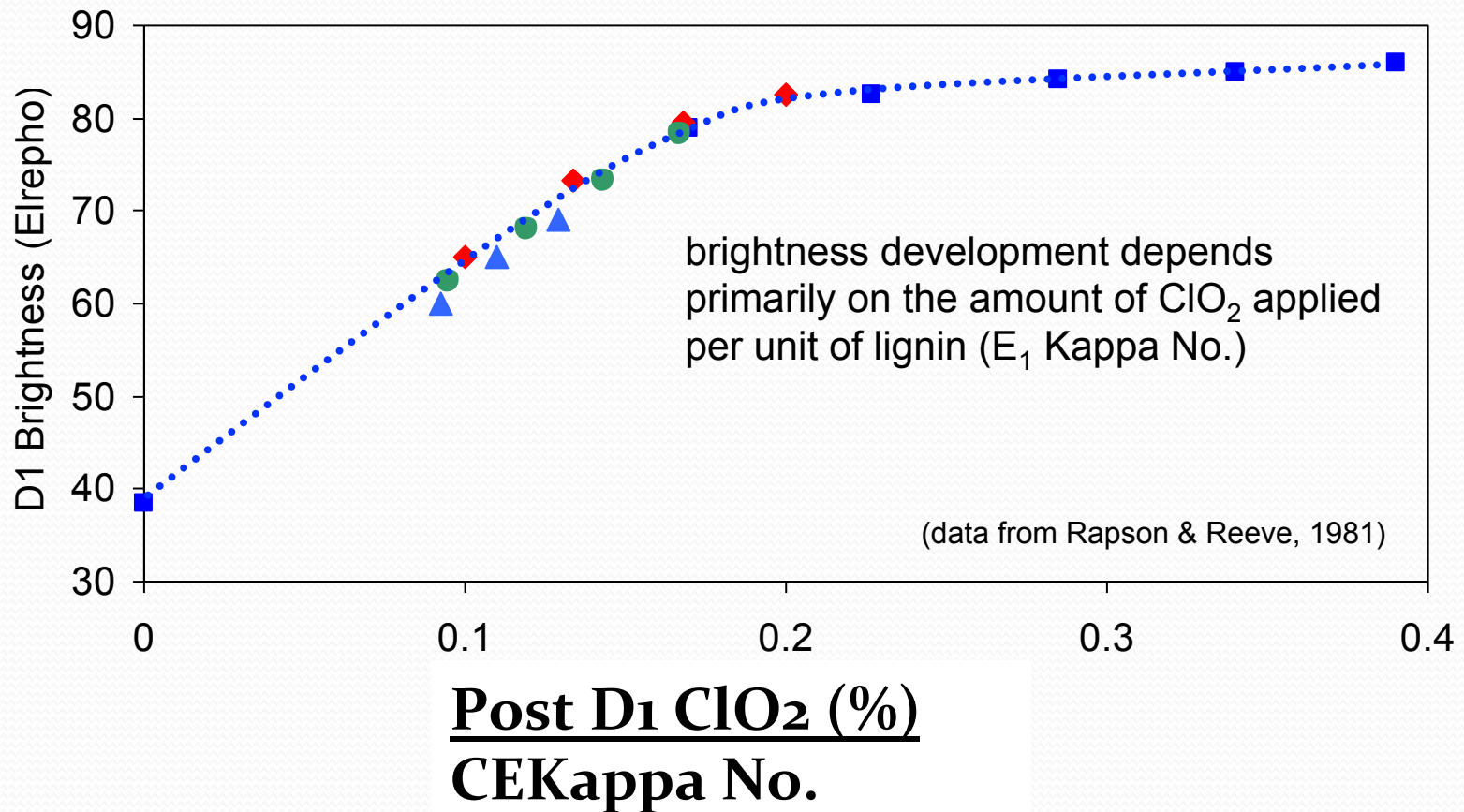
Bleach Plant Control Uptime can be high with no operator intervention if:

1) controls are set up to add too much chemical

OR

2) controls work well and are routinely monitored

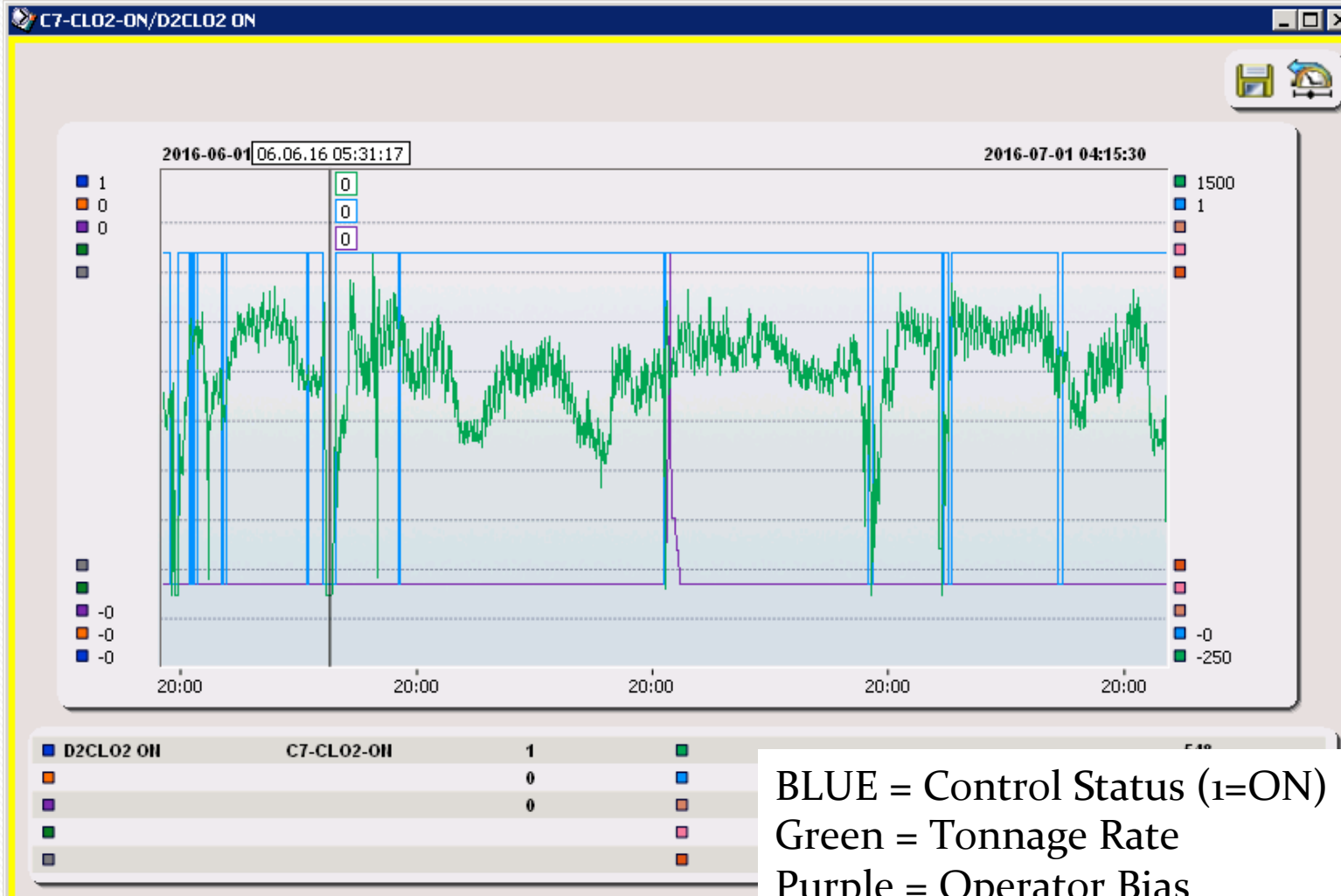
When Controls are set up to add too much chemical, operate at asymptote. Brightness is stable but chemical usage is higher than it needs to be



D0 Control Uptime 95% for entire month

- Bias used once
- This is typical for our mills
- Keys to Success:
 - Accurate, repeatable and frequent measurements
 - Good control strategy (Use of online kappa and brightness measurements AND bleaching sensors (inline brightness/inline residual), tonnage rate, and long term feedback)
- Monitoring – seasonal changes, moisture of wood, age of wood and cooking conditions can all impact bleachability – must decide if/when to make any tuning changes but shouldn't require more than 2-3 times per year, or if sensors are replaced/cleaned and tuning on them should be checked

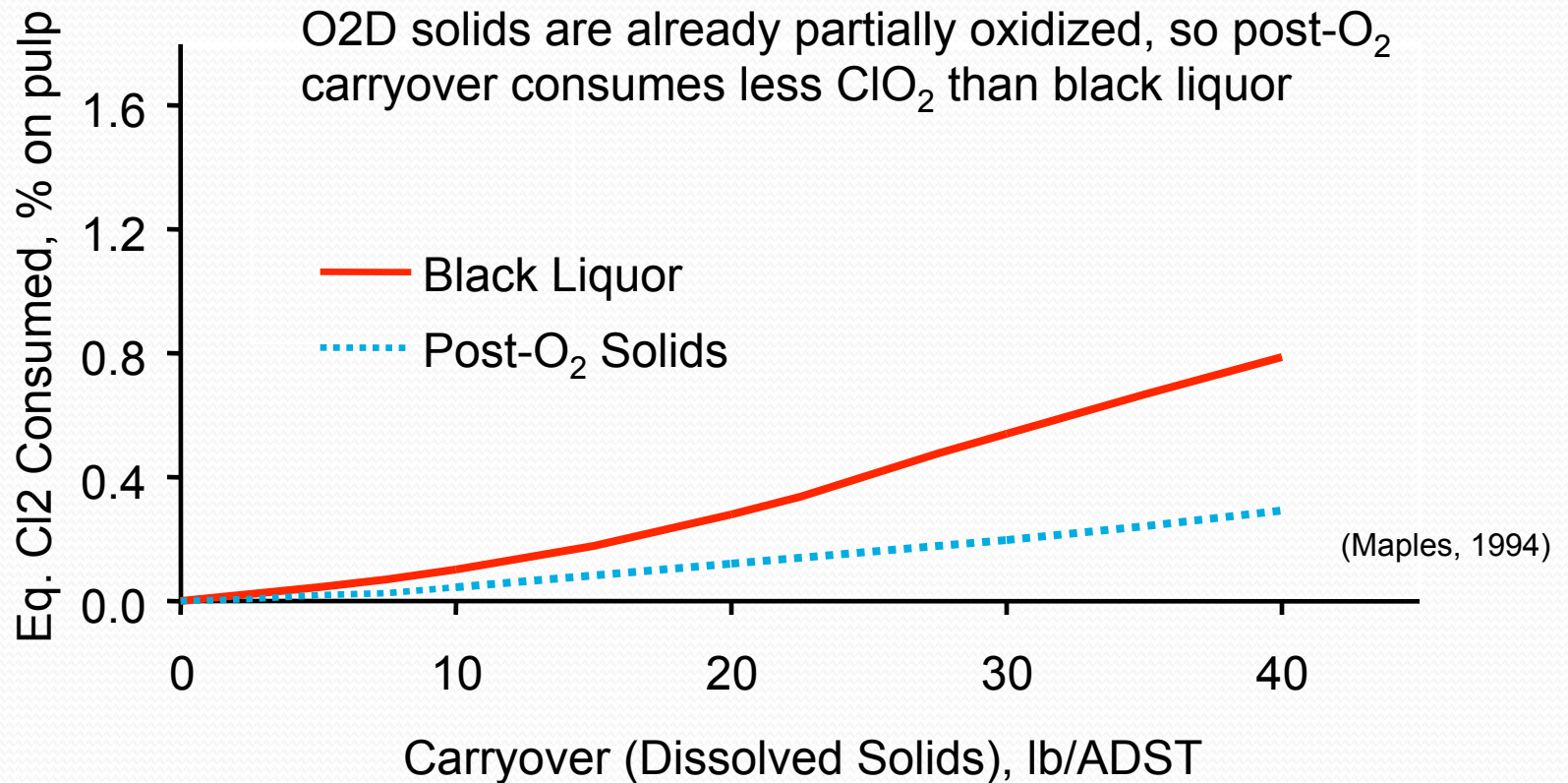
Here is a 1 month snapshot of the same mill's second D stage



Second D Stage Control Uptime 96% for entire month

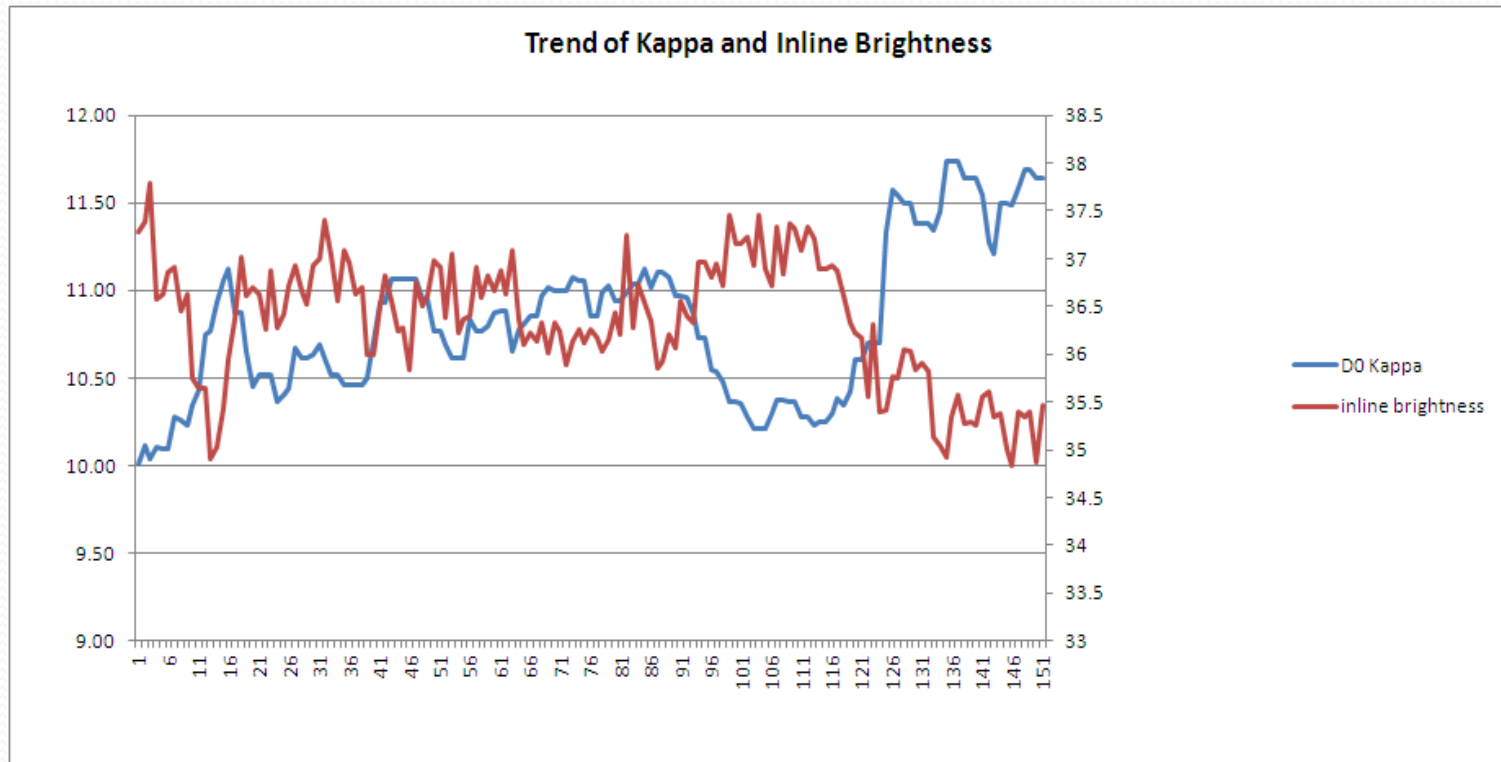
- Bias used once (same operator, same time it was used in Do)
- Controls being off is exactly the same as for the first D stage, which is when the bleach plant was down.

Carryover from O₂ Delignification



Inline Brightness and Kappa

- In the Do bleaching inline brightness signal responds to the *lignin content* (kappa) – it is an inverse relationship.

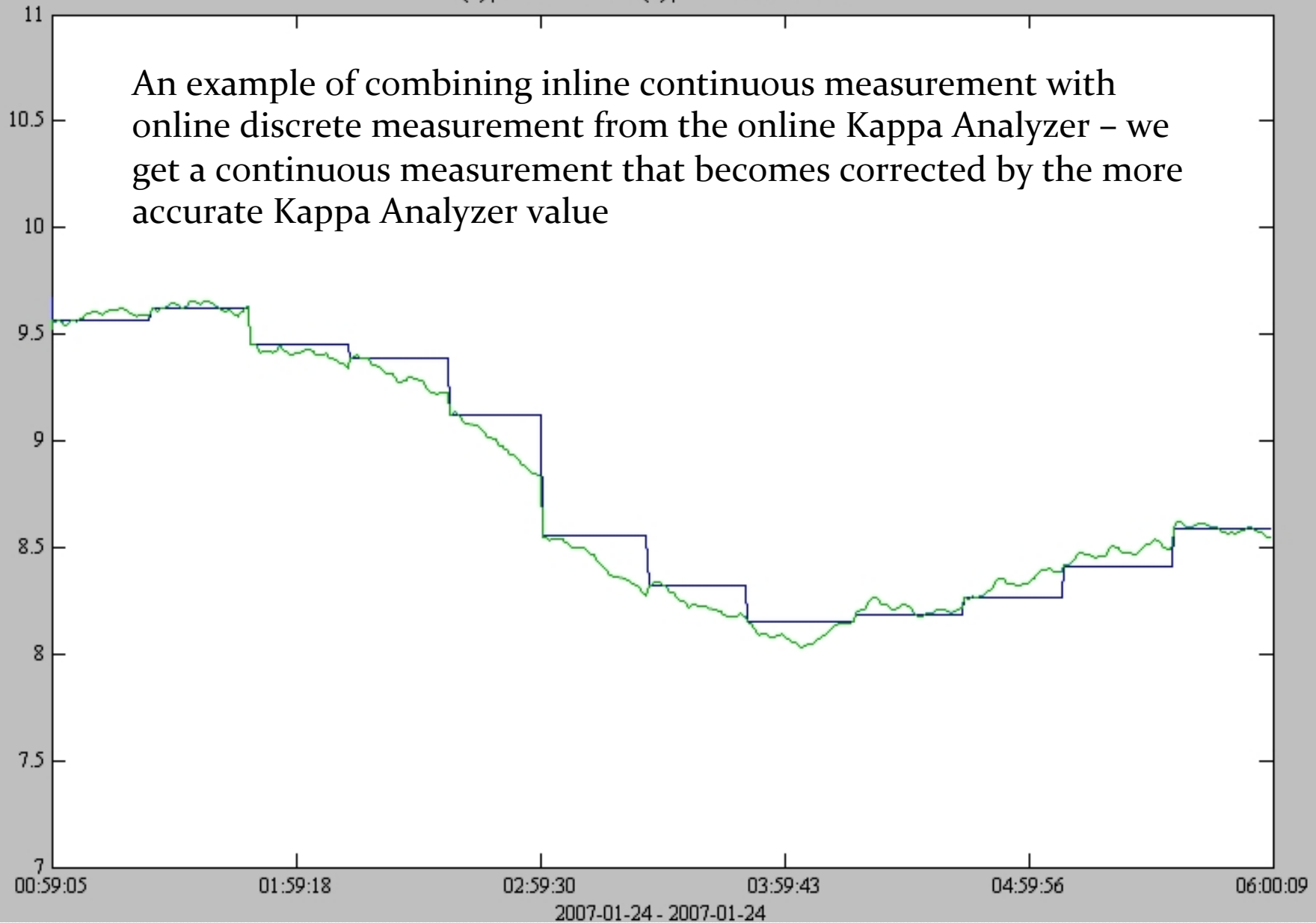


So we can combine the Kappa from an online Analyzer and inline Brightness to make a continuous Kappa (D to C)

Inline Brightness + Kappa = Continuous Kappa

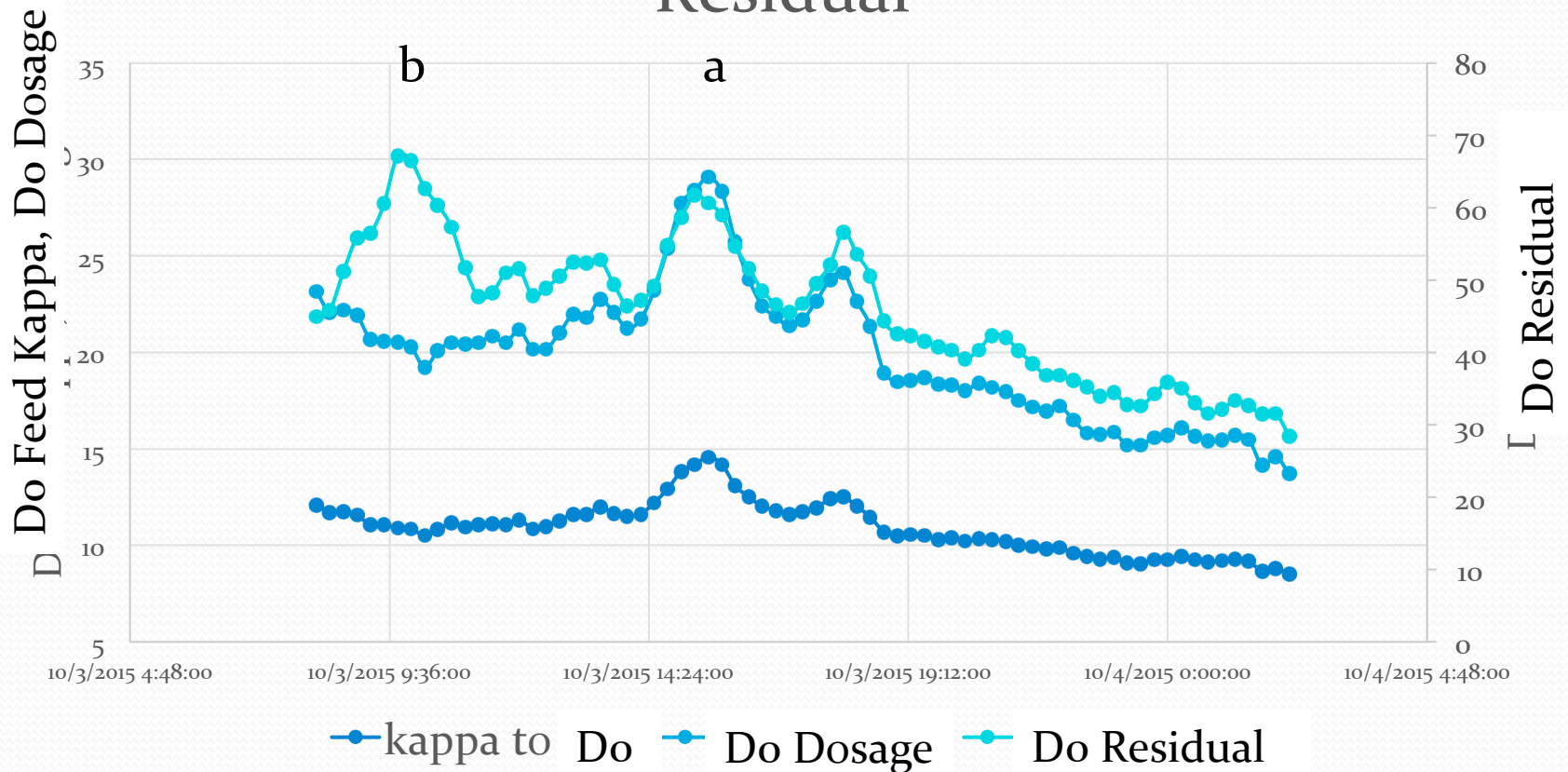
(7) pr:16-KAPPA-l:av (8) pr:16-KAPPA-CON:av

An example of combining inline continuous measurement with online discrete measurement from the online Kappa Analyzer – we get a continuous measurement that becomes corrected by the more accurate Kappa Analyzer value



Effectively Use the Residual Sensor

Do Feed Kappa, Do Dosage and Do Residual



Summary

- High Control Uptime and no operator bias is possible at low bleaching costs
- Operators are quick to turn advanced controls on and leave them there
- Our mills have low chemical usage from 3rd party benchmarking studies
- Good control strategy and routine monitoring and understanding of the strategy are key