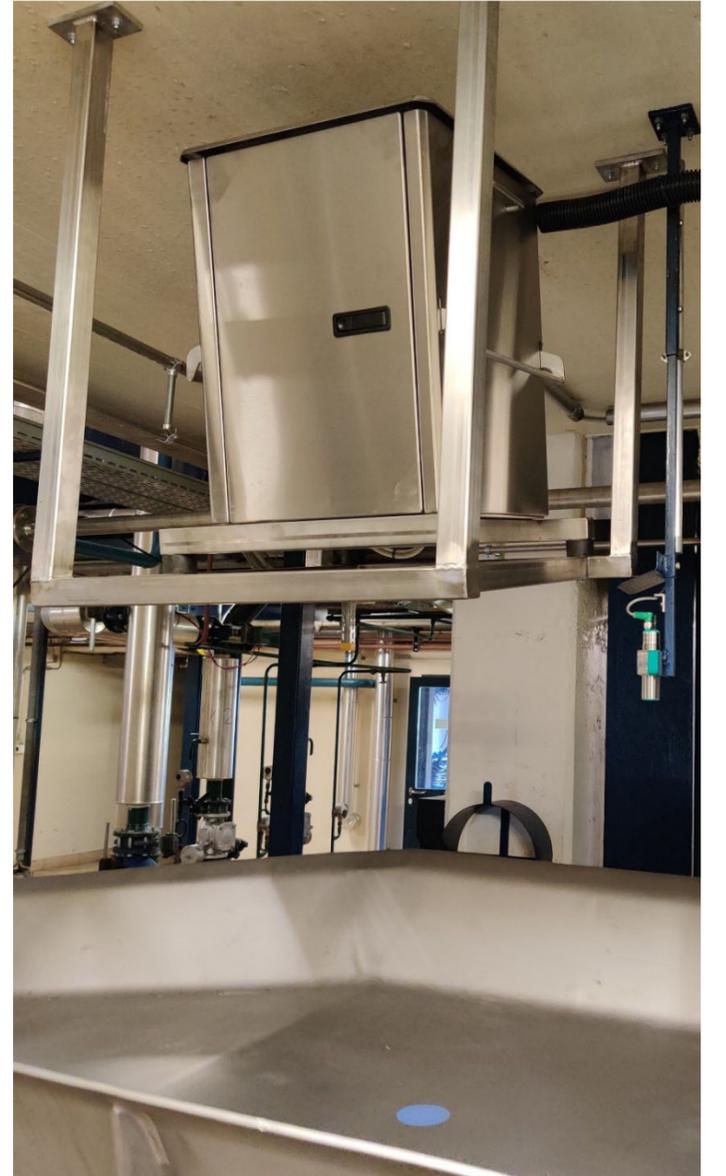


ASSBT, Long Beach, 24th-27th February 2025

Experiences from Automated Centrifuge Wash Water Control in a Beet Sugar Factory

Barbara M. Muir, Tereos and Bjarne C. Nielsen, Neltec



The Tereos beet sugar factory in Ceske Mezirici in the Czech Republic:

- Three Silver-Weibull 2250 centrifugals.
- The factory produces 35 IU sugar.
- Two washes with water.
- The quality is checked by 12-hour composite samples collected by an automatic sampler.
- In 2023 a Neltec real-time colorimeter was installed.
- In 2024 Neltec installed automatic wash water control.

Production control of sugar colour by **sampling and laboratory determination** of solution colour has serious disadvantages:

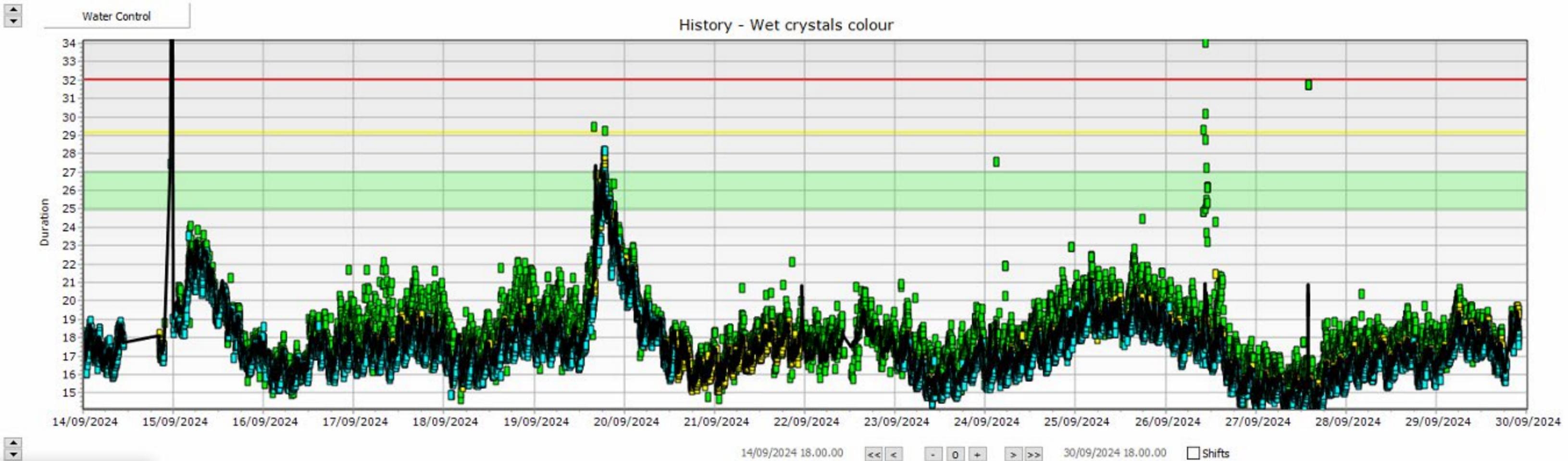
- Sugar outside specifications will already be in the silo, when the measurement result is available. Due to this
- Factories work with large safety margins.
- This **reduces** the risk but does not **eliminate** the risk.

Working with a large safety margin has consequences:

- Large amounts of good product are dissolved.
- Leads to reduction of the production capacity.
- Requires increased use of energy and water.
- Increases emission of CO₂.
- Causes loss of sucrose to molasses.

Before automatic wash control

Colour variations **before** automation. Wash 31 sec. Colour average 18.7 IU



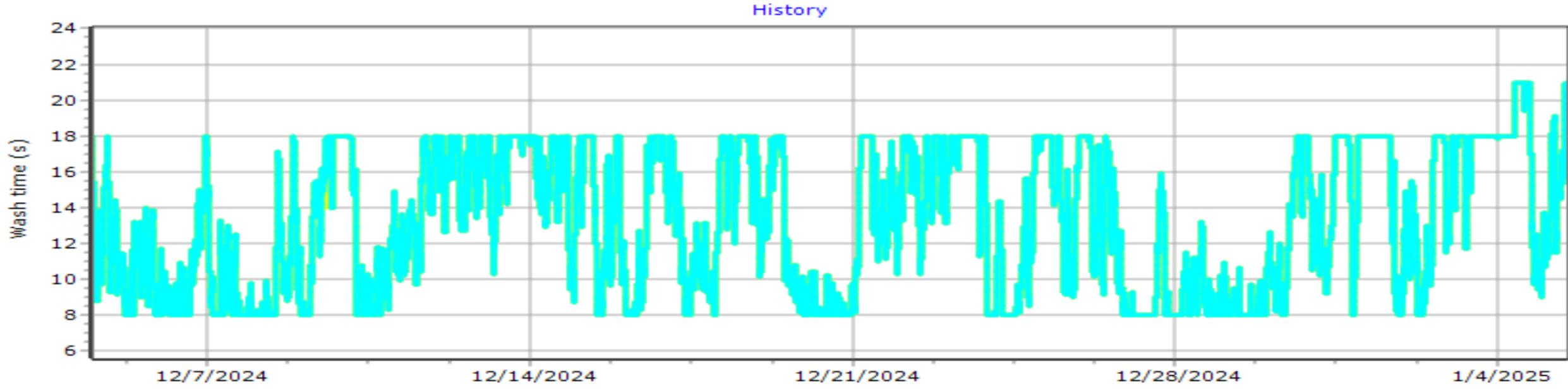
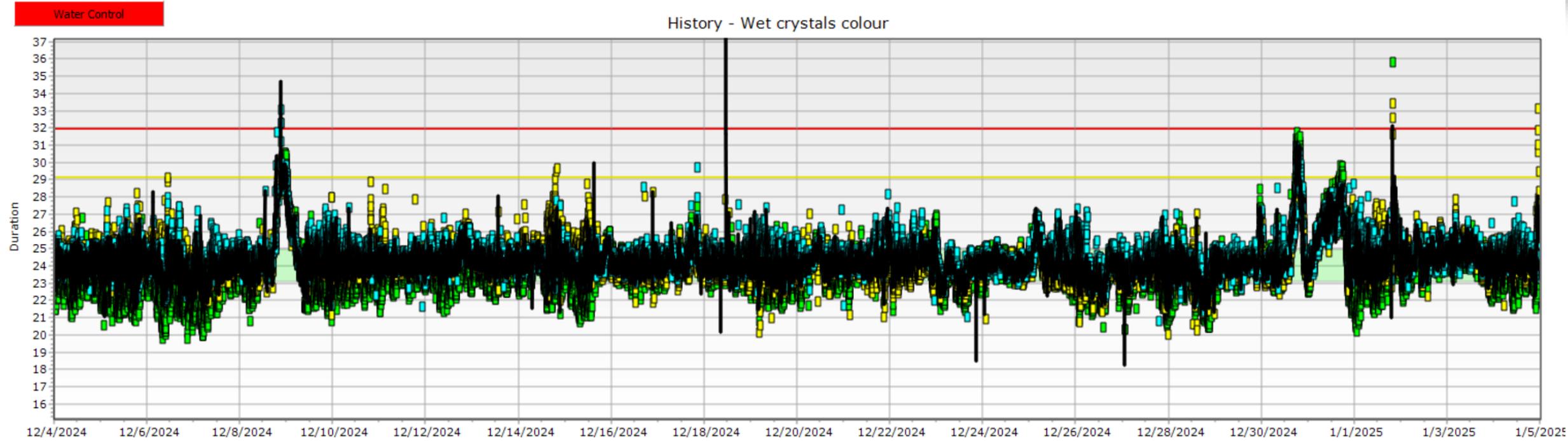
Colour variations measured by the real-time colorimeter.

Automatic wash control 1



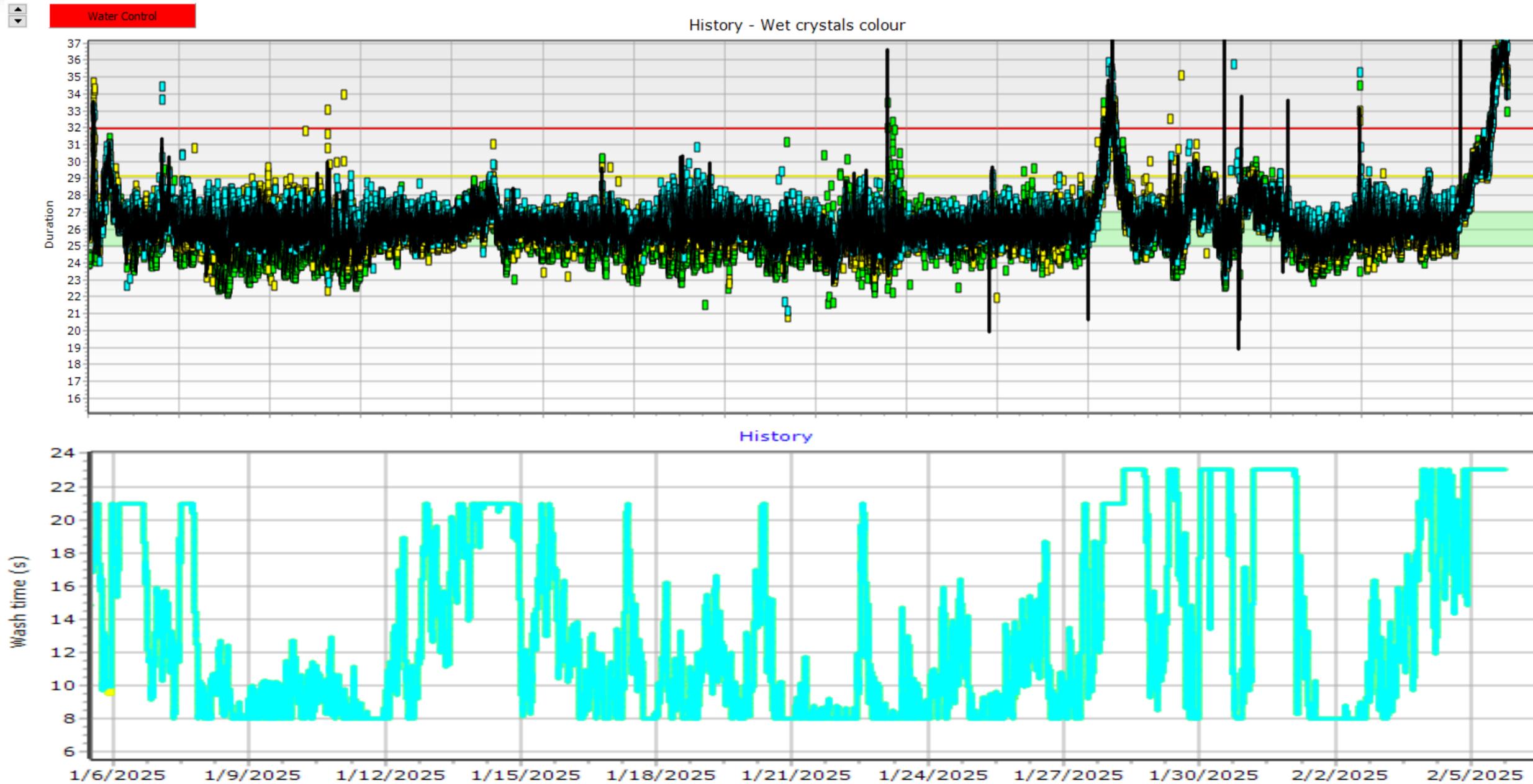
Colour target 22 to 23 IU. Colour avg. 22.9 IU. Wash water avg. 21.2 sec.

Automatic wash control 2



Colour target 24 IU. Colour avg. 24.1 IU. Wash water avg. 23.8 sec.

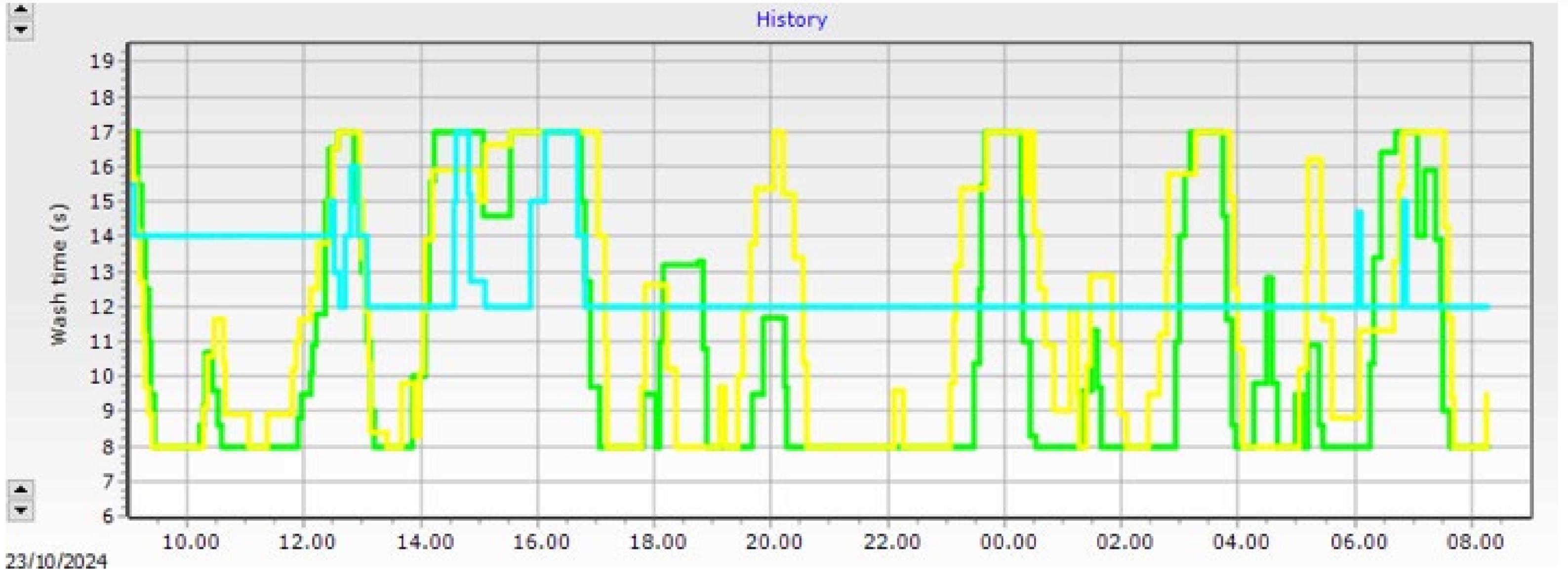
Automatic wash control – End of campaign



15

Colour target 26 IU. Colour avg. 26.2 IU. Wash water avg. 25.1 sec.

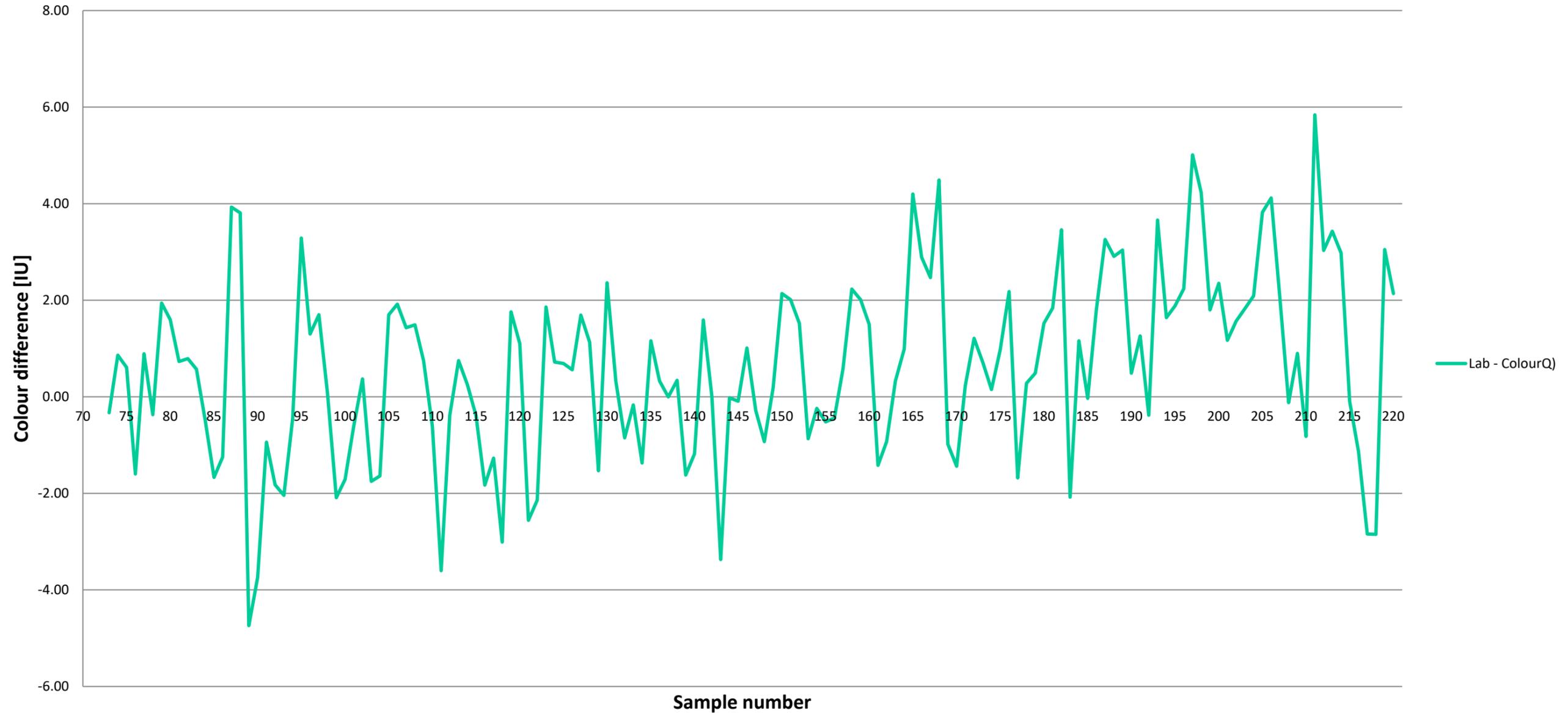
Fast water adjustments



The sugar colour and the necessary amount of wash water change so fast, that sampling and laboratory analysis has no chance to control the process.

Validity ! - Check by Control Chart

Laboratory - ColourQ



Labs/methods have equal validity for white sugar, when difference < 7 IU

Wash water before/after automation

Before: 31 sec

After: 23 sec

Reduction: 26 %

Crystal yield before/after automation

Before: 45 %

After: 48 %

Increase: 7 %

Even small wash reductions have large benefits.

In 2000 the Southern Minnesota Beet Sugar Coop factory installed a ColourQ on a scroll conveyor. A test showed spraying could be reduced by 5 seconds. This reduction has been maintained ever since.

5 seconds of wash water dissolves 46 lbs = 20.865 kg of sugar.

4 centrifugals run 20+ cycles per hour for 250+ days per year.

Reduced wash water saves redissolving of

$20.865 \times 4 \times 20 \times 24 \times 250 \text{ kg} = 10,015 \text{ metric t of sugar.}$

In 22 years of service more than **220,000 t** sugar avoided redissolving.

Conclusions from work with the ColourQ colorimeters:

1. The colorimeters are fit for process control and even automatic wash water control.
2. The real-time measurements allow a significant reduction of the safety margin and the recycling, giving significant cost reductions.
3. When the colorimeter tool is used for automatic control, then:
 - The process variations are reduced, significantly.
 - The sugar quality is more uniform.

Thank you for your attention!

