THE USE OF THE COLOBSERVER® ON LINE COLOUR MEASUREMENT SYSTEM TO AUTOMATE A SUGAR BLENDING PROCESS

By

C. TRINTIGNAC and B. GAILLAC
Iteca Socadei, France
Coraline.trintignac@iteca.fr

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Abstract

NOWADAYS all sugar mills need to improve their instrumentation and process equipment to keep production costs and energy consumption as low as possible while aiming for a specific quality. The Busco sugar plant has to produce and bag different qualities of sugar as per their customers' specifications. Thus, Busco asked ITECA to install a Colobserver® and to automatically manage the complete sugar blending process. Different blending schemes were developed in cooperation with the plant to comply with the numerous qualities used by the production. We particularly focused on the automation monitoring and to their associated operating alarms to ensure a perfect operation in a completely automatic mode. All the parameters can be adjusted independently. Today the Colobserver® installed at the Busco plant as well as many other sugar refineries worldwide provides the tailor-made tools that allow refineries to comply with the required quality and to optimise process management. Refineries are also able to track and record their complete production quality, which is very much appreciated by end clients.

Introduction

The Colobserver® is designed to monitor the sugar colour continuously and directly on the process for wet and dry sugar applications.

In the Philippines, Busco Sugar Refinery used to blend its different coloured sugars manually to obtain the requested qualities at the bagging station. It involved frequent laboratory control which could not follow colour drifts in real time to ensure an absolute quality. To increase the constancy of this blending and to automate its process, Busco decided to set up an on line-colour analyser: the Colobserver®.

The Colobserver® is able to measure sugar colour with great accuracy and, thanks to its integrated PLC, automatically manage the sugar blending process (Gaillac, 2009; Gaillac and Trintignac, 2008; Gaillac and Trintignac, 2009).

Colobserver® description

Colobserver® is sited directly above the sugar to control the total conveyor width. It uses an optical system allowing colour measurement by reflectivity. An important advantage of the use of a video sensor is the possibility to freely adapt various types of lenses according to the size of the region to be measured. Thanks to this technology, the system can easily be adapted on several kinds of conveyor as shown in Figure 1.

Developed with special care to meet the HACCP standard, the stainless steel made device is designed to work on all kinds of conveyor that are found in the sugar industry.

It ensures three functions in real-time:

- Monitoring automatically the blending of the colour into the different silos;
- Accurate measurement of the sugar coloration calibrated according to the plant laboratory; and
- Detection and quantification of brown lumps or bad coloration of the sugar

A—On a belt B—On a screw C—On a shaker

Fig. 1—Illustrations of the Colobserver® installed on different conveyor systems.

Methodology

The Colobserver® was located on a screw that fed the elevator just before the silo of the bagging station. Its PLC controls the speed of each of the rotary valves which extract the sugar from each of the four silos supplying sugar to the bagging station (see Figure 2).

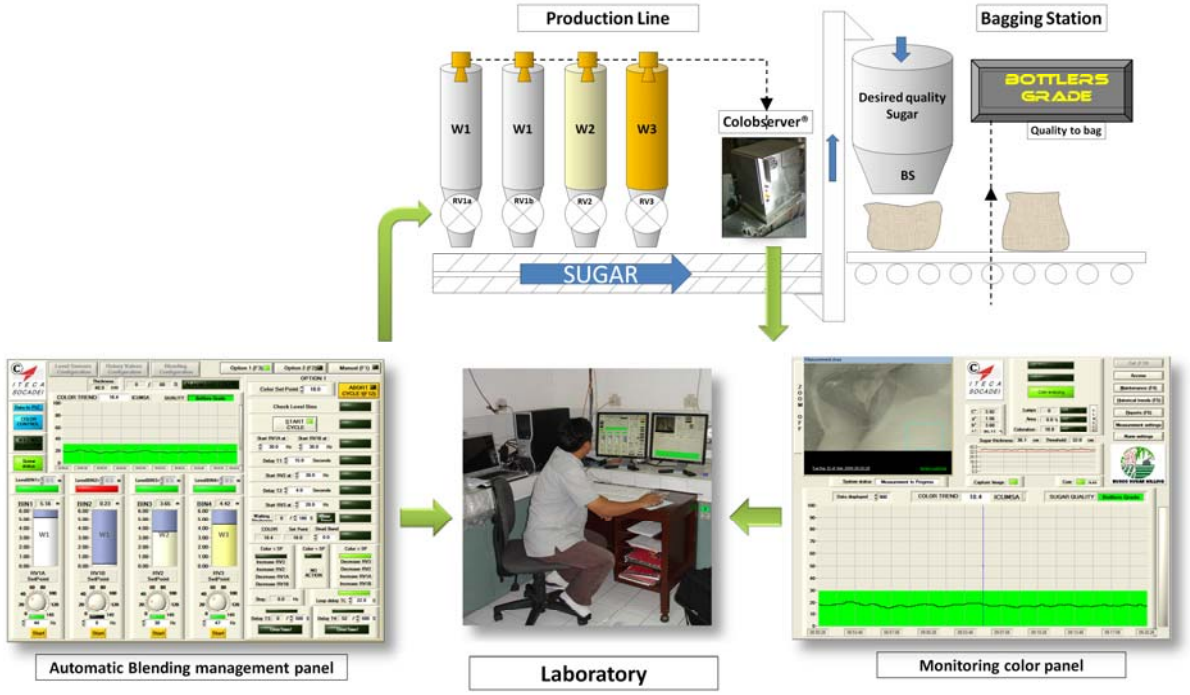

Fig. 2—Schematic of the process using the Colobserver to control the sugar blend.

Different blending schemes were developed in cooperation with the plant to comply with the numerous qualities used by the production:

Bottler – 30 IU max;

Premium – 30–45 IU max; and

Standard – 45–100 IU.

The colour range into each silo is as follows:

W1a & W1b – 7 to 35 IU;

W2 – 60 to 100 IU; and

W3 – 100 to 200 IU.

The sum of all the rotary valve speeds has to be equal to 120 Hz so that there is a constant feed rate to the screw.

As per the requests made by the production manager, the plant laboratory adjusts the colour setpoint on the computer of the Colobserver® to fill the silo with the correct sugar, so that the right quality is sent to the bagging station. The programming logic and data flows for the Colobserver® are described in Figures 3 and 4.

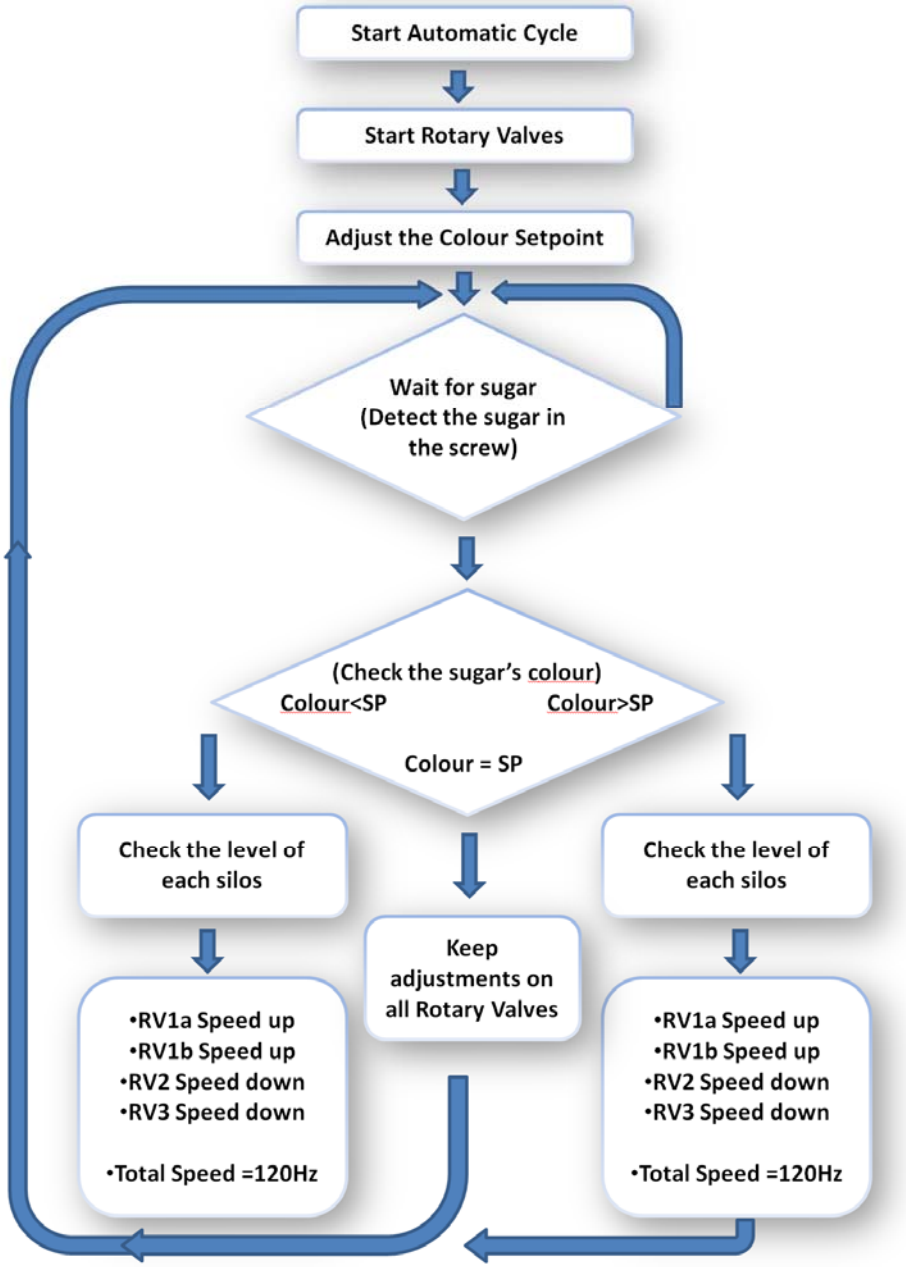

Fig. 3—Program logic for the Colobserver®.

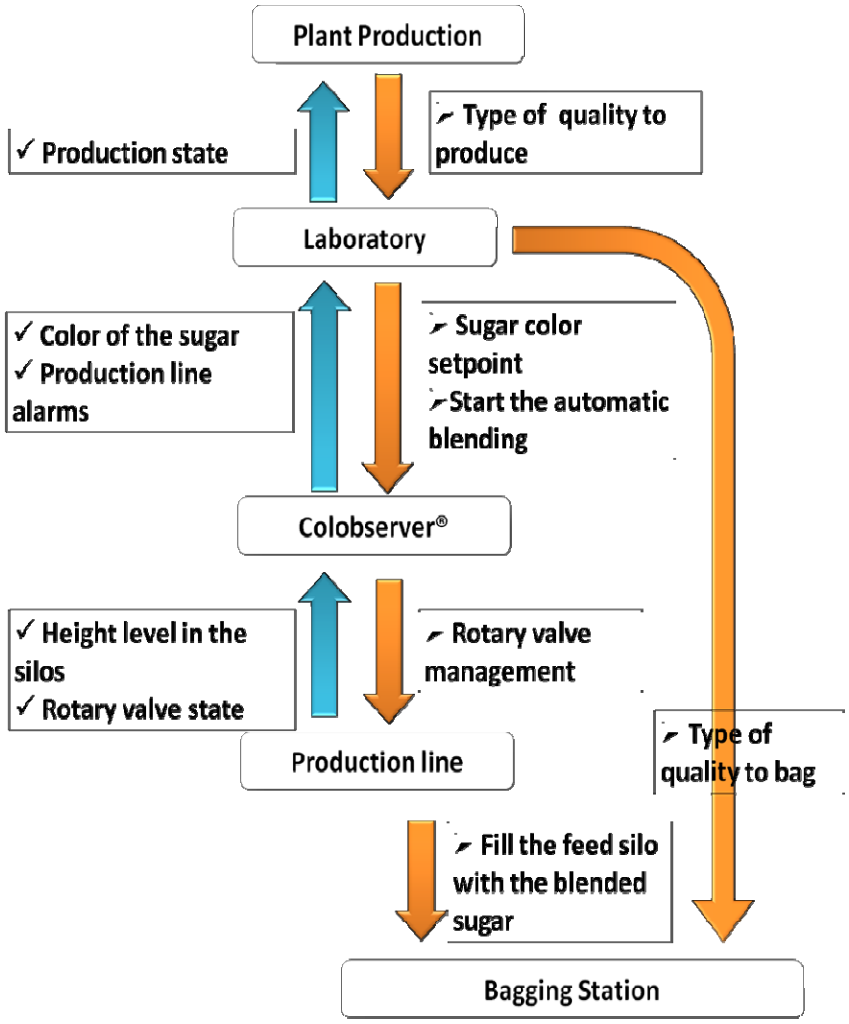

Fig. 4—Information flows for the Colobserver® system.

The Colobserver® considers the height level of sugar in the silos and intelligently proportions sugar to ensure an optimisation of the silo management, so that the obtained colour is always the requested one.

We particularly focused on the automation monitoring and to their associated operating alarms so as to ensure a perfect operation in a completely automatic mode. All the parameters can be adjusted independently.

Conclusion

Today the Colobserver® installed at the Busco plant as well as many other sugar refineries worldwide allows these plants to ensure that a mastered quality product on both wet and dry sugars is delivered to their end customers. They are also able to track and record their complete production quality, which is very much appreciated by end clients.

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L'UTILISATION DU COLOBSERVER® POUR MESURER LA COULEUR EN LIGNE AFIN D'AUTOMATISER LE MELANGE DU SUCRE

Par

C. TRINTIGNAC et B. GAILLAC
Iteca Socadei, France
Coraline.trintignac@iteca.fr

MOTS-CLEFS: En Ligne, Couleur, Mesure, Qualité, Colobserver®, Optimisation du Processus, Melange.

Résumé

LES sucreries désirent améliorer l'équipement et l'instrumentation pour maintenir la consommation d'énergie et les frais de production aussi faibles que possible, tout en visant une qualité spécifique. La sucrerie Busco doit produire différentes qualités de sucre pour leurs clients. Ainsi, Busco a demandé à ITECA d'installer un Colobserver ® et de gérer automatiquement le mélange du sucre. Différents schémas de mélange ont été développés en coopération avec l'usine pour produire les nombreuses qualités de sucre demandées. Nous avons particulièrement surveille l'automatisation et ses alarmes afin d'assurer un fonctionnement parfait dans un mode entièrement automatique. Tous les paramètres peuvent être ajustés de façon indépendante. Aujourd'hui le Colobserver® installé à Busco, et dans d'autres raffineries dans le monde, fournit des outils qui permettent aux raffineries de se conformer à la qualité requise et d'optimiser la gestion des processus. Les raffineries sont également capables de suivre et d'enregistrer la qualité en production, ce qui est très appréciée par les clients.

EL USO DE COLOBSERVER® SISTEMA DE MEDICIÓN DE COLOR EN LÍNEA PARA AUTOMATIZAR UN PROCESO DE MEZCLADO DE AZÚCAR

Por

C. TRINTIGNAC y B. GAILLAC
Iteca Socadei, France
Coraline.trintignac@iteca.fr

PALABRAS CLAVE: En Línea, Color, Medición, Calidad, Colobserver®, Optimización de Proceso, Mezcla.

Resumen

ACTUALMENTE todos los ingenios azucareros necesitan mejorar su instrumentación y su equipo de proceso para mantener los costos de producción y el consumo energéticos tan bajos como sea posible, mientras se apunta a una calidad específica. El ingenio Busco debe producir y empacar diferentes calidades de azúcar acorde con las especificaciones de los clientes. Por esta razón Busco solicitó a ITECA la instalación de un Colobserver® y el manejo automático del proceso completo de mezclado. Se desarrollaron diferentes esquemas de mezcla en colaboración con la planta para cumplir con las numerosas calidades usadas por la producción. Se enfocó particularmente en el monitoreo automático y en sus alarmas operativas asociadas para asegurar una operación perfecta en un modo completamente automático. Todos los parámetros pueden ajustarse independientemente. Actualmente el Colobserver® instalado en la planta de Busco así como en muchas otras refinerías a nivel mundial suministra las herramientas apropiadas que permiten a las refinerías cumplir con la calidad requerida y para optimizar la gestión de proceso. Las refinerías son también capaces de registrar y seguir completamente su calidad de producción lo cual es muy apreciado por el cliente final.