

## Automatic Butt Control in Rodding Shop, Feedback after Two Years of Industrial Operation

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### Abstract



SOFIA (Smart On the Fly Inspection and Analysis) is a patented solution developed by Fives for butts inspection between two rodding shop machines. The principle is to measure the butt with fixed laser scanners placed around the butt track, to reconstruct the 3D model and finally to measure virtually the geometry and reflectivity of the model. Trimet France has been operating the first equipment for two years. The special arrangement of the laser allows there the control of two types of butt (4 stubs in line and hexapod) with a single equipment. The butt thickness, the level of top oxidation, the amount of residual bath after shot blasting and the spikes location are some examples of controls. Electrolysis process control integrates these measurements and follows them on a regular basis.

**Keywords:** Rodding shop, Butt control, Residual bath, Anode defect.

### 1. Introduction

Butt geometry seen in the rodding shop is the consequence of the combination of the anode forming and baking processes on one side, and the carbon consumption and oxidation in the electrolysis pots on the other side. Measuring this geometry allows then to give indications on these processes and can help evaluating and improving them.

However, in the vast majority of smelters, this type of measurement is carried out manually and from time to time, resulting in data of low accuracy and representing a very small sample of the production.

Fives has then developed a patented solution [1] called SOFIA (Smart On the Fly Inspection and Analysis) for the inspection of butts or rods between two machines in a rodding shop. This solution makes it possible to automatically control the entire production with a high accuracy. The first system has been implemented in the rodding shop of Trimet Saint Jean de Maurienne, as part of a cooperation agreement. The system has been measuring the butts after the shot blasting machine since November 2019. The purpose of this paper is to share the results and feedbacks of this new type of equipment, operated in industrial environment for near two years.

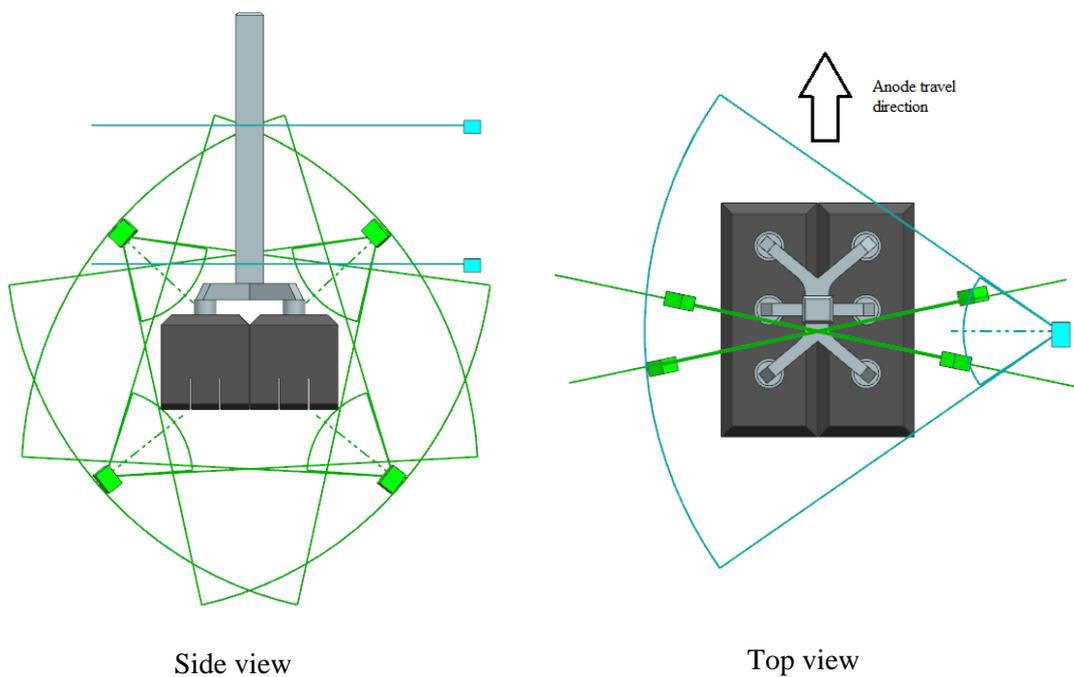
## 2. SOFIA Description

### 2.1 Principle

The special feature of the system is that the measurement is done on the fly, while the butt moves between two rodding shop machines. The butt does not need to stop and therefore there is no need to modify the Power-and-Free conveyor.

SOFIA is composed of several fixed laser scanners arranged around the trajectory of the butt:

- Two horizontal lasers (in blue in Figure 1) measure the position of the stem at two different levels. This gives the precise position of the butt in the environment at all times.
- Vertical lasers (in green in Figure 1) measure simultaneously the geometry of the butt and of the stem.



**Figure 1. SOFIA Principle.**

The measurements have been integrated into the electrolysis dashboard and are used to monitor the process, to anticipate the consequences of a change and to optimize the rotation of the anodes.

The robustness of the system and the low level of maintenance have been demonstrated, ensuring high long-term reliability.

## 7. References

- [1] Vianney Boyer, Sylvain Georgel, Système de caractérisation d'une géométrie d'une charge suspendue, procédé utilisant un tel système et installation de production d'aluminium par électrolyse comprenant un tel système, *FR Patent no. FR3085204 A1*, filed August 23, 2018, granted February 28, 2020