Thickness control – Closer loop

Presenting M.Maffoni*, Co-author A.Volontè‡

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Introduction

The competition in a global world, create a situation that does not permit to have a strongly market position without investment and improvement in the production line.

On this way, the customer focus is to improve the production, reducing the cost and maintain the product quality features.

Wagner Itep start to test, install and produce a system that has for goals the previous focus anf folloeing characteristics: Smart, Green production.

Discussion

Every era, thanks to the combination of innovation, approaching changement, solution development and research, created a ‚new vision'.

The history of enamelling has gone through 3 steps of "industrial revolutions" with various elements of change that can be summed up in:
adaptability, resource efficient, ergonomics, integration of customers and business partners in business and value processes

Enamel coating has milestones that have strengthened functionality:

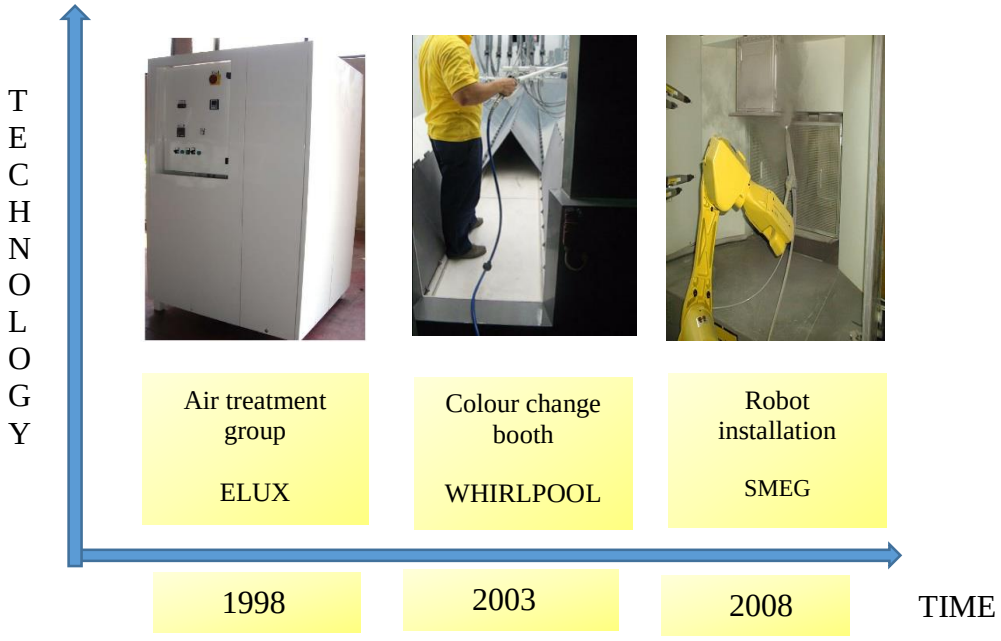


Figure 1: Enamel milestones

The industrial revolution that we are experiencing today is connected not only to innovations that change the concept, but it is aimed and focused on "changes in the horizon" of industrial policies and plans.

The industrial dynamic has changed: the primary goal is to be reactive and quick in responding, reducing process costs and maintaining a high industrial process technology.

While not too long ago industries were able to stress finished product times and methods, today it is the market that dictates change: therefore the factory must undergo a REVOLUTION of the concept itself

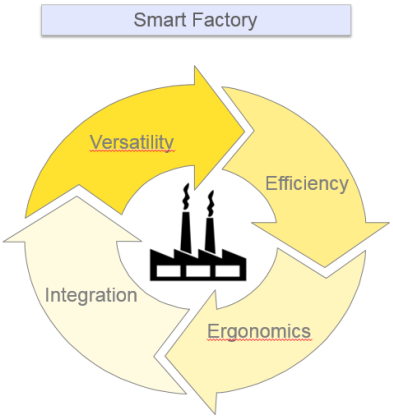


Figure 2 : Smart factory elements

Discussion: Statement enameling process

In our modern economy new dynamics are developing which lead the customer to have increasingly more pressing production needs.

Global competition is more and more heated: production numbers must increase, product quality must not decrease and answers must be provided faster and faster.

Fig. 3:Antistatic PVC material

Fig.4: No mechanical device on aspiration

Fig.5:30'on color change

The industrial logic of the FUTURE is to maintain quality performance in any condition and location. For this reason focus has shifted to systems that provide the same results all over the world through constant monitoring of the enamelling process and cost controls with more accurate forecasting. COST SAVING is possible thanks to the insertion of LOOP CONTROL

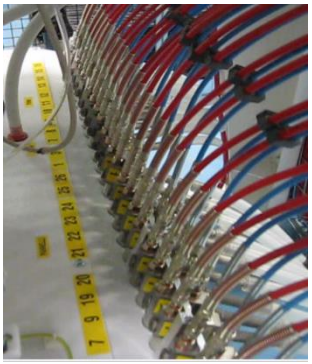


Fig. 6: Enamelling with ceramic venturi pump longlife system

CLOSER LOOP: innovation on internal enameling process

This new frontier, after various failed attempts in the past, could be discovered and explored thanks to new technologies, studies and industrial tests conducted.

Controlling the thickness takes place through a technological innovation introduced by Wagner which, unlike previous attempts, takes place through a Flash Mode .

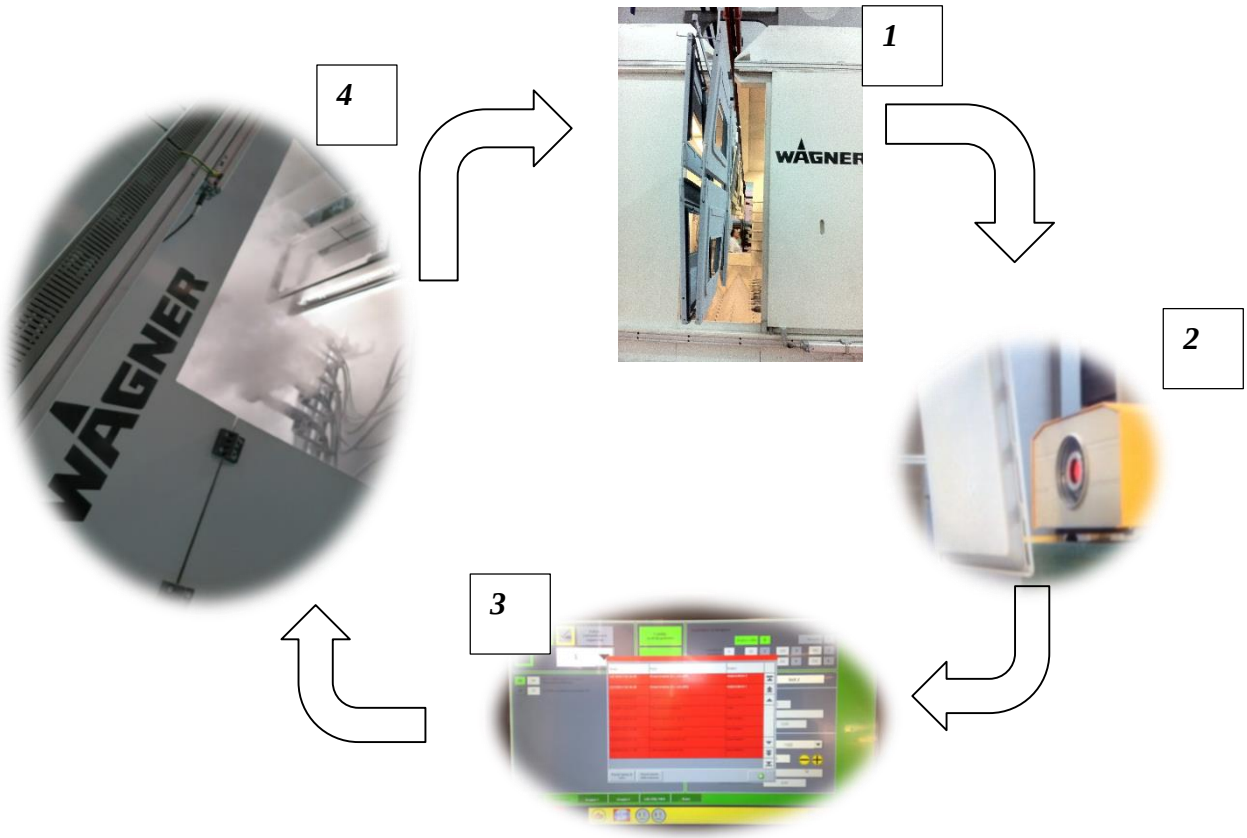
Fig. 7: Optic eye

In other words, a photo frame / Flash is taken which allows detection in 0.05 seconds on a minimum surface space of 2 mm2 with the results sent directly to the screen or industrial PC, ready to be analysed and to place the customer in the condition to modify and adjust the application ‚Just in Time‘

It use the most advanced thermal optics (ATO) and digital signal processing (DSP) techniques:

- ✓ computer-controlled, pulsed flash lamp surrounding the Coatmaster lens warms the coating
- ✓ specialized infra-red detector in the lens monitors remotely the resulting surface temperature progression
- ✓ the surface temperature decays with characteristic dynamics that depend on the thickness of the coating and the thermal properties of the substrate material
- ✓ our proprietary algorithms analyze the dynamic surface temperature progression – determining coating thickness and other properties, quantitatively and repeatably

The detector is set up at the enamel booth output, installed on a movement device which makes it flexible in terms of positioning in order to allow analysis on the points the customer requires.



The data received is sent instantly to a PC and, thanks to the software that has been developed, various actions can be taken: from reporting an anomaly to stopping the enamelling line with an alarm

These are all characteristics which are shared and decided on with the customer based on their industrial needs.

Coveyor speed:	0 to 20 m/1‘
Measuring range:	10 to 300 microns
Accuracy:	+_ 2
Measuring spot:	1 mm2
Measuring time:	0,01 sec
Working distance:	10 to 50 mm
Data acquisition :	Industrial PC/ Mobile device

Results: CLOSER LOOP- customer feedback

Thanks to collaboration with two big customers in the Home Appliance segment where these systems have been installed, we have defined and highlighted two cost reduction macro sectors:

1. SAVING enamel powder consumption

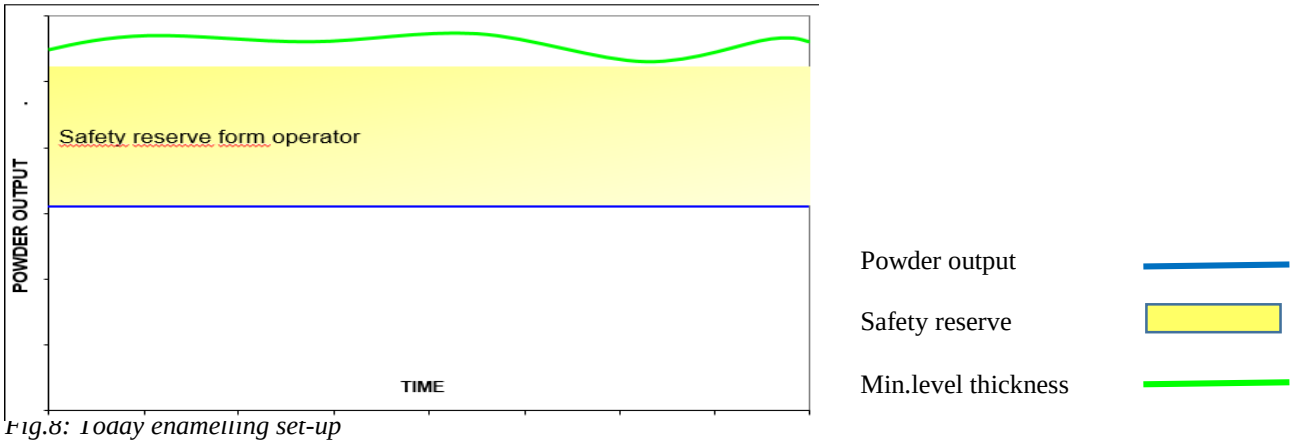


Fig.8: Today enamelling set-up

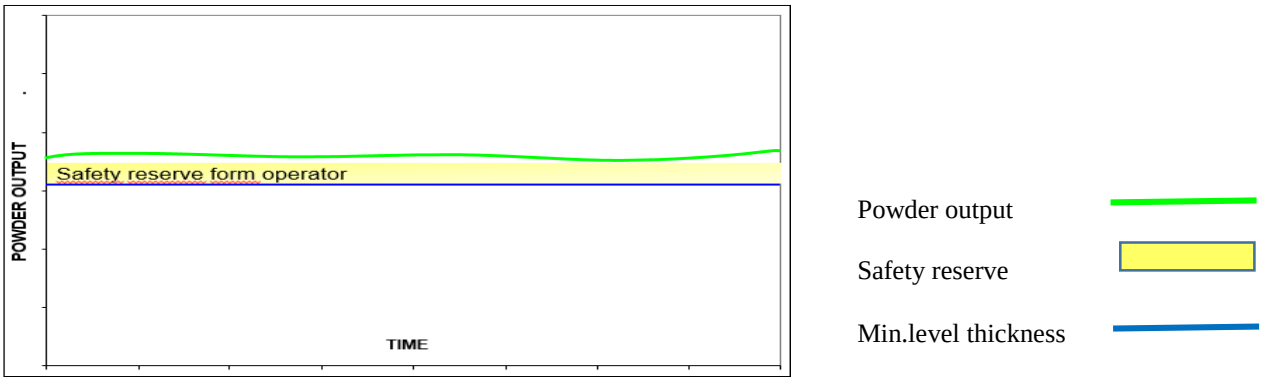


Fig. 9: future enamelling set-up

2. REDUCING percentage of production waste

The control is done before of curing oven, the customer controll all process ITSELF