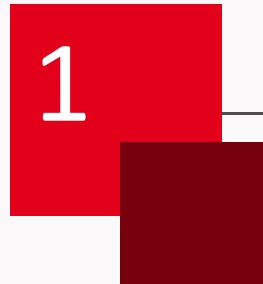




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The **smart** way to coatings

Alessia Venturi, Editor & Co-Founder, **ipcm**[®] International Paint&Coatings Magazine



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Trends in the powder coating industry: **smart** coatings

In the last decade, the field of industrial coatings has experienced a strong development of paint and coating products driven by the demand for sustainability, higher performances and appealing finishes. The field of powder coatings in particular experienced the transformation from low-cost industrial finishing products (1980s and 1990s) to a highly technological, sustainable finish with a premium quality, durability, appearance and state-of-the-art functions. In short: smart coatings.

This presentation will showcase a series of examples of smart coatings with their related industrial applications, including the most recent developments (anti-viral, low-cure, hyperdurable, high-performance, anti-graffiti and much more).

Smart Coatings – The future is now

How **smart** is powder coating today?

- **Smart** means intelligent or able to think quickly or intelligently in difficult situations, thus finding a solution

Today everything that surrounds us is **smart** (phones, TV, home appliances, cars)

- Industry 4.0 has brought smartness in the manufacturing industry, including the surface treatments industry

Smart Coatings – The future is now

Smart coatings: a class of coatings - liquid or powder - with high added value that contain complex functions, eg. self-healing, self-cleaning, self-layering, self-dimming. They interact optimally with the surrounding environment, adapting their performances and characteristics to the environmental conditions.

Smart coatings: niche/premium applications, +cost efficient –expensive, problem solving

Smart coatings: according to a NanoMarkets' report issued in 2015, sales of these high-value added products reached well over 600 milion dollars ramping up to 5,8 bilion dollars by the end of 2020, with an average annual growth greater than 50%.

Smart coatings: the smartness of paints and coatings is reaching such a level that makes them every day more used and diffused.

Smart Coatings – The future is already here

Powder coatings with an insulating effect

Global warming is an issue.

These powder coatings are able to modify the absorption of IR rays, thus having an influence on the thermal transfer of the coating to the substrate and contributing to reducing or increasing the temperature from a 15 to a 20% according to the hue of the coating



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Smart Coatings – The future is now

Photocatalytic powder coatings

Powder coatings that «clean the air» by transforming contaminating nitrogen oxide (No_x) into substances that are harmless to the human health with a purifying, self-cleaning and antipollution function.

The powder coating is based on the photocatalytic technology: it degrades the nitrogen oxide into harmless nitrates thanks to the action of UV rays. The nitrates are then washed away by the rain.



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Smart Coatings – The future is now

Powder coatings with insect repelling activity

Mosquitos are one of the biggest carriers of infectious and fatal diseases.

A large number of repellent substances exist, however, one of their greatest limitation is that they are thermolabile substances. This characteristic hampers the use of the same in many areas, such as the powder paint sector, due to the fact that these substances are incompatible with the manufacturing and/or application processes used, as they are subject to degradation and volatization.

Insect repelling powder coatings are produced and applied by means of processes designed especially to preserve the activity of the repellent substances they contain in the formulation.

On the powder coating tested (62% of efficacy against “*Aedes aegypti*” mosquito) the repellent effect on the materials could last for up to two years.



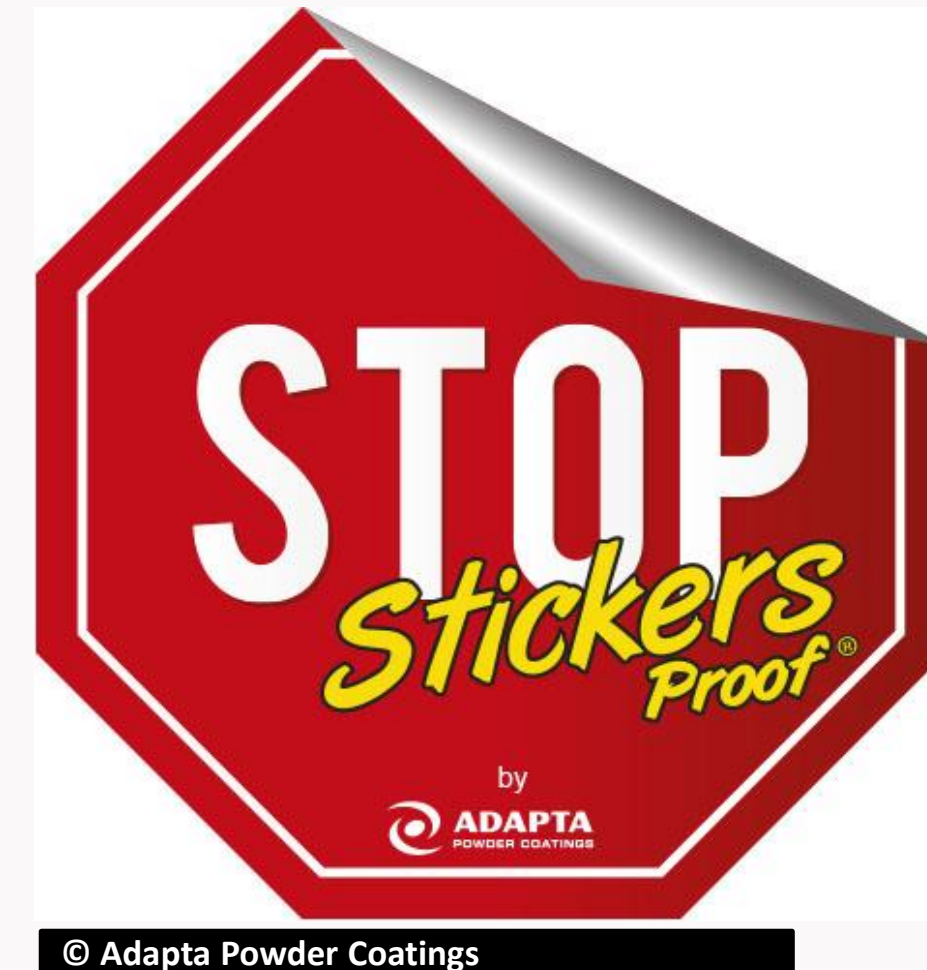
Smart Coatings – The future is now

Anti vandalism powder coatings

A powder coating which enables the easy removal of a wide range of these adhesives. The product has been designed in super-durable quality.

This product incorporates other functionalities such as anti-graffiti as well as anti-adherent features.

Its high durability, alongside the possibility of removing unwanted adhesives and easily cleaning the surface, allows owners to keep several community elements clean in the face of vandalism, all at a low maintenance cost.



Smart Coatings – The future is now

Powder Coatings for heat sensitive substrates

Ultraviolet, Ultra Fast and Ultra Low Bake powder coatings allow for an extremely low thermal load on the substrate, which makes them applicable on heat-sensitive substrates, like MDF, plywood, plasterboard and plastics.

UV with a melting temperature of 80-110°C

UF with a melting temperature of 120-130° x 3/6 min.

ULB with a melting temperature of 130-140° (internal applications)

- Environmentally friendly (no VOC)
- Sustainable
- Durable and cost efficient
- High degree of design freedom
- Single layer application – faster coating processes



© Stahl Powder Coatings, Germania

Smart Coatings – The future is now

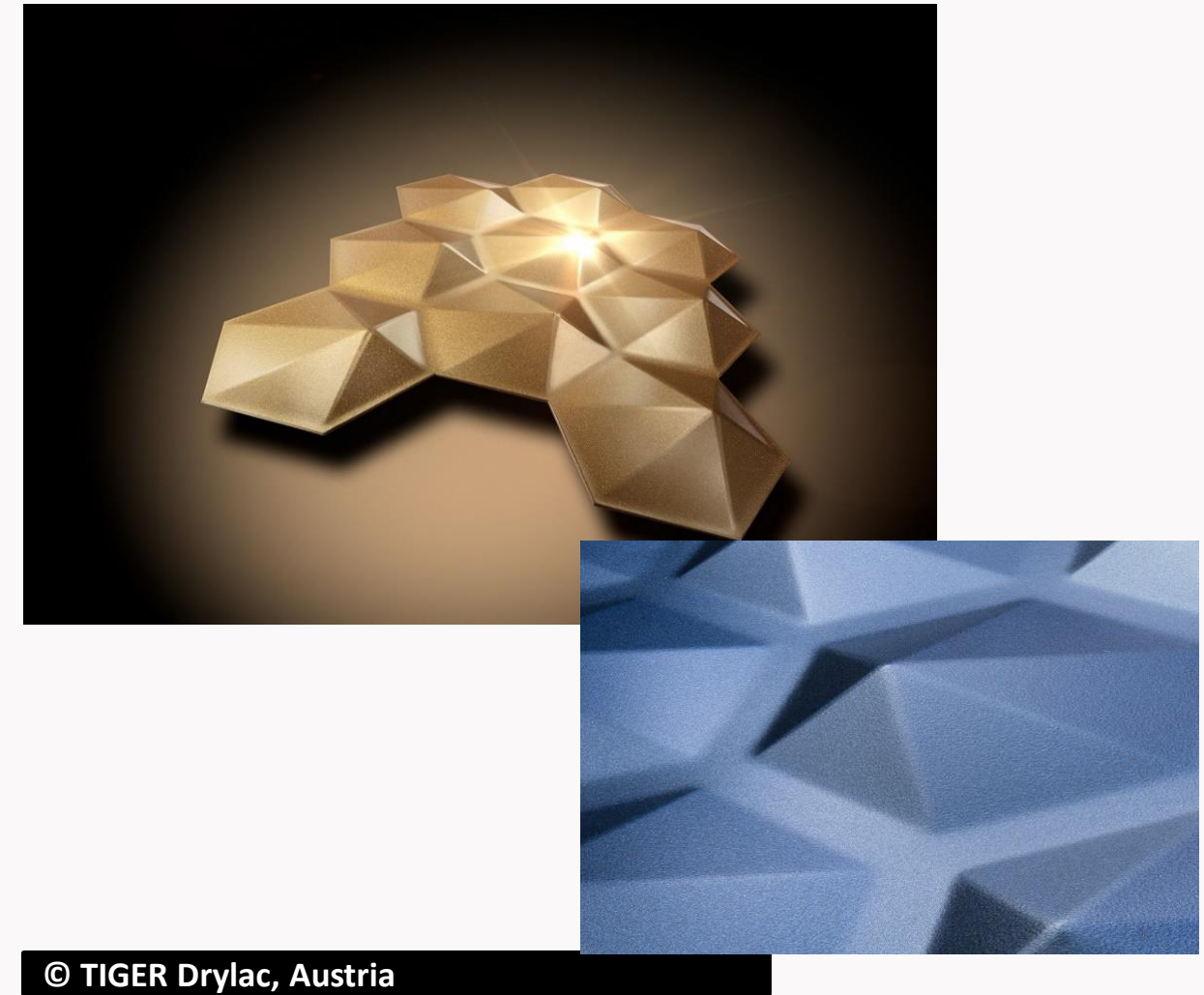
Flat Matte powder coatings

Flat, satin and low gloss powder coatings are extremely popular but until now they presented a big challenge for the applicator and showed poor weathering performance.

These new grade of powder coatings is a highly weather resistant (Qualicoat Class 2) matte powder that covers a gloss range from 12 to 4 units.

It shows:

- Velvety haptics
- C0-C3 anodizing effect
- Gloss stability in a curing range from 170 to 200°C



Smart Coatings – The future is now

Hyperdurable Powder coatings (Qualicoat Class 3)

Powder Coatings with superior durability complying with AAM2605 standard and homologated Qualicoat Class 3 and GSB Premium in Europe.

- >10 years durability in Florida Test
- Environmentally friendly alternative to PVDF liquid paints
- Suitable for hot climate and severe environments



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Smart Coatings – The future is now

Future developments of **smart** coatings

Smart coatings & IoT: stimuli-responsive coatings can act as a sensor. A Smart coating that is also a sensor would likely be more cost efficient to create a wide area sensing panel than a large array of sensing devices.

Smart Coatings – The future is already here

Future developments of **smart** coatings

Graphene-based **Smart coating**: metal-free graphene nanoplatelets can be incorporated into a powder coating to increase its barrier effect thus improving corrosion resistance, scratch-resistance or allowing smart functionalities like self-repairing.

Smart Coatings – The future is already here

Trends & Keywords / application processes

- New frontiers for process automation (hanging – shotblasting - sealing)
- Digitisation - voice-controlled digital assistants
- Zero overspray application
- Integration of the coating installation into the factory's logistics
- Lean production – the painting line as a box

Smart Coatings – The future is already here

New frontiers for process automation



Courtesy of Global Radiatori

Smart Coatings – The future is already here

Voice-controlled digital assistants



Courtesy of Evonik Resource Efficiency

Smart Coatings – The future is already here

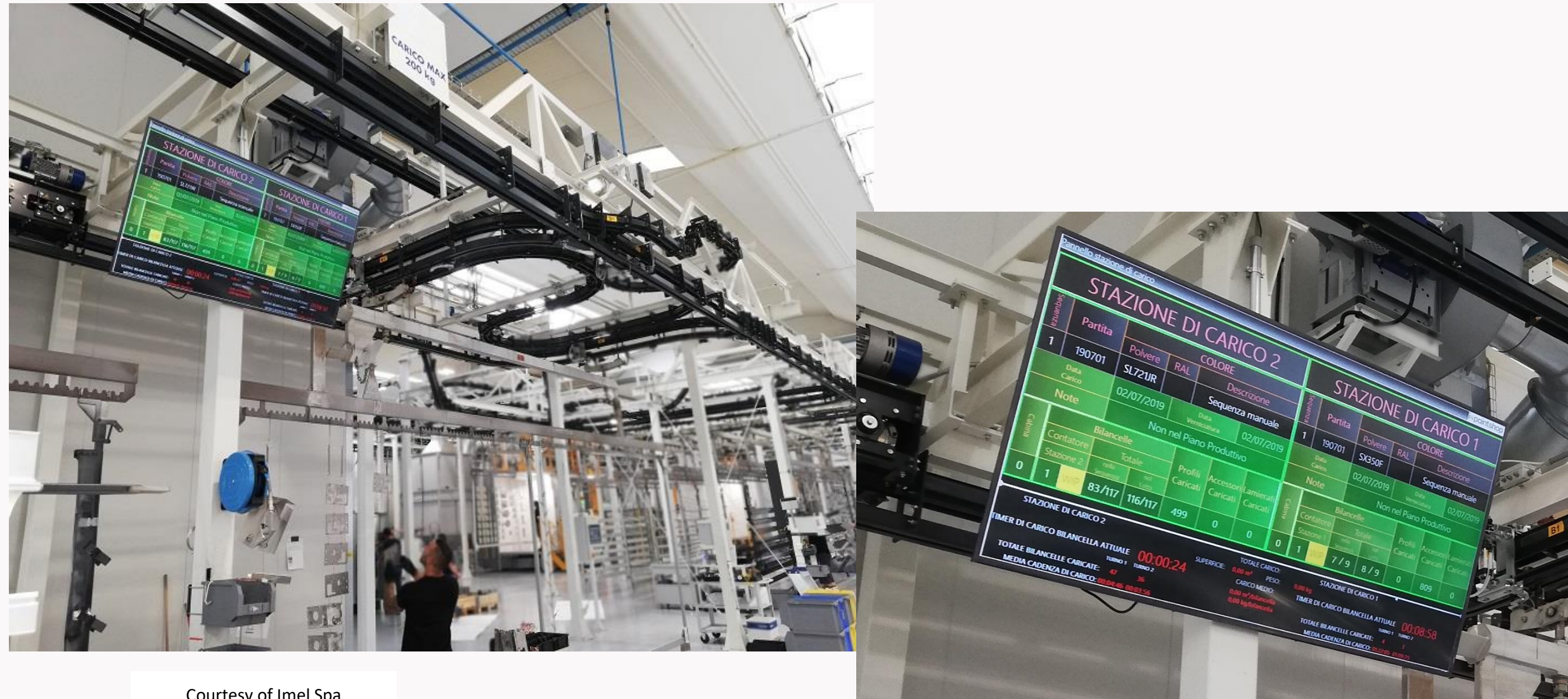
Zero Overspray application



Courtesy of Dürr AG

Smart Coatings – The future is already here

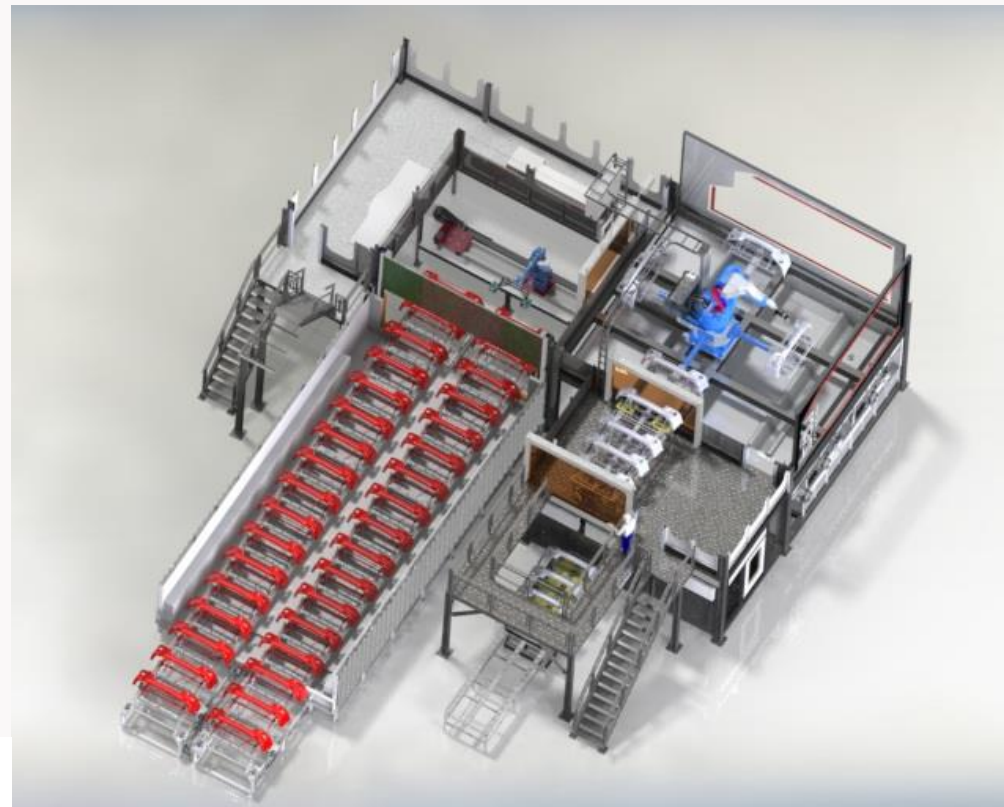
Integration of the coating line into the factory's logistics



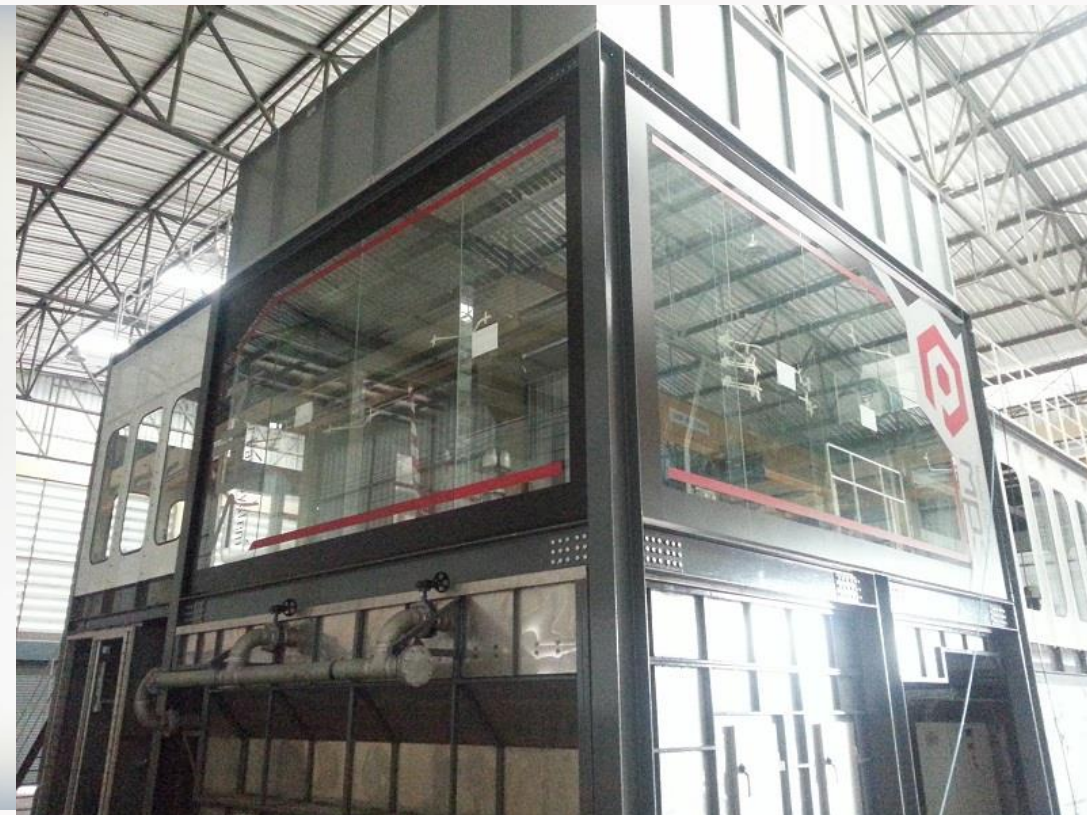
Courtesy of Imel Spa

Smart Coatings – The future is already here

Lean production – the painting line as a box



Courtesy of Thai Pollutec





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