



Major Ikea supplier in Europe uses UV LED curing in furniture finishing

High-speed furniture coating line expands UV-LED uses.

W-LED with ICAD inside. ICAD is an inline control that is continuously measuring the UV output of the lamp across the width of the whole line.

A new finishing line in Europe was designed to provide UV-LED curing on all positions except the final topcoat cure.

SC Freda has started production on their new high-speed furniture coating line. Lithuania's oldest furniture company specializes in manufacturing flat-pack furniture from particleboard, MDF and cellular lightweight construction panels.

The surfaces range from decorated paper with clear UV varnish to highly pigmented UV coating systems. SC Freda is a major supplier for Ikea, and manufactures multiple product series.

To increase their manufacturing capacity, SC Freda expanded with a new production operation, featuring a high-speed production line with UV cur-

ing that complies with Ikea quality and process control standards. In addition, sustainability and energy efficiency were taken into consideration to ensure a strategic, long-term investment.

Efsen UV and EB Technology is involved in radiation curing technology, and has experience in measuring and integrating UV-curing equipment for a wide range of applications and industries.

Efsen and Freda have been working on optimizing UV for many years, and the discussions about the intelligent UV line started in 2017. Freda required cost efficiency, product quality and maximized production capacity. Their intention was to implement a modern and environmentally friendly production process.

While UV-LED curing in the wood industry is not new, according to Efsen the current UV-LED curing production lines are only using a fraction of the capability the UV-LED technology can offer. Efsen wanted to go one step further, not limiting the use of UV-LEDs to gelling positions, which is how UV-LEDs are used in most lines.

The intention was to change the whole process to UV-LED curing on all positions except the final topcoat cure. The price/performance of conventional mercury lamps can't be matched yet for the final layer, due to the challenges of formulating price competitive UV-LED curing coatings that meet the high resistance and color accuracy requirements of a topcoat.

Curing the sanding sealer with LED

only is reported to be an industry first. With the high-power output of LEDs, the primary limiting factor of the technology is the coating itself.

Akzo Nobel was the designated coating supplier for this project. Akzo Nobel agreed to a cooperation to develop a UV-LED curable process with as much UV-LED as possible, without affecting the coating price or properties. Efsen has been working with Akzo Nobel, sharing not only the technical expertise, but also using the chemical expertise of David Ivarsson, Efsen chemist, who specializes in UV-LED formulations.

In direct contact with Akzo Nobel, it was possible to develop a new curing process, replacing all conventional UV systems with the exception of mercury lamps at the end of the production line. A key decision to make this a reality was the choice of 365 nm LED for the sanding position.

The normal coating process starts with sealing of the surface with two clearcoats, following up with sanding the surface, and then proceeding to build the color with multiple layers of basecoats, and finally finishing it off with a topcoat. The challenge has been to find a process with only one LED unit in each position, replacing multiple conventional UV lamps on each station.

The biggest difficulties to be considered have been the surface cure in front of the sanding station. According to Efsen, the coating must cure well enough so it doesn't clog the sanding.

Also, Freda will run both white and dark gray base coats, which include titanium dioxide pigment that absorbs a



Efsen's conventional UV lamp system, the WoodCure, provides guided cooling and temperature control.



ICAD sensor recognizes deviations of the emitted UV power and adjusts the individual UV LED arrays to produce a homogeneous UV-distribution.

lot of the UV irradiation up to 400nm.

Efsen solved these challenges together with Akzo Nobel by defining the optimal LED wavelength on each station, ensuring an optimum match with the chemistry for optimal curing. The final setup also uses height adjust-

able LEDs to adjust the gloss level of the top coat.

With the low temperature of an LED-cured process in combination with the full control of the UV uniformity with Efsen's proprietary

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ICAD technology, the process runs with high gloss stability. Also, the low running temperature prevents issues with edgeband glue melting, which can otherwise be a problem.

Energy efficiency is a major requirement for any modern installation. According to Efsen's calculations, 55 percent energy saving could be realized by selecting UV-LED systems rather than conventional mercury-based systems. In addition, the long life and reduced maintenance required with UV-LED systems helps to maximize the uptime of the production line.

In addition to the LED systems, Efsen's conventional UV lamp system, the WoodCure, provides guided cooling and superior temperature control, according to the company. In combination with new technology reflectors and power supplies, they provide a high intensity and a maximized lifetime. These systems are using reflector cassettes that allow for a quick and convenient cleaning and bulb change.

But even after ensuring that the chemistry and the light sources work in synergy, fulfilling the application requirement, LED curing presents a challenge to overcome in order to ensure long term process stability.

UV-LEDs, in contrast to conventional UV systems, consist of thousands of individual light sources and each of them is slightly different. Measuring the light source at a few defined positions, as it is being done at conventional light sources, will not give the required process security.

During the lifetime of the LED, a deviation will occur, such as a defect



SC Freda expanded with a new production operation, featuring a high-speed production line with UV curing. (Photos and illustrations from Efsen)

segment, damaged optics or dirt on the lens that would have a negative impact on the output and cure. If this would happen in a position away from the measuring point, it would not be recognized in a normal measurement.

Even if UV-LEDs lasts longer than mercury-based UV lamps, they still age, and will lose power over their lifetime. Efsen dealt with this process stability issue with the proprietary ICAD inline process control which is integral part of all Efsen UV-LED products.

ICAD is an inline control that is continuously measuring the UV output of the lamp across the width of the whole line. It recognizes deviations of the emitted UV power and is automatically adjusting the individual UV LED arrays to produce a homogeneous UV-distribution over the whole width

of the UV LED system.

SC Freda decided to choose Efsen's W-LED systems incorporating ICAD. The W-LED includes power supplies, PLC control and cooling air supply. No external electrical cabinets are required.

The integrated cooling air blowers forward filtered cooling air to the LED modules, important inside a wood processing plant.

The W-LED comes with optional electrical height adjustment, sensors that activate the W-LED when a product arrives, and safety sensors to deactivate the conveyor in case a bended part is getting stuck.

The W-LED, with integrated UV-LED modules, and ICAD measuring system provides a system with complete UV control. See www.Efsen.dk **+**