Fine Wood off the Printing Press

The correct paint application creates an illusion that feels as good as it looks

The coat of paint clinches it: printed wood patterns can now feel as warm and velvety as high-quality fine wood surfaces. The pre-requisite for the successful mass production of these quality laminates are subtle and precisely set process parameters that can be replicated and accurately maintained by printing presses and paint installations. The simplest solution is the systematic use of high-quality automation standards.

Harmony in look and feel – the perfect illusion of wood

Wood patterns and laminates are everywhere. They spare environment and pocket in equal measure.

Top-quality patterns and laminates must not only look perfect, they must also incorporate some of the essential properties of true wooden surfaces, e.g. the warm touch and the optional velvety or brilliantly smooth surface for finish foils. For this reason a coat of paint is applied to the printed paper web during production. This coat of paint must impart these properties while underlining the visual impact of the printed image. The paint job also doubles as an important protective layer against damage through handling and wear. The coat of paint must therefore be of a suitable thickness and very resistant, while simultaneously remaining elastic enough in order to bend and flex on the paper without losing any of its qualities.

Numerous paint layers transform the pre-printed paper web into a finish foil that will give the chipboard it covers the look and feel of a high-quality wood surface.
Low-cost mass production thanks to comprehensive system engineering

It’s clear that the secret of a layer that is both functional yet also feels right lies in an in-depth understanding of the processes involved. A large number of process parameters have to be identified, optimized and modified so they can be reliably used in mass production.

Schattdecor prints wood, stone and imaginative patterns onto 100,000 tones of paper each year – a total area of some 1,200 km². In addition to the 37 gravure printing presses and four paint lines are several laboratory printing systems that supply Schattdecor’s twelve global production sites with quality-assured patterns and recipes for each and every product.

The aim is to ensure that all products from all production sites have identical properties with the same high level of quality. It is therefore vital that every machine uniformly replicates the prints and recipes coming out of the labs.

To achieve this, all Schattdecor production machines worldwide (with the exception of a few acquired old systems) have been fully automated using Siemens systems. In 2003 Schattdecor also established a subsidiary, Rotodecor GmbH in Bad Salzuflen, and charged it with the task of specializing in pattern and packaging printing. Rotodecor has brought together the experiences of mass production to produce fully optimized production machines, with the result that it can now demonstrate exceptional expertise in process technology. As a result, Rotodecor assumed responsibility for the additional maintenance of all Schattdecor AG production sites, including the provision of spare parts, in the same year.

Schattdecor now has the chance to achieve medium and long-term uniformity across the world in all its production systems, not just in terms of automation, but also its machine concepts. New possibilities are opened up to implement potent global quality and cost control measures.

Rotodecor – machine construction skills coupled with years of manufacturing experience

Rotodecor develops and builds special machines not just for Schattdecor, but for the paper and cardboard industry as a whole. By 2008 the young company had already developed, built and delivered four painting lines around the world. Several large projects are currently in the pipeline.

The user program of the paint line is based on the Simotion Print Standard application software package, which runs on the standard Siemens motion control platform Simotion. Rapid commissioning and high productivity is the result of these totally compatible hardware and software components. The paint installation used in the laboratory boasts a run-up time of just 30 seconds, to which the operators can testify from their “faultless” experiences with the machine since January 2008.

The way to success: high level of standardization – for software as well

In its newest laboratory line, Rotodecor has made an important step towards using standardization to reduce costs. The application software is also developed around standard components. Using the Simotion Print Standard software package for the Simotion motion control system makes available all the axis-orientated functions required by the printing presses. These include implementing all synchronous relationships (including all cam disk and gear synchronization functions). This applies both within axis groups as well as across all the modules in the entire system. All axis groups take as a guide a value (Global Master, or GM) specified by a virtual master axis. The drives within a function module follow either a real or virtual local master axis (LM), which allows an individual machine module to be started independently of the complete system. Both the Simotion motion control system and the Simotion Print Standard software package allow virtual and real axes to be controlled as one, greatly simplifying engineering and diagnosis activities.

In addition to the provided individual software module functionality, Simotion Print Standard also supports an application framework to tailor the software functions depending on the actual machine hardware requirements. The application framework handles the necessary machine motion operating states, already includes a simple HMI and furthermore contains technological interfaces to integrate advanced and custom hardware/software concepts, e.g. color register control. The integration of safety functions in the machine is already taken care of by the “Safety Integrated” feature in the automation system. Error messages are not just output as codes, but are also displayed to the operator in plain text.

All motion control system interfaces and the software package are available to the operator, including the well-documented source code. The upshot of this is simple yet far-reaching adaptability to different machine concepts and system variants.

Laboratory systems: flexible production machines without reel stands

www.siemens.com/automation
The Simotion Print Standard software

Extremely complex: both paint stations can be fitted with different plug-in modules using different technologies to carry out the painting.

Extremely fast: development, commissioning ...

The Rotodecor developers created the comparatively complex automation process in close cooperation with Siemens engineers from Bielefeld. Special emphasis was placed on implementing a new type of web tension control developed by Rotodecor, which offers practically 100% reproducibility and ensures an extremely high level of process safety.

Using the Simotion Print Standard package meant that everyone involved in the development could concentrate right from the very beginning on this and other particular system requirements. Despite the high level of functional complexity, the development time was very short.

Even the commissioning process was completed very quickly. Just one week was all that was needed to bring the system up to full productivity, a task which the engineers from Rotodecor and Siemens
carried out within the framework of a wider production monitoring session.

...and a run-up time of just 30 seconds

As a laboratory environment sees the testing a huge variety of different combinations of materials and machine settings, the number of stop and start functions compared with normal operation is very high. The efficiency of a laboratory system is therefore very dependent on the run-up time of the system, which in itself depends on the dynamic and quality of the control system. By using a finely tuned system made up of the motion control system, the application program (based on Print Standard) and the drive control, a run-up time of just 30 seconds was achieved, measured from the start command to the production of goods with stable actual values for all relevant process parameters.

As a consequence, considerably more test runs are possible per unit of time, which simultaneously reduces wastage. Both time and material is saved during each start. Schattdecor can now kick on with its drive towards perfecting its wood patterns with increased efficiency – and even more customers around the world can enjoy extremely good value “wood surfaces” that not only look like wood, but feel like it too.

After completing the detailed and extremely successful tests of its paint system, Rotodecor is now planning to equip the next printing presses for Schattdecor with the Siemens Simotion D motion control system and to automate the applications using the Simotion Print Standard software package.

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Half the size: using the Sinamics S120 drive family shortens the row of switch cabinets by 20%, even though standard motor modules with 30 A nominal current were fitted as far as possible. Roller shutters instead of conventional doors also reduced the distance to the machine.