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New BMW Five Series shows flair for innovation: from the inside out

KIEFEL supplies full set of solutions, ranging from surface treatment of individual components to assembly technology and complete door-lining modules

The needs of design and haptics require that interior trim components be finished in a wide variety of decorative materials. Coloured finishes play an important role in this respect, which is why a KIEFEL laminating system has been used here for the first time to apply two-tone foil material to a single blank.
The use of two-tone interior trim is of course nothing new in itself, but the process has always previously involved the production of trim components in various parts, which then had to be bonded together by some suitable means, often leaving visible joins.
A single-component foil laminating process was chosen for the first time to create door-liner trim for the new BMW Five Series, a facelift of the previous model. The natural-fibre blank is laminated with a two-tone plastic foil material supplied from a roll. This innovative combination of machine-tool and processing techniques has been developed by specialists at KIEFEL in Freilassing (Germany). Production takes place at Johnson Controls, one of the world's leading suppliers of parts for vehicle interiors.
Each of the fully-automatic processing sequences performed by the KIEFEL-KLS laminating machine is designed to ensure seamless continued operation. The line that separates the two colours is subject to very tight tolerance limits.

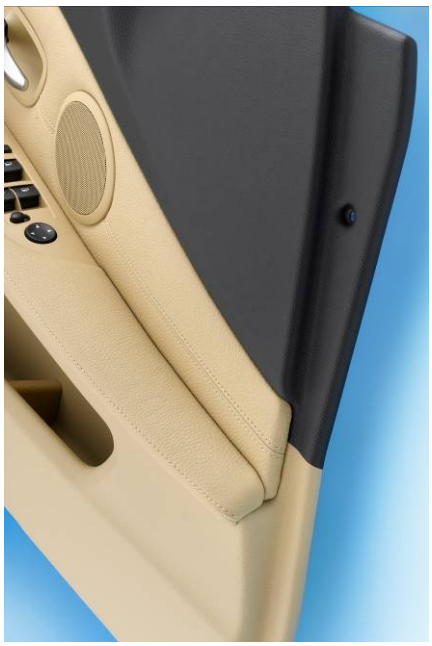

Foto 1: With the KLS Laminating Machine the colour-dividing-line will be positioned with highest repeat accuracy on the blank support

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Special sensors fitted to the machine and laminating tool detect the position with respect to the dividing line, and pass the information on to the corresponding mechanical regulating system of the laminating unit. This ensures that the foil-application process and position of the tool are both adjusted to take these tolerances into account and compensate for any mismatch. The result is a high degree of repeating accuracy where the positioning of the colour-dividing line on the three-dimensional blank support is concerned.

100,000 possible application variants

Suitable configuration of the machine tools allows the door components to be laminated in pairs, i.e. each machine cycle handles two doors (one front-passenger or driver's door plus one rear-passenger door) at once.
The use of a laminating unit with two-way rotating bottom platten and four-way rotating top platten allows the tool assemblies for a complete vehicle to be installed in the laminating machine, which processes left- and right-hand doors in alternating sequence. A tool-change is required only when working with the variant for the Chinese market, which has extended rear-passenger doors.
The laminated door elements pass through additional processing sequences, which include the surface treatment of other door components and the final assembly of the pieces to form a complete door liner module. The foil-material overhang at the edges of the door-trim element is turned over by a KIEFEL edge-finishing unit to form a 180° fold.

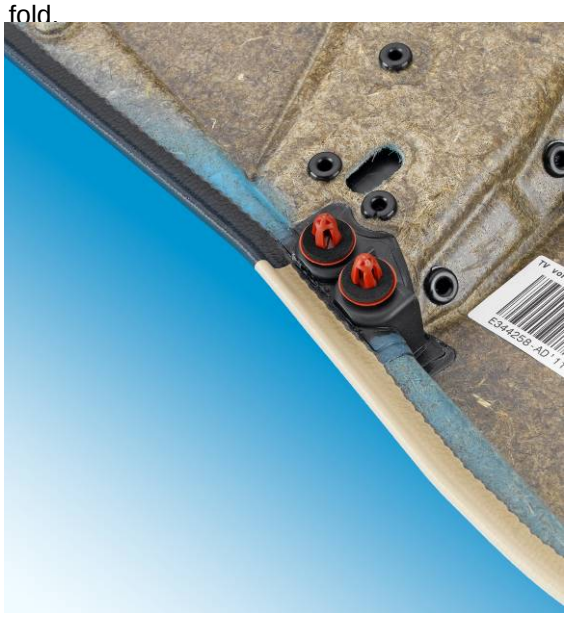

Foto 2: Riveting with ASC-Riveting System

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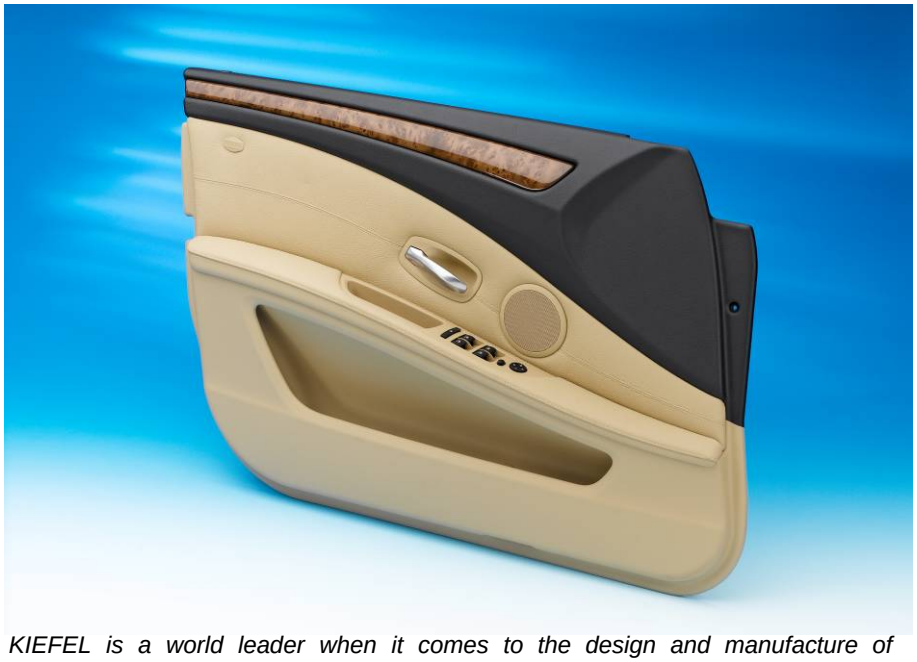
This creates a clean, precise edge and ensures that the foil material is firmly attached to the blank support. This stage in the process is of crucial importance, given the high temperatures to which the component is likely to be subjected by direct sunlight entering via the door window.
Once the other door components have been suitably finished (e.g. the backs of the map pockets with PVC-foil, plus armrests and interior linings in cloth, synthetic leather or real hide), they are all riveted to the corresponding door module, which is made to the material and colour specifications of the end customer. This process makes use of a riveting technique likewise developed and patented by KIEFEL, namely the ASC (Air Supported Contact) riveting system.
The people at Johnson Controls estimate that they have to find the technical means of coping with over 100,000 possible assembly variants. Just 2% of components are repeated.
It had to be possible to re-jig production and start a new run in just a few days; a task that KIEFEL's technicians successfully proved themselves well-qualified to do.



KIEFEL is a world leader when it comes to the design and manufacture of machines used to process plastic foil materials. The company offers core expertise in the fields of moulding and joining technology. In addition to supplying the medical technology sector, KIEFEL also serves the automotive, refrigerator and packaging industries.
KIEFEL GmbH, a member of the Brückner Group of Companies, is based in Freilassing, Germany. The company also operates branches in the United States, France, Austria, the Netherlands, Russia, the Czech Republic and China.

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