

MACHINES AND TECHNOLOGIES FOR THE

AUTOMOTIVE INDUSTRY





HF WELDING



SLUSH
MOULDING

EDGE-FOLDING

PRE-FORMING FOR
BACKINJECTION

RIVETING WITH ASC
TECHNOLOGY
AND ULTRASONIC

LAMINATING OF
TEXTILES/LEATHER

LAMINATING OF FILM
MATERIAL

KIEFEL

THE PARTNER OF THE AUTOMOTIVE INDUSTRY AND THE SUPPLYING INDUSTRY

- **Individual COMPLETE SOLUTIONS**
- **Maximum QUALITY**
- **Exellent ECONOMIC EFFICIENCY**

■ **Individual solutions:** KIEFEL is one of the international market leaders wherever the processing of plastics for the automotive industry is concerned. Working in close cooperation with our customers, we plan and provide complete solutions for the production of interior trim components.

■ **Outstanding know-how:** Our strength lies in our total mastery of the processing technologies involved, our engineering potential and our know-how as producers of industrial machines based on an experience for more than 50 years.

■ **Maximum quality:** In addition to developing the fundamental principles of plastic processing technology, our research labs work together with the customer – right from the prototype phase – to develop manufacturing techniques. Prototype components are produced for pre-series vehicles. Production is carried out using KIEFEL machines and tools – delivering components that meet the high quality specifications of automobile manufacturers, with the very best in functionality, aesthetic appeal and haptics.



Door interior trim panel BMW, Series 5, bicolor, vacuum laminated

Continual PROCESS SEQUENCE

- Consultation on the element design
- Selecting the processing technology
- Feasibility studies
- Production of prototype parts
- Industrialization
- Process optimization
- After-Sales Care

A comprehensive RANGE OF TECHNOLOGY

- Vacuum-laminating of substrates with PVC and TPO film
- Pre-forming of film for subsequent application to foam backing, back-injection or back-pressing
- Vacuum lamination and forming of film by the in-mold-graining process (IMG)
- Slush moulding
- Edge folding of film, textiles, leather and Alcantara, with and without adhesive
- Press-laminating of textiles, leather and Alcantara
- Riveting by means of ASC technique and/or ultrasonic
- High-frequency welding
- Special procedures for gluing and assembly

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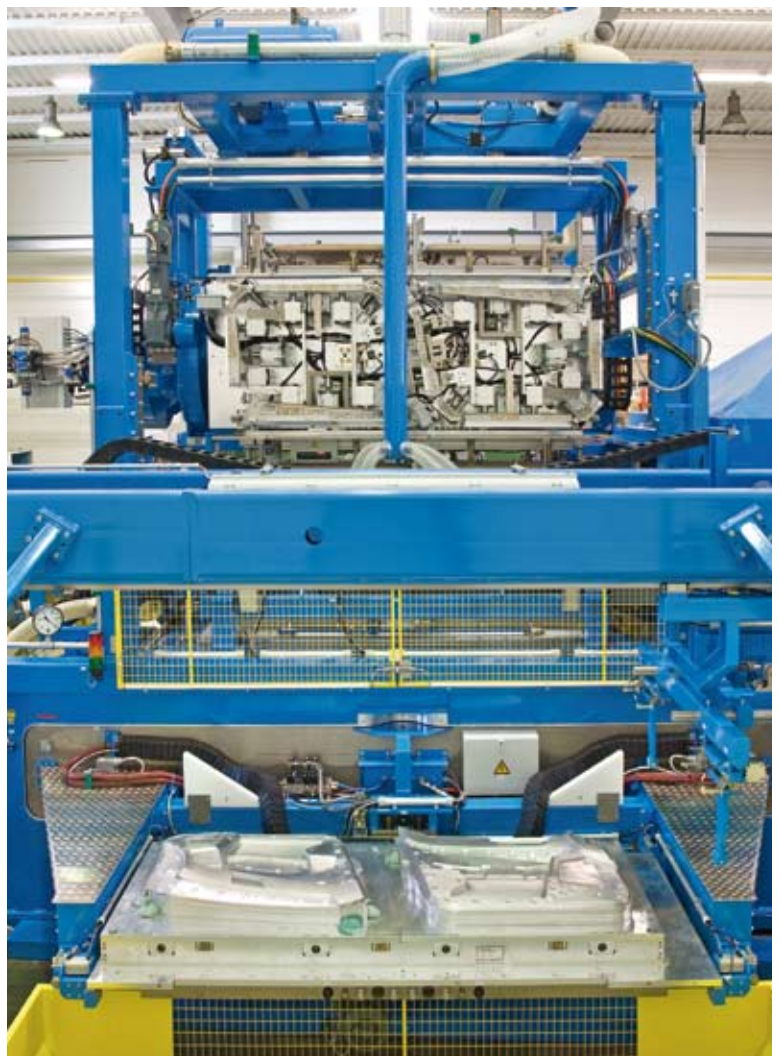
FORMING AND LAMINATING MACHINES

The **forming and laminating machines** are designed on a modular basis as:

- Single station
- Inline or
- Turntable machines.

Configurations are available for all the forming and laminating tasks involved in the manufacture or finishing of interior- or exterior-trim components in various materials.

Whether for door linings, A-, B-, and C-columns, shelves, consoles or coated film materials. Customers can count on optimised matching to their individual requirements.



KLS 76/225 with bottom turntable and rotating top table

Forming and laminating machines

OPTIMUM QUALITY AND COST-EFFICIENCY



Instrument panel BMW Mini



Door interior trim panel

■ **Committed to the future:** The increasingly demanding requirements of design and haptics mean that interior trim components must be finished in a wide variety of decorative materials. Our machines and tools meet these needs – thanks to our long experience in the thermoforming of plastics.

■ **Individual solutions:** Whether singlestation or inline machines, in combination tool and process-specific know-how, Kiefel covers the entire production spectrum. Our skills cover production-optimised design right up to the prototype phase and the industrial production. Thanks to innovative technologies and machinery concepts, our partners are well equipped to match the future.

■ **Optimised quality and cost-efficiency:** A high degree of machinery automation, advanced control technology and outstanding ease of operation can of course be taken for granted. These factors are what guarantee the optimum quality and maximum cost-effectiveness of the products made using our systems.

Technologies

- Vacuum forming and laminating
- Vacuum forming and laminating with the In-Mold-Graining Process (IMG)
- Integrated cutting and trimming solutions as well as edge folding on the laminated parts by collapsing stroke

Possible applications

- Instrument panels
- Door- and side-trim elements
- Consoles and covering elements
- Door handles and armrests
- Storage shelves
- Inserts
- Map pockets
- Pillar liners
- Luggage-compartment liners
- External trim components
- Water-shielding and insulating elements

KIEFEL EDGE-FOLDING MACHINES

The edges of the laminated, back-pressed or back-injected liner components used in the automotive interior-trim sector suppose special requirements with respect to the manufacturer. Exact quality specifications require clean and blemish-free decorative finishes with precisely-folded edges.

KIEFEL offers made-to-measure solutions: from single-station edge folding units up to complex multi-station edge-folding systems.



Multi-station-edge-folding machine for door liner trim



Edge-folding-machines PRECISE, EFFICIENT, FLEXIBLE



- **Efficient:** Edge-folding technology used with KIEFEL machines with individual BUS system-controlled pusher elements deliver outstanding results.
- Individual solutions: KIEFEL offers several tried and tested technologies – all designed to meet various needs in an optimum way:
 - Edge-folding using the cold-tool technique and contact adhesive
 - Edge-folding with adhesive activated by means of:
 - Hot air
 - Heated folding slide unit
 - High frequency
 - Infrared
 - Adhesive-free edge folding, with back-injected or back-pressed components for example
 - Combination with cutting and trimming as well as assembly tasks, e.g. ASC riveting
 - Machines with tool change for flexible processing

Possible applications

- Door and side trim elements
- Upper door panels
- Textile inserts
- Map compartments
- Armrests
- Pillar liners
- Consoles and covering elements
- Special applications



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SLUSH-MOULDING WITH INFRARED/ HOT AIR TECHNOLOGY

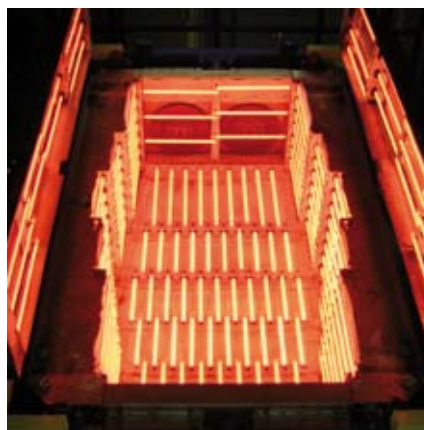
Interior-trim components are increasingly being manufactured on a three-dimensional basis. The increase in the design complexity of components – especially with respect to the reduced radius dimensions of component edges – along with requirements with regard to haptics, make the production of such complex components as instrument panels using the so-called “slush moulding process” (rotational sintering) absolutely necessary.

KIEFEL has developed a completely new heating process for heating up the tools, the galvanos. A combination of the infrared heating technology with the hot air heating system ensures a homogeneous heating of the tools. The main heating capacity is supplied by the infrared heaters and in the downstream air heating station the temperature is equalized. A large quantity of infrared heating elements which can individually be set guarantee a quick heating up to the particular heating profile of each galvano. In the downstream temperature balancing station the air is supplied to the tool very fast by a nozzle system.

With this combined procedure a very short cycle time at a homogeneous temperature distribution in the tool could be achieved.



Galvano in IR-preheating station



Infrared heating station



Galvano with slush-moulded skin at the removal station



SLUSH-MOULDING

Slush-Moulding DESIGN AND HAPTICS



Instrument panel BMW X3, bicolor



Removed slush-moulded skin



Slush-moulded skin in the galvano (tool)

- **Flexibility with design:** Complex three-dimensional shapes and minimum gaps and radius dimensions are possible. Back-surface cuts can be carried out without problem during the production process. Large-depth items, such as instrument panels, can be handled.
- **High thermal stability:** Does not create spring-back forces in the material. High thermal-load resistance prevents peeling and cracking
- **Efficient:** Inline machines with twin galvano systems can produce up to 1400 skins per day in three-shift operation.
- **High quality:** Demanding quality requirements are met with high consistency of the forming quality for matching of surfaces for joined components.



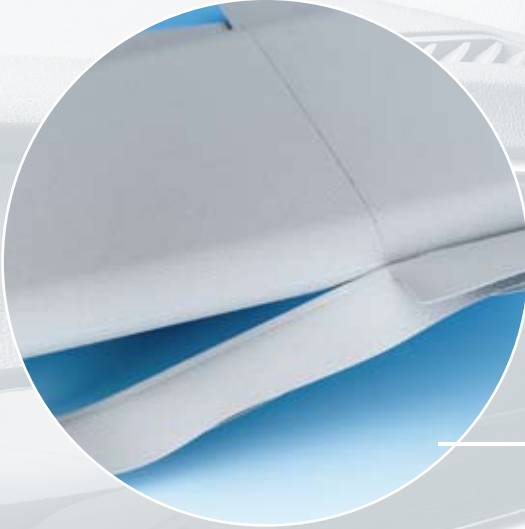
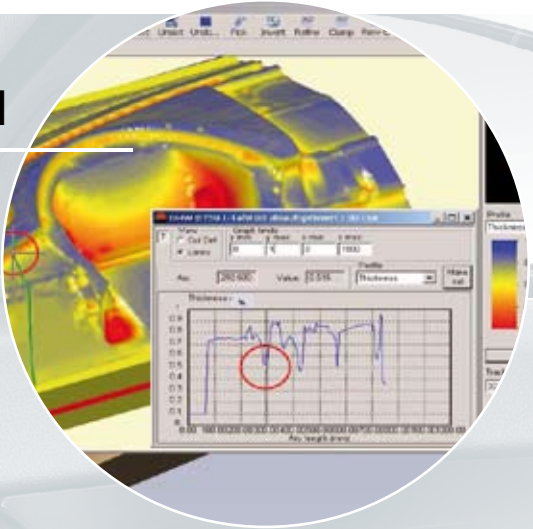
Instrument panel for BMW X5, bicolor

Possible applications

- Instrument panels
- Door and side trim elements
- Airbag and glovecompartment covers
- Various shelf elements



T-SIM



HIGH-FREQUENCY WELDING MACHINES



Know-how, b
optimised flex
values, which
reliable partner
ind



FORMING AND LAMINATING MACHINES

ASC RIVETING MACHINES





KIEFEL - THE PARTNER OF THE AUTOMOTIVE INDUSTRY



THERMOFORMING OF COATED FILM MATERIALS



PRESS-LAMINATING MACHINES



EDGE-FOLDING MACHINES



SLUSH-MOULDING WITH INFRARED/ HOT AIR TECHNOLOGY

best quality and
flexibility these are
made us to an
of the automotive
industry.

KIEFEL ASC RIVETING MACHINES

Ever more demanding requirements with respect to technology and design are turning door linings into functional items with a variety of material finishes. Door linings can consist of over ten individual components, joined at up to 70 different points. KIEFEL'S ASC riveting system is an innovative, newly-developed, patented assembly technique for hard-wearing, robust, rattle-free joints.

Kiefel ASC riveting units are working successfully and reliable in more than 100 applications.



Riveting of a complete door lining using the ASC riveting system.

ASC Riveting machines HIGH-QUALITY JOINING TECHNIQUE

The ASC (air supported contact) riveting process combines all the advantages of the joining system used to date – in a highly efficient way.

- **No heat damage:** The energy is transferred to the component only at the precise point required. This prevents the components from suffering heat damage.
- **Maximum strength:** The slow and careful reshaping of the riveting pin leads to optimum forming of the rivet head, combined with maximum rivet-head strength.
- **No shaking or rattling noise:** The process rivets the components firmly together, without any play.
- **Maximum efficiency:** Short startup time and standby control limit energy consumption to the duration of the riveting process.
- **Optimised cycle time:** A wide range of riveting systems is up to the cycle-time and ergonomic requirements, material-flow specifications and the complexity of the joining process.
- **Complete solutions:** Complex assembly task can be tackled using a combination of the ASC riveting process with adhesive-based and ultrasonic welding technology.

Possible applications

Welding/riveting of:

- Door and side trim elements
- Luggage-compartment liners
- Instrument panels
- Consoles and diverse cover elements
- Special applications
- The ASC technology may also be combined with edge folding, cutting and adhesion processes.



Door lining

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PRESS-LAMINATING MACHINES

Different machine systems are available for the press-laminating of textiles, imitation or genuine leather and Alcantara. Standardised singlestation or special machines are available to meet the individual customer requirements and cycle times.

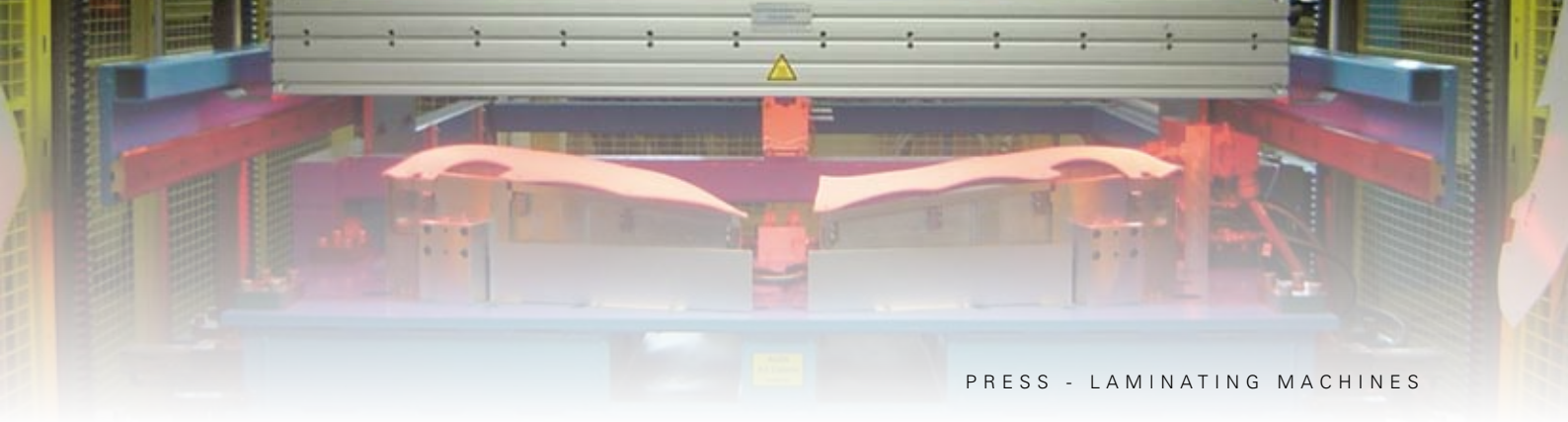
The press-laminating and edge-fold techniques can be combined, if required, to integrate the edge-fold into the press-laminating process.

This is often realized by armrests covered with textile, synthetic leather or leather.

Putting of adhesive can be integrated in the system by robots.



Press-laminating machine



PRESS - LAMINATING MACHINES

Press-laminating machines MAXIMUM QUALITY:

- Radiator heating elements with single position
- 3-D heating elements for adhesive free laminating
- 3-D sliding frame for laminating without creases
- Processing of exact blanks without refinishing
- Fast semiautomatic tool change
- Integrated tool control for edge-folding



Covering elements



Door interior trim panel



Possible applications

- Door inserts
- Door-mounted armrests
- Consoles
- Luggage-compartment liners
- Wide range of cover elements
- Special applications

KIEFEL HIGH-FREQUENCY WELDING MACHINES

High-frequency welding is one of the original technology used by KIEFEL. This technology, together with the corresponding machinery engineering, has undergone continuous further development and improvement over recent decades.



High-frequency welding machine for sun visors

High-frequency welding machines

EFFICIENT AND FAST

- **Rational:** Multi-part turntable- or sliding-table machines with high-frequency welding presses permit rational production.
- **Flexible:** Various tools can be quickly changed. Depending on the article, automated component feeding or the integration of further manufacturing steps, including fully-automated production lines, are possible.
- **Maximum quality:** Ultra-modern engineering, tooling and HF generator technology with individual power regulation and optional process control guarantee the production of high quality parts.



Sun visors



Turntable machine with feed robot for the welding of reinforced sections onto floor carpets.

Possible applications

- Door and side-trim elements (two-tone)
- Individual parts of an instrument panel (two-tone)
- Textile insert (HF lamination)
- Map pockets (HF lamination)
- Reinforced-section welding on floor carpets
- Sun visors
- Convertible hoods and rear windows
- Sound-insulating mats
- Joining of polyamide structural components
- Special applications

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THERMOFORMING OF COATED FILM MATERIALS

In addition to their use for interior items, plastics are increasingly being used on the outside of vehicles. Colour-coated film materials can be used to substitute complex coating processes.

The goal is to create a top-class surface finish. This is done by using a positive highly-polished vacuum-capable thermoforming tool to form the components in clean-room conditions. The subsequent back-injection or back-pressing process provides the required dimensional stability.

KIEFEL ensures optimum compatibility for the entire process sequence used in the thermoforming of coated film materials:

- Tool configuration with shrinkage rate detection
- Thermoforming tool
- Cleaning technology for film material
- Clean-room technology
- Thermoforming technology



Highly-polished vacuum-capable forming tool.



Series KMD machine for forming the decorative trim elements.

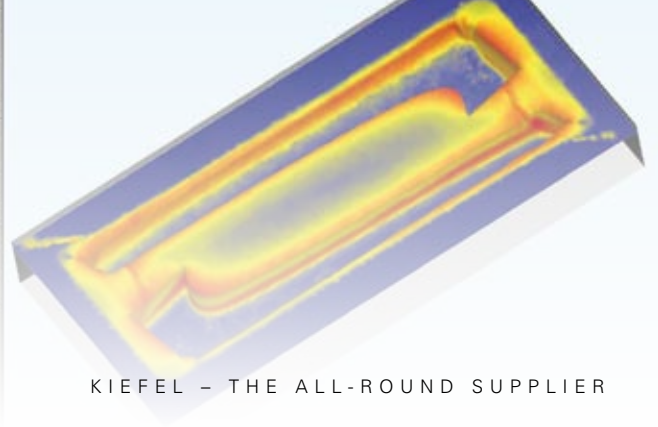
Possible applications

In the interior:

- Automotive interiors increasingly incorporate designer-style decorative elements in doors and instrument panels. This involves the three-dimensional forming of thin ABS film with compressed-air support. Depending on the surface of the ABS film, it is possible to produce an aluminium or wood-look design. A subsequent back-injection process gives the component its dimensional stability.

In the exterior:

- Forming of roof modules
- Forming of wing elements
- Forming of various hood and cover elements
- Forming of bumper bars and other body elements



KIEFEL – THE ALL-ROUND SUPPLIER

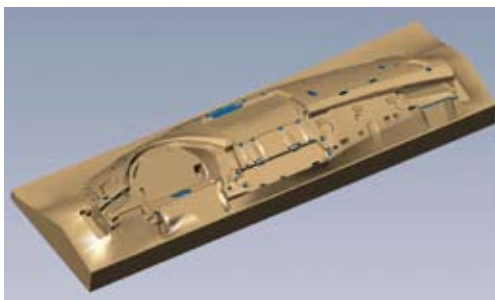
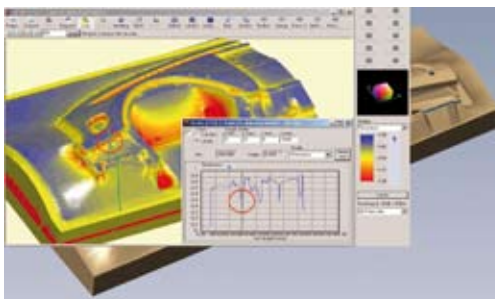
KIEFEL – FROM DESIGN TO SERIES PRODUCTION

As a single-source supplier of machines for the processing of foil materials and textiles, KIEFEL boasts of several decades of experience in the area of tool building and special industrial equipment. KIEFEL applies the latest technology in design and manufacturing to the implementation of customer-specific requirements.

All tools are thoroughly lab-tested and subjected to trials on the customer's machinery before delivery and implementation in line production.

Your benefits

- Simulation of the forming process
- Optimisation of quality
- Reduction of film consumption
- Reduction of development time
- Cost savings in development phase and series production



Process optimisation from concept phase to series production

Possible applications

- Vacuum forming tools with integrated edge trimmer
- Vacuum laminating tools with snap-type edge folder or edge trimmer
- IMG forming and lamination machines
- Press-laminating tools for use with various technologies
- High-frequency welding tools
- Substrate mounting element
- Vacuum forming tool for forming coated film materials
- Special devices for interior-trim components of all types



KIEFEL

A Member of Brückner Group

KIEFEL – with the power it takes

KIEFEL is a world leader when it comes to the design and manufacture of machines used to process plastic film materials. The company offers core expertise in the fields of forming and joining technologies. As a supplier to reputable manufacturers in various sectors, KIEFEL GmbH services customers in the automotive, medical technology, refrigerator and packaging industries.

The headquarters of KIEFEL GmbH is in Freilassing/Germany. The company also runs its own network of sales and service centres in the United States, France, the Netherlands, Russia, China, Brazil, Indonesia and India, and is represented by sales partners in more than 60 countries worldwide.

Kiefel GmbH is a member of the German Brückner Group, a worldwide leading supplier of plastics machinery.

KIEFEL is certified to DIN EN ISO 9001:2000 standards.

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