



High-End Thermoforming:
Aviation & Railway Interiors



INNOVATIONS THAT SHAPE THE WORLD OF PLASTICS.

DUROtherm



THERMOFORMED PARTS – IDEAL FOR LIGHTWEIGHT DESIGNS

Plastic parts which are produced in vacuum Thermoforming, playing an increasingly important role in aviation and railway applications. Mould costs are far lower than in many other process technologies, and the fact that these moulds can be modified quickly and easily ensures maximum flexibility during development work. Thanks to high-performance plastics, the moulded parts are very light. If self-coloured plastics are used, these parts don't need to be painted, which cuts costs and is more environmentally friendly. Regarding different surfaces of the thermoformed parts, there are a bunch of coloured variations available. Customers can choose any colour scheme they like, for instance, along with matt or high-gloss finishes. Self-coloured or film-laminated surfaces round off the portfolio – and even metallic looks can be created. Fur-

thermore, thermoformed parts using twin-sheet technology offer impressive stability and can be shaped differently on each side.

A special feature of thermoforming is that it is extremely cost-effective, even for small series. DUROtherm's innovative machinery and alternative production processes, allows production lots up to 100,000 moulded parts per year. With over 50 years of expertise, DUROtherm is your ideal full-service partner when it comes to thermoforming technology for small and large batch sizes. DUROtherm offers the full range of services – from consulting, planning, development and design all the way through to prototyping, series production and logistics.

THE BENEFITS AT A GLANCE

- Lightweight with high stability
- Low mould costs
- Short mould development and production times, making changes easy and inexpensive
- Quick response times in the case of fast-changing design/model cycles
- Pilot series can be produced by using low-cost prototype moulds
- Series moulds are barely affected by wear – as many as 100,000 moulded parts can be produced
- Etched moulds for an injection-moulded look
- UV protection is possible
- Matt or high-gloss finishes can be created
- Fire-safety requirements are met:
 - EN 45545 HL2 and HL3, R1 and R6 for railway applications
 - NFPA
 - FAR 25.853 (a-d) for aviation applications
- Resource-friendly use of recycled materials
- Low weight of plastic helps cut CO₂ emissions

THE OPTIMUM PROCESS FOR SPECIFIC REQUIREMENTS

Pending on the required shape and appearance thermoformed parts can be produced either positive (male) or negative (female).

In the case of positive forming, the mould is in contact with the underside of the plastic sheet to be formed. The sheet is pulled over the mould in such a way that the visible side does not come into contact with it, which means high-gloss and metallic surfaces that exhibit exceptional brilliance can be created. In positive forming, grains are determined by the sheets themselves, and a wide selection is available. Al-

though the sheet thickness determines the radii, attractive shaping is still possible.

In the case of negative forming, the plastic sheet is pulled into the mould. This means the visible side is in contact with the mould, which makes it possible to create very fine radii, delicate edging and strong undercuts. In addition to this, a precisely defined surface can be etched directly into the mould to produce moulded parts with a perfect injection-moulded look.



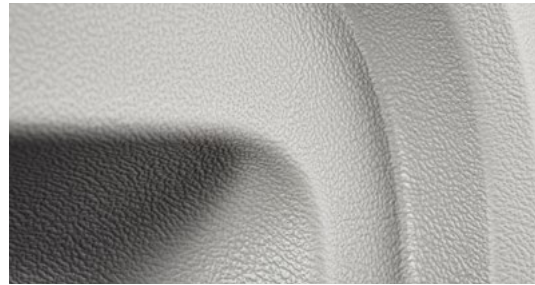
Attractive radii with positive forming, where material thickness determines the radii



Precise and very delicate edging with negative forming – optimum integration of applications



Positive forming with add-on applications – grains integrated directly into the sheet material



Negative forming for a freely definable surface structure and a perfect injection-moulded look



Self-coloured plastics in any colour – including metallic looks in the case of positive forming



Strong undercuts are easy to create with negative forming

THERMOFORMED PARTS FOR AIRCRAFT SEATS – COMPLETE ASSEMBLIES FROM A SINGLE SOURCE



DUROtherm is a specialist manufacturer of thermoformed components for aircraft seats. Processing thin-walled plastic sheets means these lightweight moulded components can be used in many different ways. Unlike injection-moulded parts, they do not have any visual defects such as sink marks or coloured streaks. The lower weight of the plastic

used helps to reduce CO₂ emissions, which is also better for the climate. Producing assemblies with a high vertical range of manufacture is a particular strength of DUROtherm. Besides tray tables, seat back shells and trims/covers for aircraft interiors, virtually all further processing options are available.



Life vest box



Entire aircraft tray table



Backrestshell assembly



Assembled kickpanel



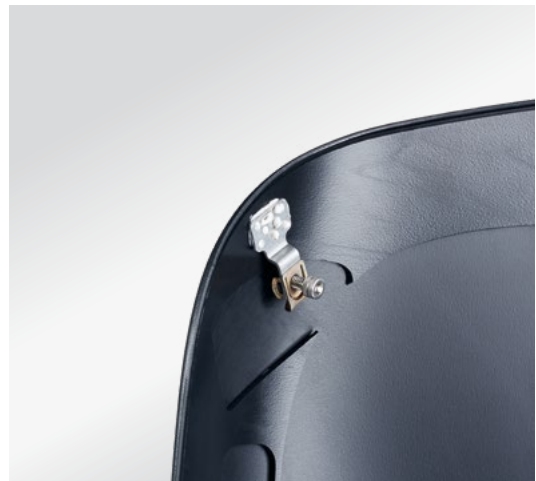
Backrestshell with coloured add-on



Complex adhesive processing with robot systems



UV printing



Bonding of metal assemblies

THERMOFORMED PARTS FOR RAIL TRANSPORT – SOPHISTICATED MATERIALS AND PRODUCTION PROCESSES

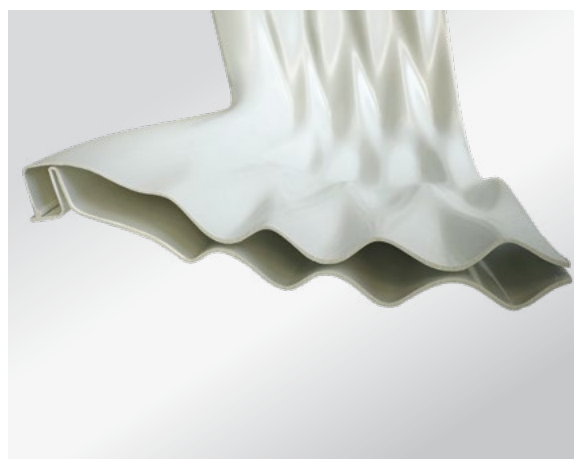


DUROtherm is a partner of the rail industry and develops custom solutions for manufacturing thermoformed components. Seat components and side trims/covers are produced using single or twin-sheet technology. One particular focal point is the design and manufacture of lightweight components. DUROtherm also works with plastic manufacturers and specialises in developing plastics that meet precise customer

requirements. As a result, it is possible to create thermoformed plastic parts that could previously only be produced from sheet metal. Thanks to the customer-optimised design of the plastics, these lightweight solutions boast excellent mechanical properties, while also benefiting from a much lower component weight. The use of intelligent materials and unique machinery have made DUROtherm a true pioneer in this sector.

TWIN-SHEET TECHNOLOGY

- Very high rigidity compared to single-sheet technology with the same material weight
- Maximum variety thanks to CNC milling cuts
- Dimensionally accurate external geometries on both moulded sides
- Fastenings/inserts can be directly integrated
- New and recycled materials can be combined
- Option of different material colours on the inside and outside
- High level of design freedom





Service hatch for trams



Folding tram seat



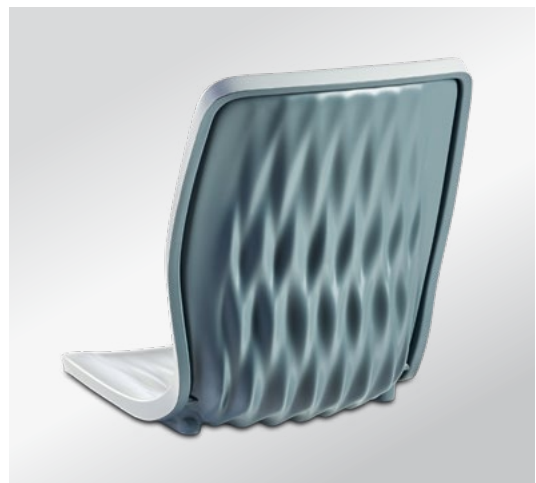
Backpanel for regional transport



Seat pillar trim



Double seat backpanel



Two-coloured twin-sheet seat



THE DUROTHERM GROUP

Established in 1968, the DUROtherm Group specialises in developing and manufacturing high-quality vacuum-moulded and PU/RRIM foam parts made of plastic. These innovative moulded parts tick all the boxes in terms of design versatility and mould size, and they are used in numerous industries. The in-depth expertise of the workforce and the extensive range of ultramodern machinery make DUROtherm one of Europe's top thermoforming companies. In addition to five production plants in Germany, the DUROtherm Group operates further branches in the Czech Republic and Switzerland.

Employing around 400 staff, the Group produces moulded parts for a wide range of sectors. Its customer base includes numerous market leaders from all kinds of industries, and it is also very well placed in terms of economic strength, machinery and production space. The Group's turnover has steadily increased over the years. Success factors include regular investment in additional equipment and the continuous expansion of production premises.

DUROtherm's high quality standards extend across all processes – from planning and production to delivering the exact quantity requested in the specified quality at the agreed time. To ensure these high standards are met at all times, all processes are organised within the framework of a quality management system to IATF 16949:2016 and DIN EN ISO 9001:2015. Protecting the environment and conserving resources are very important to DUROtherm, too, so the Group is also certified to EMAS, the European Union's quality seal for sustainable environmental management.



FULL RANGE OF SERVICES

Expert advice, careful planning

The Group's comprehensive range of services starts with careful planning for each project. Special project planning teams are put together according to the task at hand and made available to the customer. These teams use their in-depth know-how and years of experience to meet customer requirements. The top priority is to lay the foundation for a successful project from the outset by devising the optimum solution based on customer expectations and what is economically and technically feasible.

High-tech CAD engineering

Customers can also benefit from the expertise of DUROtherm's engineers at the development and design stage. From the initial concept and sketches and the complex, coherent design of one or more modules through to the "hands-on" model, DUROtherm covers every single product development stage. Design details are optimised in terms of feasibility and material properties – all in close dialogue with the customer. This ensures the best possible functionality and an innovative design.

Prototyping – fast and flexible

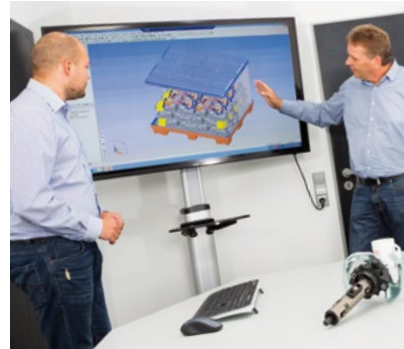
The CAD data provided by the customer or generated by DUROtherm is used as a basis for the company's own mould-making team to create high-quality sample or series moulds in no time at all, thereby laying the foundation for optimum production. Final corrections and adjustments based on customer requirements can be completed very quickly and cost-effectively. Thanks to decades of plastics forming experience, the choice of materials and the geometry of the thermoformed parts are already factored in at the mould-making stage. This ensures that the products subsequently manufactured benefit from a high level of functionality.

Consistently high-quality series production

When it comes to the series production stage, the most appropriate process technology for the task at hand is applied. As a result, DUROtherm is able to satisfy even the toughest project requirements and more unusual customer wishes. State-of-the-art machinery combined with three-shift production makes it possible to complete even large orders with consistently high series quality in next to no time and even find the best solution to overcome bottlenecks. Innovative 5-axis controlled CNC milling lines are available for further processing of the thermoformed parts, with cutting-edge CAD/CAM technology used for programming. The large assembly department handles everything from picking individual parts to producing finished assemblies.

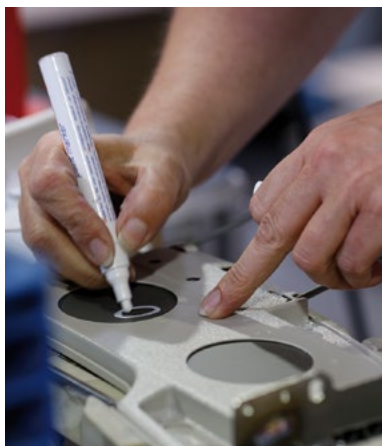
Well thought-out logistics processes

If required, even large quantities of goods can be kept available to supply promptly at short notice, thanks to a sophisticated logistics organisation. Order processing can be fully automated if necessary. To ensure uniform labelling and good traceability, all deliveries take place in accordance with VDA guidelines. Delivery notes can be sent to customers online so that they have full details of the quantity, contents and delivery time before the goods arrive and can optimise the management of further processing accordingly.



INNOVATIONS THAT SHAPE
THE WORLD OF PLASTICS.







DUROtherm

YOUR POWERFUL PARTNER FOR THERMOFORMED PARTS

Specialist for vacuum formed parts since 1968. DUROtherm's primary concern is comprehensive customer satisfaction in all areas of collaboration. All our thoughts and actions and all processes are focused on this goal.

This strict focus on customer requirements is achieved both through sound consultation combined with technically perfect thermoformed parts, and also through a high degree of flexibility and reliability. Our friendly, helpful, well-trained staff is another factor that ensures consistent achievement of this goal.

The highest standards of quality, maximum flexibility and dependability, combined with cooperativeness and fairness are factors that contribute to our success, making DUROtherm a business partner that delivers high performance – now and in the future.

DUROtherm
Kunststoffverarbeitung GmbH
Industriestraße 52
72221 Haiterbach (Deutschland)
Telephone: +49 (0)7456 695-0
info@durotherm.de
www.durotherm.de

DUROtherm
Thermoforming Czechia s.r.o.
Alejní 630
41742 Krupka (Tschechien)
Telephone: +420 417 813911
info@durotherm.cz
www.durotherm.cz

CRISCO
Formtechnik AG
Augrabenstrasse 11
9466 Sennwald (Schweiz)
Telephone: +41 (0)81 7503600
info@crisco.ch
www.crisco.ch