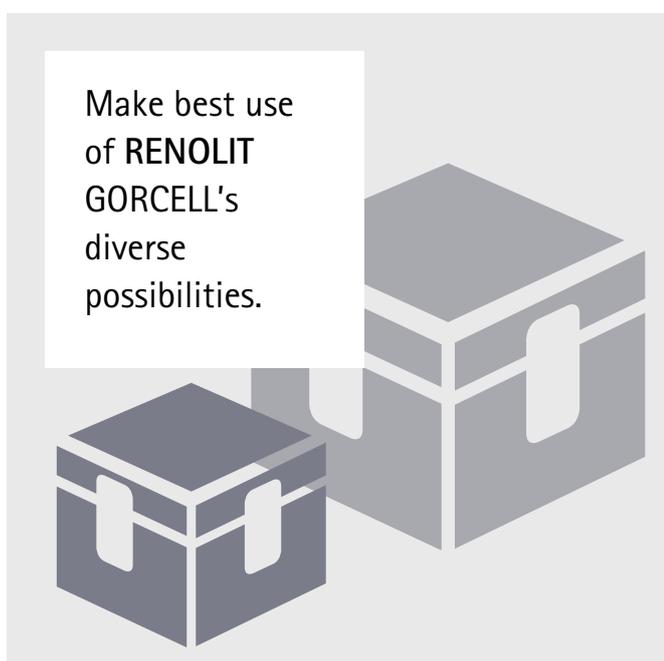




*Rely on it.*

## RENOLIT GORCELL – Composite material with a great future

Processing handbook for an innovative panel material



Make best use  
of RENOLIT  
GORCELL's  
diverse  
possibilities.



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## RENOLIT – YOUR RELIABLE PARTNER IN THE INDUSTRY

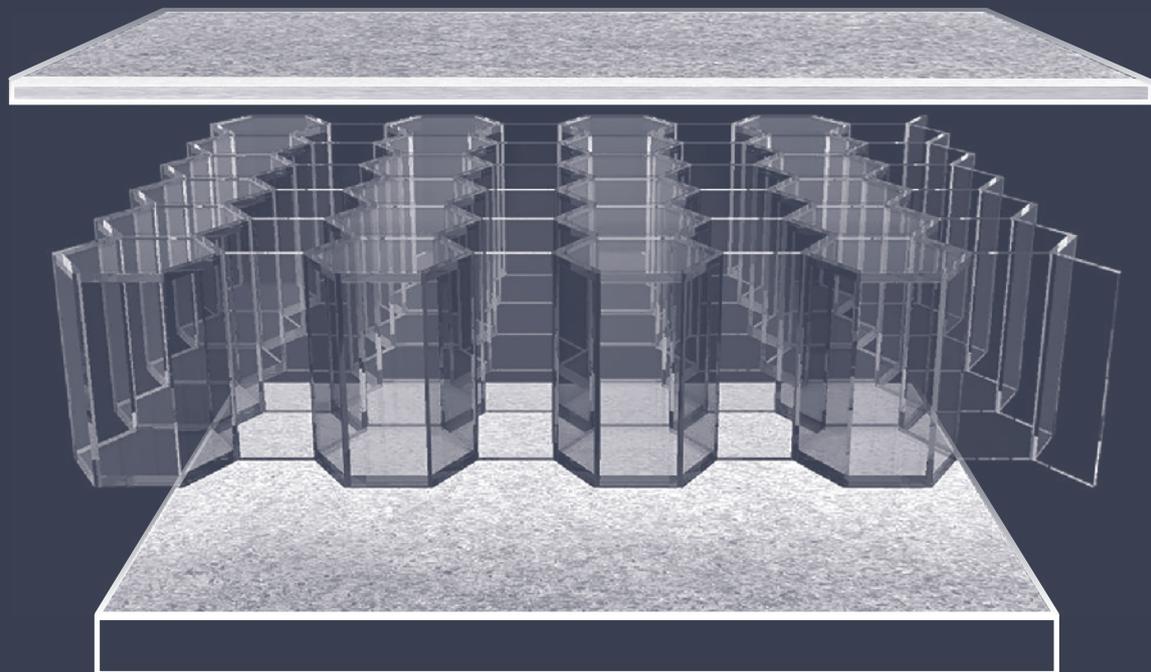
The **RENOLIT Group** is one of the leading manufacturers internationally of high-quality plastic films and related products for technical applications. For over 70 years, this independent family business has set new standards in quality and innovation, and today employs around 4,500 people at more than 30 production sites and distribution companies. The name **RENOLIT** stands for technical competency, modern product design and partnership-based services throughout the world.

**RENOLIT** plastic films are used to refine the surfaces of furniture, construction elements and hi-fi products, to insulate roof and underground structures and to line swimming pools. We produce films and tubes for medical applications and recyclable panels in combination with natural fibres for the building and automotive industry. **RENOLIT** films are also used to make products for office organisation, for the interior fittings of vehicles, self-adhesive products for the graphics and labelling industry, as well as technical products.

# RENOLIT GORCELL

Composite material with a big future  
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## RENOLIT GORCELL – THE MATERIAL AND ITS CHARACTERISTICS

With RENOLIT GORCELL, RENOLIT offers a particularly light panel material with numerous positive characteristics. This lightweight construction material is made by combining RENOLIT WOOD-STOCK composite panels with an ultra-light honeycomb structure.

The honeycomb structure of this high-tech product can withstand great pressure and is also watertight. It is manufactured from thermoplastic foil in a continuous production process, and then combined with top layers of composite panels. Both the EconCore procedure and the end product have to date been unique in Europe in this form. When covered with a RENOLIT WOOD-STOCK top panel, RENOLIT GORCELL has a multitude of possible applications, both interior and exterior, and offers completely new opportunities for the design of components.

### RENOLIT WOOD-STOCK

RENOLIT WOOD-STOCK consists of a thermoplastic WPC substrate (Wood Polymer Composite) – a combination of natural fibres and polymers which are compressed under pressure and heat. The one to three millimetre thick panel material can be designed three-dimensionally and, despite being so thin, is extremely dimensionally stable. The surface structure of the composite material is suitable for both film and non-woven material lamination. RENOLIT WOOD-STOCK is also practically hydrophobic and completely recyclable. As a decorative surface, the whole design range of RENOLIT 2D and 3D films is available in a choice of more than 400 colours and decor finishes.

## RENOLIT GORCELL – characteristics

### Particularly light

The core of the honeycomb has a specific weight of only 80 kg/m<sup>3</sup>. This light weight means that RENOLIT GORCELL panels are easy to handle.

### High weather-resistance

Because of its excellent water-resistance, the material offers high weather-resistance for external use and for humid indoor locations.

### Enormously strong

With compressive strength of up to 1.2 MPa (ASTM C365-57), RENOLIT GORCELL panels have extremely high load-bearing capacity. Although the sandwich structure is only a few millimetres thick, its internal honeycomb structure ensures unusually high strength.

### Excellent to work with

With RENOLIT GORCELL, even curved shapes can be simply achieved with a visually attractive appearance. Surfaces can be finished in the most varied coating materials without any problem.

### Versatile to use

In combination with coverings such as non-woven materials, various types of textile or decorative RENOLIT film, RENOLIT GORCELL can be used in many different ways. The external coating can be realised as a scratch-proof or weather-resistant finish, or a "soft-touch" surface.

### Fully recyclable

RENOLIT GORCELL can be 100% recycled. The whole sandwich structure is recyclable. RENOLIT also takes back all process waste produced, and returns it to production.

### Wide selection

RENOLIT has various different thicknesses and surface layers of RENOLIT GORCELL available in its range, so that it is always possible to offer the technically and commercially optimum solution.

### Cost-efficient

The sparing use of resources in the manufacture of RENOLIT GORCELL ensures sustainable cost savings.

# RENOLIT GORCELL – THE MATERIAL AND ITS CHARACTERISTICS

## AVAILABILITY OF RENOLIT GORCELL

### Wide range of applications for interior and external use

With its many positive characteristics, RENOLIT GORCELL offers new opportunities for numerous areas of application - from the car industry, through furniture and the leisure sector to transport.

can be made from it. RENOLIT GORCELL can be covered in various finishing materials. Ceilings, walls, floors and cabinet fronts in a caravan can therefore be designed with surfaces which look as though they have all been made to match.

### Example 1: Motor homes and caravans

RENOLIT sets new standards in the demanding market for motor homes and caravans with its innovative lightweight material. RENOLIT GORCELL can be used inside caravans for wall coverings, sliding doors, furnishings, side walls in wet rooms and floors. Internal claddings for caravans made of RENOLIT GORCELL weigh up to 50% less than traditional coverings based on plywood. The material withstands high pressure and impact, and is also water and damp-resistant, which means that external fittings for a caravan, such as doors,

### Example 2: External applications for home and garden

RENOLIT GORCELL also has many different external uses - for summer houses, as privacy screens for garden boundaries, screens for waste and recycling bins or garden furniture cushion storage boxes. The material is visually high-quality, easy to work with and extremely durable. It also provides a high degree of weather-resistance for external use. Unlike wood, it does not have to be regularly repainted. Its light weight means that components can be easily constructed. And freight costs are also lower.

---

## AVAILABILITY OF RENOLIT GORCELL

- **Availability:**
  - Per part/component
  - Only RENOLIT GORCELL
  - RENOLIT GORCELL with non-woven material
  - RENOLIT GORCELL with decorative surface
  - **Core option ??** RENOLIT GORCELL with non-woven material versus RENOLIT GORCELL Woodstock with non-woven material
- **Sending samples:**

Samples can be requested from [design@renolit.com](mailto:design@renolit.com)

- **Panel dimensions:**

Standard panels 1220 mm × 2440 mm  
(Maximum size 1500 mm × 6000 mm)

RENOLIT GORCELL panels are made in accordance with your particular requirements and specifications. Decorative films from the RENOLIT ALKORCELL range refine the surface and give the product a good finish.

## GENERAL DATA EXAMPLE

Further product data-sheets are available on request.

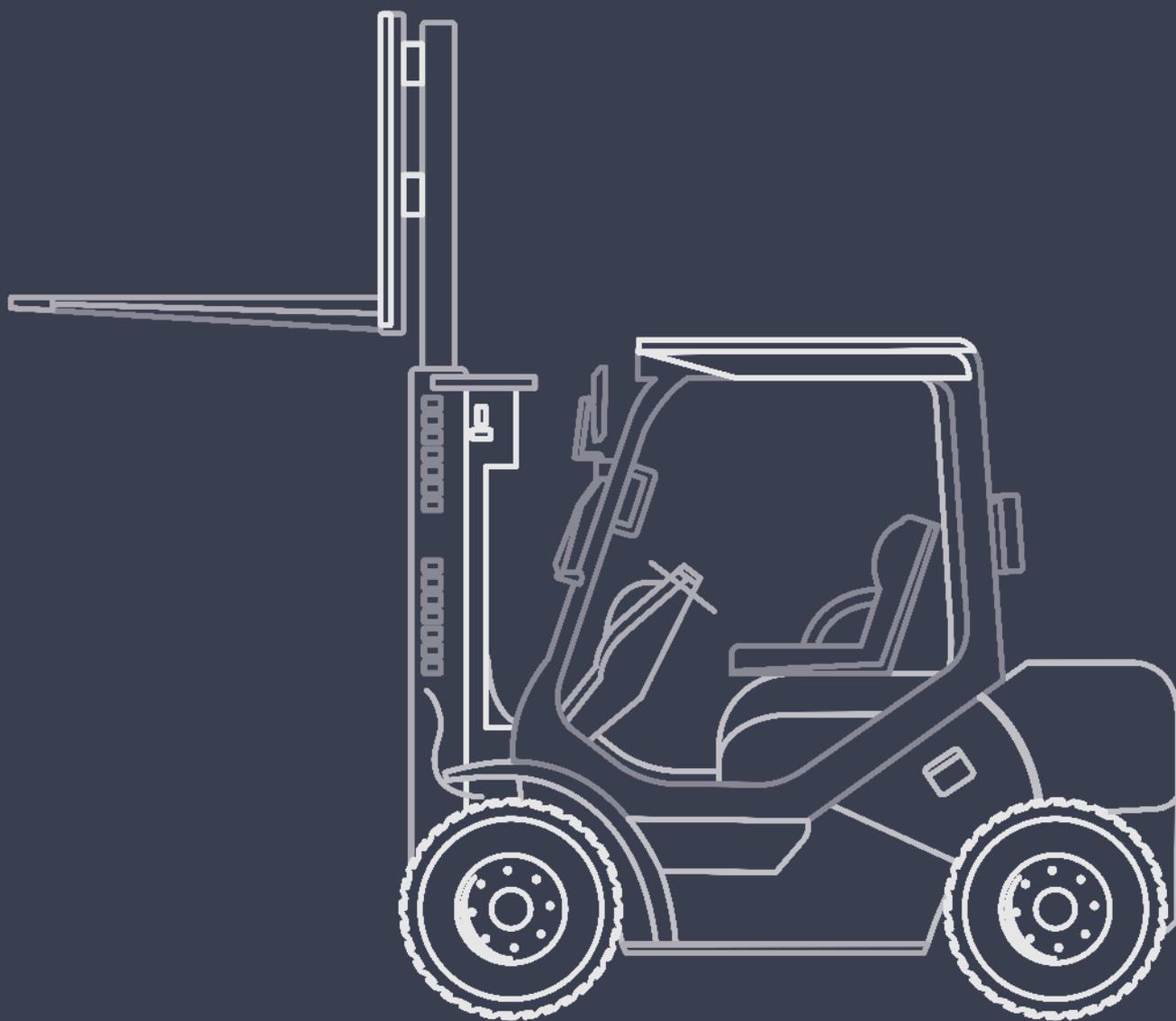
### RENOLIT GORCELL – WOOD-STOCK 20

Physical values	Standard	Unit	Direction	Standard values
Thickness	Internal method	mm		21.3
Produktaufbau	Internal method	Paneel		Top Skin WS 1.0 mm Core PP 20 00 Bottom Skin WS 1.0 mm
Specific weight	FIAT 9.55360	g/cm <sup>3</sup>		0.19
Surface weight	Internal method	g/m <sup>2</sup>		3975
Modulus of elasticity	Internal method	N/mm <sup>2</sup>	L. T.	1196 942
Bending strength	Internal method	N/mm <sup>2</sup>	L. T.	8.38 8.72
Maximum load	Internal method	KN	L. T.	0.24 0.19
Compressive strength	ASTM C/365-03	MPa		1.13
Impact resistance	FIAT 9,55360	KJ/m <sup>2</sup>	L. T.	8.69 22.2
Chemical resistane	Polypropylene standards			
Maximum light transmission	–	%		0
Coefficient of heat transfer	UNI EN 12667-2002	W/m <sup>2</sup> K		4.31
UV resistance Time 500 hrs Output 500 W/m <sup>2</sup> Fibre 300 nm (simulates daylight at sea level) Temperature 65°C Cycle 8 hours light + 16 hours darkness	ISO 4892-2	h		No colour change occurred
Resistance to wear and tear	MIS 950M	No change occurred in external layers		
Ammonia resistance	MIS 950M	No change occurred in external layers		
Alkaline resistance	MIS 950M	No change occurred in external layers		
Flame test	mm/min	25		

Further product data-sheets are available on request.  
Values are subject to technical changes.

# STORAGE

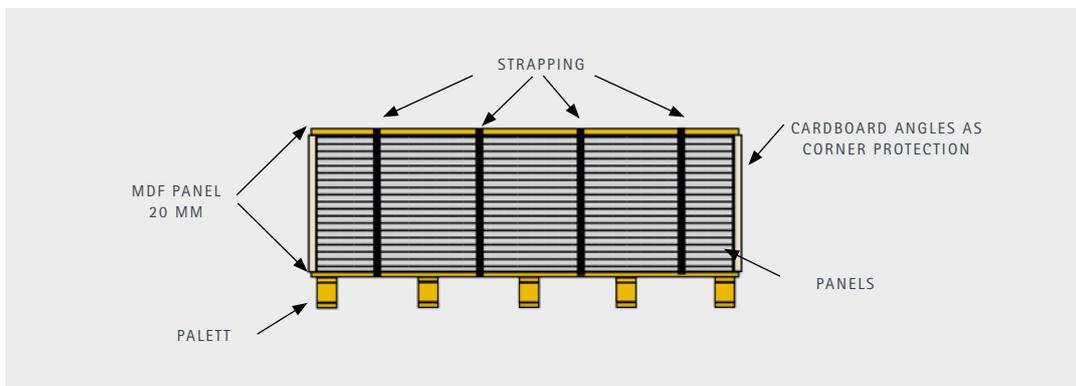
Storage of RENOLIT GORCELL panels



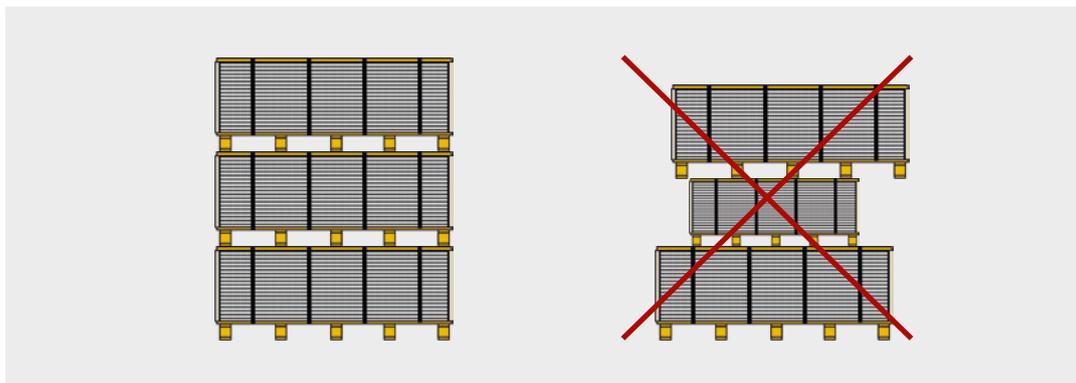
The RENOLIT GORCELL panels are delivered on wooden pallets with flat bases. Depending on the type of panel, a stack is also covered with a chipboard covering panel. The panels are packed in film as standard, and strapped down several times. The stacks of RENOLIT GORCELL should be stored in temperature-controlled rooms and protected from humidity. If several stacks are stored on top of one another, care must be taken to ensure that the load can be transferred vertically through the pallet uprights. Incorrect storage may lead to undesirable warping of the panels.



*Packed RENOLIT GORCELL panel stack*



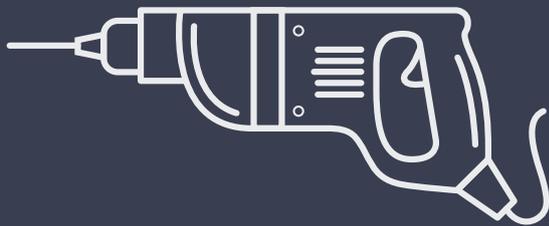
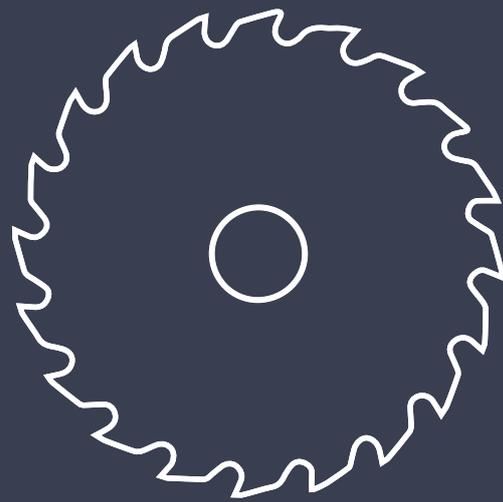
*Packed stack of panels on pallet*



*Storage of RENOLIT GORCELL panels*

# FABRICATION

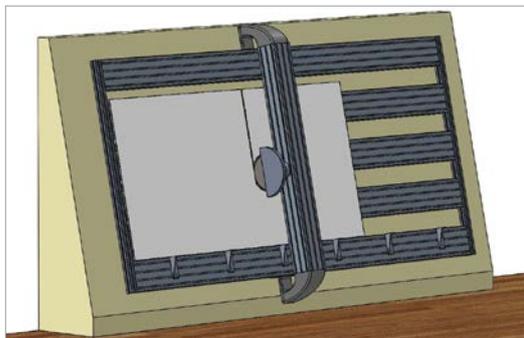
Process and treat **RENOLIT GORCELL** panels in the best way possible.



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## CUTTING

RENOLIT GORCELL WOOD-STOCK can be cut on horizontal or vertical circular saws



*Vertical panel saw*

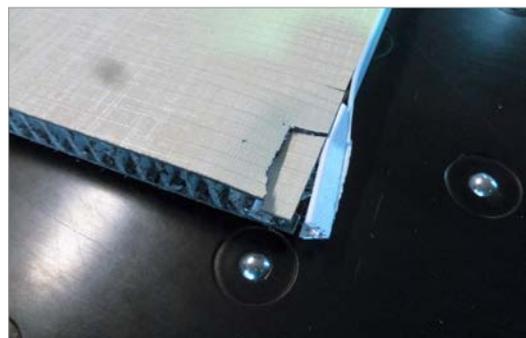


*Horizontal panel saw*

### **Reduce collet chuck pressure**

When cutting with an horizontal panel saw, the clamp pressure must be reduced, depending on the type of machine, from the normal 5.0 to 6.0 bar in cutting chipboard to approx. 2.0 to 2.5 bar. Collet chucks exert loads over small areas which can cause damage to the RENOLIT GORCELL panel.

The pressure beam of a panel saw can remain set to the usual 5.0 to 6.0 bar. The large contact area does not damage the RENOLIT GORCELL panel.



*Damaged RENOLIT GORCELL panel*



*Collet chuck pressure to high*

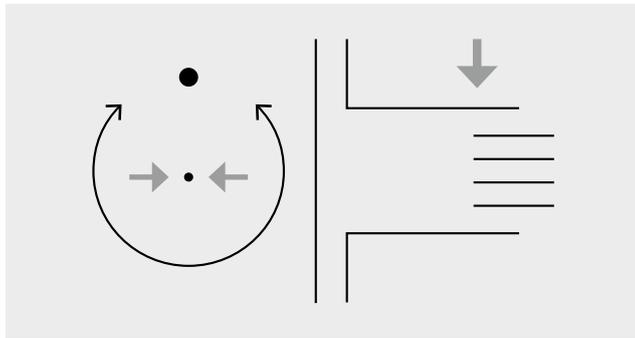


*Collet chuck pressure correct*

Setting collet chuck pressure 2.0 to 2.5 bar



Manometer adjustment

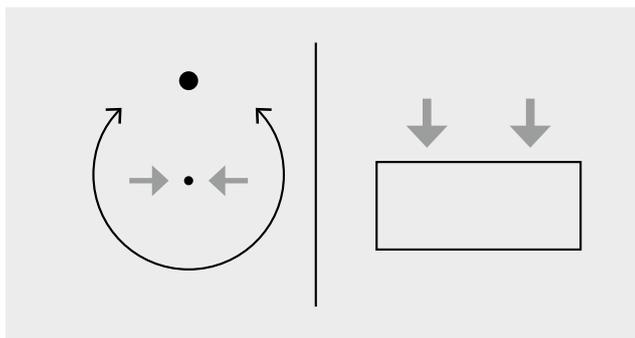


Collet chuck symbol

Setting collet chuck pressure 5.0 to 6.0 bar



Manometer adjustment



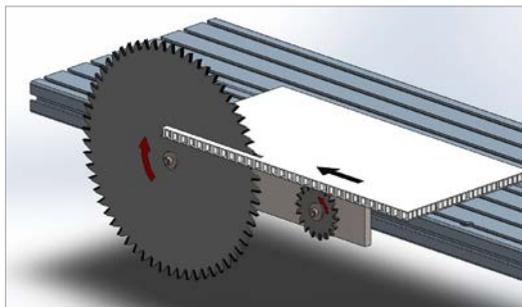
Pressure beam symbol

## SAW BLADES

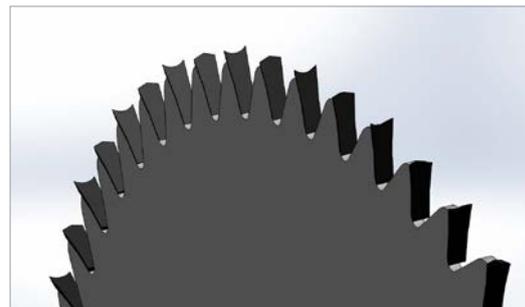
### Suitable saw blades

Hard metal and diamond saw blades are suitable for cutting GORCELL. Cutting is best done using a horizontal blade. To achieve a clean cutting edge so that edging can be done directly on the edge gluing machine, the use of a hollow-inverted blade for the main saw and, if

required, a scoring unit is recommended with the RENOLIT GORCELL WOODSTOCK. The scoring unit works in synchronism and the main saw in counter direction. *See illustration.*



*Saw with scoring unit in counter direction*



*Saw with scoring unit in a side view*

### *Saw blade type main saw:*

*Hollow-inverted blade, 10° positive, Z 60 to Z 72*

### *Depending on machine and diameter*

*Cutting speed*

*30 – 35m/sec*

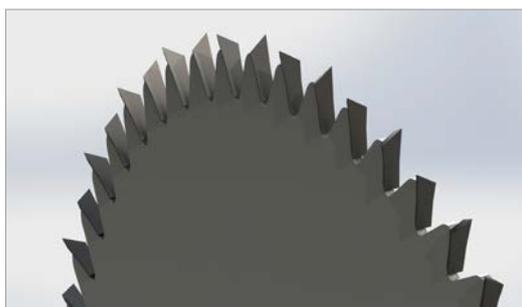
### *Scoring unit:*

*Flat tooth conical, Z 12 to Z 18 depending on machine*

Cutting speeds should be reduced if the saw blades heat up significantly.

To avoid friction heat which leads to a poor cutting result and increased clogging of the panel edge, a wider cutting joint is recommended. The sprocket should protrude 0.8 mm above the main blade as far as possible. To avoid softening and clogging the WPC, attention should be paid to ensuring a sufficient forward feed.

A very sharp alternating tooth blade is best suited to cutting RENOLIT GORCELL with CURV (R) top layers.



*Best saw tooth geometry for RENOLIT GORCELL panel cutting*

## DUST REMOVAL AND EXTRACTION

Any WPC chips created normally have a static load, and can negatively influence the cleanness of the work piece and subsequent cutting. To avoid this, the use of ionising and cleaning nozzles is recommended. The ionised air removes the charge from the chips created, so that they can be vacuumed up effectively. The work piece edges produced are significantly cleaner and can be further processed more reliably.



*Edge cleaning with compressed air*

### **Higher air humidity reduces static loading**

The static loading of the RENOLIT GORCELL panels is lower, the higher the air humidity in the processing room. Relative humidity levels of between 50% and 70% are beneficial.



*Edge cleaning with ionised compressed air*

Ionisation cleaning heads with rotating air flow are particularly effective. Chips which lodge in the honey-comb are actively released by these.

Beneficial extraction speeds for WPC and PP chips from RENOLIT GORCELL in the area of the extraction points are 20 m/sec to 25 m/sec. They should be adjusted accordingly.



*Ionisation with rotating nozzle*

When using ionisation guns in the edge gluing machine, care must be taken to ensure that the loosened chips are extracted at the same time.

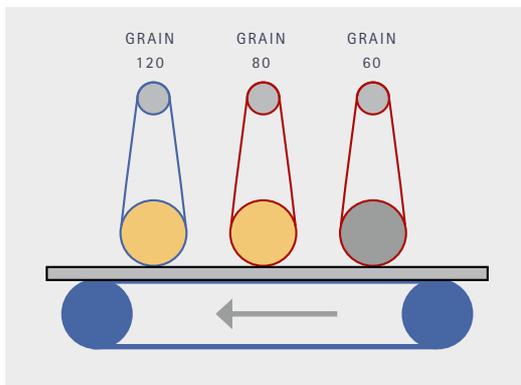


*Static ionisation gun*

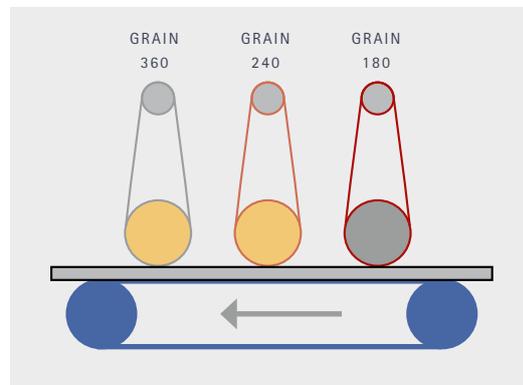
## POLISHING RENOLIT GORCELL PANELS

RENOLIT GORCELL panels can be polished before processing if some edge bonding is taken into account. This may be necessary if a particularly flat surface is necessary before laminating, eg for a highly polished surface. as the RENOLIT GORCELL top layers are generally made of a thermoplastic PP-wood mix, attention should be paid to heating of the grinding belts. It has proved effective to polish this material with similar machine parameters as for lacquer sanding.

- The grinding belt speed must be adjustable.
- Grind belt speeds of 1 m/sec have a positive impact on the heating of the belt.
- Start with grain 60 or less.
- One polish with grain 120 can result in a surface which can be laminated.
- Low material acceptance per abrasive grain. Approx. 0.1 mm total grinding thickness leads to a smooth surface which can be laminated.
- Take care to ensure that dust removal is well ionised.



Basic polish before laminating, eg with RENOLIT ALKORCELL



Fine polish before laminating with high-gloss film

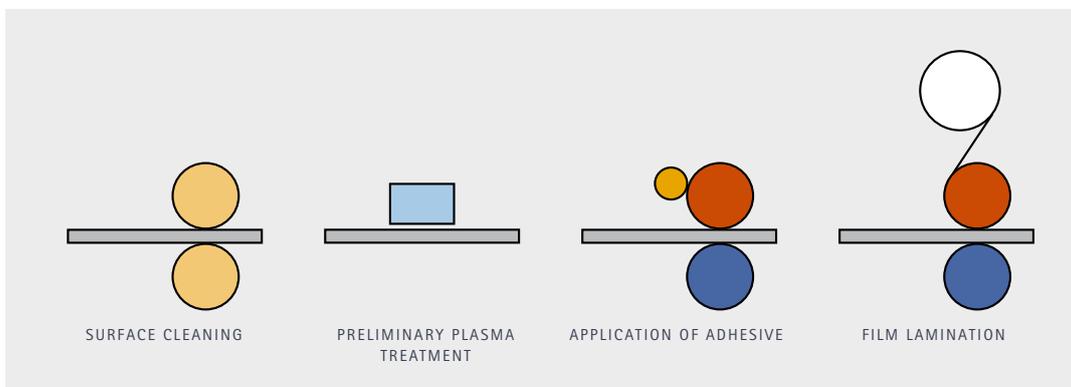
## LAMINATING FILM ON RENOLIT GORCELL PANEL

The RENOLIT GORCELL panels are cleaned at the works. After unpacking or polishing the panels, the environmental temperature should be controlled. For foil lamination to take place as unproblematically as possible, the polished surface or surface covered in non-woven material should be cleaned with an anti-static brush unit and ionised air to remove any particles present.

### Preliminary plasma treatment for polished surface

With a polished surface, preliminary plasma treatment must be carried out before bonding. The recommended bonding agent for a smooth polished surface is hot-melt polyurethane with application weight less than 60 g/m<sup>2</sup>. When applied to a non-woven material, application quantities of approx. 80 g/m<sup>2</sup> are usual.

Depending on the type of film, use moderate pressure when working to avoid the honeycomb structure coming through.



Process of laminating a RENOLIT GORCELL panel with film

### NOTE

Instead of the above described process, you can also order ready-made laminated panels with decorative surfaces from the RENOLIT ALKORCELL range. Please note our minimum order quantities.

## VENEERING AND BONDING HPL ON THE RENOLIT GORCELL PANEL

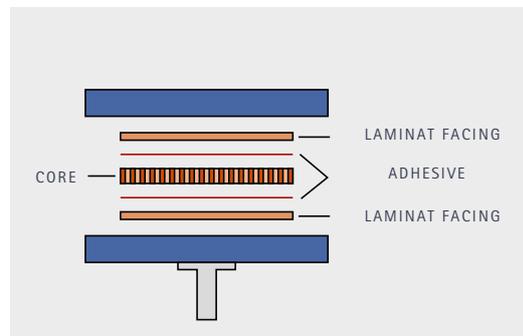
RENOLIT GORCELL panels can be hot and cold veneered, and covered with HPL. Attention must be paid to the heat expansion behaviour of the materials in choosing temperature. During veneering, temperatures between + 20 °C and + 40 °C should be used to avoid stress and cracks in the veneer.

### Apply dispersion glue very sparingly

When using dispersion glue, take care to ensure that the RENOLIT GORCELL panel shows practically no signs of water absorption. A dispersion glue must therefore be applied very sparingly, as all moisture has to escape through the veneer. The compression time must also be adjusted accordingly. In contrast to conventional MDF or chipboard, a double pressing time should be allowed. The binding time for the adhesive must also be increased. Dispersion glues should not be used for HPL, as the trapped water has no route out of the assembly.

If 1K-PUR adhesives are used, pay attention to any slight fogging of the bonded joints with water, as veneer and HPL are normally very dry and do not add moisture. It is necessary to observe the pot life of 2K PUR adhesives, to achieve a good adhesion process.

The compressive pressure with flat pressure 0.1 N/mm should be up to 0.5 N/mm<sup>2</sup>. With a vacuum membrane press, a rigid insert should also be fitted on the membrane side. Otherwise there is a danger that the corners will be squashed by the membrane.



Veneering a honeycomb panel



RENOLIT GORCELL panel with non-woven materials



Veneered RENOLIT GORCELL panel

# BONDING AND DOUBLING SURFACES OF RENOLIT GORCELL PANELS

RENOLIT GORCELL panels are available in 5 mm, 10 mm, 15 mm and 20 mm widths. The panels can be bonded together to form very stable and thick panel assemblies with high load-bearing capacity. The surface of the RENOLIT GORCELL panels can be bonded with all standard adhesives such as PVAC, EVA, 1K-PUR, 2K-PUR and hot-melt PUR.

### Water-free adhesive systems beneficial

As the panels are gas-impermeable and contain little moisture, water-free adhesive systems are to be preferred, in particular low-foaming options if 1K-PUR is used. It is essential to ensure that water spray is controlled, so that a setting reaction can occur. With a hot-melt PUR, quick-setting systems should be preferred over slow-setting systems due to their affinity with water. The best suited to doubling are the 2K-PUR-systems, as they do not tend to foam nor are they reliant on environmental or material humidity.

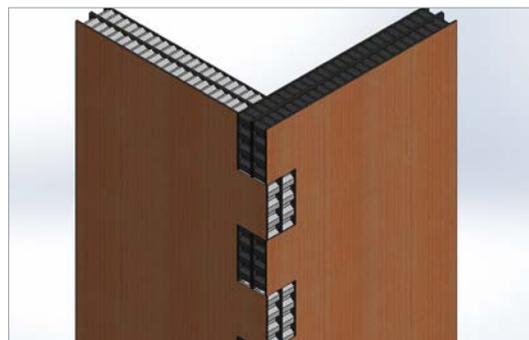
In practice, such doubling-up has a particular role to play in the cores of doors for wet rooms and outdoor furniture. The benefits of stability, light-weight construction and water resistance can be fully utilised for this purpose.



*Tripled RENOLIT GORCELL panel with OCEANDRIVE top surface*



RENOLIT GORCELL panel milled T-joint



RENOLIT GORCELL panel interlocking corner joint

## CARCASS BONDING RENOLIT GORCELL PANELS

RENOLIT GORCELL panels consist of a PP-wood mix or PP in the honeycomb core, and must be pre-treated accordingly before processing to ensure good bonding to suitable adhesives. Experience has shown that using primer and plasma pre-treatment works well. For pre-treatment, manual as well as fully industrialised processing at various speeds is possible.

Normally the adhesion points are treated by priming or pre-treating with a cleaning agent suitable for the adhesive system. This removes dirt, grease and other substances which could negatively affect bonding.

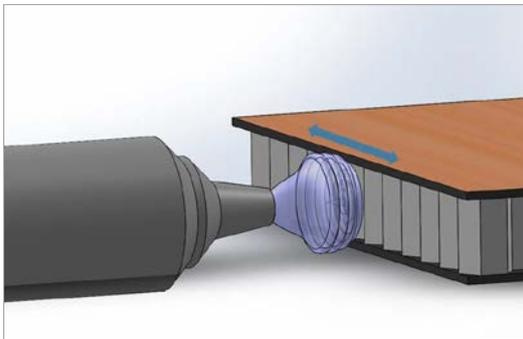
With moisture-curing adhesives, waiting a short time after application of the adhesive is recommended, so that the adhesive can absorb the necessary humidity from the air. Examples of suitable adhesive systems are shown in the table below; their suitability for the respective application should still be checked. The adhesive supplier's recommendations should be followed in all cases.

### ADHESIVE SYSTEMS

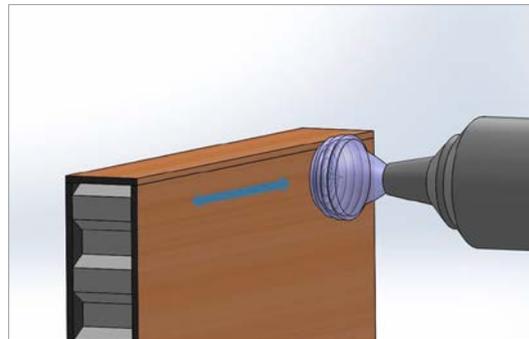
Manufacturer	Cleaning agent	Primer	Adhesive	Type of adhesive
SABA	Sabaclean 48	Saba Primer 4518	Sabatack 790	1K MS Polymer
Klebchemie	Reiniger 820	Plasma	601.1	1K MS Polymer
SABA	Sabaclean 48	Saba Primer 4518	Sabatack Fast	2K MS Polymer
Klebchemie	Reiniger 820	Plasma	602.1	2K MS Polymer
3M	Reiniger 151	Without	DP 8005	2K Acrylat

The adhesives shown are only examples of possible adhesive systems. Other adhesive systems can be obtained from reputable adhesive manufacturers (see reference and list of partners appended).

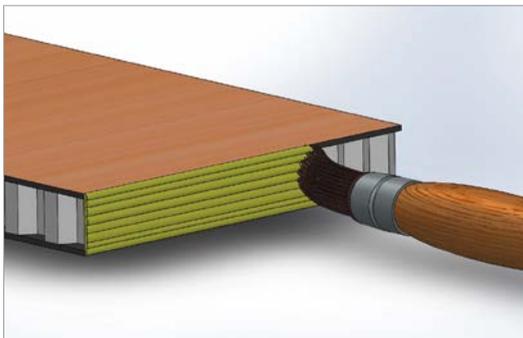
# PROCESS OF BONDING RENOLIT GORCELL PANELS



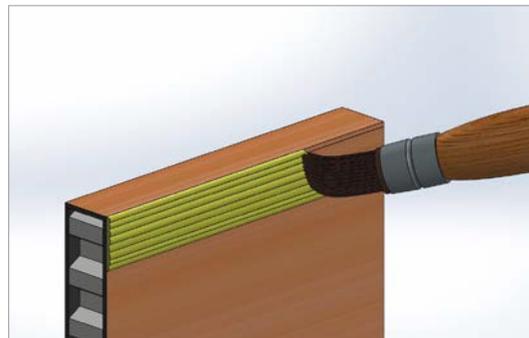
*Plasma pre-treatment RENOLIT GORCELL honeycomb*



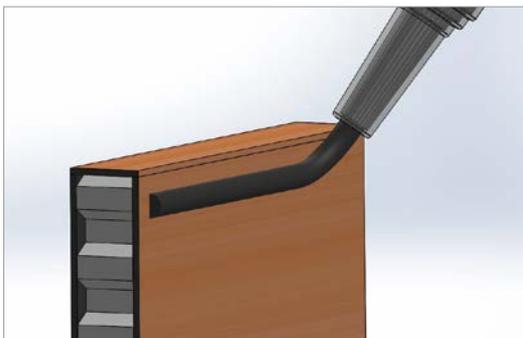
*Plasma pre-treatment surface*



*Primer pre-treatment RENOLIT GORCELL honeycomb*



*Primer pre-treatment decorative surface*



*Application of adhesive to RENOLIT GORCELL panel side*



*Bonded RENOLIT GORCELL panels*

## EDGE GLUING MACHINE

### JOINT CUTTER

## EDGE GLUING MACHINE

The high-quality application of edging materials to RENOLIT GORCELL panels can be carried out with standard machinery and edge strip materials. Some characteristics of the panels still have to be taken into account to avoid errors.

### Work-piece recognition in the machine intake

Because of the low density of a RENOLIT GORCELL panel, capacitance switches on the machine intake cannot reliably recognise the panel when there is a normal interval (approx. 5 mm), as is usual for wooden materials. A smaller gap of around 1.0mm to 1.5 mm should be set. In some model ranges, panel recognition can be guaranteed by changing the sensitivity of the switch.



*Position of work-piece sensor on an edge gluing machine*

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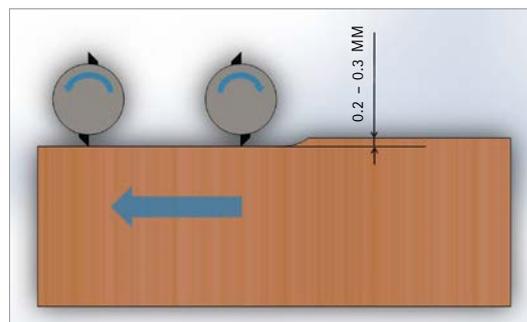
## JOINT CUTTER

On joint cutters, using diamond cutters with double-sided pulling cut is beneficial. Fitting ionisation nozzles in the chip covering reduces chip adhesion.

The most beneficial joint thicknesses are in the range 0.2 mm to 0.3 mm. Greater joint thicknesses lead to twisting in the central honeycomb layers. This can result in increased reset forces when the adhesive is applied.



*Joint cutters on an edge gluing machine*



*Chip removal on joint cutter*

## APPLICATION OF ADHESIVE WITH ROLLER UNIT

Care must be taken to ensure that adhesive is applied evenly to the edges and central layers of the RENOLIT GORCELL panels. To achieve particularly high edge peeling forces, application of the adhesive in the counter direction is recommended when applied by roller. This ensures that a lot of adhesive is applied to the central layer, which increases edge strength.

For roller application, non-reactive, easily refillable polyolefin edge adhesives from various manufacturers are suitable.

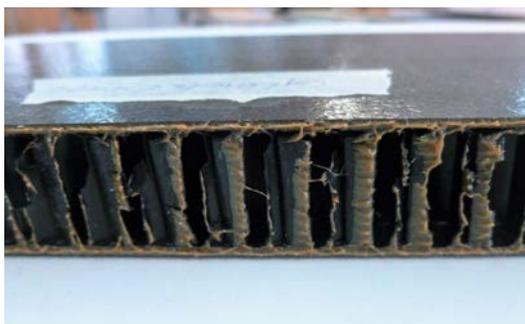


*Application of adhesive with glue roller*

### **Durable edge bonding with polyurethane adhesives**

Very durable and waterproof edge bonding with roller application can also be produced using polyurethane edge adhesives. This is bonded to the RENOLIT GORCELL

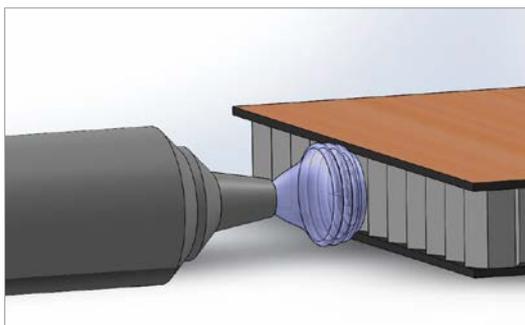
panel edge with plasma pre-treatment before gluing. Special flat plasma nozzles are available from various plasma equipment manufacturers for this purpose.



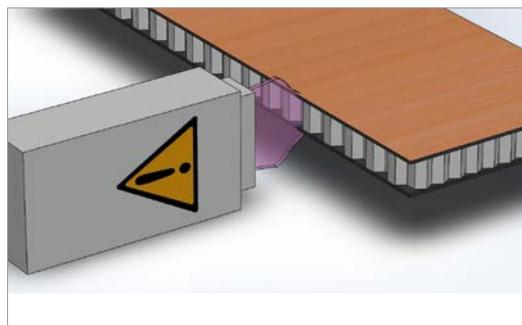
*Synchronised application of adhesive*



*Application of adhesive in counter direction*



*Pre-treatment with round plasma nozzle*

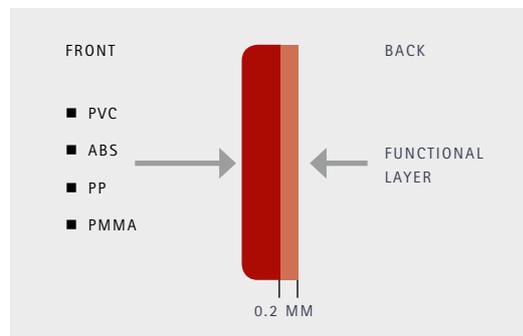


*Pre-treatment with flat plasma nozzle*

## EDGE BANDING WITH REACTIVATION TECHNOLOGY

Another highly efficient possibility for edge banding is offered by the use of laser edging. For this type of edge, a coating with a low melting point first applied to the edge material.

The coating can be activated in a correspondingly equipped edge gluing machine, either with a laser unit, plasma head, hot compressed air unit or throughput hot air unit in such a way that a very thin, but very strong bonded joint is created.



Edge material with reactivatable functional layer



### Laser technology

With laser processing, a laser activates the functional layer.



### Hot-air Technology

With hot-air technology, hot compressed air allows the functional layer to melt.



### NIR Technology

With near-infra-red technology, heat energy can be transferred quickly and accurately.



### Plasma technology

If a customer uses the plasma process, air plasma from a nozzle melts the functional layer.

Technologies for processing pre-coated edge materials (photo source: Rehau)

All these technologies are available on the market in various price ranges and with various forward feed rates from different manufacturers.



Laser edge bonding (Source: Rehau Laseredge)



Fracture pattern edge bonding

# COMPARISON OF EDGING SYSTEMS

RENOLIT's own test series on edging systems produced the following results under near-production conditions:

## EDGE BANDING TECHNOLOGY AND ADHESIVES

Adhesive or technology	Strength
Hot-air edging	+ +
Laser edging	+ +
PO adhesive	+ +
PUR plasma-treated	+ +
PUR hand-fired	+
EVA adhesive	- -
POR adhesive	- -
PUR edge untreated	- -

Until further notice, the following are recommended for edging RENOLIT GORCELL:

- 1) Reactivation using laser technology, hot-air technology, infrared technology and plasma technology
- 2) Polyurethane melting adhesives with plasma pre-treatment of the RENOLIT GORCELL panel edge
- 3) Polyolefin melting adhesives without pre-treatment of the RENOLIT GORCELL panel edge

In choosing the edge gluing procedure, subsequent use and capacity loading are basically the important factors. Strength and temperature-resistance in subsequent use must be taken into account here by the manufacturer.

## ALTERNATIVE EDGING SOLUTIONS

As an alternative to thick edges, a supporting edge may be bonded to the honeycomb panel before a decorative trim is fitted. Manual processes or edge gluing machines with a corresponding step cutter are suitable for this purpose. Polyolefins are normally used as adhesives in this case.

In partition wall construction, PP hollow profiles are more frequently used as the edge trim. These are bonded using a combination of primer and flexible MS-polymer adhesive.

For craftsmen who want to work with standard techniques such as dowels, slats or screws, bonding bars is a good alternative. The edging materials available include, for instance, solid plastic materials or lightweight foams with density and strength characteristics similar to plywood.



*Edge trim with supporting edge*



*Edge trim with hollow section*



*Edge trim with rigid foam material*

## DRILLING RENOLIT GORCELL PANELS

As RENOLIT GORCELL panels have top layers made of WPC, the panels can be drilled just like a wooden material. In choosing the drill, ensure a flat front clearance. If the drill has a centering tip, this should be as small as possible ( $< 0.3 \text{ mm}$ ) to avoid damage to the opposite top layer, which is generally an exposed side. The feed rate should not be slow, to counteract melting of the surfaces by friction heat produced.

Ionised anti-static air is beneficial for blowing out the blind holes and extracting the chips created.



*Cutter*



*Drill with flat cutting clearance*

## PANEL JOINS AND FIXING POINTS

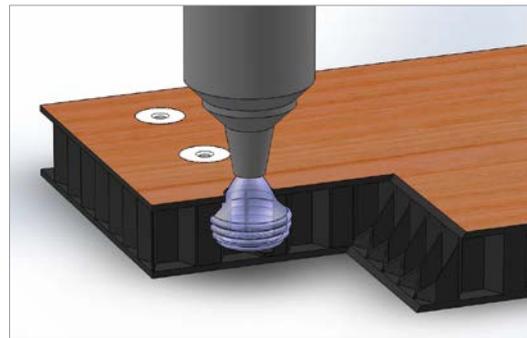
### Procedure for insert bonding, eg Hettinject by Hettich

To create panel joins or fixing points, experience has shown that inserts or glued dowels work well. A dowel used in the furniture industry for years is Hettinject, made by Hettich. The dowel is normally anchored in the honeycomb structure with a high-melt adhesive such

as polyamide or two-component adhesives such as 2K polyurethane or 2K acrylate. If 2K polyurethane is used, the drill hole should be pre-treated with a plasma ray for greater adhesion.



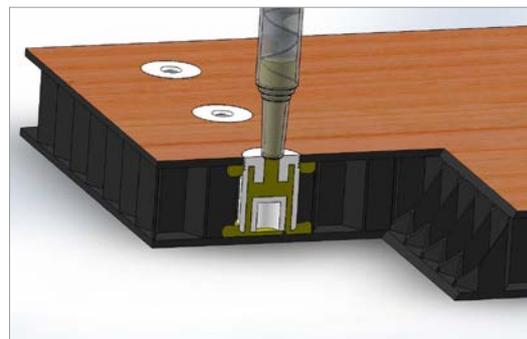
*Drilling blind holes*



*Plasma treatment of drill hole*



*Manual or automatic setting*



*Filling the cavity with the Hettinject dowel*

## Procedure with EJOT friction welded joint and equipment from WEBER automatic screwdrivers

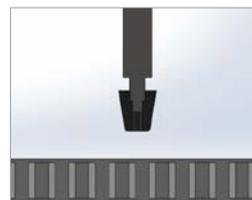
One of the most modern processing technologies for producing joints and fixing points in the thermoplastic RENOLIT GORCELL honeycomb panel is the friction welding technology from EJOT in conjunction with automatic screwdriving equipment from WEBER.

Using this technology, which was developed for series production in the automotive industry, a massive insert made of material which suits the PP of the RENOLIT GORCELL panel is rubbed into the panel. The defined friction heat created enables the inner top layer and the honeycomb material to melt in a controlled and recorded process, producing a correct adhesive bond. To obtain the necessary strength values, various diameters and lengths are available.

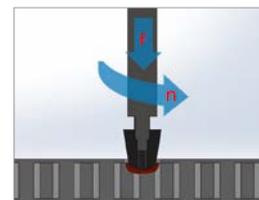
### Friction welding assembly from WEBER screw technology



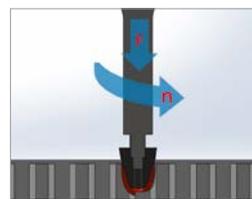
TSSD Friction welding equipment



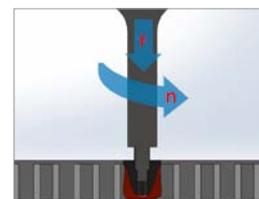
Positioning the insert



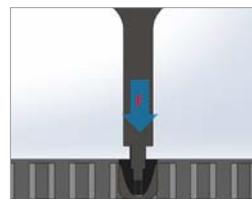
Melting the honeycomb panel



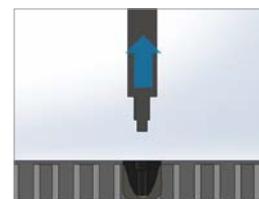
Penetrating the honeycomb panel



Completing the insert



Securing with contact pressure



Removing the tool

# PANEL JOINS AND FIXING POINTS

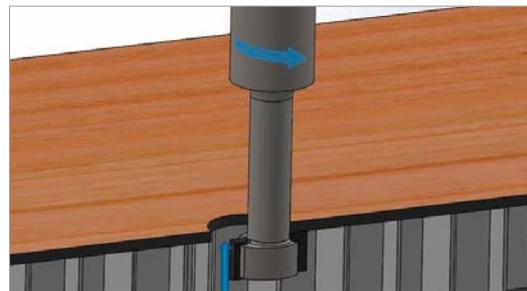
## Manual production of fixing points in RENOLIT GORCELL honeycomb panels

As an alternative to creating fastenings and fixing points fully automatically, manual fixing techniques can be appropriate, particularly for small series and the production of prototypes. For this purpose, a conical hole is made in the RENOLIT GORCELL

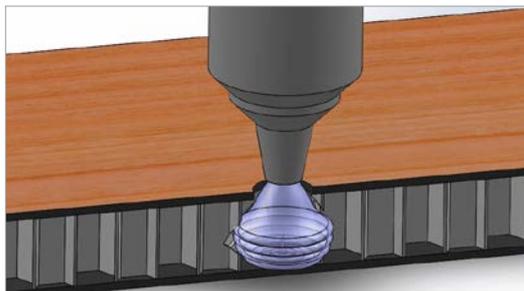
honeycomb panels with a cutter, or an undercut stepped hole with a stepped cutter. The hole is then filled with a very strong thermoplastic filler material or a 2K adhesive/2K setting compound.



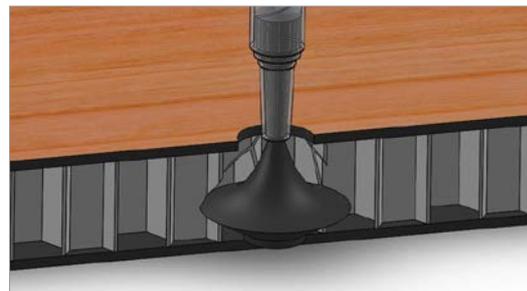
Option 1: Cutting out a tapered cavity



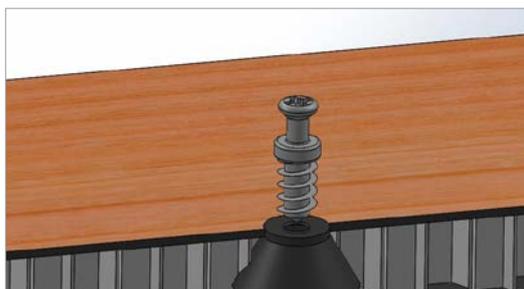
Option 2: Cutting out a stepped cavity



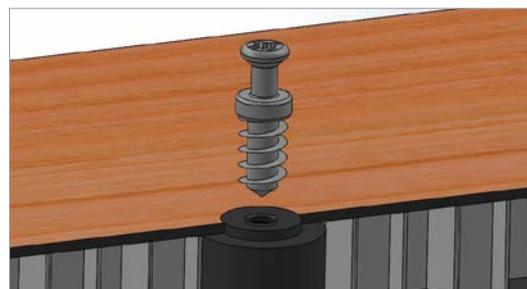
Option 3: Plasma pre-treatment



Option 4: Filling a tapered cavity



Assembly of the fixing element



Assembly of the fixing element



Back view of a screw hole filled manually



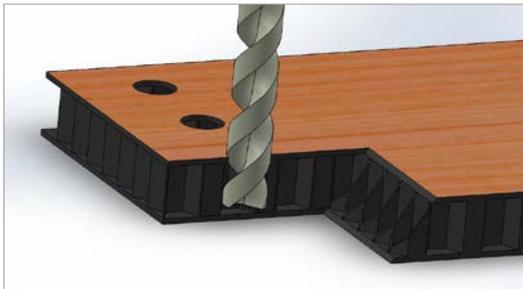
Gun for 2K adhesive cartridges

Melted adhesive guns from various manufacturers and 2K guns are available as tools.

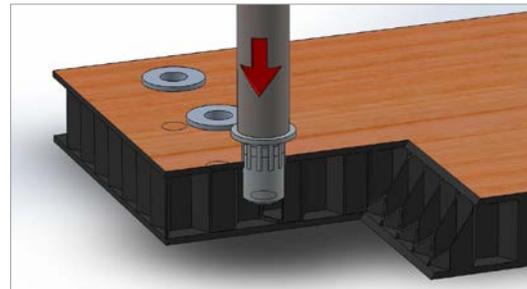
## Fixing point with pop rivets



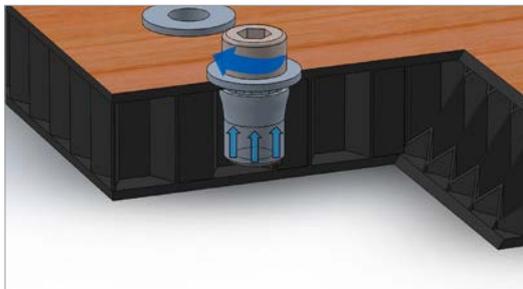
Melted adhesive gun for adhesive sticks



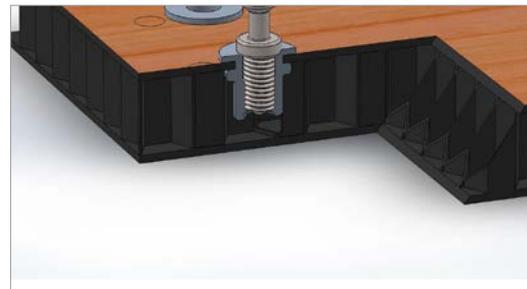
Drilling blind holes



Manual or automatic setting



Expanding the rivet



Screwing fixings together

## SCREW JOINTS

### FOLDING AND THERMALLY EXPANDING RENOLIT GORCELL PANELS

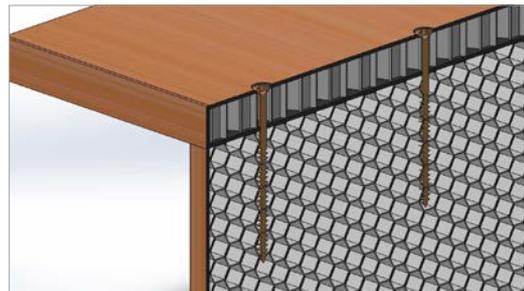
## SCREW JOINTS

If there are no aesthetic objections, in many cases RENOLIT GORCELL panels can be screwed together directly or after preliminary drilling. The following rule

applies: the longer the thread of the screws, the greater the forces which can be transmitted by action on the honeycomb structure.



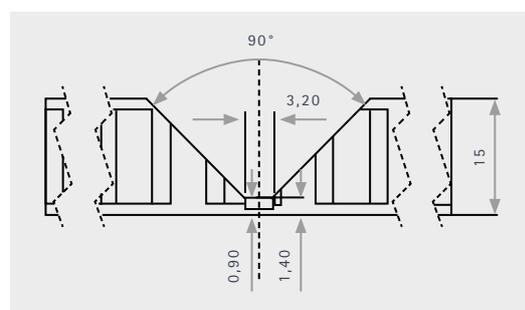
*Screwed corner of carcass*



*Screwed corner of carcass (section)*

### FOLDING AND THERMALLY EXPANDING RENOLIT GORCELL PANELS

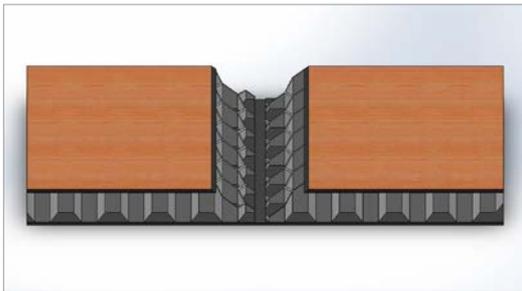
RENOLIT GORCELL panels have a thermoplastic top layer in most designs. This top layer, mostly made of a Wood Polymer Composite (WPC), is suitable for shaping a folded corner, eg for carcasses. The panels are taken out for this purpose, eg at a 90° angle at the back. In the base of this recess, a notch is then made with a flat-tooth saw blade. Between 0.8 and 1.0 mm of the top material then remains as reinforcement.



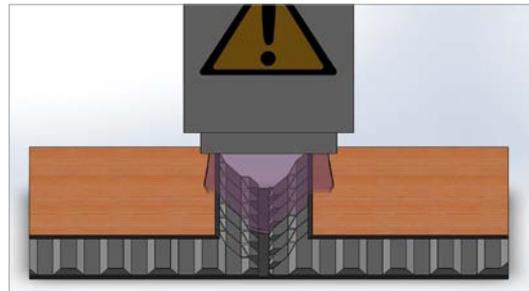
*Notching for folding RENOLIT GORCELL*

The folded connection can be very well bonded with standard silane-terminated adhesives (STP adhesives) in combination with pre-treatment of the surfaces to be

bonded. For the pre-treatment, either primers which suit the adhesive or corona pre-treatment are suitable.



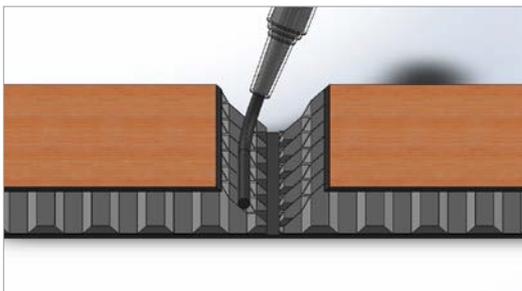
*Notched RENOLIT GORCELL panel*



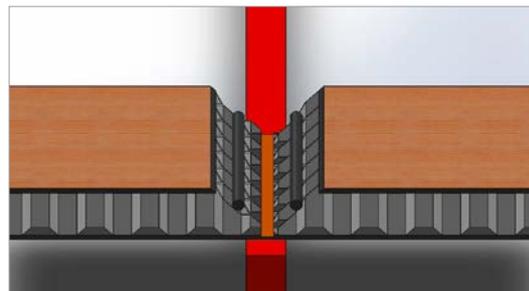
*Plasma pre-treatment*

To carry out folding without damaging the top layer, the folding area is heated

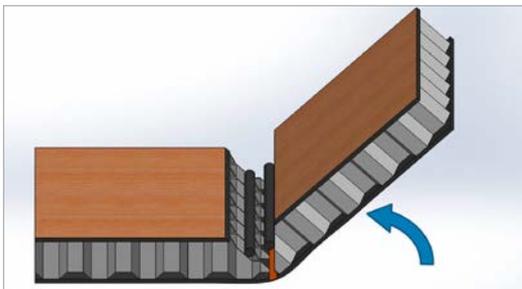
to approx. 80 °C bis 90 °C, and the fold made carefully.



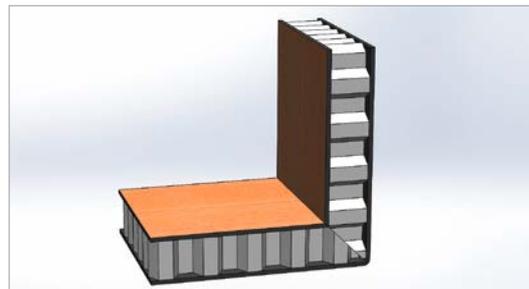
*Application of adhesive*



*Local heating*



*Folding procedure*



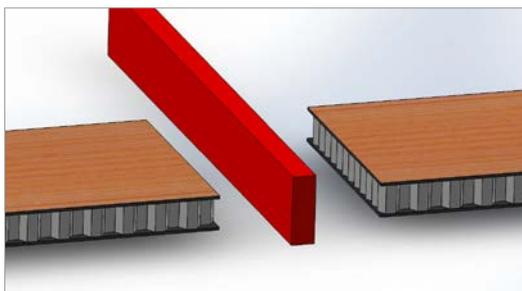
*Folded corner*

When folding is carried out in this way, corner radii of approx.  $r = 2 \text{ mm}$  can be achieved.

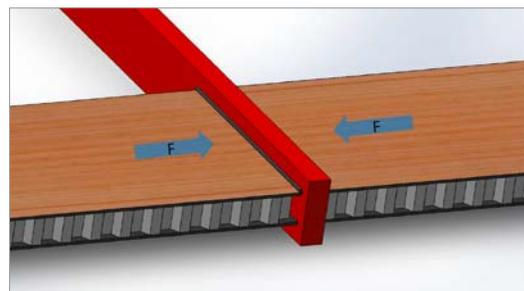
## BUTT WELDING

The dimensions of RENOLIT GORCELL panels can be extended by butt welding. Using this technique, the blunt edges are pressed against a hot welding plate. The thermoplastic material of the RENOLIT GORCELL panel melts and as a next step, after removal of the

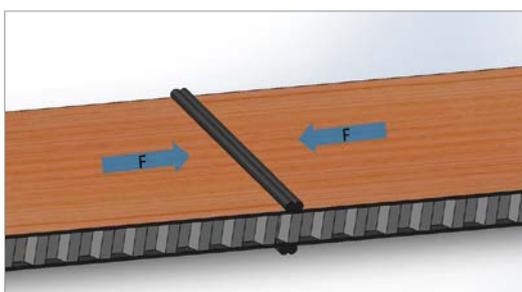
welding plate, is pressed together. The melted areas on both panels join together and then cool down. A knife appropriate for the material then removes the welding burr created.



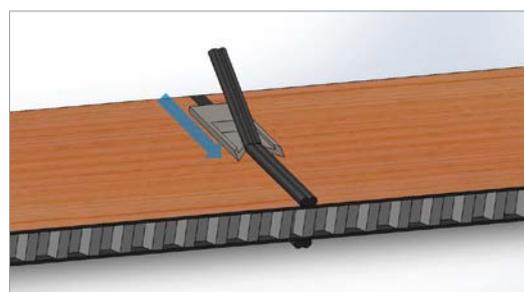
*Positioning of RENOLIT GORCELL panels*



*Melting the RENOLIT GORCELL panels*



*Joining the panels*



*Cutting off the welding burr*



*Wegener international GmbH butt welding machine*

# EXAMPLES OF CONSTRUCTION AND JOINS

## Corner of carcass with invisible join

Several systems are available for producing an invisible carcass corner joint for the RENOLIT GORCELL panel.

### Gluing a corner joint

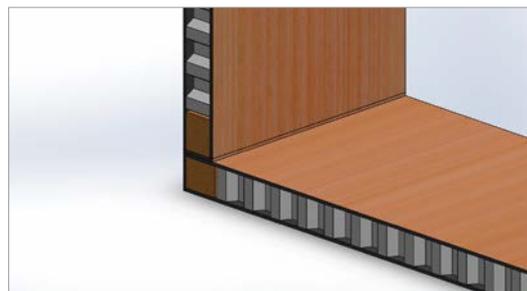
The process is similar to making a corner with adhesives. There is a list of possible adhesives under "Bonding RENOLIT GORCELL carcasses".



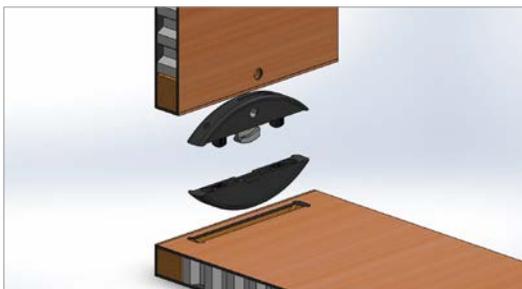
RENOLIT GORCELL Carcass corner bonded abutted

### Fastening with bonded bolt

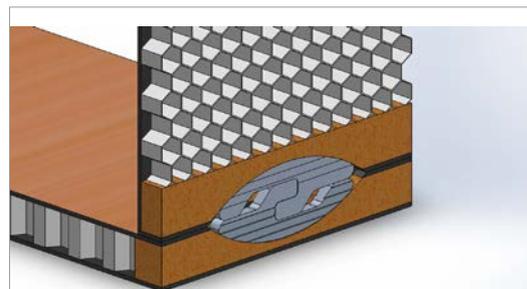
Corner joining using a bonded bolt makes it possible to work with all joining methods which are in standard use for chipboard or solid wood. The most frequently used are dowels, Lamello flat dowels, Lamello P-system, Knapp connectors, OVO® connectors and many more. An adhesive is necessary to bond the connecting elements for some of these connectors, eg a moisture-hardening PUR adhesive.



Corner join with bolt



Corner join with Lamello Simplex



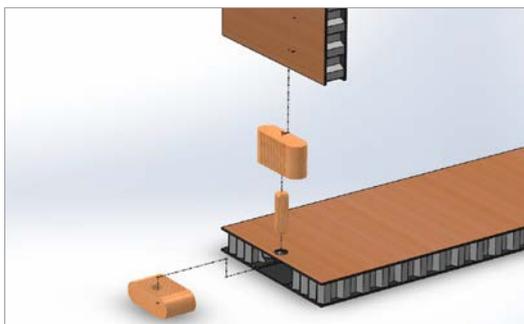
Corner join with Lamello Simplex (section)

## EXAMPLES OF CONSTRUCTION AND JOINS

### Fastening with horizontal bonded bolt

As well as the possibility of gluing a continuous locking bar into the honeycomb panel to accept adhesives, there are also locally effective bolts such as the GO.FAST horizontal bolt. With this system, a cut section of the bolt is glued into a recess which has been made

beforehand with a slot drill. Similarly to a bolt, all the standard fixing fittings such as Lamello, dowels, Knapp connectors, OVVO® connectors etc. can be used as fixing elements.



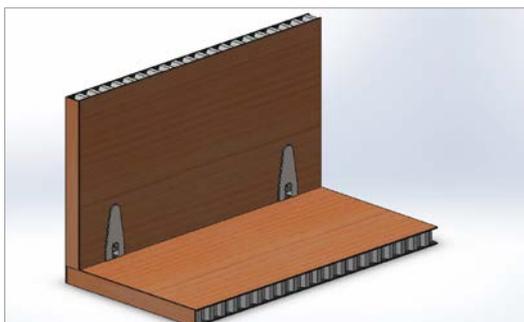
*GO.FAST corner fixing and dowels*

### Carcass corner visible

To create carcass corner joints, in addition to the invisible options, visible connectors which are quick to fit are also available. These are used particularly in the self-assembly furniture sector, and for the interior

fittings of caravans. For vertical panels, screw points are created using various techniques. These can be fixed with screw connectors or eccentric connectors to make corner joints with high load-bearing capacity.

### Combination of screw point and eccentric supports

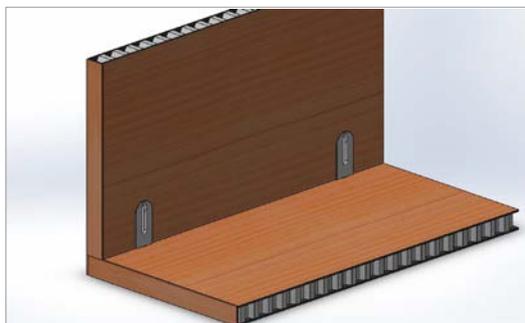


*Eccentric K support*



*Eccentric K support (exploded diagram)*

### Combination of fixing point EJOT INSERT with caravan connector



Lamello Cabineo connector



EJOT TSSD with Lamello Cabineo connector

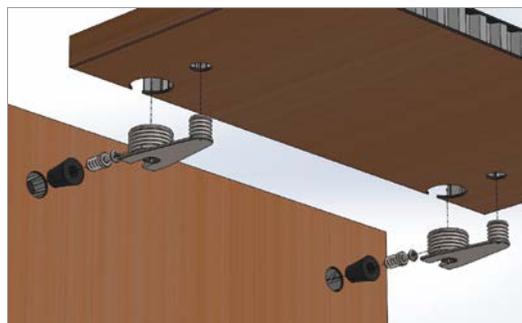
## Horizontal parts

When long side components are used, inserting an intermediate horizontal fixing to add rigidity to the furniture unit or the whole structure is often

recommended. Structural supports for horizontal parts are particularly beneficial here to achieve a higher degree of rigidity in the components.



EJOT TSSD with K support



EJOT TSSD with K support (exploded diagram)

## EXAMPLES OF CONSTRUCTION AND JOINS

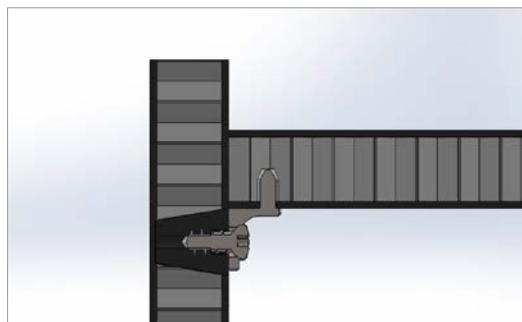
### Shelves

Shelves can be fixed either with screwed shelf supports or with plugged shelf supports. The choice of a fixed screw point to take the shelf peg or the Euro screw is

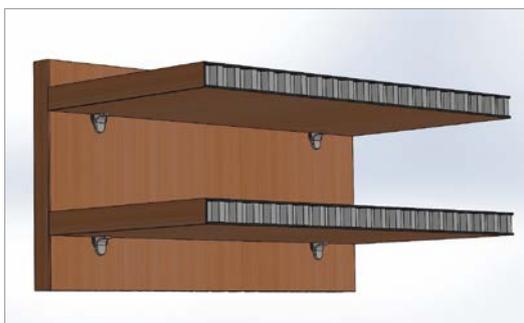
recommended. To ensure that the shelf cannot slip sideways, using a shelf with position peg is recommended.



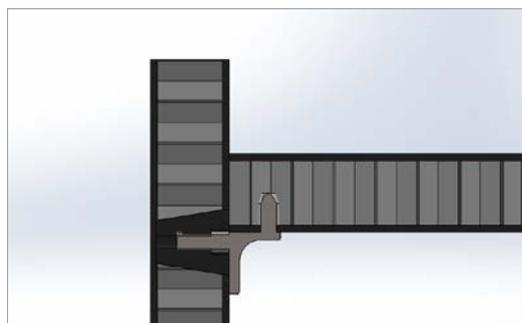
*Shelf with peg screw fit*



*Screwed shelf (section view)*



*Shelf with peg*

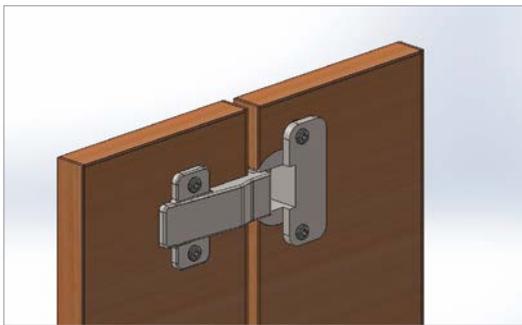


*Shelf fitted with peg (section view)*

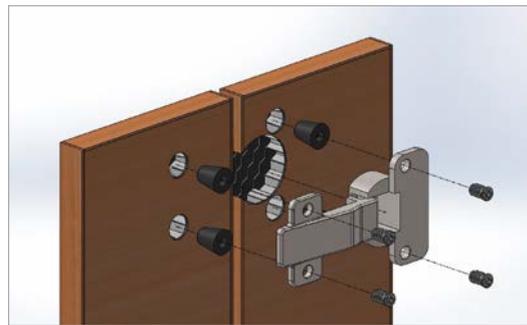
## Hinges

Doors and flaps are subject to constant dynamic stress due to the opening and closing movement. Particularly in caravan construction, hinges with a particularly strong closing force are fitted. The forces produced are

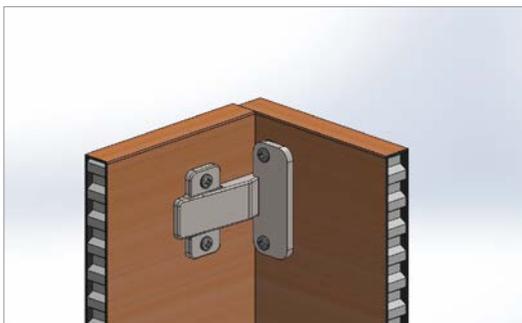
safely transmitted by the use of very strong screw points in combination with the drill hole.



*Hinge 180° position*



*Hinge (exploded diagram)*



*Hinge 90° position*

## EXAMPLES OF CONSTRUCTION AND JOINS

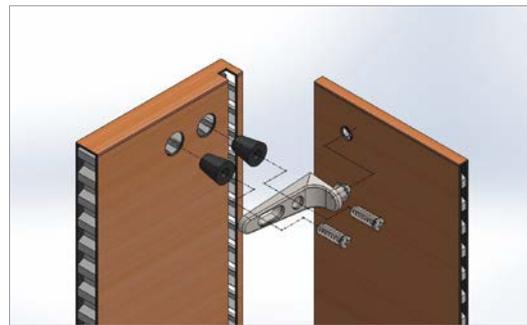
### Back wall connector

Wack walls are normally fitted into a groove and fixed with back wall connectors. The screw connections in the sides are formed with standard screw point constructions. Due to the thin material, a clip or hoe

connection is fitted. In cases with high carcass rigidity requirements, bonding into the structure is again recommended.



*Back wall connector*

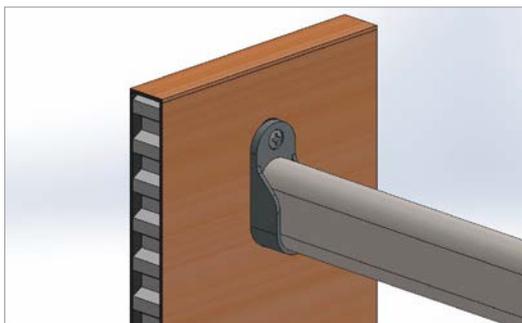


*Back wall connector (exploded diagram)*

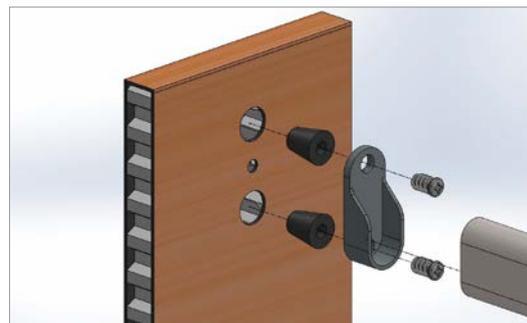
### Clothes rack support/wardrobe rail support

Clothes racks of course have to support heavy loads. To guarantee this, the use of wardrobe rail supports which are both screwed in and also transmit the loads with positive-locking pins are recommended. Clothes

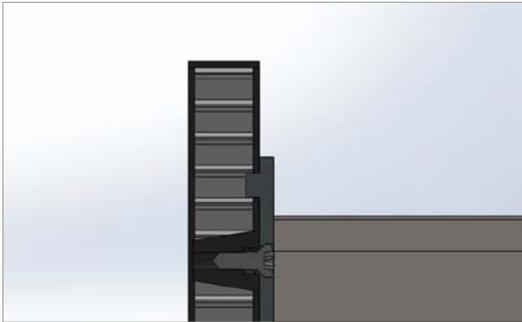
racks in the form of rails with catch pins are recommended, as these further increase the shape retention of the structure.



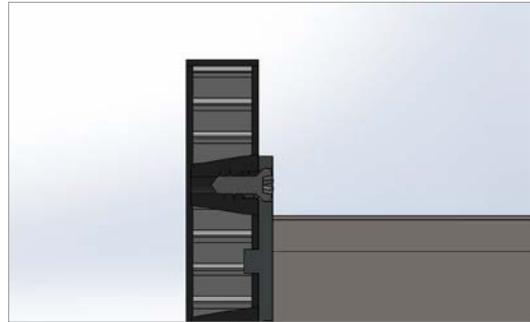
*Wardrobe rail support*



*Wardrobe rail support (exploded diagram)*



Wardrobe rail support with catch pins



Wardrobe rail support without catch pins

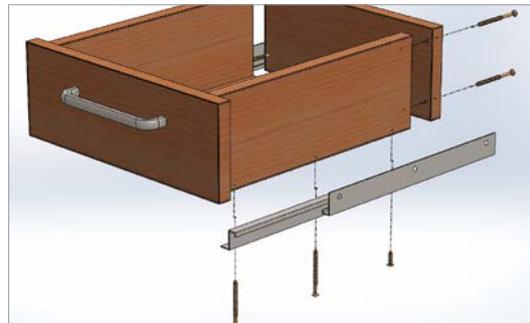
## Drawers

Drawers can be connected to the side walls with screw points. To fix the fittings with the

carcass, direct screw connections may also be used.



Drawer assembly



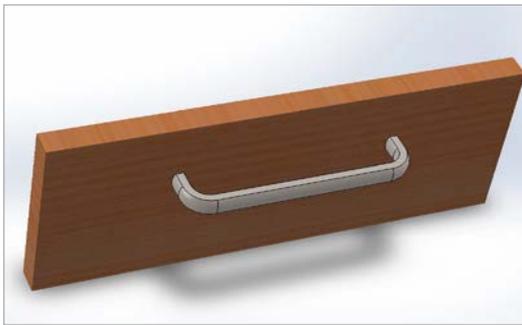
Drawer (exploded diagram)

## EXAMPLES OF CONSTRUCTION AND JOINS

### Handles

It is very easy to fit handles to RENOLIT GORCELL panels. Generally, a through hole with a 4.5 or 5 drill is sufficient. Thanks to the rigidity of the panels, no

further reinforcement by screw connections is generally required.



*Handle in trim*

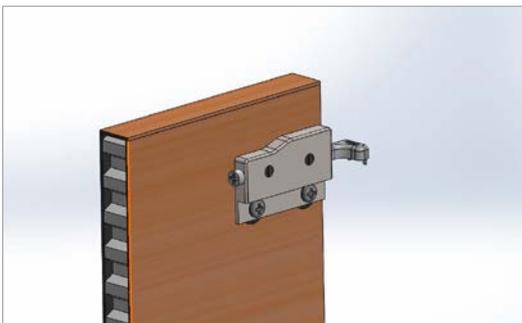


*Handle (section)*

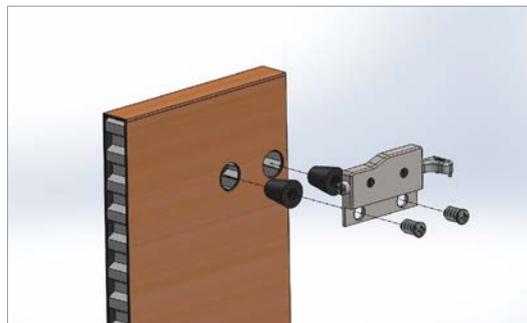
### Cabinet suspension brackets

Top cabinets have to be particularly well secured, due to their position. To secure cabinet suspension brackets correctly, very strong fixing points are required. Inserts which have been bonded with dual-component reactive

adhesives and the corresponding pre-treatment, or which use connectors which provide a firm bond and have high loading capacity should be used in this case.



*Cabinet suspension with screw fitting*



*Cabinet suspension (exploded diagram)*

# FAQ

## Frequently asked questions:

- 1) **What is RENOLIT GORCELL made of?**  
RENOLIT GORCELL is made of a hexagonal thermoplastic honeycomb core, and a thermally applied top and bottom layer.
  - TECNOGOR sheets (composition PP and (short) glass fibres): 0.8 - 1.3 mm
  - PP curved top layers with high impact resistance (high-tensile PP fibres). No glass fibre insert, reference for PROPEX "Curv"
- 2) **What material is RENOLIT GORCELL made of?**  
The honeycomb core is made of polypropylene (PP), and the outer panels of PP or PP with natural or mineral fibres.
  - RENOLIT ALKORCELL foils, heat-laminated on RENOLIT WOODSTOCK or TECNOGOR
- 3) **Is it possible to use other materials?**  
Yes, theoretically any thermoplastic, weldable synthetic material can be used.
  - Weather-resistant RENOLIT ALKORCELL foils, heat-laminated on RENOLIT WOODSTOCK.
  - Various types of non-woven fabric (Non-Woven, PP/PET, Automotive non-woven fabric)
- 4) **What technology is used to manufacture the core material?**  
The core material is manufactured using EconCore Honeycomb Technology from Leuven (Belgium)
- 5) **What core strengths are available?**  
RENOLIT GORCELL is available in core strength 5 mm, 10 mm, 15 mm and 20 mm.
- 6) **What are the standard panel dimensions, and what are possible?**  
The standard dimensions are 1,220 mm x 2,440 mm (width x length). Dimensions to customer specifications are available up to a maximum of 1,500 mm x 6,000 mm (width x length).
- 7) **What are the options for the top layers?**  
Various options are available for the top layer:
  - PP foil: 0.12 - 0.6 mm, any choice of colour (depending on minimum order quantities of foil)
  - RENOLIT WOODSTOCK Sheets (WPC = Composition PP and natural fibres): 0.8 - 1.5 mm, standard colours black and brown, other colours by arrangement
- 8) **How are the top layers applied?**  
The top layers are applied by thermal bonding in a continuous process.
- 9) **Can external top layer materials also be applied?**  
Yes, depending on the production technique, PVC decor and high-gloss foils, wood, metals and other plastics, including impact-resistant non-slip materials can be applied.
- 10) **How are these external top layers applied?**  
The external top layers can be applied during the preceding thermal bonding of non-woven fabrics during the production process - non-woven fabrics permits bonding solutions using traditional adhesives (PUR, EVA, PVAC etc.). Other options are plasma pre-treatment and flat-lamination, or priming the surfaces with suitable primers.

- 11) What are the advantages of RENOLIT GORCELL?**  
 RENOLIT GORCELL is very light (honeycomb core material approx. 80 kg/m<sup>3</sup>) but at the same time very durable (up to 1,2 MPa (ASTM C365-57)). The material is water-resistant, has an unusually high chemical resistance and can be thermally applied extremely well (Forming, welding). It is also suitable for machining. Due to its modular assembly system, RENOLIT GORCELL has diverse applications. Last but not least, it is cheap to produce and not resource-intensive, meaning it is sustainable.
- 12) What RENOLIT GORCELL options are there for the furniture sector?**  
 For the furniture sector there is the 15 mm and 20 mm honeycomb core RENOLIT WOODSTOCK with double-sided outer panels.
- 13) What fire protection class is RENOLIT GORCELL?**  
 A standard PP-RENOLIT GORCELL can reach a category C or better in the construction sector. The flammability can be adjusted through addition of the WPC matrix. Certificates and proofs are required for fire protection requirements. These can be requested if required.
- 14) What are the minimum order quantities?**  
 Standard products held in stock can be ordered from our Italian production facility. Delivery quantities should be discussed with our sales team. For client-specific products and dimensions the minimum order quantity is 1,000 m<sup>2</sup>.
- 15) How can edging tapes be applied to the narrow side?**  
 Edging tapes can be applied to the narrow side using a number of methods: with laser or another reactivatable edging, with PUR hotmelt adhesive in joints with a plasma treatment of the narrow side or with polyolefin hotmelt adhesives.
- 16) How can the panels be joined together?**  
 RENOLIT GORCELL panels can be joined in a number of ways:
- By using bolts and conventional panel connectors.
  - By screwing the panels together directly.
  - By using EJOT/Weber friction welding.
  - By using lightweight construction anchors and furniture fittings.
  - By adhesion of the panel edges and surfaces using suitable primers and adhesion systems.
- 17) Can the panels be expanded?**  
 The RENOLIT GORCELL panels can be made longer or wider by means of butt welding technology.
- 18) Can the panels be made thicker?**  
 The RENOLIT GORCELL panels can be stuck together to increase the thickness or stuck to other constructions. For sticking to constructions, PUR adhesives are most suitable.
- 19) How should panel offcuts and superfluous parts be disposed of?**  
 Because the panels are 100 % recyclable, customers can reuse offcuts in the production process. Otherwise disposal is possible using the respective monitoring system for recyclables or the regular waste disposal system.

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# SERVICE

## Central Technical Support

RENOLIT's Central Technical Support assists customers from the most varied industrial sectors worldwide with all technical application questions. Whether customers have questions on the choice of colours, problems with processing or optimising the production process, RENOLIT's service engineers are available with help and advice.

## Decor development

RENOLIT's Design Centre in Bochum designs decor to customers' personal requirements. RENOLIT's experienced design specialists have a perfect eye for decor, and will develop completely individual samples according to the customer's specifications and needs. With the best technical equipment, and great experience in printing technology, they cover the whole process chain – from decor development through digital preparation to delivery of the finished digital and engraving data.

## Colour and design trend service Colour Road

Correctly predicting future trends is a deciding factor in a product's market success. To keep up with rapidly changing style trends, RENOLIT offers customers the trend service Colour Road. Working closely with colour designers and trend institutes throughout the world, the RENOLIT trend experts monitor global developments and define from these the most important future colour codes for the most varied areas of application. Colour Road is a reliable navigation tool for predicting future trends, and helps customers to get ahead of the game.





*Rely on it.*

Business Unit RENOLIT *DESIGN*

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