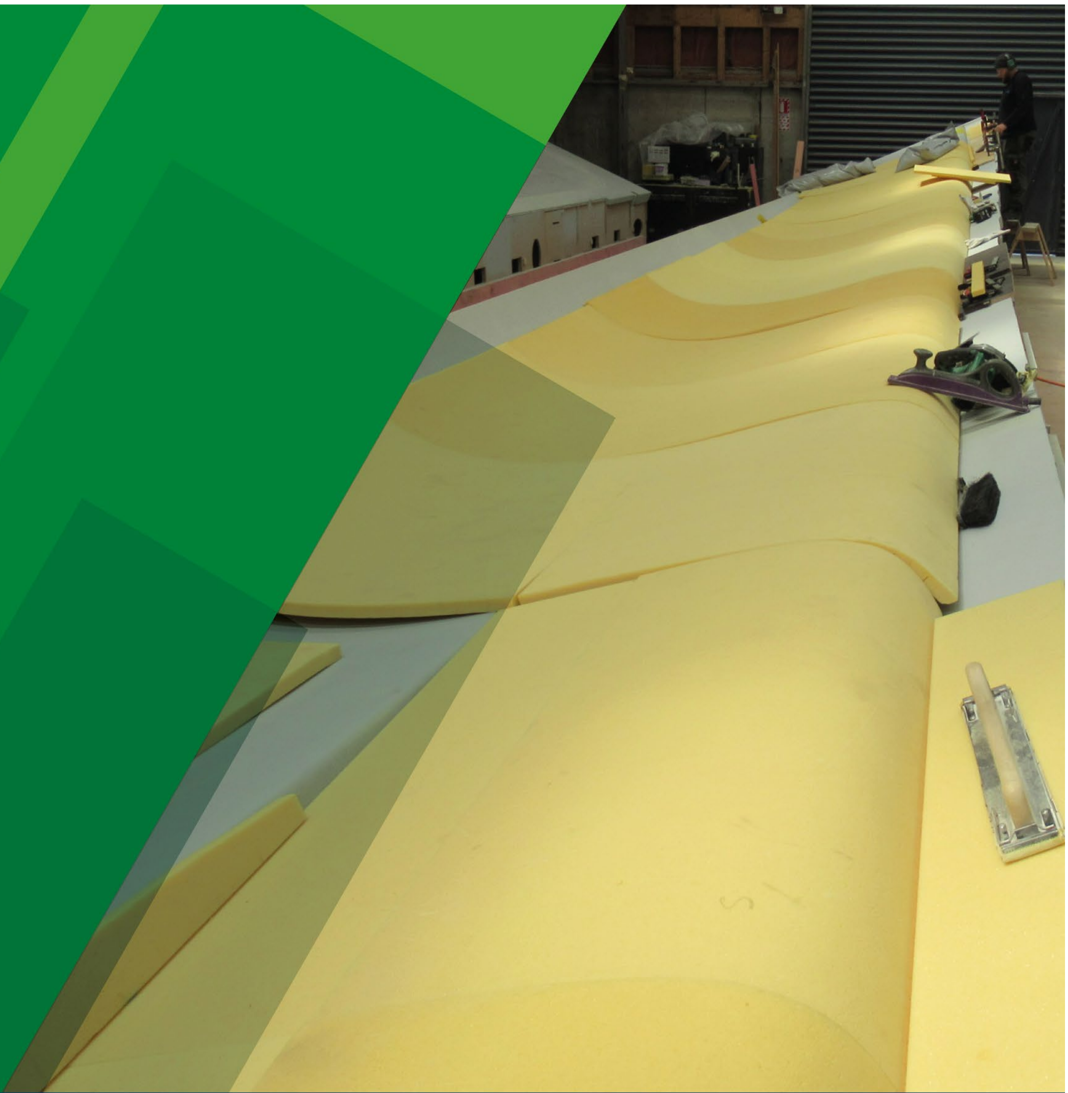


PRODUCT PROCESSING GUIDE

CORE MATERIALS

www.gurit.com

STRUCTURAL CORE

KEY POINTS SUMMARY

1. DESCRIPTION

Gurit can supply a large range of core products for composite applications, these include

- Gurit® Balsaflex™ - end grain balsa
- Gurit® Balsaflex™ Lite - end grain balsa with surface sealing
- Gurit® Corecell™ - SAN high performance structural foam
- Gurit® Kerdyn™ - High re-cycled content thermoplastic PET core
- Gurit® Kerdyn™ FR - Fire retardant high re-cycled content thermoplastic PET core
- Gurit® PVC & Gurit® PVC HT – cross-linked PVC good strength to weight ratio

2. STORAGE

All cores should be stored wrapped and dry
Gurit Balsaflex in particular needs protecting from atmospheric moisture, keep in original wrapping until needed

3. CUTTING AND MACHINING

Health & Safety - protection should be worn to prevent dust/gas inhalation when cutting or machining any of Gurit's core range. All cores can be worked with standard cutting and machine tools. Care needs to be exercised in preventing heat build-up which can soften, melt or burn some core types.

4. CORE FORMAT

All Gurit core materials are available in a plain sheet format of varying thickness. Gurit cores are also available with a variety of finishing options to suit the processing method.
Perforations to allow resin and air bleed in vacuum bag/prepreg operations
Grooves to assist resin flow in infusion techniques
Cut and contour scrim formats to allow curvature conformability.

5. THERMOFORMING

It is possible to thermoform all Gurit cores except for Gurit Balsaflex. This removes the need to add multiple cuts to allow the core to conform to mould shape. This saves weight in resin uptake and preserves the core properties.
Specific temperatures are required for thermoforming each core type

6. RESIN COMPATABILITY

Gurit Balsaflex, Gurit Corecell and Gurit Kerdyn are all compatible with epoxy, polyester and vinyl ester resin types. Gurit PVC is compatible with epoxy but *may* suffer styrene attack with some polyester and vinyl ester resins.

7. PROCESS COMPATABILITY

Wet laminating, vacuum bagging, infusion – all Gurit cores are compatible. See specific comments regarding Gurit PVC below.

CONTENT

INTRODUCTION

This guide provides processing guidelines for the manufacture of structural sandwich parts using Gurit Corecell, Gurit PVC, Gurit Kerdyn and Gurit Balsaflex core materials. Processing guidelines given are sufficient for the processing of the core material; further specific guidelines on the laminate processing can be found in other Gurit processing guides.

To ensure the fault free construction of large components it is recommended that representative test panels are always made.

TYPE	GRADE	DESCRIPTION
Gurit Corecell SAN (styrene acrylonitrile)	T400, T500	▪ Industrial grade structural foam ▪ Compatible with prepreg processing ▪ Superior strength & stiffness: weight ratio ▪ Cost-effective ▪ High temperature processing
	M60 - M200	▪ High performance foam, ideal for marine applications ▪ High shear strength and low density ▪ Compatible with prepreg processing ▪ High elongation for toughness
Gurit PVC (polyvinyl chloride)	PVC 40 - 250	▪ Superior strength & stiffness: weight ratio ▪ Outstanding chemical resistance
	PVC HT 60 & 80	▪ High temperature processing up to 120°C
Gurit Kerdyn (PET - polyethylene terephthalate)	Kerdyn 80 - 300	▪ High recycled content- from waste PET (bottles etc.) ▪ Cost-effective ▪ Excellent mechanical properties ▪ High temperature processing ▪ High stiffness/strength to weight ratio
Gurit Kerdyn FR (PET - polyethylene terephthalate)	Kerdyn FR 80-180	▪ As per standard Kerdyn product with a level of fire retardancy
Gurit Balsaflex (Balsa wood)	Balsaflex 100 - 220	▪ Classic wood core ▪ Very high mechanical properties ▪ Sustainably and responsibly sourced
	Balsaflex Lite 100 - 220	▪ Coated to reduce resin uptake

Table 1 - Gurit structural core range

STORAGE

The core should not be exposed to extremes of temperature or humidity which cause moisture to be absorbed. Ideal storage conditions are between 10° and 30ºC and below 70%RH and kept in the original packaging until the time of use.

The main function of a core material is to provide a light and stiff sandwich panel, for which a good bond to the laminate skin is needed. To achieve this storing the foam such that it is clean and dust free is critical.

Direct exposure to sunlight should be avoided as in the short term this will discolor the foam and the in the long term may degrade the surface properties.

SPECIFIC GURIT BALSAFLEX STORAGE GUIDANCE

As with most natural materials Balsa is susceptible to moisture absorption during storage, which can cause laminate adhesion and curing issues. To avoid moisture uptake in Gurit Balsaflex core it should be stored with its packaging intact on the pallet until the last possible moment. A moisture meter may be used to confirm that the moisture level is below the recommended 12%.

There are three packaging options:

1. Boxes with sealed plastic bags inside allowing easy access to the panels while keeping the remainder protected
2. Boxes with plastic film inside allowing for faster access to panels
3. Shrink-wrapped plastic pallets which allow the fastest access to the panels with a reduction in packaging waste

As Gurit Balsaflex only absorbs moisture in the direction of its fibers once the package is open it is only necessary to cover the faces of the sheets.

Boxes:

- Slit 3 sides of the top bag
- The top side of the bag can be used to cover the remaining balsa and reduce its exposure to the atmosphere

Shrink wrapped plastic pallets:

- Cover the panels with plastic once the pallet is opened

General points of care:

- Keep in original packaging until time of use.
- Reduce the humidity exposure time to a minimum by ensuring a dry working atmosphere.
- Never store balsa directly on a cement floor, always use pallets and protect the surfaces that can absorb moisture.
- When using VIP (Vacuum Infusion Process) leave the vacuum on the part for as long as possible before introducing the resin as during this time excess moisture is being removed from both the reinforcements and core.

HEALTH AND SAFETY

The main health and safety risk associated with core materials is due to ingestion of dust from machining. Exposure will occur at the time of machining at which point suitable extraction is necessary and operator dust masks may need to be used. Ideally all dust will have been removed during the cutting operation, but further exposure could happen during subsequent handling operations such as lay-up.

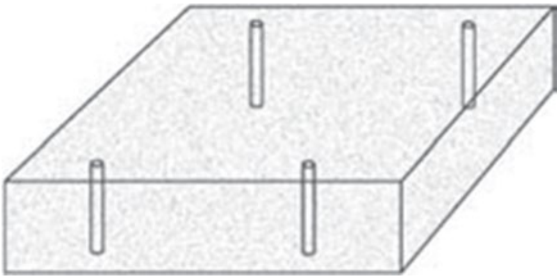
It is advisable to wear gloves during handling to avoid skin damage due to the mildly abrasive nature of the foam cores. Refer to SDS available via the Gurit website.

CORE FORMATS

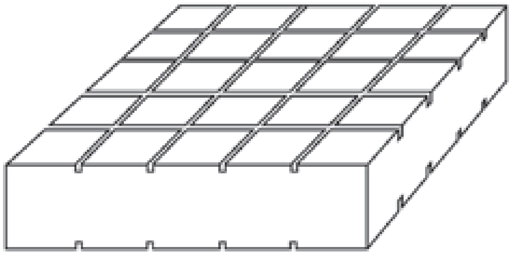
All Gurit core materials are available in a plain sheet format of varying thickness. Gurit cores are also available with a variety of finishing options such as perforations, grooving and slitting and scrim backed. All these add additional functions to the core such as conformability, laminate air removal and improved resin infusion. Care should be taken to ensure sufficient resin is available to fill the cuts and that is taken into account in both weight and structural calculations

CUTS FOR AIR REMOVAL AND RESIN DISTRIBUTION

PH – PLAIN / BLEEDER HOLE PERFORATED CORE - In general the quality of the final component is maximised by removing air from within the laminate. Regular bleeder holes in the core allows air to be removed more effectively from within the laminate. A range of spacing and hole sizes are available.



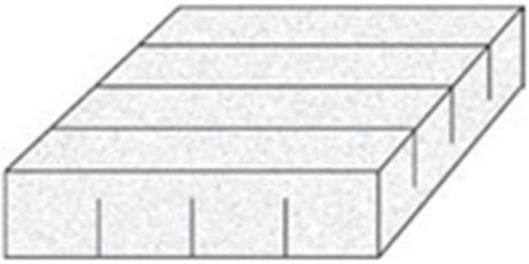
VIC CUT – VACUUM INFUSION CORE – Perforated core can also aid the flow of resin during vacuum infusion; ensuring that the occurrence of 'dry spots' on the tool side of the laminate are minimised. Adding a grooved surface to the core then adds further functionality by forming resin flow channels which can remove the need for a separate infusion medium. Standard groove width is 2mm and depth 2mm and generally combined with PH drilled holes.



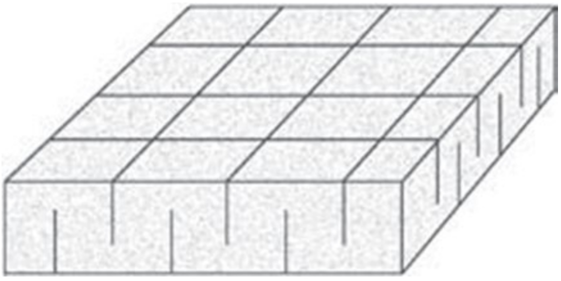
CUTS FOR CONFORMABILITY

Composite structures are typically not flat so core materials need to be shaped or have sufficient conformability to match the part shape. This can be achieved by thermo-forming, which is dealt with in another section, or slitting the core to give flexibility. Not only do the slits provide conformability, but when opened will also aid air removal under vacuum and provide a resin distribution path for infusion.

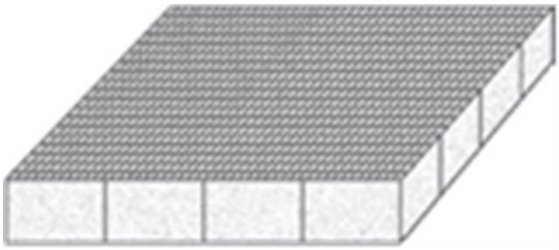
SINGLE CUT - Single Cut foam features a slit to 5mm from full thickness at a 25mm pitch. The slit allows the sheet to conform in one direction, whilst the 5mm remaining at the bottom of the cut maintains the foam in the sheet format. The slit is made with a knife so the width of the opening is minimal to reduce the resin uptake in vacuum infusion. Knife cuts only available in lower density foams otherwise saw cut. Additional slits can be provided on the other surface in the other direction which form intersections, removing the need for through thickness bleeder holes.



DOUBLE CUT - Double Cut which features slits in both directions on both faces to provide conformability in both directions. The spacing is 50mm between slits, with a 25mm spacing between slits from either side. Whereas double cut will provide greater flexibility than single cut, the additional surface area of the cuts and any opened cuts will increase the resin uptake during vacuum infusion.



CONTOUR SCRIM - Maximum flexibility is achieved with Contour Scrim by slitting all the way through into 30mm squares and bonding onto a glass scrim on one face. All core materials in the range are available in this format. It is advisable to check that the material has been 'snapped' fully to the scrim prior to use to ensure fully conformable and even vacuum resin distribution occurs.



THERMOFORMING

Thermoforming is the process of shaping foam core by heating to soften it, clamping in the desired shape and then cooling to set the shape. It is possible to thermoform all Gurit foam cores. As Gurit Kerdyn, Gurit PVC and Gurit Corecell are all thermoplastic in nature the softening point happens over a broad range of temperatures - recommended temperatures for each core type are given in Table 2. The advantage is a potential weight saving due to less resin uptake in grooves and eliminating possible print through of the core cutting pattern to painted surfaces.

PROCESS STEPS:

1. **HEATING -** Heat the foam to the stated thermo-forming temperature as detailed in Table 2. Heating can be via hot air or heated mould tool. Regardless of heating method, all of the foam must be at the correct temperature – it is advisable to measure the temperature with a thermocouple inserted into the centre of the sheet. The heat up rate is a function of core density, thickness and oven air flow. It is preferable to heat the part in the tool to be used for shaping so that the hot foam does not need to be moved, however the foam can be heated in a separate oven and then moved to the moulding or forming jig, although allowance must be made for the foam cooling during transfer. Heating above the recommended temperature will excessively soften the foam and could cause local deformation at loading points during forming.
2. **FORMING -** When the foam has reached the correct temperature load can be applied to form the foam into the tool. Load can be applied means of weights, vacuum bag or closed mould compression, depending on the size, complexity and number of parts required. Once the correct shape has been achieved the foam can be cooled until set and the pressure or straps can be removed.
3. **AFTER FORMING -** During heating some expansion or contraction of the foam can be expected. This may produce steps between adjacent core pieces or gaps between pieces. It may be necessary to abrade any steps away and fill gaps with slivers of foam or core bond adhesive.

TYPE	GRADE	RECOMMENDED THERMO-FORMING TEMPERATURE (ºC)	MAXIMUM THERMO-FORMING TEMPERATURE (ºC)
Gurit Corecell SAN (styrene acrylonitrile)	Corecell A	75	85
	Corecell M	110	120
	Corecell T	105	125
	Corecell S	110	120
Gurit PVC (polyvinyl chloride)	PVC	120	135
	PVC HT	140	155
Gurit Kerdyn	Kerdyn PET	140	160

Table 2 - Thermo-forming temperatures

THERMO-FORMING BONDED SHEETS – When thick cores are required it may be necessary to use a bonded core, comprising of two sheets bonded together with an epoxy adhesive. Thermoforming of this format core is not recommended as any differential in the expansion or contraction of the individual sheets will cause distortion of the sheet.

THERMOFORMING FOR LARGE STRUCTURES

When thermoforming core for a large structure it is often not practical to shape sheets individually. The core is cut to size and roughly placed and held in position with weights or straps. Heat is then applied through either oven heating or using a heated mould, either way the entire thickness of the foam should reach the required temperature before applying load. It may be necessary if using a heated tool to use insulation blankets. Load can be applied with weight straps or a vacuum bag.

Often the core can only be placed roughly in the correct position and can only be fully placed once it has been heated sufficiently to allow it to conform to the required shape. For some shapes, multiple processes may be required to achieve a suitable fit.

Figure 1 shows core being thermoformed over a plug for a yacht hull. In this case, the core has been bent as much as possible and attached to the plug using tie-down ropes (visible as white lines). The entire plug was then placed under a vacuum bag and the temperature was raised to the thermoforming level. As the core softened, the vacuum level was raised. Once the core was fully softened, the strings become redundant and the vacuum applied even pressure holding the core to the surface of the plug until it had cooled.

Thermoforming into a female mould is also possible. During the heat up the core will tend to sag under its own weight, but will eventually need weight added to achieve full form. The weights should be added gradually to avoid locally damaging the foam. A vacuum bag can also be used to draw the foam into the mould.

Figure 1 - Thermo-forming core over a male molded yacht hull

SANDWICH CONSTRUCTION

Specific guidance for sandwich construction using wet laminating vacuum infusion and prepreg / SPRINT manufacturing methods are given below.

Regardless of the construction method, a sandwich panel comprising of a core material with a laminate skin on either side can be constructed and cured in one step. However, due to part geometry it may be necessary to laminate and cure the first skin, bond the core to the laminate in a 2nd operation and then compete the sandwich with the final skin in a 3rd operation.

WET LAMINATING AND INFUSION

RESIN COMPATABILITY

Good quality sandwich panels can be achieved with all cores types using common resins. Gurit PVC foam can be degraded by the styrene in some polyester and vinyl ester resins. As epoxy resins do not contain styrene or other solvents there is no compatibility issue with Gurit PVC. Compatibility issues between polyester / vinyl ester resins and Gurit PVC core will tend to be more severe when infusing as these resins contain more styrene. Furthermore, any grooving or cutting introduced into the core to aid conformability or resin flow during infusion will increase the core surface area and thus increase the chance of core degradation. The incidence of Gurit PVC degradation can be reduced by reducing the gel time of the infusion resin by increasing the temperature or increasing accelerator loading.

RESIN SYSTEM	GURIT CORECELL	GURIT BALSAFLEX	GURIT KERDYN	GURIT PVC
Epoxy	Compatible	Compatible	Compatible	Compatible
Polyester	Compatible	Compatible	Compatible	Potential styrene incompatibility
Vinyl ester	Compatible	Compatible	Compatible	Potential styrene incompatibility

Table 3 - Laminating and infusion resin compatibility

CHECKING FOR GURIT PVC AND POLYESTER / VINYLESTER COMPATIBILITY

There a number of checks that can be undertaken to determine whether the Gurit® PVC core will be degraded by the chosen resin system.

IMMERSION IN RESIN - Immerse the foam in accelerated resin for the expected gel time. Swelling, the most likely characteristic of degradation will be readily apparent.

MANUFACTURE OF REPRESENTATIVE TEST PANEL - Manufacture a representative test panel using the same materials and under the same conditions as intended for the final component. Any incompatibility between the Gurit PVC and resin will be apparent from the following:

- Swelling of the foam
- Reduced adhesion between the foam core and laminate skin. This can be assessed by a hand pull-off test to check that failure has occurred within the core or ideally by measuring the pull-off force.
- Increase in gel time of the resin compared to a monolithic laminate.

CORE BONDING

If producing the laminate in several stages it will be necessary to bond the core to the cured first skin. A peel-ply should be applied to the laminate which should be removed just before application of the core. Good contact and adhesion can be achieved between the laminate and core by using Spabond 568 core bonding adhesive. The core material will need to be conformed to the mould shape using either weights or a vacuum bag. This can also be used to fill open grooves in the core.

RESIN UPTAKE WHEN WET LAMINATING

All core materials have a porous surface, even closed cell, so the level of resin uptake must be taken into consideration. Lower density cores with a larger cell structure will absorb more resin, as will cut patterns with open structure. To reduce the resin uptake when wet laminating it is common practice to prime the surface before laminating begins. The priming resin will be of the same type as used for the laminate, but with the addition of 4% silica to thicken the resin to reduce resin absorption. Once applied, the primer layer may be left to tack-off before commencing the lamination. Typically 100-300g/m^2 is applied.

RESIN UPTAKE WHEN INFUSING

Taking account of the resin uptake of a core is more critical when using infusion than wet lamination or prepreg as the amount of resin used cannot be controlled. Indicative resin uptakes for different core materials are given in the table 4 below. Panel Resin Uptake is the mass per m^2 of resin absorbed during infusion into both sides of a piece of foam. All values given are for plain format core only. Cut, grooved or perforated cores have higher resin uptake due to the open volume of the cuts. The function of the cut or groove is to allow the sheet to conform to the mold shape, so the resin uptake of these finishing options is not given as it is heavily dependent on the amount to which the cuts and grooves are opened or closed.

The resin uptake of plain foam cores is independent of panel thickness for foam cores as resin is only absorbed into the open cells on the surface. For untreated foam core the resin uptake increases with reducing density due to the relative increase in cell size.

TYPE	CORE TYPE & DENSITY NAME	APPROXIMATE PANEL RESIN UPTAKE (KG/M^2)
Gurit Corecell SAN	T300	0.94
	T400	0.56
	T500	0.46
	A500	0.49
	M60	0.84
	M80	0.71
	M100	0.61
	M130	0.55
	M200	0.49
Gurit PVC	PVC HT 80	0.62
	PVC 60	0.73
	PVC 100	0.56
	PVC 130	0.51
Gurit Kerdyn	Kerdyn 80	1.09
	Kerdyn 100	1.04
	Kerdyn 115	1.01
	Kerdyn 135	0.96
	Kerdyn 150	0.93
	Kerdyn 200	0.81
	Kerdyn 250	0.70
	Kerdyn 300	0.58

Table 4 - Foam Core Panel Resin Uptake

The mechanism of Gurit Balsaflex resin uptake is by absorption into the tubular cell structure, therefore the resin uptake increases with core thickness, as can be seen in Table 5 below. Care should be taken to avoid exotherm in resin on Balsaflex sandwich skin as this can lead to white spot defect formation in an otherwise clear glass laminate.

CORE	THICKNESS (MM)	RESIN UPTAKE (KG/M^2)	RESIN TYPE
Gurit Balsaflex 150	12.5	1.7	Epoxy
	20.0	2.4	
	25.4	2.7	
	44.3	3.6	
Gurit Balsaflex Lite 150	25.4	1.2	Epoxy

Table 5 – Balsa Infusion Panel Resin Uptake

INFUSION DETAILS

There are numerous strategies to follow for infusion, the choice of which depends upon part geometry, size and laminate construction. The choice of core format is generally dependent on curvature, with higher curvatures requiring contour scrim product whereas lower curvatures can be handled with single or double cut and flat sheets with infusion cut. Any of these approaches will provide resin distribution channels within the foam core which may be sufficient for the component being produced, or additional specific resin channels or sacrificial flow mediums may need to be included.

Gaps at core joints between core sheets should be minimized. During the infusion gaps such as these can act as resin distribution channels moving resin ahead of the intended flow front (known as 'race tracking') and locking-off areas of fabric causing dry spots. Also, large gaps will be filled with resin which may reach high temperatures during cure due to exotherm.

PREPREG/SPRINT™

RESIN COMPATABILITY

There are no chemical compatibility issues between Epoxy and Phenolic prepreg and any of the core types discussed.

	GURIT CORECELL	GURIT BALSAFLEX	GURIT KERDYN	GURIT PVC
Epoxy	Compatible	Compatible	Compatible	Potential issues
Phenolic	Compatible	Compatible	Compatible	Compatible

Table 6 - Prepreg / SPRINT resin compatibility

OUTGASSING / CURE INHIBITION

Outgassing is the phenomenon of the evolution of gas from PVC foam due to the action of heat and vacuum during the laminate cure. In extreme circumstances the gas can cause the laminate skin to be forced off the core. Outgassing is generally only an issue with higher temperature processing as the tendency to outgas increases with temperature.

- The potential for outgassing increases with higher core thickness and density.

Cure inhibition of the laminate skins occurs when certain gases coming out of the core act to slow the cure of the matrix resin. A partially cured laminate will have a lower T_g and reduced mechanical properties, but may be most easily recognised by a sugary appearance when peeled from the core.

GURIT CORECELL AND GURIT KERDYN – Both foam types are tolerant to outgassing and cure inhibition during prepreg / SPRINT cures up to 120°C. There is no need to thermally treat the core before use. Higher cure temperatures of up to 140°C are possible, but a degree of expansion or contraction may occur. Even higher temperature may be possible for short periods but representative testing should be completed prior to component production.

GURIT PVC AND GURIT PVC HT – Crosslinked PVC foams produce small amounts of gas when machined cut or sanded so as to expose a fresh surface. This gas evolution will increase markedly with added temperature during cure or post cure of the laminate skins. Therefore, to prevent problems during part manufacture, the core should be conditioned prior to use, especially after cutting or machining.
A thermal treatment of 7 days at 40°C is recommended as a conditioning step to help avoid outgassing, inhibition of laminate skin cure and excessive expansion / shrinkage during the cure. Higher temperature treatment will allow the time of conditioning to be reduced, however, this may lead to dimensional changes in the foam sheets.

The thermal treatment acts to reduce the amount of gas in the surface of the foam piece, so any thermal treatment should be undertaken after cutting.
The foam will condition naturally at room temperature but may take several months.

The standard grade of Gurit PVC is not suitable for use with prepreg / SPRINT as the temperature tolerance is not sufficient to withstand the required cured temperatures.
Gurit PVC HT, once conditioned as described above may be used with temperatures of up to 120°C, but should be verified with representative test panels. Going up to a max of 135°C may also be possible in terms of dimensional stability but further testing should be completed to ensure that age/storage representative foam for serial production is used.

- If in doubt about elevated process or service temperature, Corecell or Kerdyn foams provide a risk free solution.

USE OF GURIT BALSAFLEX WITH PREPREG / SPRINT

Gurit Balsaflex is not typically used with prepreg, but processing is possible and high performance laminates can be achieved. The main issue is around the moisture in the wood 'boiling' off under the temperature and vacuum and forcing the laminate skin off before cure is completed or the moisture preventing full cure of the laminate skin. To avoid this, the following should be adhered to:

- Pre-dry core so that the moisture content is below 8%
- Thermally pre-treat through the intended cure cycle prior to lamination
- Cure at the lowest temperature possible. Cure temperatures of 120ºC are possible, but using lower temperature cures are advisable.

CORE ADHESION

The adhesion between skin and laminate should be sufficient that in standard shear and peeling loading situations the strength of the interface between the core and laminate is greater than the strength of the foam. This can be verified by pulling a strip of laminate from the core: if a layer of foam remains on the laminate surface the failure has been within the foam and the adhesion is good. Whereas if the laminate is free from foam, and in extreme cases has a glossy appearance, then adhesion will be poor. Whilst this concern for core adhesion is more relevant to prepregs / SPRINT construction where resin quantities are more tailored and extra resin is not available such as in infusion, it also applies to wet lamination and infusion.

Sufficient resin should be available at the interface between the prepreg and core to sufficiently wet and fill the surface layers of open cells. Whilst the foam surfaces will absorb resin from the prepreg, the quantity taken is significantly less than with infusion due to the lower time that that a prepreg resin has a sufficiently low viscosity to soak the core. A typical amount of additional resin to allow on each side of the core can be seen in table 7

This can be achieved by either:

- Increasing the resin content of the prepreg / SPRINT layer adjacent to the core
- Applying a specific resin film layer between the core and laminate. Gurit's SA 80 is a toughened epoxy adhesive film ideal for this application

When using SPRINT it is advisable to either place the resin film if using single-sided SPRINT against the core, or use an adhesive film layer. Not only does this ensure a good bond is achieved, but also provides tack to the core during layup that would not be achieved with dry fabric against core.

Different core types, densities and cut patterns will each have their own resin requirements for successful bonding. It is important if using cut (flexible) foam that the resin/glue film fills all the cuts, otherwise the core properties can be compromised.

CORE	MINIMUM ADHESIVE RESIN REQUIREMENTS ON ESSENTIALLY FLAT PANELS
Corecell M80-M200 PH	250g per face
PVC 80-200 kg PH	250g per face
PET 80-200 kg PH	400g per face
Corecell M80-M200 DC (knife cut)	400g per face (20-25mm sheets - increasing with thicker sheets)

Table 7 - Approximate amounts of resin/glue film required for prepreg and SPRINT

It is **extremely important** to make representative test panels to ensure adequate adhesive/SPRINT resin is provided for adequate core bond. In one-hit cure operations it is imperative that not only is there sufficient resin and or glue film provided, but that cure profiles are sufficient to allow good resin flow, this means avoiding very slow ramp rates see below.

With cut core, the radius of the mould has a huge impact on the resin requirements, additionally, the ability of the resin to flow is affected by the cure profile, thick foam core will often insulate and reduce the ability to get heat and therefore flow into the part. If double thickness cores are required in large parts the importance of these points is magnified and representative test panels MUST be made to ensure sufficient resin and flow are achieved.

The ideal core for curved parts is thermoformed PH M foam, this will be the lightest and toughest solution.

TEMPERATURE & PRESSURE PROCESSING

Gurit cores have a maximum pressure/temperature combination defined for processing to ensure dimensional stability is maintained. 2% shrinkage is generally taken to be acceptable during core processing. Table 8 below shows the maximum pressure/temperature combinations for which no more than 2% crush is experienced. If dimensional stability is not a design priority higher temperatures may be possible, although lower mechanical properties may result.

Data given covers a range of core types and densities which demonstrate the variance between their processing limits. Pressure/temperature combinations should be used as guidance, with small scale testing verifying appropriate processing for each new application. ***NB Absolute pressure = vac bag + autoclave gauge pressure. Temperatures quoted are a guideline as to what is possible and should be verified in process**

CORE TYPE	*ABSOLUTE PRESSURE (BAR)		
	1	2.5	5
Gurit Corecell M80	110 °C	85°C	75°C
Gurit Corecell M130	110°C	90°C	85°C
Gurit Corecell T400	100°C	75°C	50°C
Gurit Corecell T500	100°C	85°C	75°C
Gurit PVC HT 60	135°C	80°C	70°C
Gurit PVC HT 80	135°C	80°C	70°C
Gurit Kerdyn 80	130°C	70°C	50°C
Gurit Kerdyn 135	180°C	85°C	75°C

Table 8 - Summary table of maximum Autoclave processing conditions for a range of Gurit Cores