A Uniquely Sustainable Solution

DISPA®

FABRICATION GUIDE

3A Composites USA
3ACOMPOSITESUSA.COM / 800.626.3365

DISPA®

3A COMPOSITES

TABLE OF CONTENTS

INTRODUCTION

Thank you for choosing a 3A Composites product for your graphic display applications.

This Fabrication Guide was created in order to incorporate the most common fabrication methods that are used with 3A Composites' line of graphics display products. Not all fabrication methods are compatible with each product, but this format was kept for consistency purposes. **The term "the substrate" is used throughout this guide and is meant to apply to all members of the substrate family unless noted otherwise.** Those fabrication methods that do not apply to a certain product are stated with a short explanation and a recommendation for an alternative product that fits that application method.

The date of the last revision is shown on the bottom right hand corner of each page. Please make sure you have the most current version by going to 3acompositesUSA.com and selecting the fabrication manual from the downloads section.

If you have any further questions about our product or about how to use this manual, please feel free to contact us at 1-800-626-3365.

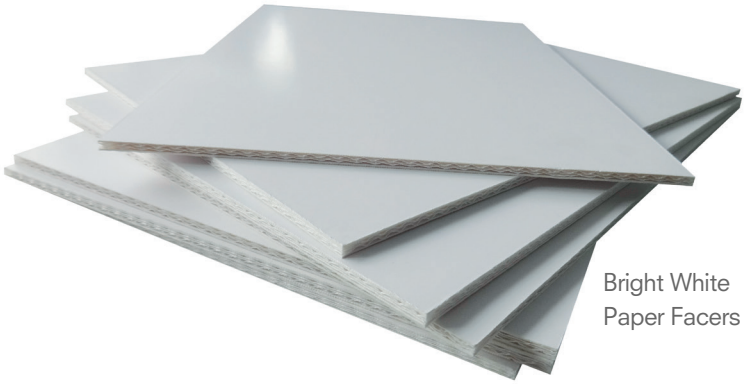
PLEASE NOTE:
TRIALING IS RECOMMENDED TO ENSURE SUITABILITY FOR THE PROPOSED APPLICATION AND FABRICATION BEFORE FULL-SCALE COMMERCIALIZATION.

INTRODUCTION TO DISPA

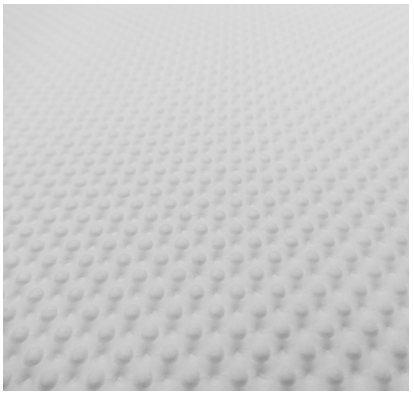
DISPA® is a display board made of 100% FSC®-certified paper (FSC®-C074317) with a unique core of embossed formed paper. Due to the patented manufacturing process, the composite structure with its smooth, bright white surfaces offers high quality results for printing with optimal flatness, rigidity and stability. The manual processing of the material is efficient and easy, as is mechanically forming it into three-dimensional structures. The core system of DISPA has mainly isotropic properties. Due to the evenly arranged hemispheres of the core, the characteristics of the panel remain equal for processing in all directions. This also translates into higher quality printing results that don't have the distracting read-through seen with fluted or corrugated materials.

This is a major difference between DISPA and competing products, e.g. corrugated boards or fluted polypropylene sheets with anisotropic structures. A decisive advantage of DISPA is that it can be used and processed, in most cases, in a direction-independant way. Thus a higher yield can be achieved from a standard size panel by optimizing waste. Nonetheless, the paper itself has an anisotropic part with regard to the orientation of the paper fibers, which will be discussed in more detail in subsequent sections.

One of the biggest differentiating advantages of DISPA is its final disposal into the paper waste stream.



Bright White Paper Facers



Embossed, formed paper core

WHY CHOOSE DISPA?

A Uniquely Sustainable Solution

DISPA is the new paper board from 3A Composites, comprised of a uniquely laminated structure of embossed formed paper giving it strength & rigidity. The embossed structure forms the central layer with flat, smooth surfaces that are ideal for printing.

- Bright white, smooth paper surfaces in sheets up to 60" wide
- Extremely lightweight for easy handling & hanging
- Excellent for digital & screen printing applications
- Good for CNC cutting as well as die cutting
- Strong, rigid and dimensionally stable - signs stay flat
- Fast, efficient and easy processing - even with hand tools
- Ideal for pre-printed double-sided offset litho sheet lamination
- Made of 100% FSC® Certified paper (FSC®-C074317)
- 100% recyclable!

DISPA is the perfect solution for short term promotional campaigns in indoor areas, such as hanging & standing signs, 3-dimensionally formed POS/POP displays, and even product packaging.

Applications

- Visual communications
- Advertising and promotional campaigns
- Hanging signage
- Window displays
- Point of purchase displays
- Tradeshow & exhibitions
- Screen printing
- Interior signage
- 3-dimensional displays
- Sophisticated packaging

DISPA®

APPLICATION GUIDE

	POP Displays	Exhibits & Fixtures	Framing	Interior Signage	Exterior Signage	Structural Signage	Interior Design	Packaging	Poster Glazing	Mechanical Assembly
$ **FOME-COR FOUNDATION** Acid-Free	○	○	■[0]	○						
FOME-COR	○	○	■	○						
FOME-COR with ENCORE Technology	○	○	■	○						
FOME-COR SINGLESTEP Heat-Activated	○	○	■	○						
FOME-COR CANVAS	○	○	■	●			●			
FOME-COR JETMOUNT	○	○	■	○						
FOME-COR QUICKSTIK Self-Adhesive	○	○	■	○						
DISPA	○	○	■	○			○	○		
SINTRA CONSTRUCT		●	■			●				■
SINTRA VERS	●	●	■	●	●					
$$ **SINTRA**	●	●	■	●	●		●			
SINTRA ECLIPSE	●	●	■	●	●		●			
GATORBLANKS	●	●		●	●					
GATORPLAST	●	●	■	●	●					
GATORFOAM	●	●	■	●	●[1]					
GATORFOAM PRO	●	●	■	●	●[1]					
GATORFOAM EXTERIOR	●	●			●[1]					
GATORFOAM SELF-ADHESIVE	●	●	■	●						
LUMEX G	●	●	■	●				●	●	●
E-PANEL / EPL-5	■	■	■	■	■					
$$$ **DIBOND**	■	■	■	■	■	■[2]	■			■

Trialing is recommended to ensure suitability for the proposed application before full-scale commercialization.

- ○ Short term application
- ● Medium term application
- ■ Long term application
- 0 Archival mounting applications
- 1 Black GATORFOAM is not recommended for outdoor usage
- 2 Applications such as workzone signage, canopies, pylons, and column covers

FABRICATION GUIDE

	Mounting	Repositioning Vinyl	Digital Printing	Screen Printing	Painting	Knife Cutting	Saw Cutting	Routing	Die Cutting / Punching	Embossing	Forming Curves	Creasing
$ **FOME-COR FOUNDATION** Acid-Free	◊[0]					◊			◊	◊		
FOME-COR	◊		◊	◊	◊[3]	◊			◊	◊		
FOME-COR with ENCORE Technology	◊		◊	◊	◊[3]	◊			◊			
FOME-COR SINGLESTEP Heat-Activated	◊					◊			◊	◊		
FOME-COR CANVAS			◊	◊	◊	◊			◊	◊		
FOME-COR JETMOUNT	◊		◊	◊	◊[3]	◊	◊	◊	◊	◊		
FOME-COR QUICKSTIK Self-Adhesive	◊					◊			◊	◊		
DISPA	◊		◊	◊	◊	◊		◊	◊		◊	◊
SINTRA CONSTRUCT	◊[1]	◊			◊	◊[4]	◊	◊	◊[5]		◊	
SINTRA VERS	◊[1]	◊	◊	◊	◊	◊[4]	◊	◊	◊[5]		◊	
$$ **SINTRA**	◊[1]	◊	◊	◊	◊	◊[4]	◊	◊	◊[5]		◊	
SINTRA ECLIPSE	◊[1]	◊	◊	◊	◊	◊[4]	◊	◊	◊[5]		◊	
GATORBLANKS	◊				◊	◊	◊	◊				
GATORPLAST	◊	◊	◊	◊	◊[3]	◊	◊	◊	◊[5]			
GATORFOAM	◊		◊	◊[2]	◊[3]		◊	◊				
GATORFOAM PRO	◊		◊	◊[2]	◊[3]		◊	◊				
GATORFOAM EXTERIOR	◊		◊	◊[2]	◊[3]		◊	◊				
GATORFOAM SELF-ADHESIVE	◊	◊					◊	◊				
LUMEX G	◊	◊	◊	◊	◊		◊	◊	◊		◊	
E-PANEL / EPL-5	◊[1]	◊	◊	◊	◊		◊	◊	◊[6]			
$$$ **DIBOND**	◊[1]	◊	◊	◊	◊		◊	◊	◊[6]		◊	

Trialing is recommended to ensure suitability for the proposed fabrication before full-scale commercialization.

0 Archival conservation mounting
1 Cold mounting techniques only
2 Face priming will provide better results
3 Do not expose polystyrene foam to solvent-based paints
4 1-3mm may be cut with a knife or blade
5 May be die cut in gauges up to 5mm or 3/16"
6 Punch press die set is required

MATERIAL HANDLING

Transport & Handling

To receive an optimal final product, please note the following:

- Carefully transport with protection material, especially at the edges and corners
- We recommend the wearing of common white cotton gloves to avoid finger marks as well as the deposition of grease and dirt particles on the surface layers.
- When lifting the sheets / pieces of material, apply as much palm as possible onto the panel in order to avoid pressure points & deformation. Under no circumstances touch and lift only from a corner.

Material Preparation

Remove the protection foil of the pallet and let the panels acclimatize prior to printing. They should adjust in the same room conditions as where the processing will take place for a period of at least 24 hours. The processing location should have the recommended temperature & relative humidity provided in 'Storage' below.

If the temperature of the processing site differs more than 50°F and / or the relative humidity differs more than 20% from the storage location, an acclimatization period of at least 72 hours is recommended.

For a good processing of the material, the paper moisture should be between 6-8%. Please carry out a measurement of the paper moisture with a suitable measuring device.

Storage

We recommend storing DISPA sheets flat in an indoor area at room termperatures between 64 - 75°F and a relative humidity level of 50-65%. Circumstances such as moisture and humidity have an impact on the paper. In general, the drier the paper layers are, the more inhomogeneous the processing will be. For all processing technologies, please follow the usual processing recommendations for paper products.

PRINTING

DISPA is ideal for both digital direct & screen printing, and can be directly printed without any pretreatment. In general, the quality of the print result depends on the climatic conditions (including room environment, humidity, & temperature), printing machine, ink type, image composition, color management, processing speed and drying.

Direct Digital Printing

DISPA is well-suited for digital printing due to the bright white paper surface and offers a faster throughput time on the printing machine than other substrates. To achieve an optimal print result, please note the following:

- Regularly maintain your printing machine and UV lamps especially, and check the intensity of the UV radiation. Blow off the panel with ionized air before printing and consistently apply existing measures to reduce static charge.
- Use only printing inks that are suitable for printing on paper surfaces. If you want to fold DISPA after printing, and flexible ink should be used for printing.
- By optimizing the maximum amount of ink applied and the color profile selected, you will achieve optimal results; this also includes the adaptation of both the printing speed and the performance of the drying unit. The drying of DISPA can be expected to save energy compared to other substrates, as drying lamps can be operated with less energy.
- Adjust the performance of the vacuum table to prevent collisions with the print head; if necessary, fix the edges of the panels with adhesive tape or cover free surfaces on the vacuum to increase the suction power.
- Before further processing, the colors or inks must completely dry or harden according to the ink manufacturers instructions.
- Since no corona pretreatment is needed with DISPA, digital printing is possible even after months of storage without any loss of quality.
- Please note our guidelines on transport, handling and storage mentioned previously.

Screen Printing

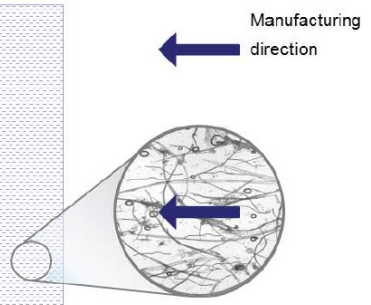
DISPA sheets can be easily screen printed. For an optimal end product, please note the following:

- Use a continuously calibrated printing process with a suitable media profile for screen printing.
- For printing, the screen printing machine should be equipped with a pressure-controlled squeegee to minimize the compression of the material. The embossed core material has a slight recovery effect.
- Please calculate a thickness reduction of the material with every squeegee application and carry out appropriate tests prior to full production to readjust your machine if necessary.
- For double-sided printing, the first side must be completely dry before printing on the second side.

CUTTING

Thanks to the almost isotropic properties of the core material - the uniform arrangement of the hemispheres in the core of the panel - the material can be processed equally well in all directions in most cases. The anisotropic part in the plate is the paper fibers which, due to their orientation in the paper composite, provide a direction that can lead to different behavior of the material during processing. The paper fibers are oriented in the production direction. The more accurate the paper is in the given humidity range, the less influence the fiber orientation has on processing. Please note the common processing instructions for paper.

Image: orientation of the paper fibres



microscopic view of the paper fibres

Manual Cutting

DISPA panels can be easily cut with solid common working knives (cutter knives). Multiple, light cuts provide a better result than only one single, strong cut. The metal scale, which can be used as a stop rail for a straight cut, should be secured against slipping.

Cutting Machines

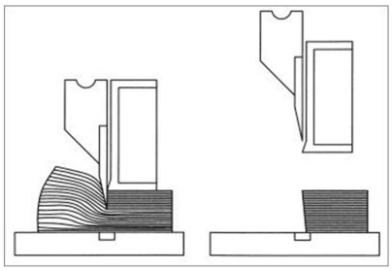
A cutting machine with guillotine cutting can separate several panels with one cutting stroke, but there is a big difference when cutting DISPA compared to solid paper materials. The pressure beam fixing the material stack to be cut applies pressure on the material. The innovative structure of DISPA with its structurally stable core material reacts to this pressure in a different way than solid paper materials - it can be compressed much more. Therefore please note the following:

- **Pressure Bar** - The pressure of the bar should be minimized. By broadening the bar, the area of the contact pressure can be increased and thus the quality of the cut can be improved. Individual manufacturers offer optional extensions of the retainer bar. Another possibility to obtain an optimal cutting result is to put an elastomeric foam below the retaining bar. Thus the top DISPA layer doesn't slip and the overall pressure will be absorbed better.
- **Knives / Blades** - It is recommended to use an HSS paper knife with an angle of 22° without bevel. The knife should not be curved at the back.
- **Cutting Procedure** - Place a suffer board (solid board) on the top panel of the stack in order to transfer the pressure of the retaining bar more evenly to the sheets and to prevent marks of the bar on the first DISPA panel. It's advisable to cut the top panel with the backside upwards so that the pressure of the retaining bar will not be marked on the printed front side.

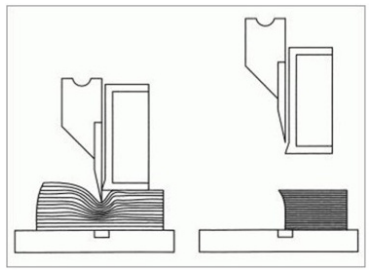
A maximum of 6 unprinted sheets should be cut at a single time. For printed pieces, the number cut at a time should be reduced depending on the ink used. We recommend a trial cut for demanding cutting work.

CUTTING (cont'd.)

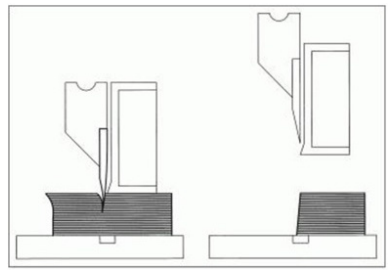
Possible errors and causes during the cutting process:



Undercut:
Too many sheets in the stack



Mushroom type cut:
Insufficient clamping pressure
Blunt knife



Overcut:
Excessive clamping pressure
Angle of knife is too lean

Digital Cutting Systems

DISPA can be cut on a digital cutting machine with both a draw knife and an oscillating knife. For both versions, we recommend to use the blades only for this material. If knives are worn out by other materials, the resulting blade irritations can result into scruffy cuts of the slender paper layers of DISPA, or in worse cases cause tearing. With new blades and the right material moisture, the cutting result is significantly improved.

For cutting contours with radii, the best results are achieved with an oscillating blade unit. Please use a pointed oscillating blade for tough materials. For small radii, a blade compensation should be used. The manufacturer of your cutting system will provide you with the ideal setup parameters for the successful processing of DISPA.

For straight cuts, tangential knives can be used as well. This results in a higher feed rate. The use of tangential knives for more complex geometries is limited.

When creating cutting files, select the predefined parameters of corrugated cardboard material with a material thickness of approximately 4.5mm. All information must be individually tailored to the machine used. If you have further questions in this respect, we recommend contacting the customer service if the respective machine manufacturer.

Die Cutting

When punching DISPA, the entire final shape can be created with one stroke. This provides an advantage for high volume productions.

- The necessary punching tool can have toothed or smooth cutting lines
- The machine settings for semi-automatic punching dies are the same as for solid board
- To distribute the pressure evenly, we recommend the use of foam rubber over the complete punching surface. Depending on the shape and radius of the contours, for large radii the use of sponge rubber on the edge of the cutting lines can be sufficient.

Punching die

DISPA after punching

FORMING

DISPA is ideal to create three-dimensional forms. Due to its five layer structure, DISPA has a very good homogeneity in all directions.

It can be shaped in three ways:

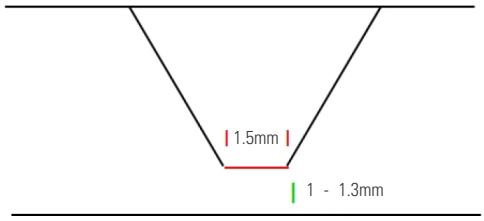
- The V-cut
- Embossing & punching technique
- Creasing wheel - digital embossing with cutting systems

V-notch Cut

To form DISPA three-dimensionally by folding, V-shaped notches are cut and the waste material is removed. With a simple V-cut, you can achieve a folding up to 90°; with a double V-cut a folding of up to 180° is achievable.

The waste can usually be taken off easily depending on the adhesive position of the core material with the cover layer. Please note the following:

- We recommend the use only new and sharp blades for V-groove cuts. The blades should only be used for DISPA.
- V-cut depth: approximately 2.5 - 2.8mm, leaving 1 - 1.3mm of material
- V-cut width: Widen the V-cut gap to 1.5mm. This can be saved in the settings of the cutting system ot already have been created as a double line in the cutting file.



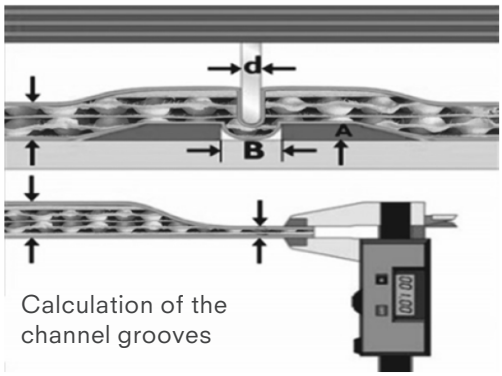
V-Cut Parameter Recommendations

Embossing & Punching

In order to bring DISPA into a three-dimensional shape, the combined processing of punching with simultaneous embossing (grooving = preparation of the fold edges) and subsequent folding is ideally suited. This is the most efficient way to shape DISPA three-dimensionally in large series.

If embossing lines are used when punching, we recommend to use embossing channels on the opposite site of the punching die as well. The width of the embossing lines should be at least 2.5mm. Depending on the forming angle of the final product, an embossing line width of up to 5mm (180° fold) should be used.

Channel grooves on the counter-punching plate should be selected according to the following formula:



Calculation of the channel grooves

B = (e x 2) + d
B = crease width
e = compressed DISPA (1.2mm)
d = thickness of creasing rule

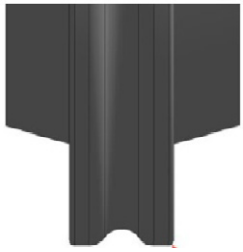
For folds between 90° & 180°, we recommend to fold the material at 180° first and then to set the desired folding angle.

Creasing Wheel - Digital Embossing with Cutting Systems

Another way to process and form DISPA three-dimensionally is by using the technology of a creasing wheel. Common cutter systems are possessing not only blade or milling units but creasing wheels as well. The creasing wheel highly compresses the structure of the core material and creates a fold line. The material can then be folded along a linear, clean fold line. Creasing wheels are available in different versions.

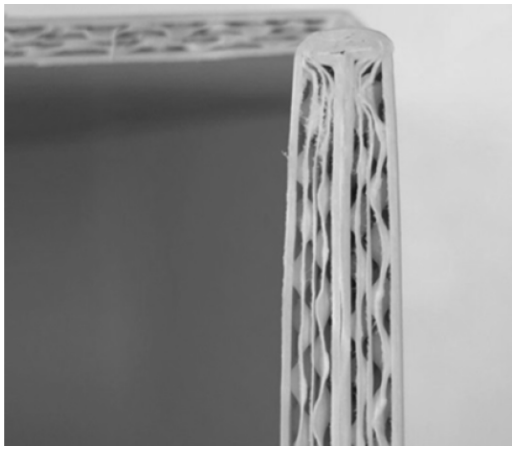
For 90° as well as 180°, we recommend to use an embossing geometry, which leaves two parallel embossing lines in an outer distance of about 5mm into the DISPA. As a result, the fibers of the outer paper cover layer are stressed less during the forming process and thus cracks and tears are avoided. For a good folding result, we recommend that you first fold the material at 180° and then set the desired final folding angle.

For all types of folding the following geometry was developed for the DISPA creasing wheel:



Detail of a creasing wheel with its special embossing profile for DISPA

The pressure of the creasing wheel onto the substrate should be adjusted to a maximum compression but without causing cracks in the material. The ideal compression is about 80% of the initial thickness of DISPA. As the material is pressed into the sift table support, it adopts the geometry of the creasing wheel. When using this processing method, the paper moisture must not be less than 7%. If the paper texture is too dry, small tears can be found on the creasing edge or at the outer edge after folding.



180° Folding

90° Folding

LAMINATION & GLUING

Lamination

The growth behavior of paper is strongly dependant on its moisture rate. Therefore only a double-sided mounting technique is recommended. For lamination, use an adhesive that has a lower water content but is still liquid enough to be spread evenly.

- Acetate-based adhesives (PVA) work faster
- Starch adhesives (Dextrin) dry more slowly, thus reducing possible distortion of the panel

Gluing

Any type of adhesive suitable for papers can be used. For example: hot-melt adhesive, solvent-based and non-solvent based adhesive glue, acetate-based adhesive (PVA), or starch-based adhesive (dextrin).

DISPA is a paper-based product. Paper shrinks and grows according to changes of the room climate. The more moisture the glue contains, the more DISPA will change in size and flatness.

WASTE DISPOSAL

DISPA is made of 100% paper and therefore is 100% recyclable. DISPA can easily be disposed of in the paper waste stream.

Allocation according to EN 643: 2014: group 3.13.00 - white, multi-ply carboard, unprinted, containing sections of unused, white, multi-ply cardboard, woody or wood-free layers, but no grey or brown layers.

CONCLUSION

This Fabrication Manual has been developed to assist fabricators to work with the substrate in the most efficient and effective manner. The tips and suggestions contained in this manual are the result of many years of combined experience by fabricators in the U.S., Canada, South America, Asia and Europe.

These fabrication suggestions and product specifications are based on information which is, in our opinion, reliable. However, since skill, judgment, and quality of equipment and tools are involved, and since conditions and methods of using the substrate are beyond our control, the suggestions contained in this manual are provided without guarantee. We recommend that prospective users determine the suitability of both the material and suggestions before adopting them on a commercial scale.

3A COMPOSITES USA, INC., DOES NOT MAKE ANY WARRANTIES, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR PURPOSE, WITH RESPECT TO ANY SAID SUGGESTIONS AND PRODUCT DATA.

In no event shall 3A Composites USA, Inc., have any liability in any way related to or arising out of said suggestions and product data for direct, special, consequential or any other damages of any kind regardless of whether such liability is based on breach of contract, negligence or other tort, or breach of any warranty, express or implied.

Also, normal safety and health precautions practiced in any fabricating environment should be used when fabricating the substrate.

3A Composites USA, Inc.
1-800-626-3365
3acompositesusa.com