

How-To



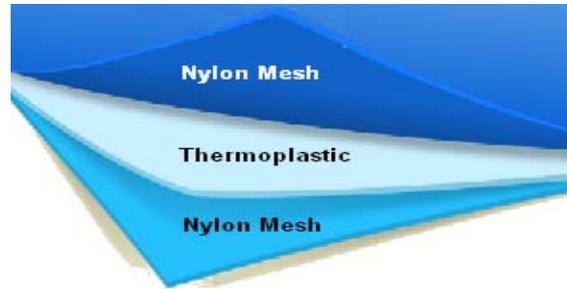
The Wonders of Wonderflex™ Mette Hedin

This easy-to-use material may be just the answer if you need a structural component or an unusually shaped object for your next costume.

You figured out what costume you want to make and the sewing is a cinch, but there's one piece of armor, a weird structural component, or a prop that stumps you. You could build it out of wood, but that is too heavy and too much work. You could find an existing object to modify, but that takes legwork and wastes a lot of time. You could dabble in vacuum forming, but you don't have the equipment or the expertise.

That's when you might want to consider *thermoplastics*. For one-off structural costume parts, large or small, few things beat thermoplastics for versatility, low weight, and ease of use. The most popular one for costuming, hands down, is *Wonderflex* by [Foss Manufacturing](#).

Wonderflex is popular because it is low cost and easy to use. It consists of a thin sheet of thermoplastic sandwiched between two sheets of nylon mesh. It is great for beginners. No matter how much you work it,



it stays in a sheet instead of glomming together like other thermoplastic materials.

Material Details

Let's quickly skim over the technical aspects before we get our hands dirty.

Technical properties:

- Softens completely at 160° F.
- Working temperature of 140°-160° F.
- Working time of 2-4 min.
- Rigidity in 10 min., full strength in 30.

Avoid heat to the finished piece, as it will start softening at 125° F. Your car on a hot day and a sauna convention are not appropriate places for your costume.

Pros:

- Ease of use - easy to handle and shape
- Durability - comparatively hard to break
- Flexibility - will bend, not crack or break, pops back to the original shape
- Lightweight - weighs little on its own

- Non-toxic - no chemicals to mix or required safety gear; can be shaped on the naked skin if done carefully
- Reusable - if a piece did not come out right, reheat and reshape many times, depending on the amount of deformation
- Fast heating time – normally softens sufficiently in a matter of seconds
- Fast setting time - depending on how and how much it was heated a piece will set somewhere in between 2-20 minutes
- Joinable - can attach to itself simply by heating with dry heat
- Paintable - can be painted and glued

Cons:

- Distinct, easily recognizable texture that is rarely desired for the finished product.
- More susceptible to damage later. In most cases it is vital that it be kept away from excessive heat and sharp objects
- Won't flex indefinitely, and complex shapes and curves, must often be made in pieces; requires hiding seams

With that background, let's get started!

Buying

Wonderflex normally comes in 40" by 55" sheets, or in smaller sizes from resellers. A sheet weights 2-3 lb. It is set in the "flat" mode, and can easily be rolled for transport.



The material isn't normally available in regular stores so you'll need to order it online or visit a specialty store (see [Links](#)).

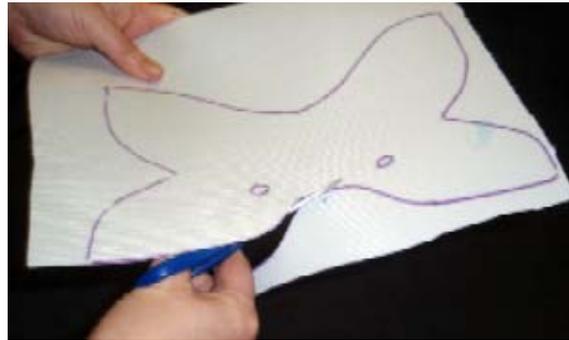
Cutting

Since the full size sheet is unwieldy, start by cutting out the pieces you need, like pattern pieces for a garment. You can wing it by cutting approximate pieces and remove the excess, or make templates ahead of time.

A common material for templates is Fun Foam, as it is more flexible than unheated Wonderflex and a bit cheaper. It is also handy for sizing the piece to a part of your body. Lay it over the item or body part, draw the outline with a Sharpie, cut out, and trace it onto the Wonderflex.



The actual cutting is easy: use a pair of scissors, and cut it like thin cardboard.



Heating

In most cases you will want to shape individual pieces before or while joining them. You can do this in a number of ways, using "dry" and "wet" heat.

Dry heat – Use a heat gun to heat the piece with hot air. Either aim the gun at the piece, or stand the gun upright and heat the piece over it. Be careful of your fingers. Wonderflex does not really burn easily, so overheating it is rarely a problem



Instead of a heat gun, you can also use a hair dryer. The difference is that heating the piece sufficiently may take a bit longer.

Dry heat makes the plastic slightly tacky. When pressed against another piece or certain other materials, it actually bonds without adhesive. It also becomes workable almost like clay, so you can "smush" pieces together, and the bond will hold for most joints. It's hard to heat large areas evenly, so reshaping larger pieces is impractical.

Wet heat – Pour boiling water into a large enough container, and dunk your piece until it goes soft enough. A pair of pliers will save your fingers from being cooked.



Once the piece is soft enough, pick it up, let it drip off slightly, and start shaping.



With wet heat, the entire piece is evenly heated, yet is cool enough to touch once the water drips off. It is far easier to drape it over things, or shape it right onto your body. However, the piece generally takes longer to cool off and thus longer to set. The very practical tackiness of the dry heat method is less reliable with wet heat.

In other words, for shaping and draping wet heat is preferable, but for fine tuning details and joining pieces, dry heat is the way to go. Luckily, you can combine the two methods, even with the same piece.

Shaping

Once the plastic has softened from the heat, simply put it into the shape you want. For smaller pieces like this facemask, shape and hold the piece with your hands.



The very first piece I made was an impossibly curly collar. I dipped my pieces in hot water, held them for a few minutes,

and I was done. It was so ridiculously simple and quick, that I was an immediate fan of the material

For larger pieces, mould or drape them over an object, a positive mould made of foam, clay, or anything moderately heat resistant, or even the human body.



Keep in mind that the material takes a little while to set, so you may want to hold it in place until it hardens enough that it won't deform. Applying cold water will speed the setting. Interacting with the Wonderflex is a simple matter of dealing with temperature rather than waiting for a chemical reaction.

Often, with larger pieces, the edges or select areas may have deformed slightly while setting if not held perfectly in place. Instead of redoing the whole piece, I suggest dipping a washcloth into hot water, and pressing onto the area, thus heating it enough to fine-tune the shape. You can also hit the specific spot only with the heat gun.

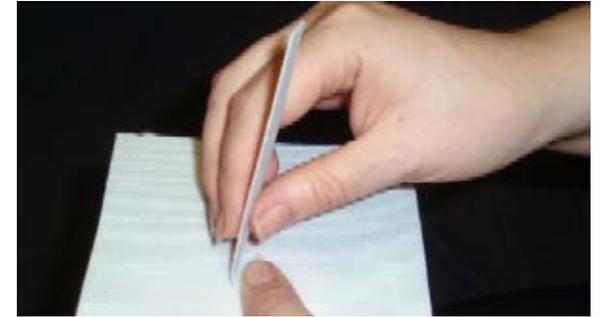
When shaping, remember that, while it is flexible, the material is plastic sandwiched between two thin sheets of mesh, so it will only stretch a little bit (generally more on the bias). Complex curved shapes, especially

bulbous shapes, are hard to accomplish with just one piece of material.

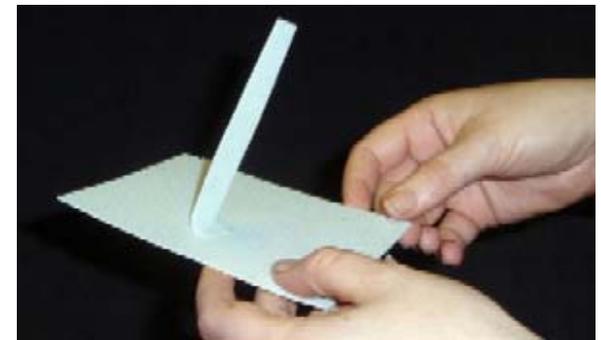
Sometimes you may want to bunch it up while shaping and cut off the excess, or cut out wedges in select places ahead of time, or simply compose larger piece of several smaller pieces joined together.

Joining

Joining is where you will get a real feeling for the possibilities. Stickiness from dry heat allows you to press surfaces together and get an instant bond that hardens as it sets. You can easily build up complex structures using this technique.



When joining two pieces together, you can heat just one, and they will still stick.



Often it is preferable to shape pieces, separately, let them cool, and heat only the edge of one piece before you press it to the other. If a join isn't right, simply re-heat and the pieces come apart as easily as they went together. The power of the construction simplicity might blow you away.

A variation is to sandwich several layers together. While it wants to stay in the shape you made, the material will still flex and bend. If you want to strengthen a piece, the easiest way is fold over edges or press several layers together. This technique adds a surprising amount of strength.

There are many ways to attach pieces to each other or to other material, so don't get too stuck on the basic joining technique. Hot glue works fairly well, with the added benefit of making the pieces hot enough to get tacky for additional bonding.

Wonderflex is strong enough that it is unlikely to rip if you attach two pieces by mechanical means, such as snaps, metal staples, nuts and bolts, rivets, etc.

I constructed a troll head where the underlying structure was shaped directly on



my head, so snugly that I couldn't get the headpiece on or off if the jaw wasn't removable. I attached jacket snaps to the head and jaw, allowing the jaw to pivot at a natural point, as well as being the way for me to get in and out of the headpiece.

A mechanical join is also a good idea in places where larger pieces are joined with small surfaces. The troll head has very long pointy ears that attach to the head with only a square inch of surface. Since I knew they would be likely to fall off, I made metal staples out of wire for extra security. The staples were easy to insert through both ears and head by heating the wire first, and then poking it through both layers at once.

Covering

Wonderflex is easy to work with and very strong, but has one major drawback: the surface mesh is very easily recognizable. When only painted, the texture often shines through, making the surface look somewhat matte and reminiscent of fabric. If your item is meant to look metallic for example, this is not very desirable.

For most uses, you will want to cover Wonderflex in one or more ways to achieve the right look. There are almost infinite possibilities, but I wanted to get the grey matter going with a few suggestions.

Smooth and/or hard surface:

Bondo - Bondo isn't exactly fun to work with, but it makes Wonderflex rock hard, while keeping the end result relatively lightweight. Apply the Bondo, sand and

repeat until you have the surface you want. You can then spray paint straight onto the Bondo, and voila, you have custom armor.

This helmet was shaped in two halves, and joined with hot glue and a Wonderflex strip. Then, it was covered in layers of Bondo and sanded.



Mod Podge – This is an easy and fast way to get rid of the texture without adding weight or much thickness. It also maintains the amazing flexibility of the Wonderflex. Paint it on in thin layers, let dry and repeat until you have gotten a smooth surface. You can spray paint straight on the surface.

Gesso - Others have reported good success with this. Be sure to sand between coats. I found it is slow to dry, but you can paint acrylics straight onto the Gesso.

Friendly Plastic - This thermoplastic can be heated in warm water and applied onto the Wonderflex. It tends to get a bit

bumpy, but can be "polished" by applying more heat. Be careful when using a heat gun however as it burns much easier than the Wonderflex. The material is hard to paint.

Sculptured/textured surface:

Model Magic – Attach this air-dry foam clay by applying spray-on adhesive to the Wonderflex. It is lightweight, dries in 1-2 days, and can be painted with acrylics. It has a relatively short working time.

Packaging/Mattress foam - carved and or textured foam pieces can easily be glued on with, for example, hot glue.

Embellished surface:

Fabric and Leather – With a bit of spray-on adhesive, you can get a clothing surface that is forgiving about smaller flaws in the shape underneath. The spikes of this leather bracelet were painted with Mod Podge (not enough as you can still see the Wonderflex texture), and then with metallic acrylic. It was intentionally half finished to show the use of the Wonderflex.



Anything gluable - Feathers, beads, sequins, fur, paper, flocking: only your imagination is the limit. Here is the facemask from before with added detail of a butterfly body and antennas made from rolled up dry heated Wonderflex. Half of the wings have been covered with stretch velvet. The other half was (poorly) flocked.



Dying:

This isn't technically a covering technique, but regular fabric dye such as Rit can be added to the hot water before immersing the plastic. The plastic absorbs the dye, however the mesh on the outside does not accept as much dye, and will contrast more than in its natural color.

Get to It!

Still feeling confused? I find that the easiest way to get a feel for the material and its possibilities is to simply get a piece and start playing around with it. So what are you waiting for? There are costumes waiting to be built!

Links

Here are several online resources.

Douglas and Sturgess: Sells sheets as "Ultra-form" under the thermoplastics category, and pellets as "Adapt-it pellets". My preferred source and the only one I have ordered from online. They have stores in San Francisco, and Richmond. A good source of interesting materials for artists and costumers. Their thermoplastic sample kit has a variety of materials.

<http://www.artstuf.com/>.

Cosplay Supplies: Sold in various sizes. I have not tried this store and cannot vouch for it

<http://www.cosplaysupplies.com/store.php?s=M4UZ>

Dazian Fabrics: Sheets in several thicknesses. I have not tried this store and cannot vouch for it

<http://www.dazian.com/html/wonderflex.html>

More info: Here are several other information sources about Wonderflex.

<http://www.cosplaysupplies.com/tutorials.php>

<http://www.costuming.org/wonderflex.htm>

Mette Hedin is a sci-fi and fantasy costumer who specializes in recreations of things that don't exist in the real world. She loves learning new techniques and materials and is always looking to expand her costuming horizons. Visit her web site:
<http://www.costumingfools.com/>.