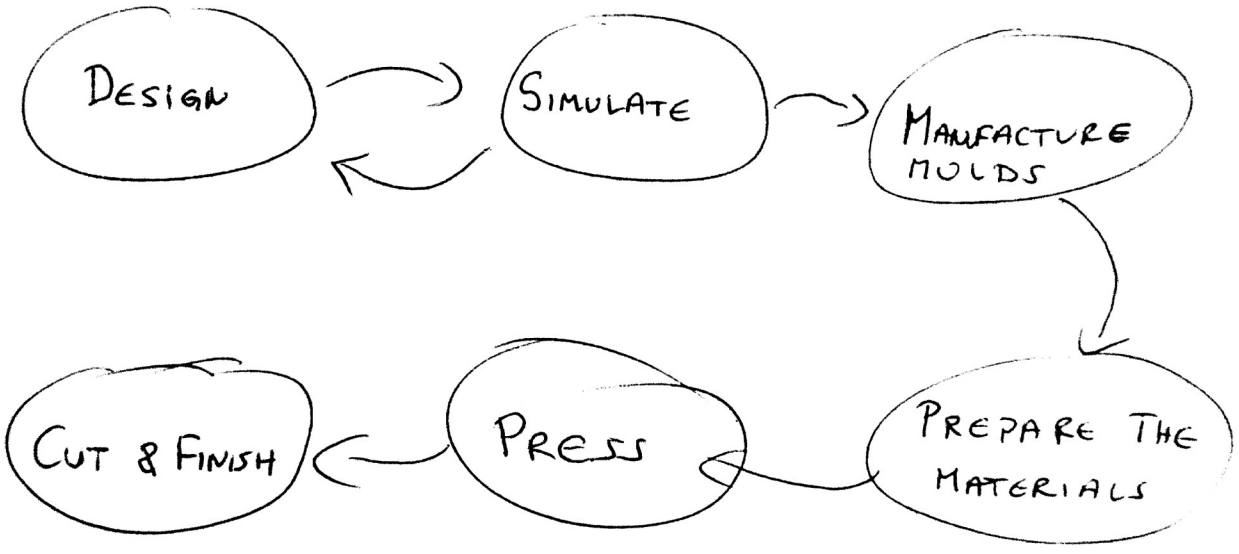
Making handmade skis or boards

Intro And ‘How To’ Guide For Beginners

Ski/snowboard/kiteboard/wakeboard/longboard or surfboard DIY builders

11.09.2020

www.junksupply.com



Whether you are building skis or snowboard or kiteboard or wakeboard, even a surfboard or a longboard, the process is quite similar. The hole idea is to wrap a core into a composite material sandwich, in order to get the desired characteristics and durability. Ski and Snowboard have most components, like steel edges, so these are the most demanding projects. Below we will go thru the process of building, but firstly lets put some guidelines down and start with the Design phase.

Dear fellow ski and board builder(s), the materials in our webshop are all produced in Europe, and are the finest materials available on the market. This means in order to get their full potential you might wish to follow some of our suggestions below when you handle and work with this fine materials…

1) Always use gloves. Use nitrile gloves when working epoxy. All materials are specially treated to work with epoxy, so never touch the materials with bare hands.

2) Be well organized. Plan everything and make a list of steps. Cut your material to dimensions, weigh each fabric piece and layer it all in the order you are going to use it. Remember your time is limited by the epoxy resin cure life/pot life so dont mix it before its time!

3) Make sure your workshop is clean. Before using the material such as p-tex base, sidewalls, fillers or topsheet in the layup, we recommend you wipe it with clean cloth and preferably with 93% ethanol or similar alcohol product. Due to production, transport or storage over some time and electro-static nature of the product they can accumulate dust, dirt or even stains.

4) Check before layup if the layers are turned correctly (contact us if in doubt) or if you have protective film on your base or topsheet. U can scratch it a bit with scalpel in order to find out.

5) If you order any carbon or glass fabric, when cutting it make sure you do it in suitable environment as it will leave a lot of itchy fine dust particles. If fabric fibers are out of line or seem damaged due transport, dont worry, just run your fingers in fiber direction to align the fabric back to normal. If you get any itchy dust in your hands, just use cold water to wash it out.

6) Mix **not more** then 250-300mL of epoxy/hardener in one batch. Always by weight. Follow instructions. Mix well for 2 min. When applying epoxy to fabric, just spread it and let it soak in, dont work it too much to avoid air bubbles, spread it around and let it get absorbed. If you have possibility to heat up your press, do it, heat builds better product. Even little helps.

7) After pressing for the required time, take the product out and leave it to finish hardening. In general, you should wait some days, up to 7 days at room temperature, before you start cutting and finishing your product, this will ensure that all epoxy is cured, and that the bounding is optimal!

Terms worth knowing

You will hear about a lot of fancy mechanical terms but dont worry, it is up to you how much you wish to learn and work with it. I wont describe too many of them (Matrix or Flexural rigidity), but in general the best idea is to read on forums, and decide what to build by borrowing some ideals from others, and copying the build up and layup to start with. Dont let this scare you, its easy to pick up.

Flexural rigidity is what we call stiffness. It is defined by your core material, core thickness and composite materials. The final flex of your ride is very important and before you start cutting and pressing,you will have to carefully go thru design and simulation phase in order to determine the wood core shape and size, and the composite materials you will use. It is worth nothing that the final stiffness is proportional (^1) to the composite fabric used, however ^3 to the core material thickness. So core thickness is an effective way to increase the stiffness easily.

Matrix, is the mixture of composite fabric and epoxy. To get best properties, you need right ratio. Typically you weigh your fabric and then you mix the same weight of epoxy!

Pot life is the time you have to work with your epoxy before it becomes gel and unusable. Make sure you dont exceed this! Be well organized!

Cure time is the time it takes epoxy to cure, where all molecules are bound, and for your ride to be usable.

Spring back factor. When making your mold, you have to take into account that after pressing your product will not stay 100% in the shape of your mold. The tensions of the core and other materials will pull it back. This is called spring back and can be typically 10-20%, depending on the press type and materials. Further you should know that when all these materials are exposed to temperature, suchas if you press at high heat, or when you go skiing at low temperatures, the thermal expention coefficient is not same for wood, metal or plastic, so funny things will start to happen. This is why it is best advised to start with symetrical layup, meaning, what fabric you put on top, do also for the bottom.

Epoxy/Fabric ration. It is good idea to use same weight of resin as the total fabric, plus a bit extra. When using carbon or flax, make sure you have more epoxy then fabric, as these materials absorb a lot.

Mechanical properties of materials suchas composites or wood cores etc is characterized by parameters suchas density, weight, Y modulus etc. These will be usefull when doing simulations.

Rules of thumb worth knowing

1) Use epoxy above 20 degrees C, minimum at room temperature. It is much easier to work with!

2) For every 10 degrees you raise the temperature of your layup, the epoxy cure time will half. In general a full cure takes 7days or more. But in 24h typically you will have 90% or more of a cure. If

you imagine that you cured at room temperature + 10 degrees C, the the same cure will be achieved in 12h. If you imagine you cured you layup at room temperature + 20 degrees C, the same cure would have been done in 6h. Many resins cure at 80 degrees C in just 30minutes or so. Further more when you cure at higher temperatures, your resin will be more viscous, and penetrate the composite fabric better, giving better result.

3) The stiffness of your final product, total thickness of your ski/snowboard, is proportional (^1) to the composite material weight/stifness, but ^3 to the core thickness within the composite material! This means you can increase the stiffness/weight of you composite material to improve stiffness or you can increase the core thickness, however the core thickness is a much more effective way to do it. If you increase the core thickness by 10% your stiffness will go up ~30%. Read here. This also means that any thickness change within the composite sandwich is much more effective then thickness changes outside the composite sandwich (like adding some veneer on top or a topseet)!

4) Weigh your fabric and mix the same weight of Epoxy. This is a good start to get optimum fabric/Epoxcy ratio.

Stiffness or flexural rigidity or flex

Basically how stiff will your design feel? It is probably the most important property of your ride. In order for you to be happy with it, the design has to be just right. Start with a known design and simulation! Please remember:

'The stiffness of your final product if proportional to the composite material (^1), but ^3 to the total core thickness! This means you can increase the stiffness/weight of you composite material to improve stiffness or you can increase the core thickness, however the core thickness is a much more effective way to do it. If you increase the core thickness by 10% your stiffness will go up ~30%. Read here.'

also note, that on wide rides, basically anything than skis, you will have to deal with the stiffness in width as well, which is pretty much unwanted and will only worsen your ride in most cases. In reality it is reflected by the flexing of the ride diagonally, that is around the length axis. So in general you can look at it as

– *longitudinal or length stiffness:* which is the stiffness of your ride that you wish to determine as much as possible. Do you wish a stiff and responsive ride, or a soft and sluggish ride or something in between these two extremes. This is why we do simulations/calculations.

– *width stiffness:* which is the stiffness across the width of your ride. In general we wish this to be as stiff as possible so that you dont have unwanted flexing in the width of your ride that will make it worse performing. In ideal situations it should be infinite, in reality we use multi-axial composite material to make it as good as it can be.

– *diagonal or torsional stiffness:* this is basically a combination of the first two (length and width), and since the product is always physically the longest diagonally, this flexing of the product in the diagonal

direction is the result of a lack of stiffness in width. You can imagine the stiffness as vectors, and any diagonal is a combination of the two (widht and lenght, x and y). In practice you can test the ‘quality’ of your product, by testing for the torsional stiffness. Start by placing the one side of your product between your feet , tightly, and grabbing the opposite end by your hands in each corner. Then try to flex the board by your hands by pulling opposite by each hand, so that it is locked tight between your feet and is turned clockwise or counter clock wise with your hands. The better the torsional stiffness, the harder it will be to flex the ride without having to loosen your feet grip.

The most widely used multiaxial fabric, and the one proven to give best stiffness properties in width and length is 0 (zero) degree combined with +/-45 degree. It is the one with the longitudinal fibers going in the length direction, 0 (zero) degree direction, and the rest of the fibers going in the plus and minus +/-45 degree direction, which is the diagonal direction of the product.

It turns out that just as with vectors, you can split the diagonal stiffness vector into the length and width stiffness vectors. The contribution you can get by multiplying the magnitude (in this case the weight of the ply in +/-45 degrees) with the **cosine to the angle.** So if the angle is 45 degree, the cosine to 45 degree is 1/square-root(2) or 0.707, then in theory you multiply the weight of the ply in the diagonal direction with 0.707 to get the weight contribution to the length (or 0 degree) stiffness and width stiffness.

Materials involved

In general you need to know the materials you will need and the precautions you need to take when making your own ride. If you get our package kit, all these materials will be included.

1) **Epoxy Resin**, is a 2 component product that consists of a Resin and a Hardener. These when mix will start a reaction that will make long polymer chains form. The end product is called a cure and is a basically plastic. Some people call Epoxy a glue. In general you can find resins of different types such as Polyester, Vinyl, Epoxy, however you should for your application only consider Epoxy as this has best mechanical properties, and when put under pressure and stress it delivers.

2) **Composite Fabric**, can be glass, carbon, flax, kevlar or even basalt or other alternatives. It is in essence fibers/threads weaved together to make up a fabric. By them self they offer no function but when mixed with epoxy they give the amazing properties. These materials are characterized by their mechanical properties such as how easy they break when pulled on or how much they stretch etc.

3) **Composite material,** are the combination of fabric (glass, carbon etc) and epoxy. This is called a matrix. Typically the ideal ration of a cured matrix is around 40-50% (fabric to resin). You can imagine a composite as two very different materials working together to make something great.

3) **Wood core and the sandwich,** is the core of your ride. There are plenty alternatives. The choice of your core with the composite materials will pretty much decide the behavior of your ride.

4) **Topsheet and the base,** are used on kiteboards or skis or similar to finish the top or base. This gives extra protection, and also on skis and snowboard or wakeboard the good gliding abilities. This tpe of plastic is sanded and/or flamed and/or ionized in order to make it stick to epoxy. You have to make sure you turn your plastic correctly when working with epoxy. Read more here, https://www.junksupply.com/type-of-plastics-for-topsheet-and-base/

5) **steel edges :** Steel edges are glued to the side of the base, and are laminated to the ski and snowbaord, as they help the rider catch the snow with the edge and turn sharp.

6) also worth knowing is a simple cheap, temperature and pressure and humidity ‘resistant’ wood such as MDF or plywood or similar. This is great for building molds and templates to be used for pressing or cutting.

7) **Inserts** are typically M6 inserts designed for use with snowbaord some skis or wake/kiteboards.

8) **sidewalls:** Sidewalls or rails and tip/tail filler or insert plastic is put around the wood core, to protect it from the moisture and the elements. It is usually solid suchas ABS plastic or HDPE or UHMWPE plastic. It can be also liquid as Urethane resin sidewalls or even epoxy mixed with cotton flox can be used or wood.

9) **VDS rubber tape:** This is rubber tape strips placed on top of the steel edges, and places where there is risk for delamination as metal parts and sensitive areas will over time delaminate due to big differences in properties and bending between metal and other materials.

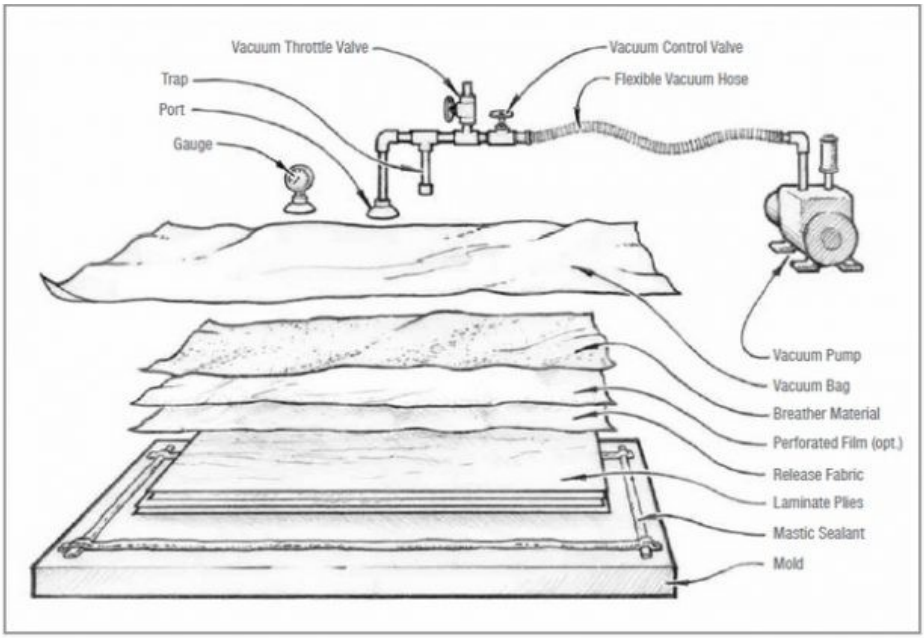
10) **Titanal**: This is thin (usually 0,4mm or 0,6mm) aluminium alloy sheet, that is placed over some specific ski types to gain some properties suchas durability, or hardness, or specific ride properties...

Press types and suppliers

There is roughly 3 types of press, below you can find a picture of each type,

1) Manual clamp press: This is a most simple press with a bottom mold and a top mold that is pushed together by a lot of clamps. This press is cheap and ok if you dont wish to invest money as you will only build one ride. The downside is that the pressure is limmited by how hard you can clamp, and the pressure will not be even. It will not yield best quality but it is cheap to make.
Example: http://www.geraldgruenwald.at/projects/diy-snowboard-and-press/

2) Vacuum press: Will press with about 1atm when in vacuum. That means 1kg/cm^2. This is a good press if you plan to press several rides every now and then. It is well tested method. If you plan to press only a few rides, you can use simply a vacuum bag. If you plan to use it more often, to get best results you should build a vacuum table. get a ~150euro vacuum pump from local shop, and some hose, connectors and vacuum gauge. Further you will need vacuum bagging consumables. Heat can be installed. Se picture.
Vacuum bagging manual: https://www.westsystem.com/wp-content/uploads/VacuumBag-7th-Ed.pdf
Example table: http://skibuilders.com/phpBB2/viewtopic.php?p=40238S



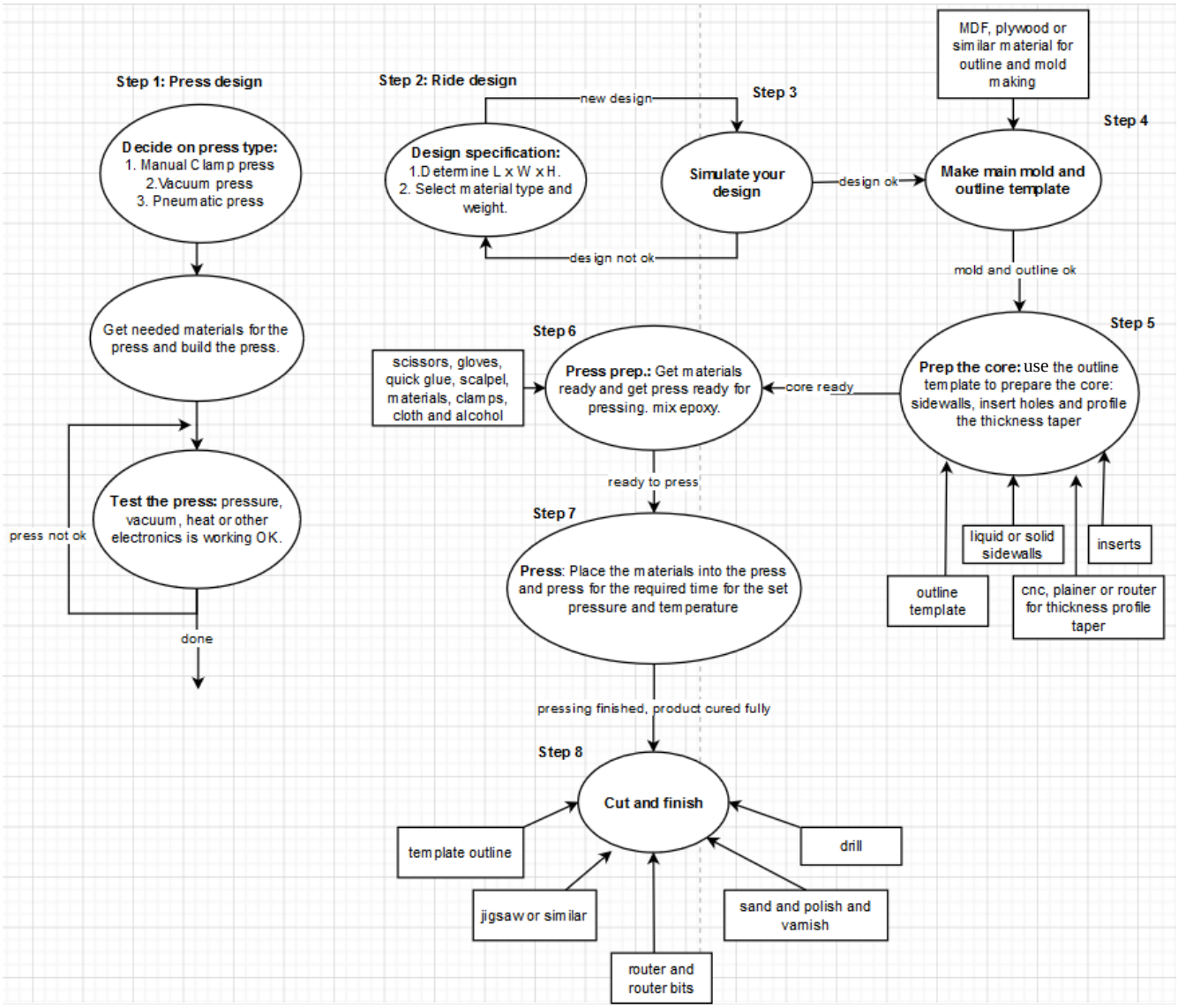
3) Pneumatic press: This is a press built from metal iron beams (H or I beams) and is powered by air compressor that inflates a sort of an air bladder, in order to push the product toward a mold. Typically heat is also installed. With this press you can press with pressures of 100psi, it is done in industry, however this might give too dry laminate with too little epoxy. I would suggest starting with 30psi and looking at the results.

Link: http://www.happymonkeysnowboards.com/MonkeyWiki/Monkey_Press_Construction

In all cases heat can be installed by heat blanket or building a heating oven. Heat will very much improve the end results and quality of your ride.

Links to all suppliers: https://www.junksupply.com/making-a-heated-press/

Process overview flowchart



1. The first step is to select a pressing method and build a press.
2. Once the press is done and tested, we focus on designing our ride. We decide the physical dimensions of the product. It can be done by measuring an existing product which we would like to replicate or improve. We determine also the composite materials we will use.
3. This is simulated until we are happy with the stiffness results and weight and dimensions.
4. Now we can build a outline template from MDF or from plywood or similar. Further we can build a mold. For making these things we can use design software snocad https://www.junksupply.com/design-software/
5. Now we can prepare the core. Cut the outline, make the sidewalls, the tip/tail fill and inserts. We profile the core thickness taper by cnc, router or a plainer.
6. Cut and prepare all the materials just prior to pressing. Its important to be well organized!
7. Press the product and let it fully cure!
8. Cut and finish the product!

For simulator, please follow link: https://www.junksupply.com/guide-to-the-simulator/

Tools you will need

Beside one of ours package kits for ski/snowboard/splitboard/kiteboard/wakeboard, there is certain tools are hard to go without. Here is some you will need. Scissors, scalpel, nitrile gloves, quick glue, lots of small clamps to fix the edges to the base, sandpaper 80 grit mainly, breather fabric for collecting excess resin.

Further you will need a drill, jigsaw, router and router bits and a tool for bending the metal edges (see picture below). Sanding machine is also nice to have.

Get also some mold release wax and some 93% ethanol alcohol for cleaning when working with epoxy.

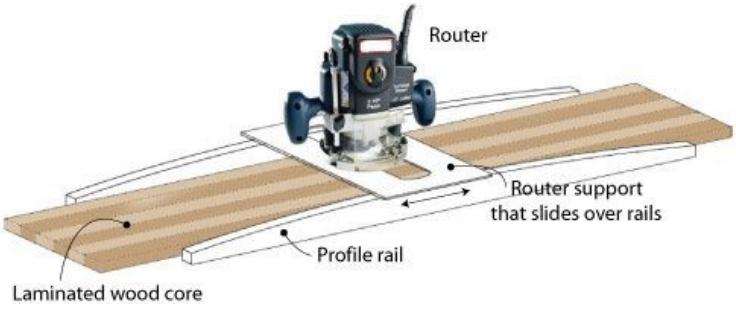
It is good to have few cups for mixing epoxy, something to mix with, and also a spatula to spread the epoxy with. It is also nice to have a roller, that you can use to push the air out of your layup, before you press it.

For profiling the core, you have 3 alternatives.

1) The best is CNC. Find someone who has CNC and pay him to do the cutting and profiling of the core, plus let him make you a outline template. This way you have very precise work done for you.

2) You can do it your self, by using a router with various router bits. This way you can make an outline template, you can cut the core and thickness taper profile it.

3) You can also use a plainer to plain down the wood taper, same as they do with foam cores in surfboards. To be precise, you will need to build a jig for this, just like in 2). See picture below



Example Step-by-step design guide for a pair of skis.

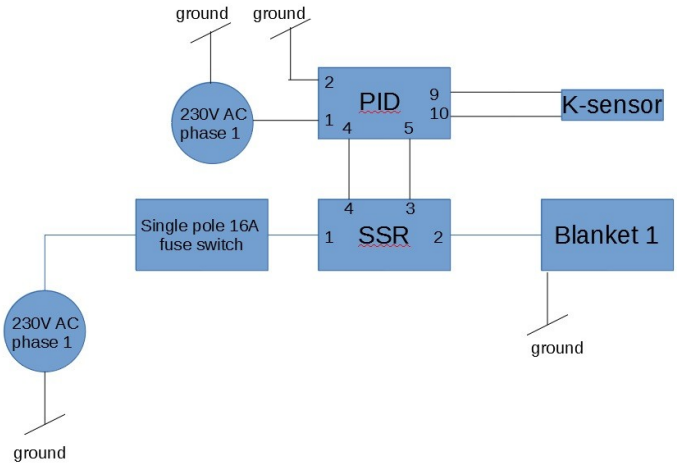
There is a collection of great step by step videos, you can find them here,

https://www.youtube.com/user/boardcrafter/videos

Step 1: Press selection
This step is quite straight forward. There is plenty info online about how to make these presses. Here are some tips,
1. If you need a vacuum pump, you can find one usually in a local hardware shop. A rotary vain pump, costs about 100 euro, see picture below.
2. The better vacuum sealing you get the better and more quite will your pump be.
3. Cover the wooden mold with a flexible plastic or rubber sheet in order to prevent the leaking epoxy to go on it when pressing!

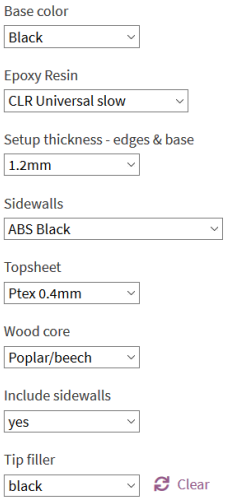
4. For the vacuum press, you will be checking pressure with vacuum gauge. If you can reach 25In HG or more would be great.
5. For pneumatic press the compressor gauge will show you pressure. Start with 30psi.

Here is an example how heat blanket electronics can be connected (be aware connector numbers might not be correct for your case!). Please use someone certified when playing with electricity. And make sure you ground all your metal components to be on the safe side to avoid any potential differences and current surges.



Step 2: Design
Now that the press is built, we need one Ski package Kit with following: 2 pcs ski wood core, base + topsheet, glass fabric, 1,2L epoxy, 8m of 25mm VDS, 8m steel edges, 4 sidewalls + tip/tail fill

For our design example we use following material choices, se picture below,



Further the composite material we will use is 25oz triaxial glass fabric with following parameters, 0/+/-45 degree

width ~620mm

0 ply: 288g

+/-45 ply: 217g
Density = 2600
Y modulus = 75000

Epoxy we use is clear all around universal room temperature epoxy, for this application. The one we have is mixed so for every 42g of hardener we put 100g or resin. A maximum combined amount in one cup is 300mL. We dont wish to mix more than this at one time, as the mix might get hot, and out of control and harden quickly. When mixing epoxy put in hardener first, then resin, then mix well for 2 minutes, make sure you scrape the walls and bottom.

The ski we had in mind to design has following dimensions,
1800mm long (effective length without tip and tail, the part that will be touching the ground is 1700mm effective length, and we will use this for the design and simulation)
tip width 154mm
tail width 144mm
middle width: 114mm
Radius 20650mm
Nose and tail length will be 50mm each approx.

Wood is poplar/beech combination and sidewalls are ABS sidewalls 10mm wide.

We can cut the glass fabric to approximate dimensions plus some extra. We need 4 pieces of glass fabric, for 2 skis, top and bottom. The total weight measured of this glass fabric when cut is 700g. This means that we will need about 700g +10% epoxy resin mix for the fabric. So we about 770g just for the fabric. Further we will need some for the base, edges, wood core, inserts and topsheet. So in total 1L of resin we will use. It is good idea to mix a bit more, so we will get ready to mix ~4x 300mL cups of resin, one or two at the time as we do the layup.

Step 3: Simulator
For a more detailed guide on how to use the simulator, and its limitations, see the link
https://www.junksupply.com/guide-to-the-simulator/

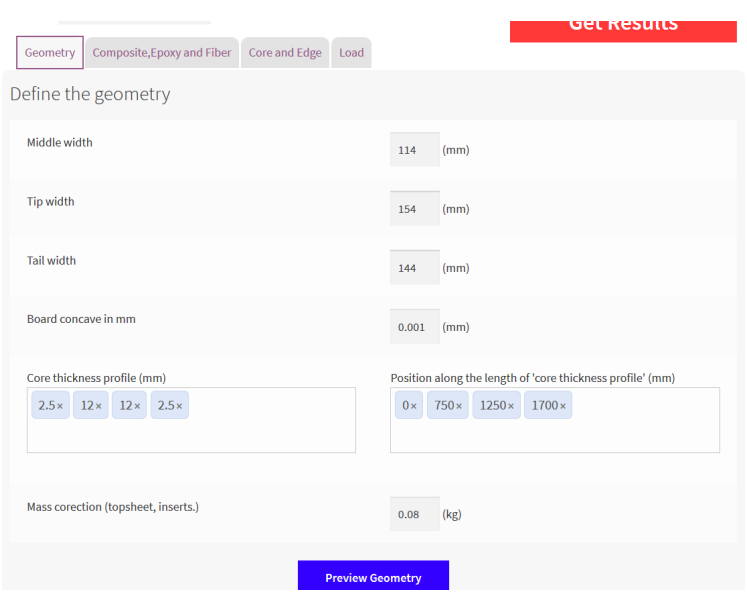
We use the simulator to get the feel for the ski core thickness and the resulting stiffness of our design.

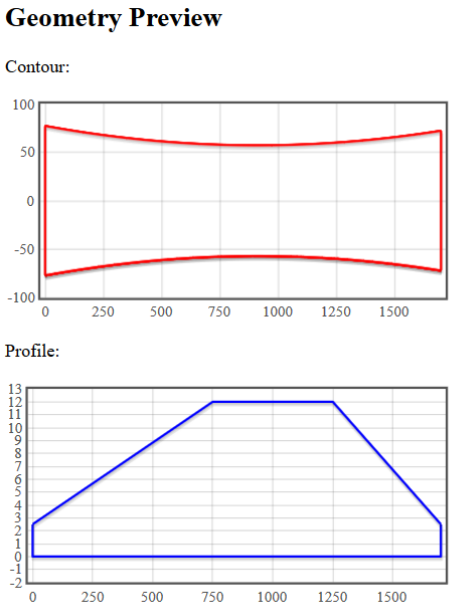
Enter the license key.
Input the geometry.

For the wood core we will use Poplar wood core, reinforced with 2 beech stringers (harder wood) thru the insert area from tip to tail. The combined poplar/beech core parameters are calculated to be by averaging the values for each wood spices individually.
wood core density: 530kg/m3
wood core Y modulus : 11000 N/mm2

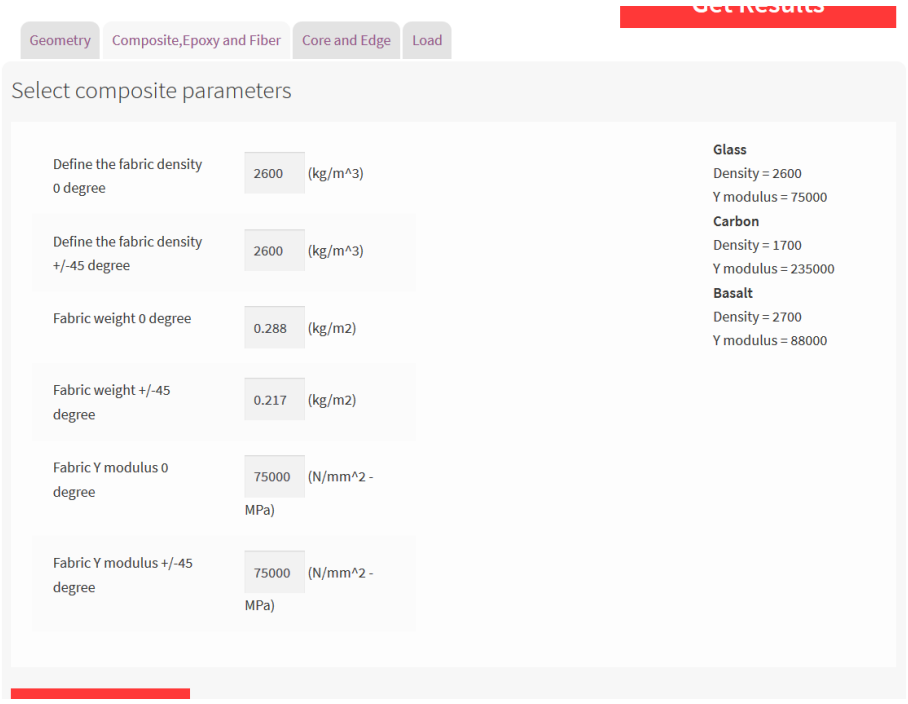
From looking at the other skis and playing with the simulator we will put the core thickness taper profile for the effective length to:
2.5mm core thickness at the tip (effective tip touching the ground)
12mm core thickness at 750mm from the tip
12mm core thickness at 1250mm from the tip
2.5mm core thickness at the tail, 1700mm from the tip. (effective tail touching the ground)

Press Preview Geometry and make sure it is correct! The core outline, is including sidewalls, looks ok.

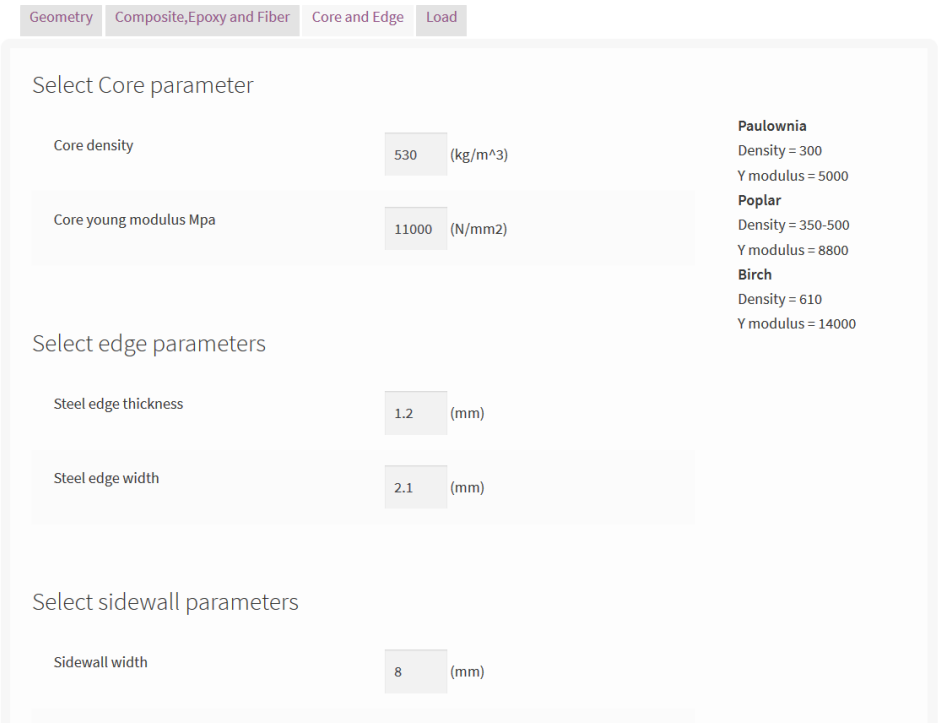




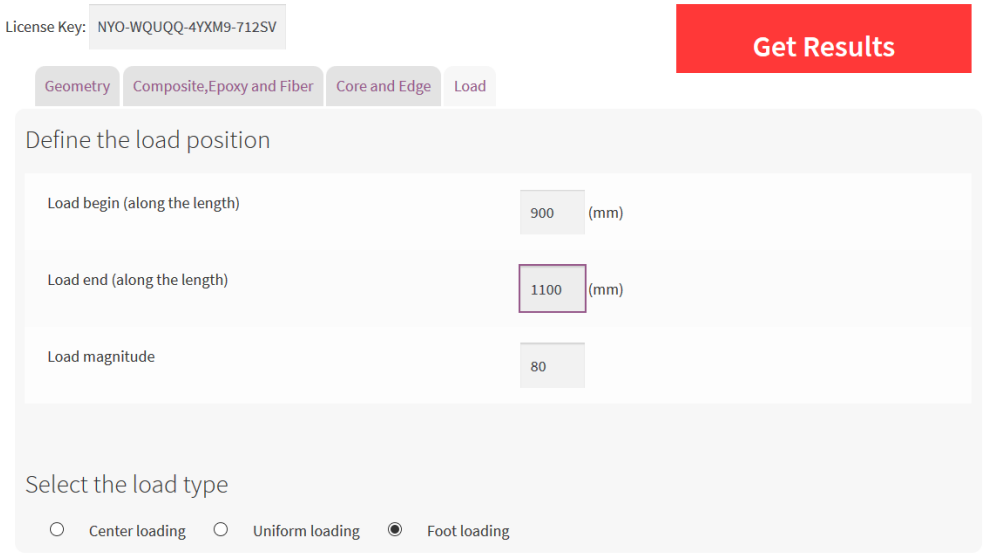
Next step is to setup the composite matrix. Since we use glass fabric only top and bottom, identically, we can just input the weight in each direction and the density and Y modulus. See picture.



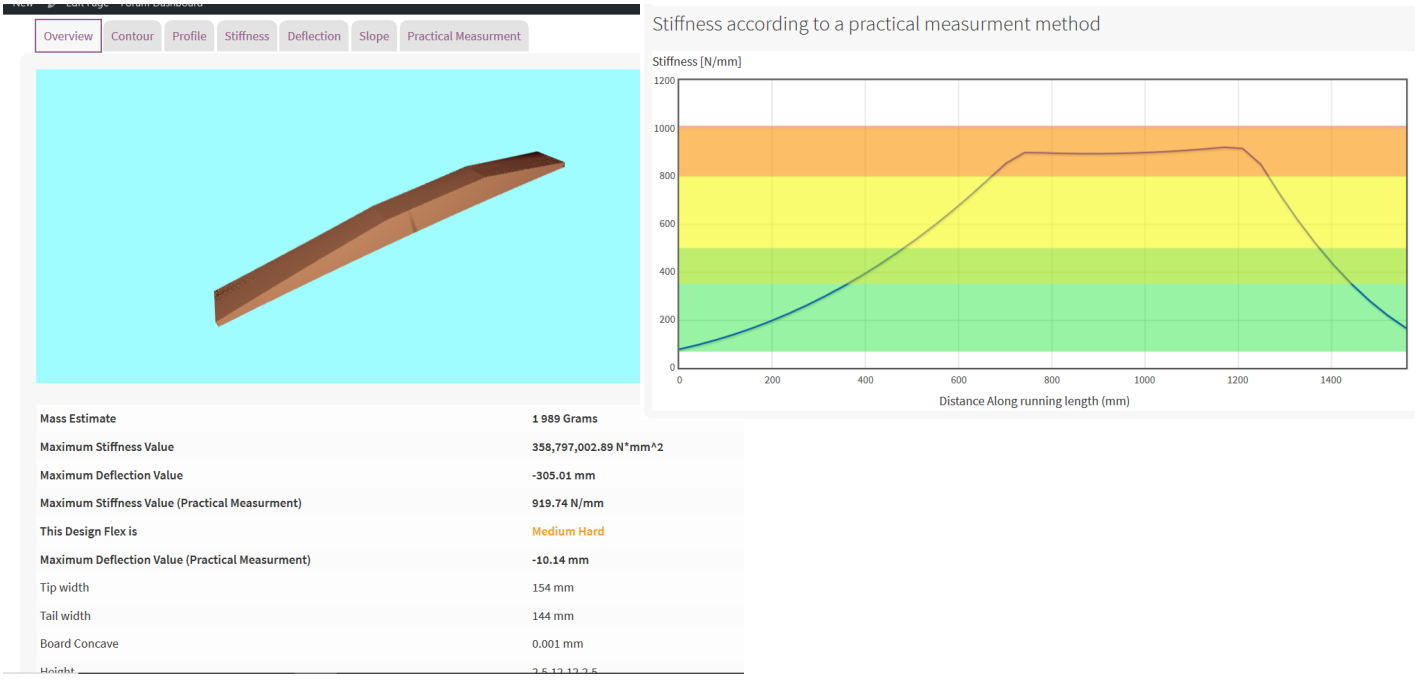
Next step is to setup the core, sidewalls and edges parameters. We use standard 1.2mm edges, 2.1mm wide. Sidewalls we will put to 8mm wide, density 940kg/m3. The core parameters we will use are as decided,
wood core density: 530kg/m3
wood core Y modulus : 11000 N/mm2



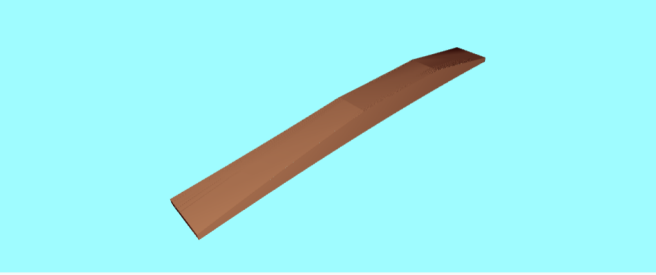
Finally we will decide the loading of our simulation. We will use 80kg foot loading in the binding area (900-1100mm) to test our design with.



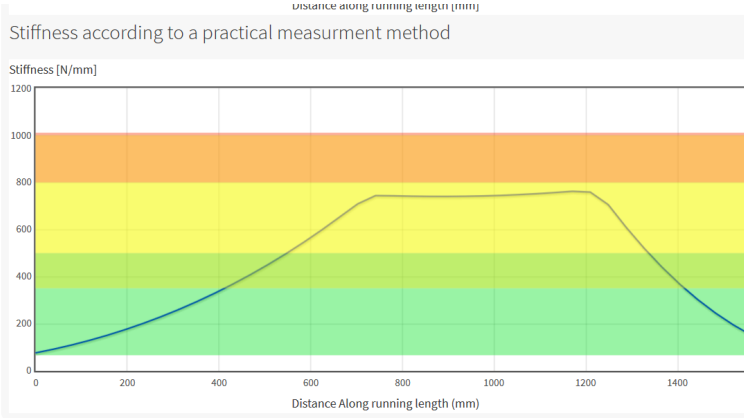
Press ‘Get Results’ to simulate!
Most important results are showen. The 3D looks correct. The weight is 1989grams all included. The design stiffness is suggested to be medium Hard, which means it is a Hard flex. Practical measurement section is good at illustrating this, the maximum stiffness of the ski is about 920N/mm, in the orange area! The tip and tail have a softer characteristic.



I would like to have a bit more soft skis, so from previous experience, I will decrease the core thickness by 1mm in the binding area, to 11mm (2.5mm 11mm 11mm 2.5mm). I run again the simulation and this is what I get.
The maximum stiffness is reduced to 760N/mm, and is suggested to be medium stiff.
Reducing the core thickness by 1mm has reduced the stiffness by whole 17,3%!!!



Mass Estimate	**1 911 Grams**
Maximum Stiffness Value	**291,448,127.02 N*mm^2**
Maximum Deflection Value	**-365.56 mm**
Maximum Stiffness Value (Practical Measurment)	**761.5 N/mm**
This Design Flex is	Medium
Maximum Deflection Value (Practical Measurment)	**-10.28 mm**
Tip width	154 mm
Tail width	144 mm
Board Concave	0.001 mm
Height	2.5,11,11,2.5
Position for height	0,750,1250,1700



I am happy with this design, so this is what I will use. I will use Snowcad to design my core from this and get the outline drawings so I can create outline template.

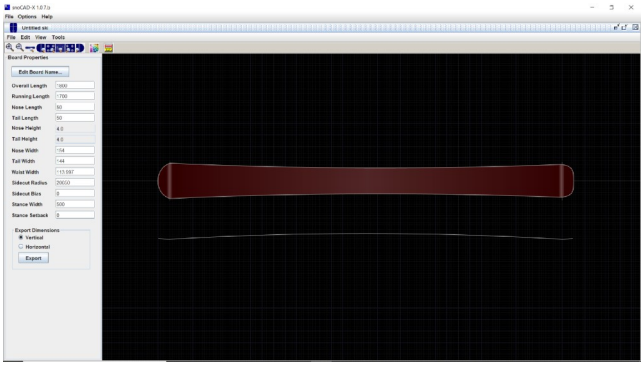
Snocad
We use Snocad design software to design the ski and get the outline drawing and also the mold outline, please see picture below.
Snowcad ski and snowboard design cad tool can be found here,
https://www.junksupply.com/design-software/

Input your design values and export the outline and mold documents. You can print them directly scale 1:1 or you can send them for cnc.

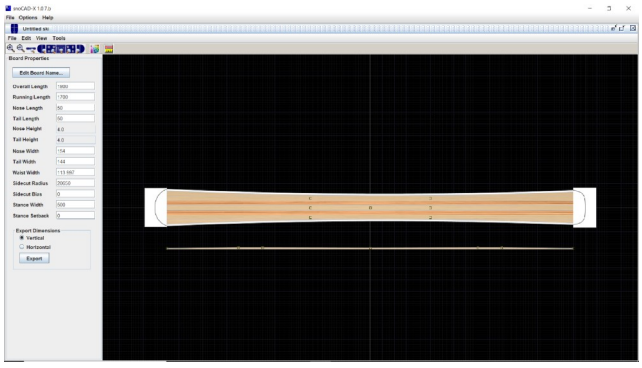
To design a ski in Snocad, open Snocad, and close if any project windows are open. Then go to File, and select New Ski.

Go to Edit, and select edit geometry.

After we input all our design parameters, this is the result we get, see picture.



Now go to Edit, Edit Core. Select Tools, Core shaper.
Set sidewalls to 7mm (so our 10mm sidewalls will extend outside of the base and edges), and tipspacer type to straight.



Now go to File, export DXF. Export only Core outline!
If you rather print it, select export split PDF template. Select Core outline.
This is your core template!

To make our base template, we will now make the geometry 2mm less wide in each side. 4mm in total, in order to take into the account for the steel edges.

Now go to File, export DXF. Select to export Main outline only, unless you wish more options!
If you rather print it, select export split PDF template. Select Board outline.
This is your base template.

For the mold base, we now go and set it up by adjusting the points on the drawing for the base, below the ski. Once we are happy with this, we can export it.

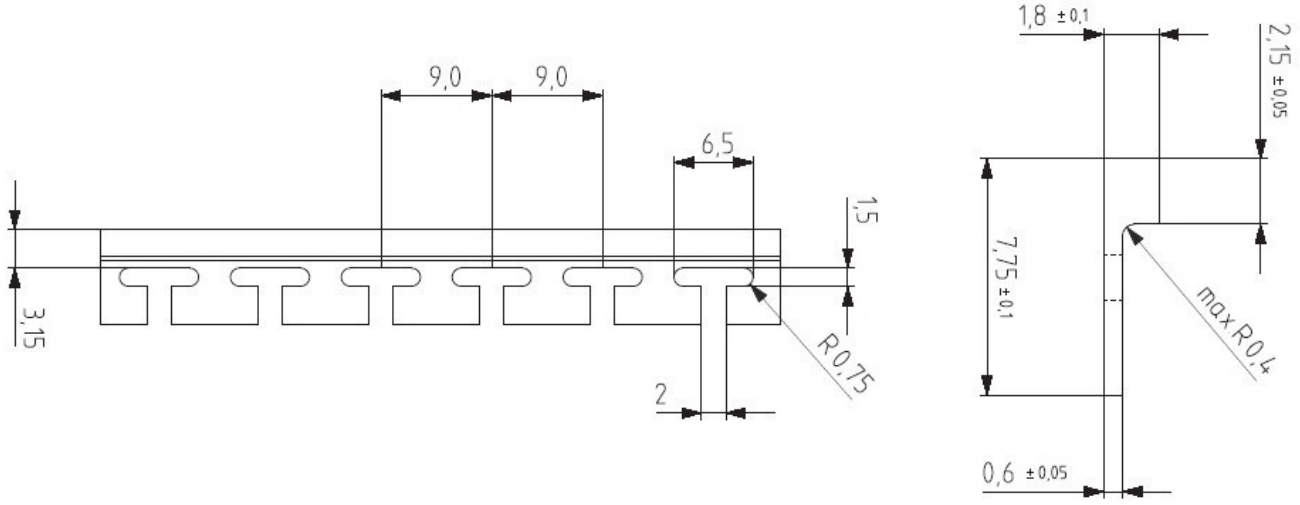
Now go to File, export DXF. Export only Base profile!
This is your base mold template!

This is now ready for cnc machining, or printing as full sized PDF. It is possible to use spray adhesive to glue the printed paper to the MDF plank when cutting.

Step 4: Making the outline templates and the mold.
I chose to use local cnc guy to cut out my template from MDF. I simply supply him the drawings from snocad. You can also print the molds from Snocad in 1:1 and lay them on top of your mdf, use some spray adhesive to get it stuck, and this way you can cut it out.

You might wish to make 2 templates:
1. The template for the wood core. This is the ski outline minus the sidewalls and the tip/tail filler insert material. With this template you can cut out the core, and attache the sidewalls and tip/tail filler insert material. After this you can profile it all down to the correct thickness taper. It is good idea to let the sidewalls and tip/tail filler overlap and extend over the ski outline by a few millimeters, just to make sure that if things move during pressing, they will still look ok, and also later when cutting we have some excess to cut. So since the sidewalls have 10mm width, we will make the core outline template equal to the ski outline template minus 7mm (reserving 3mm as excess). This we will do in Snocad by reducing the physical parameters by 3mm.

2: second template you will need is the base template. Base will be less wide then the ski, the reason is that we need to attache steel edges to the base, so we need to cut the base to ski outline minus the width of the steel edges. For our example we use 1.2mm step edges, the drawing is below. It is clear that we need to decrease the outline of the base outline template by 2.15mm(or about 2mm).
Please see this video: https://www.youtube.com/watch?v=9t0ISB0_W1Y



Step three: Mold making
Regardless what press we have, the mold design part is similar.

From the snocad software we have the mold outline, so it is quite straight forward to make the mold. We start by making one mold piece, then we can use a router to make several other identical pieces. We have decided to use vacuum pressing method.

We will use a vacuum bag, 2m long, to cover the bottom and the top. First we lay down the bottom bag on a flat surface. Then we place on tops of it the mold. When all is in the mold, and we are ready to press, we will put sealing tape on the bottom bag, around the mold, then cover the mold with the top bag, and seal the two together with the sealing tape. So, we will need sealant tape, breather fabric, peel ply. Further we will put a plastic sheet on the mold (any plastic that will not stick to epoxy and that will conform to our mold nicely), in order to avoid any excess epoxy to stick to the mold. We will use release wax to further make sure no epoxy will stick to this.

We use a simple 100-150euro rotary vain or similar vacuum pump, a simple vacuum gauge and vacuum bag connector. We need few meters of hose as well.

To make the mold we will use MDF. We will cut to the desired mold shape, 25mm wide pieces., 7 in total, and laminate them together to get the full widht for the ski. We will press 1 ski at the time.

Below is the picture of the MDF mold. Rocker or camber and the tip and tail shape we will not go into, it is up to you to decide based on your needs. The one in the picture is made adjustable so it fits several ski designs, but this is optional.

Step 5 and 6: Processing the core and preparing the materials
There are hundreds of videos online how skis are made, its good to watch them, here is a simple one that shows the steps involved,
https://www.youtube.com/watch?v=SyCALZVdkh8
https://www.youtube.com/watch?v=S_zvez-oMHQ

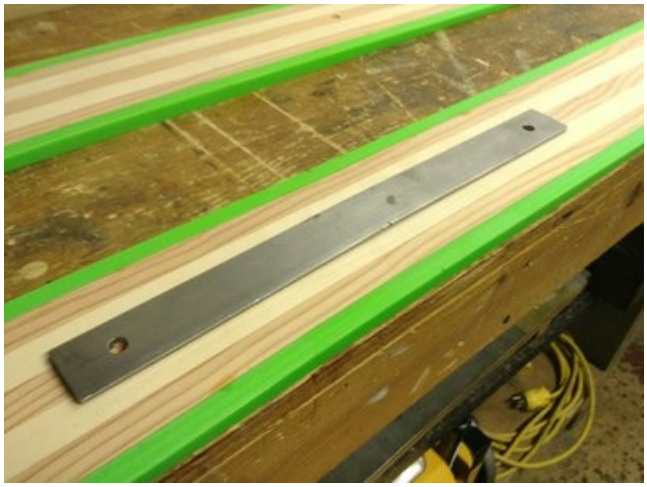
Firstly cut all the materials to length.
- fabric
- edges
- base
- topsheet
- VDS

Take the base template and clamp the base to the template. Use the router to cut the base to shape. Next attach the edges to the base, see picture. Use lot of clamps. If you need to bend edges, there are edge bending tools available. Once the clamp are holding the edges in place, use quick glue every 5-10cm to attach the edges to the base permanently.

Now the last thing to do is to prepare the core and the tip/tail filler and sidewalls.
There are 2 ways of doing sidewalls.

1. Cut the core to shape by using the core outline template. Attach the solid ABS/UHMWPE/HDPE/Wood sidewalls to the cut core. Make sure you use epoxy between core and sidewalls, and clamp them together. Make sure you turn the sidewalls so that the sanded/flamed side is toward the core. Once this is dried and attached firmly (about 24h minimum), the core can be profiled to the taper profile thickness

For more info on how to finish sidewalls, see here,
https://www.junksupply.com/flaming-and-sanding-sidewalls-or-the-tip-filler-ptex/



2. Instead of using the core outline template to cut the core all the way thru, we can cut a channel in the core as deep as possible, without braking thru the core on the other side. This way we will get a channel all the way around the core. This channel we can fill out with the PU poly urethane resin liquid sidewalls or similar material. Once the sidewalls harden, we turn the core around and profile it from the other side to remove the residual wood and uncover the sidewalls. At the same time we can taper profile the core thickness to the desired thickness.

Attache the tip/tail filler materials to the core. A medical tape made of fabric can be used or any other method that works with epoxy.

When all the fabric is cut, put it on a scale and weigh it.
Epoxy mix = 1,10 x weight of fabric + 250mL (for core, topsheet, base, vds)

Mix maximum 300mL total epoxy in 1 cup. Use 3-4 cups, and mix at once. This way its all mixed at the same time and will harden at same time, and the risk of having the mix getting too hot and hardening instantly is not so big.

Step 7: Pressing
It is a good idea to layer all the materials in correct order on a table so it is ready to go in the press. Once the epoxy is mixed, there is limited time to work. So be well organized.

Make sure the topsheet and base are turned correctly.

If using room temperature press, make sure the pressure stays on 24h at least (~90% cure). After that you should wait few days to 1 week before cutting. It does help a lot to post cure the product in a warm environment, on the sun or in a hot car, or homemade oven, in order to get most durability out of it.

If heated press is used, start the temperature ramp up once all materials are in the press.

There is not much to this phase other then to check up on your setup every now and then in order to make sure all is functioning well.

Step 8: Finishing
Here is a good video to watch:
https://www.youtube.com/watch?v=S_zvez-oMHQ

Once the product has cured it is ready to be fut and finished.

For a kiteboard/wakeboard, it is best to do a rough cut, and then have an outline template with fin posion and insert position, and route the product to finish.

For ski/snowboard, it is simply to follow the edges with a jigsaw/bandsaw. Cut the excess. Then sand down whatever it left. The sidewalls can be beveled with an angeled router bit. Once this is done, it is time to grind the base clean of epoxy, and flatten it. It will be ready for waxing. Grinding can be done in a local ski/snowboard shop with a wide belt sander or similar. Edges can also be tuned locally or at your ski resort.