In short

bCores can be machined using standard woodworking equipment. However, to get optimal results without experimenting with several parameters we want to provide you a starting point in this document. The secret why bCores are simultaneously durable and light weight lies in the different fiber orientations of the balsa and the flax fiber reinforcements. The transition from one layer to the next can be tricky to machine.
For machining the height profile of the cores, belt sander gives the best results and allows to make a profile with very thin tip and tails without any problems. Therefore, the following machining recommendation are given for customers using milling process, which is more sensitive to wood orientation.

Recommended tools

In order to simultaneously reduce machining time and improve the surface finish of the machined core we recommend the P-system tools from Leuco. These peeling tools are tested and proven highly effective. Standard sharp woodworking milling tools can be used as well.

Vacuum table

In order to produce in an efficient manner and get nicely machined cores it is crucial to have a good setup to hold the cores in place, avoiding vibrations during milling.
As balsa wood is slightly porous but cutting forces are low due to the low density, a **high flow** vacuum pump works best to hold the cores in place. This means that a simple shop-vac might work better than a sophisticated vacuum chuck for hard woods.
If you're facing problems with insufficient clamping force, a simple solution consists in sticking a layer of parcel tape on the bottom side of the core to make it air tight. The tape can be removed after profiling the cores.

Machining parameters

In the following paragraphs, a few points are given to describe how to adjust the milling parameters:

- Climb milling has to be preferred over conventional milling
- Better results can be achieved in the same time when milled in one go to the final depth at a slower feed rate rather than a rough- and a finishing-cut at high feed rates
- Use a big diameter tool and high revolution speeds (= very high cutting speed) and adjust the feed rate accordingly by increasing it until the surface quality deteriorates or chipping occurs
- The thinner the core, the slower the feed rate
- When contour milling the outline of the ski, position the core precisely so the core gets cut out of the center part of the plank. This way you can avoid milling into the reinforcing flax fibers when cutting the outline.

Profiling by End Milling

During tests, the following parameters showed great results:

Tool		prisms rebate cutter Leuco P-System D = Ø86 mm, Z = 3
rev speed	N	15’000 rpm
Cross feed		20 mm
Feed rate	V_f	20 m/min

Profiling by Circumference Milling

During tests, the following parameters showed great results:

Tool		shank cutter Leuco P-System D = Ø86 mm, Z = 4
rev speed	N	13’000 rpm
Feed rate	V_f	30 m/min

Profiling by Sanding

No special requirements.

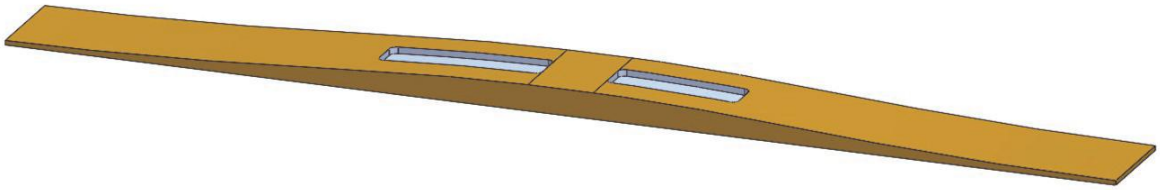
Contour milling

During tests, the following parameters showed great results:

Tool		jointing cutter Leuco P-System D = Ø25 mm, Z = 1
rev speed	N	22’000 rpm
Feed rate	V_f	8 m/min

Binding reinforcement

Due to the light weight of the cores, it is very important to have a tough reinforcement material under the binding. If the reinforcement is not tough enough, screw retention will not meet the standards and even the upper face of the ski may be pulled off the core. The reinforcement has to be big enough to cover all possible screw points of all bindings used. The reinforcement can be in two parts to cover the front and back part of the binding.
The following binding reinforcements are recommended as they proofed to be strong in the past:
A stiff reinforcement plate of ~3mm thickness. It can be made for example from hard ply-wood like birch or cotton / phenolic resin. A pocket (in grey below) is machined into the core to accommodate the plate. The plate can be glued in place during the laminating process.
An additional titanal layer of around 0.8mm in the binding area was successfully used as well.



Calculate the right core thickness

The bCores have a lower flexural stiffness than classical wood core. Therefore the bCore has to be slightly thicker in order to reach the same flex stiffness as with a standard wood core. For calculating the right thickness you can use following core bending stiffness: **2160 MPa**

Pressing bCores & resin control

Processing temperatures up to **150°C** and pressures up to **15 bar** can be used.
The surface of the cores is quite porous. Thus, to minimize weight, the amount of resin used to glue the face has to be controlled. Typically, count on 100-150 g/m2 resin for core-to-skin bonding. Additional resin will not improve the core-skin bonding.

Also our core is made of successive layers of standing wood, very stiff under compression, and laying wood, soft in compression. So if there is an excess of resin, if the pressure is applied too quickly on the ski while pressing, resin may be trapped between layers of standing wood and create “resin pocket” in the softer wood. So we recommend to **apply the pressure progressively**, in order to give time to the resin to flow out of the ski.
A typical cycle could be following: apply 1-2 bar pressure, ramp up temperature up to curing temperature (resin becomes more fluid), ramp up in one minute to your usual pressure and maintain.

Still troubles with machining? Contact us: contact@bcomp.ch