

Spoked Wheels

How to make spoke wheels for slow flyers {mosimage cw=160 popup=1} Although I do not have any indoor flyers anymore I still keep this tutorial online. That is just because people keep asking me about it. I made these wheels when I build my first slow flyer, the "Bellanca Light Tractor" Biplane. That was back in 1999. I found the plans on the homepage of RCMicroflight , which is an incredible magazine for slow flyers, unfortunately it is commercial. Anyway, this nice little airplane definitely needed some spoke wheels and since I found only insufficient ways on the internet to make them, I came up with my own method. The wheels I needed are of 3 in. in dia., but this method can be applied to smaller or larger wheels, too. Stuff you need

- A tube to make the rim of the wheel, I used cardboard cause its easy to work with (cardboard tubes are used in rolls of gift wrap or even those from the heat shrink films)
- 0.6 mm spruce (this is the lower limit to get a strong rim, if you use thicker wood you will have to wet it for bending)
- 2mm carbon rod (a few cm will do)
- Brass or aluminum tube with 2mm inner diameter (aluminum is lighter, brass looks better, you decide...)
- Washers that fit over your selected tube, use plastic ones that you can glue.
- Thread. This is the important part. Do not use simple sewing thread but go to your local kite shop and ask for special kite thread (in germany it is sold as Dynema-lines). This is a high performance multifilament thread that does lengthen less then 2%. It is sold on spools of 10m with 0.08mm dia.. Simple sewing thread will lengthen with time, and you probably don't want that. The only disadvantage is that it comes in extraordinary colours: green, green or green, so get a waterproof black feltpen.
- Some leftover of thick spruce, or plexi or plastic, just flat and strong...
- CA, thin and thick type

Building the rim

Take that .6 mm spruce and cut some 3 mm strips. Now take a piece of that cardboard tube and cover it with some plastic food wrap (that type that looks like mylar and is not glued by CA). Now carefully bend a strip of spruce around it, cut to length. Now to get a nice round rim, sand the ends of the strip to a flat angle to get two faces to glue together. Wrap around the tube, a drop of CA and done... . Now repeat to get a second layer, this one can be glued directly to the first one, inch by inch. Now try to remove it from the tube, you should get a nice round thingy. Now get out your Dremel and drill 1mm holes into the rim at the desired (constant!) distance from each other depending on how many spokes you want. This is best done before removing it from the cardboard tube. I always have sixteen spokes, looks pretty cool...

Building the wheel hub Cut the brass tube into pieces about 15 mm long. Slide two washers on them about 2mm from the tubes ends, CA, done... **Building a building cradle for the rigging**{mosimage cw=160 popup=1} Drill a 2 mm hole into a piece of thick spruce or plexi and glue a piece of 2mm carbon rod into it. This is for holding the wheel hub. Now take a piece of cardboard tube and glue it on the plate with the wheel hub centered. You have to add some pieces of wood to get the right distance from the plate so that the wheel hub is centered (left/right) according to the rim (see picture). Slide the rim over it and mark the position of the holes and cut out some triangles from the cardboard to make room for the spokes. Now use thin CA to harden the cardboard. **Rigging the wheel** {mosimage cw=160 popup=1} Slide the wheel hub over the pin and secure it by winding some tape around the pin directly over it (or use heat shrink tubing if at hand). Put the rim into place. Get a sewing needle and the kite thread. Start with rigging the lower spokes and rig the spokes as shown in the picture securing the thread after each step with CA. Do not apply to much force, just make it tight, the thread doesnt lengthen anyway. Now do it a second time with the upper spokes. **Finishing the wheel**

Now carefully remove the wheel from the cradle. And now secure the thread to the hub with a drop of CA. Yeah, I tried to do that before removing the wheel and had to replace the pin :-). And finally we add a tyre. I use some stuff that I get at the local hobby store here in germany. Its kinda foamie and comes in different colours and diameters (for the german guys, its Moosgummi). Cut to length and use thick CA to glue it around the wheel. DONE.

My wheels are 7 cm in diameter and weigh 4 gr. each. The picture shows them on my Bellanca Biplane.

If you have questions, you can email me here .

Have lots of fun and fly real slow.

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