Frieke and Jim_Mex's Balancing Dragonfly

A joint collaboration scrolling and woodburning project

April 2012

Presentation by Jim Moss

A preview of the dragonfly balancing on the spout of a coffee pot.

More photos shown at the end of the text.

Introduction

Earlier in the year, whilst working in Italy, I came across a shop selling a variety of wooden toys. In the window was a display of simply made balancing dragonflies. They were very lightweight, fabricated from bamboo, of around 8” wingspan and of not too good a quality, but they caught my attention as being a novelty item which could be used as the basis of a scrolling project.

Over Easter I was invited to visit forum member Frieke in Belgium and thought that it would be a nice memento of the visit to make a joint collaboration project between us, one where I would design and fabricate something which she would use her wood burning skills to decorate . This dragonfly idea came to mind as being an ideal subject.

This slide show shows what we came up with and describes the incredible mess I got into getting to the final result ……

The challenge

To pull this project off I needed to produce a design of a dragonfly that could be balanced on its nose. I thought this was going to be simple having seen all of those little critters balancing in the toy shop window. What I didn't take into account was that with a wingspan of 15" and a length of 18" this piece was going to turn out to be pretty heavy compared to the lightweight ones in the shop window and the weight would critically affect the balance of the piece. Physics was never my strong point at school, as I was soon to find out!

I also had to figure out how to attach the thin ends of the large and relatively heavy wings to the body in a secure manner without the attachment method looking clumsy on what I wanted to be a fairly sleek design.

First off though I needed some ideas of what a dragonfly looks like and specifically how I should design the wings. A search through Google images gave me a wealth of ideas and I was on my way.

The design

Designing the wings was easy; the fun began with working out how to fix them to the body.

I decided right from the beginning that everything had to be made on the scroll saw since all I had to work with in my temporary home in Italy was a scroll saw, a Dremel rotary tool , some needle files and some sandpaper.

I opted to fit the wings into the body using a mortise and tenon joint but to complicate matters this joint not only had to be angled forwards but also downwards in order that the position of the wings lowered the centre of gravity of the dragonfly to a point where it would balance on its nose.

To fabricate the mortise slot I made the body from three stacked profiles of 7/16” thick stock and cut the forward angled slots for the mortises out of the centre of these profiles.

The next step was to angle the mortises so that the wings would incline downwards.

I cut two small wedges of wood on the scroll saw for each mortise, inclining the table of the saw to produce the wedges by ripping down a length of regular squared stock, and then shaped them to the plan profile of the mortise, one to fit the thick end of the wedge into the inside back of the mortise and the other to fit the thin end of the wedge to the back.

Next, I glued the body part containing the mortises to the lower part in the stack to give the mortises a solid bottom base onto which I glued a wedge with the thicker end at the back of the each mortise slot, thus creating a downwards slope on which to receive the wing.

I then glued in place the top part of the body stack and, after the glue had cured, I inserted the wings into the mortises, after first wrapping the ends in scotch tape to prevent glue sticking to them. I then glued a wedge into the upper part of the each mortise with the thicker part to the outside. After the glue had cured I pulled the wings about and set about cleaning up the protruding excesses of the wedges and shaping the body.

After shaping the body fairly roughly with a course sanding drum fitted in my Dremel I hit my first problem. I slid the wings in place to test how the balancing of the body and wings was looking and it was obvious it wasn't! To get the assembly to balance I needed to incline the wings much further forwards and downwards

After trashing the first body attempt I went back to the drawing board and the saw table and started again on a new body with more appropriate mortises.

Up to now I'd been working at Frieke's place but with time rapidly running out on my long weekend stay I decided to ask her to decorate the wings so I could take them back home and finish the new body part there.

Frieke finished her woodburning in about 30 mins leaving me pretty frustrated that I'd been working for about 3 hours and didn't have much to show for my efforts. I've since forgiven her!

Before we parted company I robbed her of a couple of small decorative finials from a box of assorted wood turned objects we found hidden in the Aladdin's cave she calls a workshop. The small spheres on the end of the finials were ideal to use as a pair of eyes for our critter.

Back in my apartment in Italy it took me a few days to find time to get back to the project but after finally setting about roughing a shape for the head and attaching the eyes and then provisionally fixing the head assembly into the new body with a short dowel I was pleased to find that this time the balancing was working reasonably well, just a little tail heavy.

Some heavy sanding of the body removed enough wood to throw the balance well to the head of the piece. Next step was to cut a tail piece to use as a counter weight to fine tune the balance.

I cut the tail from one piece of wood and produced the serrated segment grooves down two opposite side of the tail as I cut. I then joined these opposite sides grooves together to form the segments using a small round needle file. Finally I carefully cut the cleft in the tail with the scroll saw.

After fitting the tail to the body with a dowel joint the design stage was pretty much over and all that was left was to fine sand the body, tail and head assembly and paint it before gluing in the wings.

The finishing – or at least the start of it ……

Painting is not my favourite finishing technique but as I had no coloured natural woods to work with nor any stains to pigment the beech stock I used for the projecct I decided to use paints. Only one problem – I had no paints at home!

It was Sunday by now and the only place I could buy some paints was in the kiddies' stationary section of the local 'always open´ supermarket.

I bought a very cheap set of gouache colors, thinking that for the amount of paint I was going to need these would do the job.

The painting went well and took just a few minutes.

After the paint had dried I glued the wings into the mortise slots but thinking that I needed a really strong joint I didn't use my normal PVA wood glue but instead some extra strong polyurethane glue I'd bought previously but never actually tried before . This was a bad move! Within a few seconds, to my horror the glue began foaming out of the mortise joints like saliva from a rabid dog onto the nicely painted body. ARGHHHH!

My panic at seeing the foam subsided sufficiently for me to reason that it was best not to try to clean the excess glue up until it had cured so it was on the next evening when I got back to the project and attacked the problem. Following some delicate scraping with a fine detailing knife I removed the glue and then touched up the damaged areas with some paint.

With the dragonfly almost finished I had my final neuron crash in the brain.

The finish up to now was looking a little matte and I thought it would really set off Freikes's woodburning if I coated the wings with a transparent lacquer and at the same time dab some on the eyes to give them a glossy highlight. I'd previously seen some spray-on crystal lacquer in a local DIY shop and decided to buy a can the next morning just for this job. I'd also picked up a roll of seemingly innocent masking tape to help with the spraying.

Back home in the evening I masked up the body and head parts and sprayed the wings and was really pleased with the result – until that is, I tried to remove the masking tape…..

The masking tape, of some nondescript brand, had stuck to the body and head parts stronger than if it was duct tape and when I started to peel it off along with it came chunks of the body paint!

After peeling off all of the tape the dragonfly looked like it had just hatched out of a pupae stage and had a decidedly horrendous flakey appearance.

About this time my neighbours could probably hear a torrent of profanities in a variety of languages coming from my small apartment window!

By now I was beginning to think that instead of crafting a dragonfly I'd made some sort of winged creature from hell, but to be fair to Freike, her wood burned wings looked very good!

After calming down there was only one thing to do – remove all of the paint and start again. Using the flat blade part of my trusty detailing knife I spent an hour carefully scraping off all of the paint from the body , and tail plus most of the head. Believe me when I say that having those wings firmly stuck in place didn't make this job any easier.

Just when I was nearly finished my next disaster struck!

I didn't like the idea of using the knife blade to scrape the crystal lacquer I'd painted the spherical eyes with and decided it would be easier to rub it off with a rag soaked in the spirits and all was going very well until the front part of head, complete with eyes and nose, slid away from the back part and dropped on the table in front of me!

More profanity hit the airwaves until my analytical mind kicked in and I realized that since I'd shaped the head from another 2 pieces of the same stacked 7/16" stock I'd used earlier the spirits has soaked into the union and attacked the PVA white wood glue I used rendering it useless.

Always one to look to make an opportunity out of a disaster to cover my stupidity I had another bright idea picked up from a recent forum thread - 'Why not hide a little slug of lead into the back of the front head part to add more weight down onto the nose and get the critter to balance even better'.

After a trip to the factory workshop the next morning to fuse some lead into a 5/8" diam x 1/4" deep bore in some scrap wood, followed by gluing this into a corresponding blind hole in the back of the front head part, a few minutes later the front of the head was double its weight and ready to be glued back in place. Not a bad recovery, I thought - LOL!

The finishing finished!

With the head part safely glued in place for the second time I fine sanded everything down, repainted the body tail and head with some decent paints I'd picked up at the DIY shop that morning and I was ready to apply the final top coat of satin acrylic varnish to the painted parts and dab some more crystal lacquer onto the eyes.

Almost 2 ½ weeks after starting this 'simple' project I was finally finished.

With a sign of relief I celebrated with a really stiff shot of Oban malt whisky!!

Despite all of this toil and strife on the way, I feel pretty pleased with the result. Not only had Frieke and myself pulled off this joint collaboration project but I'd beaten the technical issues this little bug- er , I mean dragonfly, had presented. Our dragonfly balanced nicely, the design looked ok despite a less than perfect paint job and Frieke's wing decoration really set off the piece.

Next time around

Without a doubt, making another balancing dragonfly should go much smoother now that I've resolved the technical issues. Next time around though, I'm thinking to repeat this design using natural woods. Maybe its just me but I honestly believe that pulling off a good paint job is a lot more difficult than it seems and applying a gel varnish over natural wood is a much simpler option.

The 'lead-in-the-head' was an unplanned development that worked really well and should make balancing a lot easier in the future. Likewise to fine tune the balance it would be possible to drill a bore hole under the base of the tail end of the body into which could be placed some small pieces of lead shot. Tapped with a wooden plug and sanded after balancing the piece this adjustment bore could be made invisible to all but close inspection.

Finally as a real challenge the wing veins of this piece could be cut out fretwork style which would make for an interesting piece – or better, still they could be inlaid.

Ok! I think it's time I stopped thinking! Enjoy the photos that follow….

Balancing dragonflies similar to the ones I saw in the shop window.

Our beastie showing the wing inclination and forward direction which throws the centre of gravity to the base of the head

An head on shot showing the angle of the wings to the body.
Next time around this angle could be a little steeper.

Frieke’s woodburning work on display in this high angle shot.

Detail of the wood burning decoration which Frieke produced in lightening quick time.

Detail of the head showing the small area the dragonfly balances on.

And that's all!

Frieke and myself hope you liked our collaboration project and that we balanced our respective talents together as well as we got our little dragonfly to balance.

Cheers!