
A Dragons Tale

The 'How' and 'Why' of these new DF classes.

John Tushingham

Before I get into the 'how did it happen' I need to explain why it even happened in the first place. This means going back to the winter of 2004 when I'd been looking for the right way to get back into sailing, bought a Laser Vortex, a fresh, new dinghy design that was catching on at my local club. Quickly discovered that it wasn't suited to me, or rather, I wasn't suited to it. Had a look at Finns, always fancied one, but one look at the complexity of the top boats rather put me off, but I still kept scanning the event reports on the Yachts & Yachting magazine's website here in the UK. In early February I spotted something rather interesting, a winter series for quarter scale, radio controlled Lasers being held at West Lancs Yacht Club, famous for its twenty four hour annual dinghy race, and being run by a name I recognised from way back. I hadn't been there since my youthful days as a dinghy sailor, so Liz and I decided to take a drive, partly for nostalgic reasons and to have a look at these RC Lasers. I used to sail a full sized one and Liz used to sell them to us. So we found ourselves at the lake and, from a distance, watched these little boats race. It looked like fun so we went down and introduced ourselves, within five minutes of shaking hands we each had a transmitter in our hands and the countdown timer was on. Several races later we were hooked, found out there was a national series and a national championship, but didn't know anything else about radio sailing, in fact I'd never really heard of it! We ordered two boats and collected them at the next event two weeks later. Our dealer, Andy Kissick, had fully rigged one for us and explained all the little tips needed to get the best out of it - what service!



(Photo credit: Joysway)
April 2012. The first CAD model of the DragonForce from Joysway. The most obvious differences to the final boat are the shape of the bow bumper (which would make a comeback on the version 6) and the boom fittings. A good starting point but a lot of changes needed.

We had many great years racing the Lasers, but we'd also discovered the other classes and the garage was starting to fill up with our ever increasing fleet. The build up still continues and I've actually lost count of what's in there now! However, that easy introduction to the sport that has taken over our lives has always stuck with me, the initial publicity, the readily available boats and the service that Andy provided is surely the right way to get more people into our sport. The further I got into other classes and experienced the long waiting lists for new equipment, the more I realised this was the way forward.

I wasn't the only one who thought this way, Mike Weston, now of RC Yachts fame, the go-to DF outlet in the UK, often discussed this over many red wine and cheese fuelled evenings. What we needed was a well designed, plastic, one design yacht with three rigs, probably made in the far east, that could be offered at



Photo 3 (Photo credit: John Tushingam)
October 2012. One of the first two, rather heavy, prototypes being tested in the pool next to the bar in our Spanish hotel during the Micro Magic Euro Cup. You'll be pleased to see that we took our testing role seriously!

As well as being a customer, John was also a trusted advisor to Joysway, helping them to develop the right products for western markets. So, on his advice things began to move quickly, a meeting with the three of us was held in mid December where John gave us the good news that Joysway would produce a new yacht. Then he dropped the bombshell on us, they were shelving a current project and needed a prototype boat in China in five weeks - What! Mild panic ensued, but we realised we already had a boat that we could base it on, Mark's RG65 design 'ICE'. Of course, Mark was in favour of it and we squared it up with the current builder of the carbon racing version and packed up my lovely new carbon ICE and shipped it over to Germany where Joysway were exhibiting at the massive, annual Nuremberg Toy Fair. Mike went over to meet them and I got busy producing many sheets of drawings to specify everything necessary to build a decent boat. After that we were entirely in their development engineers hands, we didn't know them very well and they didn't really know us, but it was happening!

If we'd had more time to design and develop the boat it might have been a very different product, perhaps 750mm in length, or somewhere between an RG65 and the IOM. But we didn't have that luxury and that was probably not such a bad thing. Mark and myself were, and still are, keen supporters of the RG65 class, but like the other established classes it was suffering from a restricted supply of new boats, if Joysway could make a hull to the specification we gave them it might just be a cheap, available introductory boat for the RG class.



Photo 4 (Photo credit: John Tushingham)
November 2012. A testing casualty. An early compression strut that clearly needed to be a lot stronger.

We had an anxious wait when all we could do was twiddle our thumbs, tap pencils on desks and keep checking our emails as their engineers translated our 2D design work into a production ready 3D model, would it be any good? A few months went by and as the time past our confidence took a bit of a battering. Finally, at the end of April the inbox pinged and there it was in all it's 3D rendered glory. Sure, there where obvious things that needed changing, but what a good position to start from, their design for the keelbox structure impressed us greatly, clearly we were working with the right people.

Joysway's normal lead time from concept to production is around nine months, allowing for shipping time the boat was due to be on sale late 2012. So there we were, early May 2012 with a lot still to do if the boat was to hit the market in the shape it needed to be in to be taken seriously. It was the start of many, many emails and reports to Joysway that have become a very significant part of my life ever since. It's quite a lengthy process detailing the alterations we wanted, reviewing and reporting on what they were send through, but eventually it was push the button time and Joysway could then get started on the production tooling. At this stage we had started to build up a good working relationship, we had no prior experience in dealing with a Chinese company (I should point out that Joysway is actually a Hong Kong based company with production facilities on the nearby Chinese mainland), but John Wesley was always at our shoulder and without his early help things might not have gone as smoothly. It's no good simply asking for something to be changed, you have to support that request with a full explanation as to why it needs doing, they can then appreciate what you're asking for and are happy to make the changes. They really do care about the quality of design and construction and have continued to support the boats in this way ever since and have always absorbed the cost of modifications themselves, we couldn't really ask for better product support from the manufacturer.



Photo 5 (Photo credit: John Tushingam)

November 2012. Test sailing the second, lighter weight sample. This is the boat featured in the YouTube video that you should be able to find by searching for 'Dragonforce prototype'. We were happy with the performance but the hull was too fragile.

At some point in September 2012 the DHL delivery man rang the doorbell and handed over a big brown box! here they were, no longer just a drawing and our first chance to handle the real thing. By this time we knew what the final retail price would be, when we first heard the proposed pricing our collective jaws hit the ground, it was almost half of what we expected, if the boat lived up to it's promise and sailed well it would be way, way cheaper than any decent racing yacht before it. It truly would be the boat we dreamed of all those years ago. In a perfect world it would have been job done, sign it off and get on with production, and not too far behind schedule. Unfortunately life's not like that, it was so nearly there but not everything worked as intended, so it was back to the drawing board for some of the components. But those were minor details compared to the big issue - weight! The target overall sailing weight was approximately 1050g incorporating a keel bulb weight of 550g. At that kind of weight it would be a reasonably competitive RG65, but these first sample boats tipped the scales at a shade under 1400g, it was never going to be a light weather flyer but I'm not sure it would have got far past the starting line in anything under a thirty miles per hour gale. It was strong though! Clearly it had to go on a crash diet, first to go was the full length threaded stainless rod running down the keel with heavy screw on fixings top and bottom, this was replaced by threading the ends of the tube running through the keel and using much smaller bolts at either end. This was a good start but clearly the hull moulding itself needed to shed a lot of weight. By early November the second prototype arrived, much lighter but perhaps a little too thin in certain parts. You might have seen this boat sailing in an early YouTube video I posted (search YouTube for "Dragonforce prototype" and you should find it). I can't remember the exact weight of this hull but a compromise somewhere between the two samples should give us the best blend of performance and durability. Another long report followed detailing all changes needed to bring it up to production

specification. December 2012 and the production boat was signed off, Joysway displayed a couple of production spec boats on their stand at the Nuremberg Toy Fair in February 2013 and the expected 'on sale' date was May 2013. Over the winter we had chance to test various B and C rig configurations whilst Joysway produced the final tooling for everything.

Unfortunately John Wesley died in the spring of 2013 and never got to see the launch of the boat he opened the door for us to do. We miss him, and in his honour we named the UK DF65 National Championship trophy in his memory and were delighted that his family came along to the inaugural championship in the autumn of that year to present it.



Photo 6 (Photo credit: Buzz Coleman)
July 2013. An early production DragonForce 65.

The all up sailing weight of the production boat ended up at 1250g including an allowance of 50g for a battery pack, so it wasn't quite where we wanted it in comparison to top level RG65s. That was a slight disappointment, but we had to be realistic about it, we had been given the chance to get a into production, at no expense, other than a considerable amount of time, to ourselves, and in the process had formed a good relationship with Joysway. It is, after all, their product but they were prepared to listen, trust us and make, nearly all, the changes we asked for. During the final prototype testing we had a big decision to make, given the weight of the boat do we go ahead and bring it to market as a class legal RG65, or just brand it as a DragonForce and mention in the details that it does conform to the RG65 rules. We didn't want to raise expectation that you would be buying a top level RG, and eventually decided that it still had a useful role to fill as a very inexpensive introduction to the class, after all, it is constructed to allow the fitment of a swing rig and also has deck eyes positioned for taller, high aspect conventional rigs. So it stayed with the RG65 branding and we'd wait to see what the owners wanted to do with it when they started to sail them. We also knew it had great potential as a restricted class and we needed to formulate a simple set of rules for that purpose ready for when the boat went on sale. Without those being available from launch we could foresee the urge for some owners to tinker with it, and at that stage it would have been very hard to pull it back into line as a restricted class.

Why did we make it a restricted class rather than a true one-design?

Well, you have to remember that it is a Joysway owned product and they had a fairly fixed idea of how it should be presented in terms of graphic appearance, hence the dragon printed sails. We did lobby for plain white ones but it had to have a certain showroom appeal! Not our taste but hey, did it really matter. We realised that had the rules been written on a one-design basis then you would have been forced to stick with the standard sail and we knew that one area Joysway would struggle to match the accepted standard for racing equipment would be the sails, that's why they're a single panel design supported by simple measurement rules, and opened up for anyone to make. Not only does this allow for some personalisation but more importantly, if the boat became a commercial success, would not exclude other sailmakers from benefitting from and supporting the class. I think it was a decision well made and I don't think we'd be where we are now had it been restricted.



Photo 7 (Photo credit: John Tushingam)

July 2013. The so-called 'gang of three'. (L to R) Mark Dicks, Mike Weston & John Tushingam. Mike was trying out the shorter keel, not sure if the 30-40mph winds that day were entirely suitable, but was a fun days sailing.

Writing the DF65 class rules was not a job to rush, but a lot more straightforward, I imagine, than formulating a set of rules for a new development class. Start from the premise that everything is to be used as supplied and rigged as shown in the instruction manual and then work out two things; how to resist peoples natural urge to improve the boats performance, real or imagined, through small 'tweaks' here and there, secondly, to eliminate the need for certification or event measurement where possible. Wrap all that up in plain English - sounds easy! I always have one test for the rules and keep it in mind when any amendments are required. Image you're new to the sport, you've seen DF65s racing at your local lake, you're amazed how affordable they are and that you can have one immediately. a day or so later you're opening the box and getting stuck in to rigging your new boat, you follow the instructions to

the letter (wishful thinking), then the big day arrives, you get down to the lake, everyone shakes hands, welcomes you aboard but start to point out that you could have done this or that so much better than it says in the instructions, you'll be ok today but you need to go back and practically rebuilt it - how would it make you feel? That explains why some of the restrictions in the rules might seem a bit over the top and we have to give a frequent "No" answer to most enquiries as to whether this or that little tweak is permitted.

The DF65 and RG65 relationship

I've already covered the reasons why the DF65 was introduced as an RG65, but following the boats eventual UK launch in August 2013 we decided race it within the RG65 class and wait to see how things developed. We had the DF65 class rules published at launch which gave us the ability to award a prize for the first DF, it became an unofficial sub class of the RG65. Turnouts began to rise and everything was ok until the RG65 nationals in 2014, we sailed as one mixed fleet as usual, but the entry had reached a level where we had to run as a two fleet event under the HMS system. Conditions were mixed and a few of the top DFs always made it into the A fleet, but the bulk of the DFs could not compete with the lightweight thoroughbreds and remained in B fleet. It split the racing for the Dragons and affected the results, there was a unanimous feeling amongst the DF sailors that there should be a dedicated DF65 racing series and championships, as well as participation at RG events. It was a controversial decision in the UK to form the DF65 class, not as far as the DF owners were concerned, but others saw it as a dishonourable action, they're entitled to that opinion, but given the growth of the DF since then it would have been inevitable at some point. I'm happy to say that there is still a DF presence at RG events and the RG65 class has grown in the UK in recent years with a significant number of owners who participate in both classes. Despite the DF having the ability to carry swing rigs and taller conventional rigs I don't see any desire to experiment in that way, but the DF65 will continue to have that facility built in.



Photo 8 (Photo credit: John Tushingam)
January 2014. The first, 1 metre long, design for the DragonFlite95 compared to the DragonForce 65. We learned a lot from that prototype but it had to be widened out. Joysway were concerned that they would not have enough control over the distribution of the ABS plastic during the blow moulding process in a hull that was so narrow.

The DF65s big brother

In it's first full year on sale three thousand seven hundred DF65s had been shipped and Joysway were, understandably very happy. Our working relationship with them continued to flourish and we got to know the owner, his family and the rest of the team very well on a personal level as well. They had tasted success in the radio sailing field and wanted to make an ABS constructed IOM yacht and turned to us to design it for them. Bad idea, it took a lot of persuading that they needed to leave the IOM class alone and respect it's position as a development class that sits at the top level of our sport. Even if it were possible to produce a competitive plastic boat, the IOM did not need, or want, a mass produced boat, the class has a life of it's own and a balance that seems to work. But I had been thinking of a big brother for the DF65, but designed to a very different brief.

I'd raced Marbleheads and you can't help but be impressed with their windward performance - in a straight line! The rest of their sailing characteristics leave me bit frustrated, they don't turn corners very well and are far too easily nosedive downwind. Why is this? You have to look at the development of the Marblehead, the hull has always stayed the same length but the rig height and keel length have have grown out of all proportion, the rules have been changed over time to allow this. The Marblehead, as it stands today, is now effectively a big powerful boat with a short hull length, quite the opposite of how it started out, and there's the problem, downwind it can't accelerate as quickly as it needs to to avoid tripping up over it's long, heavy keel and the tall rig only makes things worse. In a strong breeze to windward, unless you have the stiffest carbon tube available, you end up applying a lot of kicker tension to counteract excessive mast bend, so as you go through a tack the rig is unloaded and the mainsail leech becomes bar tight, making it very hard to accelerate out of the tack as you fight the boat's urge to luff into the wind. If you could dial out those issues you'd have a truly wonderful boat to race.



Photo 9 (Photo credit: John Tushingham)

December 2014. The final DragonFlite 95 prototype hull, beautifully built by Alex Cory. The deck design was not finalised at this stage, the final profile featured more detailing to provide stiffness.

We all know that hull length is one of the key components of good boat speed, so what would happen if

we stretched out the DF65 to one metre long and kept with the same keel, rudder and rig. In January 2014 Joysway had agreed to the development of a bigger yacht and we had a full year in which to work on and deliver the final design to them in person at the 2015 Nuremberg Toy Fair - game on! The initial prototype was a very radical boat, Mark Dicks drew up the hull lines of a one metre long boat with a maximum width of only one hundred millimetres. I had a wooden planked hull made locally and it was fitted with a fixed DF65 fin and rudder. It did carry a heavier, nine hundred gram keel bulb and had a larger rig, whilst the standard DF65 A rig slotted in nicely as a B rig. It looked a bit weird but it would give us some idea if the idea of a long waterline, lightweight design carrying a relatively small, low aspect rig would work. The first few times we got to sail it was in B rig conditions and it was a revelation, well balanced, tracked very well to windward, downwind it was absolutely amazing, so fast with almost no wake and eerily silent, it looked like you were fast forwarding the video. The acceleration was so rapid that it had almost no tendency to nosedive despite it's slim hull, in fact it seemed to pick up it's bow and just get on with it.

All the signs were looking good, until the first outing in lighter winds with the larger rig. It was awful, the small DF65 fin was obviously stalling out at low speed and to windward the balance was all the place, almost unsailable. I didn't want to go any deeper than the DF65 fin so we need to find out how wide it needed to be to work in light winds, but narrow enough to minimise drag downwind. Dave Creed helped out here by moulding a couple of aerofoil section sleeves that slid over the fixed DF65 metal keel, they were fairly crude but easy enough for us to keep trimming down until we seemed to have the correct balance. Now we had a hull and foils that worked and that gave me the platform to develop the sail plan. It was at this early stage that I got Buzz Coleman involved, he's an excellent skipper with a wealth of design and prototype production experience and is pretty handy on CAD design systems. I'm a graphic designer by trade, confident with 2D design software but detailed 3D work is a little beyond my pay grade. We had to rethink the hull lines when Joysway informed us that the minimum width they would be confident blow moulding would be 125mm. It was a pity to go away from the rather extreme shape of the first design but perhaps a slightly wider hull would have more rounded handling characteristics. At that point we also had a rethink about the overall length. As people got to hear about the project one of the first questions was always "will it measure as an IOM?". We didn't want that confusion and reduced the length to nine hundred and fifty millimetres, smaller than the IOM to position it below that class, leaving a clear upward progression for newcomers wanting to go further into the sport. It would have been easy to go the other way, make it longer, putting it in direct competition with existing classes and that goes against the philosophy of DFs as readily available introductory racing yachts. So the hull got fleshed out and fine tuned for trim using all the CAD facilities available and knowing all the densities of the materials involved.

Photo 10 (Photo credit: John Tushingham)
January 2015. The prototype boat as
supplied to Joysway. Note the name,
DragonFire 95. It was changed late to avoid
any possible confusion with an American
made boat, the Fire Dragon 1000.



Compared to the DF65 this was such a leap forward in the time and resources we had available during the boat's development, the complete boat, including every individual fitting was supplied to Joysway in CAD format, we had the time to properly test an accurate prototype on the water, superbly built in record time by Alex Cory. That final prototype and CAD files were handed over to Joysway at the January 2015 Nuremberg Show. I then had opportunity to contribute even further to the product by reverting back to my daytime occupation as a graphic designer and producing the rigging instructions and packaging design, very satisfying for me personally to see it all through in such detail. At the following years show the boat had just gone into production and was on display in it's final form for the first time. Our first deliveries into the UK arrived later in April 2016.

One other design feature of the DF95, key to achieving the long waterline, lightweight boat idea, are the low aspect masthead rigs. "Is that the B rig" was often heard on peoples first sight of the boat. Conditioned to seeing the usual high aspect rigs on other classes it was an understandable response. I've lost count of the number of times I've had to explain the concept, but now, after eighteen months of DF95 fleet racing it's totally accepted and understood. Amazing how quickly things change. The comparison of masthead to fractional rigs would warrant an article all of it's own but I'm happy that I got the chance to incorporate them into what is now a mainstream class.



Photo 11 (Photo credit: John Tushingam)

August 2015. The first sample production boat. They sent over two samples, one white, one black. One feature that changed before the boat went into production was the keel. Originally it was to be extruded aluminium, but the the profile was not possible to extrude to the accuracy required. This could have been a big issue, but Joysway came straight back to us to say they would like to supply it with a carbon keel - we didn't say no!

The DF65 version 6 and the A+ Rig

The DF65 all of a sudden looked a bit dated next to the shiny new DF95. It had been through five versions to improve certain areas and strengthen the hull moulding. With the ongoing success of the DF65, Joysway had the confidence to invest in much higher grade tooling for the DF95, confident that it would be worth the considerable investment required. We knew what we really needed to do to bring the DF65 up to the standard of the 95. Joysway knew it as well, and offered to produce new tooling for it. We took it a stage further and discussed with them a complete makeover, improving the rig components, sail quality and just as importantly, the overall appearance of the whole package.

It was a golden opportunity but one thing could not change - the performance of the standard boat, it must not put any of the previous versions at any disadvantage, apart from cosmetically. Buzz and myself set about this redesign in the same way that we tackled the 95, I worked in 2D, we evaluated the designs and then produced final 3D files for all new components. Again, it was a year long process from agreeing the work to a production ready state. As in the 95s development we had access to 3D printing and Joysway were very quick to supply new hull mouldings for evaluation, when it finally went into production we'd tested it thoroughly and were confident that, although it almost looked like a new design, it's performance was no better or worse than before, but I can't help thinking that it looks faster, even before it hits the water. The rigging instructions and packaging also got refreshed as well. The version 6 was a big investment for Joysway and to their great credit did all this work at no significant price increase.



Photo 12 (Photo credit: John Tushingham) September 2015. Which colour to choose was obvious straight away when we rigged the white sample. Unfortunately the fancy backstay crane didn't make it into production.

