

boats



pioneer multihull
designer,
Bernd Kohler

to the people

NOT MANY ARE FAMILIAR WITH K DESIGNS HERE IN AUSTRALIA BUT THE MAN BEHIND K DESIGNS, BERND KOHLER IS an eminent multihull designer with some simply brilliant designs. (including spectacular Wing In Ground Effect craft – check out K Designs website for more – www.ikarus342000.com)

by JO DJUBAL

DUO 425. (above)

Bernd and his cat onboard *Pelican*. (above right)

BERND WAS BORN IN Apolda, a tiny village in what was then, East Germany. "But I have Dutch citizenship. For political reasons I had to leave East Germany. As a kid I was always interested in anything to do with boats. But there was almost no material available. At 12 years of age I 'designed'

my first sailing craft, an ice boat. It was a crude affair! For skates I used the sort which you can fasten to normal shoes. The body was a cross made from a plank and the sail was a sprit sail. It was sensational to sail on our lake and with a bit of wind I'd be on the other side in no time! So that was it, from then on, I liked to sail in the fast lane!"



Bernd studied mathematics and physics in Germany and Switzerland, the main emphasis in his physics studies being aerodynamic design and development. Flying was to become another of his great loves.

“As a youngster I always dreamt of seeing the world – and the logical step was to become a professional sailor! This was an eye opener and a fantastic experience for me. It established my love for the sea even more. I was always switching between my two big loves, sailing and flying. So I got all my licences and was a pilot for five years in Switzerland.” Bernd was actually the youngest soaring pilot in East Germany and received his Level A licence at just 15.

“In Switzerland in 1968, my wife, Ursula, and I built our first boat, a 4.5m dinghy built from plywood and ‘Araldit’, a Swiss invention which was the first epoxy commercially available and very expensive at the time. But its properties were so good that we used it anyway! I was introduced to this material through the company I was working with at the time in Zürich. Ursula and I have very fond memories of our sailing adventures on the lake of Zurich. The boat sported a Gunter rig and was very fast and ultra responsive. The lake is 48km long and has many small harbours. Over the weekends we would sail to one of these ports and stay in a hotel to return to work on Monday.

One Sunday in August we were like so many other boats on the lake, hot and bored, sitting there with no wind when a huge black cloud loomed on the horizon. As it grew more and more ominous, I released the boom stretcher as a precaution. Suddenly it hit us and heavy rain and the violent winds hit the boat. The boom and sail catapulted upwards

from top left:

A P95 on the beach.

A Kohler SC435.

DUO 8.

SC 435 on the beach

DUO 8 mast stepping.

and released the force in the sail. Pandemonium broke out all around us. The whole experience lasted not more than about 10 minutes but a lot of boats were turned over; four sank and two people were lost ... We were able to sail on to our destination and after this experience we had even more confidence in our little boat!"

Encouraged by this success Bernd next designed the Penguin, an 8.5m cutter also built from plywood and epoxy. "In 1972 we sailed this boat down the Rhine to the Netherlands and liked it so much we decided to stay. It's a real sailors paradise there. Every sixth person has a boat as the waterways and lakes and the North Sea are great for sailing."

Bernd quickly found work in the Netherlands as a technical writer for aircraft maintenance and repair manuals and also as an aircraft designer for amateur aircraft construction. With his focus on flying machines, his interest in multihulls was naturally awakened!



"I discovered some articles about the work of Rudy Choy and Woody Brown. These designers and their work impressed me immensely. Especially the Waikiki Surf, a 12m long asymmetrical design built from plywood on frames that weighed only 1360kg! In 1955 the boat had sailed from Honolulu to Santa Monica, California in just 15 days. What an achievement – even by today's catamaran standards! As a technically minded person this was a revelation to me!"

Pelican on her mooring.

Although Bernd now harboured a burning desire to build his own multihull, work prevented him. But in 1979 he designed his very first cat ...

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"Of course, it was asymmetrical in plywood and epoxy!" he says. "I had intense discussions with my epoxy supplier who was totally against me using

epoxy also as a glue! The boat was 4.35m long with a beam of 2.1m and weighed only 54kg. It was designed with a very simple automatic kick up rudder

which we still use today. The mainsail sleeved over the mast windsurfer fashion. Our first sail on the Reeuwijkse Plassen, (a beautiful resort with many lakes near Gouda), was a bit of a mixed affair ... The wind was about Force five to six so off we went with the boat screaming along! We passed a Star class boat and were then competing with a Flying Dutchman. Surprise surprise! We passed them too! We were ecstatic. Maybe too much so, as to avoid an island I tried to come about dinghy fashion with a quick move at the helm but – nothing happened! Of course, we hit the island. Next time the same thing happened until I learned to handle the rudder very gently. After this experience, we encountered no more problems – or island collisions! Whenever we sailed we got a lot of attention, especially from Hobie cat sailors because we were always the



Zeeman ready for the start. (above left)
The spectacular Zeeman. (left)
A p95 showing her form. (below)



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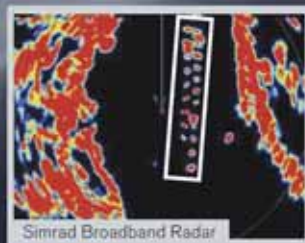
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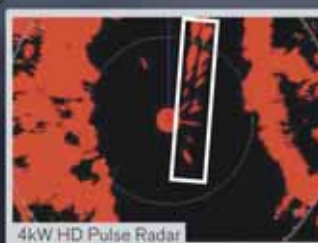
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fastest boat. Everybody was surprised by the boats performance. The next question we started to encounter from people was "Where can I buy this boat?". So I made the decision to sell plans and kits and called the boat the Speedy Cat 435 (SC 435). It was a huge success and we still sell plans for it today."

So in 1979 K Designs was off and running.

Bernd's professional background of aircraft design enables him to design light, strong and fast catamarans, with an emphasis on ease of construction and simplicity. "I am a great believer of the KISS principle as adhered to by Mr Dick Newick, a man I regard as one of the best ever multihull designers. This simplicity suits perfectly the wood/glass/epoxy composite system that I prefer."

Zeeman ready to race. (below)
Zeeman's cockpit. (bottom)



In 1984 Bernd designed his first biplane rig catamaran, the Duo 425. "The boat was introduced at the Boat Show in Düsseldorf and sports two wind surfer rigs – it's a screamer! You only stop sailing when you get scared! The boat is actually faster than windsurfers. I've never had (and neither have any of our clients) a good race with windsurfers, because when they can't keep up they pretend they have to change course!"

Bernd tested his little screamer in the Med in a gale. (Force 9) "The only drawback is ... she is a very wet boat! When people ask me "Is she as wet as a wind surfer?" I tell them "Even wetter!"

Next in the K Design stable was the DUO 800, a trailer cat with a centre nacelle cabin. "This was to enable the boat to be sailed with a free standing biplane rig. But the high cost of carbon prevented most builders using it and almost all DUO 800s were built with a sloop rig. Builders of these boats sailed them from the Netherlands as far as Norway."

Bernd then embarked on a prolific design period that he says "Would be too long to include here." He prefers to jump

to 1989 and his proudest achievement, the 60ft Zeeman racer.

"In the year 1989 I designed, what I believe is my best boat, the Zeeman racer. Henk de Velde, a famous Dutch sailor sailed non stop around the world with this cat, starting in the multihull Mecca Brest. The start was on the December 12, 1992 but bad luck prevented him breaking the world speed record when he hit a Russian freighter at 17kts while asleep just three days from Brest. He was badly injured and needed almost a year to recover. The boat, however, was rebuilt and lengthened to

DUO 425 wall. (below)
 from top right:
A bernd Kohler punt.
DUO 800 under construction.
Pelican and DUO 8 under construction.
Pelican being glassed.
Zeeman's hulls are constructed.
DUO 8 under construction.





22m. Henk entered again in 1994 for a second time under the name C1000 (the new sponsor) to sail around the world again – which he did in 119 days. However, once again, bad luck prevented him from breaking the world record



when his forestay broke after Bluff. To repair it he was forced to go as low as 52° south to get out of the high wind region and the loss in time cost him dearly ... (By the way, he was lucky to have a carbon fibre mast – any other mast would have broken!) This boat was also wood strip/glass/epoxy composite with some carbon fibre at the beams and cost half as much as other French racers of the same length and weight. The French were building, as they are today, boats from elaborate fibre lay up and vacuum bagging. Most of these boats are now gone, but the C1000 (as the lengthened Zeeman was renamed later) is still sailing today."

In the same year Bernd Kohler designs built their first Pelican catamaran, a cruiser racer that more than lived up to its design brief. "The medium speed was 9.89kts. On a beam reach it was common to sail at 16kts. The boat was precisely weighed at 2200kg as we put her in the water. Construction time was also precise being one year, as proven with the second boat built. For a boat with a water line of 10.5m and a beam of 6.5m – Not bad!"

1990 to 2001 saw Bernd and Ursula living aboard and sailing *Pelican* extensively in the Med. "We did a lot of snorkelling, scuba diving and good weather sailing. It was a great time, but I found it to be less absorbing at the end and we moved ashore."

The Kohlers now live in a tiny village in the pre Pyrenees, but are still only an hour's drive from the sea.

To conclude, Bernd says "Almost every type of boat is produced today. For a price of course and not everybody can afford them. My main design work is for the average person who would like to build their own boat. We have built thirteen boats up until now but I have lost count how many boats I have designed!" Sadly, Bernd lost a lot of his



Pelican saloon and stern. (above left)
Bernd Kohler C1000. (left)

life's work during a mishap while living aboard their *Pelican*. "The plans were stored on the wall and in a severe thunderstorm the store was swamped and we lost a lot of our belongings, including the drawings ..." Luckily, Bernd is a prolific and determined designer. Many more drawings would replace those lost,

reflecting the same ingenious design approaches and respect for the builder:

"I like to design fast and economical boats which are easy to build by both professional and amateur boat builders. This is the reason I stick to the plywood/glass/epoxy composite system. Short construction time is always on my

mind. I design boats for sailors who simply have to build their own multi."

Bernd's philosophy is summed up beautifully by his change to a famous quote ... "I changed the slogan 'Power to the People' to 'Boats to the People'. And this is what I like to do.

Why (Ply)wood epoxy composite?

BERND IS VERY PASSIONATE ABOUT HIS CHOSEN BUILD materials and defends their properties with intelligence and logical reasoning. Here he explains why he sees ply/epoxy composite as the best choice for the amateur builder.

"In the 1950s a lot of boats were made from plywood but with the arrival of polyester they more or less disappeared in a lot of countries. Plywood boats developed a bad name simply because many were built the wrong way. The plywood got water logged, the veneers separated and that was the end of the boat. With the arrival of epoxy there is no reason any more not to build durable and low maintenance boats from plywood/glass/epoxy composites. Boats built in this way are long lasting, resilient and not prone to material fatigue.

But to get rid of a bad reputation is extremely difficult!

The only country I know where many plywood/epoxy boats are still built is here in France. The French may have the reputation of being amorous and only having an interest in food but they are also known to be pragmatic. This is one of their strong points when it comes to designing and building something. So it is no wonder that I discovered when at the 2009 edition in *Bateau* for the boat show in Paris 64 CBE (Contre Placee/epoxy) that so many wood epoxy boats are being built professionally at various wharves here in France. And that is not counting companies who sell kits for CPE boats.

So there must be something good about it!

Let's look at the merits of plywood step by step.

1. Good marine plywood is water resistant due to its structural qualities.
2. Because of its strength to weight ratio, it's easy to calculate exactly towards light construction.
3. Easy to cut with normal wood working tools.
4. Smooth surfaces so not a lot to be done to end up with a very professional looking surface.
5. Very economical construction when compared to any other sandwich composite.
6. No molds are necessary which, for a one off boat, can be expensive and time consuming. I'll never forget a story which was printed in the German *Multihull Boote* about the building of a sandwich construction 12m catamaran. With all the sanding and filling he had to do, the poor guy was happy to have one of the hulls finished after one year of hard work! Our *Pelican* no 2, a 10.5m catamaran design built in the plywood/glass/epoxy system, was in the water after one year! The builder was an amateur and it was his first boat.
7. Besides the strongback, there is no waste of material as there is with the vacuum technique for example.
8. Not necessary to learn new techniques like vacuum packing or injection molding which is necessary for many sandwich constructions.
9. No osmosis as occurs in many polyester boats. Polyester is not completely water resistant and is prone to fatigue. Some explanation is necessary here.

Epoxy is made up of two components. Let's call them component A and B. When you mix them together macro molecules are formed which is the epoxy. When cured after 24 hours the material is stable with negligible stretch and shrink. It can be used as glue for almost any material, wood, stainless steel and even aluminium if properly prepared.

10. The only good thing about polyester is it is cheap. Polyester is already a finished material. To cure it you add the catalyst. Now the material starts curing but never stops! Polyesters exhibit poor performance in the areas of adhesion and elongation, rendering the finished part prone to micro cracking and secondary bond failures. Polyester hulls are still suffering from osmotic blistering when untreated by an epoxy barrier coating against water.

Wood is a non fatigue material. Look at a tree in a storm. It is known that polyester and sandwich boats are 'weakening' after some use. This will never happen to a plywood sandwich boat. It is known that wood/glass/epoxy Tornado class catamarans stay competitive over years, but that Tornados built from any other materials remain competitive for only about two years. Material fatigue is the reason. They simply become weak. Older plywood boats are often a bit 'boxy' – but then – beauty is in the eye of the beholder!

11. Plywood boats can actually be built in any shape. Look at the A class. Many of these boats are built in the 'tortured' plywood system with a U-shape cross section.

In my opinion, for amateur boat builders there is no better choice than (ply)wood/glass fibre/epoxy. I hope the information above will help prospective builders to look at this proven build material choice in a new light!"