



Multiple challenges

Three-time solo round the world veteran skipper Norbert Sedlacek now aims to join the very short list of yachtsmen to have successfully traversed the Northwest Passage under sail. But, as Matt Sheahan finds out, that is just the beginning

Fibres made from volcanic rock might not be at the top of your list as a construction material to consider for a boat of any type, let alone one that would share the racing style and characteristics of a modern Imoca 60. Yet this is the material that was used to create Innovation Yacht's 60-footer for solo sailor Norbert Sedlacek in his quest to set a reference time for an unusual and challenging lap of the planet.

After two false starts, both times curtailed by a diverse range of technical issues, in 2020 the Ant Arctic Lab project will see Sedlacek set out on a 34,000nm non-stop circumnavigation that will begin with a trip through the Northwest Passage. From there he will sail down the Pacific along the west coast of the Americas and turn east at Cape Horn for a lap of Antarctica before heading north to the finish back in Les Sables. His goal, to be the first to accomplish a non-stop circumnavigation that takes in all of the world's oceans.

The trip is extraordinary, taking in the extremes of both hemispheres to complete

a figure of eight-styled tour of the world. Yet there is a great deal more to this project than the voyage itself, which is estimated to take around 200 days.

'Originally we were looking at a race from New York to Vancouver via the Northwest Passage but when the organisers' plans collapsed our project came to an abrupt halt,' said Sedlacek. 'But then a friend of mine in the Vendée region said why don't you do a version of the Vendée Globe that visits all of the oceans?'

'I'm pretty familiar with the Imoca 60, which has always been a benchmark for me for long-distance offshore racing, and I knew that a normal Imoca wouldn't be able to cope with the ice, so my boat would need to be much stronger. I also knew this trip had never been done before... so let's do it.'

Launched in 2018, the construction of Sedlacek's 60-footer, *AAL*, is a marked departure from the norm. Built by Innovation Yachts, a company co-founded by Sedlacek and design engineer Marion Koch to create boats that incorporate sustainable materials, *AAL*'s hull is constructed from volcanic rock fibres and a balsa sandwich.

'Volcanic fibres have been around for a while and have been used in the military for heat-protection applications. Today they are also used in the construction of wind turbine blades,' said Koch. 'The fibres have good structural properties in tension and compression and are stronger than glass while being around 20 per cent

the price of carbon. They also have good shock-absorbing properties.

'In addition to this, volcanic fibres are hydrophobic so they do not suffer from osmosis, they are UV resistant and are obviously fully recyclable – they offer plenty of useful characteristics.'

The fibres are produced commercially by Isomatix, in Belgium, and are created by heating volcanic rock to a high temperature in an electric induction furnace to melt and purify the lava before extruding filaments through platinum-rhodium dies. From here a yarn is produced which is then used in the production of the woven rovings, tapes and matt.

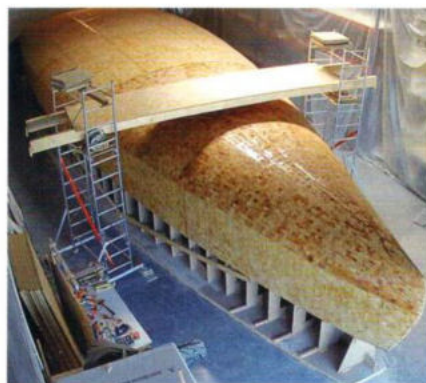
While the build process for the hull and deck is conventional, using a wet lay-up and vacuum bag system, the core material and resin matrix also see steps taken in a new direction.

The balsa core is sourced from 3A Composites, a company that specialises in sustainable core materials. The balsa is from the company's own FSC-certified plantations in Ecuador and Papua New Guinea. Finally, the resin matrix is produced by BTO Epoxy and is also fully recyclable, biologically safe, solvent free and harmless to health, while having good UV and osmosis-resistant properties.

While the specific materials may be a departure from the norm they are familiar to Innovation Yachts. Their extraordinary little 16ft offshore test mule *Fipofix* used the same construction technique and materials as a proof of concept. She made the first of



Opposite: with a dry ship displacement of 9.5 tonnes Norbert Sedlacek's 'sailing volcano' is at least 1,500kg heavier than a current Imoca of the same length, but the extra weight is primarily down to the reinforcement required for a yacht that will bounce off the ice floes of the Northwest Passage... along with the structure for 73 flotation compartments. Another slice of additional weight is down to the materials used, with a core (below) of sustainable balsa replacing the Nomex in all today's Imocas. The resin used is also recyclable. The construction matrix was trialled in the 16ft *Fipofix* (above left) which has now completed two solo atlantic crossings...



two solo transatlantic crossings in the hands of Sedlacek's son Henry in 2014.

'Building this boat taught us a lot about the fibres and the laminating technique,' said Sedlacek. 'Getting the fibres is one thing, but creating a woven material quite another. Then there is the issue of making the resin matrix work. And while we were successful with *Fipofix* it was clear that the industry needed to see it used on a bigger boat.'

Designed by Marion Koch and Vincent Lebailly, the Open 60 AAL follows a similar style to that of the modern Imoca 60, yet the boat has not been designed to line up in this fleet. Indeed, three major differences leave her some way outside the Imoca class rules.

The first is her three daggerboards, which breach the maximum appendage rule in the Imoca class. 'Because this boat will go through ice we decided to fit three daggerboards, one on the centreline and one either side to provide a cage of protection for the keel,' said Koch.

'The mast profile that we used was designed before the latest Imoca rules were written and our section is too big, plus we have a welded fin rather than a milled one.' But it is not just rule compliance issues that set this boat apart from a typical Imoca.

To cope with ice Sedlacek's 60-footer has an inner hull liner that includes 73 (sic) watertight sub-divisions to provide protection in the event of a serious collision with ice. The largest compartment is just 110 litres. 'This aspect of the construction

probably adds around 800kg but it does mean that we have a boat that is unsinkable,' said Koch.

When it came to the fit-out the target was to produce a boat with zero emissions that would produce its own energy throughout the trip. No fuel will be carried aboard and the galley will be electric. To achieve sufficient power for the trip two 15kW Oceanvolt electric engines also act as hydro generators when the boat is sailing. (When in motoring mode they are powered by a 14kW battery pack). In addition, 12 large solar panels supplement the hydro power to complete the zero-emission package.

The concept of fossil fuel-free circumnavigations is gathering momentum. One of the most recent was during the last Vendée Globe when Conrad Colman completed the race using no fossil fuels and used the same Oceanvolt electric power-generation system.

Since then various refinements to the system have been developed and incorporated for Sedlacek's expedition which include the ability to change the pitch of the blades depending on the speed of the boat, to maximise the efficiency of the hydro generators.

While this trip will be his longest, Sedlacek is no stranger to solo circumnavigations... this will be his third. His first was aboard his home-built 26-footer in 1996, a trip that took him two years to complete.

In 2009 he completed the Vendée Globe aboard his bright yellow Imoca 60 *Nautic-sport-Kapsch*, finishing 11th and last of

the finishers... but out of 30 starters.

His first attempt at this ambitious figure-of-eight trip around the world was last year, but he was forced to abort his trip off the west coast of Ireland with technical problems. 'Last year was a big challenge and there was quite a lot on our list that was not complete. So after some heavy weather at the beginning I thought rather than break gear let's go back and sort the boat properly, which is what we've done,' said Sedlacek.

'We have now around 4,500 miles of testing including a trip to the Azores and back and we haven't broken anything major. But far and away the biggest challenge for me and for the materials will be the Northwest Passage. There is so little knowledge about sailing through this area. I won't be using any power other than sail, but if I can complete this part of the trip I think I stand a good chance for the rest.'

His campaign clearly fits into the profile of an ambitious and inquisitive offshore solo sailor, but the project is also part of a longer-term vision for Innovation Yachts. 'We are trying in many ways to move on more generally to building greener boats using a greener construction that makes less impact on the environment,' said Koch. 'We're doing our best to get there... and with every project we're getting a little cleaner and a little smarter.'

'At the moment we are working on a 56-footer as well as a design study for a 100ft yacht. This bigger yacht is quite a challenge as you need a lot of power at this size, so this boat will be more of a hybrid but still with as much hydro generation as is possible.'

So when Sedlacek sets off in his innovative 60-footer built from volcanic fibres on his quest to complete a 34,000-mile solo trip around the world unaided, there will be plenty of opportunities for headlines. If he succeeds the underlying achievement could have an even bigger impact. □