Practice makes perfect; basic skills in technical diving can make it seem like one is learning to dive all over again, albeit better with more streamlined trim

Lessons from Technical Diving

Text and photos courtesy of Mark Powell

Diving is an activity that appeals to a huge selection of people, and within diving, there are almost as many ways to enjoy the sport as there are participants. During the 1990's scuba diving became a mass participation sport. The increase in holidays to exotic destinations, together with a growing commercialisation of diver training agencies, combined to make it was possible for people to do a basic open water course in a few days during the annual summer holiday. Whole families could do an open water diving qualification, which allowed Mum, Dad and the kids to experience the wonders of the undersea world.

While the barriers to this underwater world were gradually being broken down, a small group of experienced divers were starting to push the limits of traditional recreational scuba diving. This movement, which has been christened 'technical diving', started off with just a few dedicated individuals. Over the last few years, this area has seen a huge increase in interest, and now a significant number of divers are moving towards technical diving. In this and subsequent articles, we will explore what is meant by technical diving, what is involved, the risks that arise and how you can move towards this type of diving. For those who are not tempted to venture into this area of the sport, we will also discuss what lessons can be learnt from technical diving in order to improve normal recreational diving. This is similar to the way in which the majority of motorists will never come close to a Formula One Grand Prix car, but make use, in their own cars, of many of the innovations that have been developed by the Formula One teams.

In order to talk about technical diving, we should first try to define what is meant by the phrase *technical diving*. This is not as easy as it might seem. There is no agreed definition of the phrase, and different people use it to mean different things.

One common definition is that technical diving is everything beyond recreational diving. This is a good starting point but does have a few problems. First of all, different organisations have different limits for what constitutes recreational diving. For example, some organisations do not allow decompression diving within the limits of recreational diving whilst

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Technical dive instructor, Mark Powell, geared up for a technical dive

Oxigen tank and scooter are typical equpment used on technical dives

other organisations do. A second problem in defining technical diving as everything beyond recreational diving is that the dividing line between the two is not fixed. For example in the early 1980's, Nitrox was considered to be firmly in the technical diving area. It was thought to be too risky for use by recreational divers. Yet over the last twenty years, Nitrox has become much more widely accepted, and today, when used correctly, is recognised as offering significant safety benefits for all divers.

Another definition is that technical diving is the type of diving that is at the leading edge of the sport, or the type of diving that is carried out by the pioneers. This is another appealing definition but suffers from some of the same problems as the previous ones. Where do we draw the line between the leading edge and mainstream but adventurous diving?

So, we can see that a firm definition of what constitutes technical diving is difficult to pin down. Despite this, it is usually easy to recognise it when we see it. Furthermore, it is clear that there are certain aspects that we can use to identify technical rather than recreational diving.

Dives to depths greater than those found in recreational diving, or involving significantly longer dive times, are typical in the field of technical diving. Dives are undertaken to considerably greater depths than the recreational limit of 40m. Depths of 50m to 100m are not uncommon, with many dives greater than 100m or even 200m. This inevitably means that technical diving is decompression diving. However, not all decompression diving is necessarily technical diving, as some recreational agencies do allow limited decompression.

In recreational diving, we often hear the term 'no-decompression dive'. In reality, there is no such thing, as all dives require decompression to some extent. It may be that during the ascent, sufficient decompression occurs and no decompression stop is required, but we have still been decompressing during this ascent and will continue to decompress on the surface for a number of hours afterwards.

Deco time

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Decompression stops are carried out at certain depths to allow the excess nitrogen in the body to reduce to a level where it is safe to continue on to the surface. Effective buoyancy control and the ability to hold decompression stops accurately are essential before any diver considers carrying out decompression diving.

Breathing mix

With longer decompression times, it is common for technical divers to carry more than one breathing mix. In addition to *back gas* carried in large cylinders mounted—not surprisingly—on their back, they will also carry one or more *deco gases*. These are rich nitrox mixes, which will speed up the decompression. This is known as *accelerated decompression* and can make a significant difference to the amount of

It's a good idea to get used to using twin tanks before you start a technical diving course

decompression time involved. For example, using EAN50 as a decompression gas can cut the decompression time required for a particular dive from 50 minutes to just 24 minutes.

Either air or nitrox is the gas of choice for the recreational diver. However, for technical divers, neither of these choices is suitable for deep diving. The oxygen and nitrogen in both air and nitrox becomes toxic as the diver goes deeper; oxygen causes oxygen toxicity and nitrogen causes debilitating nitrogen narcosis. Nitrox reduces the amount of nitrogen in the breathing mixture but only by increasing the amount of oxygen. This additional oxygen increases the risk of oxygen toxicity at depth.

For deeper dives a breathing mixture that reduces the levels of both nitrogen and oxygen is required. The only way to do this is to introduce a third gas, which will replace some of the oxygen and nitrogen. This gas must have limited side effects, as we don't want to reduce two problematic gases only to introduce a third. Helium is the only real option and is the gas of choice for technical divers. This combination of oxygen, nitrogen and helium is known as Trimix.

Why do we do it?

There are a number of reasons why people undertake technical diving. For me, the main reason is related to shipwreck exploration. Wrecks hold a unique fascination, and diving on a previously undiscovered wreck for the first time is a magical experience. In order to find undiscovered or rarely visited wrecks, divers often have to dive deeper than the recreational limits.

Another reason for venturing deeper is that wrecks at depth tend to be better preserved than wrecks in shallower water. The wave and storm action will quickly break up wrecks in shallow waters, and so the deeper we go, the more intact the wreck tends to be. So, for me, technical diving is a means to an end. If there was an endless supply of intact, undiscovered wrecks in 20m of water, then I would never have become involved in technical diving.

For others, there are different attractions to technical diving. In general, diving is not a competitive sport, but there are some people who want to dive deeper than anyone else, or to dive beyond some real or imagined depth limit. In the same way as climbers want to conquer a particular mountain peak "because it's there", there are divers who want to dive to a specific depth for the same reason. Similarly, there are divers who want to be the best in their field and who view technical diving as the pinnacle of scuba diving and a way to perfect their diving skills.

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The Risks

Whatever the reason for starting down the technical diving path, it is important to recognise that any type of technical diving can potentially increase the risk of serious injury or death. Recreational diving is a very safe activity, and if we are going to increase the risks, then we should do it with our eyes open.

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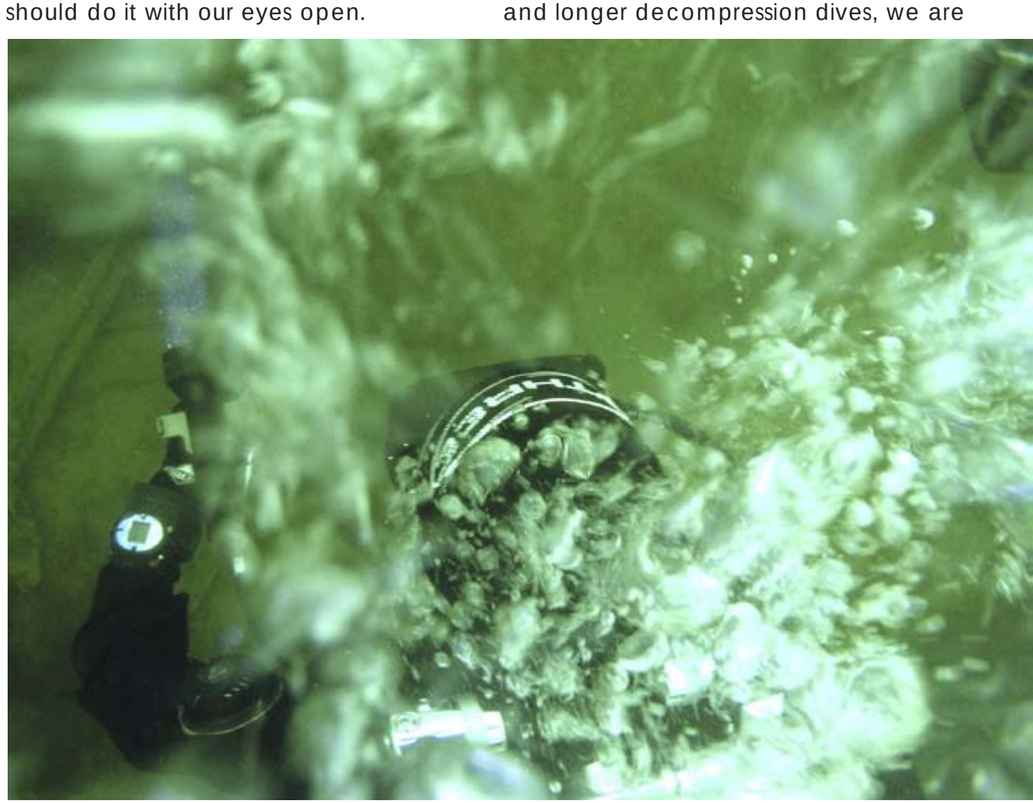
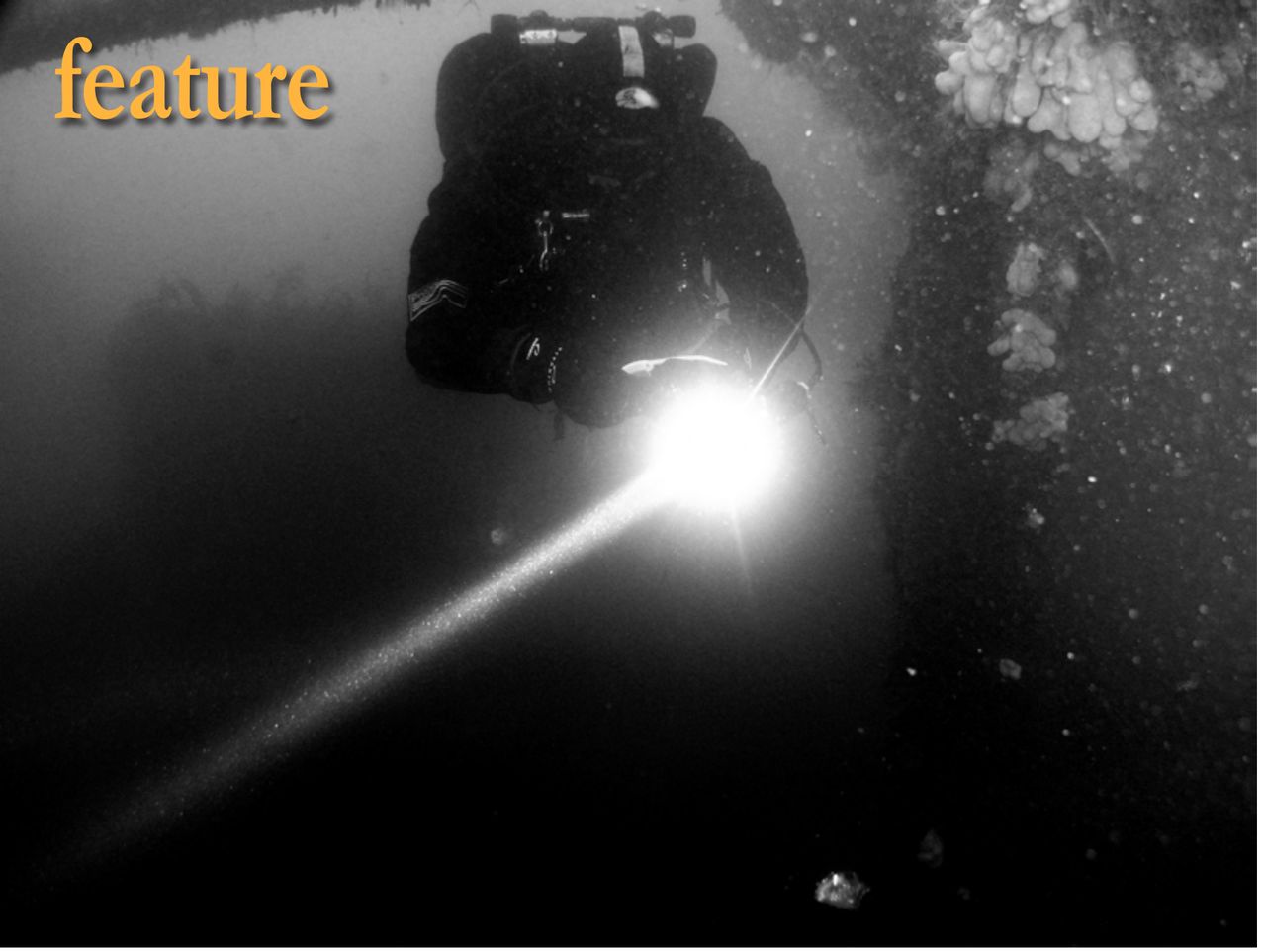
As we go deeper and stay longer, we increase our decompression obligation. In the event of a problem, we cannot simply ascend to the surface without risking decompression illness. Many divers would never consider cave diving, as the thought of not being able to ascend due to being in an overhead environment would be too much to deal with. Yet any diver who carries out a decompression dive introduces these same limitations, as the decompression obligation introduces what is known as a *virtual overhead*.

As we move further into the realm of technical diving, our assumptions about decompression illness start to become tested. If we are diving at 20 metres, then we know that millions of other divers have successfully dived in these depths. Whilst any dive will have a risk of decompression illness, we can be confident that the risk is very small. With deeper and longer decompression dives, we are



During deco stops at the end of a technical dive, divers switch to 100 percent oxygen



Technical diver taking notes in the deep

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moving into an area where there is much less experience of decompression principles. We are, in effect, acting as guinea pigs for decompression research. There are so many aspects of decompression that are not fully understood, and the risks of suffering decompression illness when pushing this knowledge are correspondingly higher. Nitrogen narcosis, oxygen toxicity and a variety of other risks must also be considered when diving in these ranges.

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In order to manage these risks, and reduce them to an acceptable level, we have to review how we carry out the dive. In many cases, the solutions are the same as those adopted by the recreational diver, but the emphasis placed on effectively carrying them out is much higher than for normal recreational dives. In other cases, different equipment, training, procedure and techniques are adopted in order to reduce the risks to an acceptable level. This is the reason why normal recreational diving equipment and training is not sufficient for technical diving.

Obviously, this type of diving can only be undertaken with extensive training, experience and preparation. Divers should already have significant experience of recreational diving involving more than 100 dives before even considering technical diving. At this stage, they should find an experienced technical diving instructor who can give them the necessary training to move from recreational to technical diving.

In subsequent articles, we will look at some of the different equipment configurations used by technical divers. These stress the need for redundancy in essential equipment, familiarity with the use of all equipment, and streamlining to ensure everything is accessible, being overly cluttered.

We will also look at some of the additional training and skills that must be practiced and become second nature. We will look at the approaches to dive planning that are adopted in order to increase the safety of these dives. As we go through each of these areas, we will see that many of these changes can also be adopted by recreational divers to further increase the safety of their dives.

Mark Powell is one of the leading technical diving instructors. Powell has been diving since 1987 and instructing since 1994. He is a full time technical diving instructor for a number of the leading agencies and teaches all levels up to and including Advanced Trimix. Powell has led a number of expeditions to various parts of the world including the Middle East, Costa Rica, Malta and the Red Sea but is usually found diving the wrecks around the coast of the UK. ■

Divers form a small trident star around the ascent line as they begin their journey to the surface