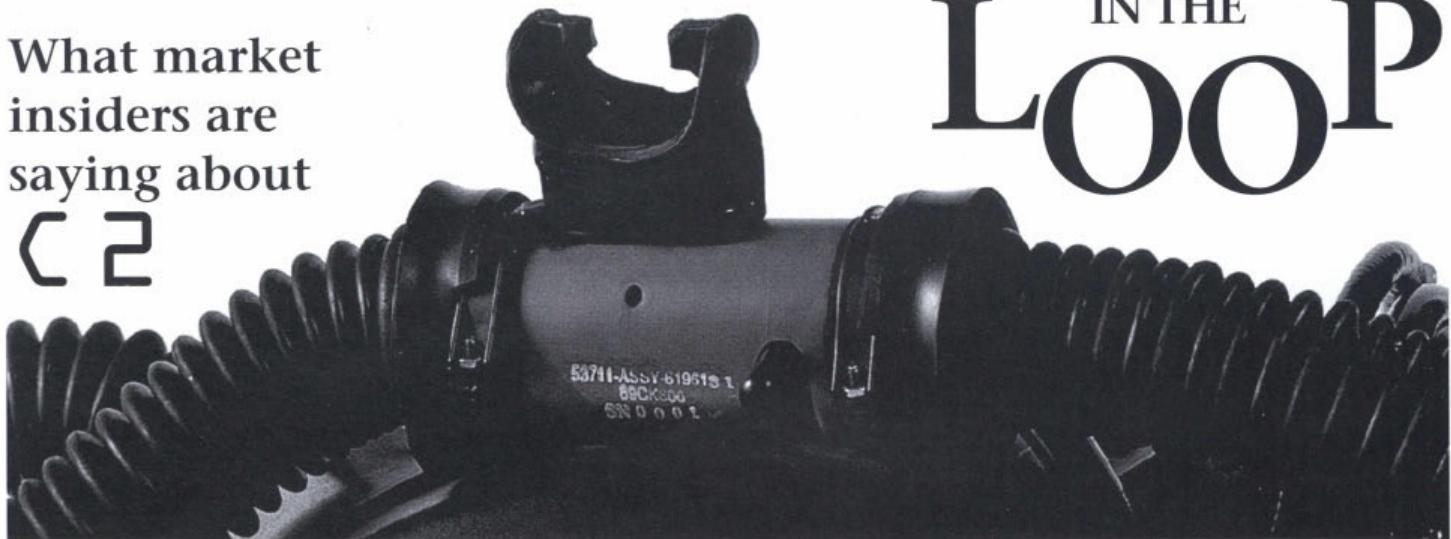


What market
insiders are
saying about

C2



IN THE
LOOP

Closed Circuit Intervention

Interview with Stuart Clough,
President, Carmellan Research Ltd.

a.c: When did you get started with rebreathers?

Clough (C):

It was probably the biggest mistake I ever made. Having worked with computer systems, I had gotten involved in marine photographic surveying in the late seventies to early eighties and needed a means of carrying out short deep dives. Open circuit was patently not appropriate. It was fairly obvious that closed circuit offered the solution we needed. I never had any intention of building these damn things.

a.c: Let's talk about control systems. That's been kind of the guts of your conception and design.

C: The ingredients of a rebreather are well established. You need a counterlung, a scrubber, cylinders and valves. All that had been developed. The thing that was missing was a sensible control system to monitor, record, analyze and make decisions and changes during the course of a dive. Computers are ideally designed for that type of application. It was the logical thing.

I came out of the aviation computing side of life where automated flight and process control systems are commonplace. Here was a neat, efficient solution that had never been applied. We couldn't buy what we wanted so we decided to do it ourselves. Several hundred thousand pounds later and ten years later...

a.c: When did you actually crossover and say, "Gee, this should be a product?"

C: That's really very hard to say. There was a

lot more to it. When people found out that we were looking at these sorts of things, we got involved in a variety of strange schemes, not the least of which were the typical problems that treasure hunters run into. They use electronic systems for doing a survey, but you don't know whether they've found an oil drum, a piece of pipe or a cannon until they get a camera down there or a diver to take a look. Classifying the returns is the crucial point in any marine survey, and for the sort of medium depth probes down to 100 meters/325 feet, closed circuit rebreathers provides an excellent method for conducting short intervention dives. You can zip down to 300 feet/92 metres for 10 minutes and be up on the deck in no time—a very reasonable thing. At that point the contractor can decide whether or not to commit the funds to put a diver on site or whatever else you need.

a.c: Send in the big toys.

C: That's right. Eventually it occurred to us that we should either desist forthwith or we might turn what we had done into a product. It was our view that we would be better off trying to work with companies that were already in the business rather than trying to reinvent the wheel; hence our associations with Dräger and Oceanic.

a.c: You're nine months to a year away from getting out a product?

C: Is anything ever finished? [smiles]

a.c: I can see we're not going to get too far on that one. How about markets?

C: **The current market for closed circuit diving systems is most certainly the military but with peace breaking out that market may be in decline.** Obviously people are looking to



broaden the scope of this sort of equipment. Most people have seen or heard about the low end systems that Japan has been tinkering with over the last few years. If they are starting to think about closed circuit systems, it probably means the time is right to get something out on the market. Obviously we'd like to see it be one of ours.

a.c: You've done a lot of closed circuit diving, what about systems reliability.



C: The best analogy I can think of is that they are probably something like a vintage car where the requisite amount of tender loving care keeps them going and makes them serviceable. **But you have to lavish a fair amount of TLC on these devices; otherwise they let you down at a surprising rate over the years—some very bizarre occurrences.**

Again, that's the reason we have selected established corporations like Dräger and Oceanic to work with. It's not a cheap solution to get right. You need to be prepared for a few false starts, a few failures, and a few problems during the course of your research and development. The small fries can't tolerate these difficulties.

- a.c:** On the redundancy side there seems to be two tracks of development. What do you think about Stone's approach—essentially building two rebreathers in one.
- C:** Suitable for the application he's trying to tackle. A commendable solution to the problem.

a.c: Your approach has been different than that.

C: How many cave divers are in Bill Stone's league and need that level of equipment? I know he's interested in space travel and I think the analogy there is the Lunar Lander. Though it's eminently suitable for the task at hand it isn't suitable for going down the road to the store or for traveling from London to New York. The Cis-Lunar rebreather is going to be damned expensive if they're going to get their investments back on it.



We've adopted a more moderate approach—a basic rebreather that can be adapted to many applications. Sometimes the simplest solution

is the most appropriate—a straight reliable rebreather with open circuit bailout made as simple as we possibly can. Certainly in the commercial arena, an umbilical and open-circuit bail-out has been a simple, adequate, sane, sensible way to deal with a diving problem.

a.c: Do you see a potential market in the commercial diving sector?

C: The existing commercial system has a major investment in surface supplied diving and they're not going to change their ways; it doesn't make economic sense for them too. **However, there's a growing demand for inspection, demolition, monitoring, scientific work—short intervention diving—and a need for methods that don't require the same level of logistics. Cost.**

a.c: Isn't that part of the motivation behind one-atmosphere suits, like the Newtsuit? To put a sat diver down to 600 feet/184 metres takes 40 hours with an awful lot of hardware, whereas with the Newtsuit, she's down in 20 minutes with a winch and a couple of support people.

C: Exactly right. Closed circuit systems provide a means to accomplish short economic interventions where you need diver intervention. The way I view it, it's just another tool in the diving locker. It's not the answer to every problem, it's just a piece of equipment that has some very unique treatment. **It is the only piece of kit that will allow you to jump off the side of the boat and go to 40 or 400 meters; you'd have to take an awful long walk to go to**

400 meters, but it would give you the working gas. Operationally it's probably safer from about 10 to 125 meters. That's the range most of our clients are interested in.

a.c: What about regulations?

C: The regulations that have grown up around commercial diving were established for very good reasons. People complain about them, but they grew out of the need to improve the safety of the divers out there. The problem is that regulations are typically slow to adjust to technological and market changes. We do most of our work overseas because here in England, we cannot legally ply our trade over 50 meters/165 feet without a bell which is just not cost effective in many circumstances.

The U.S. Navy uses the MK-16 for small boat operations down to 300 feet/92 metres as a matter of routine. **And from our own experience, we can say that the equipment is reliable, efficient, and cost-effective for many types of projects in this range. It's not well suited for construction diving. But there are many tasks requiring short dives to have a look, collect samples or check out a situation where it's an ideal tool.**

A mistake a lot of people make is to look at these systems and try to apply them to tasks for which they were not conceived. You wouldn't take your mountain bike down the M-1. There are tools and methods for particular jobs. People who look at rebreathers and say, "Oh, it can't do that" miss the point. You can't do an awful lot of things with them, but for appropriate tasks, they are an efficient piece of equipment just as big SAT systems are an efficient tool for deep tie-ins.

a.c: Maybe that's part of the education process that's going on now.

C: **Rebreathers are not tomorrow animals** [pats his rebreather]. **They aren't just theory.** My problem right now is that the damn things have just come back from a job in the Pacific and ended up getting trashed in customs. At the moment, we have them diving proof but customs-proof is another thing.

Stuart Clough is the founder and principal of Carmellan Research Ltd and has been actively involved in the development of closed circuit technology for over a decade. Clough can be contacted at: CRL, 11 Hillside Close, Ellington, Huntingdon, CAMBS PE18 0AR UK f: 0480.890.946

SHADOW



Interview with Tracy Robinette, President, Divematics

aquaCorps (a.c.):

Is closed circuit technology the wave of the future?

Robinette:

I don't think there is any doubt of that. Everybody wants to have more capability these days; it's a matter of gas logistics. For every liter of gas used on a open circuit rig, a closed circuit uses 0.004 liters.

a.c: Two orders of magnitude difference.

TR: Exactly. Closed circuit is now to the point where it is getting smaller, more safety oriented and redundant which makes it much more viable than it ever has been in the past.

a.c: What will it take for closed circuit technology to become more widespread? What are the key issues or obstacles that need to be addressed?

TR: The biggest thing is training. Closed circuit diving is much more intensive than open circuit diving. And then there's expense—the equipment is more expensive because it is more complex. Complexity also impacts maintenance requirements. You are doing maintenance on an entire system instead of just a regulator and a bottle; two regulators, two bottles, a scrubber assembly, a breathing bag assembly. You've got at least ten different assemblies to consider.

a.c: You mentioned cost and that is obviously a big issue right now. Do you believe it will be possible with volume to reduce user costs to say under \$10,000?

TR: Well, I know that the Carmellan boys are saying that they can produce them for under US\$ 5,000 but the only way that they will be able to produce them for that in the States is to