

## Scuba Dive SA Bulletin - April 2018

This bulletin is provided as a service to members of the

SCUBA DIVERS FEDERATION OF SA

(Trading as Scuba Dive SA)

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Scuba Dive SA is the peak body in South Australia, representing all recreational scuba divers. The SDF is also the 'Safe Diving' Federation. We promote Safe Diving.

We are publishing this electronic bulletin as a separate publication to our normal monthly SDF News Sheet. Future issues of this "Scuba Dive SA Bulletin" will include lengthy articles about matters of interest to recreational divers. We welcome contributions from our readers.

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### ROBOTIC FISH CHECKS OUT THE SECRETS OF THE OCEAN

According to the web page found at <https://www.axios.com/newsletters/axios-science-3778d5f6-519a-4447-a20f-6f0c847c17c7.html> , "Vast swaths of Earth's oceans are unexplored and the details of their inhabitants' personal lives are unknown. Nowadays, researchers peer into this world with remote operated vehicles that can surprise fish and are expensive to build. MIT graduate student Robert Katzschmann sees a future filled with swarming robotic fish that can more discreetly "find out the secrets of the ocean."

On Wednesday in Science Robotics, he and his colleagues reported building a soft robotic fish — dubbed SoFi — that can swim at depths of up to 60 feet alongside divers who occasionally ping it directions to dive or speed up.

The specs: SoFi's key feature is a soft tail made of rubbery silicone that starts off with a beeswax skeleton inside. The beeswax is then melted away, similar to how sculptors use lost-wax casting to create intricacies in their work. One way to then normally move the robot would be to pump air between the remaining hollow spaces. But, since that would raise the problem of buoyancy with this underwater robot, the researchers instead pushed seawater back and forth between the chambers in order to move the tail.

The foot-and-a-half-long SoFi has a camera, battery (it can currently swim for 45 minutes), visual sensors and a microphone on its back to catch the ultrasonic swimming commands.

Where it will go: So far, the robotic fish has navigated Fiji's Somosomo Strait but Katzschmann imagines it one day inspecting oil rigs, collecting data about the behavior of marine animals in their environment, or spotting rarely witnessed underwater events, like the birth of a southern

right whale. "Imagine using the fish to observe the mysteries of the whale," MIT professor Daniela Rus says."

## **ALUMINIUM CYLINDERS WITH A HYDRO TEST DATE BEFORE 1996 MAY BE CONDEMNED**

Following last month's report regarding the recent 'failure' of an aluminium dive cylinder hydrostatic test based on age alone, our Federation investigated the incident. The 1989 ally in question had been tested several times in the past 5 years but it had now been condemned based on the year of manufacture. It was unclear at the time as to what had changed to cause the test station to suddenly reject a tank for testing. We visited the station to enquire about their procedures. We also searched online for any relevant details concerning the hydrostatic testing of old aluminium dive cylinders. Our report on the incident follows below: -

### 'FAILURE' OF AN ALUMINIUM CYLINDER TEST BASED ON AGE ALONE

We reported in last month's news sheet that our Federation was investigating the recent 'failure' of an aluminium dive cylinder hydrostatic test based on age alone. The 1989 ally had been tested several times in the past 5 years but has now been condemned based on the year of manufacture. We stated at the time that it was unclear as to what had changed to cause the test station to suddenly reject a tank for testing. We visited the station to enquire about their procedures. We also searched online for any relevant details concerning the hydrostatic testing of old aluminium dive cylinders. One such, relevant web page could be found at <http://www.safework.nsw.gov.au/news/safety-alert/gas-cylinders-manufactured-from-aluminium-alloy-6351-t6> . That page is titled "Gas Cylinders Manufactured from Aluminium Alloy 6351-T6 - Safety Alert | 25/10/2016". It started with the comments "This safety alert highlights the risks associated with filling gas cylinders manufactured from aluminium alloy 6351-T6 and updates a previous SafeWork NSW (formerly WorkCover NSW) 2009 safety alert." It went on to give the following background and risks: -

"In August 2016 a worker suffered serious injuries including partial amputation of a leg when an aluminium scuba cylinder catastrophically failed, exploding while being filled. The cylinder that failed was manufactured in 1987 from aluminium alloy 6351-T6. However, the investigation into this incident has not yet determined the cause of the failure.

Investigative work into similar failures worldwide has shown that failure is typically caused by sustained load cracking (SLC) in the neck and shoulder area of the cylinder. The problem of SLC only affects cylinders made from aluminium alloy 6351-T6 and is not limited to any one cylinder design or manufacturer. Failures have typically occurred when filling SCUBA/SCBA and oxygen cylinders. Catastrophic failures have occurred at or below the working (fill) pressure.

Additional control measures have been introduced for cylinders made from the above alloy, including the requirement for eddy current non-destructive testing (NDT).

### RISKS

Explosion hazards resulting in the possibility of serious traumatic injury or death and extensive damage to property.

At risk cylinders

Any cylinder manufactured from aluminium alloy 6351-T6 is susceptible to SLC and therefore considered to be at risk cylinders.

Cylinders can be identified by their cylinder markings by either locating the oldest hydrostatic pressure test date typically marked mm yy applied at time of manufacture or the following DOT special permit or exemption number markings.

At risk cylinders that SafeWork NSW is aware of include:

- Luxfer cylinders marked with a special permit or exemption number: 6498
- Luxfer cylinders originating in the UK marked with a special permit or exemption number: 8364
- Wallter Kidde cylinders marked with a special permit or exemption number: 7042
- other cylinder manufacturers marked with a special permit or exemption number: 6576 or 6688 or 8107 or 8422
- aluminium composite cylinders (hoop wrapped) marked with exemption number: 7235 or 8023 or 8115
- Luxfer cylinders marked as DOT 3AL with a hydrostatic test date before 1989
- Walter Kidde cylinders marked as DOT 3AL with a hydrostatic test date before 1990
- **CIG (Australia) cylinders marked as AS 1777 with a hydrostatic test date before 1991**
- Luxfer cylinders originating in the UK marked with a hydrostatic test date before 1996.

The line above in bold is relevant to the failed aluminium dive cylinder hydrostatic test based on age alone. The same cylinder had passed a test by the same testing station in July 2016 (just prior to the case where a worker suffered serious injuries when an aluminium scuba cylinder exploded whilst being filled in August 2016). Up to that stage, there had been no suggestion that the cylinder recently failed on age alone was manufactured from aluminium alloy 6351-T6. The owner of the failed cylinder was mainly concerned that it was condemned without ever being tested. The owner asked the test station to provide a test certificate, but his requests went unanswered. It seems that a few cylinders have failed tests recently due to age alone. Everyone should now be prepared for having their old cylinders condemned on age alone. The only sure way that this can be avoided is by having a direct discussion with the test station operator prior to a test. If the operator indicates that they will not pass the cylinder due to its age, it may be advisable to seek an alternative test station that doesn't mind carrying out an actual hydrostatic test on the cylinder. Some divers steel cylinders are passing their annual hydros after some 60 years. Aluminium cylinders are different though, and everyone's safety is paramount. Certainly, do not fill cylinders that are not in test.

The Scuba Divers Federation of SA is a member of the following: -

RecfishSA (SA Recreational Fishing Advisory Council)

TRAIL COMMITTEES - SA Trails Coordinating Committee (Office of Recreation & Sport) and Port Noarlunga Reef Underwater Trail [South Australian Trails](#)

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