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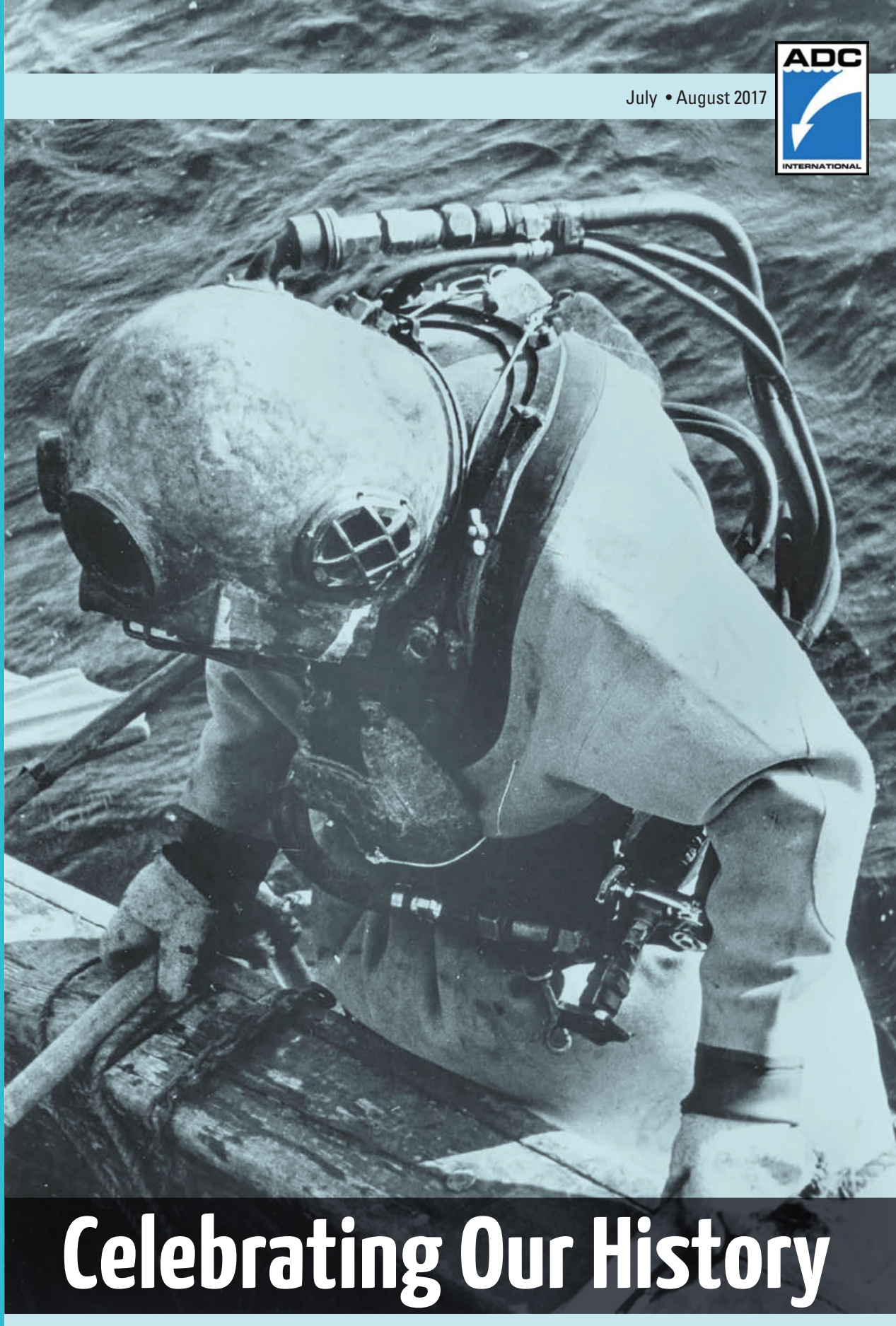
UNDERWATER
The Official Publication of the Association of Diving Contractors International

July • August 2017



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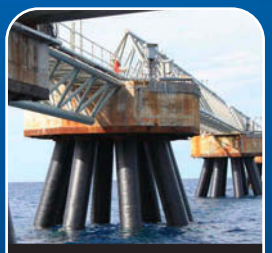

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INSIDE

The official publication of the Association of Diving Contractors International

FEATURES

12

22

DEPARTMENTS

28

To contribute articles and photography to *UnderWater* magazine, please contact Steve Guglielmo at 352-333-2741 or sguglielmo@naylor.com

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Publisher: Kathleen Gardner

Executive Editorial Committee:
Phil Newsum, pnewsum@adc-int.org

Managing Editor: Steve Guglielmo
sguglielmo@naylor.com

Advertising Sales Director: Jamie Williams

Marketing Associate: Kaydee Currie

Account Representatives: Angie Bevilacqua, Jeff Bunkin, Krys D'Antonio, Brian Donohoe, Shaun Greyling, Erik Henson, Shane Holt, Chris Zabel

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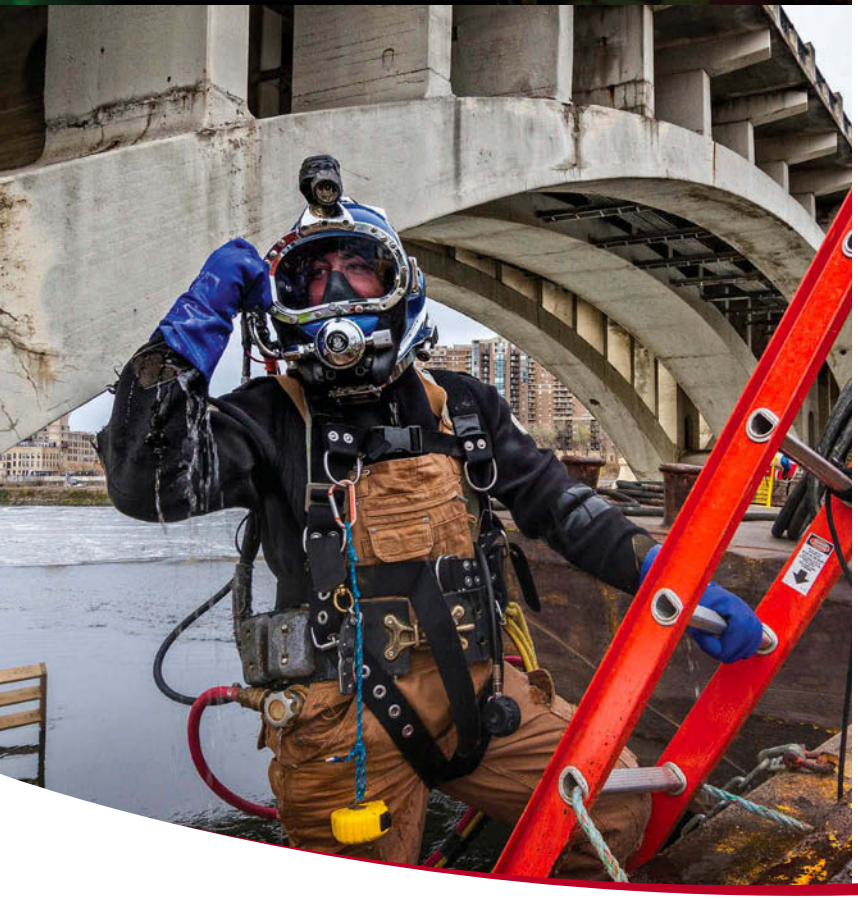

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A MESSAGE FROM THE ADCI PRESIDENT | BRYAN NICHOLLS

For those of us north of the equator, summer has arrived.

Summer is typically the busy season for our industry; a time of year where the days are long and man-hours are at their peak. While those of you from the north get a break from working in the ice and snow, summer can bring dangerously high temperatures in some places; so we must remind our teams about the importance of hydration and the ways to prevent heat-related illnesses.

Safety moment aside, I doubt that I am in the minority in my belief that summer is the best time to be a commercial diver.

A little over a month ago, I was asked by UNDERWATER Magazine to contribute what I could to a piece regarding careers in the commercial diving industry. This gave me a few moments to reflect on my time in the industry thus far, and reaffirm what most of you already know; that some of my best memories come from my career in diving, both inside and outside of the helmet.

I often think about what I would have done with myself had I not taken this path, and the honest answer is, "I have no idea".

The people I have met, the things I have seen, the challenges that I have overcome, and the variety of work that comes with being a commercial diver have almost entirely shaped me (for better or worse) into the person that I am today. And, if misery truly does love company, I would venture to guess that a lot of you feel the same way!

But, as is the nature of things, I have now spent more time on the outside of the faceplate than looking through it. And, just like anyone else that chooses to stick it out, I had to adapt and look for new opportunities if I wanted to remain in the industry.

Do I miss the view, the camaraderie, and even the outdoors? Sure I do. However, even out of the water I am surrounded by the same kind of people that I spent time with in the field. Even better, I get to meet divers and former divers from all over the industry, which simply would not have happened had I remained in the field or left diving completely.

But we all know that the reality is different for a majority of those that pursue a life in the hat, and unfortunately attrition is a significant part of the game. In addition, the prolonged decline in the world's oil and gas market has forced many to consider their options much sooner than they had planned. Regardless of how or why a diver leaves the field, I think it is important to know that "leaving bottom" for the last time does not have to mean the end of one's time in the industry.

As our industry evolves and changes, there are many opportunities that a commercial diver can explore. I look forward to hearing what our peers have to say regarding this topic later in this issue.

Speaking of opportunities, the notification for the ADCI scholarship nominations is included in this issue as well.

I have had the pleasure of nominating two past recipients, and I have seen firsthand the impact that these funds can have toward furthering one's education. We all know that education is expensive, which is why the ADCI scholarships can make a big difference. If you know of a worthy candidate that could benefit from such an award, regardless of their field of study, please bring this opportunity to their attention.

Second only to our mission to promote diver safety, I believe that these scholarships are the greatest contribution that our association has to offer. Thank you for your continued support of this cause.

Until next time, I hope that you have a safe and prosperous summer. ≋

A MESSAGE FROM THE EXECUTIVE DIRECTOR | PHIL NEWSUM

This edition of *Underwater* magazine features articles on **Careers in the Commercial Diving Industry, Cyber Security in the Oil and Gas Industry**, as well a look at **The Emergence of the Work ROV** from *The History of Oilfield Diving*, by Christopher Swann. Rounding out the major articles is a continuation of our series on **Helmets In History. The Helmets That Launched Commercial Mixed Gas Diving**, by Leslie Leaney (HDS and ADCI Commercial Diving Hall of Fame Inductee 2017). From a sheer interest standpoint, this was the one article that I couldn't wait to read. It chronicles those helmets that broke the commercial diving barriers from deep air operations to mixed gas. As noted in the article, historians consider the launch of commercial mixed gas diving as being made by Hugh "Dan" Wilson on November 2, 1962. I want to personally thank Leslie Leaney for his contributing articles. If you are a diver, you will find each one of the **Helmets In History** series articles great reading. If you are not a member of the Historical Diving Society, or a subscriber to *The Journal of Diving History*, I strongly urge you to reach out to the HDS office (membership@hds.org) and secure your membership. Anyone that has a passion for diving will find *The Journal of Diving History* to be the foremost periodical on diving history.

The ADCI will have its fourth quarter Board of Directors and Western Chapter meetings in conjunction with the 25th Anniversary HDS Conference in Santa Barbara, 22-23 September 2017. The Santa Barbara Maritime Museum will host both the ADCI Western Chapter meeting and the HDS Conference. The museum is also home to the ADCI Commercial Diving Hall of Fame Monument. When the conference is held in Santa Barbara, the unofficial birthplace of deep commercial diving, it's a "who's who" in the industry. Lad Handleman, Bob Kirby, Bob Ratcliffe, and Bev Morgan are just some of the diving royalty that can be found at conference activities. Unfortunately, we will miss the company of Torrance R. Parker, who passed away in March of this year. For those who had the opportunity to know Torrance Parker, you knew a man who lived an interesting and full life, always having time to share his experiences with those who may have only had a fraction of the knowledge and experience that he possessed. From a grateful industry, hearty thanks for your contributions.

A FEW REMINDERS:

1. The ADCI Audit Initiative is into its fourth month, with many companies taking advantage of co-scheduling their audits in conjunction with other contractors or schools in the region. It is important to note that the 90-day comment period for revision to the Consensus Standards for Commercial Diving and Underwater Operations (edition 6.3) is currently underway. Once the approved revisions are incorporated into the document, those companies and schools that have not been audited will be audited under the edition 6.3. In most instances, once the comment period ends on 24 September 2017, it takes another 90 days for the selected revisions to be recommended by the Consensus Standards Review Committee, and then ratified by the Board of Directors. The formal release of edition 6.3 will likely be in March of 2018. I cannot stress the importance of not waiting until the eleventh hour to have your company or school's audit performed. It is recommended that you look out for announcements of when ADCI Designated Auditors will be in your area. If possible, assign members of your team to organize personnel and equipment files, and review the Safe Practices and Operations Manual. Download the ADCI Diving Contractor or Diver Training Program Audit Reports and perform a self-audit/inventory to identify any gaps. Remember, this is not an audit which determines continued membership. It is meant be educational and not punitive. All General Members and Associate Members Schools that have gone through the audit have expressed that the experience was very worthwhile, providing many takeaways towards bettering their company or school.
2. The Association is soliciting comments for the upcoming revisions to the Consensus Standards. All industry stakeholders can participate. Not just reserved for senior management or diving personnel; medical personnel, office personnel, equipment technicians, regulators, students, and retirees can submit recommendations. In short, any interested party can weigh-in on what should be added or revised to the document.

CYBER SECURITY

Readiness in the Oil and Gas Industry

BY KEN HANS, TRELLIS ENERGY

This article was reprinted with permission from North American Oil & Gas Pipelines. It originally appeared in the March 2017 issue.

North American Oil & Gas PIPELINES

Oil and gas companies are continuously looking for ways to efficiently manage their industrial assets and better streamline their operations to lower fixed costs and safely deliver the energy resources they provide.

With the dawn of the digital age, these companies are adopting a growing array of next-generation wireless sensors and related industrial internet technologies that enable them to connect to their industrial equipment in real time. Designed to increase visibility, monitoring and control of a wide variety of industrial assets, these next-generation technologies have the ability to monitor asset performance in real-time and can be integrated into the supporting SCADA control systems, making it possible for operators to remotely and/or automatically turn on, off or modify industrial assets based on real-time performance feedback.

As a result, the traditional distinction between information technology (corporate IT) and industrial operations technology (OT) is blurring as these worlds continue to converge and provide new levels of industrial automation.

The increasing digitization and modernization of technology in the industry has many benefits, including a more reliable and continuous supply of energy resources to customers at a lower cost for the organizations that deliver it. However, along with these benefits comes a new issue to contend with: A growing number of cyber security threats that are emerging as a result of the convergence of industrial and corporate networks.

MODERNIZATION INCREASES VULNERABILITIES

The operations technology running industrial control systems (ICS) has traditionally been closed-off and segregated from enterprise IT networks through "air gapped" security measures that ensure OT is isolated from other, ancillary corporate IT computer networks. However, with the rise of progressive industrial internet solutions, OT systems are increasingly becoming more adapted to an open-standard, digital-age IT infrastructure while being bridged into corporate IT networks to take advantage of new capabilities. While there are positive advantages created by these changes, a side effect is new vectors of exposure of the ICS to potential cyber-based vulnerabilities.

The industry is already witnessing some of this phenomenon in the form of an increased number of cyber security attacks on its energy infrastructure. In 2015, the U.S. Department of Homeland Security's Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) responded to 295 cyber incidents, a 20 percent increase from 2014, when there were 46 energy sector incidents. Furthermore, a 2016 survey of 150 energy sector IT professionals found that more than 75 percent had experienced at least one successful cyber-attack in the previous 12 months.

Security attacks in other industries can create disruption and monetary damages to businesses and individuals, but when security attacks compromise oil and gas industry SCADA systems and overtake their industrial control functions, the results can be disastrous — even deadly. If cyber hackers compromise the industrial control network running a pipeline, for example, they could adjust pipeline compressors to increase pressure until a weak point in the pipeline explodes. And all this can be done from anonymous, remote locations via the internet or other similar external communications pathways.

Alternatively, the information from within the ICS could be generally gathered, manipulated and/or even extracted and sent to a third party, such as a terrorist group or non-friendly foreign nation, to be used with malicious intent. This approach was reportedly used to cause the 2008 explosion of a pipeline in Turkey. More recently, in March 2016, the U.S. Justice Department claimed that Iran had attacked U.S. infrastructure by infiltrating the industrial controls of a dam in Rye, New York. The attackers compromised the dam's command-and-control system using a cellular modem. In June 2016, ICS malware targeted a European energy company. A backdoor was created that could be used to deliver a payload that could extract data from or potentially shut down the energy grid.

As the pace of digitization in the industry continues to intensify and cyber criminals continue to develop ICS-specific malware, there likely will be an increasing number of cyber security attacks against systems that manage critical infrastructure.

GUIDELINES FOR THE ENERGY SECTOR

Securing assets such as pipelines and other energy infrastructure will require a combination of training, technology, industry standards and regulations and improved processes. There are some baseline recommendations and frameworks for addressing pipeline cyber security.

In 2015, the U.S. Department of Energy released the Energy Sector Cybersecurity Framework Implementation Guidance, which is designed to help energy sector owners and operators implement the Cybersecurity Framework for critical infrastructure that was developed by National Institute of Standards and Technology (NIST). While it is a voluntary framework, it serves as an excellent starting point and shows pipeline owners and operators how to incorporate the framework into their cyber security and risk management programs.

The Transportation Security Administration's (TSA) Pipeline Security Guidelines provides cyber security recommendations for pipeline operators, including general security measures, information security coordination and responsibilities, system lifecycle considerations and system restoration and recovery planning.

Additionally, industry associations such as the American Petroleum Institute (API), the Interstate Natural Gas Association of America (INGAA) and others provide cyber security guidance and recommendations.

These industry standards and frameworks should be considered a starting point for developing your company's specific cyber security posture in the energy sector. And while these frameworks can help get a program off the ground, to date the industry generally relies on voluntary compliance as mandatory cyber security obligations for pipelines are not yet hard-lined.

Pipeline owners and operators should not only look to leverage these sample frameworks as a starting point for their cyber security posture, they should also look to develop appropriate supporting management practices, employee training, performance tracking metrics and business intelligence related to their cyber security program in order to further safeguard their industrial infrastructure against cyber threats.

EDUCATION AND TRAINING

Malware is most often introduced and spread through networks due to unaware behavior by good actors. Employees, for example, unknowingly open malicious email attachments, are tricked into revealing passwords and/or connect their laptops in unsecure ways to networks they should not be connected to. The prevalence of personal, internet and network-enabled smartphones in the workplace also exacerbates the problem.

Both acts of commission and omission by good actors are quite often a material part of the root cause behind a malicious cyber intrusion. To change this, pipeline companies must create a culture focused on identifying and reducing digital vulnerabilities in the same way there is a culture for preventing explosions and fires.

Widespread awareness of cyber security issues must be cultivated among the workforce and employees should receive

The increasing digitization and modernization of technology in the industry has many benefits, including a more reliable and continuous supply of energy resources to customers at a lower cost for the organizations that deliver it. However, along with these benefits comes a new issue to contend with: A growing number of cyber security threats that are emerging as a result of the convergence of industrial and corporate networks.

regular cyber security training tailored to their role in the organization. For example, the SANS Institute provides a Global Industrial Cyber Security Professional certification that trains ICS operators to understand how to best recognize and react to a cyber-attack.

Additionally, the Department of Homeland Security (DHS) has been engaging organizations managing critical infrastructure with a service where DHS will come on-site and simulate a cyber-attack using "white hat" hackers who attempt to compromise the OT and IT systems using the same techniques as a malicious hacker. The multi-day exercise helps these organizations identify where their greatest risks and vulnerabilities exist and provides recommendations for how to improve.

SOLUTIONS FOR THE OIL AND GAS SECTOR

Given how complex, multi-dimensional and highly regulated aspects of operations in oil and gas can be, asset owners should look for threat detection software solutions that are specifically designed for energy sector infrastructure to ensure these critical assets are appropriately secured. A simplistic approach such as installing a firewall is simply not enough to protect from the nature of today's sophisticated and coordinated cyber threats.

When evaluating industrial cyber security solutions, an important feature to look for is machine learning. Its value in industrial cyber security is the ability to dynamically "paint a picture" of the entire industrial network. For example, from an industrial process perspective, such a solution can "learn" what each Programmable Language Control is touching (e.g., control valves, switches, related components), to identify if something out of the ordinary is occurring during the normal industrial process cycle.

Another key feature to look for is the ability of a cyber security tool to be fully passive. That means it requires zero downtime and zero interruption to the existing industrial control network in order to install, setup, learn and monitor the network. Think of the ideal cyber security solution as a fast learner, an exceptional listener

and a 24/7 first responder of any anomalous activity on your industrial network, all while being fully passive and non-intrusive to the system(s) it's monitoring.

And perhaps most importantly, a good industrial cyber security solution should have the ability to provide operators with real-time situational awareness related to security incidents, malfunctions or misuse in the process network, service disruptions, anomalies in the ICS and more. With the growing volume of digitally based data being fed to industrial operations centers, operators are becoming overwhelmed by the volume of atomic alerts and events they receive.

It's no longer enough for a cyber security solution to simply create another alert without providing the necessary context. Mature cyber security solutions should be able to correlate individual anomalies into threat events, as well as score the threat level of those events, in order to provide operators with situational context into the nature of threat that could be developing. By doing this, operators will be better equipped to see the proverbial forest through the alert trees, and have the right insight they need to make actionable decisions to avoid service disruption, downtime or worse: A compromise in infrastructure safety that could result in human casualties.

CONCLUSION

As OT and IT continue to converge, industrial control systems in the energy sector are increasingly vulnerable to a growing number of sophisticated cyber security threats. Unlike other business sectors, a cyber security attack in the energy sector has the potential to be disruptive or even deadly.

By following some emerging best practices, frameworks and guidelines laid out by organizations like the U.S. Departments of Energy and Homeland Security, NIST and TSA; combined with employee training and industrial cyber security software solutions that are designed specifically for the unique needs of the oil and gas industry, companies in this sector can strengthen their cyber security stance and prevent attacks.

Ken Hans is vice president of sales and services at Trellis Energy, where he manages business development and delivery of digital t*ransformation engagement for energy companies in the natural gas and electric utility sectors.*

The First Commercial ROV

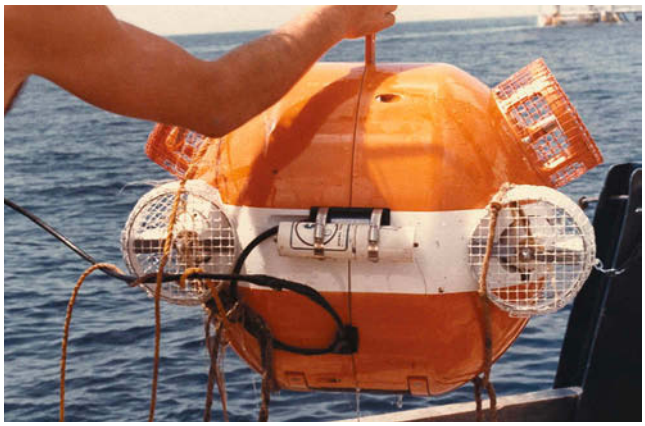
BY CHRISTOPHER SWANN

In mid-1974, John Culbertson, former Oceaneering vice-president for the US Gulf Coast and Central and South America, set up Martech International. The new company was based in Morgan City, with money from Enterprise Products, the very substantial firm that was Culbertson's 50% partner. Culbertson had learnt that Hydro Products, a San Diego manufacturer of underwater television cameras, lights and oceanographic equipment, had developed what amounted to a swimming television camera for the US Navy. The device was called the RCV-125: RCV standing for 'Remotely Controlled Vehicle'.

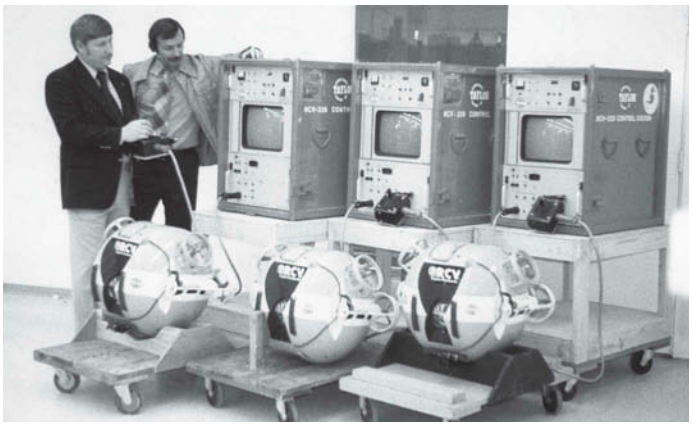
Although Hydro Products were tight-lipped about what the navy was doing with this 'flying eyeball', it was fairly clear that its small size and approximately spherical shape were dictated by the need to pass through a submarine's torpedo tube, presumably to run reconnaissance. Culbertson, who was as concerned as his former colleagues about the potential long-term effects of exposing divers to extreme pressure, saw the RCV-125 as a promising alternative to divers for deep inspection work. It was also a way to attract business. Seaway Diving of Norway bought the first unit that was sold to a commercial customer; Culbertson bought the second.

Although the industrial use of Remotely Operated Vehicles or ROVs (Hydro Products registered the name RCV) began with the RCV-125, it was not the first ROV. The first person to build such a vehicle appears to have been the Frenchman Dimitri Rebikoff, well known for his work in underwater optics and photography, who produced an unmanned cable-controlled version of his *Pegasus*, a torpedo-like craft equipped with a camera and strobe that was piloted by a scuba diver.

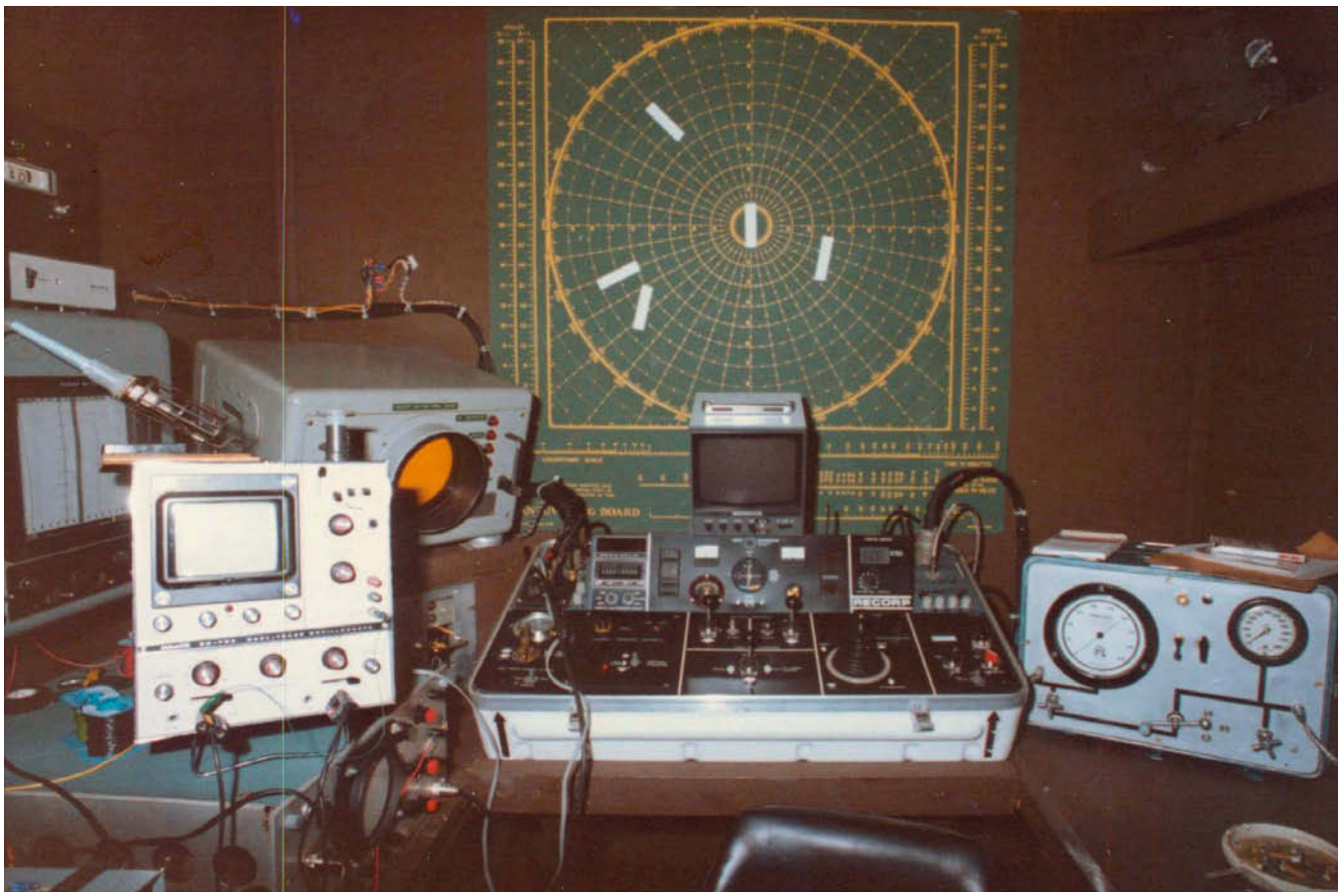
In 1965 the US Naval Electronics Laboratory in San Diego followed with the Cable Controlled Underwater Recovery Vehicle (CURV), the device which in April 1966 caught the world's attention by bringing up a lost hydrogen bomb from 2,850 feet beneath the Mediterranean. Although the recovery owed much to chance—CURV inadvertently snarled the bomb's parachute—it was nonetheless an impressive demonstration of the new technology. Over the next eight years, the governments of



Rear view of Martech's RCV-125 on its first outing. The wire mesh cages were added to prevent stray lines and debris from being drawn into the thrusters (Jack D. Smith).



Drew Michel (left), Taylor Diving Vice-President of Technical Services, taking delivery in April 1977 of three RCV-225s from Chuck Strickland of Hydro Products (Collection of Drew Michel).



The Recorp Mk 3 control van and console (Deep Sea Systems International, Inc.).

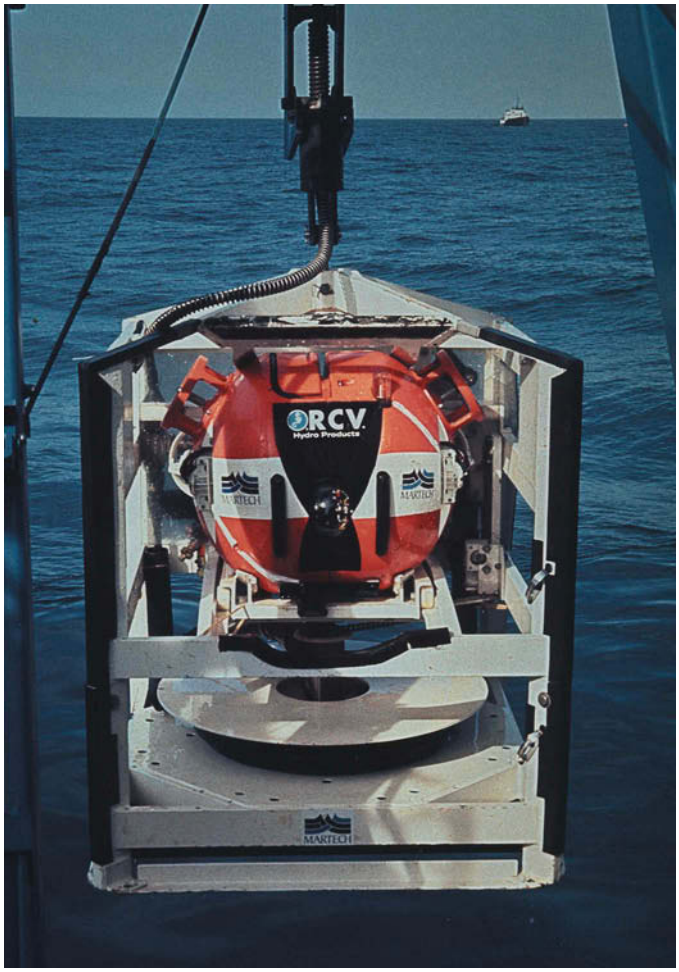
Britain, France, Norway, the United States and the USSR paid for the construction of about a dozen ROVs, for military use or for conducting geological surveys. In Britain, there was the further impetus of the diving accidents in the North Sea, which prompted Sir Hermann Bondi, the chief scientist at the UK Department of Energy, to initiate an effort to try to replace divers with machines: a research program that became known as the Bondi Initiative.

For two years or so, Martech had the ROV business in the United States to themselves. The first operation took place in 1975 in the Gulf of Mexico, with support from S & H Services, a company started by Jack Smith, one of the first Gulf Coast oilfield divers. As delivered to Martech, the RCV-125 system consisted of three components: the vehicle, made up of a pressure housing containing the motors, television camera and electronics, surrounded by a syntactic foam hull and propelled by four thrusters; a control station with the television monitor and power supply, and a hand controller with which the operator piloted the vehicle.

RCV-225 flying over a platform cross member (Jack D. Smith).

Initially there was no winch; the vehicle was simply lowered into the water on a line passed through the lifting eye. Although the RCV-125 was rated to 1,250 feet, how deep it could go was naturally limited by the length of the umbilical and, more importantly, by the drag it exerted on the vehicle, especially in a current. In practice, this was no more than a few hundred feet. Therefore, in 1977, Hydro Products introduced an underwater launcher or deployment cage which carried the vehicle to working depth, where it motored out to do its inspection. It then re-entered the cage for transport back to the surface.

Experience with the RCV-125 soon led to a fully-fledged commercial version, the RCV-225, which Martech also ordered. The second American customer for the vehicle



RCV-225 in the deployment cage (Jack D. Smith).

RCV-225 with the Articulator mini-manipulator (Deep Sea Systems International, Inc.).

was Taylor Diving, a company that became a major operator of ROVs.

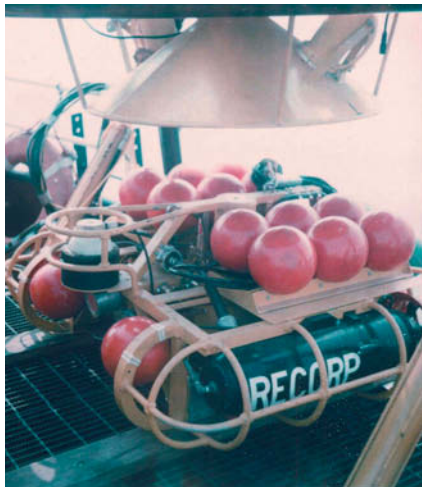
The RCV-225 was a great success. As John Lawrence of the former British submersible and ROV builder OSEL observed:

'Hydro Products had something nobody else had and margins were high, so they pumped the profits into research and development. It was lovely. The RCV-225 did a lot of work; nobody had been able to look under water before and move around, unless you sent a diver or a submersible down.'

By 1983, there were 56 RCV-225s at work around the world.

After buying the RCV-125, Martech set up a separate division and hired an engineer to manage it. The company also enlisted electronics technicians to maintain and operate its vehicles, but found that divers, who were used to finding their way around a structure without becoming entangled, generally made better pilots. Nonetheless the technicians were still needed to keep the vehicles running, and eventually they became good pilots themselves. Necessity being the mother of invention, the crews soon devised ways of extending the remote eyeball's capabilities, for example by rigging up a hook or arm to take down a messenger line and reeve it through a shackle.

Initially the typical diver, particularly in the Gulf of Mexico, regarded the robot vehicle as a threat. The oil companies, on the other hand, were enthusiastic. For inspections beyond 200 feet—and many of the deeper dives were for inspection—the little vehicles were less expensive than divers. They were also more effective because an engineer could see the situation for himself instead of having to rely on a diver's description or drawing. To make sure the industry knew what was on offer, Martech set up a tank at the annual Offshore Technology Conference in Houston, where they gave oilmen a chance to try their hand at piloting. Considering how profitable ROVs were for Martech almost from the start, Culbertson was surprised his competitors did not get into the business sooner than they did—even if, as some thought, he initially offered the ROV at no charge as a sweetener for obtaining diving contracts. (In the early years, an RCV-225 went out for some $3,500 a day, an unheard of rate for an inspection vehicle compared with the start of the 1990s.)



The Recorp Mk 3 (Deep Sea Systems International, Inc.).

Another American company who went into ROVs early on was Michel Lecler Divers of Harvey, Louisiana. In 1974–77,

The MiniRover, the first "Low-Cost ROV".

Chris Nicholson, then employed by Lecler, developed a vehicle named the Recorp Mk 3, which he built using components from military salvage yards and various other sources. Michel Lecler Divers was subsequently bought by the Dutch company Smit International, for whom Nicholson designed and built three ROVs: a nuclear inspection vehicle, a 30 h.p. hydraulic salvage-claw ROV, and the Smit Sub 1000 oilfield vehicle.

In January 1982, Nicholson started his own company, Deep Sea Systems International. His first product was the Articulator, a mini-manipulator for the RCV-225 and other small ROVs. In October 1983, Nicholson introduced the MiniRover, a 60-pound ROV that sold for under $30,000, the first of a new category of vehicles referred to as 'Low-Cost ROVs'.

In 1976, Martech did the initial work for the setting of Exxon's platform Hondo in the Santa Barbara Channel, at 850 feet and entirely with ROVs. Later they installed the tanker-loading monobuoy in 500 feet of water, using ROVs and saturation diving. The planning for putting in the mooring system went on for a year, largely under the direction of Jerry Ruse, an old hand from the early days of helium diving. The actual job was completed in 26 days, at a very substantial profit.

Martech I.S.E. TREC ROV (George 'Woody' Treen).

Despite such successes, several years later as a result of a disastrous decision to diversify into pipe laying, Martech was forced to seek protection under Chapter 11 of the federal bankruptcy code. Meanwhile, the company had bought what must have been one of the first TROV vehicles from the Canadian company McElhanney Offshore Surveying and Engineering—later International Submarine Engineering (I.S.E.)—and built their own manned observation submarine, *Pioneer 1.*

Neither proved particularly profitable. Disposing of the pipeline division and getting the company out of bankruptcy took almost three years. Culbertson liquidated the division in Singapore and concentrated on Martech's core business of diving and ROV services, mostly in the Gulf but also in Alaska, where they dominated the market, and in California. By then, however, for lack of capital, they had lost their lead in ROVs.

Christopher Swann is the author of The History of Oilfield Diving: An Industrial Adventure

Careers in the COMMERCIAL DI

VING INDUSTRY

BY AARON LAY

There are lots of reasons people decide to be commercial divers. Some can't bear the thought of sitting behind a desk. Some are attracted to adventure and love the idea of traveling all over the world. Some are simply drawn to the water and view a career in diving as an obvious choice – and some folks do it for all three reasons. Commercial diving offers more variety and options than many other trades out there. And what's more, there's a whole slew of options available that don't even require you to put on a helmet and get wet. But many aren't aware of this fact.

Unfortunately, there's a good deal of misinformation floating around online and elsewhere that inaccurately portrays the commercial diving industry as *only* providing opportunities for folks who actually want to get in the water and dive. This couldn't be further from the truth.

But make no mistake, ADCI Executive Director, Phil Newsum asserts, "Most people get into commercial diving with the intent of actually getting in the water and diving. That goes without saying, but few people look past that to see the scope of what this industry has in terms of supportive roles. Also, there's a point that folks in our industry need to understand what else is available besides actually diving."

ADCI President, Bryan Nicholls, understands firsthand the very common phenomenon of divers getting out of the water and making the transition to other roles within the industry. "When I initially went to commercial diving school, I was completely unaware of the opportunities that were available outside of diving. Almost immediately though, our class was told that our 'field time' may be the shortest part of our careers, as most of those who stay in the industry end up working in project management, operations, estimating or another area. At that time, I thought this was a ridiculous proposition. Why would anyone want to give up the hat and sit on the sidelines? As I found out

Go further in-depth on this topic by viewing Careers in the Commercial Diving and Underwater Industry on ADCI-TV. To view, visit videos.adc-int.org/careers-in-the-commercial-diving-and-underwater-industry

over the years, the simplest answer was 'life happens.' Divers start and support families, buy homes and settle down due to experience, age or wear and tear. With change, comes change – and people either get out entirely, or they find that their experience is needed elsewhere.

As I learned, there are plenty of opportunities available to us outside of the hat, and the skills that we learn in the field can translate very well into other professions. It seems that no matter where I go, I run into former divers who have moved up within their organizations into the positions mentioned above, or moved on to roles in ROV work, hyperbaric medicine, construction, consulting, equipment and supplies, oil and gas, diver support products and tools, public service, NDT, HSE, etc. I even know a couple of former divers that work in marine insurance!"

Diving is inherently hard work. Take welding for example – handling the required gear and getting your beads just right is hard enough on dry land in the shop. Now, imagine doing that with 400 feet of cold water above your head in limited visibility. It's physical, exacting, dangerous work that surely isn't for everyone, but it's hard for many of us to imaging doing anything else. At a certain point in all of our careers, there comes a time to look down the road and weigh our options. But with all the opportunities available in our industry, it's not time to clock out just because you can no longer dive comfortably. Newsum stresses that seasoned divers, "…may have not even realized that they can *continue* to have a career even after they've sort of reached their shelf life as a diver."

Divers commonly seek out positions in operations, project management and supervising, which do require some diving experience. "No matter what area you're in, if you

have some diving [experience], it gives you a leg up because now you're able to really take those skills and you're better able to tie that into the industry in other ways. But if you don't have that, it's fine. There's plenty of other work to do," Newsum admits.

When one takes into account the many facets of commercial diving in both inland and offshore sectors that are involved in getting a diver into the water and keeping him safe, positions start to add up quickly. In addition to roles like divers and tenders, there are jobs on and off the dive site absolutely integral to a safe, productive dive. "Take equipment maintenance for instance. Maintenance of life support equipment is not taken lightly for very obvious reasons. Someone needs to work in the shop maintaining the integrity of the helmets and all applicable life support equipment. Maybe that person likes to work with equipment and is mechanically inclined – well, we need them in the shop. Guys who maintain the SAT systems – before getting into our industry, many of them were electricians or have backgrounds in refrigeration, mechanics or hydraulics. They have absolutely *no* diving experience at all, but I don't need them to have diving experience. I need them to understand and maintain the equipment. Everyone has their role."

It's important for anyone considering a commercial diving career to never jump to conclusions about and to understand the variety of career opportunities this industry offers for several reasons. Misconceptions about our industry aren't necessarily due to misrepresented information, per se, but sheer lack of it. Let's look at the offshore sector, for example. Offshore work is perhaps the most commonly known facet of our industry, but it is only *one* part. And the same reasons some find working offshore appealing are the same reasons that may

Most people who come into this industry with a skill set they developed before they even considered commercial diving. They can also complement their time in this industry by tapping into the other skills they have *before* they came into diving. Often they'll find out they can use those skills to help further themselves within the industry.

Newsum concludes, "Most people who come into this industry with a skill set they developed before they even considered commercial diving. They can also complement their time in this industry by tapping into the other skills they have before they came into diving."

cause someone else to look for a different career path.

A diver working offshore may be out at sea working 12 hour shifts for weeks at a time away from his family and friends. For some, these facts are all just part of the job, and they're okay with that. For other, less informed folks who may assume offshore work is all that's to our industry, these facts can serve as a significant deal breaker. But one only needs to look toward land for the other half of the story.

Just stop and think of the sheer number of bridges, hydroelectric dams, harbors/ports, water and sewage treatment facilities, nuclear facilities, etc. there are just in the United States. Well, there are currently 614,387 bridges *alone*. And every single one of these bridges, and the rest of the aforementioned structures and facilities, require maintenance and inspection, and much of this is mandated by federal and local laws.

Jobs in the inland sector offer divers a different lifestyle and variety of work than offshore. This is not to say there isn't variety in the Gulf – there most certainly is. But for folks who find that offshore work may not be for them, the inland sector provides more flexibility. For one, inland divers typically aren't away from home as long as offshore divers. This makes inland work preferable for those divers with families who prefer not to be away from home for long periods of time. Also, the working hours in this sector are often more akin to what most people are used to, allowing inland divers more personal time.

The inland sector is also less prone to downturn due to domestic and global economic trends. Or as Newsum puts it, "There's no fluctuation of price-per-barrel in the inland sector." That's because, as we mentioned earlier, infrastructure maintenance and inspection is mandatory. "The work inland – in the ports, the nuclear power facilities, on the docks and bridges – this work must go on. Most of it is mandated by law to be maintained and inspected, and that's never subject to change. It's routine, and that's something that if you weren't in the industry or take the time to see what's happening outside a particular sector you may not realize," Newsum contends.

So, if you're ready to dry off and hang up your hat, check out the operations, project management, consulting and other opportunities requiring diving experience available to you. Trust us: our industry needs your knowledge and skill set! Remember, there is plenty of upward mobility available to you after your time in the water has run its course.

If you're interested in breaking into our industry, do a little homework and see what's out there. Consulting, sales, marketing, equipment and tool fabrication, transportation, health, safety and environment (HSE) roles, ROV operations – the list of jobs you can do in our industry with little to no diving experience whatsoever goes on and on.

And don't forget this: right now, as you're reading this, you're already in possession of an existing skill set or talent that you can easily apply to our industry – you just may not realize it yet. Newsum concludes, "Most people who come into this industry with a skill set they developed before they even considered commercial diving. They can also complement their time in this industry by tapping into the other skills they have *before* they came into diving. Often they'll find out they can use those skills to help further themselves within the industry. There's a lot of different ways to parlay your past experiences into this industry. I advise people to simply come into it with wide open eyes and a wide-open mind in terms of finding where you fit and what's available. Just pursue the thing you have the greatest degree of passion for. My bet is that you'll find something here you'll really excel at. There's plenty of work to do..." ≋

UNDERWATER INTERVENTION 2018

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The Helmets That Launched Commercial Mixed

BY LESLIE LEANEY

Anyone attending Underwater Intervention (U.I.) this year could not have failed to notice the large display of traditional copper and brass helmets that were exhibited by the Historical Diving Society (HDS). The display was titled The Helmets That Launched Commercial Mixed Gas Diving and was curated by HDS Chairman Lee Selisky and myself, who loaned the helmets from our individual collections.

> The most accurately documented dive that historians consider the launch of commercial mixed gas diving was made by Hugh "Dan" Wilson on November 2, 1962. Wilson had installed a scuba demand regulator in a modified Yokohama type J helmet used for abalone diving, and had reached a depth of 400 feet in the Santa Barbara Channel off California.

The idea for the exhibit came from ADCI Executive Director Phil Newsum, and by any measure it was deemed very successful, with a constant stream of visitors, old and young, stopping by to inspect the helmets.

These early mixed gas helmets had never been displayed as a group before and were exhibited in an historical time-line that started in 1962 and ended in 1967. In discussions with Phil and the Naylor team at U.I. it was decided to start this column in Underwater magazine so that the helmets could be shown to ADCI members who had not been able to attend the conference.

THE HISTORY

The use of mixed gas was one of the major milestones in the history of deep diving. In the western world, the U.S. Navy had used helium experimentally since the 1920s and it came to international attention in 1939 with their salvage of the USS Squalus.

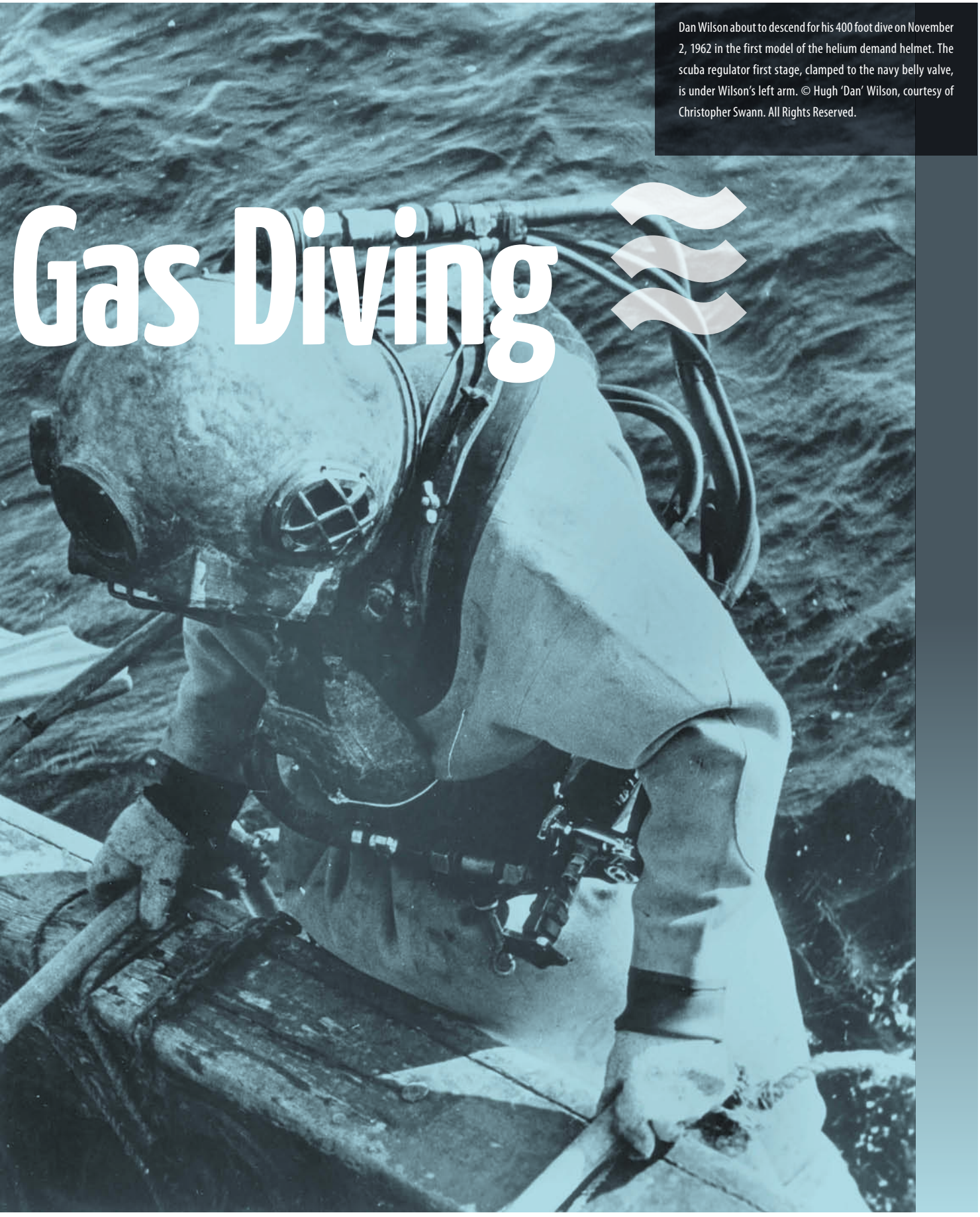
The use of helium for extended deep diving on the successful salvage of the USS Squalus gave the US Navy a strong foundation to build on, and when the USA entered WWII in December 1941, the development of helium diving equipment, like almost every other military asset, was fast tracked. This led to the manufacture of the first run of US Navy Mark V helmets designed for helium diving, and the USN continue to modify and develop their mixed gas diving equipment to the present day.

As a military arm of the US government, the funding for this development was basically in place and available by application through existing USN channels or internal political lobbying. The quest for deep-water diving using helium was, however, a very different challenge for the commercial diving industry, which labored with deep-air diving from the mid 1800s to the early 1960s.

In the prior issue of Underwater magazine we featured a U.S. Navy Mark V helium helmet built by DESCO in 1944. It was former U. S. Navy divers who had a working knowledge of this Mark V helium helmet with its venturi system who helped establish the foundation for commercial mixed gas diving almost two decades later.

A milestone on the road to commercial mixed gas diving was made in Italy in the early 1950s by the Pirelli, Belloni and Galeazzi (PBG) helium helmet. The helmet had a demand regulator installed inside it and was granted USA Patent number 2,792,832 on May 21, 1957. Only two models of this helmet were originally built and

Gas Diving



Dan Wilson about to descend for his 400 foot dive on November 2, 1962 in the first model of the helium demand helmet. The scuba regulator first stage, clamped to the navy belly valve, is under Wilson's left arm. © Hugh 'Dan' Wilson, courtesy of Christopher Swann. All Rights Reserved.

it currently appears not to have been used either commercially or militarily.

THE BEGINNING

The most accurately documented dive that historians consider the launch of commercial mixed gas diving was made by Hugh "Dan" Wilson on November 2, 1962. Wilson had installed a scuba demand regulator in a modified Yokohama type J helmet used for abalone diving, and had reached a depth of 400 feet in the Santa Barbara Channel off California. HDS member Chris Swann has done the most to record the history of this dive, and his research is published in his article in Journal of Diving History, issue 55, and in his book, The History of Oilfield Diving.

Wilson's dive changed the rules for deep-water commercial diving. The helmet he used is now part of the permanent display of historical diving equipment at the Santa Barbara Maritime Museum.

Wilson's helium demand helmet for mixed gas diving was the functional starting point for the commercial diving industry, as the requirement for deep-water oil field diving became an ever increasing pressure on diving companies in Santa Barbara and the Gulf of Mexico during the 1960s and onward. The majority of the development in the United States came from a small group of divers based in Santa Barbara, California, most of whom had migrated into oilfield diving from the abalone diving industry.

In this, and the columns in following issues, the HDS presents a brief, and probably incomplete, historical time-line of the mixed gas diving helmets developed and manufactured in Santa Barbara that led to the standardization of heavy gear commercial mixed gas diving helmets.

THE GENESIS

Helium Demand Helmet built for Dan Wilson/General Offshore Divers. Circa late 1962, early 1963.

The shell of this helmet is a Yokohama Diving Apparatus Co. Ltd. of Japan, type J. The blank shell (without ports or apertures) was most probably purchased by Wilson, or his associates, from a supplier in Mexico. The modification into a helium demand helmet was probably done by Santa Barbara Radiator Works and Robert "Bob" Ratcliffe sometime in late 1962 or early 1963. In a recent interview, Lad Handelman recalled that Al Williams at Carburetor & Electric of Santa Barbara was also involved in building these helmets. Current opinion among knowledgeable sources is that the model shown here was the second helium demand helmet produced, the first now being on display in the Santa Barbara Maritime Museum.

To date, my research has confirmed that at least five helium demand helmets were made by Wilson's team around this time. However Lad Handelman, who worked with Wilson and consistently dove these helmets during that period, recalls that there were probably somewhere between 10 and 20 built, as Wilson's General Offshore Divers company were running three or four jobs at a time.

Of the five I am aware of, I can confirm that the first two were built on Japanese Yokohama shells and have been located. The next were probably two that were assembled on DESCO 29118 Sponge Diver's helmet shells, and both of these have also been located. A fifth, built on a DESCO 29211 Abalone Diver's helmet shell, was featured in *National Geographic* magazine being worn

by Lad Handelman, but I have, to date, not located that helmet.

Authors note. The historical time-line of these helmets owes a great deal to my colleague Chris Swann and is researched from his book The History of Oilfield Diving, available from www.oceanautpress.com. The helmet shown is courtesy of the Leslie Leaney Collection. Helmet photos ©2017 by Trent Schultz for Leslie Leaney Archives, All Rights Reserved.

A version of this article originally appeared in *The Journal of Diving History*, issue 91, and is published by the kind permission of the Historical Diving Society, www.hds.org.

Nominations are now open for the ADCI Scholarship Program

AWARD

This year the ADCI will award 2 Scholarships at $4,000.00 each.

ELIGIBILITY

This ADCI Scholarship is open to members of the community of all ADCI voting member companies who are current and in good standing with ADCI, with the exception of officers and/or directors of the ADCI Board of Directors or their immediate families. This award is available for any institution of higher learning after high school including universities, colleges, junior colleges, vocational training schools and trade schools.

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DEADLINE FOR SUBMITTAL OF NOMINATIONS: OCTOBER 31, 2017

PLEASE VISIT ADC-INT.ORG TO DOWNLOAD THE APPLICATION FORM.

ADCI To Celebrate 50 Years in 2018

The Association of Diving Contractors International will be celebrating its 50th Anniversary throughout 2018. To commemorate this momentous occasion, ADCI Media will be highlighting different aspects of the association's history throughout the year as well. Be on the lookout for historical articles in *UNDERWATER Magazine*, testimonial interviews and videos on ADCI TV, fun facts and trivia on @UnderWater_Mag and the ADCI Facebook and LinkedIn pages and much more! The Association is even publishing a coffee table book detailing the history of the association and the industry over the past 50 years.

Today the ADCI has more than 600 member companies, furnishing services and support for the conduct of safe underwater operations from 41 nations throughout the world.

Encompassing offshore and inland sectors of diving, ADCI is comprised of segments from the business, educational and medical communities. ADCI cooperates and participates with State and Federal regulatory agencies and works closely with all stakeholders to develop standards that are consistent and attainable, while meeting the highest standards of safety for underwater operations.

The ADCI now has four membership classifications. General Membership is for those members who conduct commercial diving as a substantial part of their business. Associate Members support General Members through the training of personnel engaged in commercial diving services, and/or through the manufacturing/supporting of goods and services. Supporting Members are "for profits" or "not for profits" that support the mission and purpose of the ADCI. This includes government regulatory authorities, oversight agencies and military authorities among others. Affiliate membership includes any organization that supports the purposes of the ADCI that is invited by the Board of Directors.

Today the ADCI has more than 600 member companies, furnishing services and support for the conduct of safe underwater operations from 41 nations throughout the world.

The mission of the ADCI is:

- To promote the highest level of safety in the practice of commercial diving and underwater operations.
- To promote proper and adequate training and education for industry personnel.
- To foster open communication within the underwater industry.
- To hold all members accountable in adherence to the Consensus Standards for Commercial Diving and Underwater Operations.

Recognized as the premier Association that issues safe diving guidelines through its International Consensus Standards for Commercial Diving and Underwater Operations, the ADCI is also the primary entity for the issuance of certifications for diving personnel in the U.S. and many regions globally.

The ADCI has formal partnerships with the United States Coast Guard, the American Salvage Association, the United States Navy's Naval Sea Systems Command (Supervisor of Salvage & Diving), as well as with several navies in the Latin America and Asia Pacific sectors. The U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) "recognizes ADCI standards as the best established industry practice."

Thank you for all of your support of ADCI through the years and for helping build this association into what it has become today! ≋

Nominations are now open for the

ADCI Commercial Diving Hall of Fame

Recognizing and honoring individuals whose efforts and accomplishments have significantly contributed to commercial diving through a lifetime of dedication.

Nominees do not have to be commercial divers, but can be any individual who has been influential and who has made a significant and recognizable life-long contribution to the commercial diving community.

Inductees will be honored at the Awards Dinner at Underwater Intervention 2017.

For more information, contact
Phil Newsum
Executive Director
(281) 893-8388 or
pnewsum@adc-int.org

Deadline for submittal of nominations: OCTOBER 31, 2017

Please visit adc-int.org to download the nominations form and to learn more about the Commercial Diving Hall of Fame.

Return completed forms to
btreadway@adc-int.org
or mail to
ADCI, 5206 FM 1960 W.,
Ste 202, Houston, TX 77069

14 Tips to Protect Your Business from Ransomware Attacks

BY NATALE GORIEL, SBA OFFICIAL

Ransomware attacks are the fastest growing malware threats. On average, more than 4,000 ransomware attacks have occurred daily since January 1, 2016. Ransomware, a type of malicious software that infects and restricts access to a computer until a ransom is paid, affects businesses of all sizes. The good news is that there are best practices you can adopt to protect your business.

1 | Implement an awareness and training program. Because end users are targets, employees should be aware of the threat of ransomware and how it is delivered.

2 | Enable strong spam filters to prevent phishing emails (an attempt to obtain sensitive information electronically) from reaching employees and authenticate inbound email using technologies like Sender Policy Framework (SPF), Domain Message Authentication Reporting and Conformance (DMARC), and DomainKeys Identified Mail (DKIM) to prevent email spoofing.

3 | Scan all incoming and outgoing emails to detect threats and filter executable files (used to perform computer functions) from reaching employees.

4 | Configure firewalls to block access to known malicious IP addresses.

5 | Patch operating systems, software, and firmware on devices. Consider using a centralized patch management system.

6 | Set anti-virus and anti-malware programs to conduct regular scans automatically.

7 | Manage the use of privileged accounts based on the principle of least privilege: no employees should be assigned administrative access unless absolutely needed and those with a need for administrator accounts should only use them when necessary.

8 | Configure access controls—including file, directory, and network share permissions—with least privilege in mind. If an employee only needs to read specific files, the employee should not have write access to those files, directories, or shares.

On average, more than 4,000 ransomware attacks have occurred daily since January 1, 2016.

9 | Disable macro scripts (tool bar buttons and keyboard shortcut) from office files transmitted via email. Consider using Office Viewer software to open Microsoft Office files transmitted via email instead of full office suite applications.

10 | Implement Software Restriction Policies (SRP) or other controls to prevent programs from executing from common ransomware locations, such as temporary folders supporting popular Internet browsers or compression/decompression programs, including the AppData/LocalAppData folder.

11 | Consider disabling Remote Desktop protocol (RDP) if it is not being used.

12 | Use application whitelisting, which only allows systems to execute programs known and permitted by security policy.

13 | Execute operating system environments or specific programs in a virtualized environment.

14 | Categorize data based on organizational value and implement physical and logical separation of networks and data for different organizational units.

Visit the *U.S. Computer Emergency Readiness Team* website for additional information on how to protect your business from ransomware attacks.

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