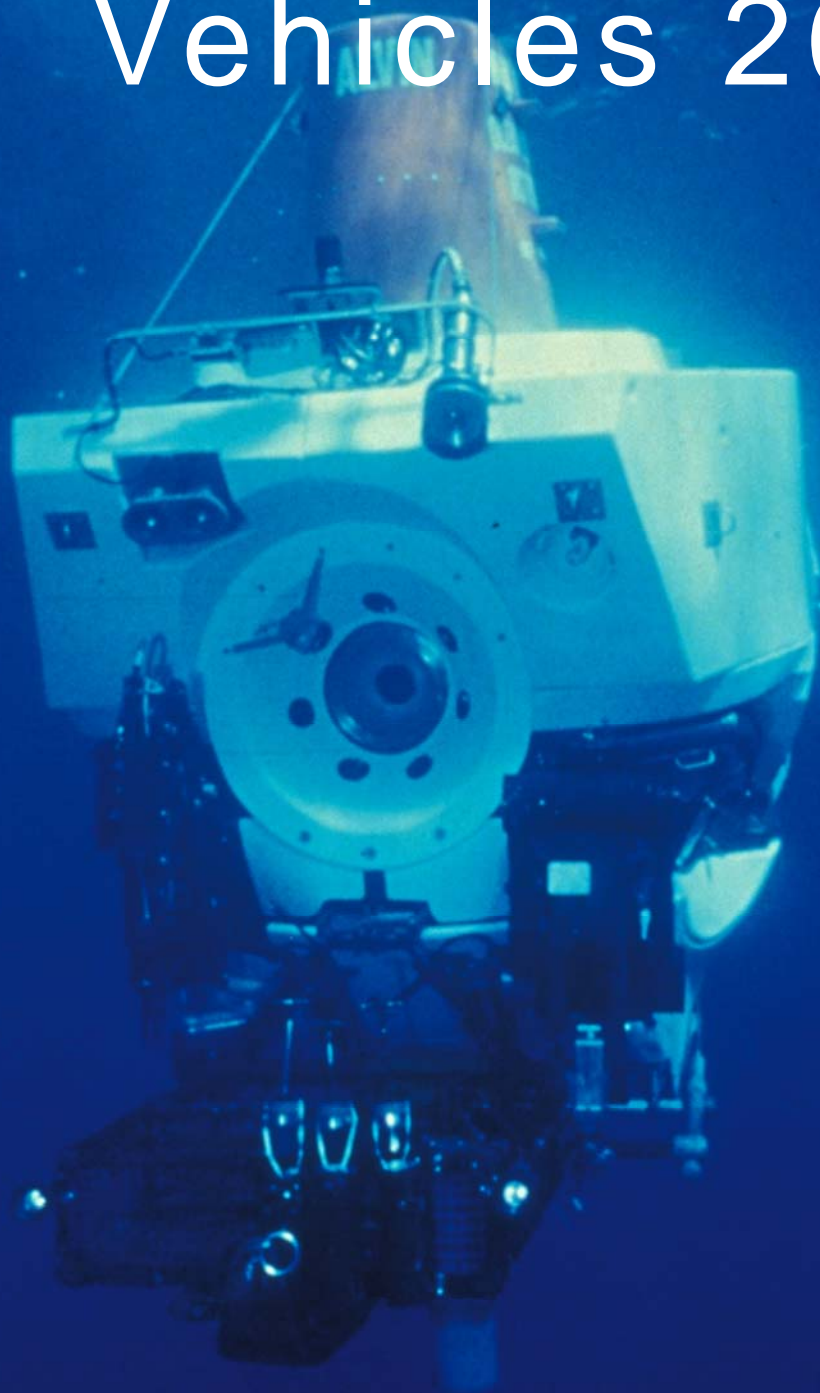


Manned Underwater Vehicles 2012



Organized by:

MTS MUV Committee



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Underwater Intervention Conference

NEW ORLEANS, USA, 24-26 JANUARY, 2012

www.underwaterintervention.com

9th Annual MUV PROGRAM

2012 MUV TECHNICAL PROGRAM

Room 219	DAY 1 Jan 24, 2012	DAY 2 Jan 25, 2012	DAY 3 Jan 26, 2012
8:30-9:00		PSUBS Overview and Update Jon Wallace PSubs Organization, USA	New Developments in Pressure Vessel Applications of Acrylics Bart Kemper Kemper Engineering Services, USA
9:00-9:30	MTS MUV Overview of Manned Submersible Activity in 2011 William Kohnen	Overview of ABS Rule Change Proposals for 2012 Roy Thomas American Bureau Shipping, USA	Naval Architecture Software Tools for Underwater Vehicle Design Tobin McNatt DRS Adv. Marine Technology Center, USA
9:30 to 10:00		MTS Manned UW Vehicles Committee, USA	Efficiency of Power to Thrust Conversion for Underwater Thrusters William Kohnen Hydrospace Group, USA
10:00 to 10:30	BREAK	BREAK	BREAK
10:30 to 11:00	Narco Subs: Implications for Sub Operators William Thompson US Coast Guard, MIFC PAC, USA	An Alternative Method to Remove Carbon Dioxide From Submersible Environments Marshall Nuckols Duke University, USA	Technology Panel Discussion: Modern Buoyancy Foam for Underwater Vehicles Moderator: William Kohnen Panelists: Roy Thomas, American Bureau Shipping Robert Kelly, Trelleborg Offshore Thomas Murray, Engineered Syntactic Systems Jim Teague, JTeague Enterprises
11:00 to 11:30	RHOV Personnel Sphere Update - The End is in Sight Jerry Henkener Southwest Research Institute, USA	Ocean Going Diesel Electric Submersible Development Brett Phaneuf Deep Submergence LLC, USA	
11:30 to 12:00	ALVIN Sub Upgrade Program Overview for 2011 Kurt Uetz Woods Hole Oceanographic Inst., USA	Hawaii Undersea Research Lab (HURL) 2011 Update Colin Wollerman University of Hawaii, Hawaii, USA	
12:00 to 1:30	LUNCH	LUNCH	LUNCH
1:30 to 2:00	Titanic at 100 –Legal Implications to Submersibles & Visitors Laura Gongaware, Ole Varmer NOAA, USA	Lithium Battery Certification Considerations at ABS, LR and DNV. Matt Koenig CORVUS Energy Americas, USA	MTS Manned Underwater Vehicle Committee 1:30 to 2:30PM ANNUAL MUVVC MEETING Chaired by: William Kohnen
2:00 to 2:30	MUV Exploration To 1/2 Mile Depths Karl Stanley Stanley Submarines, Honduras	Modular Pressure-Tolerant Batteries for Subsea Applications Richard Wilson Bluefin Robotics, USA	
2:30 to 3:00	Antipodes - Developing a Launch, Retrieval System Stockton Rush Ocean Gate LLC, USA	Operation & Safety Of Modular Li-Ion Battery Systems for MUVs David White Southwest Electronic Energy Group, USA	
3:00-3:30	BREAK	BREAK	BREAK
3:30 to 4:00	NUYTCO Overview of Submersible Operations in 2011 Phil Nuytten, Jeff Heaton Nuytco Ltd, Canada		
4:00 to 4:30	Forward Looking Sonar Technology for UW Vehicles Peter Eriksen Norbit Subsea AS, Norway		
4:30 to 5:00	Improved Oxygen Calculations and their Benefits to MUVs Phil Ziegler Zeke Underwater Consulting, USA		

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Introduction

It is with great pleasure and excitement that we meet at the Underwater Intervention conference for our 9th annual Manned Underwater Vehicles Program. New Orleans is a great city to meet with delegates and colleagues from around the world. This promises to create a unique atmosphere to learn and share information about the latest developments in the manned submersible industry. The next few days offers overviews of industry activities, new product presentations, opinions, technical insight, knowledge, information and most importantly, a networking opportunity for all attendees. Coupled with a showcase of exhibitors on the show floor, a full technical program on ROVs, AUV's and Diving Systems, we hope this year's conference will live up to your expectations, be an enjoyable and valuable.

Above all, this event is meant to bring people together and find common points of interest. I encourage everyone to take full advantage of the list of speakers and delegates at this conference and if there are people you don't know, make it a point to meet them. This is why this program provides photos and background biographies. All presentations have Q&A sessions and some were structured to engage a panel discussion and a dialogue with the audience. If during the session you have a question you want to ask, don't hold back. Chances are it will be relevant, interesting and other delegates may be thinking the same thing.

I would first thank all the speakers for taking up the offer to present and provide such a wonderful program. Thank you for attending and your participation, and thank you to Underwater Intervention for making this all possible.

Welcome to Underwater Intervention 2012 and our 9th MTS Manned Underwater Vehicles Program.

William Kohnen
Chair, MUV Committee
Marine Technology Society

Day 1

Tuesday 24 January

TUE 9.00 – 10.00

William Kohnen, MTS Manned Underwater Vehicles, Chair



Mr. William Kohnen is President of Hydrospace Group which provides specialized integrated solutions for underwater intervention using manned vehicle systems. Mr. Kohnen is the co-founder of SEAmagine Hydrospace Corp. which specializes in the design and construction of manned submersibles and which delivered nine ABS classed submersibles to date. Mr. Kohnen has a background in aerospace with a M.Sc. Elec. Engr. from McGill University, Canada. He has been chair of the Marine Technology Society Manned Underwater Vehicles Committee since 2003 leading the MUV program at Underwater Intervention conference to represent the manned submersible industry. Mr. Kohnen is an active member of the ASME Pressure Vessel for Human Occupancy (PVHO) Committee. He is also engaged as an industry representative on the ALVIN Replacement HOV Oversight Committee (RHOC). He has over 15 years experience working with the US Coast Guard and ABS rules and regulations for building submersibles, is a member of the ABS Special Committee on Underwater Systems and Vehicles and member of the Deep Submersible Pilots Assoc.

MTS MUV Overview of Manned Submersible Activity in 2011

by: William Kohnen
Chair, MTS Manned Underwater Vehicles
Email: wkohnen@HydrospaceGroup.com

A yearly review of the state of the Manned Submersible industry in 2011. The overview will look at developments in all branches, including international research, tourism activity, leisure and security developments. This will include a summary of submersibles under Classification, operating and in construction, review of the industry trends and regulatory highlights for the year.

10.00 – 10.30

COFFEE BREAK

TUE 10.30 – 11.00

William Thompson, Southwest Research Institute



Chief Petty Officer William Thompson is a twenty-year veteran of the uniformed services with four years as an Intelligence Analyst in the Marine Corps and sixteen years as an Avionics Technician and Intelligence Specialist in the Coast Guard. He spent 12 years as a navigator aboard Coast Guard HC-130 Aircraft flying search and rescue and counter-drug missions and is currently a trans-national crime analyst with the Maritime Intelligence Fusion Center-Pacific. Chief Thompson holds a bachelor of science in Intelligence from the National Defense Intelligence College and will enter the National Intelligence University in June to complete a master of science in strategic intelligence.

“Narco Subs”: Implications for Submersible Owners and Operators

By: ISC William Thompson
MIFC PAC Alameda, CA
Email: William.H.Thompson@uscg.mil

This presentation will be divided in two parts. The first part will be a brief history of the use of semi-submersible vessels for

drug trafficking, beginning with the 2006 seizure of the first confirmed semi-submersible and concluding with the seizures of two fully submersible vessels in 2010. I will provide technical specifications of those seized as well as the drug trafficking organization requirements for a submersible to be a viable method of delivery.

The second part of the presentation will be the implications of the suspected use of submersibles by drug traffickers for the submersible community. This will include the perception of submersibles by the law enforcement community, the potential of misidentification of a legally operated submersible as a threat, and the necessity of standard operating procedures by legitimate submersible operators to help avoid this misidentification. The presentation will use examples of both submersible and surface vessel operations, as well as other examples from various transportation sectors. These examples will clarify how other industries help to separate legitimate from illegitimate operators to ensure both their economic and physical survival.

TUE 11.00 – 11.30 Jerry Henkener, Southwest Research Institute



Jerry Henkener is a staff Engineer at Southwest Research Institute. He has been involved in the development of underwater systems for many years including diving equipment development for the US Navy during more than 12 years at Battelle and the development of manned and unmanned submersibles at Southwest Research Institute (SwRI) for the past 30 years. He is presently the lead engineer in the design, fabrication and test of the replacement personnel sphere for the ALVIN submersible and previously at SwRI he was the lead engineer for the design, fabrication and testing of the hull structure and frame for the PRMS, the US Navy's new Submarine rescue vehicle.

RHOV Personnel Sphere Update - The End Is In Sight

By: Jerry Henkener
Southwest Research Institute
Email: jerry.henkener@swri.org

Southwest Research Institute® (SwRI®) is under contract to WHOI to design, fabricate and test the titanium personnel sphere that will be installed in the upgraded ALVIN submersible. SwRI is nearing completion of the fabrication and testing phases for the new personnel sphere. The personnel sphere will be tested in the Annapolis Test Chambers for a 6500 MSW maximum operating depth. The fabrication and testing had been expected to be completed but the decision to have the personnel sphere dual certified by both ABS and NAVSEA has resulted in schedule delays. All major weldments and the final machining of all components have been completed without experiencing any appreciable distortion or change in out-of-sphericity. Component assembly and structural validation tests are in progress. Stud welding procedures for the viewport windows and the hatch have been developed and are being employed. A strain gauge location plan is being developed based upon an as-built dimensional FEA model and analysis. A comprehensive hydrostatic test procedure is being developed and going through the dual approval process leading up to the hydro test in the Spring of 2012. SwRI will deliver the sphere and documentation to WHOI after the hydro test to complete our contract. The status and activities since last year and activities to complete the personnel sphere in 2012 will be discussed.

TUE 11.30 – 12.00 Kurt Uetz, Woods Hole Oceanographic Institution



Kurt Uetz spent 20 years as a Navy officer with tours of duty aboard ships in engineering and operations as well as in shipyards managing shipbuilding and repair projects. He then worked for several years in the telecommunications industry as a project manager, network planner, and operations manager. Kurt is an experienced practitioner in project management and applying his skills to the DSV Alvin Upgrade project.

ALVIN Submersible Upgrade Program Overview for 2011

By: Kurt Uetz

Woods Hole Oceanographic Inst., USA

Email: Kuetz@whoi.edu

Woods Hole Oceanographic Institution (WHOI) is developing a new deeper diving submersible by upgrading the present ALVIN in stages. The upgraded ALVIN will ultimately have an increased operating depth from 4500 MSW to 6500 MSW. The project at WHOI is being accomplished in two phases and the submersible will be classed to ABS and certified by NAVSEA. The presentation will discuss the impact of the new NAVSEA certification and the new project schedule.

12.00 – 1.30

LUNCH BREAK

TUE 1.30 – 2.00 Laura Gongaware, NOAA



Laura Gongaware is a second year law student studying maritime law at Tulane University Law School in New Orleans, Louisiana. Laura spent this past summer in D.C. interning with NOAA's General Council for International Law where she researched laws protecting underwater cultural heritage as a continuation of her master's thesis research. She continued her internship with NOAA this past fall and will be returning to intern with NOAA's General Council for Oceans and Coasts this summer. Laura received her B.A. in archaeology, history and classical studies from the George Washington University and is finishing her master's degree in nautical archaeology from Texas A&M University. She is a member of Tulane's Maritime Law Journal and a member of the Maritime Law Journal's John R. Brown Moot Court Team.

TITANIC at 100 – Legal Implications to Visitors, Researchers and Salvors

By: Laura Gongaware, Ole Varmer

NOAA, USA

Email: Laura.Gongaware@noaa.gov

Titanic is now one-hundred years old, and on April 15, 2012 Titanic will be subject to the 2001 UNESCO Convention on the Protection of Underwater Cultural Heritage (UCH) as well other U.S. domestic laws. This presentation will discuss these laws and the unique use of the law of salvage to protect Titanic from looting and keep the collection of salvaged artifacts intact for the public benefit. Finally, the presentation will discuss the potential implications of these laws to those planning visits to the wreck site using manned submersibles to commemorate the 100th Anniversary of the wreck.

TUE 2.00 – 2.30

Karl Stanley, Stanley Submarines



Karl Stanley got the idea to make a submersible when he was 9 years old and started construction of his first vehicle when he was 15 years old. This winged, gliding sub made it's maiden voyage the same week he graduated college. It went on to make over 550 dives in 3 countries and paved the way for the construction of his latest vessel, Idabel. Karl has been taking tourists, film-makers and scientists on dives up to half a mile deep off the island of Roatan, Honduras since 1998. This is the longest operating and deepest diving operation of its kind. Karl is continually frustrated with the logistics of cost-effective deep ocean exploration and strongly believes a diesel electric sub capable of extended missions is the ultimate solution.

MUV exploration to 1/2 mile depths for pennies on the dollar, 4,000 hours later

By: Karl Stanley

Stanley Submarines, Roatan, Honduras

Email: karl@stanleysubmarines.com

This presentation will trace the development and use of two manned submersibles on budgets that are a fraction of other vehicles with similar capabilities. The first one of these was began in 1989 and named C-BUG (Controlled by Buoyancy Underwater Glider). It was one of the first winged subs ever made and enjoyed a successful career spanning over 550 dives in three countries. The next vehicle was named Idabel, and despite an initial budget of under 100k it has made over 900 dives to depths of up to half a mile. In addition to keeping manufacturing costs low, operating costs have been kept low as well by a location choice that offers immediate access to deep water without the need for a support craft of any sort. A third aspect to the low operating costs has been the engineering of Idabel for minimum displacement. This craft carries two passengers and a pilot and weighs in at just over 9,000 pounds, making it not only less expensive to build and operate, but giving it a distinct advantage for photography. This formula has resulted in dive rates that start at just \$400 per person for a 1000 foot dive, and a day rate of \$2,000 for up to 6 hour-long dives.

TUE 2.30 – 3.00

Stockton Rush, Ocean Gate



Stockton Rush is co-founder and Chief Technology Officer of OceanGate. Stockton also currently serves on the Boards of Directors for several Seattle-based technology ventures, including OceanGate strategic partner BlueView Technologies, a manufacturer of small, high frequency sonar systems. Previously, Stockton was a founding partner of Peregrine Partners, a San Francisco based venture capital firm. He began his career as a Flight Test Engineer on the F-15 program with the McDonnell Douglas Corporation and then flew over 400 hours as a DC-8 co-pilot for Overseas National Airways out of Jeddah, Saudi Arabia. Stockton holds a commercial pilot's license with multi-engine, helicopter, instrument, seaplane and DC-8 ratings. He also constructed and flies a Glasair III experimental aircraft and completed a heavily modified Kittredge K-350 two-man submersible in 2006. Stockton earned a BSE in Aerospace Engineering from Princeton University and an MBA from the University of California at Berkeley Haas School of Business.

Developing a Launch, Retrieval, and Transport System for Ocean Exploration

By: Stockton Rush

Ocean Gate

Email: stockton@opentheoceans.com

Since OceanGate acquired the Antipodes manned submersible (former PC-1501) two years ago, we have been deploying her on different missions in support of ocean exploration, marine research, filmmaking, and education and community outreach. To expand our range of operations while simultaneously controlling costs, we have been developing a towable Launch, Retrieval, and Transport (LRT) system that will allow us to access more near-shore dive sites without the need for expensive support vessels. We tested our first prototype in Southern California last fall, and we are currently developing the next version out of our headquarters in Seattle. We plan to field-test this next system in Florida during early 2012, so this presentation will provide an update on our efforts and our future plans.

3.00 – 3.30

COFFEE BREAK

TUE 3.30 – 4.00

Phil Nuytten, Nuytco Research Ltd.



Dr. Phil Nuytten has spent his life in subsea exploration. He has logged many thousands of hours underwater world-wide as a working commercial diver, and as a developer of underwater equipment and techniques. He is widely regarded as one of the pioneers of the modern commercial diving industry and a significant force in the creation of new technology. His goal has been to provide scientific, technical, military, and sport divers full access to continental shelf depths without the hazards of decompression, so that humans can explore, learn about, and - ultimately - protect the world's oceans.

NUYTCO Overview of Submersible Operations in 2010

Phil Nuytten

Nuytco Research Ltd., Canada

Email: nrl@nuytco.com

Jeff Heaton

Nuytco Research Ltd., Canada

Email: jeff@nuytco.com

The presentation provides an overview of the submersible activity at Nuytco for 2011. The review will include: 1) Completion of year 5 of Canadian Space Agency and NASA mission analogs as part of the Pavilion Lake Research Program. 2) Newtsuit and Dual DeepWorker dives to support filming and research operations on the wreck of the RMS Lusitania. 3) Deployment of the 'Dual DeepWorker' submersible to perform fisheries research on natural and manmade habitats off the coast of California. 4) Deployment of 2 Deep Worker submersibles to support the NASA Extreme Environment Mission Operations #15 (NEEMO 15). Deep Workers were used as vehicle Analogs for NASA's proposed Multi Mission Space Exploration Vehicle (MMSEV). 5) Completion of the Shaft 19 remediation project for the NYDEP in Valhalla NY. Nuytco Research deployed two Newtsuits to support construction efforts to complete the uptake and downtake shaft repairs on the worlds' largest UV Water Purification facility.

TUE 4.00 – 4.30

Peter Eriksen, Norbit Subsea AS



Peter K. Eriksen is Business Development Director of Norbit Subsea AS which provides integrated acoustic solutions for many underwater application areas. Mr. Eriksen is also founder and co-owner of GOMX2 in Santa Barbara; a consultancy company providing design, project management and business development to some of the main companies within the underwater acoustic instrumentation market. Mr. Eriksen started his acoustic career in active vibration control in 1991. Mr. Eriksen worked for RESON from 1992 and became member of the global management team in 1995 as the Chief Technology Officer. As group CTO he led the development of the new state of the art multibeam sonar design. Recently Mr. Eriksen has undertaken the lead for Norbit Subsea business development activities. Mr. Eriksen graduated from Aalborg University, Denmark in 1989 with a B.Sc in Mechanical Engineering and a M.Sc in Acoustics. He also holds an MBA from Kellogg Northwestern, Chicago. Mr Eriksen has published numerous papers on utilization of multibeam technology as well as general underwater acoustic system.

Forward Looking Sonar Technology for Underwater Vehicles

By: Peter K. Eriksen
Norbit Subsea AS, Norway
Email: pke@norbit.norg

The presentation will review the basics of forward looking sonar technologies, its evolution over the years and the present state-of-the-art in multibeam capabilities. This includes discussion and examples of object detection in the water column as well as on the seabed, such as underwater structures, pipelines, marine mammals and hydrocarbon (oil & gas) detection. The adaptation and optimization of these technologies to underwater vehicles is an important aspect of the technology and its future developments. The presentation will address Interface and Power considerations, flexibility of installation and real-time signal processing tradeoffs. These devices provide essential long range viewing capability to help high speed unmanned vehicles as well as manned vehicles under low visibility conditions.

TUE 4.30 – 5.00

Phil Ziegler, Zeke Underwater Consulting



During his career, Philip Ziegler designed a range of equipment from machinery for raising a dam's Tainter gates; to small, high-pressure, pump heads to motion compensation equipment capable of supporting 1¼ million pounds. He also spent eight years as a technical review engineer for the American Bureau of Shipping, spending the majority of his time reviewing plans produced worldwide for underwater vehicles. The common thread running throughout Phil's career is an ability to conceive and produce innovative solutions to the problems he faced, often solving problems other failed to solve. Some of his innovations are now standard industry practice. Philip is past vice-chair of the ABS Special Committee on Underwater Systems and Vehicles and past chair of the International Association of Classification Societies Correspondence Group on Passenger Submersibles and Diving Systems. He represented the latter at the 41st and 43rd sessions of the International Maritime Organization Sub-Committee on Ship Design and Equipment meetings in London, actively participating in the production of the IMO Guidelines for the Design, Construction and Operation of Passenger Submersible Craft (MSC/Circ. 981). Currently, Philip is an active member of the ASME Pressure Vessels for Human Occupancy Committee and the ABS Special Committee on Underwater Systems and Vehicles.

Improved Oxygen Calculations and Their Benefits to MUVs

By: Phil Ziegler

Zeke Underwater Consulting, USA

Email: zieglerp@zekeunderwater.com

This presentation discusses an improved method of performing oxygen supply calculations and describes how its significantly greater accuracy can improve safety and reduce operating costs.

Day 2

Wednesday 25 January

WED 8.30 – 9.00

Jon Wallace, P-Subs Organization



Jon Wallace co-founded PSUBS in 1996 and leads the organization today. He is employed as a software engineer for Hewlett-Packard and was an elected official in local government for 13 years before retiring from politics in 2003. Jon is responsible for setting goals and direction, public relations, and liaison to private, business, and government entities. He provides software and technical support for the website and mailing list, and helps coordinate PSUBS conventions. He is an open-water PADI certified diver and his interest in submersibles is for exploration of the undersea world at depths and durations not possible with SCUBA.

PSUBS Overview and Update

By: Jon Wallace

P-Subs Organization, USA

Email: Jonw@psubs.org

This presentation will provide an update of PSUBS (Personal Submersibles Organization) activities for the past year including various submarine projects under development, organization roadmap and interaction with other industry organizations, and a review of the re-building of the K-600 Kittredge submersible.

WED 9.00 – 9.30

Roy Thomas, American Bureau of Shipping (ABS)



Roy Thomas is a Principal Engineer with the American Bureau of Shipping (ABS), Houston, TX. He has worked with ABS for the past 9 years and is responsible for the design approval of lifting appliances and underwater vehicles/systems. Prior to joining ABS, Mr. Thomas worked as a seagoing marine engineer. Mr. Thomas is the author of various technical papers and a number of new sections of the ABS Underwater Rules including “Diving Systems” and “Lock-out Submersibles”. He is an active participant on various industry committees including the ASME Committee on Pressure Vessels for Human Occupancy. Over the last few years, he has been conducting the annual ABS - Industry meeting at the Underwater Intervention Conference. He also serves as an instructor for the courses “Classification of Submersibles” and “Classification of Diving Systems” conducted by the ABS Academy. Mr. Thomas holds a master’s degree in Naval Architecture from Memorial University of Newfoundland (MUN), Canada and a bachelor’s degree in Marine Engineering from Marine Engineering and Research Institute (MERI), India..

Overview of ABS Rule Change Proposals for 2012 Submersible

By: Roy Thomas

American Bureau Shipping, Houston, USA

Email: rthomas@eagle.org

Open meeting of the American Bureau of Shipping (ABS) with the subsea industry to review proposed rule changes to the ABS Rules for Building and Classing Underwater Vehicles, Systems and Hyperbaric Facilities. The meeting facilitates an open dialogue with the industry on current issues that work well or do not work. All active designers, fabricators, owners and operators are invited to attend and provide feedback.

WED 9.30 – 10.00 Roy Thomas, American Bureau of Shipping (ABS)

ANNUAL ABS – INDUSTRY OPEN DISCUSSION MEETING

By: Roy Thomas

American Bureau Shipping, Houston, USA

Email: rthomas@eagle.org

This session is an OPEN DISCUSSION meeting with all members of the subsea industry to discuss the latest rules and regulations and provide feedback on new or old issues related to Manned Submersibles, Diving Systems or Hyperbaric Systems.

10.00 – 10.30 COFFEE BREAK

WED 10.30 – 11.00 Marshall Nuckols, Duke University



Dr. Nuckols joined the faculty at Duke University as Senior Research Scientist in October of 2004. Prior to joining Duke, he served as a professor at the United States Naval Academy for 20 years while conducting research in underwater life support systems design. He earned a M.S.M.E., Mechanical Engineering, at Duke University in 1974. He completed his Ph.D at Duke in 1981

An Alternative Method to Remove Carbon Dioxide From Submersible Environments

Dr. Marshall Nuckols

Duke University, USA

Email: marshall.nuckols@duke.edu

Serpil Awdry, University of Bath, UK, Email: s.awdry@bath.ac.uk

Stam Kolaczowski, University of Bath, UK, Email: cesstk@bath.ac.uk

Chien Le, University of Bath, UK, Email: DCL22@bath.ac.uk

Tony Smith, S&C ThermoFluids, UK, Email: tony.smith@thermofluids.co.uk

Dave Thomas, S&C ThermoFluids, UK, david.thomas@thermofluids.co.uk

A major obstacle in the development of manned submersibles involves the removal of metabolically-produced carbon dioxide

from the cabin environment, particularly during long-duration, cold water operations. Traditional CO2 absorption methods utilized in underwater life support systems use alkali metal hydroxide chemical beds "mostly calcium hydroxide" which have been shown to have poor absorption efficiencies in cold environments. Experimental evidence suggests that seawater, a readily accessible medium during submersible operations, could be a highly effective alternative scrubbing medium to remove metabolically-produced carbon dioxide. Laboratory CO2 absorption trials are currently being conducted in a joint research effort between Duke University and the University of Bath in the United Kingdom, under sponsorship by the Office of Naval Research. An overview of these absorption trials will be presented and the physical principles governing this absorption technique will be explained. Alternative concept designs will be introduced and the suitability of these concepts for open and closed-circuit breathing systems will be discussed.

WED 11.00 – 11.30 Brett Phaneuf, Submergence Group



Brett Phaneuf is the president of Submergence Group, LLC, which along with its subsidiary organizations designs and rapidly prototypes experimental submersibles for research and development programs with the military. Mr. Phaneuf has extensive experience in the operation of manned and unmanned submersibles and remotely operated vehicles, which he also applies to ocean exploration through the non-profit company, ProMare, which he helped found in 2001.

Development of a Commercial, Ocean-Going, Diesel Electric Submarine For Extended Operations At Sea

By: Brett Phaneuf
Submergence Group LLC, USA
Email: Brett@promare.org

Since 1986 MSUBS has been producing small, diesel-electric submersibles; coupled with recent rapid prototyping projects, in concert with Submergence Group, that produced manned and unmanned vehicles ranging from 25-65 tons, MSUBS and Submergence Group have embarked on a project to produce the world's first privately owned and operated ocean-going diesel-electric submarine for research purposes. The submarine, as yet unnamed, will be approximately 30 meters in length with a beam of nearly 4 meters and be capable of diving to 300msw and transiting vast ocean distances while snorkeling. The presentation will provide an overview of the submarine design and production plans

WED 11.30 – 12.00 Colin Wollerman, Hawai'i Undersea Research Lab



Colin is the chief electronics technician at the Hawaii Undersea Research Center, which operates the PISCES IV and PISCES V. Colin started with HURL in early 2000 and has over 400 hours in the PISCES subs. Both deep diving research submersibles are rated to 2000m and classed by the American Bureau of Shipping. The Hawai'i Undersea Research Laboratory (HURL) was established by the National Oceanic and Atmospheric Administration (NOAA) and the University of Hawai'i. Its mission is to study deep water marine processes in the Pacific Ocean. HURL builds its research program through an annual request for proposals. Projects are selected through peer review and by a scientific advisory panel. In addition, HURL accepts funded requests from private, state, or federal agencies and participates in international collaborative research projects in the Pacific.

Hawai'i Undersea Research Lab (HURL) 2011 Update

By: Colin Wollerman

Hawai'i Undersea Research Center, USA

Email: wollerma@hawaii.edu

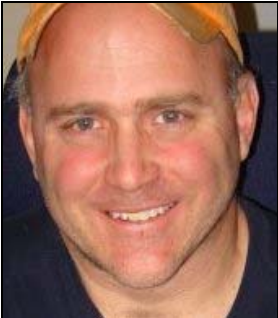
Operating two manned submersibles with a crew of five specialists at close to 100% success rate for over ten years is unique in the industry. The presentation will provide an update on the operation of the PISCES IV and V along with a review of the technical updates made to the equipment and expansion of personnel at HURL. This includes the two submersibles, ROV, multibeam sonar and the support ship R/V Ka`imiaki-o-Kanaloa. The 2011 pre-season "test & trial" produced a number of Marine Heritage site dives. These historical wrecks were discovered while the HURL team multi-tasked its way through its operational, training, and safety protocols conducted prior to each dive season. In September HURL took part in a National Geographic production Alien Deep using the Pisces IV and V outfitted with 3D HD camera gear and LED lights from Woods Hole Advanced Imaging and Visualization Lab (AIVL). HURL also enjoyed a successful series of dives in the North West Hawaiian Island National Monument. The Pisces IV is coming apart for a special survey and the Pisces V is in stand-by for emergency deployment.

12.00 – 1.30

LUNCH BREAK

WED 1.30 – 2.00

Matt Koenig, Corvus Energy Americas



Matt Koenig, VP Americas for Corvus Energy, has more than 25 years management experience in finance, distribution, manufacturing, and technical sales and marketing. He most recently served as Vice President of Isoflex Technologies Pty., Ltd. America. Earlier, he held several positions in the marine and composites industries, including Director of Business Development for Polynova Composites, Marine Division manager at Globe Composite Solutions, COO The Violette Companies, and management roles at State Street Bank and Trust, Fidelity Investments and Bank of Boston. He holds a BA in Economics from John Carroll University. Matt is based in Boston.

Lithium Battery Certification Considerations at ABS, LR and DNV

By: Matt Koenig

Corvus Energy Americas, USA

Email: Mkoenig@corvus-energy.com

Manned submersibles, as well as Remotely Operated Vehicles (ROVs), are two of the most significant platforms for Marine Technology research and operations. Long lived and powerful on board energy storage is a major roadblock to fully exploiting their operational effectiveness. Lithium based storage has the potential to provide this much needed capacity and scalability. Lack of Type certification for a technology can terminate the process of its implementation in the MarTech sector, and for many operators, is equally as terminal to obtaining government approvals and funding. Corvus Energy has obtained class certification for its lithium battery technology from Lloyds Registry and is completing its classification with ABS and DNV. The path which it traveled to obtain these informs Corvus' process for submerged type approval, as well as the process for others seeking to pursue these certifications in this sector. The presentation will review the certification process and discuss the future trends and possibilities for use of these batteries in underwater vehicles.

WED 2.00 – 2.30

Richard Wilson, Bluefin Robotics



Dr. Richard Wilson is the Director of Power and Electrical Systems at Bluefin. He has over ten years experience in the design of AUVs and has made significant contributions to Bluefin's pressure-tolerant battery and power systems. Dr. Wilson was the project manager and designer of a number of battery products including an 8.8 kWh pressure tolerant battery designed for use in large battery systems, and also the smart-battery electronics board and power control systems that are used across the battery range. In addition, he has served as project manager for the GAMBIT AUV (ONR-sponsored joint US/UK sonar test bed vehicle) and has led the design of all of the electrical systems that are used on the Bluefin vehicles. Prior to joining Bluefin, Dr. Wilson was employed by the Proudman Oceanographic Laboratory in the UK developing marine instrumentation. Dr. Wilson holds a Postdoctoral degree in Electro-Mechanical Design/instrumentation, a Masters degree in Electro-Mechanical Design/Technology and a Bachelor of Engineering in Electrical and Electronics Engineering from Plymouth University in the UK.

Modular Pressure-Tolerant Batteries for Subsea Applications

By : Dr. Richard Wilson

Bluefin Robotics, USA

Email : rwilson@bluefinrobotics.com

Subsea power has long been identified as a challenging component of designing and operating underwater equipment. There is a continuous demand for reliable energy sources that allow equipment to run for longer, operate at deeper depths, and offer enhanced performance. This presentation will outline the challenges of subsea power and describe the benefits of modular pressure-tolerant batteries. It will also highlight how this type of battery can effectively be used to supply power for a multitude of subsea applications such as AUVs, ROVs, benthic instrumentation and actuation of subsea equipment. The talk will describe the characteristics of the underlying technology, the design methodology and historical development and the characteristics of pressure-tolerant batteries ranging from small replaceable units (1.5kWh / 30V) to larger units (29.6kWh / 240V). Field data of the battery performance in AUVs and possibly other platforms will also be presented. Additionally, a new method of achieving safer performance of lithium-based battery packs will be presented. The method essentially prevents the propagation of fire among cells within a pack effectively yielding a safer energy supply. Recent research was conducted that included testing of fundamentally safer cells that shut down following an unsafe event. Results from this research will be shared.

WED 2.30 – 3.00

David White, Southwest Electronic Energy Group



David White graduated from Texas A & M University in 1970 with a BS in Electrical Engineering. David's practical design experience is in large, high capacity, high reliability computer and system designs used in battery operated, man portable applications that must work in any environment above, on, or under the earth. David is named with other colleagues at SWE on over 9 patents or patent applications covering inventions for Continuous Cell Balancing Methods, Module Balancing Methods, and BMS algorithms for extending Li-Ion battery life, reliability, and safety. David is a member of the MTS, an emeritus member of the Society of Exploration Geophysics and a Life Senior member of the IEEE, and has been recognized during his employment at Texas Instruments, as a Texas Instrument's Senior member of Technical staff.

Operation, Maintenance, & Safety of a Modular Li-Ion Battery System for Manned Underwater Vehicles

By: David White

Southwest Electronic Energy Group

Email: dwhite@swe.com

Large, modularly constructed Li-Ion and Li-Polymer battery systems are now being constructed for manned under water vehicles. A significant advantage of modular construction of large battery systems is the maintainability of the battery system and the economic edge gained by repairing a large battery system using a single, relatively inexpensive, replacement battery module. Battery system modularity also provides an easy path to improved reliability and safety via redundancy. This presentation provides an overview of a modularly constructed 240 Volt 58 KWh Li-Polymer battery system for a manned deep submergence vehicle. Architecture, operation, maintenance, and safety features of the battery system are provided. An innovative method for rapid module replacement with immediate system availability is described. Two new means for detection of battery module State Of Health is described and an automatic means for detection of cell internal shorts is described. A means to extend battery life and safety using module charge control is described. Packaging of the pressure equalized battery modules and battery system is described.

Day 3

Thursday 26 January

THU 8.30 – 9.00

Bart Kemper, Kemper Engineering Services



Bart Kemper, P.E. is the principal engineer for Kemper Engineering Services, LLC. Based in Baton Rouge, LA, Kemper has 20 years experience in engineering ranging from pressure vessels to mechanisms to computer simulations to shock, blast and ballistics. His work has ranged from saturation diving systems to down hole tools to aerospace and marine applications. Past recognitions include being one of the Top 10 Federal Engineers in 2007. He is a member of the ASME Pressure Vessels for Human Occupancy (PVHO) codes and standards committee, has written numerous professional articles, and has several patents and patents pending.

New Developments in Pressure Vessel Applications of Acrylics

By: Bart Kemper

Kemper Engineering Services, USA

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Acrylics are a proven, reliable material for submersible viewports. The current codes and standards reflect a first-generation development of defining a nonmetallic for pressure vessel application. Kemper Engineering Services, Blanson Ltd., Atlantis Submarines, and Hydrospace Group are building on decades of in-service data to potentially expand the application of acrylics.

THU 9.00 – 9.30

Tobin McNatt, DRS Advanced Marine Technology Center



Tobin McNatt is the Director of the Advanced Marine Technology Center (AMTC) within DRS Defense Solutions, LLC. The AMTC is a group of naval architects and software developers that provides marine vehicle design software products and technical services to a wide spectrum of industry customers. Tobin served as Program Manager for technology development programs for organizations including NAVSEA, NSWC Carderock Division, Office of Naval Research, US Special Operations Command, DARPA, and several ship classification societies. He led the ocean engineering design and fielding of the full scale open ocean underwater explosions shock testing programs for the USS Jacksonville (SSN 699) and for the submarine shock test vehicle (SSTV). He served on the pre-commissioning unit of fast attack submarine USS Birmingham (SSN 695), performing operations including reactor plant initial criticality and power range testing. He also served on the USS Francis Scott Key (SSBN 657) conducting strategic deterrent patrols. Tobin is a graduate of the U.S. Naval Academy with a degree in Physics.

New Developments in Pressure Vessel Applications of Acrylics

By: Tobin R. McNatt

DRS Defense Solutions

Advanced Marine Technology Center, USA

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Traditionally, naval architecture has been more craft than science. Determining what is ‘right’ in a particular situation in the absence of definitive supporting analysis encompasses the art of naval architecture to this day. With the advent of computers, naval architects began to move their work from ‘the drawing board’ into the computer and its display. This presentation describes the evolution of computer-based naval architecture tools from the early stages circa 1980 through the present, from the point of view of a team that pioneered tools which gained a diverse user community over that time frame. This team’s story reflects progress and successes as well as continuing opportunities for advancement. Technical domains such as hull form design, hydrostatics and stability, structures, and weights and moments will be included, with applications to underwater vehicles discussed. Technology developments related to software architecture and development processes will be highlighted, as well as a view toward future opportunities to further integrate and extend the scope of marine vehicle design tools.

THU 9.30 – 10.00

William Kohnen, HYDROSPACE Group



William Kohnen is President of Hydrospace Group, specialized in integrated solutions for underwater intervention, focusing business development efforts on manned vehicle systems. Mr. Kohnen is also co-founder of SEAmagine Hydrospace Corp; a manufacturer of ABS classed manned submersibles. His engineering career started in aerospace designing high efficiency, high reliability custom electric motors for NASA satellite systems from 1988 with motors flying on Space Station, Hubble, Cassini and many others. This expertise led to the development of high efficiency and high reliability propulsion systems for submersible vehicles. Mr. Kohnen headed the propulsion system design for nine manned submersibles under ABS Class rules. Hydrospace Group provides custom design and fabrication expertise in electric propulsion systems for manned and unmanned applications based on DC as well as high power AC motors. Mr. Kohnen graduated with a B. Engr and M.Sc. Electrical Engineering from McGill University, Montreal Canada.

Efficiency of Power to Thrust Conversion for Electric Underwater Thrusters

by: William Kohnen

HYDROSPACE Group, USA

Email: wkohnen@HydroSpaceGroup.com

Propulsion systems are a central element to all underwater vehicles. A wide range of design parameters must be considered to provide the best propulsion for each specific vehicle. In order to properly evaluate different thruster systems, it is important to understand the tradeoffs between size and weight, propeller diameter, power source, power transmission and kinetic energy conversion to thrust produced by each horsepower of input. The necessary data is typically available on most specification sheets from manufacturers to obtain thrust and corresponding input power parameters. In some cases, input power is only provided indirectly by giving Hydraulic Pressure and Flow Rate or for electrical motors by specifying voltage and current. All of these parameters can provide input power values at corresponding thrust levels. This paper presents the ideal theoretical kinetic jet energy conversion to thrust as a baseline from which to compare the merits and efficiencies of different thrusters. The presentation covers basic evaluation parameters useful to the design engineer to properly evaluate the various performance tradeoffs and compare various commercial thrusters to illustrate specific design features.

10.00 – 10.30

COFFEE BREAK

10.30 – 12.00

MUV TECHNOLOGY PANEL DISCUSSION

MODERN BUOYANCY FOAM TECHNOLOGY for MUVS

PANELIST 1

Robert Kelly, Trelleborg Offshore



Mr. Kelly is vice-president of Trelleborg Offshore, in charge of global customer solutions. With a global reputation for material development, Trelleborg Offshore is recognized as a leading manufacturer of advanced glass microspheres and high performance syntactic foams which are used in such markets as aerospace, defense, tooling products and buoyancy materials for underwater vehicles. Located in Mansfield, MA, Trelleborg Offshore Boston was established in 1948 as Emerson & Cuming, Inc., the company was the first to offer a complete line of commercially available aerospace grade glass microspheres through and has continued to focus on material innovation ever since.

Selection, Development and Qualification of Syntactic Foam for Manned Submersibles

by: Robert Kelly

Trelleborg Offshore, USA

Email: bob.kelly@trelleborg.com

Trelleborg will present the philosophy of selection, development and qualification of raw materials for the next generation man-rated syntactic foam buoyancy. Since lives are at stake in manned submersibles, every component of a syntactic foam must undergo increased scrutiny; from the QC of microballoons to the strength that the resin provides.

PANELIST 2

Thomas Murray, Engineered Syntactic Systems



Mr. Murray is a Materials Engineers with over 30 years of experience in the Research and Development of composite materials with more than 20 years of experience in syntactic foams. He is one of the three founding directors of CMT Materials, Inc (1998), and Engineered Syntactic Systems (2005). Mr. Murray holds both a Bachelor of Science degree in Chemical Engineering and a Master of Science in Plastics Engineering from the University of Massachusetts at Lowell. Prior to starting the companies, he was employed with the Raytheon Corporation as the manager of the Composites Group in the Materials Engineering Laboratory. He has also held materials engineering positions with WRGrace/Emerson & Cuming and the Army's Materials Technology Laboratory.

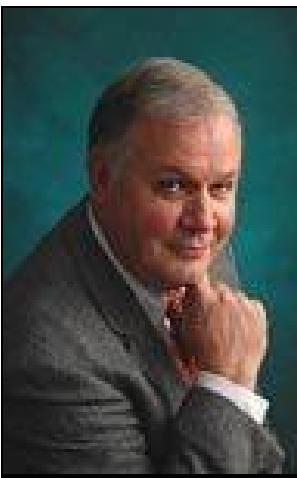
An Introductory Overview of Syntactic Foam Materials and Processes for Manned Submersibles

by: Thomas Murray
Engineered Syntactic Systems, USA
Email : tech@esyntactic.com

At present, the U.S. Navy's deep diving submersible Alvin is undergoing the first stage of an upgrade to an operational depth of 6500 meters at Woods Hole Oceanographic Institution, (WHOI) The work will include installation of a new titanium personnel sphere that is both larger and heavier than the existing structure. As a consequence, the majority of the fixed buoyancy material will need to be replaced and the decision has been made to use 6500 meter rated material, even though the first stage of the upgrade will not increase the operational depth beyond the present 4500 meters. Since R/V Atlantis will continue as Alvin's support ship with only minor modifications to the launch and recovery system, the upgraded submersible's size and weight cannot be increased substantially. As a consequence, the density of the fixed buoyancy material needs to be the same or less than that presently in use. This challenge is common to syntactic foam manufacturers; fulfilling specific density and performance requirements while concurrently advancing the technology of the syntactic systems. In this presentation, a brief overview of the materials and processes used to manufacture the various types of syntactics for manned submersibles will be presented. A summary of the properties and testing of the 6500 meter foamed developed and produced for the Alvin upgrade will be included, along with the newly instituted specification for the foam.

PANELIST 3

Jim Teague, J Teague Enterprises



J Teague Enterprises, LLC is located in Norfolk, Massachusetts. The founder of the agency has a BS in Management from Stonehill College and over 40 years experience in Corporate Sales and Sales Management and General Managers positions. Since 1978 Jim has been actively involved in all of the man rated deep water vehicles. From Turtle to Seacliff to Alvin to Nautile and finally Dragon, Jim has either supplied the materials or wrote the specifications, in conjunction with the U.S. Navy. J Teague Enterprises, LLC has an agreement with the United States Navy, via a major sub-contractor, to supply guidance and consultation regarding improvement in margin and stability on deep ocean programs. The expertise provided assures the Navy they will receive the greatest return on their investment whether it be in the littoral or deep ocean environments. Because J Teague Enterprises, LLC is not restricted to working with a single syntactic foam manufacturer, there are no agreements with any one provider, the Navy, as well as others J Teague Enterprises, LLC work with are guaranteed open and fair assessment of the materials available and the capabilities of those offering to supply them.

Littoral to the Trench

by: Jim Teague

J Teague Enterprises, USA

Email: Teague@jteagueenterprises.com

A walk through of the deep water technology in syntactic foam and other buoyancy materials as they are used both the littoral and deep ocean. The syntactic used on various manned submersibles including: Alvin, Turtle, Seaciff, Nautil, MIR, Shinkai 6500 and the new Chinese 7,000 meter submersible, DRAGON.

TECHNICAL PANEL DISCUSSION

Modern Buoyancy Foam Technology for Manned Submersibles

Chaired by: Will Kohnen, MUVC

Panelist No. 1: Robert Kelly, Trelleborg Offshore

Panelist No. 2: Thomas Murray, Engineered Syntactic Solutions

Panelist No. 3: Jim Teague, J Teague Enterprises

Panelist No. 4: Roy Thomas, American Bureau Shipping

Sponsored by the MTS Manned Underwater Vehicles committee, the Technology Panel in 2012 will discuss the challenges involved in development, fabrication, safety and regulatory issues related to new buoyancy foams used on ever deeper diving manned submersibles. All audience participants are encouraged to ask questions and share field experience on all aspects of the implementation on manned submersibles.

12.00 – 1.30

LUNCH BREAK

1.30 – 2.30

MTS MUV ANNUAL COMMITTEE MEETING

Chair: William Kohnen

Email: wkohnen@HydrospaceGroup.com

Secretary: Daniel Lance

Email: lanceind@gmail.com

Annual meeting of the MTS MUV committee. Annual review of 2011 and objectives for 2012. All subsea community members are invited to attend and help grow the organization of the Manned Underwater Vehicles world for its board structure, conference planning, web site content, regulatory discussions and industry support resources.

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NOTES

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