

*R. T. (Phil) Nuytten, OBC, L.L.D., D.Sc*

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.

In the 1960's and 70's, Nuytten was heavily involved in experimental deep-diving and the development of mixed gas decompression tables. In 1968 he was a member of the team that completed the first 600 foot ocean 'bounce' dives on 'Project Nesco', and in 1972 he wrote the protocol for 'Deep Work 1000', the first North American thousand foot saturation dive. These early projects helped set the international standards in use today.

In 1965 Nuytten founded Can-Dive Services Ltd, and in 1969, he co-founded Oceaneering International Inc. Both companies pioneered many early subsea development projects, and Oceaneering has gone on to become one of the largest publicly traded underwater skills companies in the world.

In the 1970's, working with long-time colleague Dr. Joe MacInnis, Nuytten headed the equipment research component of a series of high-arctic expeditions. Among the goals of these expeditions was the testing of Nuytten's designs of life-support gear for use in polar and sub-polar conditions. In 1984, Phil Nuytten appeared on the cover of National Geographic Magazine for his record dives through ice-covered arctic waters onto the 'Breadalbane', the northern-most known shipwreck. His involvement in underwater activities in virtually all of the world's oceans has resulted in articles on his work in Reader's Digest, Business Week, Newsweek, Time, Popular Science, Discovery, Fortune, and Scientific American, as well as dozens of dozens of diving and aerospace technical journals. Nuytten is a popular speaker at underwater conferences around the world and has published numerous technical papers on his leading-edge work in subsea technology.

Phil Nuytten has been instrumental in the development and current acceptance of Atmospheric Diving System technology. In 1977, he began work on a revolutionary new one-atmosphere diving suit that resulted in a patented break-through in rotary joint design, and formed the basis for the world-famous NEWTSUIT. The NEWTSUIT is a thousand foot-rated hard suit that completely protects the wearer from outside pressure and eliminates the need for decompression while still maintaining mobility and dexterity – a "submarine that you wear". It is now standard equipment in many of the world's navies.

Among his diverse interests, Phil Nuytten is a noted expert on West Coast Indian Art. In 1982 he published a book called The Totem Carvers. An accomplished carver himself, Nuytten is of Métis descent, has been adopted into the West Coast *Kwakiutl* tribe and is active in the potlatch system. Nuytten also frequently acts as a consultant for appraisals of West Coast Native art and antiquities.

In 1987, Phil Nuytten was the recipient of the "Canadian Award for Business Excellence" given by the Canadian government for his NEWTSUIT development.

In 1988, the Association of Diving Contractors presented Nuytten with the industry's highest award: the John Galletti Memorial Award and induction into the 'Commercial Diving Hall of Fame'. He was the first Canadian to receive this award, which is presented to those who have made significant accomplishments and contributions to the diving industry. Also in 1988 Nuytten received the Canadian Advanced Technology Award from the Canadian government.

In 1990, Nuytten was given the "Life Sciences" Award for "leadership and service to the institute" by the American Institute of Aeronautics and Astronautics.

In 1992, Phil Nuytten received the Order of British Columbia, his home province's highest honour,,

in recognition of his contribution to the economic well being of the Province and the recognition and support of the native culture, and for making the province known beyond its borders as a leader in underwater high-technology.

In 1995, Nuytten conceived and patented the 'Remora', a submarine rescue system. Remora is a rescue vehicle with a manned personnel compartment and a patented articulated mating skirt that permits mating with a disabled submarine at angles of misalignment up to 60°. During a NATO presentation by the U.S. Navy 'Remora' was described as a major breakthrough in submarine safety. 'Remora' vehicles subsequently have been purchased by both the Australian and American navies.

In June 1995, Phil Nuytten was one of five Canadians to be granted an honorary doctor of laws degree from Simon Fraser University in recognition of his technological achievements.

In 1996, Nuytten and his design team were awarded a contract to develop a 2,000 foot version of the ADS NEWTSUIT for the United States Navy.

In 1997, Nuytten and his design team produced the two thousand foot-rated micro-submersible 'DeepWorker' - a revolutionary deep-diving system that has been called "an underwater sports car" - and received a five year contract from the National Geographic Society to provide DeepWorkers and crews on the 'Sustainable Seas Expeditions', an initiative to study deep ocean environmental impact. The use of the DeepWorker micro-sub to explore and monitor National marine sanctuaries has significantly increased scientists' understanding of underwater ecology, habitats, and biodiversity. Also in 1997, Nuytten was inducted into the 'Diving Hall of Fame' by the Academy of Underwater Arts & Sciences.

In 1999, NASA contracted a pair of DeepWorkers to study their possible use in the recovery of the Space Shuttle booster rockets, and in 2000 DeepWorkers successfully recovered the Space Shuttle booster rockets from the May flight to the U.S. Space Station. NASA is currently studying acquisition of a pair of titanium DeepWorkers specifically dedicated to booster rocket recovery. Nuytten's work with NASA spans more than twenty-five years, and he has published several papers on space applications of undersea technology. He is also a senior member of the American Association of Aeronautics and Astronautics, and a life member of the American Association of Underwater Scientists.

Also in the year 2000, Nuytten introduced a new concept for an ultra light weight, swimming, hard suit called the 'Exosuit'. Nuytten and his team then completed a contract for the Canadian Department of National Defence to examine the feasibility of using the Exosuit as a submarine escape device.

In November of 2000 Nuytten was honoured with the Explorer's Club's prestigious 'Lowell Thomas' Award, which is only awarded when the selection committee deems there are worthy recipients.

In 2001 Nuytten received the Jules Verne Award in Paris for his international accomplishments in the subsea field.

In 2003, Nuytten and his design team completed the first side-by-side Dual DeepWorker, designed for a pilot and one observer. This 2000' rated submersible has both commercial and scientific applications, and has been used for deep-diving underwater tourism.

In 2005, Nuytten and his team finalized development on the 'Prehensor' – an articulated "hand" for use on one atmosphere diving suits and space-related pressure suits. In addition, the 'Prehensor' is fully adaptable to remote-controlled manipulators. This three year project has resulted in a prosthetic-like device that mimics the human hand and will allow manipulative dexterity far in advance of the current pliers-style end effectors.

In 2006, Nuytten showed his concept of an underwater “Mars colony”, centred around, and powered by, a deep-sea heat vent. The prototype will be called ‘Vent Base Alpha’; it is a self-sufficient habitat whose major purpose is to support the extraction of fluid-dissolved minerals from the super-heated water of heat vents. The occupants will live and work at one atmosphere, where they are protected from exposure to the hazards of outside pressure. This one-atmosphere environment will make ‘Vent Base Alpha’ unique among underwater habitats to date.

Also in 2006, the US Navy set a world’s record by descending to a depth of 2000 feet in a one-atmosphere ‘Hardsuit’ based on Nuytten’s original ‘Newtsuit’ patent.

In 2007 Phil Nuytten was recognized and feted as a ‘Legend of the Sea’ at the 36<sup>th</sup> annual exposition ‘Beneath the Sea’ in New York.

Nuytten and his team spent 2008 preparing for the Beta-testing of various sub-systems of the Exosuit, fabricating parts and preparing for a 2009 prototype. Plans to utilize a space version of the Exosuit are under discussion. Nuytten and his team are currently training astronauts from NASA and the Canadian Space Agency as pilots of the DeepWorker Submersibles for the Pavilion Lake Research Project (PLRP), a multi-year research project. The PLRP presents an opportunity to advance the long-term objective of human exploration of the Moon and Mars by combining research on life in extreme environments with high fidelity training in an underwater, remote field setting. The information gained from this analogue project will help to improve the knowledge base, tools and techniques of future human missions to the Moon, Mars and beyond. DeepWorker training continues into the 2009 field season.

During 2008 Nuytten also signed a contract for the design and build of a one-atmosphere, four-passenger tourist submersible, slated to operate off of Curaçao, Netherlands Antilles. This submersible, nick-named ‘Curasub’, is being built at the Nuytco facility for 2009 delivery. Also in 2008 Nuytten received his second Honourary Doctorate, from Queen’s University, Kingston, Ontario.

In October of 2008, the US Navy announced the successful test of the ‘Pressurized Rescue Module System’ (PRMS) and described it as “the world’s most technically capable submarine rescue system”. The PRMS is the latest generation of the ‘Remora’ rescue system and is based on Nuytten’s 1997 patent.

For the past twenty years Nuytten has been involved heavily in the production of film and TV specials based around his unique technology. Made for TV specials include a one hour CBC special on his life and work called “Descent of Man”, NBC ‘Mysteries of the Sea’, Walt Disney’s “Pressure Point”, and dozens of Canadian, U.S., European and Asian specials.

Nuytten’s invention, the ADS NEWTSUIT was the feature of an IMAX movie called “Flight of the Aquanaut” which has been shown all over the world. Nuytten was also senior technical advisor and provided the submersibles and other futuristic subsea devices for James Cameron’s Academy Award winner “The Abyss”.

Phil Nuytten has spent nearly forty years to developing undersea systems that have the safety of the diving technician as their common theme. 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.