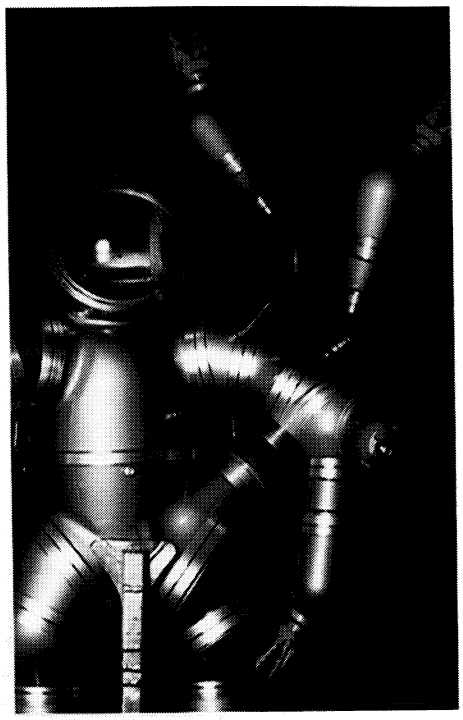
Space Technology for Deepwater Divers

Among a selection of spinoffs that contribute to enhanced public safety is an ocean diving system that promises new underwater efficiency

Many of the tasks involved in underwater inspection and maintenance of offshore oil rigs are complex and must be accomplished by human divers rather than automated systems. But some underwater assignments require divers to reach depths of 1,000 feet. At that depth the diver's mobility is severely limited; he waddles along the ocean floor in a "hard shell" suit that may weigh half a ton or more, his leg and arm motion sharply restricted by mechanical joints sealed against the crushing pressure of the deep. The work is at best arduous, at times dangerous.

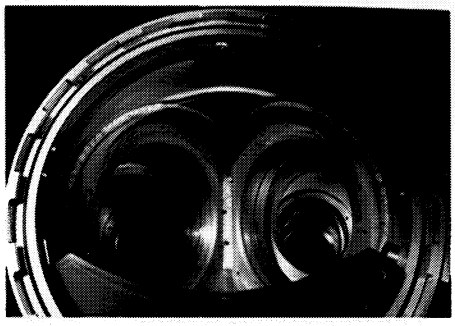
Phil Nuytten hopes to change all that with his "Newtsuit." Nuytten is president of Can-Dive Services Ltd., North Vancouver, British Columbia, which is developing the Newtsuit with help from NASA technology that originated in the mid-1960s, when Ames Research Center was conducting design studies of hard shell pressure suits capable of providing protection against meteorites for future lunar colonists. Can-Dive acquired a number of reports on Ames' developments and incorporated in the Newtsuit NASA technology relative to space suit design and human ergonomics, or man/machine relationships.

The Newtsuit offers several features that the Canadian company feels will be attractive to both divers and their employers. Although it is a hard shell—armored—suit, it is a relatively light 400 pounds, made of aluminum; future Newtsuits may be made of carbon fiber composite material that is lighter yet stronger than steel. It has a constant pressure of one atmosphere, meaning that the pressure all the way down to the suit's 1,000-feet limit will be the same as on the surface. The Newtsuit, like a space suit, has a self-contained backpack breathing system with a duration of 48 hours. And it employs a series of patented low friction fluidic joints designed to make underwater motion easier and permit 75 percent normal human mobility.



The Newtsuit, a deepwater diving system that incorporates NASA technology developed for "hard shell," meteorite-proof space pressure suits. A major feature is mobility provided by fluidic joints; the multiple exposure photo illustrates the exceptional range of movement the joints allow.

The combination of design features promises manifold advantages in safety, efficiency and economics. A dive to 700 feet under ambient pressure would require that the diver spend five days or more in a decompression chamber to avoid the decompression sickness known as "the bends." With a constant one atmosphere pressure, that need is eliminated. That's not only a safety factor, it has economic implications for the oil rig operator; divers are paid not just for underwater time but for total task time, including the time they spend in compression/decompression chambers.



At left, the Newtsuit is shown in open position preparatory to diver's entry. The technician is adjusting a rebreathing device that cleans air for reuse. The above photo is an interior view of the bottom half of the seat, showing the leg wells and the joints that permit knee bending.

The Newtsuit also offers extended "bottom time," limited only by diver fatigue, and compressed mission time; a maintenance task that might otherwise take a week, counting chamber and underwater time, can be accomplished in a day.

Can-Dive has been working on the Newtsuit for three years and it is still in research and development status but scheduled for advanced operational trials this year. This development could eventually prove to be a full-circle spinoff, one that transfers *from* aerospace technology and eventually generates technological advances transferrable *to* aerospace systems. NASA is studying space suit designs for extravehicular activity associated with the Space Station, for astronaut servicing of high orbit platforms and for 21st century establishment of colonies on the moon and elsewhere in the solar system. Phil Nuytten feels that much of the technology he is developing and some other ideas still in the conceptual stage might prove useful in the development of advanced space suits. ▲