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## Breaking The Ice: Datamate connector system chosen for prestigious Neutrino Telescope project

### Case Study

#### Hi-rel connector system chosen for prestigious Neutrino Telescope design

By Mark Herbert, Datamate Product Engineer, Harwin plc

#### Mapping the skies

Sunk deep into the Antarctic ice, the [AMANDA II](#) (Antarctic Muon and Neutrino Detector Array) Telescope is designed to look not up, but down, through the Earth to map the sky in the Northern Hemisphere for high energy cosmic Neutrino activity. When considering the interconnect system to be used on this highly prestigious project, designers from the Physical Science Laboratory of the University of Wisconsin needed a very reliable, small footprint product which was also capable of handling high transmission speeds.



500 meter deep wells were drilled into the ice with the help of high-pressure hot-water drills.

Designated IceCube, the next-generation Neutrino Telescope consists of 677 glass optical modules, each the size of a bowling ball, arrayed on 19 cables set deep in the ice with the help of high-pressure hot-water drills. The array transforms a cylinder of ice 500 meters in height and 120 meters in diameter into a particle detector. The glass modules work like light bulbs in reverse. They detect and capture faint and fleeting streaks of light created when, on occasion, neutrinos crash into ice atoms inside or near the detector. The subatomic wrecks create muons, another species of subatomic particle that, conveniently, leaves an ephemeral wake of blue light in the deep Antarctic ice. The streak of light matches the path of the neutrino and points back to its point of origin. The ability to routinely detect high-energy neutrinos will provide astronomers not only with a lens to study such bizarre phenomena as colliding black holes, but with a means to gain direct access to unedited information from events that occurred hundreds of millions or billions of light years away and eons ago.

#### High-Reliability Requirements

To complete the project, the University of Wisconsin needed a connector system to carry power and communication signals to the main printed circuit board inside each Digital Optical Module (DOM). The team had looked at a number [connectors](#) for this project, but none seemed to match its requirements for high reliability and high speed data transmission.

Although reliability was the number one concern there were also had significant space constraints. Additionally the connector was required to have crimp contacts and a positive latching mechanism.

#### Datamate connectors meet the challenge

After evaluating several different interconnect systems, only the [Datamate](#) system from Harwin - the UK-based manufacturer of high performance, high reliability interconnect systems - was found to meet all these constraints.

Harwin's Female Crimp Datamate and Male PC Tail Datamate connectors have now been designed into IceCube. Both pieces are being made as custom designs with 1.27 microns of gold plating - rather than the standard 0.75 microns - on the contact area to ensure high speed data transmission. These connectors are placed in the sensors which are about the size of a bowling ball. The male side of the connector is being used by the University of California Berkeley National Laboratory and the female by the University of Wisconsin Physical Science Lab.

The hunt for sources of cosmic neutrinos will get a boost as the AMANDA II Telescope grows in size as new strings of detectors are added. Plans call for the telescope to grow to a cubic kilometre of instrumented ice, and IceCube is expected to make scouring the skies for cosmic neutrino sources highly efficient. Harwin ultimately expects that over 4500 mating [Datamate](#) pairs will be deployed into the Antarctic ice. For Harwin Inc, the US arm of the Harwin group which led the design win, this is an extremely prestigious order as it emphasizes Datamate's suitability as a high speed, high reliability, and small footprint connector system.



The glass optical modules, each the size of a bowling ball are arrayed on 19 cables set deep in the ice.

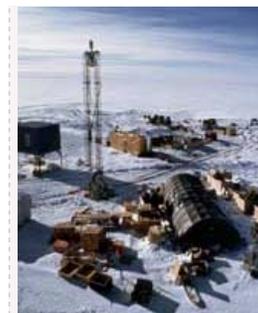
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The AMANDA II Antarctic camp.

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