

NO. 01 - APPLICATION NOTE - 400 kHz 2D Profiler

Ensuring operational safety through real-time current data collection in Port of Juneau, Alaska

Challenge

Port of Juneau officials in Alaska, USA, had challenges with operational safety while docking cruise ships when the tidal flow was high at the cruise ship terminal.

Solution

Installing a 400 kHz 2D Profiler that provides operators with current speed and direction data. The instrument was mounted on a semi-submerged dock piling (the dock's "leg") and connected to the port operators via an online cable.

In this way, operational users at Port of Juneau can now easily access real-time, long range current measurements collected from the waters of the cruise ship terminal.

End user value

"The benefit of Nortek's current data system is safe and efficient maritime operations in the Port of Juneau. By providing information on environmental conditions to mariners, this system helps prevent marine casualties such as colliding with a dock."

Captain Ed Page,
Executive Director,
Marine Exchange of Alaska

Making informed navigational decisions through real-time data collection

How did Port of Juneau officials in Alaska solve safety challenges as increasingly larger cruise ships made port calls to this small port? Reliable current speed and direction data have been key to meeting such challenges.

The large cruise ships arriving at Port of Juneau in Alaska required the construction of larger docks to provide adequate moorage. In doing so, the new docks further restricted the open water where vessels maneuver when arriving and departing the port. This made it more challenging to safely navigate ships in the confined waterway.

In this context, it was important to get reliable current speed and direction data from Nortek's 400 kHz 2D Profiler to aid in the docking of cruise ships.

Captain Ed Page is Executive Director at Marine Exchange of Alaska, an organization providing services that aid safe, secure, efficient and environmentally responsible maritime operations.

"The ship pilots and masters desired better information on currents and wind conditions to aid their making informed navigational decisions", says Captain Ed Page.

He emphasizes that this information is important to compensate for the increased challenges of maneuvering vessels in the port area.

Operational simplicity and cost savings

Captain Ed Page explains how the current speed and direction data from the 400 kHz 2D Profiler contributes to public safety and operational simplicity:

"The current sensors transmit data over a cell network and the Automated Identification System (AIS) to vessel operators to provide them an understanding of the forces of tidal currents that they had to compensate for when maneuvering their vessel in confined waters."

In addition to helping the understanding of tidal currents, the operational use of this data contributes to quicker, safer and simpler docking of vessels. In turn, this translates to cost savings for both the port and the ship operator.

Setting up a practical solution

How did Port of Juneau officials solve the practical side of setting up such a current monitoring solution? Ed Mayer, Innovative Technology Specialist at Marine Exchange of Alaska, explains:

"Connection of the sensor was straightforward and remote access was achieved using a cellular modem. Setting up went without difficulty."

Fabrication of the instrument's mounting bracket was done in a local workshop and divers were used for the installation. Shore power is unavailable during winter, so a wind turbine and batteries were installed to provide power during that period.

The current sensors have become an essential part of the port's daily operations, and real-time data collection will continue to be an integral part of the way Port of Juneau is run.

"We are now considering the installation of two additional 400 kHz 2D Profiler sensors", Ed Mayer concludes.



A diver installing the 400 kHz 2D Profiler clamp onto the piling.

Guide to online measurement of oceanographic data

What it is

An online measurement is real-time telemetry (or transmission) of sensor data to either a secondary telemetry system (i.e. satellite or GSM modem) or directly to a PC for real-time or near real-time display or storage.

End user value

There are many benefits of getting online data. One is being able to use the data for real-time processing or for display immediately after the data are collected. For example, processing of data collected in real-time allows for weather forecasting, daily operations as well as public safety.

Another benefit of transferring the data from the sensor in online mode is that users will have a second copy of the data should something happen to the sensor during normal operation, such as ice damage or damage from a fisherman. There is great value in using such an online system because in most cases the data being collected are much more valuable than the instrument itself. In other words - you will not be leaving valuable uncollected data deep in the ocean.

How it works

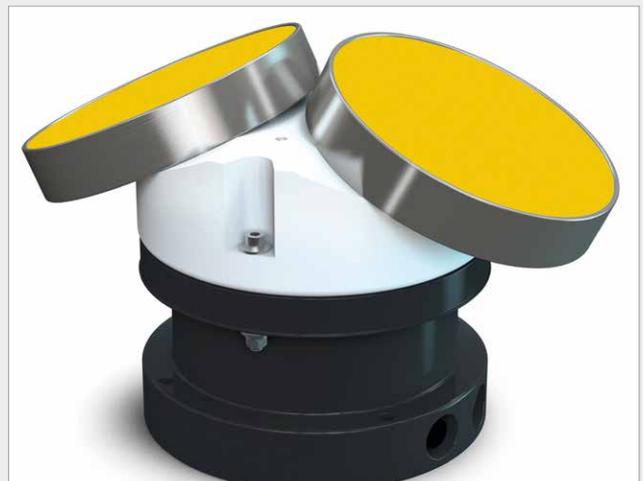
A cable is connected to the Nortek sensor and the sensor is configured to transfer the collected data as the sensor operates. These data can be either raw unprocessed data or in some cases subsets or processed data packets. Subsets or processed data packets are ideal when the telemetry link has a lower data transfer rate – such as an underwater acoustic modem. The cable into the Nortek sensor can be either an Ethernet connection, an RS-232 or RS-422 cable connection, or in some cases an analog connection.

Keep these potential challenges in mind

It can be challenging to operate an online telemetry system. If subsea cables are used those cables can be subject to vandalism, wave damage, fish bites, marine growth and storm damage – as well as a host of other factors that can damage cables. When using long cables, it can also be a challenge to provide sufficient power for instruments to operate.

Properly armored cables with service loops are recommended to avoid cable breakage, wave damage and other similar hazards. (A service loop is a section of cable intentionally left loose to aid in serviceability.) It can also be very beneficial to use pre-molded cables that have been pressure tested to ensure that water does not enter the online system via connectors or an underwater connection between two cables. Seek assistance from a qualified electrical engineer to solve issues related to power requirements, cable types and telemetry protocol. This is often overlooked!

In some cases, telemetry protocols can also create a challenge when the selected protocol does not support the cable length, or when it picks up electrical noise when long cables are used. This electrical noise can come from nearby AC power lines, wireless transmitters or other sources of electrical noise.



The Nortek 400 kHz 2D Profiler.

Make sure to test before deployment

After selection of a proper power supply, telemetry protocol and cable specification it is highly recommended to fully test all equipment as it would be used when fully deployed.

Testing it for a period of days, not only briefly, is preferable. While the sensor may not be collecting useful data during this testing, configuration issues may become evident and can be resolved before the system is deployed. Troubleshooting and modifications when the system is deployed can turn out to be very difficult and expensive. Issues such as instruments not being set to the correct protocol, improper cable wiring, cable damage or other issues are much easier to fix when in a laboratory environment.

How Nortek online measurement technology meets end user needs

Although online systems can have some challenges to overcome, Nortek offers a number of solutions to help solve these challenges.

Nortek offers reliable and well-engineered cabled online systems that can operate from 10 meters up to several kilometers. With power regulation, protocol management and cable designs all pre-engineered and offered as standard products these solutions can make a difficult design process very easy.



The 400 kHz 2D Profiler was mounted on a semi-submerged dock piling (the dock's "leg") and connected to the port operators via an online cable.

No.01 - 04.16 - Rev01 - 08.16

True innovation makes a difference



Nortek AS
Vangkroken 2
1351 Rud, Norway
Tel: +47 6717 4500
Fax: +47 6713 6770
inquiry@nortek.no

www.nortek.no