sense the difference

case study
mining

Process water metering at Mogalakwena Platinum Mine

Challenge

Continuous metering of many process water flows at Anglo American's Mogalakwena mine, the largest surface platinum mine in the world.

Solution

Anglo American's FutureSmart™ program enabled a permanent installation for a non-intrusive, multi-zone, optical process flow metering system. This installation uses a single, extended fibre optic circuit of several miles in length to enable continuous online metering of mine water flows at several measurement zones throughout a region comparable in size to Lower Manhattan.

The data from all metering zones is capable of being automatically uploaded to a server for the purpose of enabling automatic water balance calculations. Following installation, a calibration operation was executed whereby the system was calibrated using output obtained from clamp-on ultrasonic meters.

Results

The sensing system was installed in early December 2016, and has been in continuous use since commissioning. The continuous acquisition of flow data from a non-invasive metering network at Mogalakwena represents a critical step towards the development of an automatic water balance system at a tier one mine.

Impact

Anglo American was awarded awarded the prize for "Innovation in Sustainability" by Mines and Technology (London, 2017) for this technology application.

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Introduction

Material from Finfer, D,. "Continuous process water metering at Mogalakwena Platinum Mine using non-intrusive fibre optics", Water Congress 2018 incorporating 6th International Congress on Water Management in Mining and 2nd International Congress on Water in Industrial Processes, Santiago CL, May 2018.

Mogalakwena is a highly productive surface mine in a water-stressed region with complex water management requirements. In this environment, delivery of accurate, real-time monitoring for all water flows mine-wide will deliver real water savings. To this end, Anglo American commissioned Silixa to install a permanent, non-intrusive, multi-zone, optical process flow metering system. This installation uses a fibre optic circuit of several miles in length for continuous online metering of water flows at several measurement zones throughout a region comparable in size to Lower Manhattan, as indicated within Figure 1 on the right.

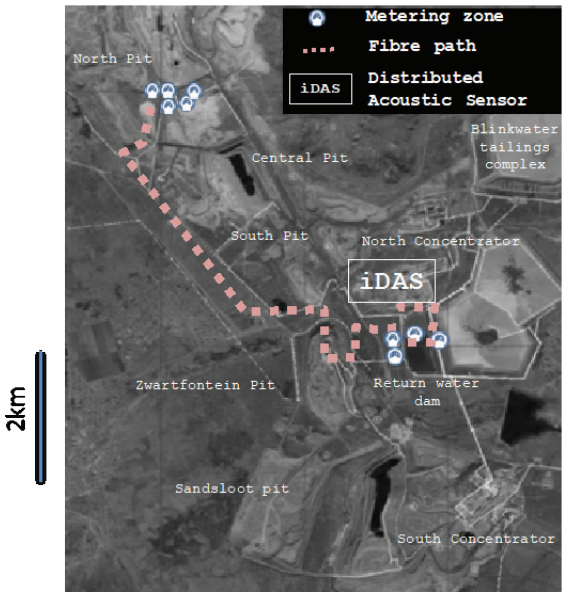
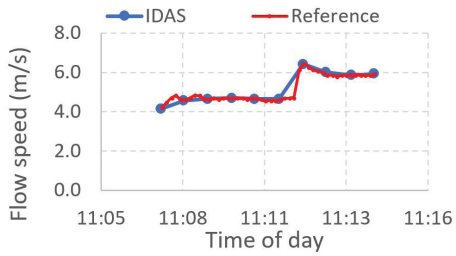


Figure 1. Process metering layout for mine water balance application at Mogalakwena.

Results

The process metering system relies on Distributed Acoustic Sensing (DAS), which can measure the acoustic signals everywhere along a telecommunications-grade optical fibre with a spatial resolution on the order of meters.



When sensing fibre is wrapped around a pipe, DAS observes the speed at which turbulent vortices convect through the pipe. A single length of fibre can measure many pipes in series without any electrical supply or communications equipment at the point of sensing. Robust sensing cable is straightforward to retrofit in brownfield applications, even on bends or large pipes.

The data from all metering zones can be integrated with a server for automatic water balance calculations. The sensing system was installed in December 2016, and has operated continuously since commissioning. A time-coordinated calibration operation was executed using output obtained from clamp-on ultrasonic meters. Continuous flow data acquisition from a metering network at Mogalakwena represents a critical step towards an automatic water balance system at a tier one mine. Once an automatic balance system is achieved across the entire mine-site, the full system will support real-time, automated process control; conserving water and, ultimately, improving metal recovery.

"[Anglo American] expects that this accurate, real-time monitoring of all mine- wide water flows will yield significant water savings. [States the company,] 'Unlike traditional sensors that measure at discreet, predetermined points, this installation uses a single fibre-optic circuit, several kilometres long – enabling continuous real-time metering of mine water flows across multiple points throughout a region comparable in size to lower Manhattan.'"

Source: Under Control, Mining Decisions Magazine, Feb 2018