

Article outline is loading...

JavaScript required for article outline



Safety Science

Volume 50, Issue 4, April 2012, Pages 811 – 815

First International Symposium on Mine Safety Science and Engineering 2011



Special Issue Article: The First International Symposium on Mine Safety Science and Engineering

The internet of things (IOT) and cloud computing (CC) based tailings dam monitoring and pre-alarm system in mines ☆

Enji Sun^{a, b}, Xingkai Zhang^a, Zhongxue Li^b

^a China Academy of Safety Science and Technology, Beijing 100012, China

^b Key Laboratory of the Ministry of Education of China for High-Efficiency Mining and Safety of Metal Mines, University of Science and Technology Beijing, Beijing 100083, China

<http://dx.doi.org/10.1016/j.ssci.2011.08.028>, [How to Cite or Link Using DOI](#)

[View full text](#)

Abstract

Tailings disposal is a significant consideration for the mining industry, with the majority of the ore processed in most mining operations ending up as tailings. Several tailings dam failure accidents have occurred during the past few years and mine tailings dam failures, which are disastrous with the serious damage and the loss of lives, are occurring at relatively high rates. To improve the tailings dam safety, a tailings dam monitoring and pre-alarm system (TDMPAS) based on the internet of things (IOT) and cloud computing (CC) is accomplished with the abilities of real-time monitoring of the saturated line, impounded water level and the dam deformation. TDMPAS has helped the mine engineers monitor the dam safety 24/7 and acquire pre-alarm information automatically and remotely in any kind of weather conditions. TDMPAS has been applied in several mines and has demonstrated the feasibility of monitoring the tailings dam physical condition.

Highlights

- ▶ Tailings dam failure is disastrous with the serious damage and the loss of lives.
- ▶ A tailings dam monitoring and pre-alarm system (TDMPAS) has been developed.
- ▶ TDMPAS is based on the internet of things (IOT) and cloud computing (CC) framework.
- ▶ TDMPAS can monitor the saturated line, impounded water level and the dam deformation.
- ▶ TDMPAS has been demonstrated it is useful to monitor tailings dam safety condition.

Keywords

Tailings dam; The internet of things; Cloud computing; Pre-alarm system

Figures and tables from this article:

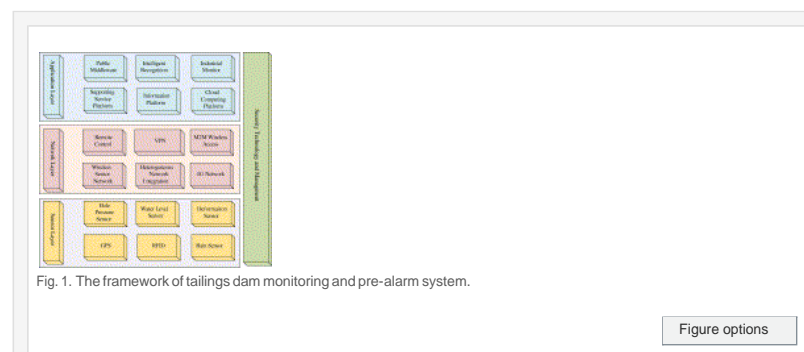


Figure options

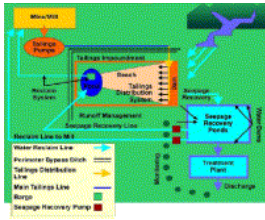


Fig. 2. A generic model of a tailings containment system with the key monitoring parameters.

Figure options

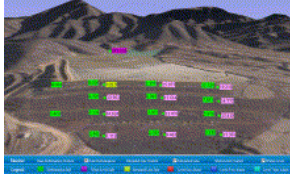


Fig. 3. The main monitoring interface of TDMPAS.

Figure options



Fig. 4. The TDMPAS real time 3D deformation monitoring data graphically.

Figure options



Fig. 5. The TDMPAS real time water level monitoring data graphically.

Figure options

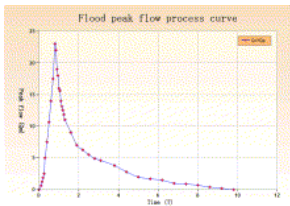


Fig. 6. The flood peak flow process in 500 year period.

Figure options

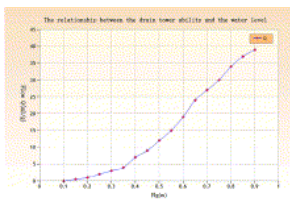


Fig. 7. The relationship between the drain tower ability and the water level.

Figure options

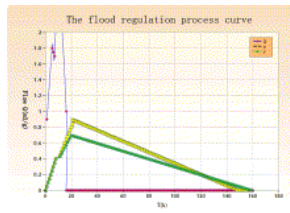


Fig. 8. The 500 period flood regulation process results in TDMPAS.

Figure options

☆

The First International Symposium on Mine Safety Science and Engineering (ISMSSE2011) will be held in Beijing on October 26 - 29, 2011. The symposium is authorized by the State Administration of Work Safety and is sponsored by China Academy of Safety Science & Technology (CASST), China University of Mining & Technology (Beijing) (CUMTB), Datong Coal Mine Group, McGill University (Canada) and University of Wollongong (Australia) with participation from several other universities from round the world, research institutes, professional associations and large enterprises. The topics will focus on mines safety field: theory on mine safety science and engineering technology, coal mine safety science & engineering technology, metal and nonmetal mines safety science & engineering technology, petroleum and natural gas exploitation safety science & engineering technology, mine safety management and safety standardization science & technology, occupational health and safety in mine, emergent rescue engineering technology in mine, etc.



Corresponding author at: China Academy of Safety Science and Technology, Beijing 100012, China. Tel.: +86 010 8491 1522; fax: +86 010 8491 1373.

Copyright © 2011 Elsevier Ltd. All rights reserved.