

Workshop on the space design of underground openings for ILC project  
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# On-Site Visualization

New strategy for safety management in underground


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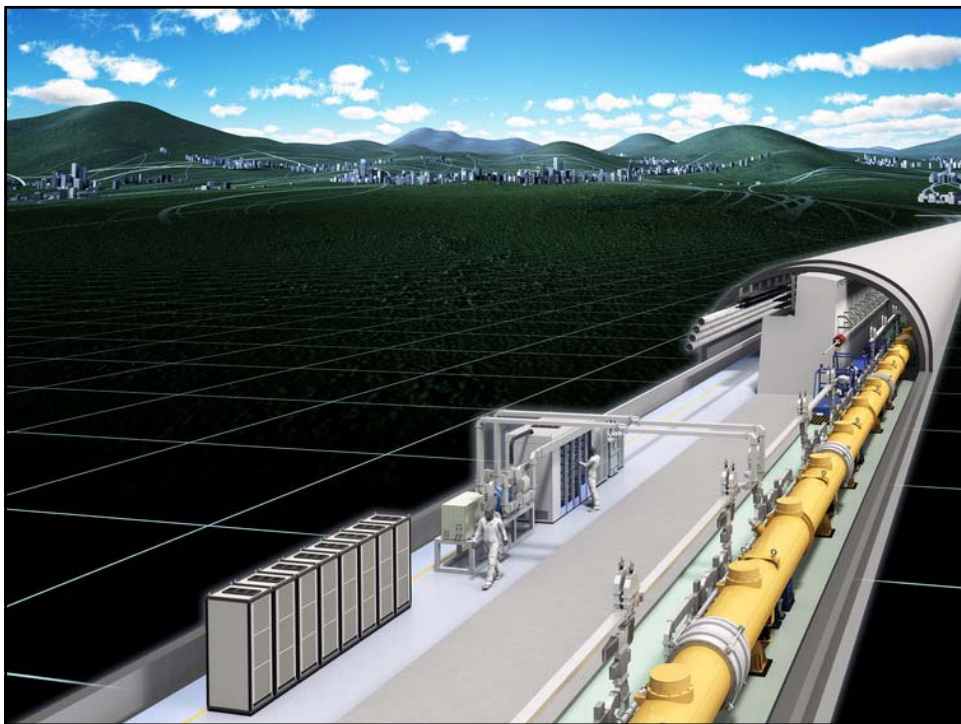


<http://kenplatz.nikkeibp.co.jp/const/feature/trouble/accident/007/index.shtml>



### Metro construction in Singapore, April 20, 2004

- Collapse over 80m zone
- Adjacent 100m subsided.
- 4 dead







**2010, New Delhi, India**  
 "Special Assistance for Project Implementation (SAPI) applying the monitoring method by On Site Visualization at Delhi Metro construction sites" was conducted successfully, funded by JICA. The OSV monitoring was conducted at the selected sites of Phase II Delhi Metro construction project. The primary goal of employing the monitoring by OSV at a construction site is to improve safety awareness both of workers and citizens so that an advanced safer working environment with, hopefully, zero accident could be built. The questionnaires confirmed that the proposed method was well accepted by workers, residents, and engineers in India.

**2013, Vietnam**  
 A medium-scale low-cost OSV monitoring was conducted to successfully monitor rock slope deformation sensitive to heavy rain.

**2006~present, Japan**  
 The new scheme "On-Site Visualization" proposed by Professor S. Akutagawa of Kobe University, Japan, is for monitoring safety for arbitrary structures encountered during construction or service time of infrastructures whereby so-called Light Emitting Sensors are used as the key technology. Employment of the new leads to better understanding of what is going on for the monitored structures, faster detection of abnormalities, quicker reactions to minimize further structural damages, and realization of safer working and living environment for workers and citizens. Monitoring based on OSV has been applied to more than 50 sites in Japan, as of July 2015.

**2011, Bangalore, India**  
 "Special Assistance for Project Implementation (SAPI) applying On Site Visualization and Dust Monitoring at Bangalore Metro construction sites" was conducted successfully, funded by JICA. Japanese made OSV devices were jointly used with Indian made sensors to confirm compatibility. The monitoring was an overall success; however, there was an incident of a possible soil-mass collapse, suggesting that cost required to install sufficient number of OSV sensors be reduced so that wider area could be monitored.

**2010, Philippines**  
 A small scale OSV monitoring was conducted in an underground powerhouse water tunnel.

**2015, Jakarta, Indonesia**  
 "Construction Safety Improvement applying OSV monitoring at Jakarta MRT Project" is scheduled to be performed as a JICA supported project for promoting technologies developed by small and medium-sized Japanese firms. Light Emitting Converters, portable Light Emitting Inclination Sensors, Electric papers and Mirrors (optional), manufactured in Japan, are going to be used at a site in Jakarta to see how Japanese-born technology is accepted by Indonesian community for improving safety at construction.

**201x, Hanoi, Vietnam**  
 Execution of OSV monitoring is specified in the tender document for upcoming Hanoi Metro Line-2 where construction of stations and tunnels are expected to be in very soft ground. Strategic planning of OSV monitoring is required.

**Hot tips of OSV**

- Fast by smartphone
- Fast data processing
- All data needed do by MATHCAD
- Information is visually opened for all
- Improving safety awareness among workers

Going global to improve safety for all.

(\*) These photos are light emitting sensors of various kinds used in the OSV.

## Think → Test → Make → Use

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