Introduction by John Dunnicliff, Editor

This is the 87th episode of GIN. Only one article this time, and that's by the editor!

To all of you 'out there' – if you believe that GIN has any value, please help by contributing. Surely you have practical experiences or lessons you've learned that are worth sharing. I hope for some 200-300 word abstracts.

If you believe that GIN has any value, PLEASE help by sending me an abstract

General role of instrumentation, and summaries of instruments that can be considered for helping to provide answers to possible geotechnical questions.

The previous three GINs included articles about instrumentation for braced excavations, embankments on soft ground and cut slopes and landslides in soil and in rock. Here's one about driven piles and bored piles (drilled shafts).

Call for author(s) for one or more articles on monitoring embankment dams

In the previous GIN I asked if anyone would be willing to write an article on monitoring of embankment dams, but you've been silent. So I'll ask the question another way – do you know of anyone who might be willing to write an article? If yes, will you please let me have contact information?

Third International Course on Geotechnical and Structural Monitoring, June 2016 in Italy

The Third International Course on Geotechnical and Structural Monitoring is now history. For the first three editions of the course (held in 2014, 2015 and 2016), more than 330 people from 48 countries joined us. In addition, 42 companies provided exhibits.

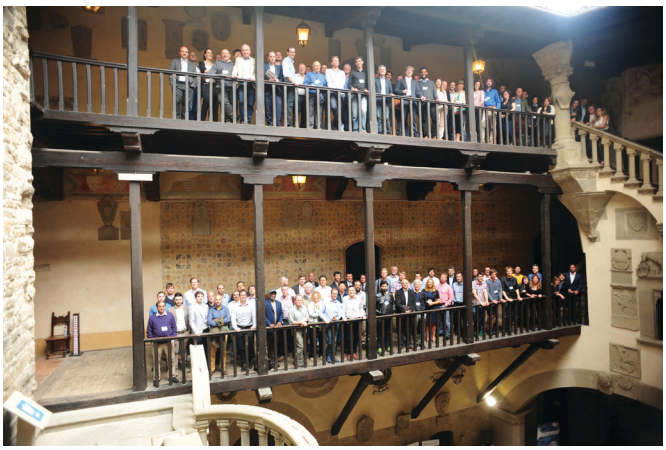
Here are two photos from this year's course. For more, take a look at the photo gallery on *www.geotechnicalmonitoring.com/en/july-newsletter.*

For the 2017 edition we're looking at two options for location: again in the beautiful small Tuscany town of Poppi, or perhaps in Rome. Watch this space! We're planning to add some side courses on the day before the main course to provide practical basic know-how on how to use the most common monitoring systems.

Closure

Please send an abstract of an article for GIN to *john@dunnicliff.eclipse.co.uk*—see the guidelines on *www.geotechnicalnews.com/instrumentation_news.php*

Amor, pesetas y el tiempo para gozarlos ("Love, money and the time to enjoy them") - Spain



2016 course registrants on balconies in the castle.

Unforgettable street party.

General role of instrumentation, and summaries of instruments that can be considered for helping to provide answers to possible geotechnical questions. Part 4.

John Dunnicliff

Introduction

This is the fourth in a series of articles that attempt to identify:

- The general role of instrumentation for various project types.
- The possible geotechnical questions that may arise during design or construction, and that lead to the use of instrumentation
- Some instruments that can be considered for helping to provide answers to those questions.

Part 1, covering internally and externally braced excavations, was in December 2015 GIN. Part 2, in March 2016 GIN, covered embankments on soft ground. Part 3, in June 2016 GIN, covered cut slopes and landslides in soil and in rock. This Part 4 is about driven piles and bored piles (also called drilled shafts).

Four introductory points were made in December 2015 GIN (www.geotechnicalnews.com), for Part 1 of this series of articles, and these also apply here.

Driven piles

General role of instrumentation

The subsurface length of a driven pile cannot usually be inspected after driving; thus, its physical condition and alignment are unknown. Subsurface geotechnical conditions are rarely known with certainty, and therefore the design of driven piles involves assumptions and uncertainties that are often addressed by conducting instrumented full-scale tests. Tests may examine the behaviour of the pile under load applied to the pile head or under load caused by settlement of soil with respect to the pile.

Defects in piles can be created during driving, and inspection procedures are available for examining the condition and alignment after driving. Certain types of driven pile cause large displacements and changes of pore water pressure in the surrounding soil, and these may in turn have a detrimental effect on neighboring piles or on the stability of the site as a whole. Instrumentation can be used to quantify the consequences of pile driving and thus to assist in planning any necessary action.

Summary of instruments that can be considered for helping to provide answers to possible geotechnical questions

Table 8 lists the possible geotechnical questions that may lead to the use of instrumentation for driven piles, together with possible instruments that can be considered for helping to provide answers to those questions.

Table 8. Some instruments that can be considered for monitoring driven piles

Possible geotechnical questions	Measurement	Some instruments that can be considered
What is the load-movement relationship of the pile	Displacement at head	Dial indicators with reference beams Wire/mirror/scale Surveying methods Remote methods
	Load at head	Load cell
	Displacement at toe	Telltales
	Stress along pile	Embedment or surface-mounted strain gauges (Fibre-optic instruments)
Has the capacity of the pile been reduced by defects caused during driving?	Curvature of pile	Inclinometer
	Condition of pile	Integrity testing

Bored piles (drilled shafts)

General role of instrumentation

Many uncertainties exist during design of bored piles (also called drilled shafts), and instrumentation plays a role in determining the load-movement relationship, by conducting load tests. Concrete integrity is often uncertain during construction, particularly when they are constructed in granular soils below the water table or in softer, squeezing clays, when concrete slump is inadequate, or when concrete placement practices are inferior. Instrumentation can be used to examine the integrity of the concrete. For piles cast under support fluid, concrete integrity at the pile tip is particularly important.

Summary of instruments that can be considered for helping to provide answers to possible geotechnical questions

Table 9 lists the possible geotechnical questions that may lead to the use of instrumentation for bored piles, together with possible instruments that can be considered for helping to provide answers to those questions.

Table 9. Some instruments that can be considered for monitoring bored piles

Possible geotechnical questions	Measurement	Some instruments that can be considered
What is the load-movement relationship of the pile?	As in Table 8 Load at toe or in pile	As in Table 8 Osterberg load cell
What is the integrity of the concrete?	Condition of pile	Integrity testing