

Report on the Educational Workshop
**CONCRETE SCIENCE & ADVANCED
METHODS FOR EVALUATION OF CONCRETE**

Athens - Greece
November 2019



Conducted at the Stavros Niarchos
Foundation Cultural Center



GERMANN INSTRUMENTS A/S

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Test Smart - Build Right

The topics

With great success the 19th workshop was conducted at the Stavros Niarchos Cultural Center organized by Germann Instruments A/S and Geotest SA in the stunning city of Athens, Greece. 35 attendants from 5 different countries were present during the two-day lectures and device demonstrations. The topics covered during the workshop were:

► Visual inspection using Drones

► Bridges Inspection using impulse- response ultrasound, impact-echo methods. Special focus on corrosion of strands in cable ducts.

► Evaluation of in-place concrete strength

- Core testing
- Rebound hammer
- Pullout test (LOK-Test, CAPO-Test)
- Pull-off test (BOND-Test)
- Maturity method (COMA-Meter)

► Location of reinforcement

- Covermeters (CoverMaster)
- Ground penetrating radar (Conquest)

► Evaluation of reinforcement corrosion

- Durability principles
- Water penetration (GWT)

- Chloride content (RCT & RCT/W)
- Carbonation (Deep Purple, Rainbow)
- Chloride profile (Profile Grinder)
- Service life estimation
- Half-cell potential (Mini Great Dane)
- Corrosion rate (GalvaPulse)
- Concrete conductivity (Merlin)
- Rapid chloride penetration (PROOVE'it)

► Flaw detection based on stress waves

- Ultrasonic pulse velocity (PUNDIT, Surfer)
- Impact-echo method (DOCTer)
- Impulse-response method (s'MASH)
- Ultrasonic-echo method (MIRA)

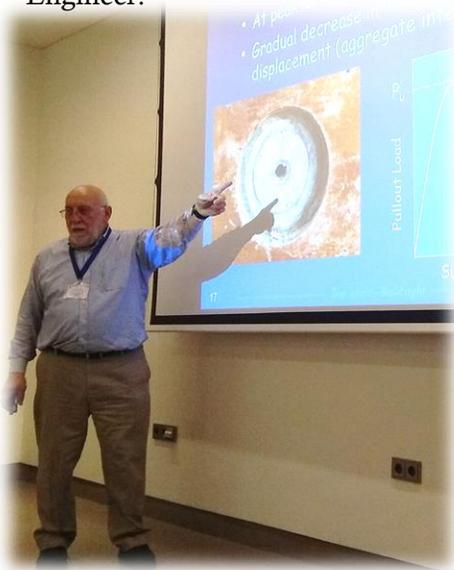
► Advanced test methods

- Air-void characteristics (AVA)
- Heat of hydration (HeatBox)
- Concrete rheology (ICAR Rheometer)
- Autogenous shrinkage (Auto-Shrink)



The lecturers

Geotest SA opened the first day with a lecture on the use of drones for visual inspections of tall structures. The lecture titled "Inspection of structures in the future" was made by **Mr. Anastasios Gkotza**, MBA and Civil Engineer.



The major part of the theoretical basis of concrete and the test systems were lectured by **Dr. Nicholas J. Carino**, independent consultant, internationally recognized, expert and teacher on NDT and standard test methods, multiple times awarded from ACI and ASTM during his work in research and standards development. He has served in several leadership positions at ACI and ASTM Committees. Today he is an honorary Member of ACI and a Fellow of ASTM.



Bright ideas. Sustainable change.

From Ramboll Finland Oy we had **Mr. Guy Rapaport** covering the topics related to practical experience in bridge testing with ultrasound, impact-echo and impulse response techniques. He is a Civil Engineer, leading consultant, NDT-manager and project manager in Ramboll, and certified Bridge Inspector from the Finnish Transport Agency.



During the lectures Germann Instruments was represented by **Mr. Hugo D. Orozco**, MBA and Civil Engineer with a wide experience in concrete structures repair from his employment for 8 years in SIKA Mexico. In the durability section he lectured about service life estimation and concrete diffusion and concrete resistivity.



The demos

The attendees had the opportunity of watching the devices in action. Two locations were used for this purpose, the lecturing room and a near-by parking garage.

With more than 40 years of experience in the NDT, **Mr Claus Germann Petersen**, President of Germann Instruments A/S, one of the world's leading suppliers of advanced concrete test systems, demonstrated the LOK-Test, CAPO-Test and Bond-Test. He showed the DOCTer impact-echo on concrete cylinders of different heights and finally the successful Rapid Chloride Test and the Profile Grinder for service life estimation.

Mr. Petersen, inventor of numerous test systems that are used worldwide is dedicated to spreading knowledge on the capabilities and benefits of advanced test systems. He has been an active member in the NDT Committees of ACI, ASTM, and RILEM, and is the recipient of the Professor Ostenfeld Gold Medal from the Danish Society for Structural Science and Engineering.

Mr. Hugo D. Orozco ran a test with the ICAR Plus on silicone oil to demonstrate the steps the device follows to measure the viscosity and the yield stress. After that he used some samples of saturated concrete to demonstrate the Merlin (resistivity), the GalvaPulse (Corrosion Potentials and Corrosion Rate).



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The demonstrations in the near-by parking garage started with a Drone for inspection of structures, the main topic on **Mr. Anastasios Gkotza** lecture in the beginning of the workshop. After that, using a wall in the parking garage **Mr. Guy Rapaport** demonstrated the MIRA Tomographer, the DOCTer impact-echo and the s'MASH impulse response.



The attendees

We had the great honor of sharing this two days with 35 very intelligent, curious, attentive concrete construction professionals from 5 different countries, whose enthusiasm and interest on the topics covered motivate us to keep on with this activities.



Testimonials and diplomas

*“Excellent presentations
and very useful
demonstrations”*



*“Great job!
Congratulations!”*



*“Excellent! However, the length
of this workshop was short for
the topics we discussed . Maybe
is possible to extent it a couple
of days more”*



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“Best workshop I have participated until now ”



“Very good workshop! The bridge inspection topic was very interesting. This is a large worldwide problem and very important issue”



Dr. Nick Carino and Mr. Guy Rapaport
with Greek Olympic Leaves.

Thank you for your excellent presentations!!!

Special thanks to our friend
Mr. Nikolaos Zoidis and Geotest SA
for this great collaboration
and

Thank you very much to all of you!!!
Your enthusiasm and dedication is
what keep us going!



Test Smart - Build Right

True wisdom is in sharing what you know, considering humbly what Socrates once said: *“The only True wisdom is in knowing you know nothing”*