

**15th German-Lithuanian-Polish colloquium
and Meeting of EURO working group OR in Sustainable Development and Civil Engineering
June 19th - 21st, 2015, Poznan, Poland**

1. Name:

H. Pankrath¹, M. Barthel¹, A. Knut¹, M. Bracciale², R. Thiele¹

2. Organization:

¹ Leipzig University of Applied Sciences, Leipzig, Germany

² University Rome Tor Vergata, Rome, Italy

3. Paper title:

Efficient Soil Compactors - Numerical Simulation and Optical High-Speed Measurement as a Development Component for Innovative Equipment Approaches

4. Abstract (200-300 words):

Soil Improvement with reduced requirement of additional material and constructions is getting more and more important in times of increasing scarcity of resources. For the compaction of middle deep soil between 1 m to 5 m next to systems like the Impact Roller and Rapid Impact Compactor (RIC), especially BOMAG[®] rollers with a polygon shape of the drum have to be mentioned. With a better understanding of compacting mechanisms, possibilities of improving equipment systems and advantages in the execution of construction work with regard to energy consumption, depth of influence, evenness and quality of compaction such as efficient working methods can be derived.

Since 2012 a group of civil and mechanical engineers of the HTWK Leipzig in Germany supported by national and international academic and industry partners is working on this topic in a project financed by the German Federal Ministry of Education and Research. A main focus was on better understanding of relevant and successful systems such as compaction with drop weights, RIC, Roller and Impact Roller. Three different fields of investigation were developed and improved in an interactive process. (1) Using the FE Code ABAQUS[®] for design and simulations with implicit and explicit solver, high performance numerical models for dynamic calculations could be achieved. (2) For field tests with the most powerful single drum roller in the world and RIC, high resolution measurements of acceleration were performed on the equipment and supplemented by precise soil mechanic field testing. (3) Dynamic laboratory tests and non-contact measuring using the Particle Image Velocimetry method were adapted and further developed for optical high-speed measurement. With these interactive methods and research tools the group created conditions for proofing and linking the concepts for optimizing and new development of innovative heavy equipment approaches for soil compacting.

