Minutes from Belfast meeting, 15 – 16 May 2017

Progress of WG1

General progress of the RRT$^+$ - presented by Marijana Serdar (WG1 leader)

GP	Experiments performed	Expected until Sept
GP1a Fresh properties and setting	30%	85%
GP1b Microstructure	10%	20%
GP1c Permeability	18%	60%
GP1d Mechanical properties	35%	70%
GP1e Deformation	35%	70%
GP1f Fracture	10%	50%

Progress of GP1a – presented by Ivan Gabrijel (GP1a leader)

- in general participants very responsive
- interesting results already obtained for ultrasonic and heat of hydration, only one result so far for rheology
- ultrasonic
    - different methods measure different parameters, challenge to find an optimal way to compare instrumentation
    - two levels of comparison: i) within the same laboratory ultrasonic vs standardised methods (setting time) to evaluate accuracy/sensitivity of method, and ii) between laboratories to compare different approaches / instrumentation
    - method is not standardises, benefits: able to detect changes from viscous to hardened, continuous measurement – potential for WG3
- heat of hydration
    - isothermal, adiabatic, semi-adiabatic calorimetry – different boundary conditions, strong influence of testing equipment
    - necessary to calculate apparent activation energy to take into account effect of temperature (results available from isothermal calorimetry on cement paste at 20, 30, 40, 50 and 60 °C)
    - measurements will be used for WG2 – important to prepare set of confident results
- rheology
    - only one laboratory submitted results, other pending
    - additional SCC compositions proposed for comparison (proposed by Jacek Gołaszewski)

Actions for GP1a

- ask for more standard test to be submitted (initial and final setting using Vicat or ASTM on paste, mortar and concrete) together with non-standard
- heat of hydration if doubtful result can be compared to results of TG on cement

- prepare confident results of heat of hydration for WG2 Macroscopic modelling

Progress of GP1b – presented by Shiju Joseph (substituting for Özlem Cizer, GP1b leader)

- only few laboratories participating
- confident results needed for microstructural modelling – particle size distribution and chemical composition
- data available from cement producer – need to be compared with obtained data
- TG data from participants available – sent to Shiju and Özlem
- ZAG will perform MIP and SEM, will check about XRD

Actions for GP1b

- personal emails to participants
- crucial to obtain chemical composition, at least one more quantitative XRD

Progress of GP1c – presented by Sree Nanukuttan (GP1c leader)

- enough laboratories participate
- WG2 would be interested in moisture isotherms – description of conditions needed
- possible strategies - comparison of different durability parameters (electrical resistivity vs chloride diffusion), comparison with microstructural methods (permeability vs pore size distribution with MIP),

Actions for GP1c

- continue collecting data

Progress of GP1d – presented by Violeta Bokan-Bosiljkov (GP1d leader)

- many laboratories participated with compressive strength – this can be used as confirmation when explaining possible differences between laboratories in case of more advanced techniques
- tensile strength testing of importance to WG2 – inconsistent results on modified cement paste and mortar

Actions for GP1d

- ask laboratories to focus on:
    - load-displacement curve for cement paste and mortar from early ages
    - tensile strength (direct, indirect through splitting and indirect through bending) from early age
    - modulus of elasticity

Progress of GP1e – presented by Emmanuel Roziere (GP1e leader)

- some results on autogenous and drying shrinkage available

- autogenous shrinkage – challenge in defining time zero (temperature, inital setting, measuring RH)
- drying shrinkage – challenge in comparing set of data – proposal to use shrinkage half time, differences in sample size – comparing shrinkage evolution which does not depend on height

Actions for GP1e

- ask laboratories to focus on:
  - chemical shrinkage
  - restrained shrinkage (TSTM and ring)
  - thermal coefficient

Progress of GP1ef– presented by Aljoša Šajna (GP1f leader)

- responses of participants absent

Actions for GP1f

- personal emails to participants
- crucial to obtain fracture energy from early age
- define RRT on acoustic emission if there is interest

GENERAL CONCLUSION: All experimental work should finish by Brussels conference in September 2017.