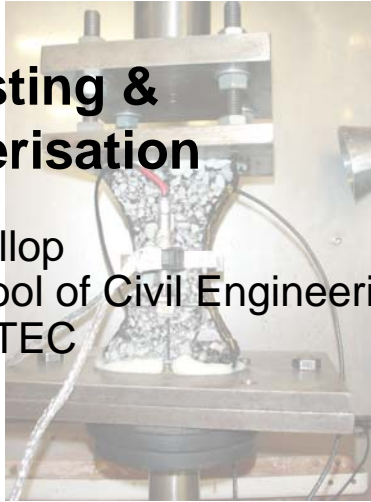


HMA Testing & Characterisation

Andrew Collop
Head, School of Civil Engineering
Director, NTEC



Contents

- Introduction
- Laboratory element testing
- Small-scale rolling wheel testing
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Introduction

- Laboratory test data critical for modelling
 - Parameter determination
 - Validation
- Test data required for parameter determination tends to be model specific
- Different (more realistic) boundary value problem to provide comprehensive validation

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Nottingham/Delft project

- 42 month programme (ended in Dec 07) funded by EPSRC (equivalent of NSF)
- Testing in Nottingham, modelling in Delft & LCPC, France
- 2 generic types of mixture (DBM, HRA)



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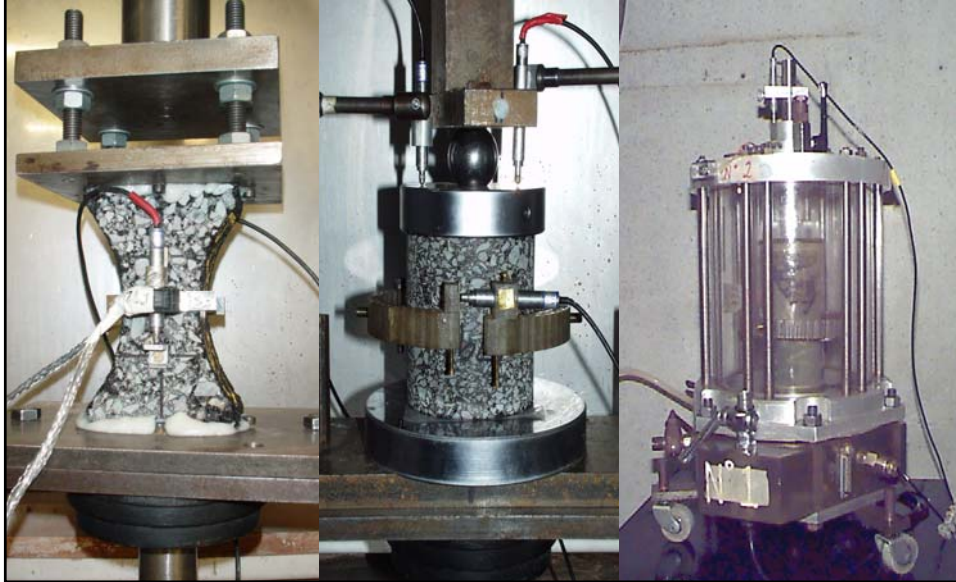
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Element testing

- Wide range of variables
 - Test type (dynamic, quasi-static, etc)
 - Test configuration (stress, strain-rate etc)
 - Temperature
- Best to have uniform(ish) stress conditions (not a structural test)
- Typically used for parameter determination and preliminary validation

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Tension and compression

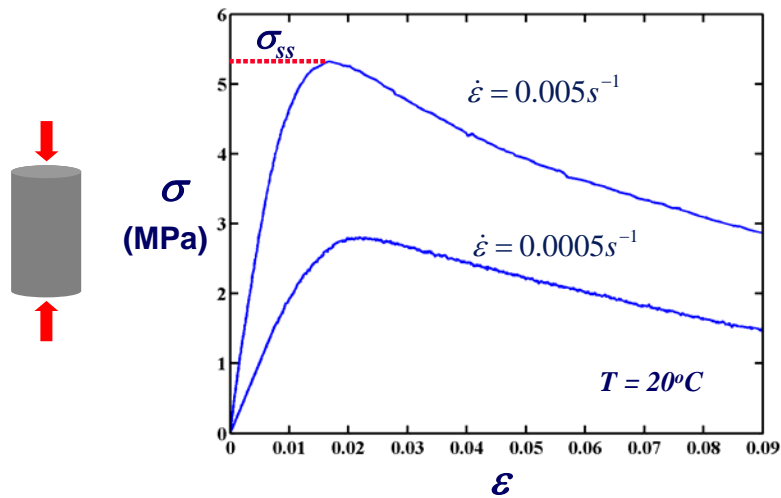


Tests

- Dynamic modulus
- Creep
- Creep recovery
- Constant strain-rate
- Repeated loading tests
- Triaxial (compression only)

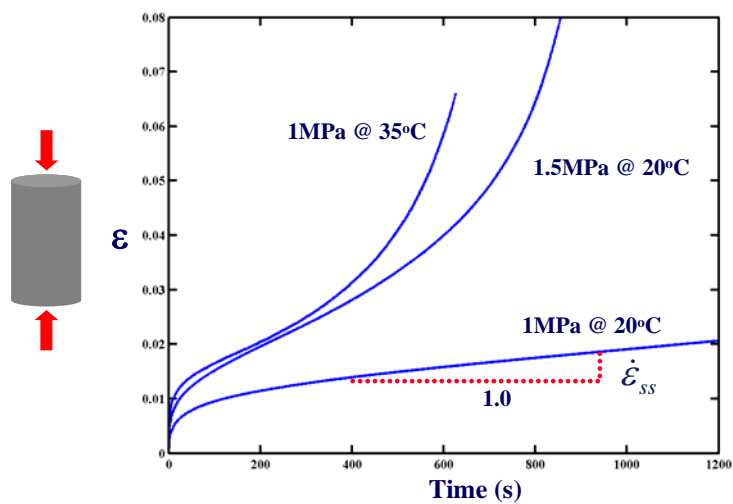
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Constant strain-rate (DBM)



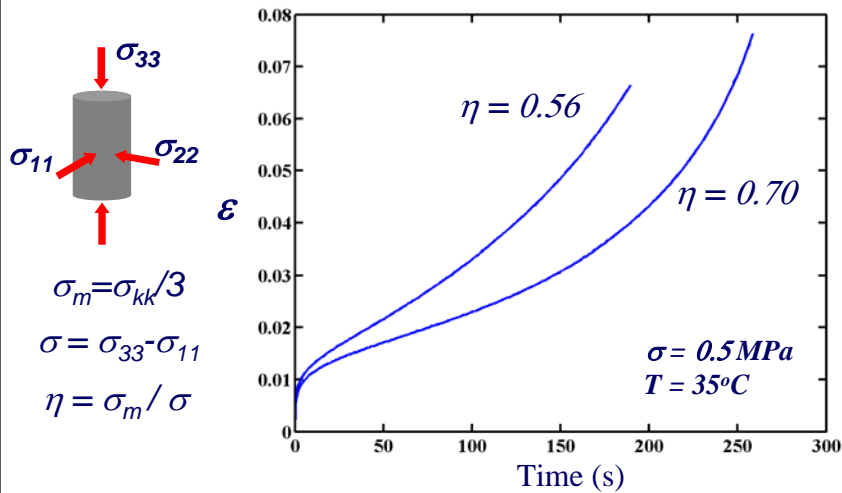
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Uniaxial creep (DBM)



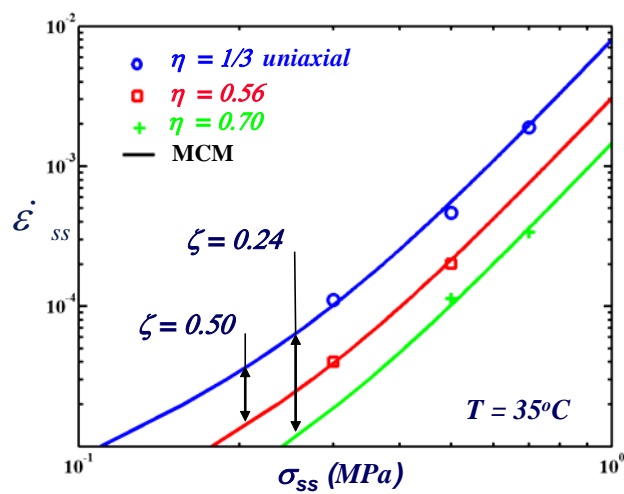
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Triaxial creep (HRA)



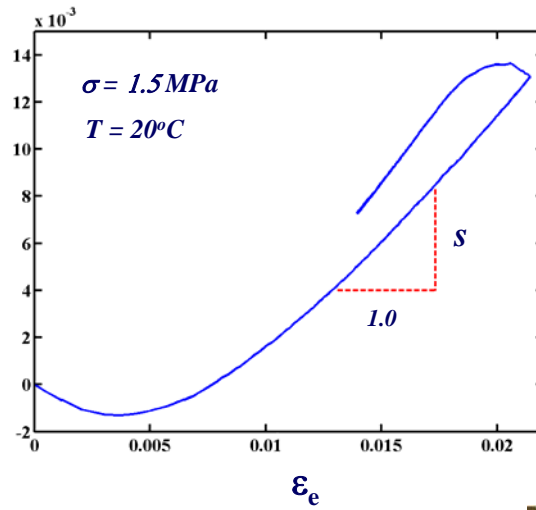
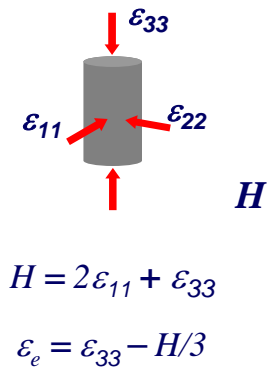
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Steady-state behaviour (HRA)



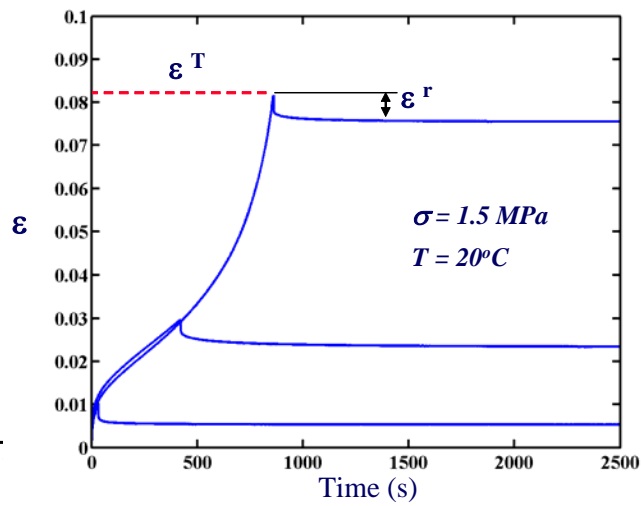
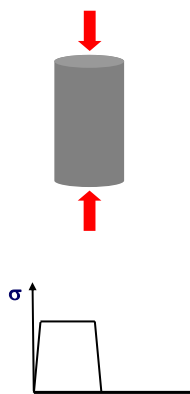
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Volumetric behaviour (DBM)



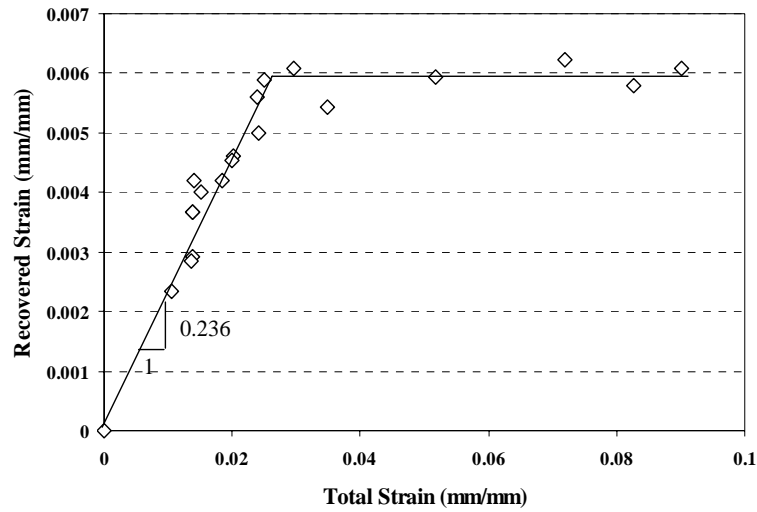
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Creep recovery (DBM)



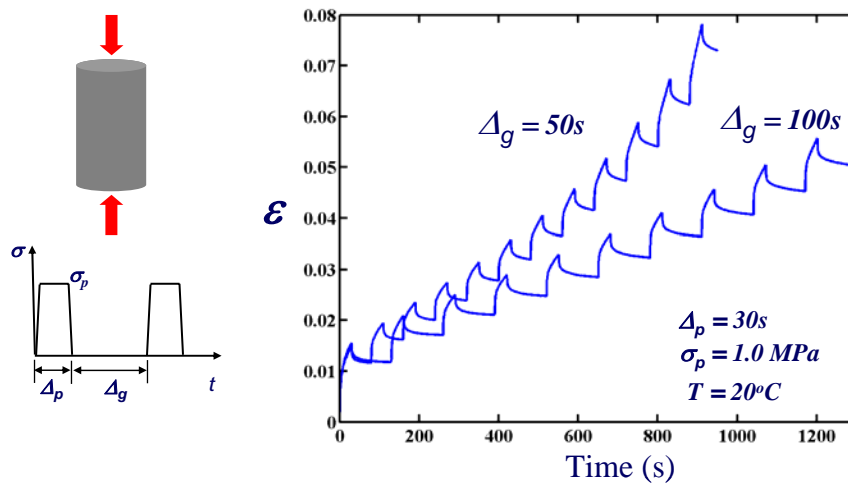
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Recovered strain (DBM)



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Cyclic pulse train (HRA)



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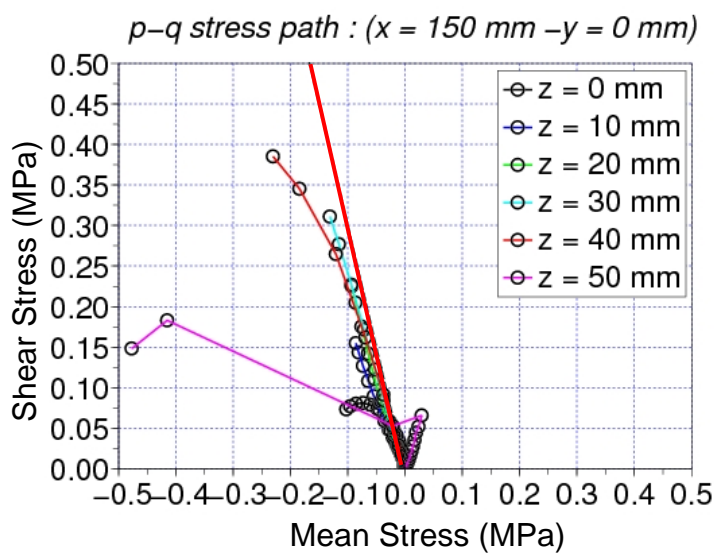
Wheel tracking (UK)



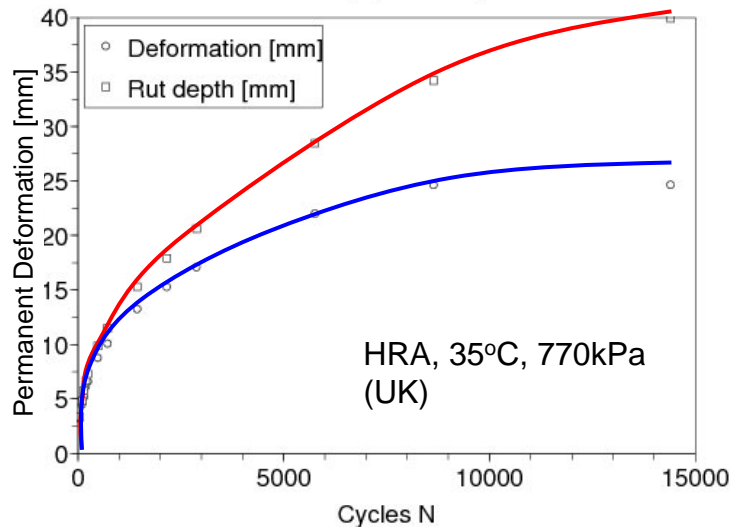
Wheel tracking (French)



Stress paths (UK)

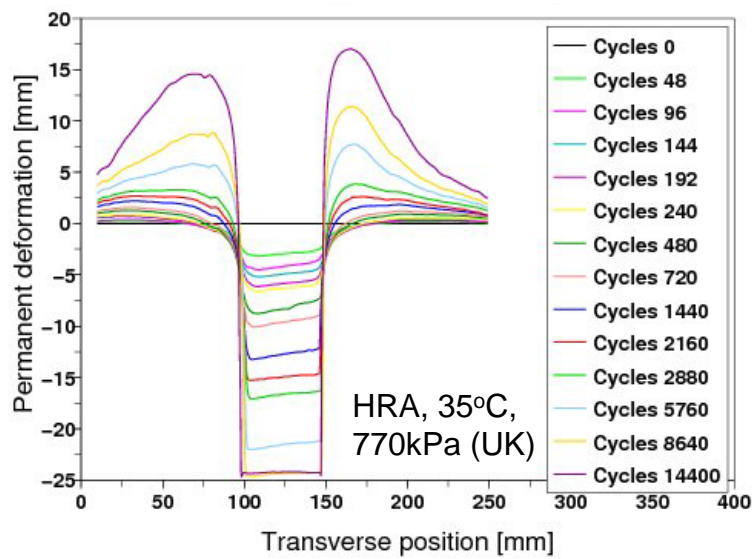


Rut depth



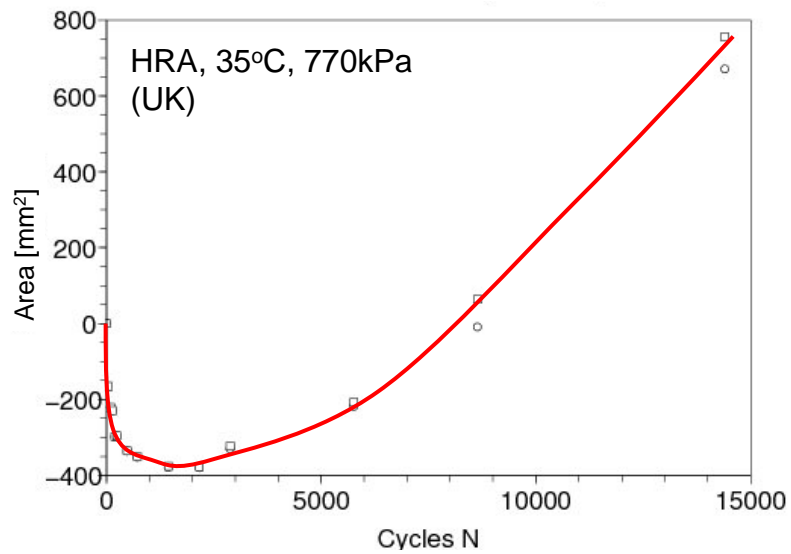
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Transverse profiles



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Volumetrics



Contents

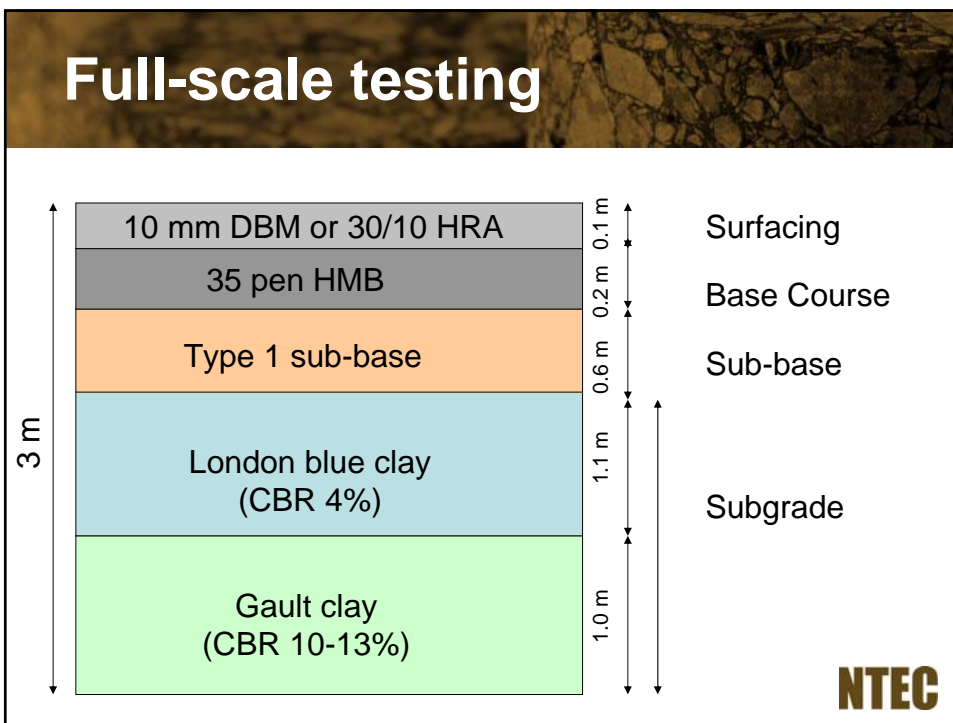
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Full-scale testing (TRL)



Full-scale testing



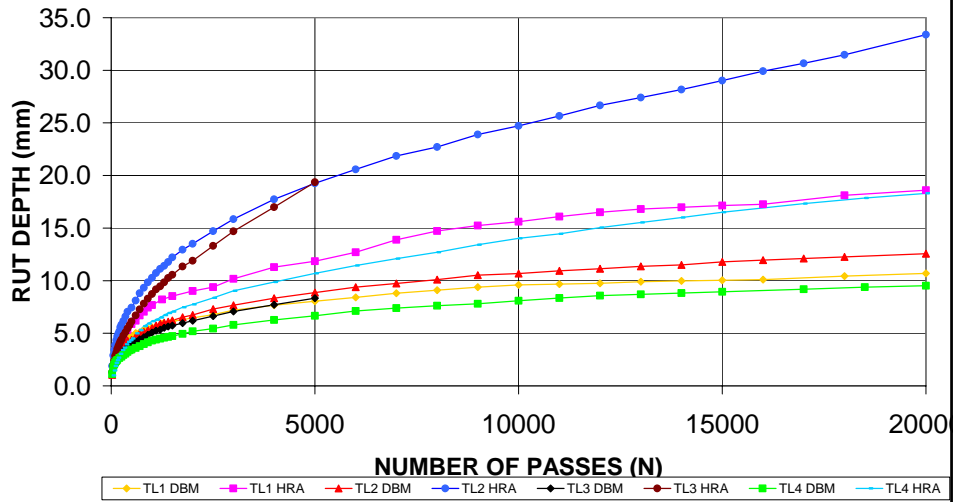
Asphalt laying



Trenched section

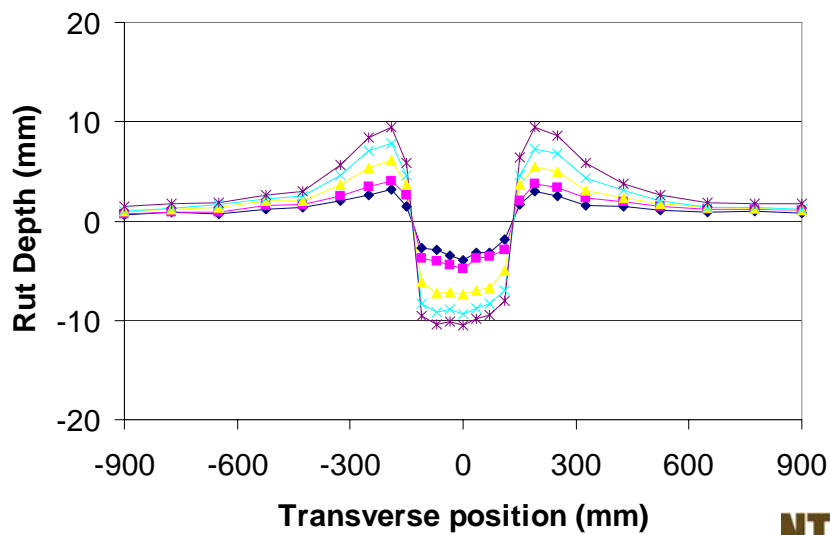


Rut depth



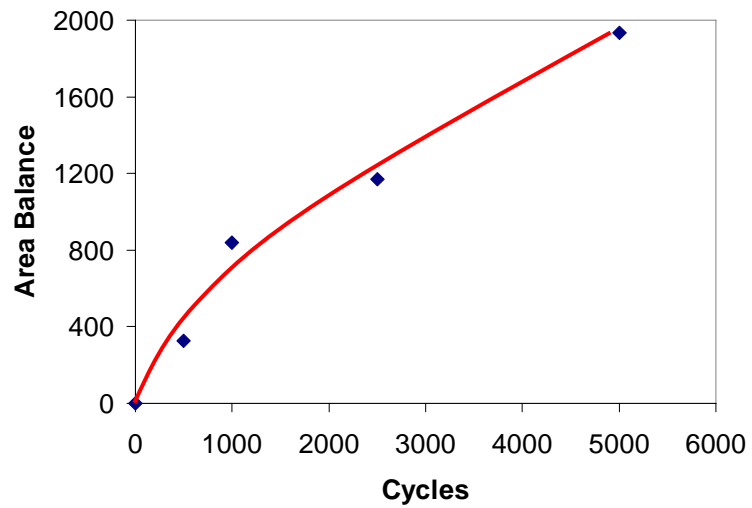
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Transverse profile (HRA)



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Volumetrics (HRA)



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Summary & conclusions

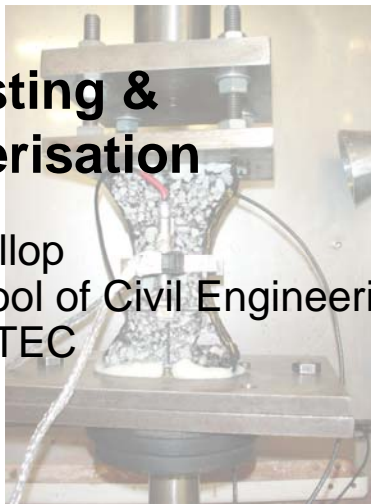
- Careful experimentation critical in robust model development (not easy)
- Relatively simple experiments (uniform stress/strain-rate conditions) required for parameter determination
- More complicated (realistic) stress conditions for validation
- Experimental results represent reality!

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