University of BRISTOL

Bristol Composites Institute (ACCIS)

ADVANCED COMPOSITES COLLABORATION FOR INNOVATION & SCIENCE

Consolidation sensor framework for challenging material characterisation problems

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Importance of consolidation

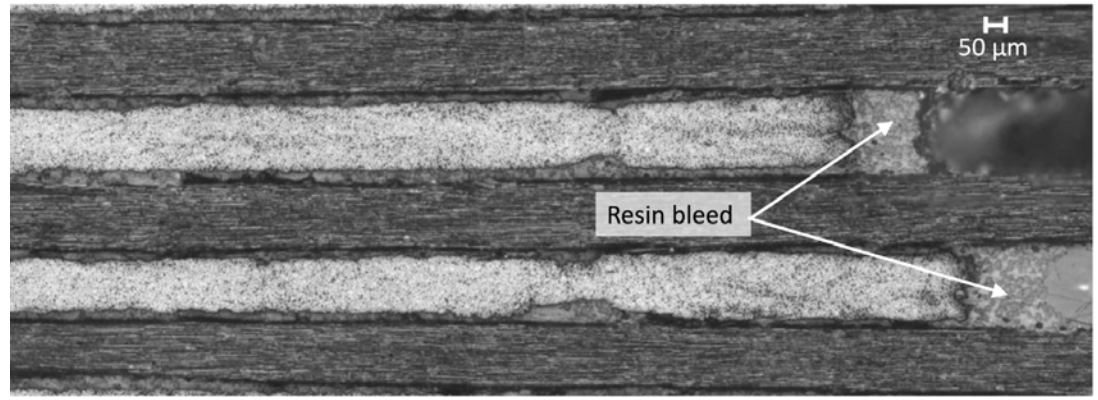
1 - Importance of consolidation in defect formation (fibre path defects, resin defects, voids)

2 - Dimensional tolerances (5% of thickness)

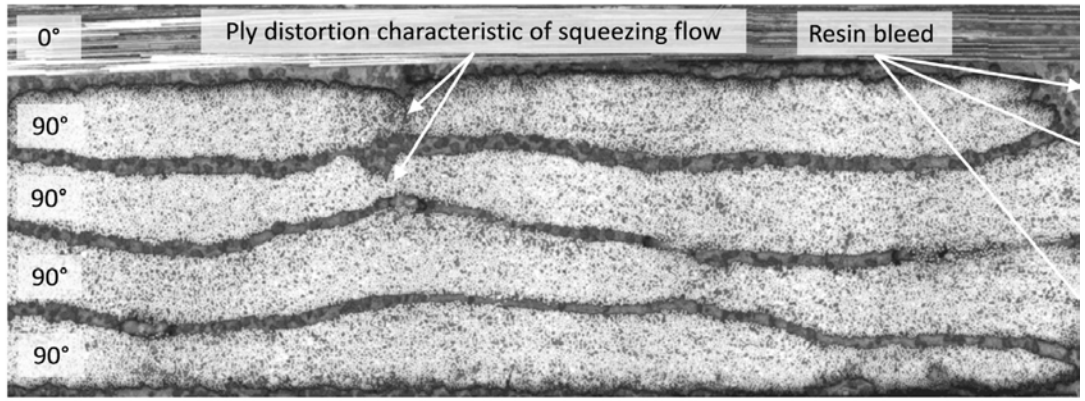
3 - Consolidation is influenced by resin flow modes

4 - Interconnected processes and parameters

Percolation resin flow

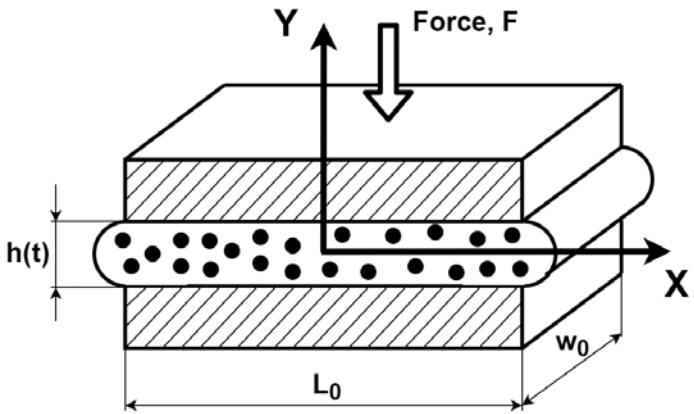


Shear resin flow



Characterisation process

Test scheme



Candidate models

Model 1

$$\frac{dh}{dt} = F(t,h) \cdot Q_1(h)$$

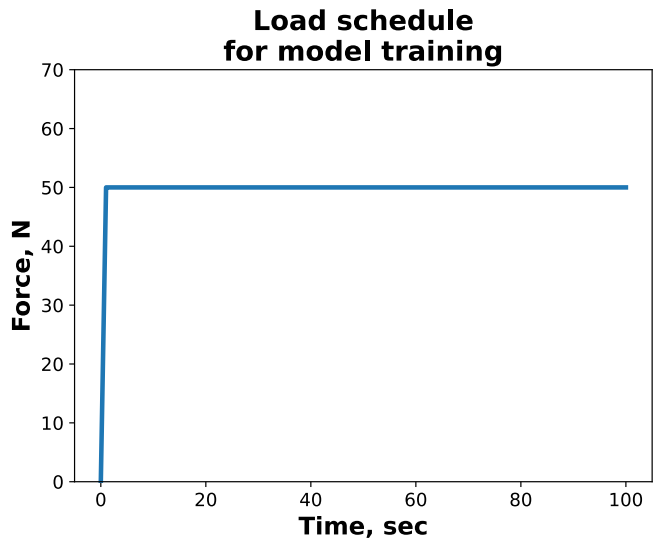
Model 2

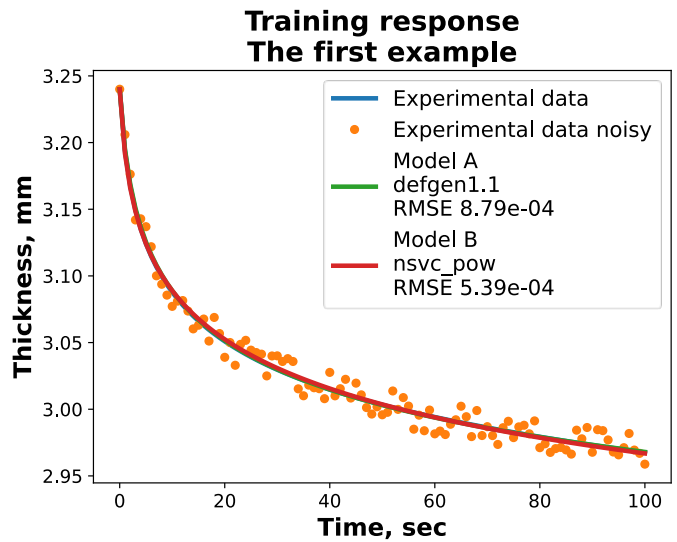
$$\frac{dh}{dt} = F(t,h) \cdot Q_2(h)$$

Model N

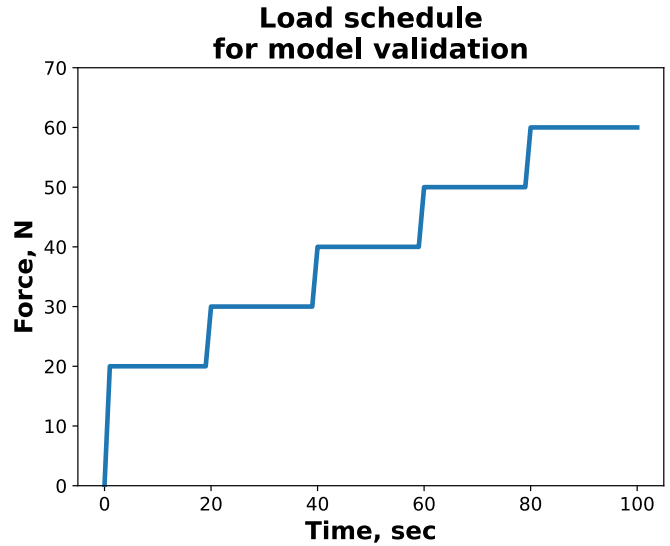
$$\frac{dh}{dt} = F(t,h) \cdot Q_N(h)$$

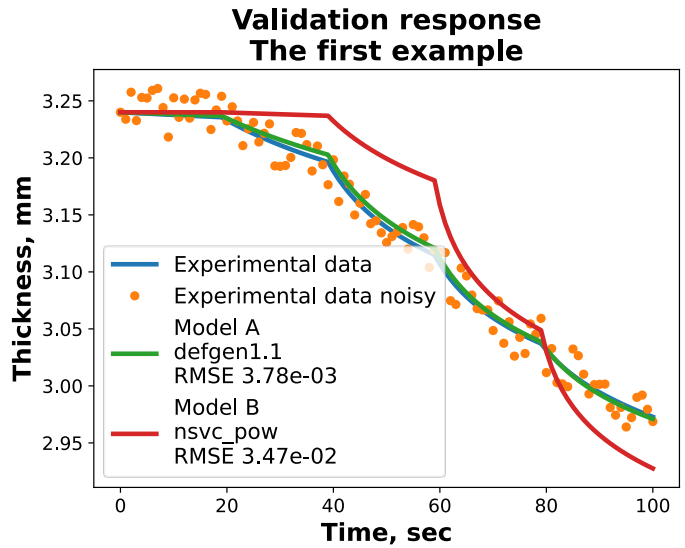
Training





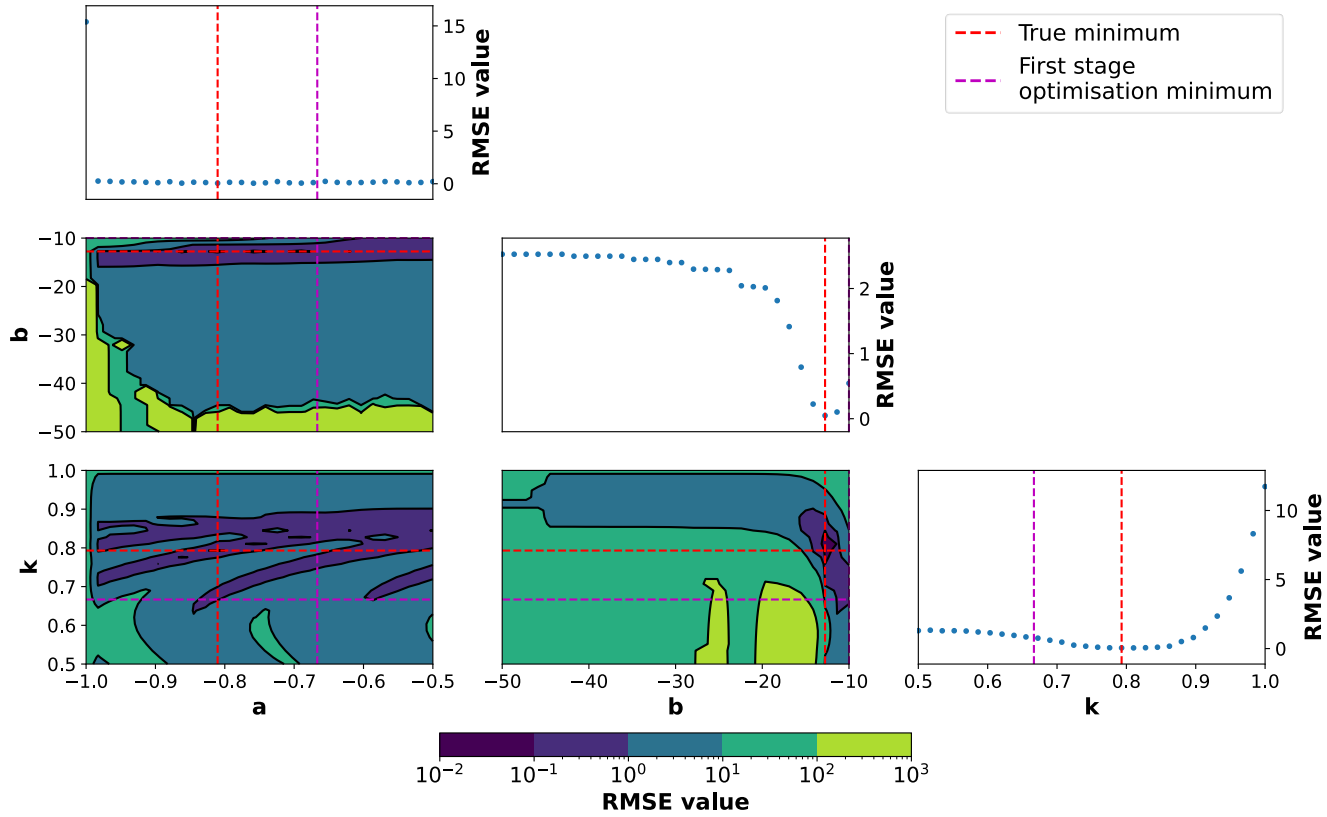
Validation



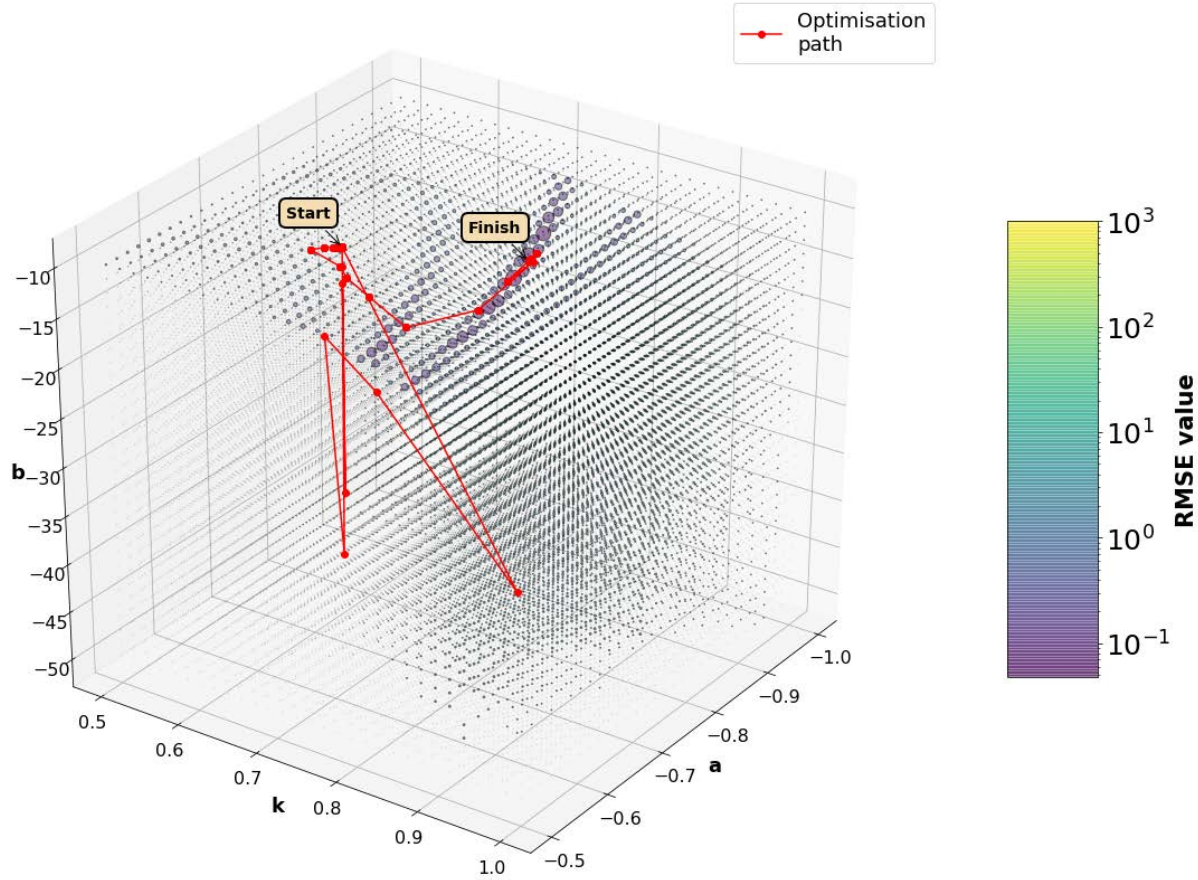


Two-step parameter extraction

Brute force step

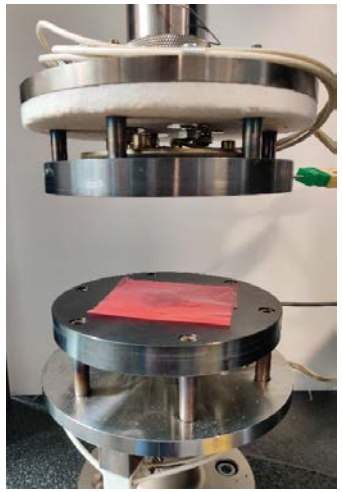


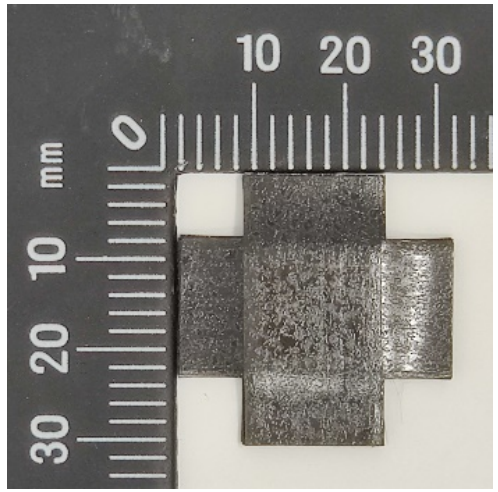
Secondary optimisation



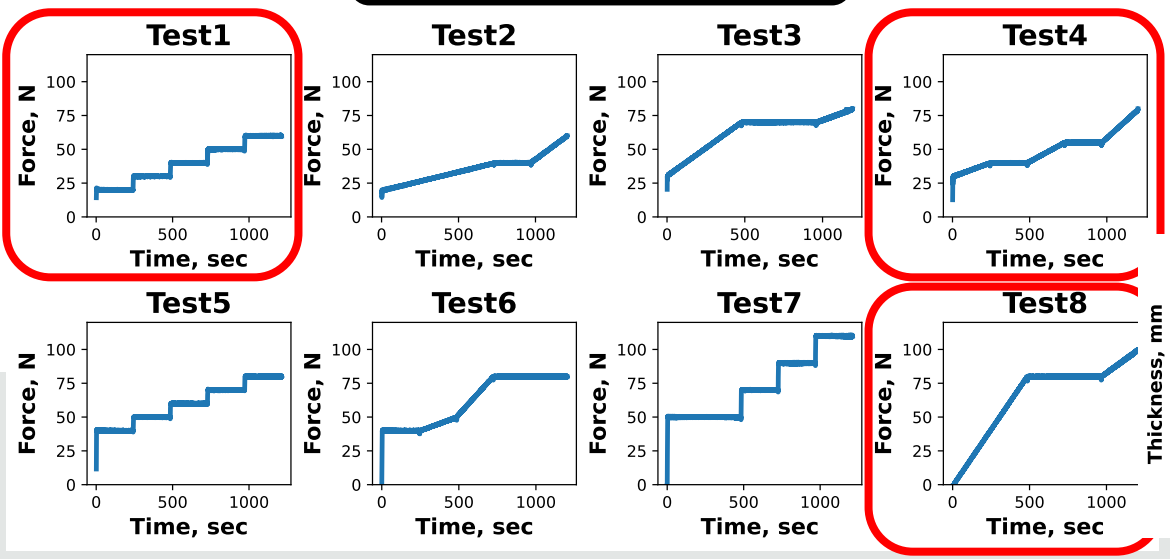
Data-rich testing programme

Test setup





Test cases

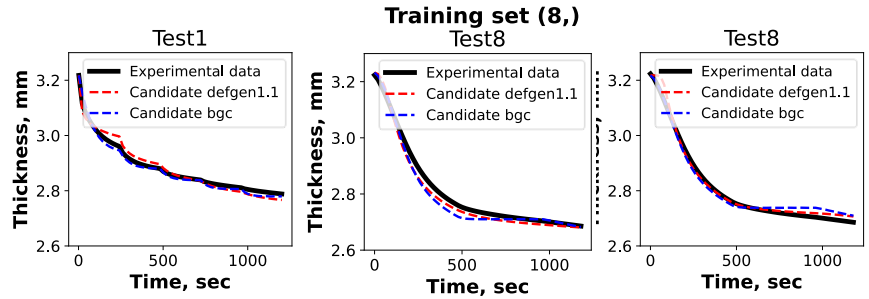


Training set options

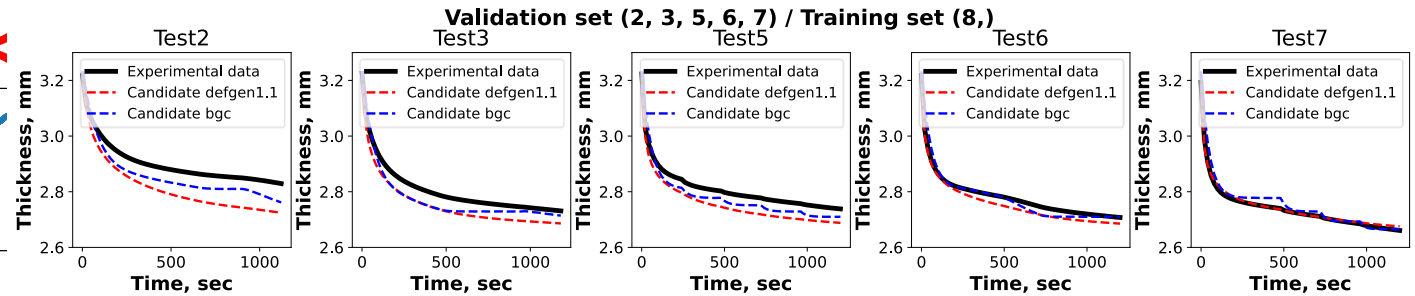
- Test 1
- Test 4
- Test 8
- Test 1, Test 4
- Test 1, Test 8
- Test 4, Test 8
- Test 1, Test 4, Test 8

Training / Validation

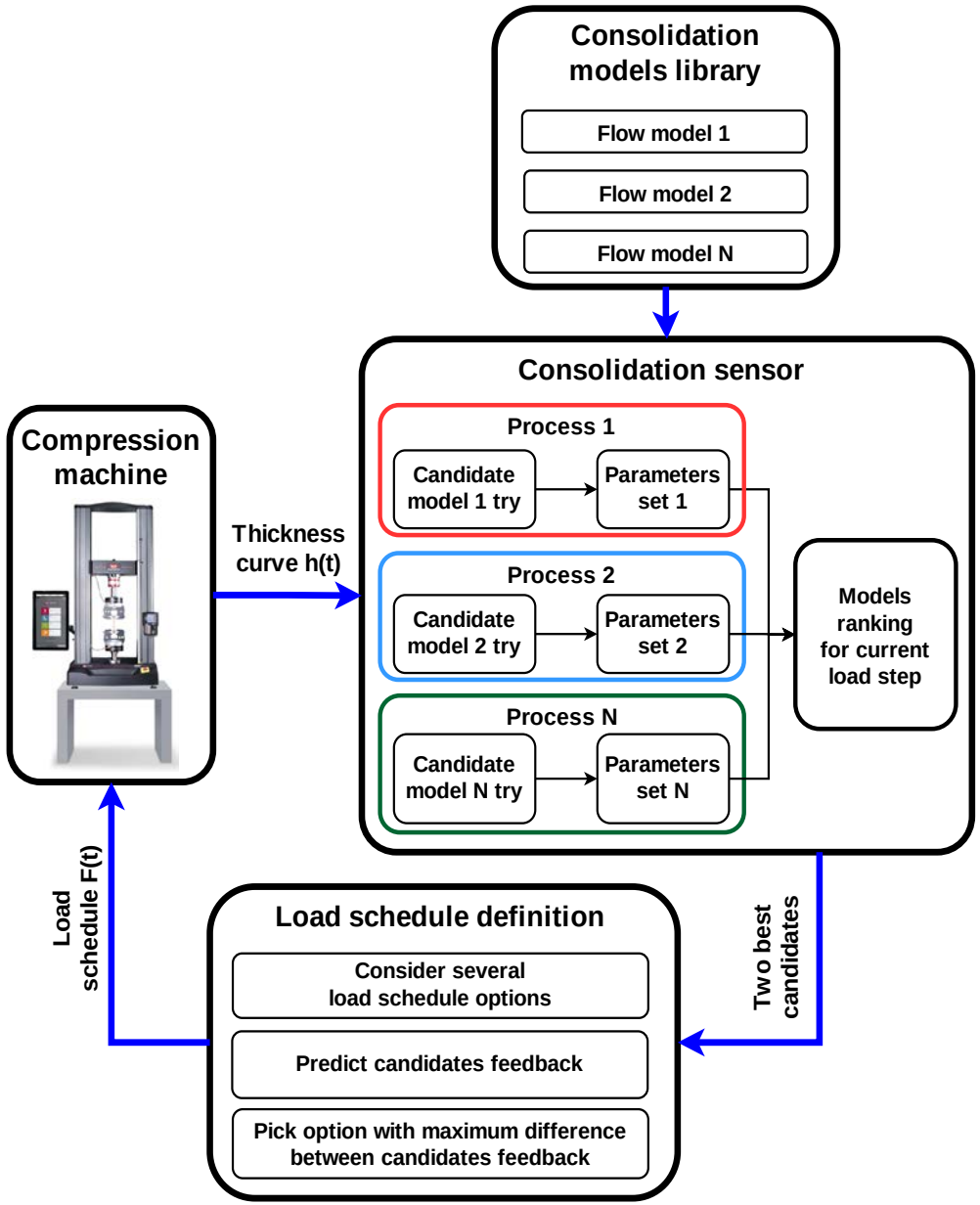
Training



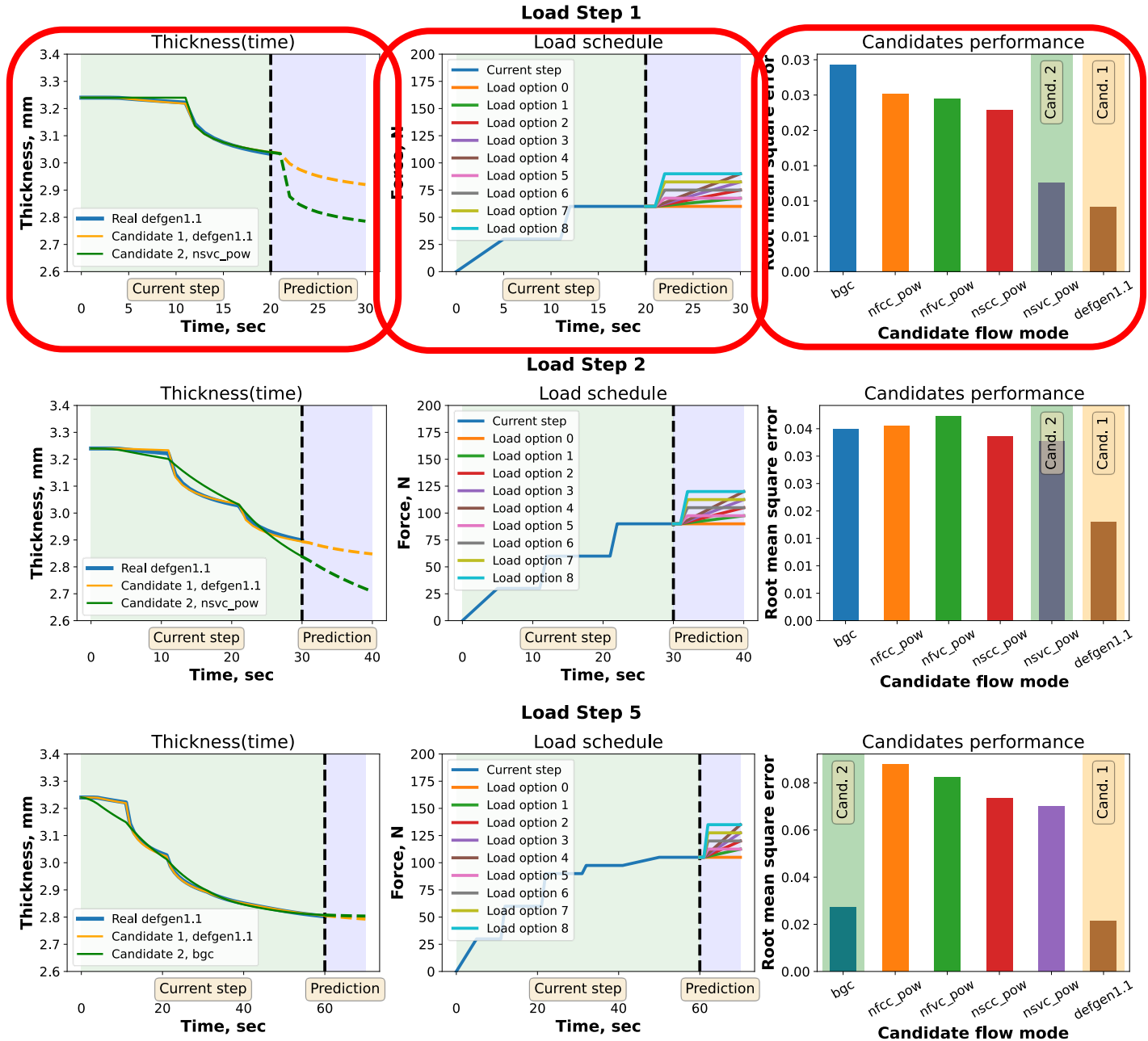
Validation



Conceptual design



Test example



Thank you
for your attention!

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