

Proposed Ageing Model for bituminous binders

RPF THIRTY- SIXTH MEETING
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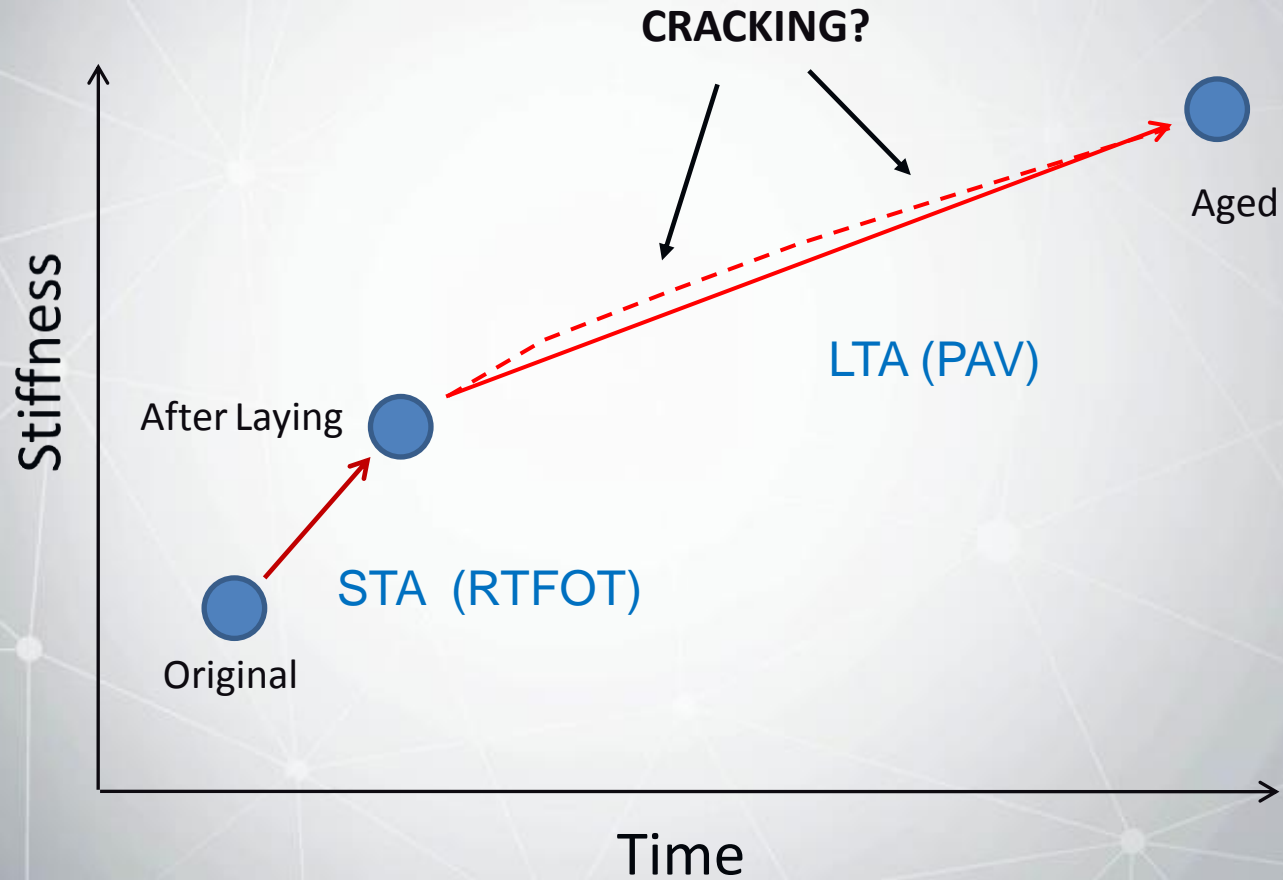
13th November, 2018

Engineering Perspective?



- Optimist: The Glass Is Half Full*
- Pessimist: The Glass Is Half Empty*
- Engineer: The Glass Is Twice The Size It Needs To Be*

Proposed Model



Ageing Indicators

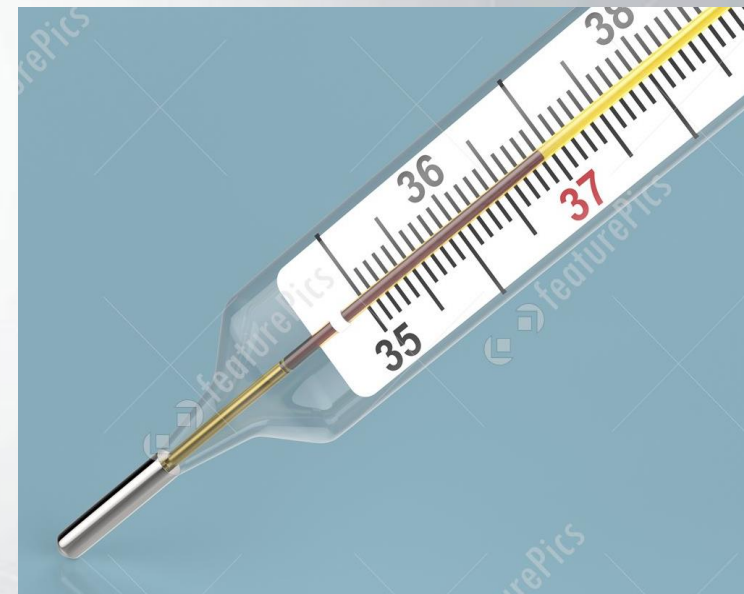
- Many parameters available
 - Empirical (Softening point, penetration, etc)
 - Fundamental rheological properties (G^* , δ , J_{NR} , etc)
- Study focused on evaluating both types – but only softening for this presentation

STA modelling: Original Planning

- Determine increase in stiffness from the original binder state to that after manufacture, transport and placement
 - Binder sample from plant vs asphalt samples from site after laying (followed by recovery)
- Variables: Temperatures, Time/Distance, Mix type, film thickness
- 6 different binders
 - 10/20 or 15/25 for EME
 - 35/50
 - 50/70
 - SBR
 - SBS
 - Warm mix binder
- 10 mixes for each binder

STA modelling: Reality !!!!!!!

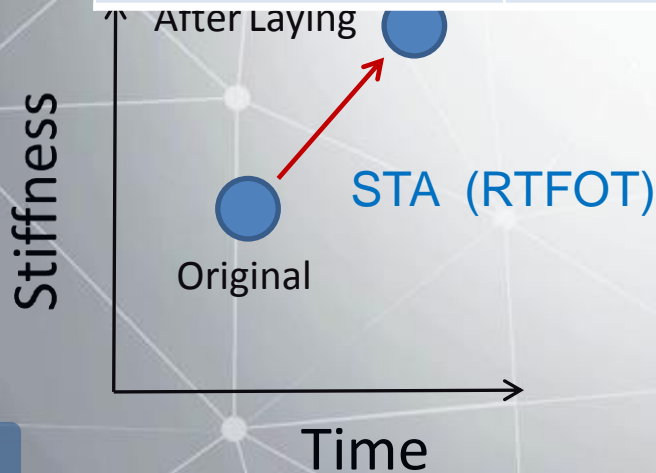
- 30 mixes evaluated the majority of binders consisting of 50/70 and SBS-modified binders
- After completion, results made no sense!!! Internal investigation revealed a broken thermometer
- Blame Game?
 - Greed !!!!
 - Abandoned QC tests to save money
- Repeat was done
 - **incl** all QC tests
 - Thermometer verified daily



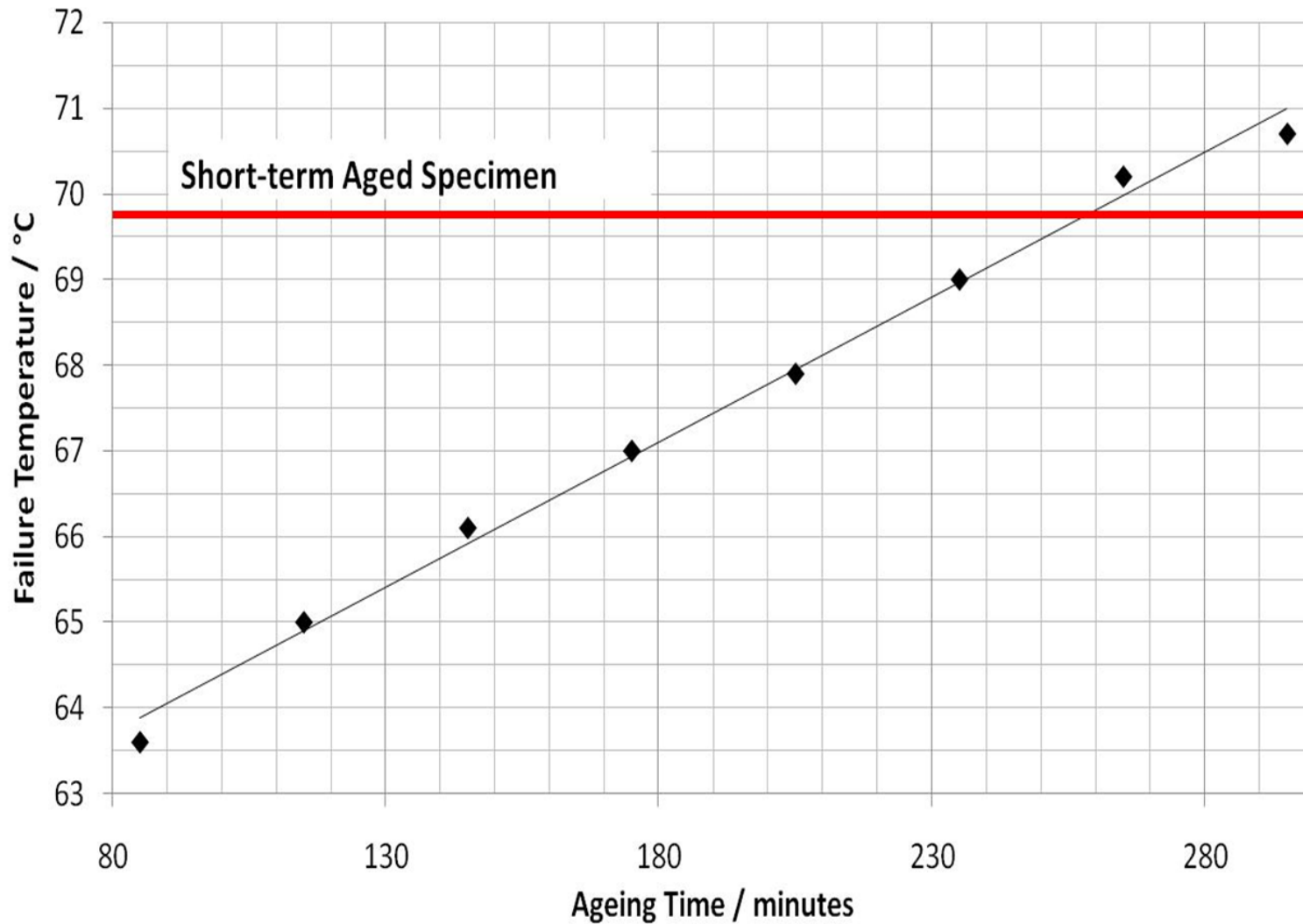
STA Results

Binder	Number of sites	Increase in softening	RTFOT
35/50	2	4.9	4.7
5070	13	5.2	4.0
SBS modified	8	- 22.7	-22.6

SBS modified - 2yrs earlier	2	- 20,5	-12.4
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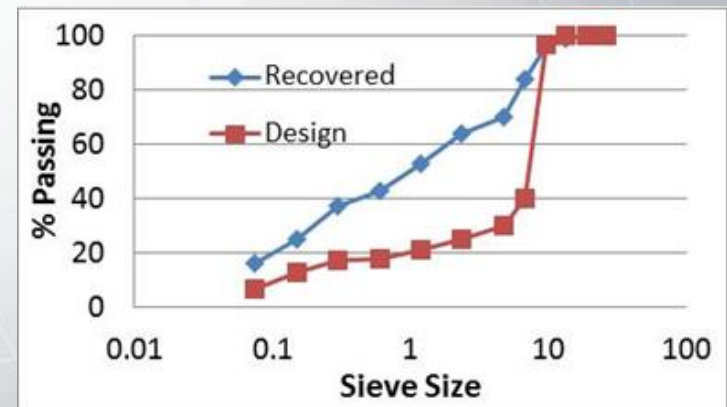
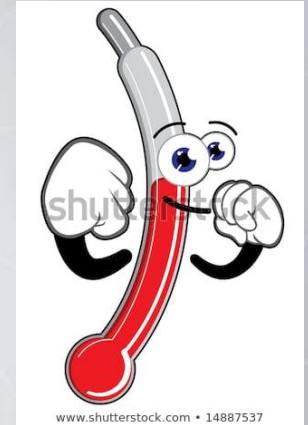


STA for SBS-modifieds: why the decrease?

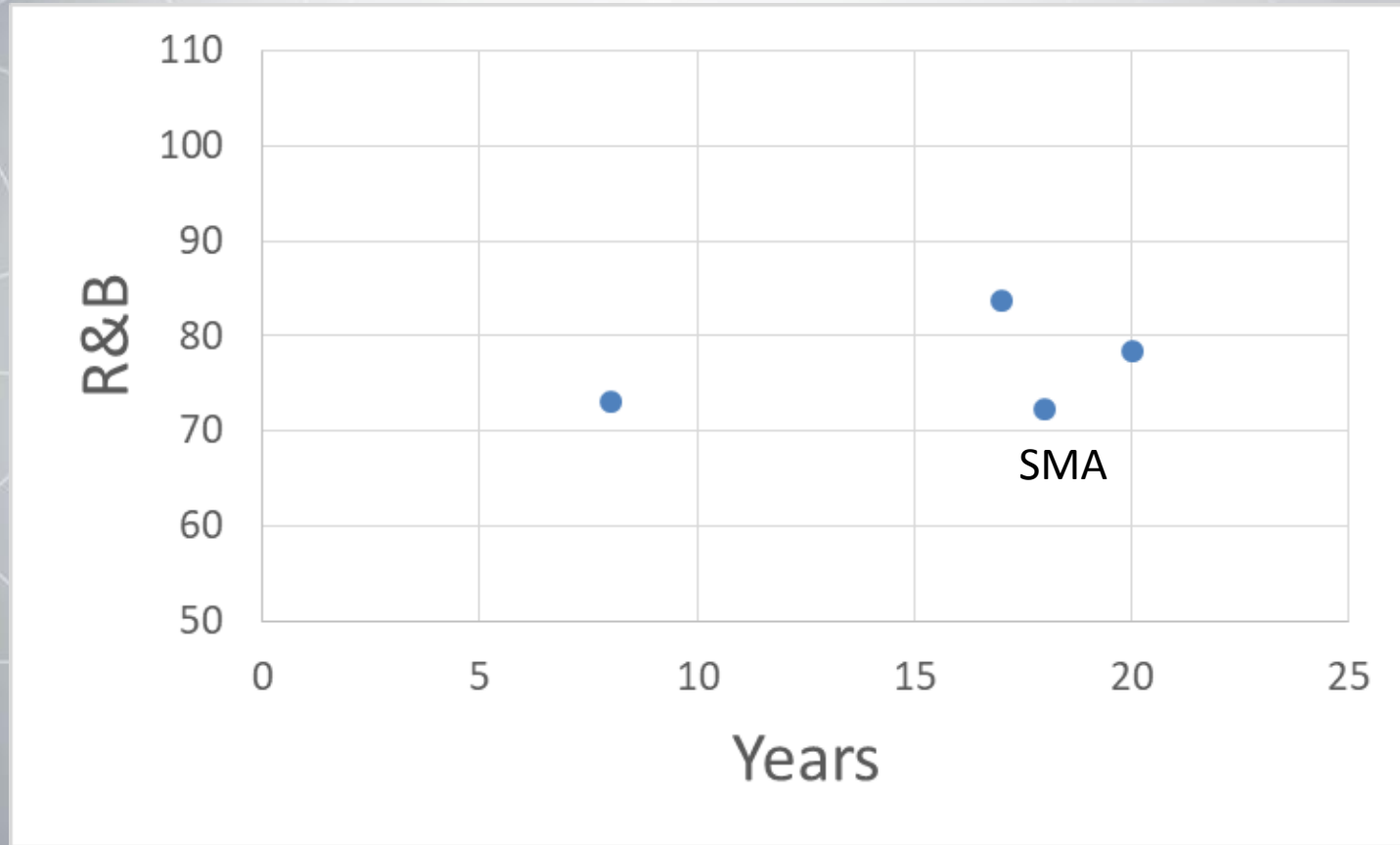


LTA modelling: Reality !!!!!!!

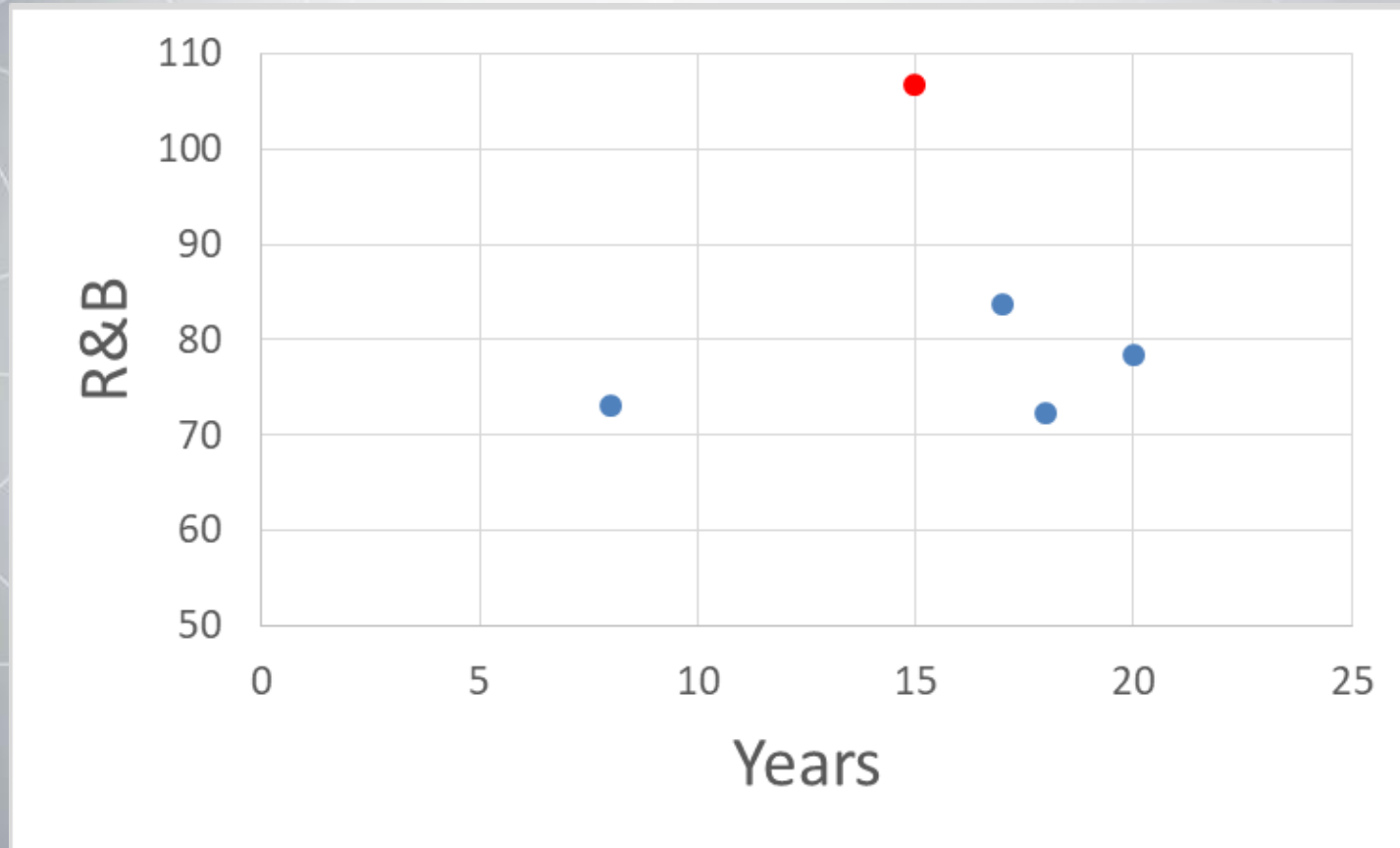
- 45 mixes evaluated the majority of binders consisting of a variety of binders and mix types
- 50% re-evaluated
- Issues?
 - Diligent engineer !!!!
 - Rejuvenator spray?
 - Mill and replace



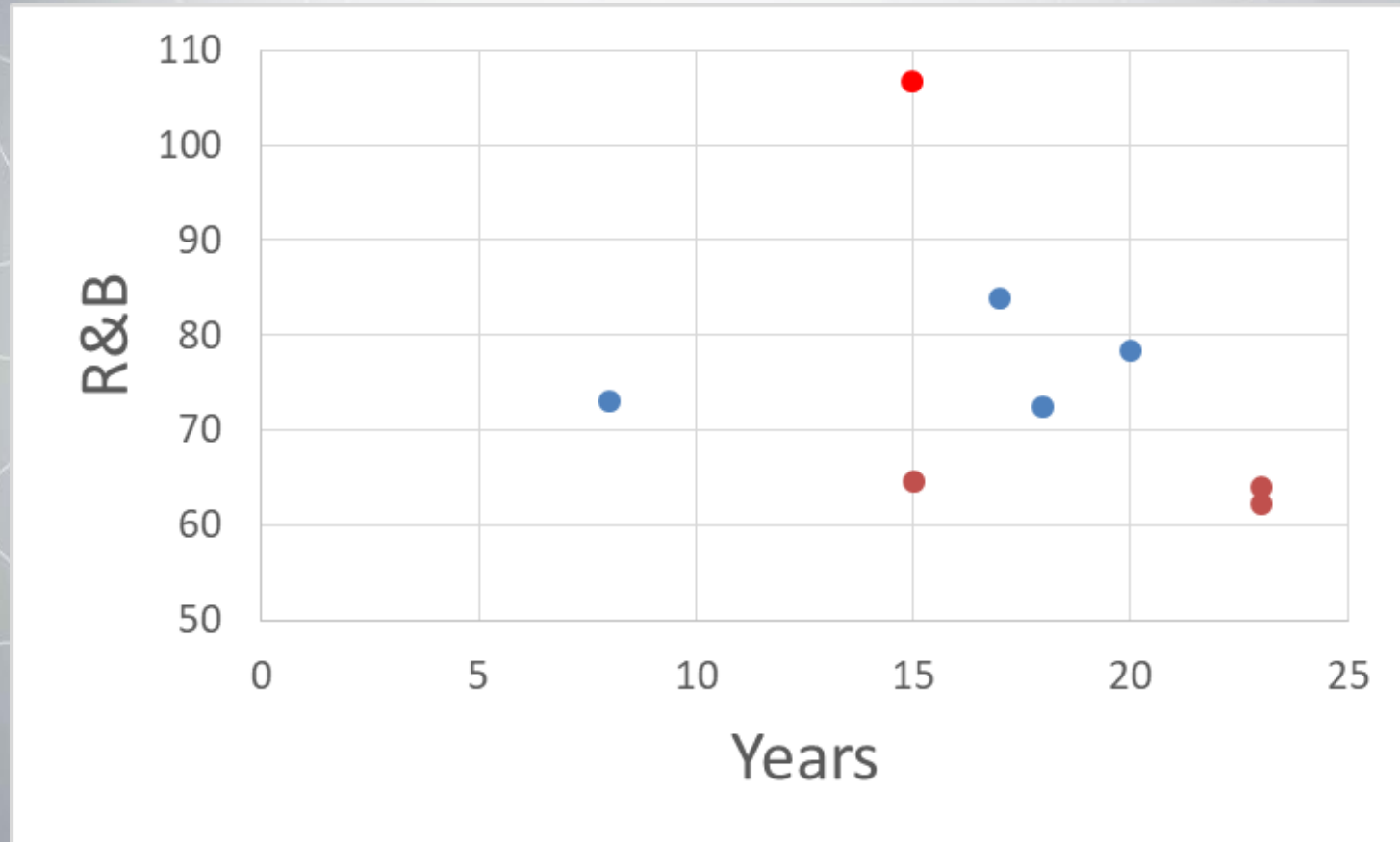
LTA Results



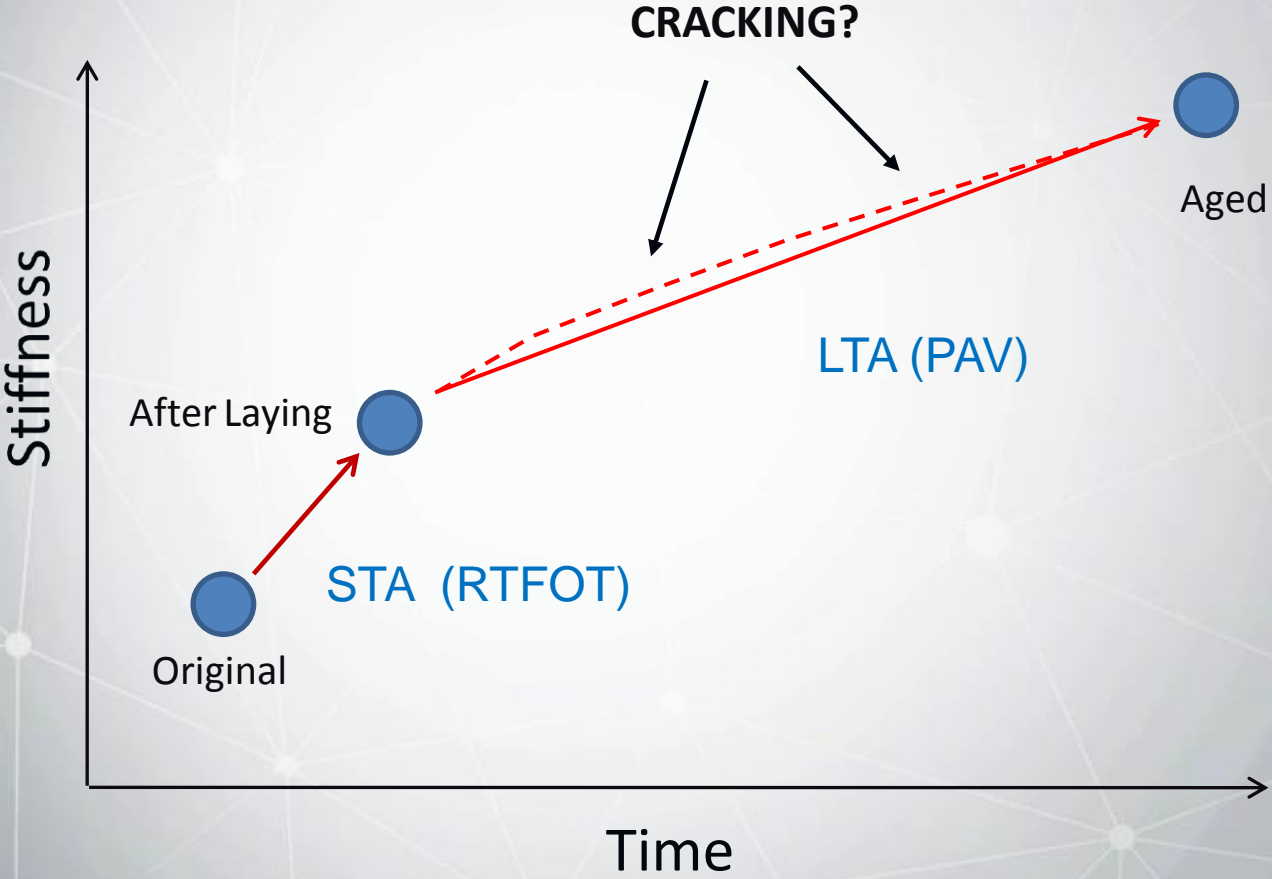
LTA Results



LTA Results



Third phase



Acknowledgements

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Thank you



Confidential