Performance of Composite Liner: Shotcrete and Thin Spray-on Liner (TSL)

Shotcrete

TSL

- sprayed onto the rock
- part of a support system
- strength increases over time

- sprayed concrete
- cement, aggregates, water with or without fibre reinforcement
- thickness between 50 mm to 100 mm

- liquid (polymer) and powder (cement)
- thickness between 3 mm and 5 mm

Advantages of TSLs

- Superior tensile and bond strengths and yield characteristics
- Application time is shorter (quicker)
- Equipment is smaller and therefore maintenance is much simpler
- Significant time savings in materials handling
- User friendly and cost effective
- Do not require large amounts of capital to be spent setting up plants


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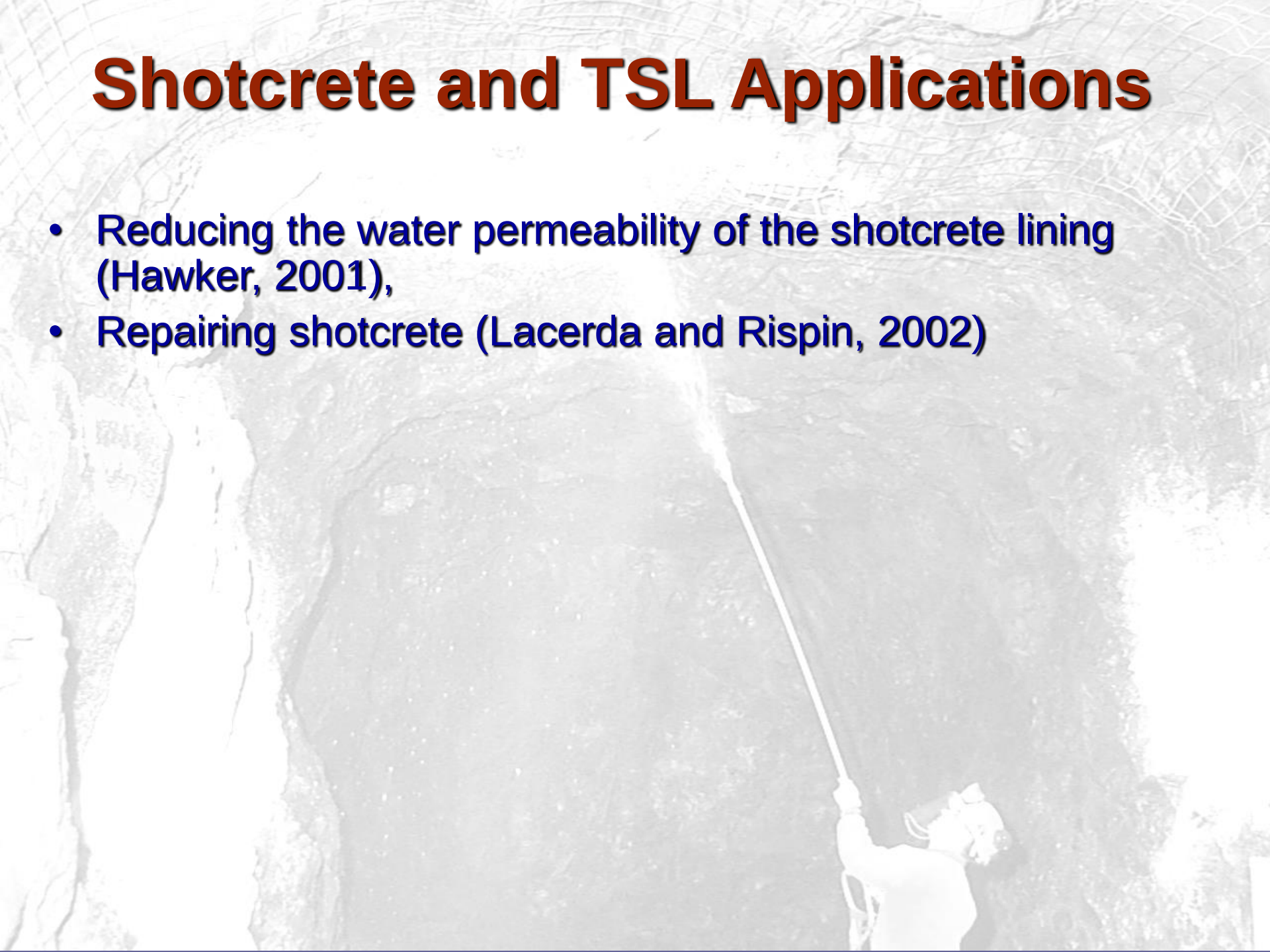
Shotcrete and TSL Applications

- Reducing the water permeability of the shotcrete lining (Hawker, 2001),
- Repairing shotcrete (Lacerda and Rispin, 2002)



Question

- Is it possible to reduce the shotcrete thickness?
- Can this reduction be achieved by TSL application over or under shotcrete?
- Shotcrete performance should remain the same.

TSL laboratory tests

On Rock

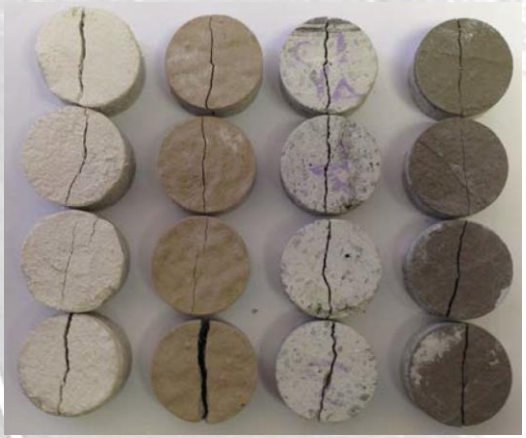
- Enhance the strength of rock Up to 40%

(Tarr *et al* 2006)

(Mpunzi, 2011)

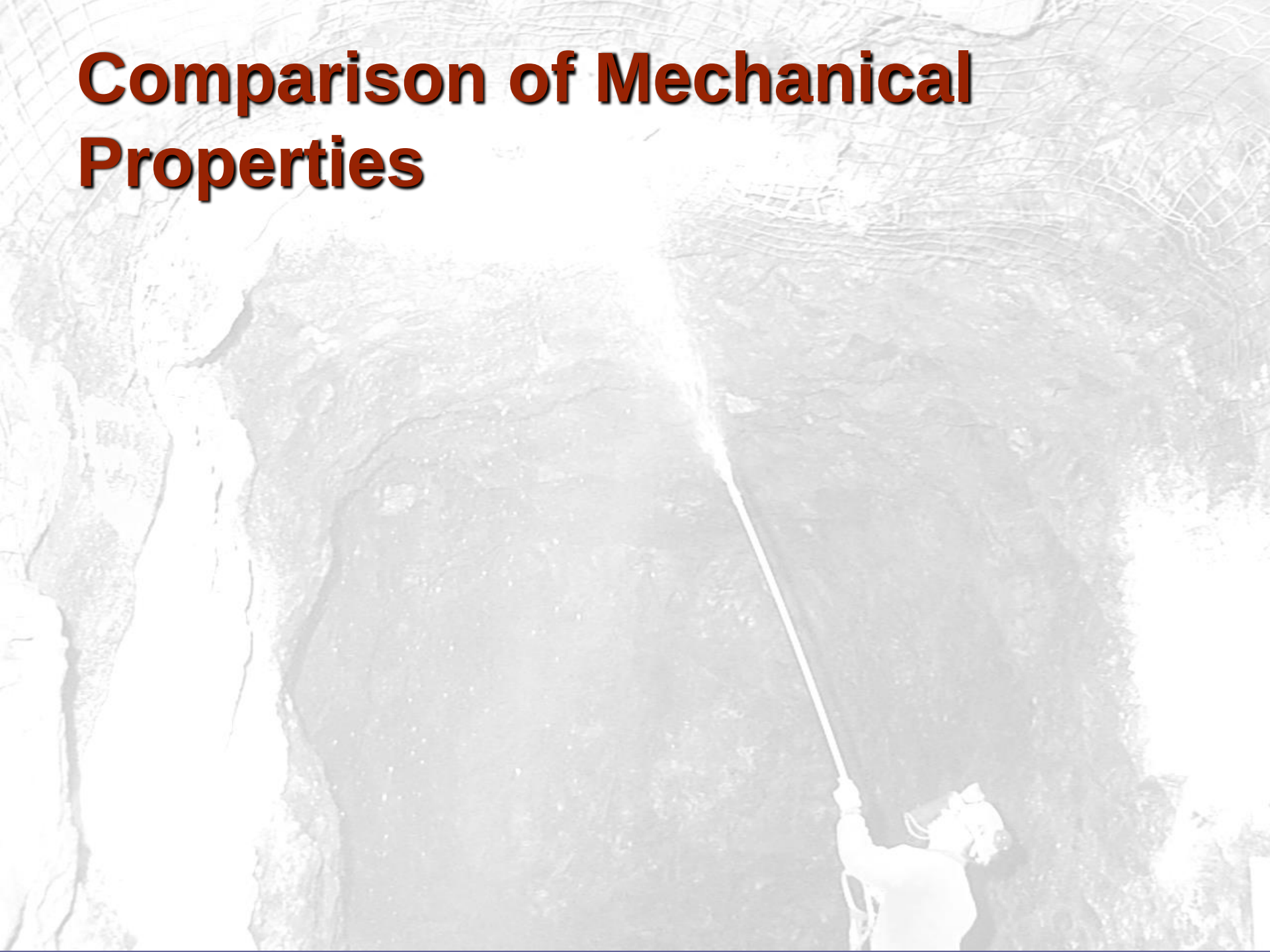
On Shotcrete

- Tensile strength increased by 40% after 28 days



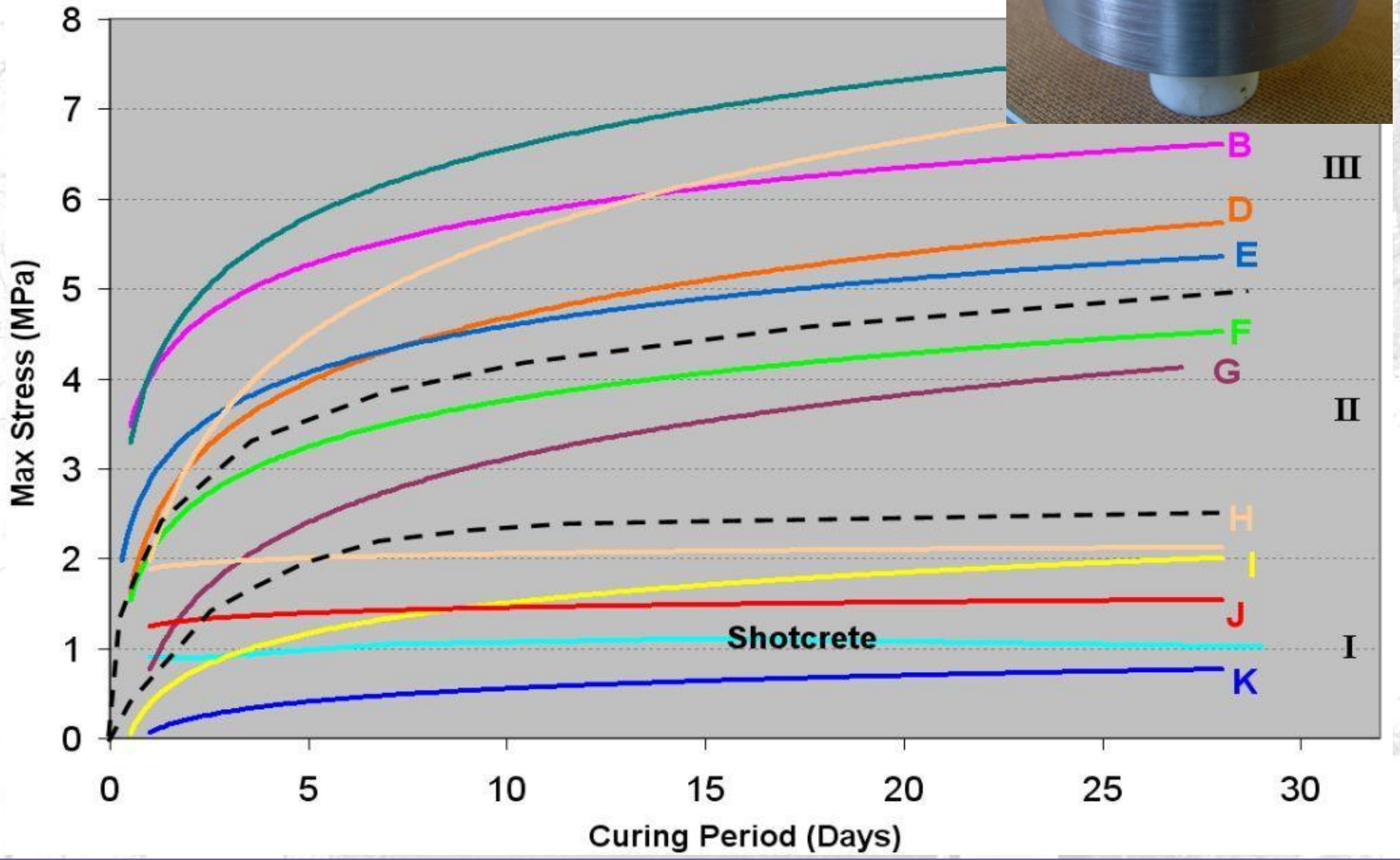
Masethe (2015)

Comparison of Mechanical Properties

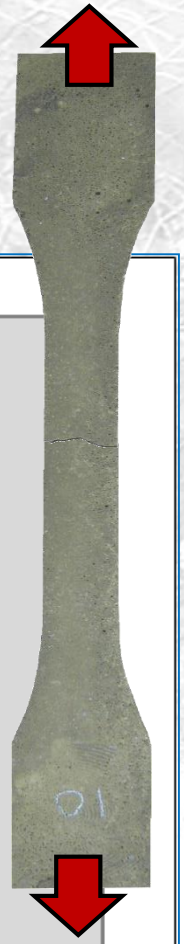


Bond Strength (Tensile)

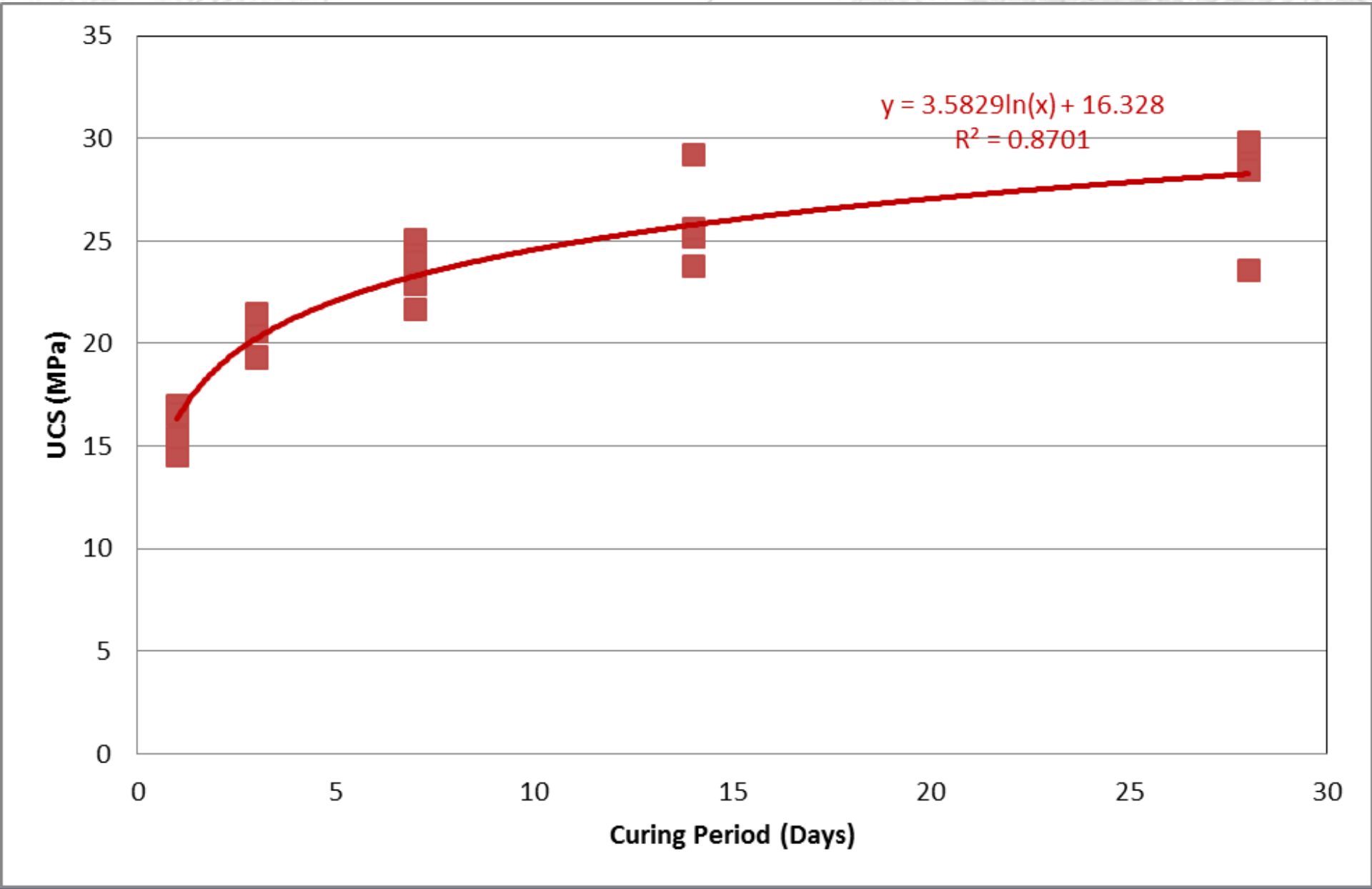
Bond Strength (Shear)



Tensile Strength



Compressive Strength (TSL)



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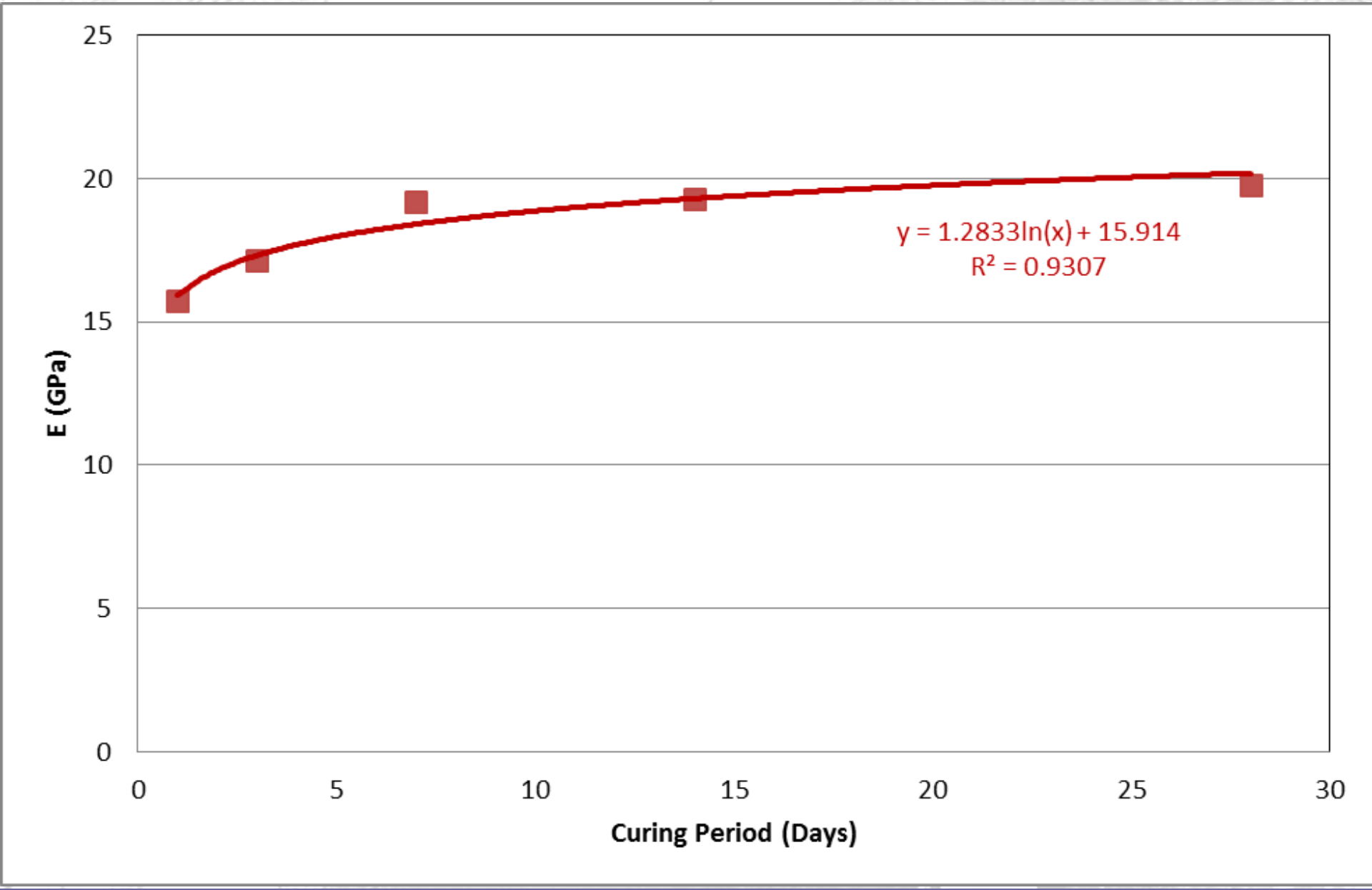
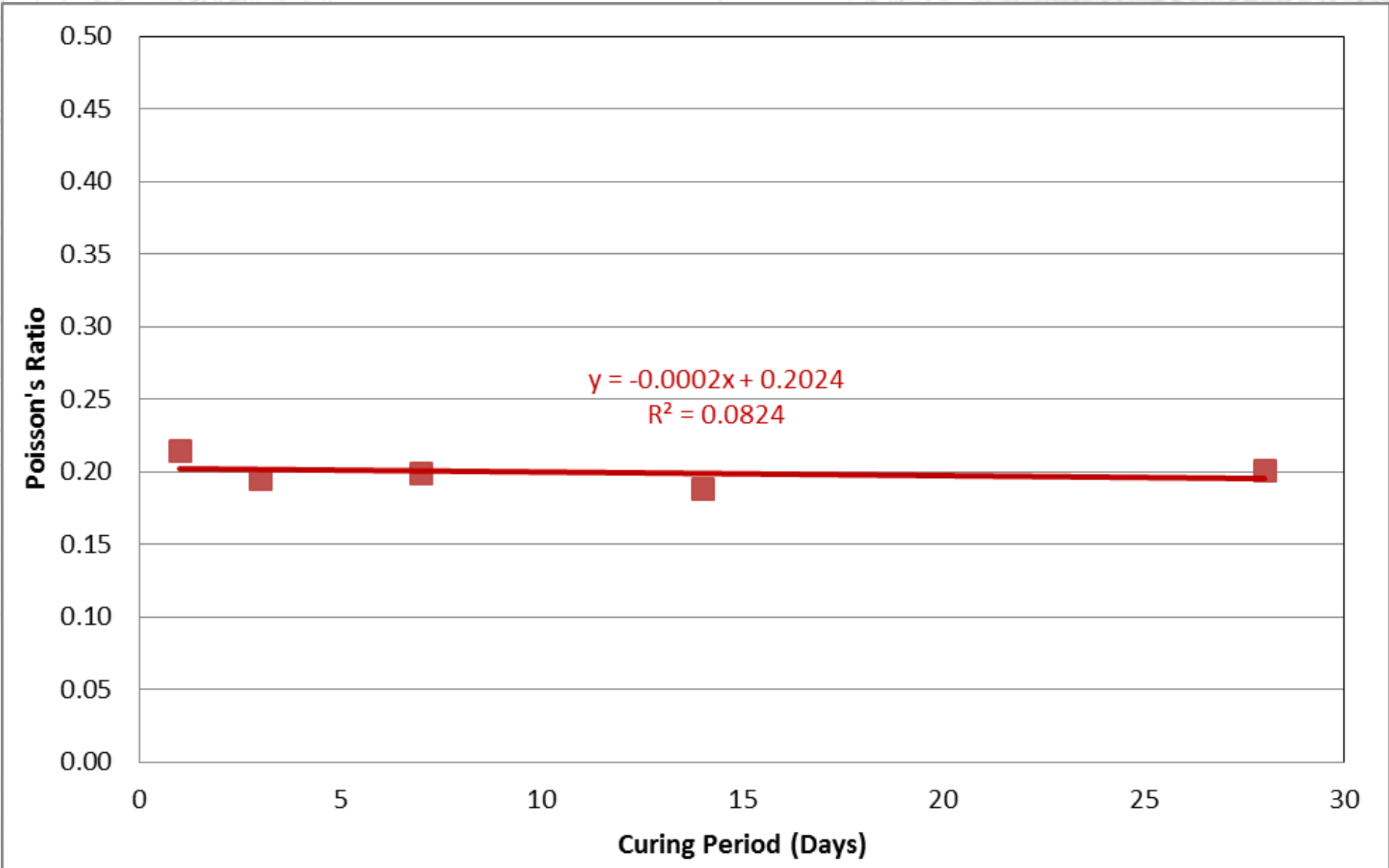


Compressive Strength (TSL)



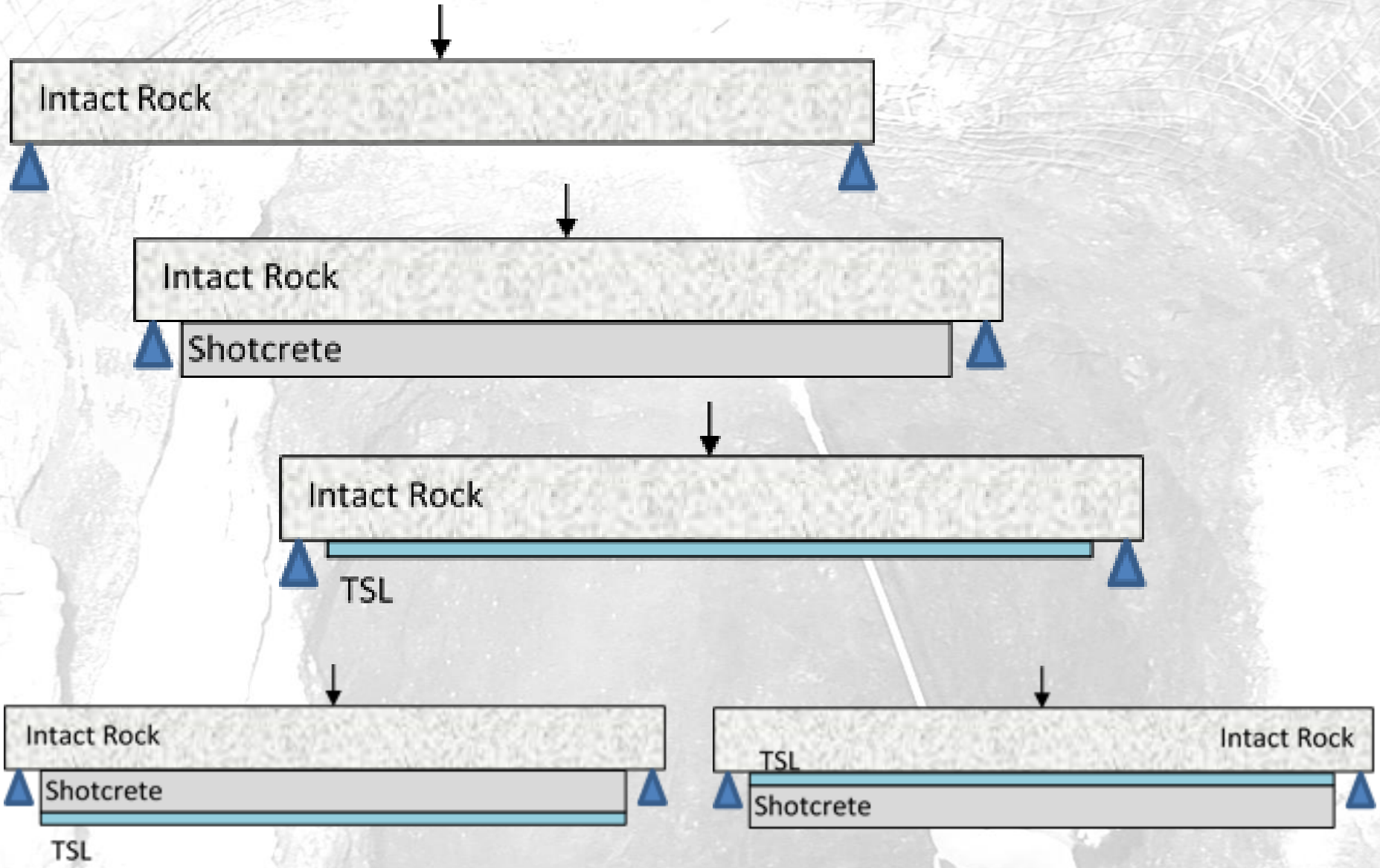
Questions;

- Would the contribution of TSLs on shotcrete performance be formulated?

- Is it possible to reduce the shotcrete thickness when it is used in combination with a TSL?

- Is there any difference on shotcrete performance if the TSL is applied over or under shotcrete?

Suggested scenarios to be examined



QUESTIONS???