CONCRETE SOLUTIONS FOR HIGH TEMPERATURES
Effects of elevated temperatures on concrete and cementitious materials
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Motivation
Concrete at high temperatures suffers loss in strength, which has led to catastrophic failures.

Objectives
• Improve understanding of effects of elevated temperatures on concrete materials
• Develop new construction materials to better withstand elevated temperatures

Research significance

Material development
Inspired by the thermal changes within concrete

Results
Residual compression strength:

- 2% PVA fibers → strength retention up to 400°C
- Loss beyond 400°C similar in all concretes

Residual flexural (tensile) strength:

- 2% PVA fibers only → similar to concrete after 200°C (melting of fibers)
- HFR-SHCC performs better up to 600°C than conventional concrete @ 20°C

Summary
Successful development HFR-ECC:
- Strain-hardening behavior at 20°C
- Compression strength retention till 400°C
- Superior tension strength till 600°C
- Improved bond performance over PVA-SHCC

References

Images:
https://www.tunneltalk.com/images/Mont‐Blanc/The‐aftermath‐of‐the‐1999‐fire.jpg
https://tribktla.files.wordpress.com/2017/03/s077272674‐300.jpg?quality=85&strip=all&strip=all

Tunnels (Mont Blanc, 1999)

Bridges (I-85 near Atlanta, 2017)