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CO_2 Concrete

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Research Interest: Sustainable construction, Green buildings, life-cycle analyses, recycled concrete

Editor
International Journal of Construction Management, Taylor and Francis Group
Construction and Building Materials, Elsevier, Impact factor of 3.485

1 of 184 College of Experts employed by the Australian Research Council (ARC), Australian Government

Competitive research funding: Awarded 36 research grants (totalled AU$2.5 million), including two ARC Discovery Project, Life cycle analysis for green building implementation.

Research outcomes: 2 books, 19 book chapters, 227 refereed journal articles and 121 refereed conference papers.

Research impacts: Hirsch Index of 40 (Scopus), 52 (Google Scholar), i10 index of 154 (Google Scholar), a total of 4,714 citations (Scopus), and 9,688 citations (Google Scholar).


MORE
P


27M


20M


17M


2M

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Why Recycled Concrete cannot currently be used for Structural Applications?

- Weak points such as old cement paste attached to old virgin aggregate;
- Possible pre-cracked aggregate;
- Frail interfacial transition zone;
- Poor grading;
- High porosity;
- Low density; and
- High water absorption.

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Keys for using Recycled Concrete for Structural Applications

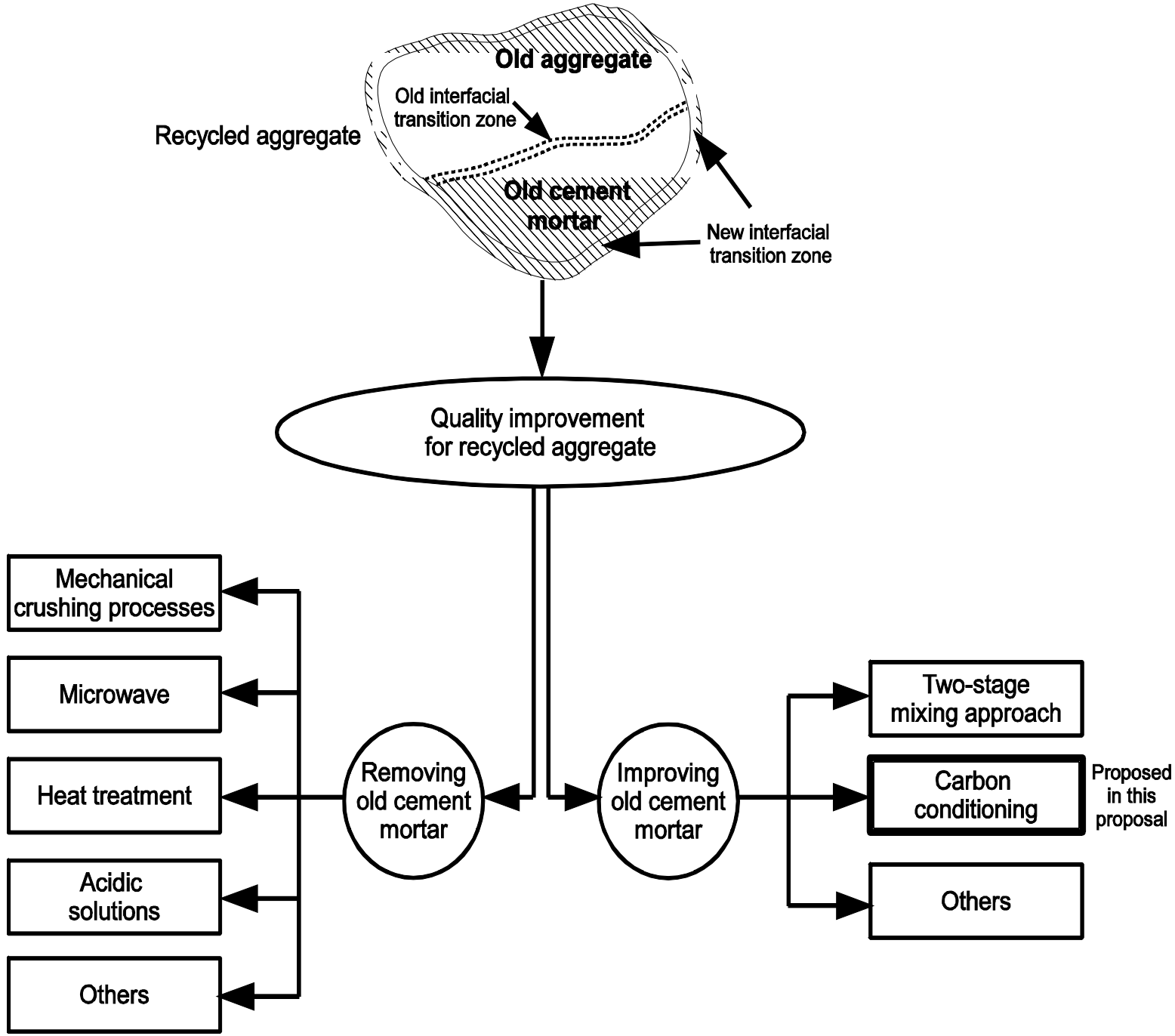
Suitable Physical and Mechanical Properties

– Recycled concrete must match or surpass qualities of virgin concrete.

Real world practicality

– Concrete can be delivered in a timely and achievable manner similar to virgin concrete. Recourses required in these methods must be readily available.

Cost efficiency


Old aggregate
Old interfacial transition zone
Recycled aggregate
Old cement mortar
New interfacial transition zone
Quality improvement for recycled aggregate
Mechanical crushing processes
Microwave
Heat treatment
Acidic solutions
Others
Removing old cement mortar
Improving old cement mortar
Two-stage mixing approach
Carbon conditioning
Proposed in this proposal
Others

CO_2 Concrete

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CO_2 Concrete

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This benefits the environment in two ways:

- Using carbon dioxide which would otherwise be released into the atmosphere, worsening global warming and climate change issues; and

- Reducing landfill space by turning construction waste into construction material, i.e. recycled concrete whose performance is similar to virgin concrete.

This process can bring direct benefits to concrete batching plants as

Slump

Compression Strength

Modulus of Elasticity

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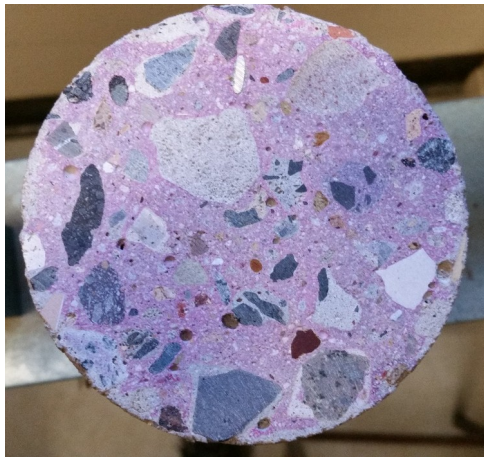
Flexural Strength

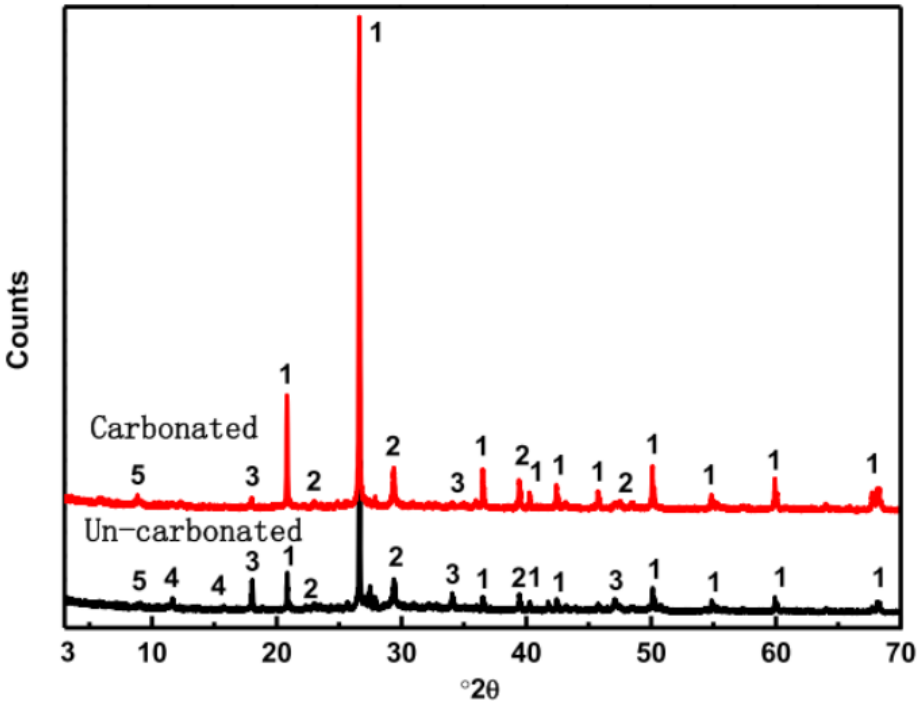
Tensile Strength

Shrinkage

Permeability

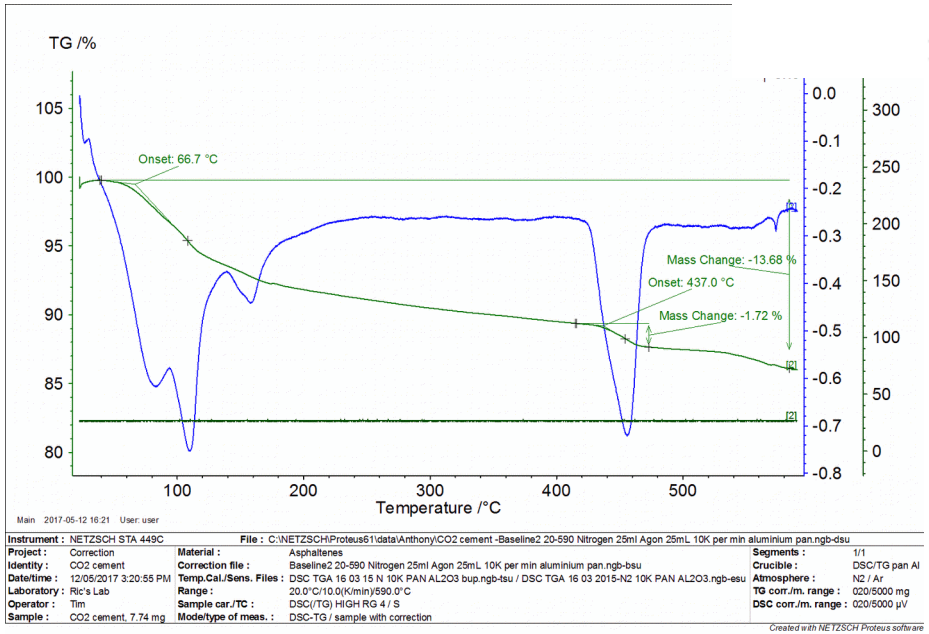


Phenolphth
indicator te



1-quartz; 2-$CaCO_3$; 3-$Ca(OH)_2$; 4-AFt; 5-mica

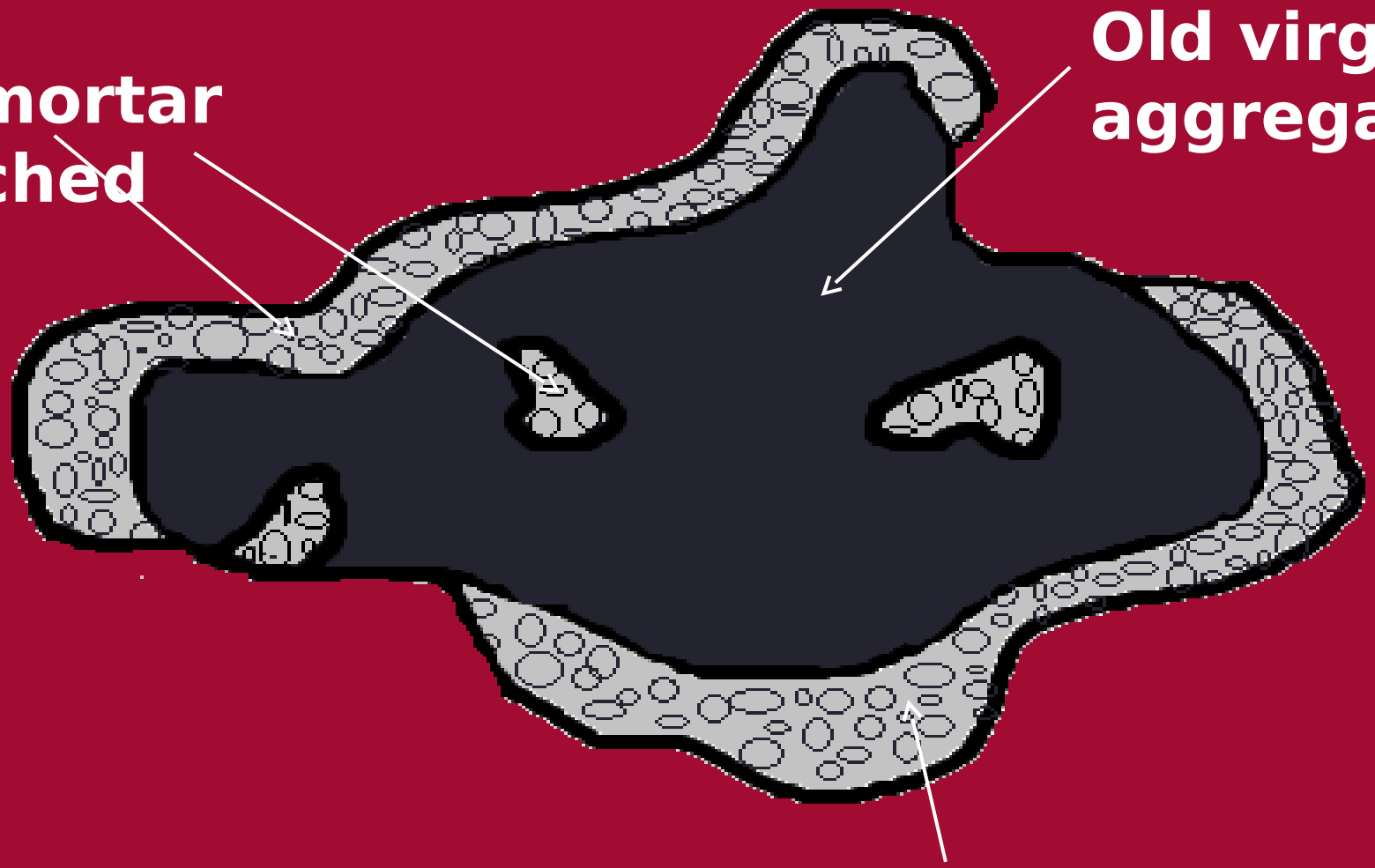
X-ray powder diffracti



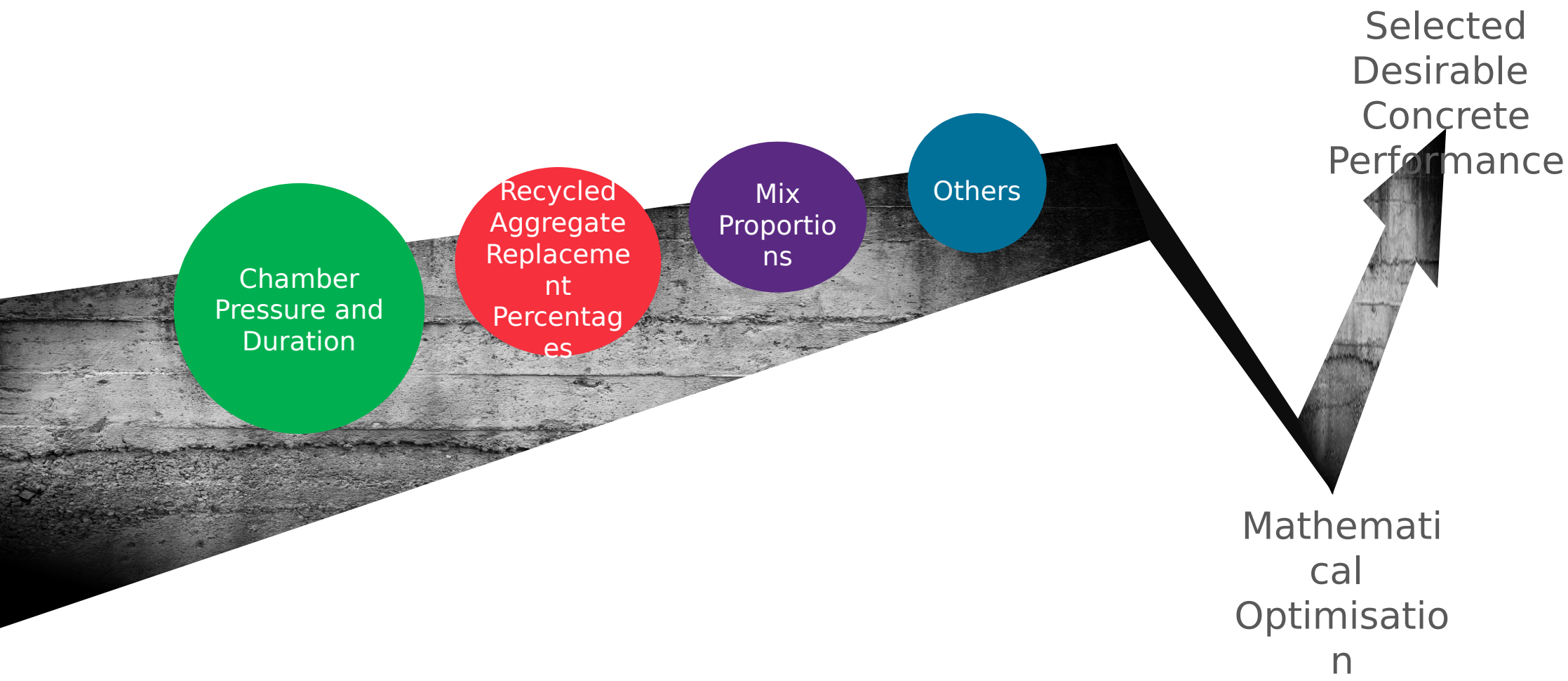
Differential scanning calorimetry

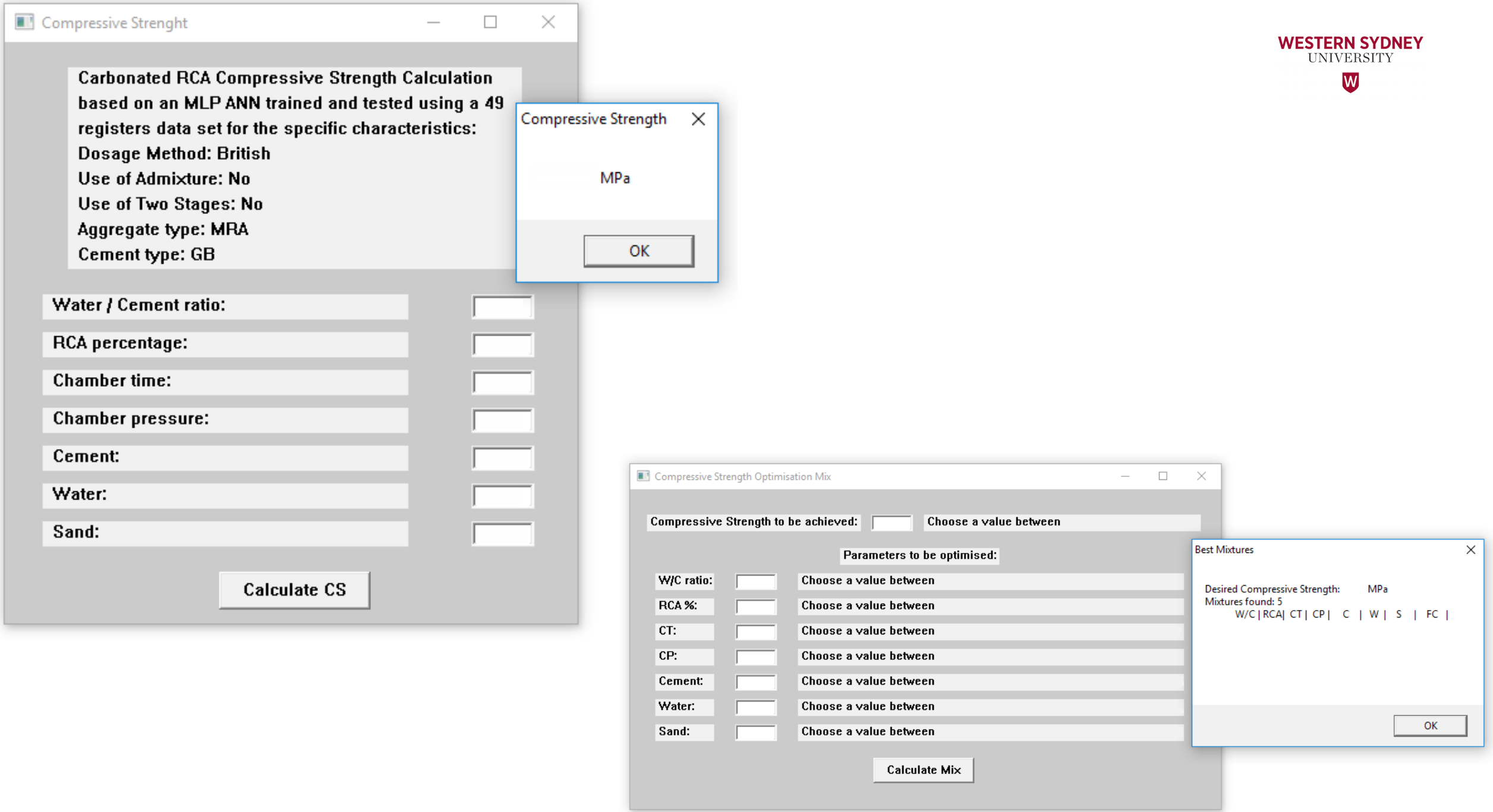
Old mortar attached

Old virgin aggregate



CO_2 enters the old mortar pores and makes it stronger


Chamber Pressure and Duration
Recycled Aggregate Replacement Percentages
Mix Proportions
Others
Selected Desirable Concrete Performance
Mathematical Optimisation



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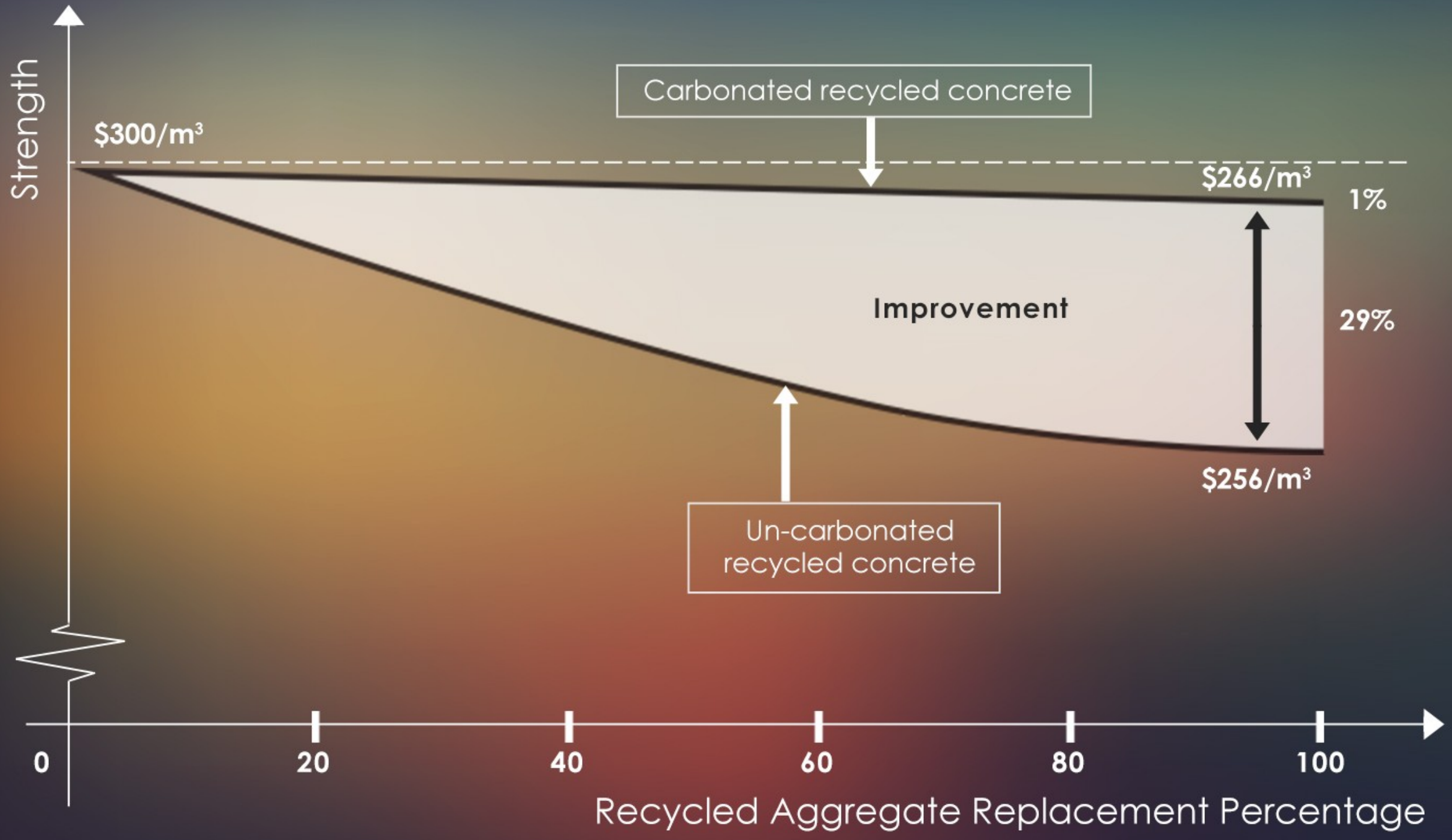
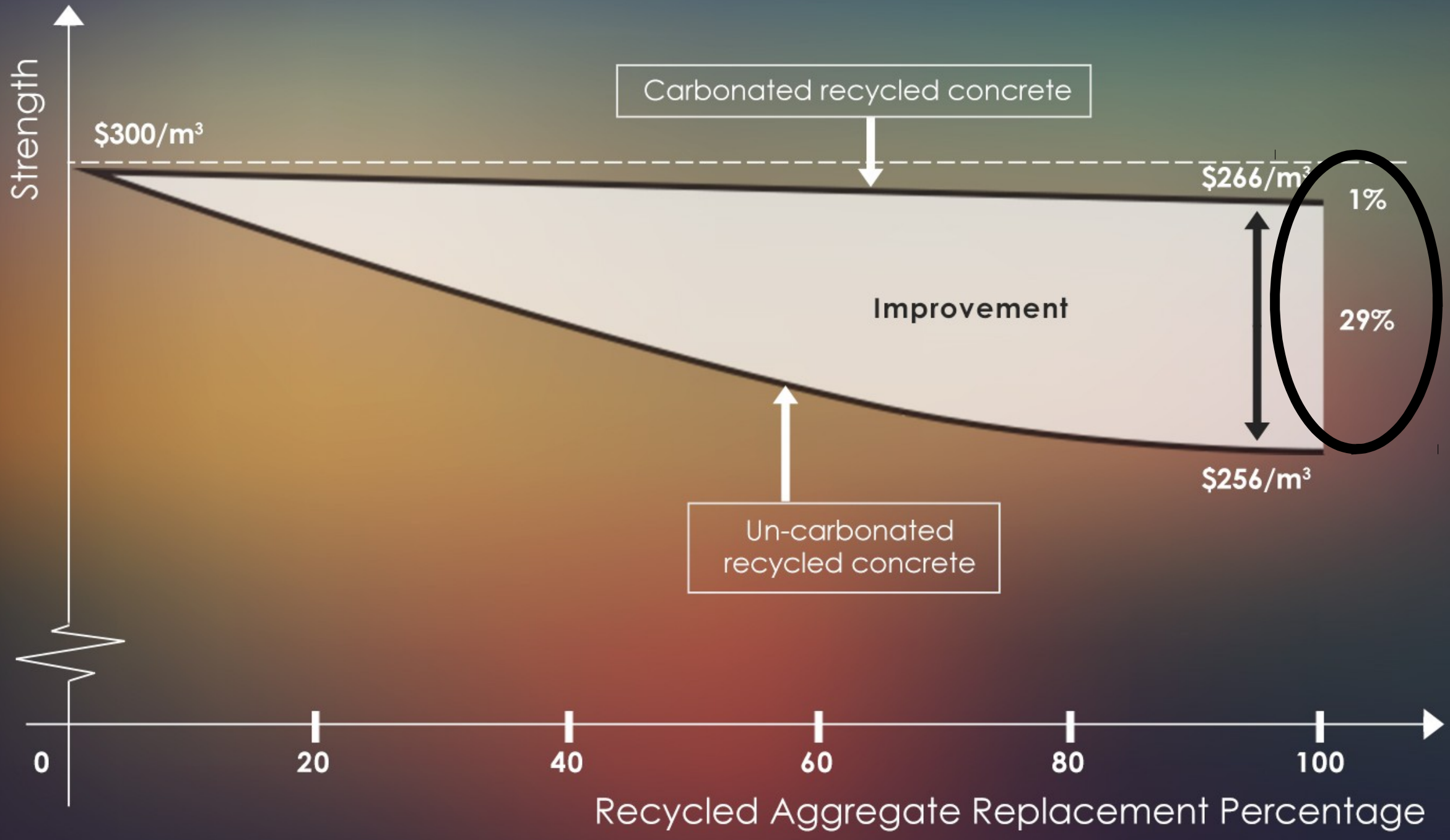

Strength
Carbonated recycled concrete
$300/m³
$266/m³
1%
Improvement
29%
$256/m³
Un-carbonated
recycled concrete
0
20
40
60
80
100
Recycled Aggregate Replacement Percentage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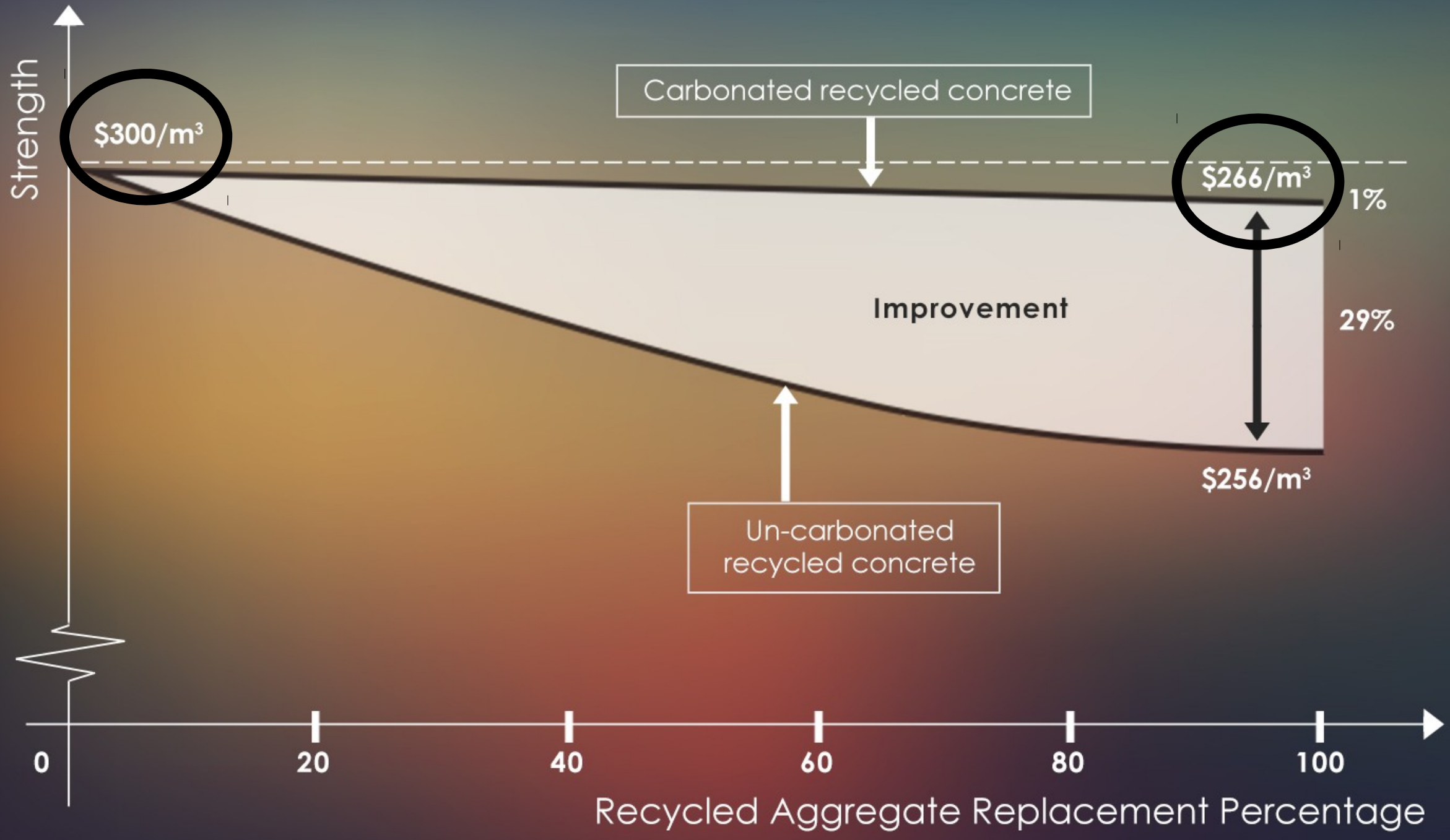
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Moving Forward

- Commercialisation?

- Impact to the Environment / Economy / Society

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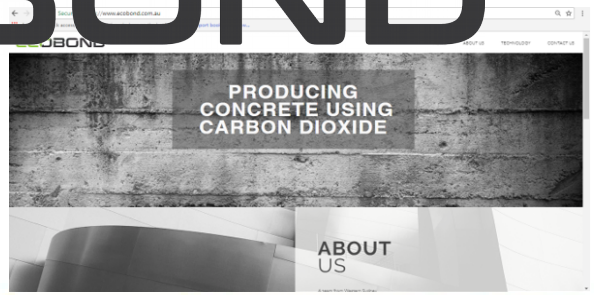
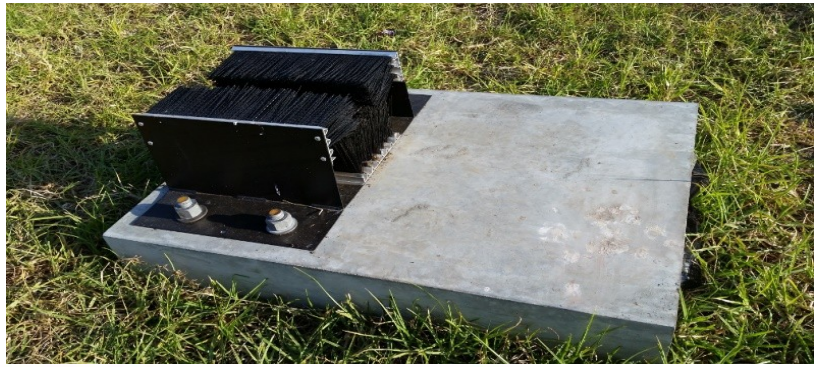




Project leader,
Top 8 research teams selected by Innovyz Institute, Pty. Ltd. for a Waste and Recycling Technologies Program under 1.5 million support by Green Industries SA

Fundamental research Commenced

Founded EcoBond Pty. Ltd.

EcoBond Pitching

World's first CO_2 Concrete: Biosecurity Platform

Upscale CO_2 Concrete: 4 3m x 3m slabs

Term 1 | Term 2 | Term 3 → Time

Mar.15 | Mar.17 | Dec. 17 | Jan. 18 | Mar. 18 | Apr. 18 | Mar. 19

9-month intensive training on commecialisation and research development skills
Term 1 is validating and expanding technologies;
Term 2 is defining commercialization paths;
Term 3 is for investment strategies and capital raising activities.

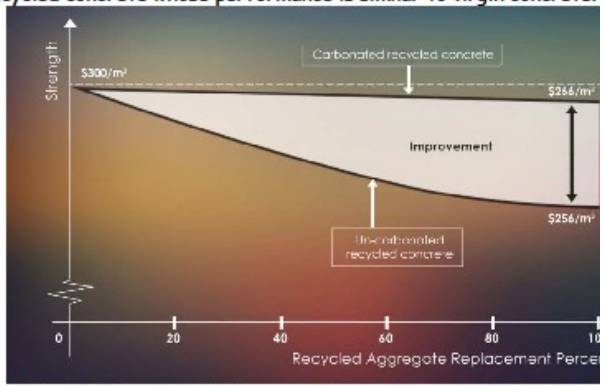
ECOBOND

PRODUCING CONCRETE USING CARBON DIOXIDE

We have invented CO_2 Concrete, which is a new process for producing strength recycled concrete. We inject carbon dioxide into recycled aggr its bonding, and thus performance of recycled concrete.

This benefits the environment in two ways:

- Using carbon dioxide which would otherwise be released into worsening global warming and climate change issues; and
- Reducing landfill space by turning construction waste into construc recycled concrete whose performance is similar to virgin concrete.



We are looking for Investors, Partners and Network connectors in the s this new material.

You can find more information via http://www.ecobond.com.au.

Please follow us via our Facebook and Linkedin for all new updates.
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https://www.linkedin.com/company/18578057/admin/updates/

Contact:
Dr. Khoa Le and Prof. Vivian Tam, Inventors of CO_2 Concrete, Ec
info@ecobond.com.au

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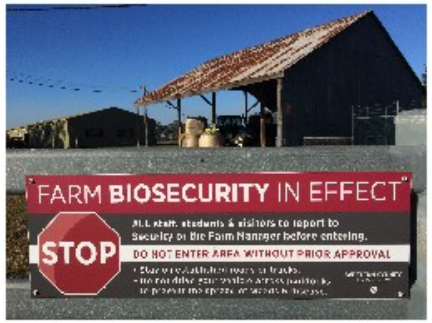
PRODUCING CONCRETE USING CARBON DIOXIDE

World's First CO_2 Concrete

We have cast two CO_2 Concrete Biosecurity Platforms for Hawkesbury Campus, Ap

Western Sydney University Hawksbury Farm has been known for its state-of agricultural research. We have now become a part of this great culture by contribu CO_2 Concrete biosecurity platforms, which are employed for boot cleaning, minimis and diseases.



We are looking for Investors, Partners and Network connectors in the sector to this new material.

You can find more information via http://www.ecobond.com.au.

Please follow us via our Facebook and Linkedin for all new updates.
https://www.facebook.com/EcoBond-182364185894004/?ref=bookmarks
https://www.linkedin.com/company/18578057/admin/updates/

Contact:
Dr. Khoa Le and Prof. Vivian Tam, Inventors of CO_2 Concrete, Ecobond P
info@ecobond.com.au

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PRODUCING CONCRETE USING CARBON DIOXIDE

UPSCALED - CO_2 Concrete Slabs

We have upscaled our CO_2 Concrete production. With the success of our biosecurity platforms at Hawbesbury Farm, Western Sydney University, we made four 3m x 3m concrete slabs with our CO_2 Concrete. The slabs were cast in March 2019 using our 2 innovative mix designs. The slabs are employed to support gross animal weight (about 1 ton each) for their troughs (drinking stations).

We are looking for Investors, Partners and Network connectors in the sector to publicise this new material.

You can find more information via http://www.ecobond.com.au.

Please follow us via our Facebook and Linkedin for all new updates.
https://www.facebook.com/EcoBond-182364185894004/?ref=bookmarks
https://www.linkedin.com/company/18578057/admin/updates/

Contact:
Prof. Vivian Tam and A/Prof. Khoa Le, Inventors of CO_2 Concrete, Ecobond Pty. Ltd.,
info@ecobond.com.au

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