



<i>Project Title:</i>	Promoting the use of recycled aggregates derived from demolition waste in concrete
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<i>Project ID:</i>	CICR/03/19
<i>Research Institution:</i>	The Hong Kong Polytechnic University
<i>Subject Area:</i>	Environment
<i>Duration:</i>	24 months

Background

In many countries as well as in Hong Kong, reuse of recycled concrete aggregates (RCA) derived from construction & demolition waste (C&DW) as a renewable resource is still limited to low-level civil engineering works such as on-structural concrete products. To facilitate the reuse of RCA in structural concrete applications, innovative techniques to improve the quality of RCA should be sought. In this project, the main aims are to develop three new techniques for enhancing the properties of RCA in Hong Kong, including (i) CO₂ curing treatment using waste flue gas, (ii) modified nano-particle treatment, and (iii) micro-biological modification treatment. The fundamental mechanisms of how these techniques enhance the RCA will be unraveled in this research. Meanwhile, the pre-treated RCA will be used in practical precast structural concrete applications. The research will be conducted in close collaboration with local recyclers and industry users of RCA in implementing the developed treatment techniques of RCA and reusing the treated RCA in concrete elements.

Objectives

- ♦ To develop different novel enhancement techniques for treating recycled aggregates;
- ♦ To unravel the fundamental mechanisms of these enhancement techniques for optimization;
- ♦ To enhance the properties of precast/cast in-situ concrete when prepared with treated recycled aggregates;
- ♦ To compare life cycle cost and quality of recycled aggregates and the new products with existing construction materials;
- ♦ To evaluate the research end products (structural precast, non-structural precast or ready mixed concrete and others) and their market demand and value in relation to the local construction industry;
- ♦ To assess the supply chain with assistance of local companies and organizations in government, including production of good quality recycled aggregates, transportation and storage by manufacturers;
- ♦ To give suggestions on amendment of the existing specifications for implementation in public and private works in association with governmental partners.

Key Deliverables

- ♦ Different enhancement techniques for treating recycled aggregates will be developed;
- ♦ The fundamental mechanisms of these enhancement techniques for optimization will be unraveled;
- ♦ The properties of precast/cast in-situ concrete will be enhanced when prepared with treated recycled aggregates;
- ♦ Life cycle cost and quality of recycled aggregates and the new products will be compared with existing construction materials;
- ♦ The research end products and their market demand and value in relation to the local construction industry will be evaluated;
- ♦ The supply chain will be assessed with assistance of local companies and organizations in government;
- ♦ Suggestions on amendment of the existing specifications will be given for implementation in public and private works in association with governmental partners.

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