혼합 콘크리트의 CO_2 배출 및 비용 분석

CO_2 Emission And Cost Analysis Of Blended Concrete

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Abstract

This paper investigates CO_2 emission and cost analysis of blended concrete which was added with fly ash and slag. Three kinds of blended concrete were studied in this investigation, the first blended concrete was added fly ash replacing part of the cement while the second was added slag, the third was added fly ash and slag. Analysis result display that the blended concrete containing fly ash and slag is the optimal choice while considering economic and CO_2 emissions.

키 워 드 : CO_2 배출량, 비용, 압축 강도
keywords : CO_2 emission, cost, compressive strength

1. Introduction

The cement industry is the second largest producer of the greenhouse gas. Since CO_2 emissions of portland cement account for 7% of the world's annual emissions, in order to reduce CO_2 emissions, it is necessary to find some binding materials that can be replace part of the cement. Most of previous works on some sustainable and economical binding material which industrial by-products such as fly ash and flag replacing part of cement in concrete. This paper investigates CO_2 emission and cost analysis of blended concrete which was added with fly ash and slag.

2. Data and methods

Three kinds of blended concrete were studied in this investigation, the first blended concrete was added fly ash(FA) replacing part of the cement while the second(SG) was added slag, the third was added fly ash and slag(FA+SG).

The mix ratio and the compressive strength (28-day)(Mpa) data of the concrete in this study come from the network. Material prices calculated according to local standards while the CO_2 emissions (per volume unit) refer to previous literature.

3.Data analysis

3.1 Correlation of cost and 28-day compressive strength of blended concrete

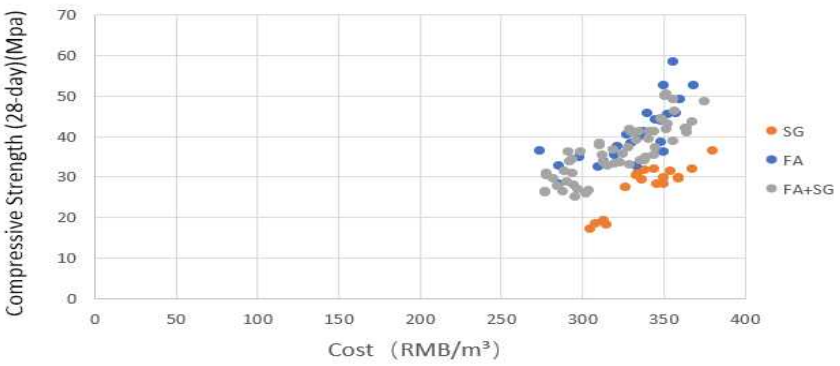

Figure 1. Correlation of cost and 28-day compressive strength of blended concrete

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3.2 Correlation of 28-day compressive strength and CO_2 emission of blended concrete

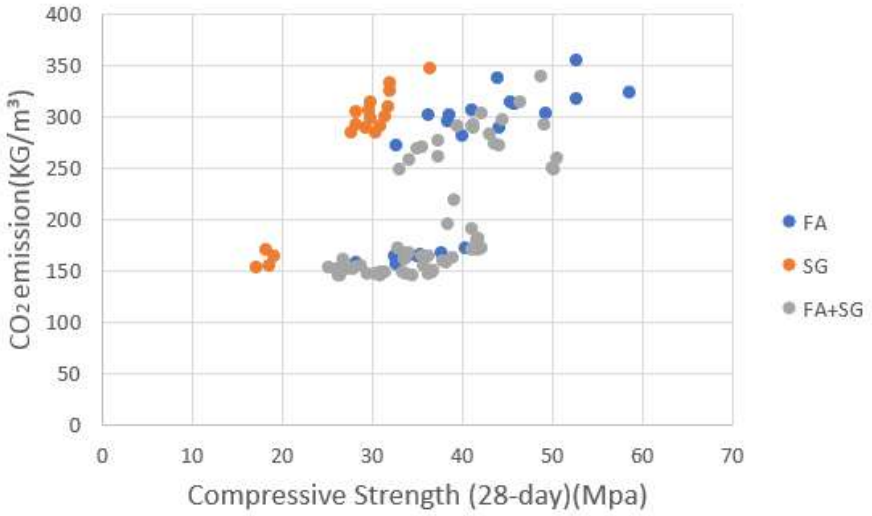

Figure 2. Correlation of 28-day compressive strength and CO_2 emission of blended concrete

4. Conclusions

It can be seen from Figure 1 that the 28-day compressive strength of blended concrete containing both fly ash and slag and the blended concrete containing fly ash is higher than those containing slag at the same level of cost. Figure 2 show the CO_2 emission of blended concrete containing fly ash and slag is significantly lower than that of blended concrete containing fly ash or slag alone under the same compressive strength.

Based on the aforementioned elements, it can be concluded that the blended concrete containing fly ash and slag is the optimal choice while considering economic and CO_2 emissions.

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