

**A STUDY OF THE ATTRITION AND POROSITY OF COARSE
AGGREGATES TOWARD THE COMPRESSIVE STRENGTH OF CONCRETE
USING COARSE AGGREGATES FROM RECYCLED CONCRETE MADE OF
PEBBLES FROM THE RIVER OPAK**

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Abstract

Concrete is made of cement paste, coarse aggregates, fine aggregates, and with or without other additional material. One type of coarse aggregates is the utilization of concrete wastes, as coarse aggregates, to be recycled, which is known as recycled concrete. Solid wastes which come from concrete damage caused by various natural disasters and demolitions of old structures can harm the stability of the environment. In order to deal with the great number of solid wastes, this research examined the effect of attrition and porosity of coarse aggregates on the compressive strength of concrete using coarse aggregates from recycled concrete made of pebbles from the river Opak, together with the compressive-strength comparison between the recycled concrete and aggregates from the river Krasak.

This research was aimed at finding out the effect of the attrition and porosity of recycled coarse-aggregates on the compressive strength reduction of the concrete produced up to three times of repetitions, and also comparing the compressive strength of recycled concrete between the aggregates from the river Opak and those from the river Krasak. This research began with examining the attrition and porosity of the recycled coarse-aggregates. Then, some concrete cylinders with dimensions 15 cm x 30 cm, as many as 12 original, 8 first-recycled (R1), 5 second-recycled (R2), and 3 third-recycled (R3) concrete cylinders, were made in order to examine their compressive strength at the age of 21 days. The compressive strength of 13 original and first-recycled, 5 second-recycled, and 4 third-recycled concrete cylinders at the age of 28 days was also examined. The concrete cylinders which were broken after their compressive strength was examined were recycled to be used as coarse aggregates in the next concrete-cylinder making process. The concrete recycling processes were done up to three times of repetitions.

The result of the research showed that: 1) The compressive strength of the concrete made of recycled aggregates got lower and lower in each repetition; 2) The correlation between the attrition and porosity of recycled aggregates and the compressive strength of concrete: When the attrition value of the aggregates decreased by 15.69% (R1), 43.03% (R2), 44.4% (R3) and the porosity value of the coarse aggregates decreased by 58.28% (R1), 52.11% (R2), and 47.28% (R3), the compressive strength of the aggregates decreased by 1.25% (R1), 25.61% (R2), and 82.56% (R3); 3) The compressive strength of the recycled concrete with aggregates from the river Opak was not higher than that with those from the river Krasak.

Key words: concrete, recycled, attrition, porosity, compressive strength