INTISARI

Peningkatan volume limbah plastik *Polyethylene Terephthalate* (PET), khususnya dari botol minuman sekali pakai, telah memunculkan tantangan lingkungan yang signifikan. Di sisi lain, pembangunan infrastruktur yang pesat mendorong tingginya konsumsi beton dan eksploitasi sumber daya alam. Penelitian ini dilakukan sebagai upaya untuk mendukung konstruksi berkelanjutan dengan memanfaatkan limbah PET sebagai bahan tambahan dalam campuran beton. Selain itu, digunakan pula *superplasticizer* sebanyak 1% dari berat semen untuk mengatasi penurunan workability akibat karakteristik PET yang hidrofobik. Tujuan utama dari penelitian ini adalah untuk mengevaluasi pengaruh penambahan limbah plastik PET dan *superplasticizer* terhadap karakteristik mekanik beton, meliputi kuat tekan, kuat tarik belah, dan kuat lentur.

Penelitian ini dilakukan di Laboratorium Bahan Bangunan Sekolah Vokasi Universitas Gadjah Mada. Sampel beton dibuat dengan empat variasi penambahan limbah PET, yaitu 0%, 0,5%, 1%, dan 1,5% terhadap berat agregat halus. *Superplasticizer* ditambahkan secara konstan sebesar 1% dari berat semen. Benda uji berbentuk silinder (15 × 30 cm) digunakan untuk uji kuat tekan dan tarik belah, sementara balok (15 × 15 × 60 cm) digunakan untuk uji kuat lentur. Seluruh pengujian dilakukan setelah beton mencapai umur 28 hari, dengan standar acuan dari SNI. Pengujian dilakukan terhadap sifat beton segar (slump test), berat jenis, serta kekuatan mekanik beton.

Hasil penelitian menunjukkan bahwa penambahan limbah PET hingga 1,5% secara umum meningkatkan kuat tekan, kuat tarik belah, dan kuat lentur beton. Nilai kuat tekan tertinggi tercapai pada variasi 1,5% dengan hasil 35,7 MPa, sedangkan nilai slump masih berada dalam kategori dapat dikerjakan berkat penggunaan *superplasticizer*. Berat jenis beton cenderung menurun seiring peningkatan kadar PET. Secara keseluruhan, kombinasi limbah PET dan *superplasticizer* terbukti mampu menghasilkan beton yang lebih ramah lingkungan tanpa mengorbankan performa mekanik, dengan variasi 1,5% PET dinilai sebagai komposisi optimal dalam penelitian ini.

ABSTRACT

The increasing volume of Polyethylene Terephthalate (PET) plastic waste, particularly from single-use beverage bottles, has become a significant environmental concern. Simultaneously, the rapid growth of infrastructure development has driven the demand for concrete and the exploitation of natural resources. This study aims to support sustainable construction by utilizing PET waste as an additive material in concrete mixtures. In addition, a superplasticizer (1% by cement weight) was used to counteract the reduced workability caused by the hydrophobic nature of PET. The main objective of this research is to evaluate the influence of PET waste and superplasticizer addition on the mechanical properties of concrete, including compressive strength, splitting tensile strength, and flexural strength.

The study was conducted at the Construction Materials Laboratory of the Vocational School of Universitas Gadjah Mada. Concrete specimens were prepared with four PET variation levels: 0%, 0.5%, 1%, and 1.5% by weight of fine aggregate. A constant superplasticizer dosage of 1% of cement weight was applied across all variations. Cylinder specimens (15 × 30 cm) were used for compressive and tensile strength tests, while beam specimens (15 × 15 × 60 cm) were used for flexural strength tests. All tests were carried out at 28 days of concrete age, following Indonesian National Standards (SNI), including slump tests for fresh concrete workability and density measurements.

The results showed that adding up to 1.5% PET generally improved the compressive, tensile, and flexural strengths of the concrete. The highest compressive strength of 35.7 MPa was recorded at the 1.5% PET variation, while the slump values remained within acceptable workability ranges due to the superplasticizer addition. The concrete density slightly decreased as PET content increased. Overall, the combination of PET waste and superplasticizer successfully produced more environmentally friendly concrete without sacrificing mechanical performance, with 1.5% PET identified as the optimal composition in this study.