

## INTISARI

### STUDI PENGARUH PENAMBAHAN SUPERPLASTICIZER TERHADAP KUAT TEKAN MORTAR DENGAN CAMPURAN SILICA FUME SEBAGAI MATERIAL SUBSTITUSI SEMEN

Peningkatan kebutuhan pembangunan yang terus berkembang pesat mendorong pemanfaatan material tambah dan alternatif untuk mendukung kualitas infrastruktur yang tinggi. Salah satu inovasi yang diterapkan adalah penambahan *superplasticizer* serta penggunaan *silica fume* sebagai substitusi sebagian semen pada campuran mortar. Penelitian ini bertujuan untuk mengkaji pengaruh kombinasi material tersebut terhadap peningkatan, berat jenis, kuat tekan, dan daya serap mortar.

Penelitian dilaksanakan di Laboratorium Bahan Bangunan, Departemen Teknik Sipil, Sekolah Vokasi Universitas Gadjah Mada. Benda uji berbentuk kubus  $5 \times 5 \times 5$  cm dibuat dengan hasil kuat tekan tertinggi dari variasi substitusi *silica fume* 0,0%; 5,0%; 7,5%; 10,0%; 12,5%; dan 15,0% serta variasi penambahan 3 produk *superplasticizer* merek PBAX-100, Sika® Viscocrete-3115N, dan SPC-200 sebesar 0,0%, 0,5%; 1,0%; 1,5%; 2,0%; dan 2,5% dari berat semen. Campuran mortar menggunakan variasi perbandingan 1 PC : 4 PS dengan total jumlah benda uji sebanyak 234 buah, 18 buah untuk mortar *silica fume* dan 216 buah untuk mortar *superplasticizer* yang kemudian dilakukan proses perawatan selama 7, 14, 21, dan 28 Hari.

Substitusi *silica fume* sebesar 10,0% tercatat memberikan nilai kuat tekan tertinggi, yaitu sebesar 17,52 MPa, dibandingkan dengan variasi persentase lainnya. Selanjutnya, hasil penelitian terhadap benda uji umur 28 hari menunjukkan bahwa penambahan *superplasticizer* pada mortar yang mengandung campuran *silica fume* memberikan performa terbaik pada pengujian berat jenis, kuat tekan, dan daya serap, yang secara berurutan dicapai pada penambahan 2,5% produk Sika® Viscocrete-3115N. Pada variasi tersebut, diperoleh nilai berat jenis tertinggi sebesar 2,26 gr/cm<sup>3</sup>, dengan kuat tekan mencapai 47,09 MPa, serta daya serap terendah sebesar 6,60%.

**Kata Kunci:** Mortar, *Silica Fume*, *Superplasticizer*, Kuat Tekan

## ABSTRACT

### *EFFECT OF SUPERPLASTICIZER ADDITION ON THE COMPRESSIVE STRENGTH OF MORTAR CONTAINING SILICA FUME AS A CEMENT SUBSTITUTE.*

*The increasing demand for infrastructure development has encouraged the use of admixtures and alternative materials to support high-quality construction. One of the innovations applied is the incorporation of superplasticizer and the partial substitution of cement with silica fume in mortar mixtures. This study aims to investigate the effect of combining these materials on the improvement of mortar's specific gravity, compressive strength, and water absorption.*

*The research was conducted at the Building Materials Laboratory, Department of Civil Engineering, Vocational College, Universitas Gadjah Mada. Cube-shaped specimens measuring 5×5×5 cm were prepared based on the highest compressive strength results from various silica fume substitution levels 0.0%, 5.0%, 7.5%, 10.0%, 12.5%, and 15.0% and the addition of three types of superplasticizer products: PBAX-100, Sika® Viscocrete-3115N, and SPC-200, with dosage variations of 0.0%, 0.5%, 1.0%, 1.5%, 2.0%, and 2.5% by weight of cement. The mortar mix used a proportion of 1 cement : 4 sand, with a total of 234 specimens, comprising 18 specimens for silica fume variations and 216 specimens for superplasticizer variations. The curing process was carried out for 7, 14, 21, and 28 days.*

*A 10.0% silica fume substitution was recorded to produce the highest compressive strength value of 17.52 MPa compared to other substitution percentages. Furthermore, the test results on specimens at 28 days of age showed that the addition of superplasticizer to mortar containing silica fume yielded the best performance in terms of specific gravity, compressive strength, and water absorption. These optimal values were achieved with the addition of 2.5% Sika® Viscocrete-3115N, resulting in the highest specific gravity of 2.26 g/cm<sup>3</sup>, the highest compressive strength of 47.09 MPa, and the lowest water absorption value of 6.60%.*

**Keywords:** Mortar, Silica Fume, Superplasticizer, Compressive Strength