

FINAL PROJECT

**THE EFFECT OF SILICA FUME AS ADDITIONAL
MATERIAL ON HIGH STRENGTH CONCRETE
CHARACTERISTIC**



By :

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**CIVIL ENGINEERING DEPARTMENT
FACULTY OF ENGINEERING
UNIVERSITAS 17 AGUSTUS 1945 SURABAYA**

2022

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Prepared as a Requirement for Obtaining a Bachelor of Engineering
Degree (S.T)

Universitas 17 Agustus 1945 Surabaya



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2022

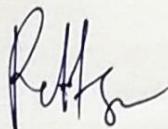
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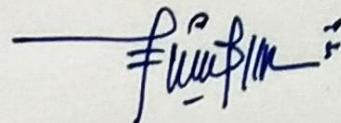
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Stating that the "**FINAL PROJECT**" that I made was to meet the requirements for the graduation of Strata (S1) civil engineering – Degree Program – Universitas 17 Agustus 1945 Surabaya with the title:

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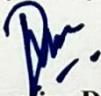
Praise is always presented to The One Almighty God who has bestowed His grace and guidance so that the author can complete the Final Project with the title "*THE EFFECT OF SILICA FUME AS ADDITIONAL MATERIAL ON HIGH STRENGTH CONCRETE CHARACTERISTIC*". This Final Project was prepared to meet one of the conditions to obtain a Bachelor of Civil Engineering degree at the University of 17 Agustus 1945 Surabaya.

This Final Project Proposal has been compiled to the maximum and as well as possible. In the preparation of the Report, of course, it is inseparable from the encouragement and assistance of various parties, the data obtained and in addition to literature books and journals and knowledge that has been obtained during the lecture. Therefore, of the completion of this Final Project, the author wants to say a big thank you to:

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7. As well as friends and all parties that I cannot mention one by one, and have provided support, motivation, and assistance for the author can complete this Final Project Proposal.

Finally, the author realizes that this Final Project is still far from perfection, therefore the author expects constructive criticism and advice for improvement in the future. The author hopes that this Final Project can provide benefits and inspiration for the readers.

Surabaya, May 12th 2022


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PENGARUH SILICA FUME SEBAGAI BAHAN TAMBAH PADA KARAKTERISTIK BETON MUTU TINGGI

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ABSTRAK

Beton mutu tinggi adalah beton dengan karakteristik khusus yang tidak dimiliki beton normal. Beton mutu tinggi dapat didefinisikan sebagai beton dengan satu atau lebih karakteristik, seperti penyusutan kecil, permeabilitas rendah, modulus elastis tinggi, atau kuat tekan tinggi. Silica Fume (SF) digunakan sebagai bahan aditif dalam campuran beton. Silica fume merupakan produk limbah dari silicon metal atau ferrosilicon alloy dan memiliki kandungan silika (SiO_2) yang sangat tinggi yaitu 93,09%. Dalam penelitian ini akan dilakukan analisis penggunaan silica fume sebagai bahan tambah semen untuk beton mutu tinggi dengan variasi silica fume sebesar 0%, 2,5%, 5%, 7,5%, dan 10%. Dengan campuran bahan tambah berupa superplasticizer (Consol SS-74) dengan persentase 0,4%. Dari hasil penelitian yang dilakukan, diperoleh nilai slump terbesar sebesar persentase 7,5% dengan nilai 24 cm. Berat volume terbesar diperoleh pada persentase 10% baik dalam kondisi kering maupun basah dengan nilai 2513,9 kg/m³ dalam kondisi kering dan 2554,6 kg/m³ dalam kondisi basah. Nilai air resapan terbesar diperoleh pada persentase 0% dengan nilai air resapan sebesar 4,50%. Dan kuat tekan tertinggi dari nilai beton diperoleh pada persentase 5% baik pada usia 7 hari, 14 hari, dan 28 hari berturut-turut nilainya adalah 43,4 Mpa, 46,3 Mpa, dan 55,8 Mpa.

Keywords: Beton Mutu Tinggi, Silica Fume, Superplasticizer

THE EFFECT OF SILICA FUME AS ADDITIONAL MATERIAL ON HIGH STRENGTH CONCRETE CHARACTERISTIC

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ABSTRACT

High-strength concrete is concrete with special characteristics that ordinary concrete does not have. High-strength concrete can be defined as concrete with one or more characteristics, such as small shrinkage, low permeability, high elastic modulus, or high compressive strength. Silica Fume (SF) is used as an additive material in concrete mixtures. Silica fume is a waste product of silicon metal or ferrosilicon alloy and have a silica content (SiO_2) that is very high at 93.09%. In this research, an analysis of the use of silica fume as a cement additive for high-strength concrete will be carried out with variations in silica fume of 0%, 2.5%, 5%, 7.5%, and 10%. With a mixture of added material in the form of a superplasticizer (Consol SS-74) with a percentage of 0.4%. From the results of the research conducted, the largest slump value was obtained at a percentage of 7.5% with a value of 24 cm. The largest volume weight was obtained at a percentage of 10% in either dry or wet conditions with a value of 2513.9 kg/m³ in dry conditions and 2554.6 kg/m³ in wet conditions. The largest water absorption value was obtained at a percentage of 0% with a water absorption value of 4.50%. And the highest compressive strength of concrete value is obtained at a percentage of 5% both at the age of 7 days, 14 days, and 28 days in a row the value is 43.4 Mpa, 46.3 Mpa, and 55.8 Mpa.

Keywords: High Strength Concrete, Silica Fume, Superplasticizer

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NOTATION LIST

A	= Areacross section (cm ²)
B	= Amount of water
C	= Amount of fine aggregate
Ca	= Water absorption fine aggregate
Ck	= Water content fine aggregate
D	= Unit weight (kg/m ³)
Da	= Water absorption coarse aggregate
Dk	= Water content coarse aggregate
F'c	= Compressive strength of concrete (MPa)
F'cr	= Average compressive strength
M	= Added value
Mj	= Saturated mass of water (gram)
Mk	= Dry mass (gram)
n	= Number of object test
P	= Load maximum (N)
SD	= Standard deviation (MPa)
Sr	= Plan standard deviation (MPa)
SSD	= Saturated surface dry
WA	= Water absorption (%)
WCR	= Water cement ratio
xi	= Compressie strength of concrete obtained from the test object
1.64	= Statistical constant