INVESTIGATION OF THE OPTIMUM AMOUNT OF SILICA FUME IN WORKABILITY AND COMPRESSIVE STRENGTH IMPROVEMENT OF SELF COMPACTING ULTRA HIGH PERFORMANCE CONCRETE

Final Project

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APPROVAL

Final Project Proposal

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Author realize that this final project report is far away from perfectness. Still, author hopes that this final project report might be useful for the readers and author himself. Author also hopes for all the critics and advises to develop author himself.

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ABSTRACT

INVESTIGATION OF THE OPTIMUM AMOUNT OF SILICA FUME IN WORKABILITY AND COMPRESSIVE STRENGTH IMPROVEMENT OF SELF-COMPACTING ULTRA HIGH-PERFORMANCE CONCRETE, Ignatius Yoga Patria Budi Pratama, Student ID Number 15.13.15959, year of 2019, Structural Engineering, International Civil Engineering Program, Department of Civil Engineering, Universitas Atma Jaya Yogyakarta.

Self-Compacting Ultra High Performance Concrete is a developing technology in construction industry. This concrete is expected to answer the problem in concrete which are: low filling ability, low passing ability, noise pollution that caused by vibrator, low durability. In addition, this concrete has very high compressive strength which is up to 100 MPa within 28 days. However, in order to improve the workability, compressive strength and extend the hydration process, mineral admixture as cement replacement material is needed. Mineral admixtures that commonly used is Silica Fume. However, the number of optimum amounts of silica fume to replace cement is various. This study is aimed to check the optimum amount of silica fume to improve the workability and the compressive strength of concrete by adding the mixture with 0%, 5%, 10%, 15%, and 20% of silica fume. The workability test is divided into slump flow test and l-box test which has satisfying result with result from 0% to 20% consecutively are: 678 mm, 718 mm, 678 mm, 658 mm, 626 mm for slump flow test and 0.83, 0.86, 0.843, 0.84, 0.817 for block ratio in L-box test. Besides , the compressive strength is tested within 7, 14, 21, and 28 days with result from 0% to 20% consecutively are: 28.48 MPa, 32.07 MPa, 35.84 MPa, 38.67 MPa, and 32.63 MPa for age 7 days; 30.75 MPa, 34.33 MPa, 43.38 MPa, 44,52 MPa, and 35.65 MPa for age 14 days; 33.01 MPa, 36.97 MPa, 51.12 MPa, 50.74 MPa, and 35.08 MPa for age 21 days; and 34.33 MPa, 36.78 MPa, 50.98 MPa, 52.82 MPa, and 36.78 MPa for age 28 days. Also, modulus of elasticity that tested in 28 days, within the addition of 0%, 5%, 10%, 15%, and 20% of silica fume consecutively are: 21883.3, 22410.8, 22590.1, 22680.6, and 21874.7. So that, the, optimum amount of silica fume in order to improve the workability and compressive strength of Self-Compacting Ultra High-Performance Concrete is suggested between 10%-15%.

Keywords: Self Compacting Ultra High-Performance Concrete, Silica Fume, Workability, Compressive Strength