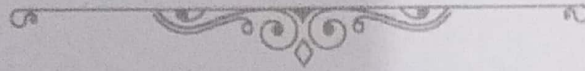




PRESENTER AWARD



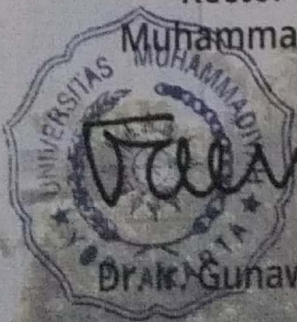
The scientific committee of The Third International Conference on Sustainable Innovation (ICoSI) gives

Nursiah Chairunnisa

of The International Symposium on Civil, Environmental, and Infrastructure Engineering (ISCEIE)

The BEST PRESENTER AWARD in the international conference held in Universitas Muhammadiyah Yogyakarta, Indonesia, 30 - 31 July 2019

Rector of Universitas Muhammadiyah Yogyakarta



Dr. Iman Permana
Dr. Iman Permana, M.P.

Chairperson of The Third ICoSI 2019



dr. Iman Permana, M. Kes., Ph. D.

DETERMINING ON FRESH AND HARDENED PROPERTIES OF SELF-COMPACTING CONCRETE DUE TO THE USE OF VARIOUS SIZE AND PERCENTAGES OF COARSE AGGREGATE AND CHEMICAL ADMIXTURES

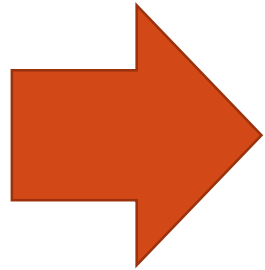
Prepared by

Nursiah Chairunnisa, Wiku Krasna Wicaksana, Dwi Nurdiansyah

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Civil Engineering Program, Engineering Faculty,
Lambung Mangkurat University (ULM)



Outline

- ❑ Introduction
- ❑ Material and Experimental Program
- ❑ Test Method :
 - Fresh Concrete and Hardened Concrete
- ❑ Result and Discussion
- ❑ Conclusion



Introduction

- ❑ Concrete technology has been developing rapidly in the last decades.
- ❑ The difficulty of construction for special structures triggers researchers continuously to investigate the new method of concrete technology
- ❑ Self-compacting concrete (SCC) can be defined as a key innovation of concrete technology which do not vibration for compaction and placement.



<https://www.cement.org/designaids/mass-concrete>

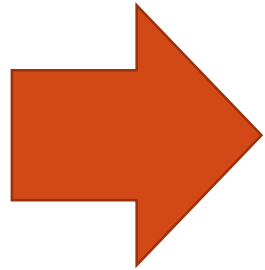


Self-Compacting Concrete: History & Current Trends



Self-Compacting Concrete: History & Current Trends

Figure 1. Special Structures



Introduction

WHY SELF COMPACTING CONCRETE ?

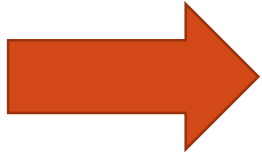
- The existing concrete has faced criticism for its lower strength and difficult to obtain consistent quality.
- Requirement of skilled worker for compaction in conventional concrete
- Difficult to use mechanical compaction for
 - Underwater concreting
 - Cast in-situ pile foundation
 - Columns with congested reinforcement



Figure 2. EFNARC Standar (2005)

BENEFIT OF SCC ?

- Faster Construction .
- Minimized of skilled worker for compaction
- Improving durability and easier placing
- Reduce noise level



Materials SCC

- ❑ The constituent materials of SCC mixtures are similar to the conventional concrete which need a vibration, except the content of aggregate is less than the conventional one
- ❑ According to Okamura & Hauici [2003] The comparison of mix proportioning between the conventional concrete and self-compacting concrete can be depicted in Figure 3

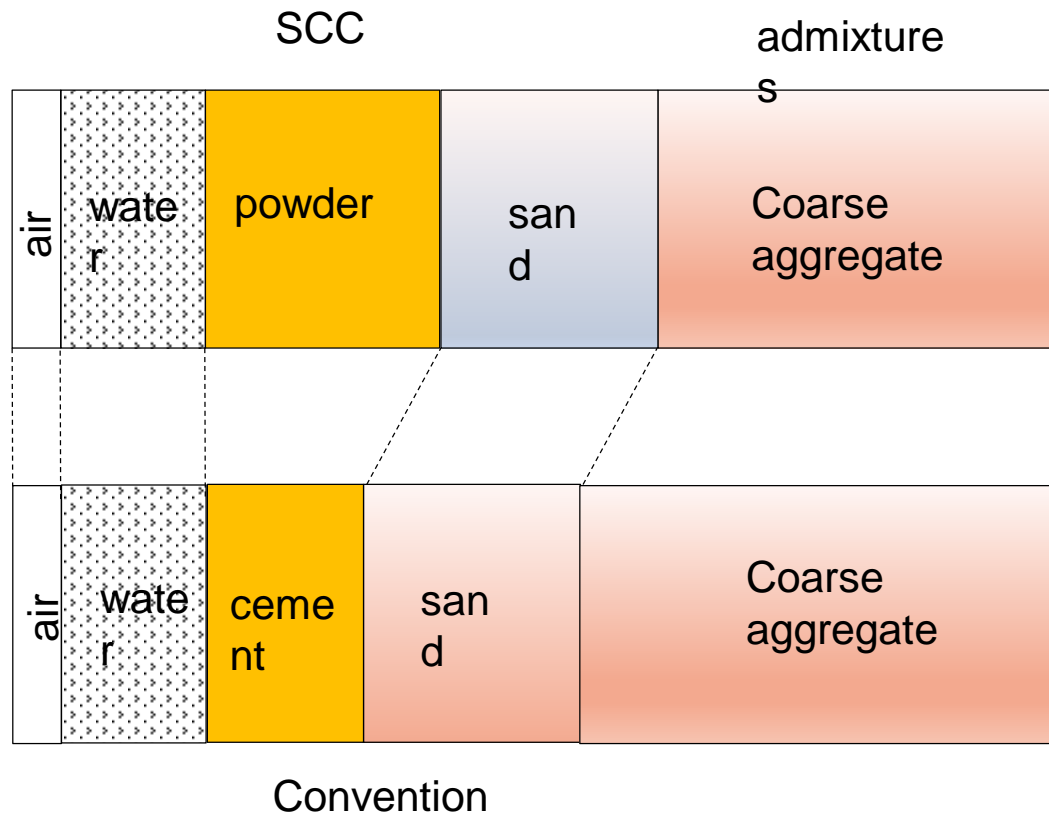


Figure 3. Constituent material of SCC and Conventional Concrete (Okamura & Haura, 2003)



The Requirement for Self Compacting Concrete

Table 1. Typical range composition of SCC

Constituent	Typical range by mass (kg/m ³)	Typical range by volume (liters/m ³)
Powder	380-600	
Water	150-210	
Paste		300-380
Coarse Aggregate	750-1000	270-360
Fine Aggregate	Content balances the volume of the other constituents, typically 48%-55% of total aggregate weight	
Water/powder ratio by Vol		0.85-1.10

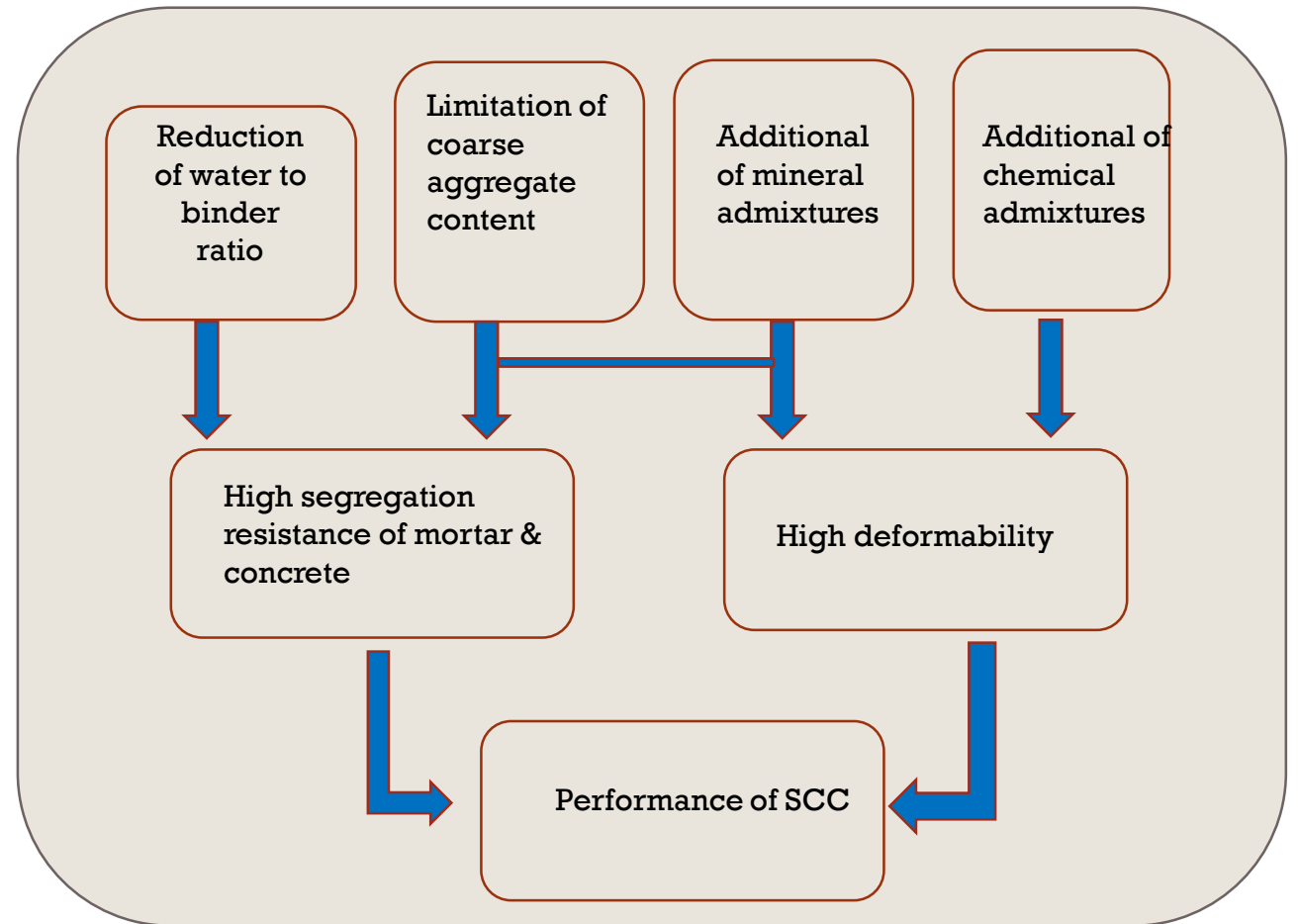
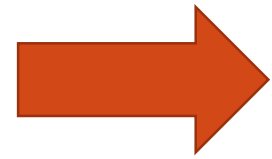


Figure 4. Flow Chart for achieving Self Compacting Concrete



The Requirement for Self Compacting Concrete

Table 2. Test Methods for Fresh Concrete of Self Compacting concrete

Characteristic	Test Methode
Filling ability	Slump-flow
	T50 Slump- flow
	V-funnel
Passing Ability	Orimet
	L-box
	U-box
	J-ring
	Fill-box
Segregation Resistance	V-funnel at T _{5minutes}
	GTM Screen Stability test

The aims of the research :

To investigate the influence of size and the percentage of CA and Percentage of SP due to the fresh and hardened concrete properties of SCC

Table 3. Acceptance criteria for Self-compacting Concrete

	Method	Unit	Typical range of values	
			Minimum	Maximum
1	slumpflow by Abrams cone	mm	650	800
2	T _{50cm} slumpflow	sec	2	5
3	J-ring	mm	0	10
4	V-funnel	sec	6	12
5	Time increase, V-funnel at T _{5minutes}	sec	0	+3
6	L-box	(h ₂ /h ₁)	0,8	1,0
7	U-box	(h ₂ -h ₁) mm	0	30
8	Fill-box	%	90	100
9	GTM Screen stability test	%	0	15
10	Orimet	sec	0	5

Table 4. Test Methods for Self Compacting concrete (Actual test)

Property	Method	Unit	Typical Range of Values	
			Min	Max
Filling ability	T ₅₀ Slump Flow	Sec	2	5
Passing ability	L-Box	H ₂ /H ₁ (Cm)	0,8	1

MATERIAL AND EXPERIMENTAL PHASE

Material and Experimental phase



Cement Composite Portland (PCC)



Aggregates



water



Chemical Admixtures



Mineral Admixtures

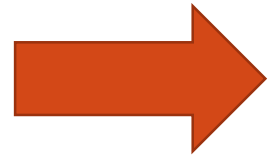
Table 5. The composition of SCC mixtures (in actual test)

Constituent	Typical range by mass (kg/m ³)	
	Mix type A	Mix type B
Powder	455.65	455.65
Fine Aggregate	1094.61	922.17
Coarse Aggregate	729.74	922.17

Based on EFNARC 2005

750-1000kg/m³

Figure 5. Constituent materials of SCC (Resarch)



Material and Experimental phase

Table 6. The Physical Properties of Cement

Particulars	Test results
Specific gravity	3.15
Normal Consistency	25 %
Initial setting time	112 minutes
Final setting time	154 minutes

- ❑ A water-to-cement ratio (w/c) of 0.44 was used in the SCC mixtures
- ❑ The size of coarse aggregate (CA) consists of two types such as 10 mm and 12.5 mm respectively
- ❑ The content of coarse aggregate (CA) is composed of 40 % and 50% of the total aggregate weight.

Table 7. Physical Properties of Fine Aggregate

Particulars	Test results
Water content	3.7%
Sludge level	0.47%
Organic content	Colour 1
Fineness modulus of sand	3.08
a. Apparent specific gravity	2.65
b. Bulk specific gravity on dry basic	2.62
c. Bulk specific gravity on SSD basic	2.63
Water absorption percentage	0.48%

Table 8. Physical Properties of Coarse Aggregate

Particulars	Test results
Water content	3.7%
Sludge level	0.47%
Organic content	Colour 1
Fineness modulus of sand	3.08
a. Apparent specific gravity	2.65
b. Bulk specific gravity on dry basic	2.62
c. Bulk specific gravity on SSD basic	2.63
Water absorption percentage	0.48%

Material and Experimental phase

Test Methods for self compacting concrete

Fresh concrete :

Table 9. All variation of specimens in the actual test

Mix ID	Size of CA	Content of CA (mm)	% of Sp
SCC 10	10	40	0.5
			1.0
			1.5
		50	0.5
			1.0
			1.5
SCC 12.5	12,5	40	0.5
			1.0
			1.5
		50	0.5
			1.0
			1.5

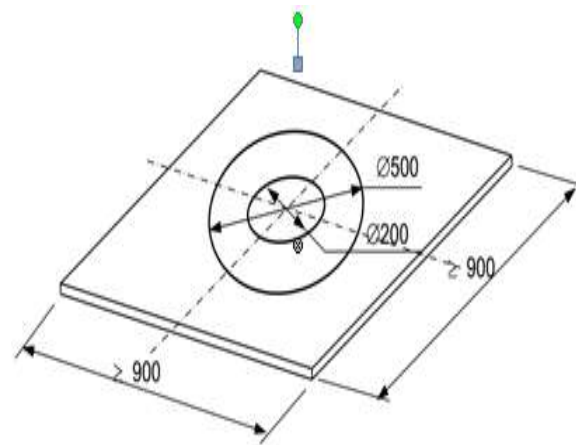


Figure 6. Slump Flow Test

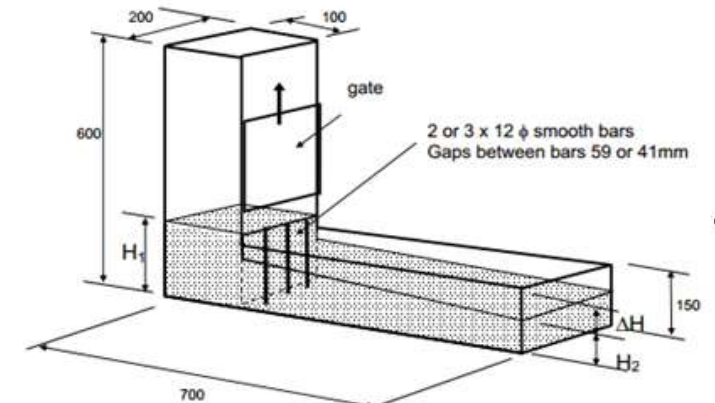


Figure 8. L Box Test

Hardened concrete :

The compressive test of cylinders was determined according to SNI 1974:2011

The test was carried out of 3, 14 and 28 days of age

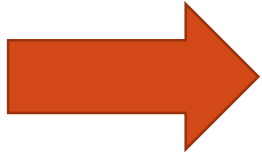


Figure 7. Slump Flow Test (Actual test)



Figure 9. L- Box Test (Actual test)

RESULT AND DISCUSSION



The Fresh Concrete test

Table 10. Result of the experimental test in the fresh properties of SCC mixtures

Mix ID	Size of CA (mm)	Content of CA (%)	% of Sp	Slump Flow Test (second)	Min Required by EFNARC 2005 (second)	L-Shape Box (H2/H1)	Min Required by EFNARC
SCC 10	10	40	0.5	2.85	2-5	0.37	0.8-1.0
			1.0	2.61		0.50	
			1.5	2.08		0.76	
		50	0.5	2.25		0.37	
			1.0	2.70		1.00	
			1.5	2.10		1.00	
SCC 12.5	12.5	40	0.5	2.05	0.069		
			1.0	2.64	0.13		
			1.5	2.55	0.18		
		50	0.5	2.4	0.05		
			1.0	2.5	0.07		
			1.5	2.1	0.41		

>> the size of CA → << poor fairly mixtures of SCC for both of specimens → cannot meet criteria for the passing ability (L-shape box) → EFNARC

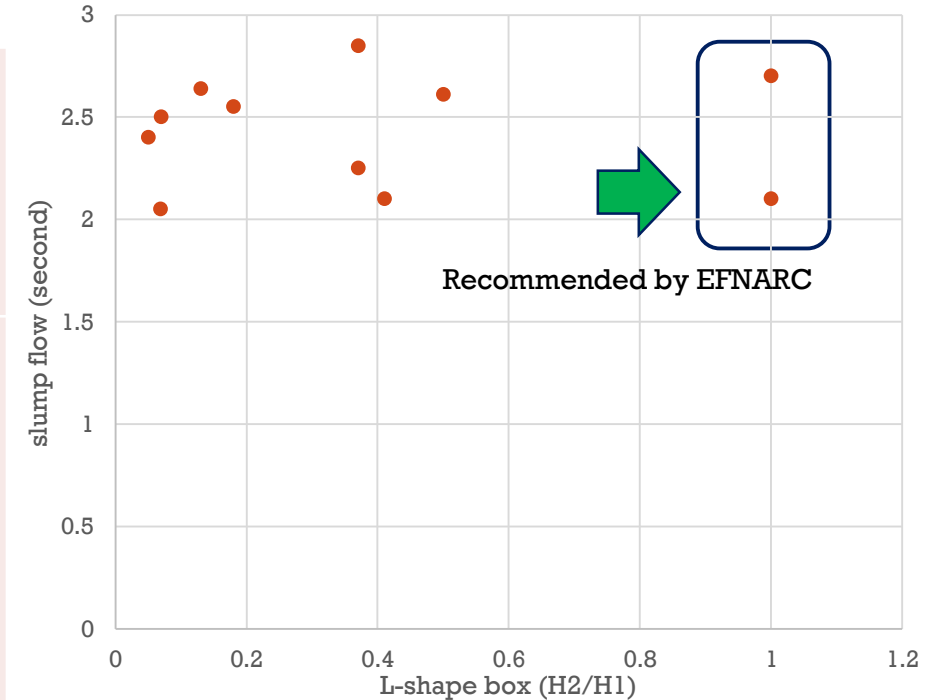
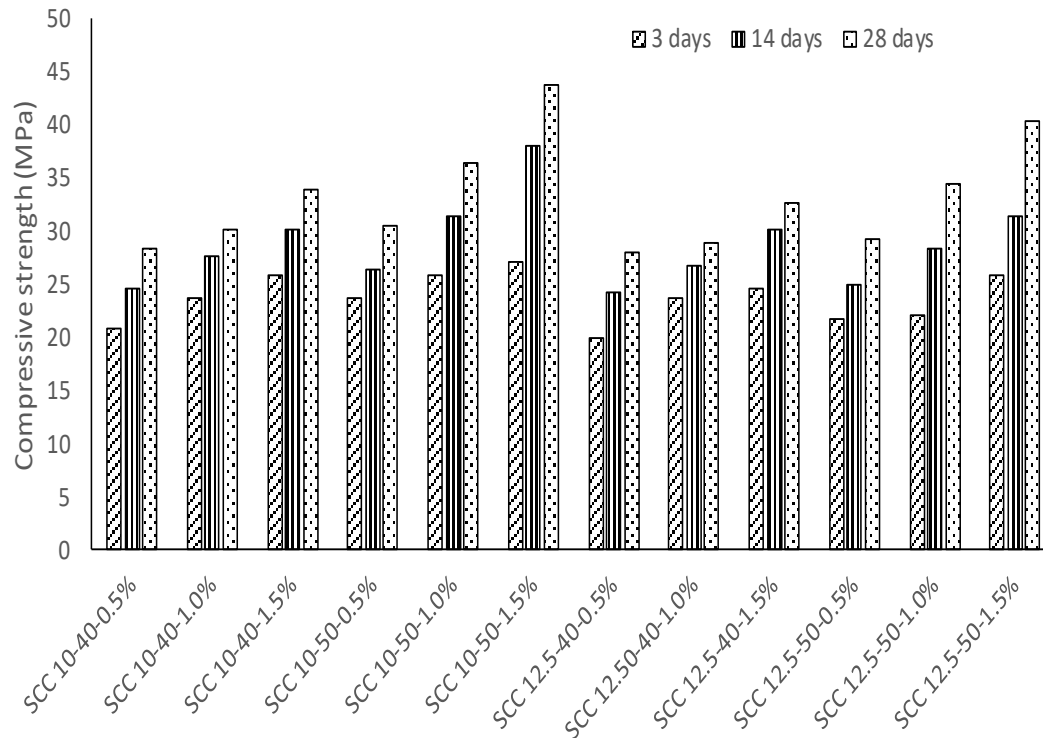


Figure 10. L- Box Test and slump flow test (Actual test)

Only SCC 10-50-1.0% and SCC 10-50-1.5% mixtures have well workability for SCC concrete in term of fresh properties of SCC such as flowability, filling ability and passing ability

The Hardened Concrete test



- ❑ The compressive strength increases with the increase in curing time.
- ❑ The compressive strength of SCC mixtures increased with increasing the percentages of superplasticizer in the mixtures in 3 days, 14 days and 28 days tests.
- ❑ The % enhancement in 28 days compressive strength of SCC mixes with the increasing percentage of superplasticizer from 0.5% to 1.5% of weight cement by using 40% coarse aggregate ranged between 14.0% -16.5%.
- ❑ This value increased sharply around 27% - 31% with a change in the percentage of coarse aggregate to 50% in the SCC mixtures

Figure 11. Compressive strength test of all specimens

The Hardened Concrete test

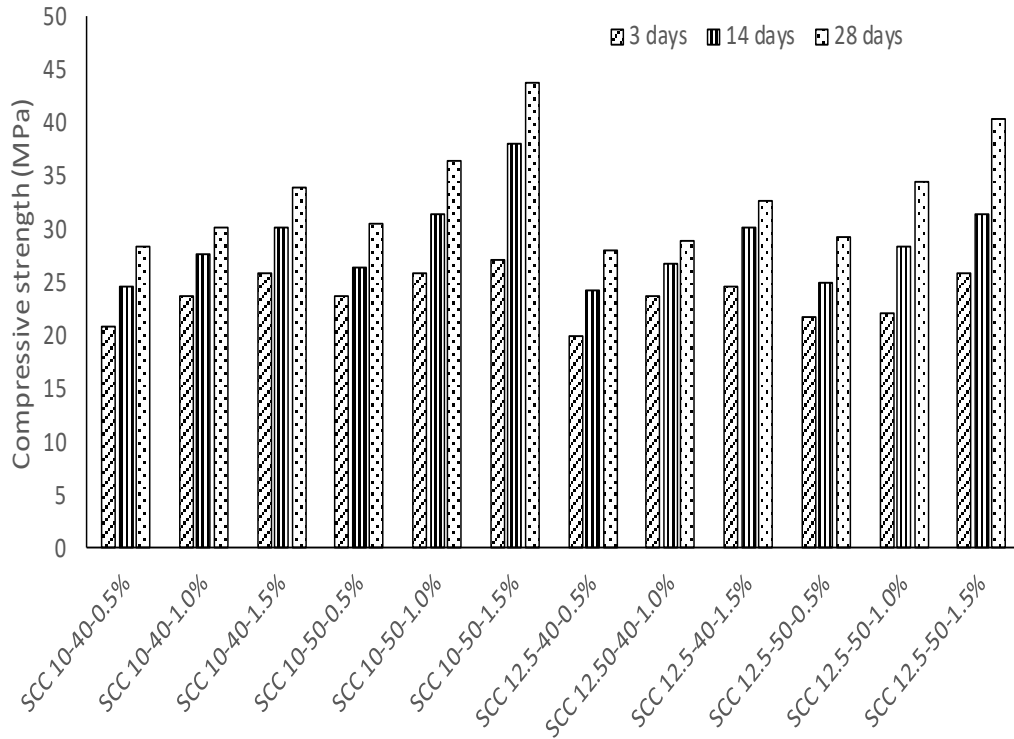


Table 11. Result of the experimental test in the hardened properties

Max size and content of CA	Percentage of superplasticizer (%)								
	0.5			1.0			1.5		
	The compressive strength of specimen at certain days (MPa)								
	7 days	14 days	28 days	7 days	14 days	28 days	7 days	14 days	28 days
10-40%	20.81	24.63	28.45	23.78	27.60	30.15	25.90	30.15	33.97
10-50%	23.78	26.33	30.57	25.90	31.42	36.52	27.18	37.97	43.74
12,5-40%	19.96	24.20	28.03	23.78	26.75	28.87	24.63	30.15	32.70
12,5-50%	21.66	25.05	29.30	22.08	28.45	34.39	25.90	31.42	40.34

Figure 11. Compressive strength test of all specimens



The Hardened Concrete test

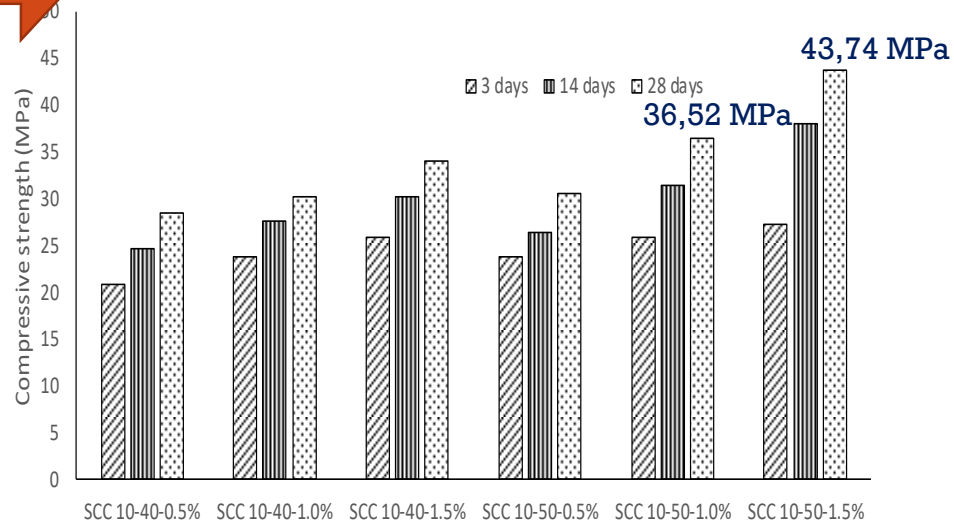


Figure 12. Compressive strength of SCC with using 10 mm size of coarse aggregate

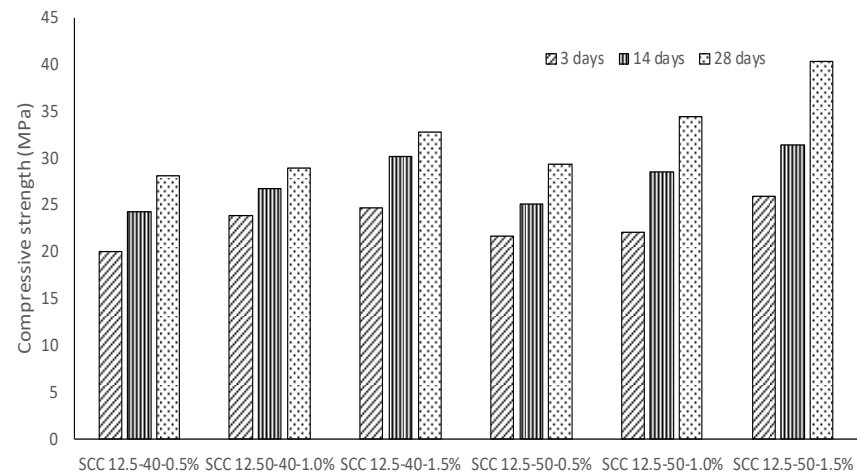
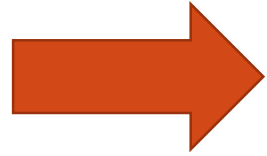


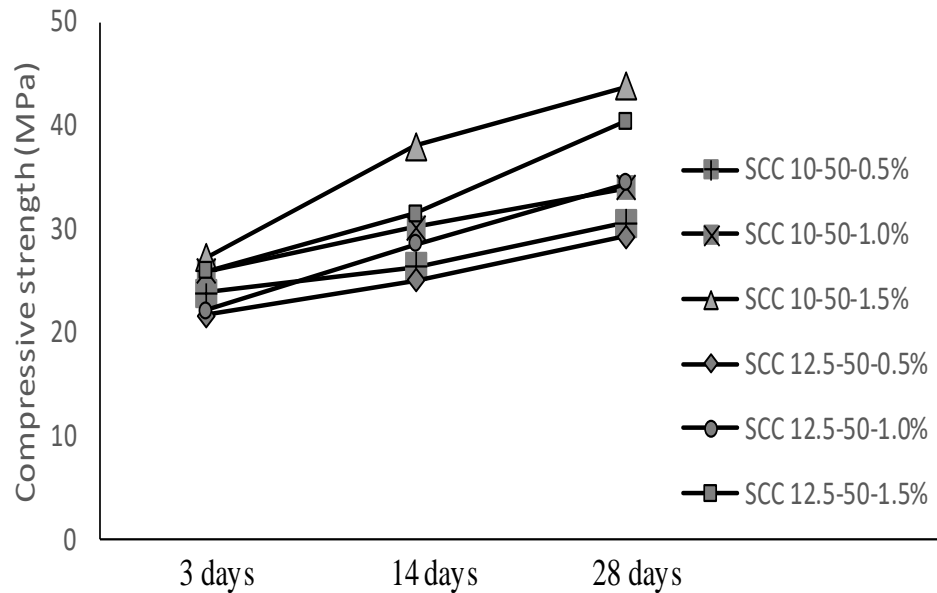
Figure 13. Compressive strength of SCC with using 12.5 mm size of coarse

- ❑ Moreover, according to Ozawa et.al (2003) the value of 42% of coarse aggregate is practically used for SCC concrete
- ❑ The augment of the volume content of coarse aggregate from 40% to 50% of total aggregate weight can improve the compressive strength of concrete
- ❑ EFNARC (2005) mentioned that a typical volume content of coarse aggregate that ranged from 28 to 35 % by volume of the mix.

The typical volume content of CA in this research are 29 to 39% by volume of the mix



The Hardened Concrete test



□ The compressive strength of the mixes with 10 mm coarse aggregate size is higher than the compressive strength of mixes with 12.5 mm coarse aggregate size due to proper interlocked cement paste and aggregate and also the composition of coarse aggregate in the mixtures are sufficient flowable

□ It can be concluded that the increasing particle size of coarse aggregate can reduce the performance of SCC mechanical properties such as the compressive strength of concrete.

Figure 14. Compressive strength of SCC in term of the coarse aggregate size effect



The Hardened Concrete test

- The predicted compressive strength according to the ACI 209 equation :

$$(f'_c)_t = \frac{t}{a + \beta t} (f'_c)_{28}$$

Where a in days and β are constants, $(f'_c)_{28}$ is compressive strength of concrete at 28 days and t is the age of concrete (days). $(f'_c)_t$ is the compressive strength of a certain age.

- The value of a and β depends on type of cementitious materials
- the range value of a and β are 0.05 to 9.25 and 0.67 to 0.98
- The value of a and β for normal weight of concrete are 4.0 and 0.85.

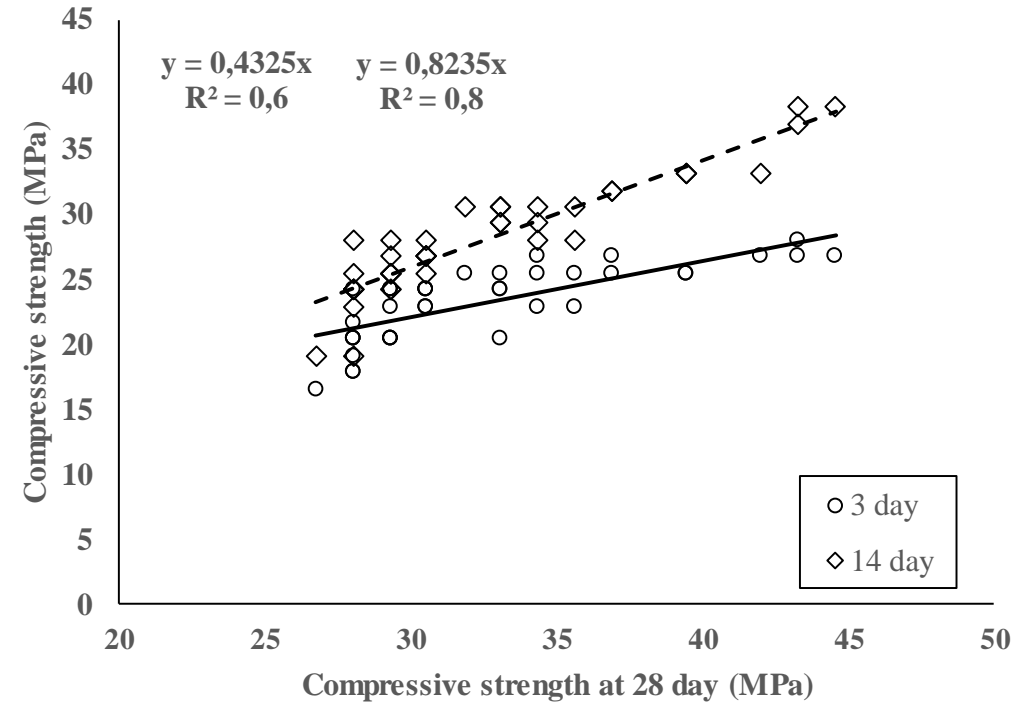


Figure 15. Correlation between certain days of compressive test to 28 days compressive test

From Figure 15, it can be concluded that the most suitable line exhibit the average ratios of 3-days and 14 days compressive strength to average 28- days compressive strength are 0.43 and 0.82 respectively

The Hardened Concrete test

- ❑ The predicted compressive strength according to the ACI 209R-92 equation

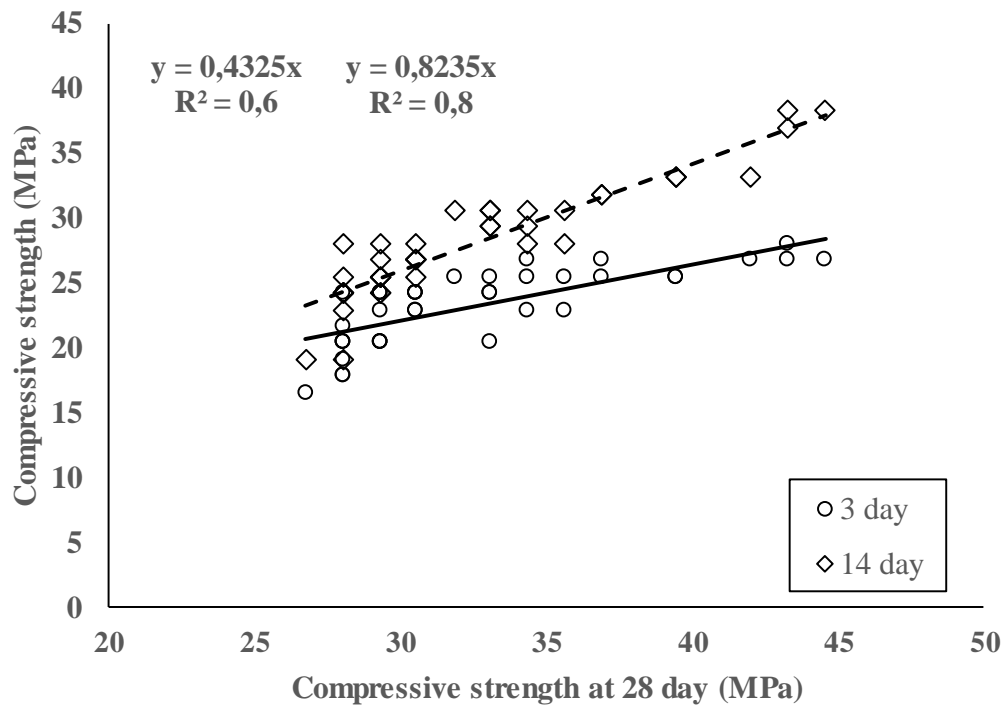
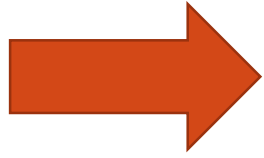


Figure 15. Correlation between certain days of compressive test to 28 days compressive test

Table 12. Comparison of predicted ratio and actual test of compressive strength at certain days.

Days (t)	Predicted ratio according ACI 209	Actual ratio of SCC according experimental test	R-square
3	0,46	0,42	0,6
14	0,88	0,82	0,8
28	1,00	1,00	1,0

- ❑ It is obvious that the equation from ACI 209R-92 can be utilized to predict the compressive strength of SCC
- ❑ Moreover, this equation is the representative for SCC mixtures, especially for advanced concrete ages.



Conclusion

- ❑ SCC mixtures were composed in the laboratory for SCC 10-50-1.0% and SCC 10-50-1.5% specimens mixtures have well workability for SCC concrete in term of fresh properties of SCC such as filling ability and passing ability
- ❑ The flowability of SCC in terms of slump flow and L-Shape Box and the compressive strength of SCC with lower size of coarse aggregate 10 mm is better than 12.5 mm coarse aggregate that used in this research
- ❑ Increasing the percentage of superplasticizer in SCC mixtures from 0.5% to 1.5% of cement weight can improve the fresh and hardened properties of SCC.
- ❑ The compressive strength development of purposed SCC mixtures can be fairly predicted in certain days ages by ACI 209R-92 standard

□ THANK YOU

RUNDOWN

ICoSI 2019 (The 3rd International Conference on Sustainability and Innovation)

Universitas Muhammadiyah Yogyakarta (UMY)
30-31st July 2019

Tuesday, July 30, 2019			
Time	Agenda		Venue
07.00- 08.00	Registration	Committee of ICOSI 2019	Sportorium UMY
08.00 - 08.05	Opening Ceremony	Master of Ceremony (MC)	Sportorium UMY
08.05 - 08.15	Indonesia Raya and Mars Muhammadiyah	All participants	Sportorium UMY
08.15 - 08.20	Tilawatil Quran	Nur Sofyan, S.Ikom, M.Ikom	Sportorium UMY
08.20 - 08.50	Welcoming Speech Launch By Rector	Head of Committee 3rd ICOSI dr. Iman Permana, PhD, M.Kes Rector of Universitas Muhammadiyah Yogyakarta (UMY) Dr. Ir Gunawan Budiyanto, M.P	Sportorium UMY
08.50 - 09.30	Token of Appreciation for key note speakers & Photo Session Cultural & dance performances	All invited speakers, key note speakers, chairs of ICoSI UMY and Rector of Universitas Muhammadiyah Yogyakarta (UMY)	Sportorium UMY
09.30 - 10.30	Main Keynote Speech 1	Dr. Reza Anglingkusumo (Bank Indonesia) Dr Prof. Dr. Sri Tahir (Tahir Foundation) <i>Moderator: Dr Rizal Yaya (UMY)</i>	Sportorium UMY
10.30-11.30	Main Keynote Speech 2	Prof. Alberto Gomes (La Trobe University, Australia) Prof. Hideharu Nakashima (Kyushu University, Japan)	Sportorium UMY

Time	Agenda	Venue	
		<i>Moderator: Prof Dr. Agus Setyo Muntohar (UMY)</i>	
11.30 - 13.00	Lunch and Prayer Poster Presentation	All Participants	Sportorium UMY Prayer at UMY Mosque Sportorium UMY
13.00 - 15.00	Plenary Session 1	All Participants	Focal Venues
15.00 - 15.30	Coffee Break II	All Participants	Zone 1: Sportorium (ISHERS and Asian Col) Zone 2: ICOELTICS ISETH and ISCEIE (E6 building) Zone 3: AR A 1 st Floor (ICOSA) Zone 4: ICISDE Zone 5: Post Graduate Buildings (ICONURS) Note: Prayer at UMY Mosque
15.30 - 17.30	Parallel Session 2	All paper presenter	Focal Venues
18.30 - 21.00	GALA DINNER	All participants of ICoSI 2019	Sportorium UMY

Wednesday, July 31, 2019

Time	Agenda	Venue	
07.00 - 08.00	Registration at Focal	Committee of Focal	Focal Venues
08.00 - 09.00	Plenary Speakers At Focal	Committee of Focal	Focal Venues
09.00 - 09.30	Coffee Break I	All Participants	Zone 1: ISHERS and Asian Col, ICOELTICS ISETH and ISCEIE (E6 building)

Time	Agenda		Venue
			Zone 2: AR B 5 th Floor (ICISDE) Zone3: Post Graduate (ICONURS)
09.30 - 11.30	Parallel Session at Focal	Committee of Focal	Focal Venues
11.30 - 12.30	Lunch and Prayer	All Participants	Zone 1: ISHERS and Asian Col, ICOELTICS ISETH and ISCEIE (E6 building) Zone 2: AR B 5 th Floor (ICISDE) Zone 3: Post Graduate (ICONURS)
12.30 - 14.30	Parallel Session at Focal	Committee of Focal	Focal Venues
14.30 - 15.15	Closing Ceremony & Best Paper Awarding	Committee of ICoSI 2019	Closing Remarks by Dr. Sukamta, M.T Vice Chancellor in Academic Affairs UMY
15.15 - 16.00	Coffee Break	Committee of ICoSI 2019	Sportorium UMY
CERTIFICATE WILL BE GIVEN TO ALL PARTICIPANTS			

PARTICIPANT GENERAL GUIDELINES FOR THE 3RD ICoSI 2019



The 3rd International Conference on Sustainable Innovation (ICoSI) 2019
Universitas Muhammadiyah Yogyakarta
Secretariat: A.R. Fachrudin A Building, Ground Floor
Kampus Terpadu Universitas Muhammadiyah Yogyakarta
Brawijaya St., Kasihan, Bantul
Yogyakarta 55183
Website: icosi.umy.ac.id email: icosi@umy.ac.id



GENERAL INFORMATION

- The 3rd ICoSI 2019 will be held on July 30th – 31st 2019 at Universitas Muhammadiyah Yogyakarta on Brawijaya St., Kasihan, Bantul, Yogyakarta 55183
- For papers with more than one writers, each of the writers should register and pay the conference fee if they would like to present or participate in the conference.
- For writers with more than one papers, they should pay the conference fee based on the number of papers they wish to present and publish.
- The registered presenters/non-presenter participants will get a certificate and all facilities provided by the conference committee.
- All the participants, both presenters and non-presenters should fill out the **attendance confirmation and meal preference form** that will be sent out by the committee through email no later than July 15th, 2019.
- Since the conference will be held in several different buildings at UMY campus, the participants are strongly advised to wear comfortable shoes such as flat shoes or sneakers.
- Participants are also encouraged to bring drinking bottle or tumbler to reduce the consumption of bottled water. The committee will provide several water dispensers at several locations at the venue.

GUIDELINES FOR PARALLEL PAPER PRESENTATION

- The presenters are encouraged to provide an outline of the major points of their presentation in the form of **PowerPoint presentation** or other presentation media and send it to the committee through our email at icosi@umy.ac.id no later than July 25th, 2019. Please use the title: **full name_abstract number_focal conference**. This will provide the committee ample time to integrate the presentations in the appropriate parallel sessions.
- Highlights may be given to the purpose of the study, description of the sample, methodology, problems, and major findings, conclusions, and recommendations.
- Presenters are advised to bring a backup file of their presentation on a USB device.
- All oral presentations are allocated 15 minutes including 10 minutes for the presentation and up to 5 minutes for question and answer session. It is of utmost importance that the presenters do not exceed the 10 min they have to present their work; otherwise the moderator will interrupt the presentation.

- The presentation rooms are equipped with a laptop that is connected to the LCD projector and an audio system including a microphone.
- The presenters are encouraged to check the presentation room prior to the presentation schedule, and come to the presentation room early before the session starts in order to be able to check all the necessary equipment needed for the presentation.
- The presentation schedule and venue can be checked at the schedule provided in the program book.
- More detail information on the presentation will be provided by each of the focal conferences under the umbrella of ICoSI, so please make sure to check it.

GUIDELINES FOR POSTER PRESENTATION

- This is a graphic presentation of the research done by an author in that the author illustrates his/her study findings by displaying graphics, figures, photos, diagrams, and text on the poster.
- The poster presentation session will be held on the first day of the conference, Tuesday, July 30th, 2019 at 11.30 A.M. to 12:30 P.M.
- The content of the poster should include title, authors, purpose, methodology, findings, and references.
- The poster is meant to stimulate discussion. Therefore, keep text to a minimum, emphasize graphics, and make sure to put only necessary items in your poster.
- The poster presentation is presented using an X-banner with the dimensions of 60 cm x 160 cm.
- Please be well-noted that the committee will not provide computers or other extra aids to be used during the poster presentation.
- When designing your poster, choose a neutral background colors for the poster, and make sure that the background colors contrast with the colors of the texts and photos so that the poster can be read easily.
- Choose legible font such as Times New Roman, Calibri, or Cambria and make sure that the size of the font is easily readable from a considerable distance.
- Design your poster in a logical order, so that the participants who are interested in your research can easily follow your presentation.
- Plan to have your presentation for approximately 5 minutes per-visitor
- Please prepare your own poster and bring it to the conference venue. Please do not mail your poster to the conference secretariat.

ADDITIONAL INFORMATION

- For further information, please do not hesitate to contact the committee (+6281392945758), or by emailing us at icosi@umy.ac.id.
- Also, for detail information concerning the conference, please browse our website at icosi.umy.ac.id