Sustainable Road Construction: Advancements in Cement Product as Key Enabler

10th Business Forum
Road Engineering Association Of Asia and Australasia

Labuan Bajo, August 2023

OUTLINE

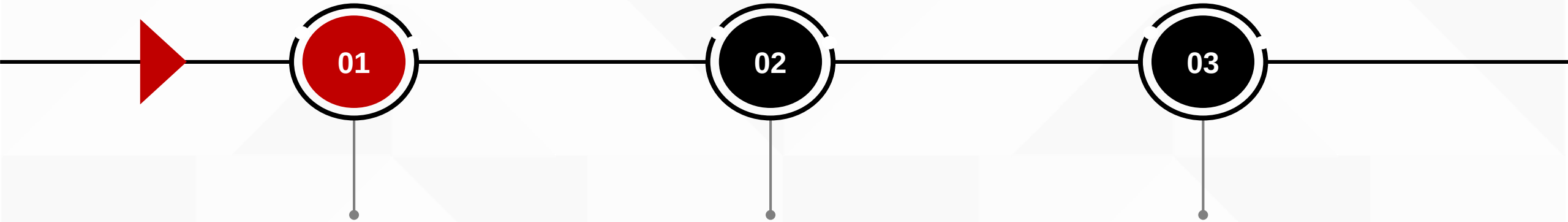
01 THE CHALLENGES

02 SIG PROFILE & COMMITMENT

03 PRODUCT & SOLUTION

Go Beyond Next

OUTLINE



01 **THE CHALLENGES**

02 **SIG PROFILE & COMMITMENT**

03 **PRODUCT & SOLUTION**

Go Beyond Next

THE CHALLENGES OF TODAY'S ROAD INFRASTRUCTURE

Building a good city requires good infrastructure.

The road network in Indonesia is a vital public infrastructure that connects all parts.

The construction industry is currently facing many problems and challenges

The following are some of the challenges in Indonesia's road infrastructure development:

Poor Pavement Structure

Unstable Material Quality

Unstable Soil

Road Structure Complexity Increases

Vulnerable To Flooding

Environmental Impact of Construction

Inconvenience During Maintenance And Repair Work

Inconsistent Work Results

…….. as a material supplier, SIG will be an integrated solution provider to overcome the problems and challenges of road construction in Indonesia.

OUTLINE

01 THE CHALLENGES

02 SIG PROFILE & COMMITMENT

03 PRODUCT & SOLUTION

Go Beyond Next

SIG PROFILE & COMMITMENT

2020

We Are Now the Solution Provider

SIG aims to be at the forefront of providing innovative, applicable and value-added building material solutions in the region.

National Distribution Coverage	9 integrated plants, 6 grinding plants and 30 Packing plants spread from Sabang to Merauke.
43 % Capacity Share	70% utilization. 76% green cement production.
Diverse & Green Label Product	Complete diversification of cement, mortar and concrete products based on construction uses Green label product with lower carbon emission: PwrPro, EzPro, DuPro+ LH, DuPro+ SBC, Maxstrength
Footprint PSN	YTD 2022 SIG has contributed to 148 National Strategic Project (PSNs) and we are committed to do more.
Domestic Component Level (TKDN)	Cement Product TKDN value of up to 98.6%*. *Certified by Sucofindo

50%
2021 National market share

51%
Government Shares


Balikpapan - Samarinda Toll
East Kalimantan


Mandalika Circuit


Patimban Port


SABO DAM Merapi

Network and Distribution

GP Grinding Plants

Dumai	Palembang	Bandar Lampung	Cigading	Gresik	Ho Chi Minh
Riau	South Sumatra	Lampung	West Java	East Java	Vietnam
1 unit Cement Mill	1 unit Cement Mill	1 unit Cement Mill	1 unit Cement Mill	1 unit Cement Mill	1 unit Cement Mill

PP Packing Plants

In 30 locations

Sumatra, Java, Kalimantan, Sulawesi, Bali, Maluku, and Papua

Port

Dumai	30.000 DWT
Teluk Bayur	40.000 DWT
Palembang	8.500 DWT
Cilacap	40.000 DWT
Tuban	40.000 DWT
Gresik	20.000 DWT
Biringkassi	40.000 DWT
Quang Ninh	20.000 DWT
Ho Chi Minh	15.000 DWT

ICP Integrated Cement Plant

Lhoknga, Aceh
1 Cement Kiln and 2 Cement Mills
Capacity
1.8 Million tons per year

Indarung, West Sumatra
5 Cement Kilns and 8 Cement Mill
Capacity
8.9 Million tons per year

Baturaja, South Sumatra
2 Cement Kilns and 4 Cement Mill
Capacity
3.85 Million tons per year

Narogong, West Java
2 Cement Kilns and 6 Cement Mill
Capacity
6 Million tons per year

Cilacap, Central Java
1 Cement Kilns and 2 Cement Mill
Capacity
3.4 Million tons per year

Rembang, Central Java
1 Cement Kilns and 2 Cement Mill
Capacity
3 Million tons per year

Tuban, East Java
6 Cement Kilns and 11 Cement Mill
SIG Capacity
15 Million tons per year
Kapasitas SBI
3.6 Million tons per year

Tonasa, South Sulawesi
4 Cement Kilns and 6 Cement Mill
Capacity
7.4 Million tons per year

Quang Ninh, Vietnam
1 Cement Kilns and 2 Cement Mill
Capacity
2.3 Juta ton per tahun

SIG'S COMMITMENT TO SUSTAINABLE LIVING

INTEGRATING SUSTAINABILITY STRATEGY

DRIVING SUSTAINABLE SOLUTIONS AND INNOVATION

Promote sustainable products and solutions

49% proportion of sustainable products and integrated services solutions to total revenue

Sustainable procurement

75% long-term contract value to total purchases (goods/services)

100% of active contractors screened via CSMA

PROTECTING THE ENVIRONMENT

Climate and Energy

27% scope 1 GHG emissions reduction from 2010 baseline

Air emissions

25% dust emissions reduction from 2019 baseline

Biodiversity

100% biodiversity management plans implementation

Water management

11.46% reduction of specific freshwater withdrawal (L/tonne cement eq.) from 2019 baseline

Circular economy

1.87 million tonnes alternative raw material

0.9 million tonnes of alternative fuel

CREATING VALUE FOR PEOPLE AND COMMUNITY

Community development

8.6 million beneficiaries cumulative since 2015

Ethics and compliance

100% compliance on code of Conduct

Occupational health and safety

0 fatality

0.33 Lost time injury frequency rate (LTIFR)

Employment

Availability of top talent with global leader quality

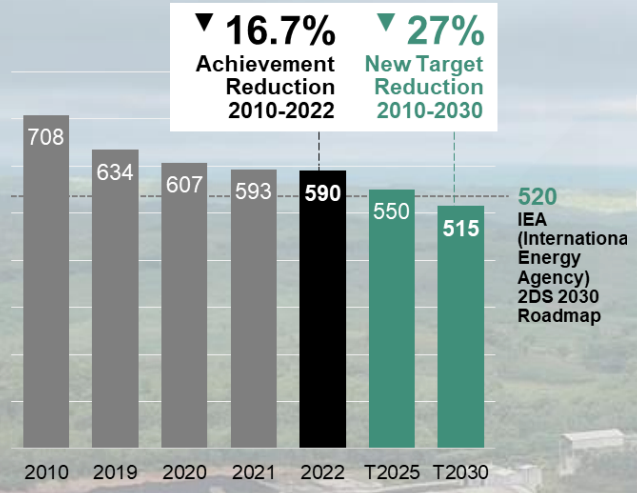
Rembang Plant

SIG'S COMMITMENT TO SUSTAINABLE LIVING

DECARBONISATION EFFORT

CO_2 Emission Intensity, Scope 1 – From Internal Process ($KgCO_2$/Ton cement eq.)

Decarbonisation Initiatives related to GHG Reduction - Scope 1



Increasing Alternative Fuel & Raw Material (AFR) Use

Optimising Specific Thermal Energy Consumption (STEC)

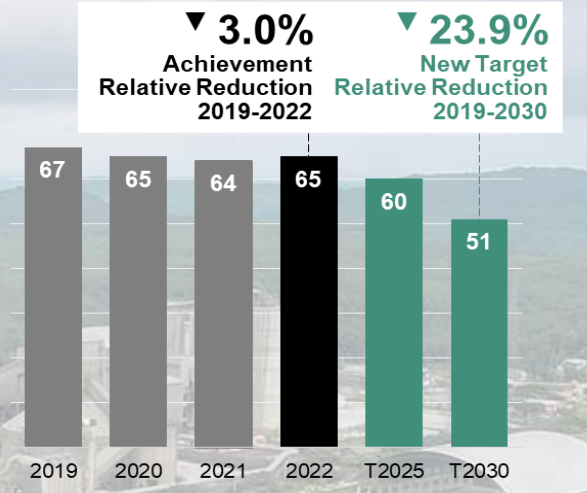
Producing Excellence Products

- Substitution of extractive material with non extractive material
- Collaboration with PENTAHELIX scheme to optimise the use of the green products and solution

Utilization of Municipal Waste Through RDF at SBI Cilacap

CO_2 Emission Intensity, Scope 2 – From Indirect Use of Electricity ($KgCO_2$/Ton cement eq.)

Decarbonisation Initiatives related to GHG Reduction - Scope 2



Optimising Renewable Energy Supply

- Solar Panel installation via Partnership with local provider—Scheduled to scale up **by 7.5 MWp in 2023 with target 572 Mwp in 2030**
- Solar Panel will be installed in all plant across Indonesia (SIG Tuban, SBI, SP, ST, SG, SMBR and IKSG)
- Other renewable initiatives such as optimise use of existing waste heat recovery power generator (WHRPG) with 29.5 MW installed capacity

PLTS SIG Tuban Plant

PLTS Rembang Plant

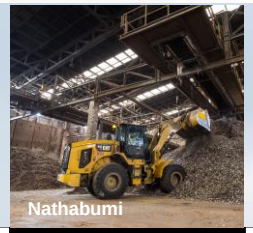
SIG'S COMMITMENT TO SUSTAINABLE LIVING

DECARBONISATION EFFORT

Production Excellence

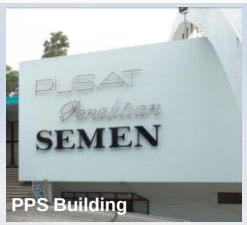
Lean Manufacturing (Eliminate Waste)

Advance Process Control



Utilisation of AFR (Non Extractive Material)

Sustainable Supply Chain



Applied Research & Innovation

Technology Digitalisation

Renewable Energy

BULK CEMENT

PWRPRO

SNI 8912:2020 (HE)

- Cast in situ & precast concrete (wet & semi dry) applications, and the drymix industry.
- Higher initial compressive strength & 5-10% faster initial setting time*
- 12% lower hydration heat*
- 8% lower emissions*
- TKDN: 96.99%

EZPRO

SNI 7064:2014

- General concrete applications (roads, drainage, housing), embankments, soil stabilisation.
- High adhesion 24% lower hydration heat*
- 28% lower emission*
- Strong & smooth finish
- TKDN: 96.95%

MAXSTRENGTH

SNI 8363:2017

- High rise building, fly over and tunnel construction applications
- 25% lower hydration heat*
- Permeability is 19% better*
- Sulfate resistance is 92%*
- Chloride resistance is 85%*
- 16% lower emissions*
- TKDN: 89.98%

DUPRO+ LH

SNI 0302:2014 (IP-U)

DUPRO+ SBC

SNI 0302:2014 (IP-K)

- Construction applications in marine waters, power plants, smelters, waste water lines
- 11% lower hydration heat*
- Permeability is 20%*
- Sulfate resistance is 72%*
- DUPRO+ LH: 16% lower emissions*
- DUPRO+ SBC: 22% lower emissions*
- TKDN: 91.39%

MULTIPURPOSE CEMENT

SNI 3758-2004

- Affordable prices and guaranteed quality
- Mix fluffier and dry time just right
- Better adhesion
- Minimal cracking and peeling
- 37% lower emission*

SNI 7064:2014

- Easier to work with, and more watertight
- Lower temperature of concrete so it doesn't crack easily
- Higher concrete strength without additional additives
- Concrete dries 30% faster
- Concrete is 15% stronger
- 8% lower emissions*

SNI 7064:2014

- better adhesion, easier to work with, and more watertight
- Lower temperature of concrete so it doesn't crack easi
- the end result is stronger and the surface is smoother
- masonry work (parting, plastering, plastering)
- environmentally friendly cement
- 28% lower emissions*

ADVANTAGES

ECONOMIC BENEFITS

- Potential savings of 5-15% on cement costs
- Efficient repair costs due to durability

TECHNICAL BENEFITS

- Allows for a more precise and accurate selection of cement according to requirements and environmental conditions
- Compressive strength growth continues even after 28 days of age
- Better durability, so the life of the structure can be extended
- Consistency of product quality is more controllable compared to manually adding a third material when making concrete in the field.
- Have the ability to achieve much higher final compressive strength, so there is potential for slimmer structural dimensions.

ENVIRONMENTAL BENEFITS

- Contribute to government programs to reduce CO_2 emissions
- Support the use of waste materials from other industries (fly ash & GBFS)
- Supporting the implementation of green infrastructure programs

Source: SIG Sustainability Journey , 2023. Product Catalog SIG

*) than conventional production process

ORDINARY PORTLAND CEMENT

SIG PRODUCT & SOLUTION

UltraPro	SprintPro	DuPro+ HSR	DuPro+ MSR	SuperTermo
SNI 2049-2015 - Tipe I	SNI 2049-2015 - Tipe I	SNI 2049-2015 - Tipe V	SNI 2049-2015 – Tipe II	API Spec 10A Class G-HSR
• High early and late strength • Optimal Dry Time • Better Flexural Strength • Sturdy Final Results • Cement based Soil stabilization	• Higher early Compressive Strength • Optimum Hydration Process and Maintained • High Productivity • The End Result Is Not Easy to Crack • Cement based Soil stabilization	• High sulphate resistance • Moderate chloride resistance • Better permeability of concrete • Higher and longer lasting initial & final press tips	• The resistance to sulfates and chlorides is moderate • Better permeability of concrete • Higher initial & final compressive strength and long lasting	• Consistent Quality and Response to Additives • Sulfate Resistance and Stable Performance At High Pressure • Cement Rheology According to Application


Jakarta International Stadium


Thamrin 9


PLTU Paiton, Probolinggo


PLTU Grati, Surabaya


PLTP Sarulla

Go Beyond Next

ROAD RESEARCH & DEVELOPMENT COLLABORATION

TO MEET FUTURE BUSINESS CHALLENGES

Porous Concrete Application on the Road Material Technology Application Trial Project (mini circuit)

Directorate of Road and Bridge Engineering, Directorate General of Highways, Ministry of Public Work

Porous Concrete Application on the glass bridge project, National Tourism Strategic Area (KSPN) Bromo-Tengger-Semeru, East Java

East Java Regional Residential Infrastructure Centre, Directorate General of Human Settlements, Ministry of Public Work

Development of high performance concrete using hydraulic cement (SNI 8912:2020)

National Research and Innovation Agency (BRIN) and Chemical Additive Manufacturer

Development of Soil stabilization

Taiheiyo Cement Corporation (TCC)

Development of an environmentally friendly geopolymer based on fly ash as a non-shrinking grout

University of Indonesia (UI)

Self Healing Concrete for Prevention and Repair of Concrete Cracks

National Research and Innovation Agency (BRIN)

Rapid Strength Concrete (RSC) Rigid Pavement as an environmentally friendly road construction solution based on a case study of national road repair in the Duduk Sampeyan - Lamongan area.

East Java-Bali National Road Implementation Centre, Directorate General of Highways, Ministry of Public Work

RESEARCH AND DEVELOPMENT CAPABILITY

RESEARCH FACILITIES

R&D SIG Holding
- Physical laboratory
- Chemical Laboratory (Instruments)
- Chemical Laboratory (Wet)
- Concrete and Bulding Materials Laboratory
- Soil Laboratory

Research Center Narogong
- Cement Laboratory
- Concrete Laboratory
- Housing and Building Materials Laboratory
- Soil Laboratory

Laboratory of Concrete Subsidiary
- Concrete Laboratory

Laboratory of Cement Subsidiary
- Cement Laboratory

PARTNERSHIP AND COLLABORATION

- Universities
- External Laboratory and Research Institution
- Chemical Products Companies
- Construction Companies
- Consultant Companies
- Government and Association

FIELD OF R&D

- Raw and Alternative Materials
- Cement Products
- Cement Derivative Products
- Packaging
- Spareparts
- Application Test

QUALIFICATIONS AND CERTIFICATIONS

QUALIFICATIONS
Chemical Engineer, Civil Engineer, Material Engineer, Mechanical Engineer, Chemist, Analyst

CERTIFICATIONS
International and Domestic

OUTPUT RESULTS OF RESEARCH
(2017 – 2022)

Product Development
77

Process Development
16

Material & Application Test
27

X-Ray Diffraction, XRD

UV Spectrophotometer

X-Ray Fluorescence, XRF

Abrasion Testing Machine

Bomb Calorimeter

Heat of Hydration Calorimeter

Roller Screed

Paving Machine

Vertical Mill

Compression Testing Machine 2000 kN Capacity

Mini Ball Mill

*ISO17025 accredited lab

*example of R&D Equipment

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ENVIRONMENTAL FRIENDLY SOLUTIONS FOR SUSTAINABLE ROAD INFRASTRUCTURE

SIG PRODUCT & SOLUTION

RAPID STRENGTH CONCRETE (SpeedCrete)

As an effort to minimising road traffic issues and reducing CO_2 emissions, PT Semen Indonesia (Persero) Tbk (SIG) as a leading multinational building material solution company has presented Rapid Strength Concrete (RSC) as one of the solutions to the problem of reducing the duration of concrete pavement. Fast track pavement concrete solution with guaranteed open traffic 3-12 hours after concrete finishing and maintenance period. SpeedCrete has proven to be effective in reducing congestion caused by road repairs in high traffic areas.

PARTNER

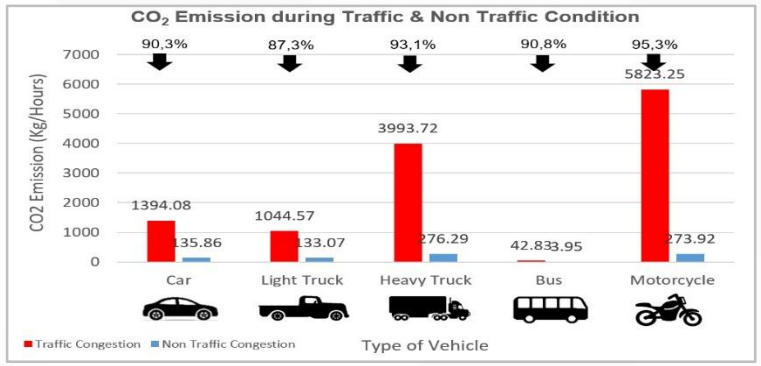
- Directorat General of Highways - East Java & Central Java, Ministry of Public Work
- Directorat General of Human Settlements - Central Java, Ministry of Public Work
- Cement Indonesia International University (UISI)
- Diponegoro University

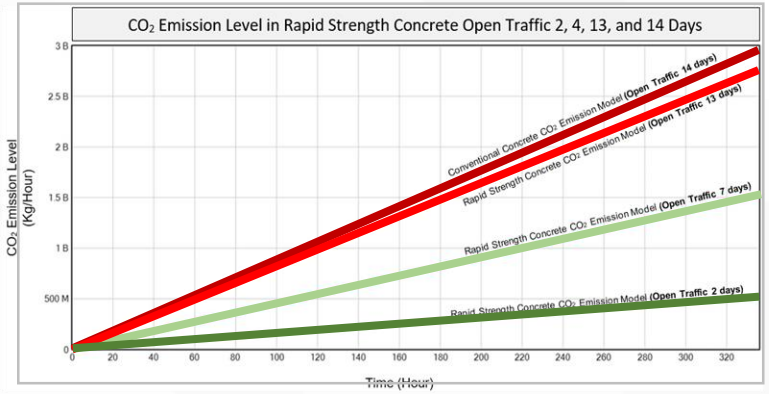
STANDARD

- SNI 2847-2013
- ACI 318
- AASHTO T 140
- ASTM C 116

APPLICATION

- Harbor
- Arterial road
- Busway
- Toll road





Source: Analysis Results, 2023

Total CO2 Emission (Idle) : 12,3 Ton/Hrs.
Total CO2 Emission (Active) : 0,82 Ton/Hrs.

- The total reduction in CO_2 emissions by all types of vehicles when traffic returns to normal is 98.3%.
- This research demonstrates that the use of RSC in road construction reduces carbon emissions and traffic congestion.

Loss of Fuel Consumption due to Traffic Congestion

Type Vehicle	Units	Average Cost Loss		
		Average Cost Loss For Each Vehicle in Non-Traffic Congestion	Average Cost Loss For Each Vehicle in Traffic Congestion	Average Cost Loss For Each Vehicle
Car	197	Rp232,263.00	Rp5,048,125.00	Rp4,815,862.00
Small Truck	122	Rp229,360.00	Rp4,445,924.00	Rp4,216,564.00
Big Truck	247	Rp474,240.00	Rp12,308,751.00	Rp11,834,511.00
Bus	4	Rp6,756.00	Rp146,448.00	Rp139,692.00
Motorcycle	1988	Rp528,808.00	Rp26,337,024.00	Rp25,808,216.00

The total cost lost due to loss of vehicle fuel consumption is Rp 46.814.845,-

Source: Analysis Results, 2023

BEST PRACTICE

Advantages

- Total Solution
- Minimize congestion
- Sustainable Construction
- Added Value & Total Cost Ownership
- 24 hour batching plant network

Guaranteed to be passed by vehicles at specified hours mentioning in the table:

SOLUTION PACKAGE	PERFORMANCE CRITERIA
SpeedCrete 3 hours	Setting time 3 hours
SpeedCrete 4 hours	Setting time 4 hours
SpeedCrete 8 hours	Setting time 8 hours
SpeedCrete 12 hours	Setting time 12 hours

ENVIRONMENTAL FRIENDLY SOLUTIONS FOR SUSTAINABLE ROAD INFRASTRUCTURE

SIG PRODUCT & SOLUTION

POROUS CONCRETE

One of the innovative construction materials that is environmentally friendly because it can absorbs surface water into the ground

PARTNER

East Java Regional Residential Infrastructure Centre, Directorate General of Human Settlements, Ministry of Public Work

STANDARD

- ACI 522
- ACI 330R-01
- Special specifications for porous concrete pavement SKh-1.5.14 Directorate General of Highways 2022

TECHNICAL PROPERTIES

- Dimensions : 21 x 10,5 cm (H6 and H8)
- Colour : green, red, natural
- Void : min 20%
- Strength : up to K250
- Percolation : 81-730 lt/mnt/m^2

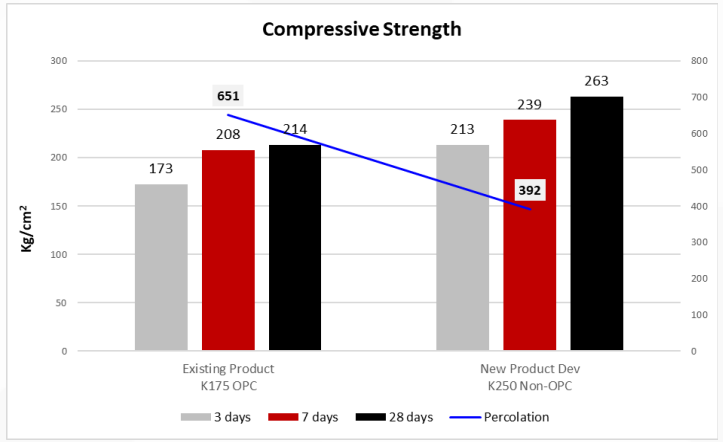
PAVING POROUS BY VUB

RESEARCH GOALS:

1. Showcase paving porous at national tourism strategic area Bromo-Tengger-Semeru (area of 457 m^2).

There is no such application yet in the construction work of the East Java Regional Residential Infrastructure Center. **This application will be the first time.**

2. Product novelty: higher target compressive strength than existing product (K250) using PwrPro (SNI 8912:2020 (HE)).



Source: Analysis Results, 2023

BEST PRACTICE

ENVIRONMENTAL FRIENDLY SOLUTIONS FOR SUSTAINABLE ROAD INFRASTRUCTURE

SIG PRODUCT & SOLUTION

POROUS CONCRETE

One of the innovative construction materials that is environmentally friendly because it can absorbs surface water into the ground

PARTNER

Directorate of Road and Bridge Engineering Development, Directorate General of Highways, Ministry of Public Work

STANDARD

- ACI 522
- ACI 330R-01
- Special specifications for porous concrete pavement SKh-1.5.14 Directorate General of Highways 2022

TECHNICAL PROPERTIES

- Ready mix concrete
- Colour : red, dark grey, natural
- Void : min 20%
- Strength : up to 20 MPa
- Percolation : ±250 lt/mnt/m^2

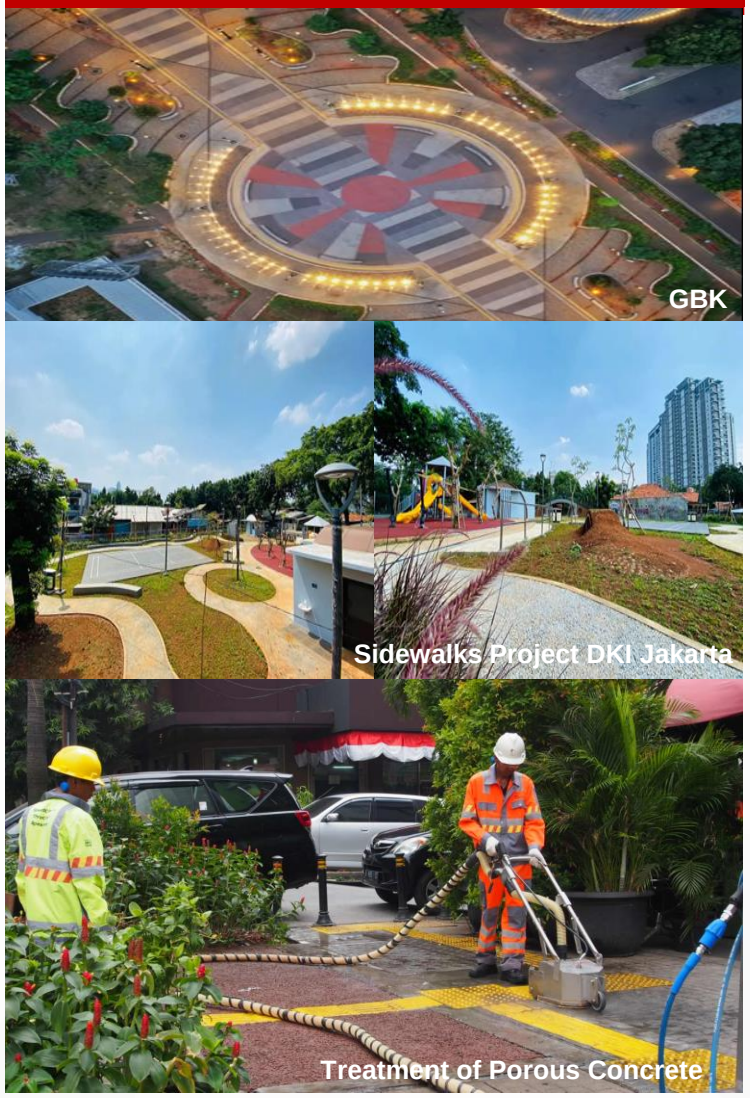
THRUCRETE BY SBB

RESEARCH GOALS:

1. Support in order to improve the Special specifications for porous concrete pavement.
2. Showcase on the agenda: Exhibition of Electric Vehicles in the Context of Road Day 2022

- Porous Concrete has been applied with an area of 595 m^2 for 6 days.
- All requirements for acceptance according to the special specifications for porous concrete pavement SKh-1.5.14 of the Director General of Highways 2022 have been fulfilled.

BEST PRACTICE



ENVIRONMENTAL FRIENDLY SOLUTIONS FOR SUSTAINABLE ROAD INFRASTRUCTURE

SIG PRODUCT & SOLUTION

PARTNER

Taiheiyo Cement Corporation (TCC)

SOIL STABILIZATION

Our solution is a breakthrough soft soil problem by using cement based stabilizer agent. After applying the solution, the soil becomes impermeable, obtains high UCS and improves road durability.

STANDARD

- SNI 8460-2017
- ASTM D 2216-98
- ASTM D 698-00a
- SNI 03-3638-1994
- SNI 03-1744-1989

INDONESIAN SOFT SOIL & PEAT

- Soft soil land in Indonesia deposit reaches 20 M hectare or 10% of total land area.
- The ground varies from area to area with different types, such as **Peat soil, Shale clay, Marine clay, Expanded soil, etc.**, and
- **We can harden almost all type of soft soil.**
- However, it is important to use stabilizer agents and construction methods that are appropriate for each type of soil.
- As for the construction of Road, the durability of roads can be improved if solidifying the soft soil ground foundations properly.

One of the projects in Japan by CDM method (TCC Group)

BEST PRACTICE

Stabilizer agent was **customized** for the project. The solution was developed by SBI&PLP (SIG Group) and TCC Group.

Go Beyond Next

ENVIRONMENTAL FRIENDLY SOLUTIONS FOR SUSTAINABLE ROAD INFRASTRUCTURE

SIG PRODUCT & SOLUTION

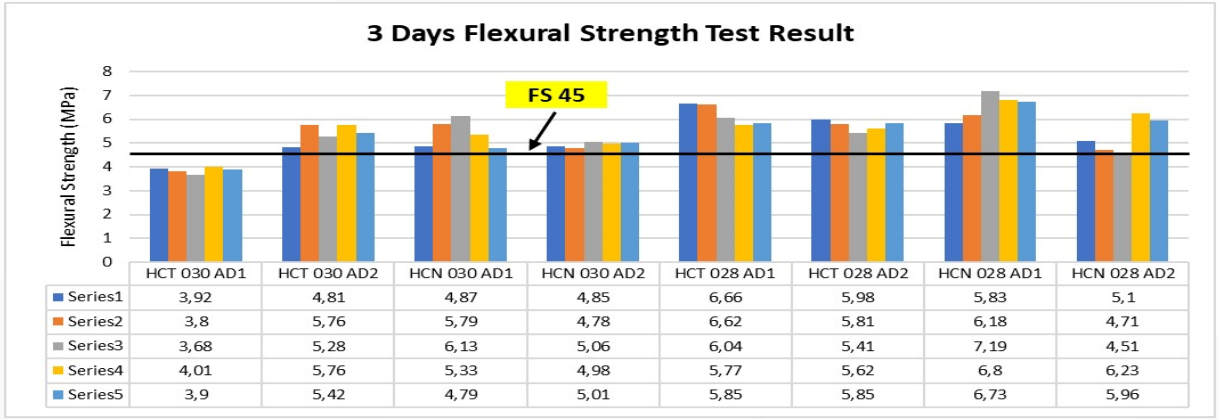
HIGH PERFORMANCE CONCRETE USING HYDRAULIC CEMENT
(SNI 8912:2020)

According to Civil Engineering Research Foundation (CERP), HPC is concrete that has some or all of the following characteristics high/special : ease of placement, long term mechanical properties, early age strength, toughness, volume stability, extended service life in severe environments.

PARTNER

National Research and Innovation Agency (BRIN)

RESEARCH GOALS:
Development of High Performance Concrete using Hydraulic Cement so that performance is obtained in accordance with the quality requirements of SIG concrete subsidiaries with the quality criteria of FS 45 (3 days achieved 100%) for rigid pavement applications.



	HCT 030 AD1	HCT 030 AD2	HCN 030 AD1	HCN 030 AD2	HCT 028 AD1	HCT 028 AD2	HCN 028 AD1	HCN 028 AD2
Series1	3,92	4,81	4,87	4,85	6,66	5,98	5,83	5,1
Series2	3,8	5,76	5,79	4,78	6,62	5,81	6,18	4,71
Series3	3,68	5,28	6,13	5,06	6,04	5,41	7,19	4,51
Series4	4,01	5,76	5,33	4,98	5,77	5,62	6,8	6,23
Series5	3,9	5,42	4,79	5,01	5,85	5,85	6,73	5,96

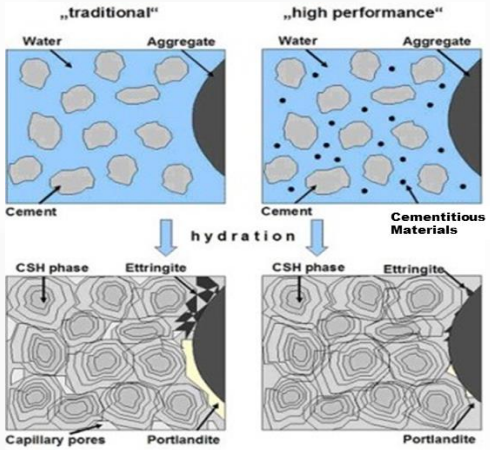
Based on the data from the research conducted, it was obtained the results of a concrete mix design using hydraulic cement which has high performance (optimal) and meets the Strength and Workability indicators.

Minimum flexural strength for concrete pavements

Description	Standard	Flexural Strength
Flexural strength at 28 days for concrete trial mix	SNI 4431:2011	47 (kg/cm^2) FS 47
Flexural strength at 28 days for concrete pavements (production control)	SNI 4431:2011	45 (kg/cm^2) FS 45

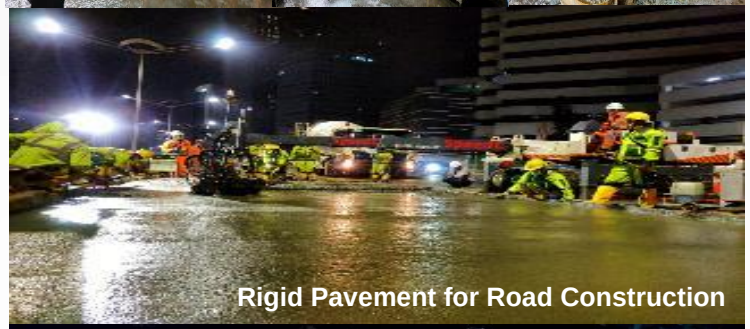
Source: Directorate of Road and Bridge Engineering Development, Ministry of Public Work, Dec 2012

Collaboration between SIG – BRIN
HPC = fast track, in the age of 3 days can be achieved FS 45 using Hydraulic Cement



Hydration of Normal Concrete versus High Performance Concrete

BEST PRACTICE



PERSON IN CHARGE
PRODUCT CATALOG SIG

READYMIX CONCRETE	
Name	**Phone Number**
Rizko	0812-8879-4633
Destynia (Telesales)	0813-1655-1029
Ifah (Telesales)	0878-8336-0292

BULK CEMENT	
Name	**Phone Number**
Dwi Andi Mahendra	0811-3385-586
Rendra Jakadilaga	0811-3335-3695
Taufan Maulana	0811-3486-885

CUSTOMER CARE SIG	
Toll Free	**Email**
0800-10-88888	cs@sig.id

SCAN HERE

PRODUCT CATALOG

Go Beyond Next

THANK YOU

PT Semen Indonesia (Persero) Tbk.
South Quarter Tower A Lt. 19-20
Jl. RA Kartini Kav. 8, Jakarta Selatan 12430, Indonesia

DELIVERING ROAD SOLUTION

SIG PRODUCT & SOLUTION

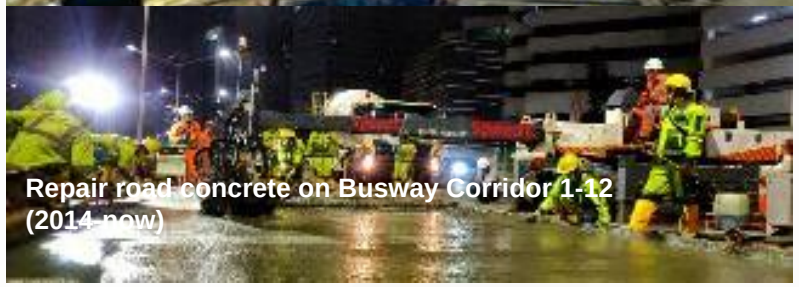
SPEEDCRETE

SNI 2847-2013

SpeedCrete is one of SIG's innovative solutions – concrete with early strength and high performance, which can dry in hours. With SpeedCrete, repairing roads can be done in one night. SpeedCrete is made using state-of-the-art technology, applied using professional expertise and workmanship, and gives you superior strength and speed. It is proven to be highly effective in decreasing traffic jams while repairing high traffic area roads.

Repair road concrete on Intersection of Jakarta city (2015-now)

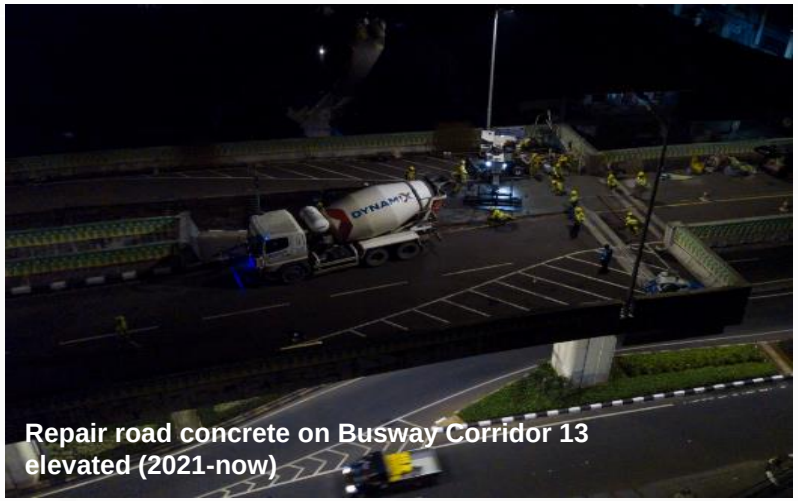
Repair road concrete on several toll road such as : Jagorawi, CTC, Japek, Sumo, Surgem (2012 -now)



Repair road concrete on Busway Corridor 1-12 (2014-now)

TOPCRETE

TopCrete is a high-performance ultra-thin white topping concrete work solution, has the ability as thin concrete construction, using laser screed & 3D profiler technology application and traffic management services carried out in hours and also can reduce total cost ownership. TopCrete thickness in the range of 7 to 10 cm



Repair road concrete on Busway Corridor 13 elevated (2021-now)

COMFILPLAS

SNI 2847-2013

ComfilPlas is a mixture of mortar and foam as a lightweight fill material (density in the range of ±600-800kg/m3) for road foundations and bridge structure supports that have a light weight, produced by DynaPump a computerized mini batching plant and can pump up tp 150 M vertically and 250 M horizontally.

ComfilPlas - Tapal Kuda Flyover Lenteng Agung (2019)

ComfilPlas - On Off Ramp Toll Road Cakung (2021)