

**MS JAIN GROUP
WELCOMES YOU ALL**

**GEOPOLYMER
WORKSHOP**

2016





Practical issues in commercialisation of Geocement

R V RAMANI
Director - Innovations
KIranGlobal Chems Limited
India



KIRAN GLOBAL CHEMS LIMITED

- largest manufacturer of silicates in India for 35 years
- Global second largest in 6 countries
- 33 manufacturing locations - catering to all segments
- Govt accredited R & D centre for silicates
- Started Geopolymer research in 2012-13
- First to emerge in India with product launch Jan 2016
- Likely to be the leading player of Geopolymer hardener
- Planning to establish > 250 channel partners in 2 years
- Installed capacity in 2018
 - 2,000,000 MT of liquid accelerator and
 - 4,000,000 MT of binder powder (premix)
 - 3,000,000 MT of Geoconcrete - Precast

GEOMISSION

To be a part of universal human quest for development and progress by contributing eco friendly green building products which meets the global challenge of building modern society in harmony with nature

MANUFACTURING PROCESS

Silicates manufactured by:

- 1. Fusion & Dissolving process
(using Na_2CO_3 & Silica sand) - above 2.60**
- 1. Direct Hydrothermal process
(using NaOH & Quartz) - upto 2.50**

Geopolymer accelerators manufactured by:

- 1. blending of grades of silicates**
- 2. currently produced using Feldspar**

**12
Months
Geopolymer
Experience**

**Accelerator
Development**

**Application
areas**

**Observations &
Recommendations**

KIRANGLOBAL GEOCEMENTS LIMITED

- **MILESTONES**
- **FACILITIES CREATED**
- **OUR ROAD MAP / BUSINESS PLAN**
- **CHANNEL PARTNERS**
- **RECOMMENDATIONS**
- **GLOBAL PRESENCE**

Milestones (2015 - 16)

Sep '15

**facility for
accelerator
production**

Dec '15

**repairs of
> 300
potholes
in roads**

Jan '16

**launch of
Geo
products**

Mar '16

**production
facility for
precast
Geo
products**

Jun '16

**construc
tion of
15,000
sq.m
building**

PROJECTS under EXECUTION

- ❖ **Paver blocks – 65,000 sq.m**
- ❖ **Labour quarters – 1200 sq.m**
- ❖ **new factory to produce Precipitated silica (20,000 sqm)**
 - **Entire non-load bearing walls, roads, drains,**
 - **underground water storage tanks (1,000,000),**
 - **ETP and non structural elements**
 - **Geoconcrete chimney - 16.0 m**
- ❖ **Samples / approval of coastal armour – 6000 TPM**
- ❖ **60 cottages for a resort - precast Geoconcrete**
- ❖ **Order for 8 MLD Sewerage treatment plant concreting works (20,000 Cu.m – 2 years)**
- ❖ **perimeter fencing (4.5 m x 4.1 km) for new port**
- ❖ **# B concrete roads – 42 km x 7.0 m wide**

New factory to produce 50 TPD of Precipitated silica nearing completion in Tamilnadu



PRECAST ELEMENTS



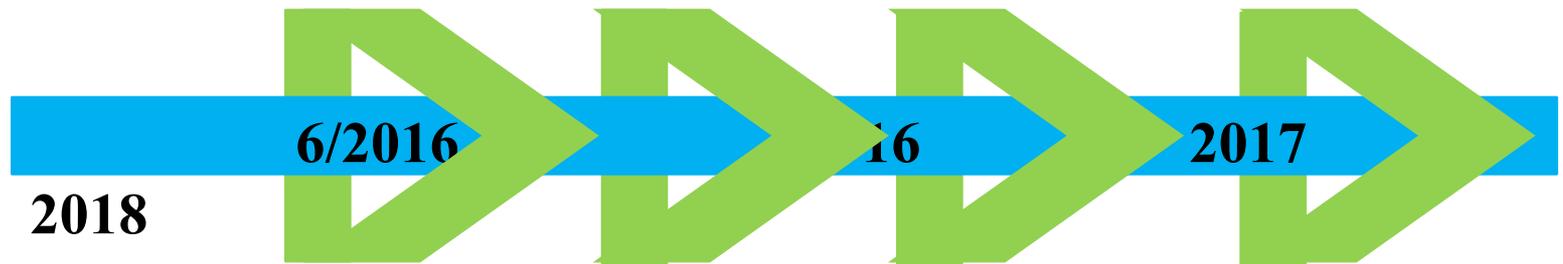


CORE TEAM





CHANNEL PARTNERS



**Blending /
Packing**

**Quality /
certification**

**Precast /
Erection**

**Disribution/
Logistics**





sample concreting at Sewerage treatment plant



Precast
Geopolymer
Tetrapod
- 2940 kg



COTTAGE VIEW





**MAIN
RAFTER**



**SECONDARY
RAFTER**



CONCRETE WALKWAY



**PERIMETER
FENCING**

WORK DETAILS

Geopolymer working

- own well equipped mould making workshop
- moulds made from polymers - pvc, rubber
- developed steel moulds with ceramic coating
- ambient setting/ curing
- premixed powder binders (fines & moisture)
- replacing 30% of sand with cu slag
- no water added in the mix (liquid tuned)
- mix design for 30 to 180 minutes setting
- 1 barrel of liquid accelerator for 1 cum concrete
- designed own plough shear mixer

Our plans

PROJECT	GEOCEMENT AND GEOCONCRETE
PLANT CAPACITY	50,000 TPA
PLANT (GGBS + Flyash)	Grinding, blending and packing
LOCATIONS	South india (2 plants commisioned)
INVESTMENT so far	INR 200 Million

PROJECT	GEOACT - ACCELERATOR
PLANT CAPACITY	20,000 TPA
PLANT (LIQUID)	Na & K – Silicate blending and packing
LOCATIONS	South india (3 plants comisionned)
INVESTMENT so far	INR 150 Million

A
**GREEN ALTERNATIVE
WITHOUT CEMENT**



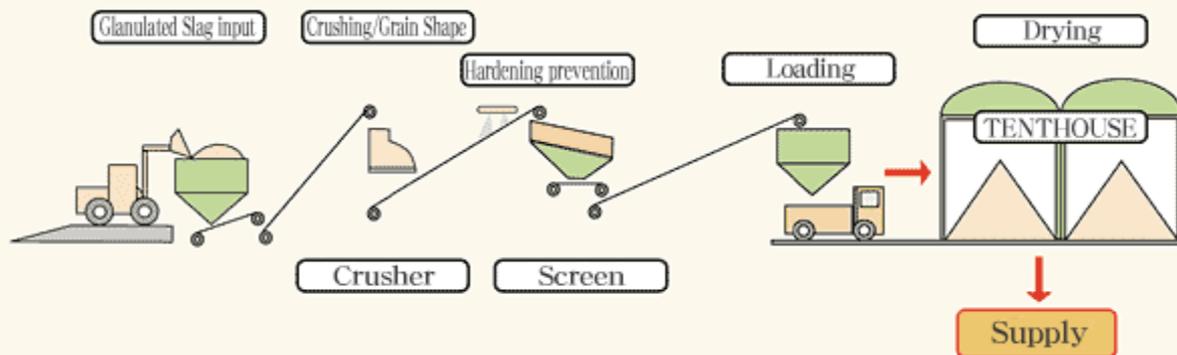
**GREEN
GEOCEMENT**

Click Here





Blast furnace slag fine aggregate produce process





राष्ट्रीय इस्पात निगम लिमिटेड
(भारत सरकार का उपक्रम)
Rashtriya Ispat Nigam Limited
(A Government of India Undertaking)
CIN : U27109AP1982GOI003404



28th June, 2016

No. RINL/VSP/CSM/567/ 368

To
The Chairman,
M/s Kiran Global Chems Limited,
New No.42, Old No.81,
New Avadi Road, Kilpauk,
Chennai - 600 010

Dear Sir,

Sub: Raw material linkages for your proposed Geo-Polymer Cement Project

This has reference to your mail requesting to a letter of comfort for long term supply of Fly Ash and BF Slag.

We are happy to learn about your plan to set up Geo polymer Cement unit in large scale eliminating use of limestone in this product which is substitute of cement.

We are interested for long term supply of your initial required quantity of 15,000 MT/month of Fly Ash and BF Slag each subject to our mutually agreed terms and conditions.

Kindly let us know your time frame for commencement of supply required by you so that we can deliberate the detailed terms and conditions for long term tie up in this regard.

Please note that our supply shall depend on the projected spare quantity available with RINL for such long term tie up during finalising the agreement/MoU with you.

Thanking you,

Yours faithfully

(Biswamay Dutta)

DGM (CSM), RINL

Government support

400,000 TPA Binder plant in Vizag

15000 MT/ month Fly ash & BF slag

Investing in a Sustainable Future

PRODUCT RANGE

GEOCEMENT	GGBS + Flyash + + (Powder)
GEOACT	Basic accelerator liquid used with Geocement powder
GEOCRETE - Normal	General purpose concrete for construction and repairs
GEOCRETE – SUPER	Quick setting(< 30 min) concrete for instant repairs – roads, plugging, fixing
GEOCRETE - TOUGH	Wear resistant concrete for heavy duty roads, runways, dams, pressure pipes, railway sleepers, special foundations
GEOMORTAR	General purpose mortar for all applications
GEOTILEFIX	Special compound for thin layer tile bonding to walls
GEOPLAST	General plastering mix for good surface finish
GEOPUTTY	Filling and leveling of surfaces before painting

Geocement range

- ❖ **General purpose**
- ❖ **Acid resistant**
- ❖ **Temperature resistant**
- ❖ **Chloride resistant**
- ❖ **Ready mix concrete**
- ❖ **Quick setting**
- ❖ **light weight**
- ❖ **insulation**
- ❖ **Retarder**

Products under development

GEOPROOF	Water proofing compound for roof joints, pipelines and sealing
GEOCOAT	General purpose primer coat for masonry surfaces
GEOHEAT	Exclusive heat resistant cement / concrete and coating
GEOACID	General purpose acid proof applications
GEOCHLOR	Chloride resisting cement for coastal / undersea construction, pipelines
GEOSHOT	For all shotcreting concrete spray requirements
GEOFLOOR	Floor coating systems for hard flooring and antibacterial coating
GEOGROUT	Concrete grouting for repairs, renovation and quickfilling
GEOFILL	Low density filling concrete
GEOPAINT	Zero VOC paint for all masonry walls
GEOLIGHT	Light weight concrete for blocks and walls
GEO-3D	Exclusive 3 D Printing of concrete



trials at MAPEI - Dubai



ACCELERATOR/ HARDNER

- Developed various grades
- With Na & K / Feldspar
- Multiple molar and solids / viscosity





Few Case Studies

1. Food processing factory flooring
2. Flooring after the floods
3. Pothole repairs in chennai
4. Sample Oilwell filled in Egypt
5. Trials at MAPEI , dubai
6. Road in 2 hours in Indian Road congress

New facility to manufacture Silicate accelerators for Geocement - 100 TPD



RECOMMENDATIONS

- **Choosing the right accelerator**
 - **Choosing the powder mix**
 - **Mix design / setting time**
 - **Cracks - more fines, less curing,**
 - **Efflorescence**
 - **colour change**
 - **Dark spots in concrete**
 - **Fine GGBS / Fly ash**
 - **surface roughness / abrasion**
 - **fibres in concrete**
 - **plough shear mixer for concrete mixing**



EXCLUSIVE GEOPOLYMER WORKSHOPS



- ❖ STUDENTS (250)
- ❖ ARTISANS (30)
- ❖ SUPERVISORS (20)
- ❖ ARCHITECTS (6)

GEOBINDER MIX

	FLY ASH *	GGBFS**	
SLOW SETTING LOWER STRENGTH	100	-	 30 minutes 
	90	10	
	80	20	
	70	30	
	60	40	
	50	50	
	40	60	
	30	70	
	20	80	
	10	90	
180 minutes	-	100	

- Alumina compensation may be required
- # C can be blended in quick setting uses
- finer the particle size more hardner is required
- ** Other steel slags not recommended for commercial use

Metakaolin is not feasible in India

SELECTION OF ACCELERATOR

K ₂ O / Na ₂ O	: SiO ₂		
1 :	0.65	STRONG / HIGH ALKALI S M S N / R Corrosive	Hazardous Alkali activation Efforoscence
	1.00		
	1.40		
1 :	1.65	Medium Alkaline	Accelerator , Hardner good results
	1.85	Safe Stable	
	2.10	Workable	
1 :	3.10	Low alkaline Not reactive	Plasticiser
	3.35	Neutral	Retarder

Cost analysis

Hardner	Sodium 1.85 / 40%	Potassium 1.65/ 35%	Feldspar 1.65 / 35%
%	9.0	5.0	8.3
Powder binder	17.0	18.0	18.5
Fine aggregate	30.0	33.0	30.0
Coarse aggregate	42.0	43.0	42.0
water	3.0	1.0	1.2
Cost / MT - US\$	41 - 44 (252)	45 - 48 (540)	38 - 40 (230)

65%(Si) +
 17% (Al) +
 15% (Na+K)
 + 2% (Fe) +

OUR PLANS

- India (SAARC)
- MENA (GCC)
- S AFRICA

- EUROPE
- U K
- FAR EAST

- CHINA
- USA
- AUSTRALIA

2016 - 17

**appoint
distributor**

2017 - 18

Food for thought

samples of silicates for R & D

- 3 D Printing
- coastal armour
- plastic composites
- automobiles
- canal embakement
blocks to grow fish

*manufacturing a lot of
geopolymer products*

IOT & Connectivity

- Solar GP roof
- Intellegent products
- Kerbs with cable
holes and sensor
- Parking sensors
- Pedestrian crossing
- Beams / structurals
with sensors
- lighted floor tiles



Let's discuss your requirements and clarifications across the table



thank you

for more details:

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www.geocement.in

[geopolymer2015.googlegroups](https://www.google.com/groups?hl=en&ik=geopolymer2015)