CEMENTING THE SKYLINE OF SRI LANKA

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CEMENT INDUSTRY – AN OVERVIEW

Particulars	Sri Lanka	World
Cement Consumption	4.5 MTPA	2857 MTPA*
Imports (World Trade)	3 MTPA (75%)	164 MTPA (6%)*
Per Capita Consumption	200 KG	440 KG*

Significance ?

- Dependence on imports and bargaining power
- Quality and types required for tall buildings
- Green cement and/or durability aspects

*Source: The global cement report 8 th edition and internal estimate

CEMENT INDUSTRY - FACTS

- Sri Lanka Cement Industry – 4.5 million MTPA
  - **5** major Players (producing/grinding/packing in Sri Lanka) - 96 % of volume
  - 20 (about) traders/importers of bags supplying only 4 % of volume.
- Primary Source:- India, Malaysia, Thailand and Indonesia
- Secondary Sources: – Pakistan and Gulf

FLOW OF CEMENT/CLINKER TO SRI LANKA

GLOBAL/LOCAL CEMENT SPECIFICATIONS

- European : EN 197 & 196
  - Performance oriented
  - Type basing composition
  - Strength class
- American Standards: ASTM C 150, 109, 114
  - Prescription oriented
  - Types basing application
  - No strength class

- SLS Specs are based upon European Specs.
- Four types: OPC, BHC, PLC & Masonry Cement
- Strength Class 32.5 & 42.5 N
- Inclusion of strength class 52.5 N ?
- Parity with other specs ?

WHAT SHOULD WE EXPECT FROM CEMENT ?

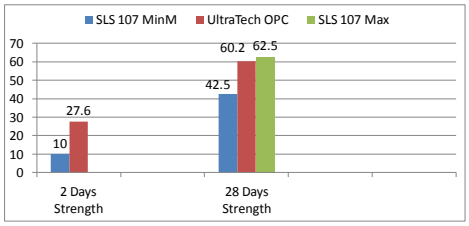
Superior Strength

Optimum Chemical Properties

Consistency of quality

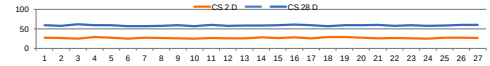
BS 8500 gives range of cement suitable for use in defined exposure class (durability). The producer can select a cement …that will economically achieve the required performance.

Superior Strength



Superior Strength with Consistency

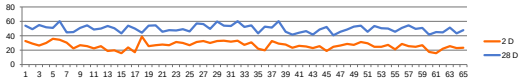
Single source and superior strength



CEMENT STRENGTH – MEAN STRENGTH – 1.65 * STD DEV

56.75 = 59.15-1.65*1.45

Various sources and varying strengths



CEMENT STRENGTH – MEAN STRENGTH – 1.65 * STD DEV

41.72 = 49.8 – 1.65 * 4.9

Economy through consistent superior strength of cement – higher grade Concrete

AXIALLY LOADED SHORT COLUMN		
Concrete Grade	M20	M30
Load	1000 KN	1000 KN
Steel	1%	1%
Gross Area	385*385	325*325
Saving in space		29%

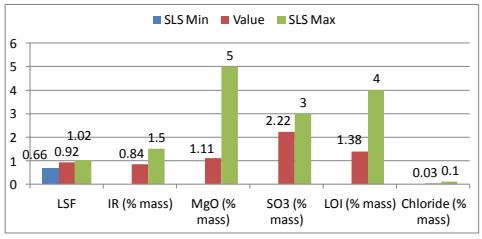
Saving in floor space, concrete qty, labor, shuttering ….i.e. time, money and resources.

Economy through consistent superior strength of cement – less cement consumption

Dept of Census & Statistic-2010	**All Sectors**			
Sector	**Value of Work Done**	**Raw Material Consum.**	**Cement Consum.**	**Percentage**
Building	28,632,950,841	13,313,225,071	3,120,329,031	10.90%
Highway	19580570631	13769407790	46,7635,321	2.39%
Bridge	825190375	208274338	52,759,621	6.39%
Waetr Supply & Drainage	10103149507	3270853529	574,334,010	5.68%
Irrigation & Land Drainage	443001995	227092673	57,726,240	13.03%
Dredging & Reclamation	180194474	83172672	5,069,350	2.81%
Others	3229814955	182657133	27,714,515	0.86%
All sector	62,994,872,778	31,054,683,206	4,305,568,088	6.83%

Even 3-4 % reduction in cement consumption can be substantial.

Optimum chemical properties



ESSENTIAL FOR ENSURING DURABLITY-
A KEY POINT OF GREEN CONSTRUCITON.

DURABILITY ISSUES A MAJOR CONCERN

Special cements & requirements ?

- Costal construction: Sulfate Resisting Cement ?
- In some cases the density & permeability of the concrete influence its durability to such a degree that they override the influence of the type of cement used.
- OPC & RHPC > PSC & Low heat OPC> PPC&SRC> Super-sulphated cement > High Alumina Cement
- In Sri Lanka, OPC with moderate sulfate resisting property (i.e. C3A range of 5-8%) offers best compromise in terms of sulfate as well as chloride resistance.

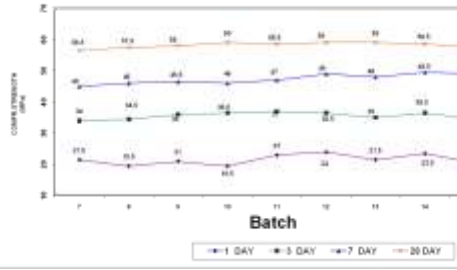
Green cement ?

- Is Cement a polluting Industry ?
- Is there any alternative available ?
- Globally: Cement Industry is not only making efforts to reduce carbon emission from it's own process rather helping other industry by making use of their waste/by product. Those type of cement can be put in green category ?
- Is it green or degree of greenness of cements?
- Reply : Context – local Relevance in terms of availability, application's requirement, economy and more importantly manufacture's commitment to environment

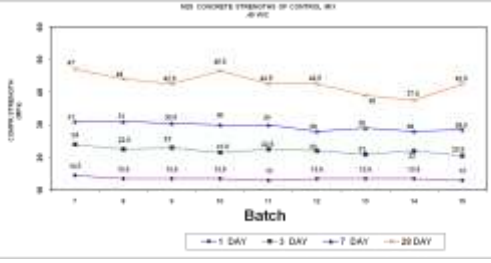
Does good cement guarantee good concrete ?

- **Although vital but Cement is not the only contributor for quality of concrete.**
- **Substantial contribution is from**
  - Other ingredients-aggregates, water, **Admixture**
  - Workmanship
  - Temperature & humidity

Cement testing results



Concrete testing results



Effect of small difference in dosages of same admixture

Date & Time	Admixture	Dosage l/m3	Slump Retention (mm)				Com.Strength (Mpa)			Remarks
			0 H	1 H	2 H	3 H	1 D	7 D	28 D	
18/09/07 10.55am	Daratrad 17	0.414	Coll	195	180	135	2.2 25 H	33.7	46.6	Had set & good mix
	Daracem 100	2.48								
19/09/07 12.30pm	Daratrad 17	0.331	Coll	200	175	165	0.2	25.6	37.2	Had set & good mix
	Daracem 100	2.898								

Effect of delay in adding admixture

Date & Time	Admixture	Dosage l/m3	Slump Retention (mm)				Com.Strength (Mpa)			Remarks
			Init	1H	2Hr	3Hr	1 D	7 D	28 D	
Admixture addition along with water										
01/08/2007 3.00pm	Adcrete	1.6	210	190	165	90	10.2	37.9	49.9	Had set & good mix
	Supercrete	3.2								
Delay of 5 mins for admixture addition										
20/08/2007 9.50am	Adcrete	1.6	Coll	210	185	160	3.45 30 H	32.9	47.3	Good mix
	Supercrete	3.2								

Effect of change of brand of admixture

Dat/ Tim	Admxtre	Dsge l/m3	Slump Retention (mm)				Com.Strength (Mpa)			Remark
			Init	1 Hr	2 Hr	3 Hr	1 D	7 D	28 D	
25/07/09	Control	-	45	-	-	-	15	35	48.5	
10/08/09 12.20pm	Adcrete	1.65	Collapse	200	170	150	9.59	41.6	55.3	Set & good mix
	Supercret	4.2								

Dat/ Tim	Admxture	Dsge l/m3	Slump Retention				Com.Strength			Rmark
			Init	1 Hr	2 Hr	3 Hr	1 D	7 D	28 D	
25/07/09	Control	-	45	-	-	-	15	35	48.5	
10/09/2009 11.30am	Pozzolith300 R	0.518	Collapse	195	180	150	0	36	50	Good mix & not set after 24 hrs.
	Rheobuild 561	3.312								

Compatibility issue ?

- The problem is that not all cements which comply with the appropriate national standard have the same rheological behavior when used with a given super plastizer at a very low W/C ratio. Same is true for super plasticizer.
- The issue of compatibility can be readily resolved because it has been established that for each Portland cement there exists an optimum amount of soluble alkalis (existing as alkali sulfates), which ensures compatibility with a given super plasticizer.
- It is to be hoped that the approach of buying cement and plasticizers in isolations shall come to an end and matching pairs of both will become available thru reducing laborious testing prior to their use.

Dr Adam Neville

Beyond quality of cement, holistic consideration of the manufacturer as well as industry is necessary.

Beyond quality - Operational strength of cement company

- Company's strategic strengths including supplies
- Certifications – QMS, EMS, OHSAS and sincere concern for Society, Environment & Safety
- Resources – manpower , machinery and infrastructure
- Quality Assurance System

- Infrastructure planning – Silos for example
- In-house laboratory
- Technical Expertise

- Regular source of supply for consistent quality

Who We Are

- A USD 35 billion group - India's first truly multinational corporation
- 100 state-of-the-art manufacturing units and sectoral services in 36 countries over 6 continents
- Anchored by and extra ordinary force of 133,000 employees of 42 nationalities
- Globally ranked 4 th and 1 st in Asia Pacific in "Top companies for leaders survey" in 2011 (conducted by Aon Hewitt, Fortune Magzine and RBL). Best employer in India – 2007 & 2011.

GLOBAL PRESENCE

60 % REVENUE OF 35 BILLION COMES FROM OUTSIDE INDIA (AMONG FORTURE 500 COMPANIES)

ADITYA BIRLA GROUP

Globally

- A metal power house with largest aluminum rolling company
- No. 1 in Viscose Staple Fibre
- No 1 in Carban black
- Fourth largest in insulators
- Fifth largest in acrylic fibre
- Among top ten cement compnies

In India

- Largest in cement
- Top fashion & lifestyle player
- Largest in chlor-alkali
- 2 Nd largest in Viscose staple yarn
- Among top three mobile companies
- Leading player in life insurance & asset management
- Among top two super market chains
- Among top 10 BPO companies

CSR-Beyond business, supporting 7 million people in 3000 villages

RESOURCES AND COMMITMENT

RESOURCES – SOPHISTICATED TECHNOLOGY

AN EXAMPLE OF BENEFIT IN APPLICATION AREA - MINOR ADDITIONAL CONSTITUENT – PURPOSE ?

	Fineness	Cement Strength				Concrete Strength			
	m^2/kg	N/mm2				N/mm2			
		1D	2D	7D	28D	1D	3 D	7D	28D
SLS - 107	**> 225**		**> 10**		**> 42.5**				
SPEC					**62.5<**				
Regular OPC	308	17.1	24.6	43.4	57.7	14	23	29.5	38
Sample-1(2%FA)	308	14.5	23.9	42.1	58.6	15	24	36.5	45.5
Sample-2(2%GGBS)	306	13.8	23.7	40.7	55.6	9	18	25	31

DECLARATION OF MINOR ADDITIONAL CONSTITUENT ?

AS PER SLS, MANUFACTURER CAN BE REQUESTED TO GIVE DETAILS.

- Rest assured from cement side……As with good quality of suitable cement and superior services, we are already geared up to support your endeavor of advancing tall building technology in Sri Lanka.

THANK YOU.