



Fly Ash as Green Building Material For Durable Structures



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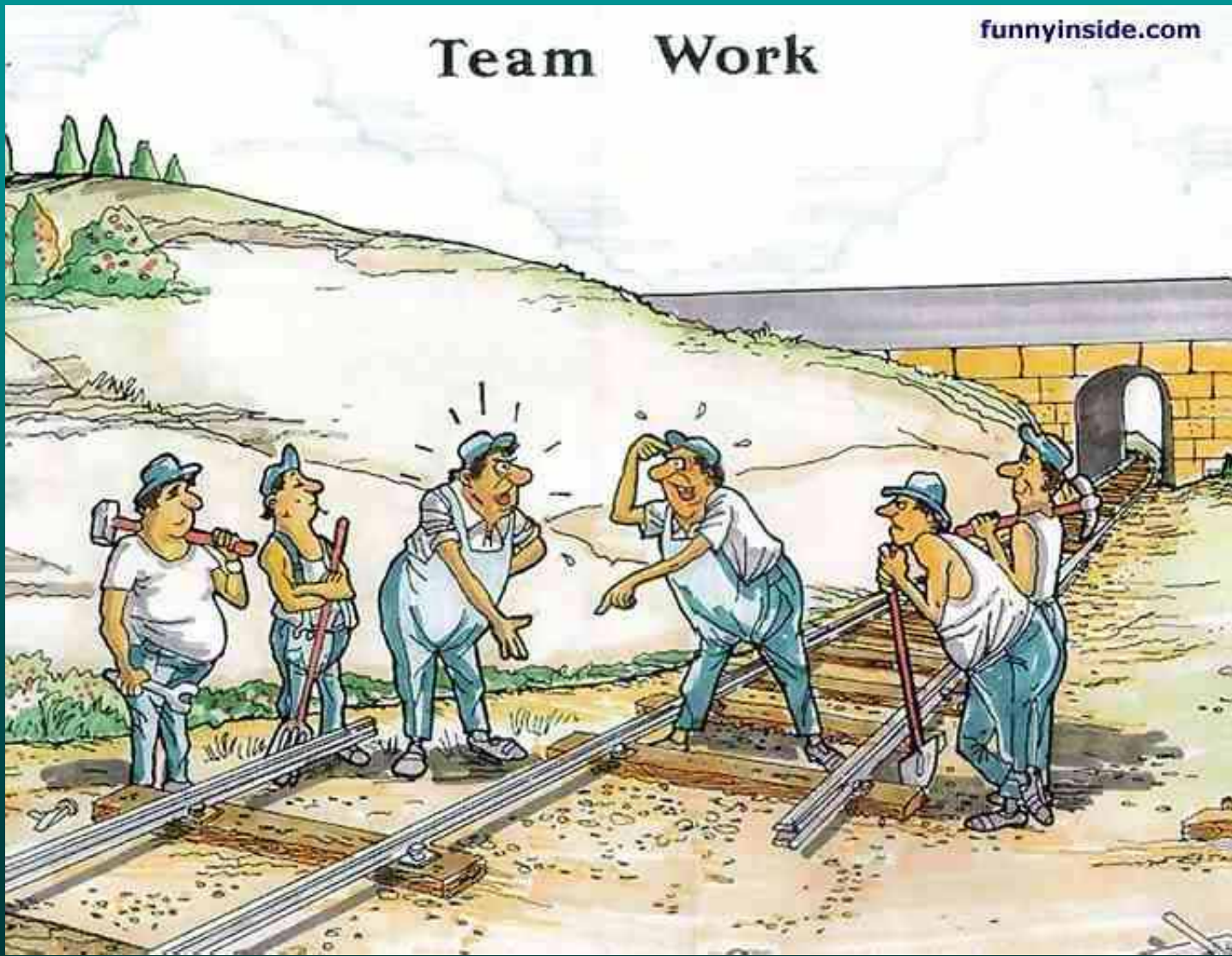
This Presentation is Divided in 3 Parts

- Part 1: Understanding Fly Ash - Technically
- Part 2: Understanding Fly Ash – Environmentally
- Part 3: Conclusion



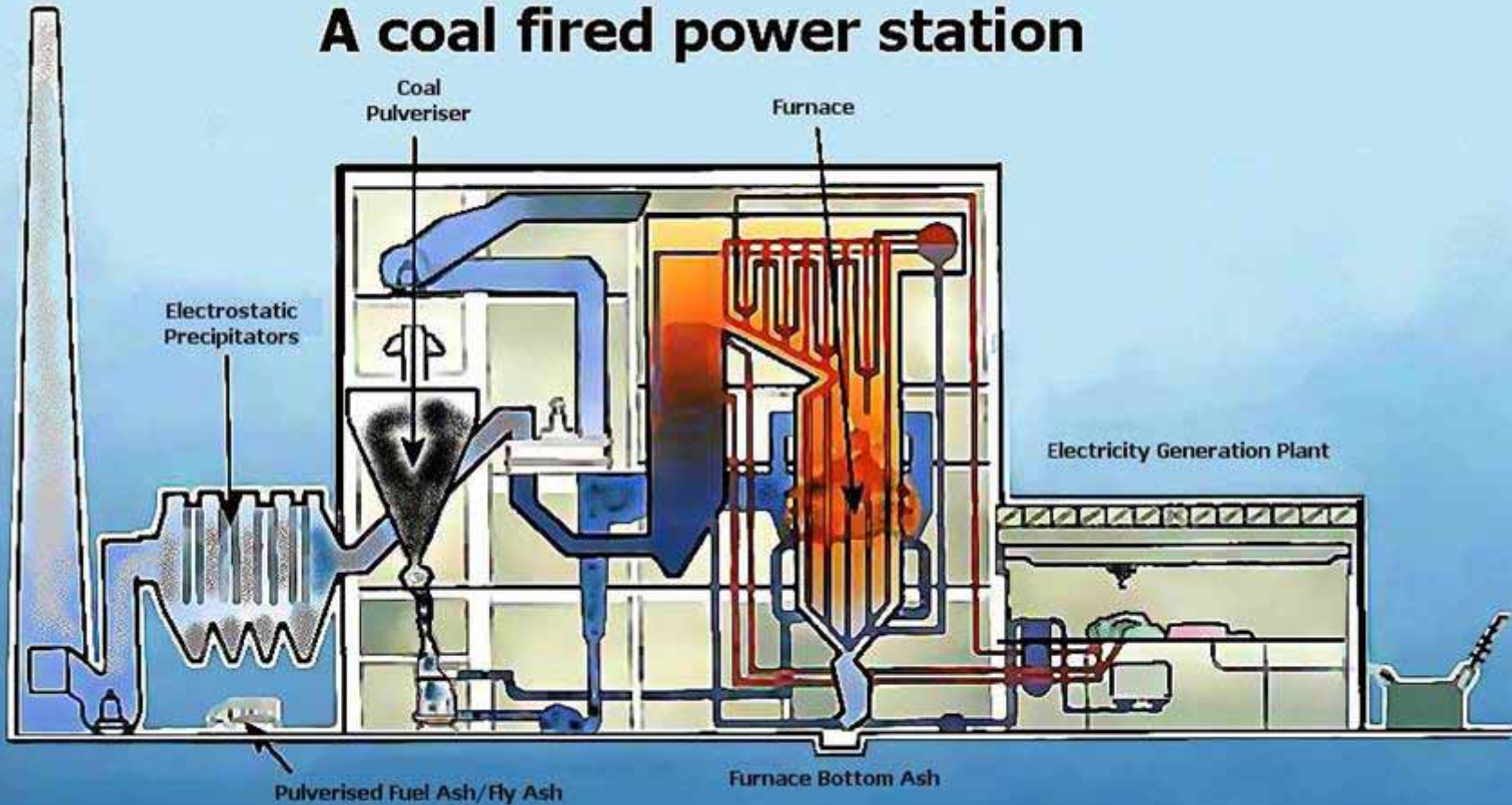


Part 1: Understanding Fly Ash – Technically





A coal fired power station





Boring Concrete Chemistry

A House Called Cement

Three Strong Brothers

- Tri Calcium Silicate (C_3S)
- Di Calcium Silicate (C_2S)
- Tri Calcium Aluminate (C_3A)

One Docile Brother

- Tetra Calcium Alumino Ferrite (C_4AF)



Hydration of Cement



Proportions of C-S-H and CH in Concrete

$$\underline{C-S-H = 75\%}$$

$$\underline{CH = 25\%}$$





Deterioration of Concrete

- **Porous Concrete**
- **Failure due to Carbonation**
- **Attack of Chloride ions**
- **Sulphate Attack**
- **Heat of Hydration**





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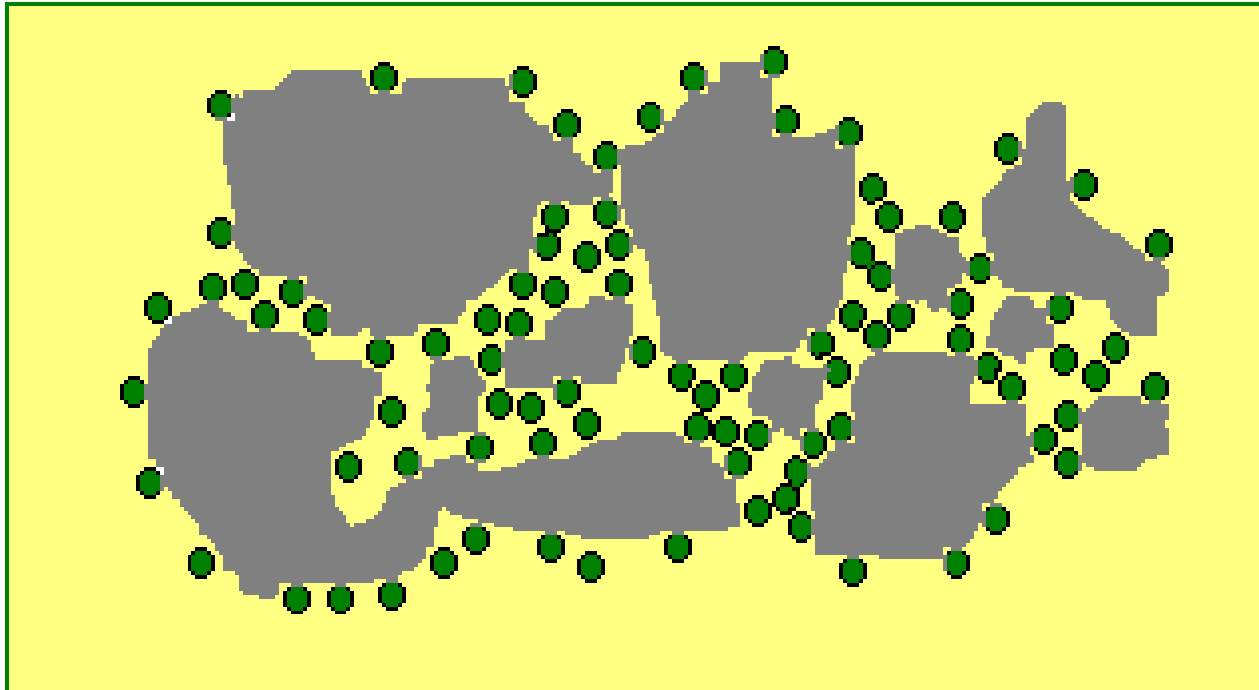




PROPERTIES	BS 3892:	IS 3812: 2003	Pozzocrete 60	Pozzocrete 83
	Part 1: 1997	(Indian)		
Blain Fineness, min		320 m ² /kg	320 m ² /kg	500 m ² /kg
% Retained on 45 micron, max	12%		18%	5% on 25 micron
LOI, max (%)	7%	5%	2%	2%
Chemical Composition, max (%)				
SO ₃ ,	2	2.75	2	2
Silica, min. (%)	-	35	65	72
Magnesia (MgO) (%)	-	5	5	5
Moisture content, max. (%)	0.5	0.5	0.3	0.3
Strength factor/activity index, min. (%)	80 (28 days)	> 80 (28 days)	90	95
Lime Reactivity - MPa		4.5	6	8
Soundness (mm)	8mm	.8%	0.03%	0.03%



The Ball Bearing Effect





Quality Assurance in Pozzocrete

- ISI Standard Mark from Bureau of Indian Standards
 - Process is approved by BIS
 - Laboratories are approved by BIS
 - Product is approved via independent testing by BIS
 - QA/QC system approved by BIS
- ISO 9000 : 2000 certified unit





Part 2: Understanding Fly Ash – Environmentally





PFA and Environment

- Since 1860, 9 warmest years of 10 years have been since 1990.
- The month November 2004 has been the warmest November in last 20 years.
- One ton of CO₂ is emitted per ton of cement produced.
- World consumption of cement = 1600 million tons / year





Pozzocrete and Environment

POZZOCRETE

Partial Cement replacement
...for superior concrete

Saves cement cost
Saves operational cost
Saves the environment by using
the ash of this MSEB power station



POZZOCRETE = Environmental intelligence

Contact: www.dirkgroup.com

www.pozzocrete.co.in



Part 3: Conclusion





PFA - A Boon To Construction Industry

- It offers innumerable benefits to various parties like:-
 - Client
 - Consultant
 - Contractor
 - And Most Importantly





Planet Earth





Using Fly Ash

- It is not a substitute for Bad Workmanship
 - Curing – must for 7 days
 - Curing the plaster on south facing walls
 - Slump – minimum 80mm for 10/7 mixers

Strength Development

- 15% less on 7 days
- Equivalent on 28%

