• WITH SINCERE THANKS TO THE PUBLISHER:

• I ACKNOWLEDGE THAT WHILE PREPARING THIS PRESENTATION I HAVE USED INFORMATION GIVEN IN MY BOOK:

“MINERAL ADMIXTURES IN CEMENT AND CONCRETE”

CRC PRESS – TAYLOR & FRANCIS GROUP
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

- Generation of fly ash in India increased from 68.88 MTPA in 1996–97 to 169.25 MTPA (155 TH power stations) in 2016–17; of that 107.1 MTPA (63.28%) was being utilized.

- Thus 62.15 MT fly ash is added to environment every year.

- Focus on making fly ash disappear.
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

FIVE REASONS WHY FLY ASH SHOULD BE USED AS THE MINERAL ADMIXTURE IN CONSTRUCTION
WHY FLY ASH IS GOOD FOR CEMENT AND CONCRETE

STRENGTH INCREASE BECAUSE SPHERICAL SHAPE OF FA PARTICLES REDUCE WATER REQUIREMENT OR W/C RATIO, TO OBTAIN REQUIRED SLUMP
WHY FLY ASH IS GOOD FOR CEMENT AND CONCRETE

STRENGTH INCREASE DUE TO REDUCTION IN THE THICKNESS OF INTERFACIAL TRANZITION ZONE (ITZ)

SEM IMAGES OF CONCRETE ITZ MICROSTRUCTURE AT 28 DAYS WITH 0% & 25% BY MASS OF FA
WHY FLY ASH IS GOOD FOR CEMENT AND CONCRETE

IMPROVED DURABILITY DUE TO PERMEABILITY REDUCTION

CAPILLARY PORES INTERCONNECTED

CAPILLARY PORES PARTIALLY BLOCKED
WHY FLY ASH IS GOOD FOR CEMENT AND CONCRETE

LESS TEMPERATURE RISE

**TEMPERATURE AT CENTRE OF 560x560 BEAMS AFTER CASTING OUTDOORS**

- **TEMPERATURE C (280mm inside)**

MIX6: 100% PC
MIX1: 50% SLAG
WHY FLY ASH IS GOOD FOR CEMENT AND CONCRETE

Strength increase continues over long time period
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

BLENDED CEMENTS

- REDUCING CARBON (GHG) EMISSION THROUGH CLINKER SUBSTITUTION
- REDUCING ENERGY CONSUMPTION
- INCREASED PRODUCTION CAPACITY
- REDUCING SOLID WASTE
- MAINTAINING QUALITY: STRENGTH & DURABILITY
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

BLENDED CEMENTS

- **IS 1489** permits 15-35% FA addition to cement
- **IS 456-2000** permits 15-35% FA replacement of cement in concrete (. )
  Higher additions permitted but with mutual agreement
- **IS 16415** on composite cement permits 15-35% FA addition, along with GGBS 20-50%
## HIGH-VOLUME FLY ASH CEMENT (HVFAC)

**Manufactured in Cement Plant**

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Particulars</th>
<th>FA (%)</th>
<th>IST (min)</th>
<th>FST (min)</th>
<th>Compressive Strength (Mpa)</th>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>3-day</td>
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<tr>
<td>1</td>
<td>VFAC from US Cement Plant</td>
<td>45</td>
<td>150</td>
<td>270</td>
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<tr>
<td>2</td>
<td>HVFAC: Indian Cement Plant</td>
<td>45</td>
<td>120</td>
<td>150</td>
<td>24</td>
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<tr>
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<td>ASTM C 1157M</td>
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<td>45</td>
<td>420</td>
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MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

HIGH-VOLUME FLY ASH CONCRETE

<table>
<thead>
<tr>
<th>SI No</th>
<th>Concrete Type</th>
<th>Compressive Strength as % of 28-Day Strength</th>
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<tr>
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<td>7-Day</td>
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<tr>
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<td>Portland Cement</td>
<td>75-80</td>
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<tr>
<td>2</td>
<td>HVFA Cement</td>
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EXAMPLE OF PRESTIGIOUS PROJECT WITH HVFA CONCRETE: KAIGA ATOMIC POWER PROJECT (M-30 CONCRETE WITH 50% CEMENT REPLACEMENT WITH FA)
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

ROLLER COMPACTED CONCRETE WITH HVFA
GHATGHAR DAM IN ROLLER COMPACTED CONCRETE WITH 60% FA
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

SINTERED FLY ASH LIGHTWEIGHT AGGREGATE (LA)
- RECENT IS: 9142 (Part 2) : 2018
- MANUFACTURED BY SINTERING MIX OF FA, PLASTIC CLAY & COKE BREEZE AT 1200-1300 C
- EFFECTIVE WAY TO UTILISE LARGE QUANTITY OF UNUSED FA IN CONCRETE
- NO STANDARD METHOD OF MIX DESIGN WITH LA
- POSSIBLE TO OBTAIN COMPRESSIVE STRENGTH UPTO 70 MPa
- VERY GOOD CHLORIDE RESISTANCE
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

SINTERED FLY ASH LIGHTWEIGHT AGGREGATE (LA)
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

SINTERED FLY ASH LIGHTWEIGHT AGGREGATE (LA)

Typical physical properties

- **SIZE**: 5 – 16 mm
- **BULK DENSITY**: 650-800 Kg/m³
- **SP GRAVITY**: 1.25-1.45
- **WATER ABSORPTION**: > 15%
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

FLY ASH CEMENT BRICKS

- MANUFACTURED AS PER IS 1670-2018
- MIXING OF CEMENT, FA (35-65%), AGGREGATE & WATER
- FA UTILISATION IS MAXIMISED WHEN BOTTOM ASH IS USED AS FINE AGGREGATE
- MIXTURE MOULDED IN BRICK SHAPE & CURED: WATER, MIST OR STEAM
- 28-D WET COMPRESSIVE STRENGTH: 5-15 MPA (.) RED CLAY: 3.5-5 MPA
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

FLY ASH CEMENT BRICKS VS RED CLAY BRICKS

- HIGHER COMP STRENGTH (.) INCREASES WITH TIME
- LOWER WATER ABSORPTION HENCE LESS CURING BEFORE USE
- UNIFORM DIMENSIONS & BETTER DIMENSIONAL STABILITY
- LESSER TRANSIT WASTE
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

AUTOCLAVED AERATED CONCRETE (AAC) BLOCKS

- AAC IS A LIGHTWEIGHT, PRECAST, FOAM CONCRETE
- AAC PRODUCTS INCLUDE BLOCKS, WALL PANELS, FLOOR & ROOF PANELS, CLADDING (FACADE) PANELS & LINTELS
- AAC IS MANUFACTURED USING CEMENT, LIME, FLY ASH/SAND, WATER & ALUMINIUM POWDER AS FOAMING AGENT
- AUTOCLAVING AT 190 C
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

AAC BLOCKS CELLULAR PORE STRUCTURE
MULTIPLE APPLICATIONS OF FLY ASH IN CEMENT AND CONCRETE

AAC BLOCKS ADVANTAGES

- SAVING IN CONSTRUCTION TIME
- REDUCTION IN CONSTRUCTION COST
- BETTER STRENGTH
- BETTER INSULATION
- FIRE RESISTANT
- SOUND PROOF
WHATSAPP GROUP
ON
MODERN CONCRETE

JOIN THE GROUP

WHATSAPP YOUR

NAME:

ORGANISATION:

DESIGNATION:

TO ME ON: 9422517402
THANKS !!

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