Concrete Repair Strategies for Coker Units

STRUCTURAL PRESERVATION SYSTEMS

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Structure Elements of Interest within Coking Units

- Octagonal Penetrations
- Switch Deck
- Head Deck
- Columns
- Beams
- Coke Pits
- Railroad Tracks
- Anchorages
Deterioration & Damage Mechanisms

- Elevated Temperatures
- Mass Concrete Shrinkage
- Dynamic Loading
- Impact Damage
- Fire Damage
- Corrosion-Induced Deterioration
- Failed Patch Repairs

Microcracking of Cover Concrete

Desiccated Cover Concrete

Moisture Stable Concrete
Fire Damage

- Aggregate swells
- $\text{H}_2\text{O}$ to steam
- Chemical change

Impact Damage

- Impact of steel bucket edge on coke pit walls and basin
Factors Leading to Corrosion within Coke Support Structures

- Cast-in-chlorides
- Air-borne chlorides
- High temperature
- Moist/wet conditions inherent to process
- Shortcut access of elements through cracks
- High concentration of CO₂

Concrete Repair is a Process!

![Concrete Repair Process Diagram]

- **Cause & Effect**
  - Defect, damage or deterioration
  - Leakage
  - Settlement
  - Deflection
  - Wear
  - Spall
  - Disintegration
  - Crack

- **Repair required?**
  - Safety
  - Structural catastrophe
  - Use disfunction

- **Condition Survey**
  - Evaluate
  - Leakage
  - Effects on environment
  - Aesthetics
  - Preventive maintenance

- **Repair Analysis**
  - Owner Criteria
    - Urgency
    - Cost
    - Expectations
    - Useful life
    - Aesthetics
  - Engineering Criteria
    - Structural req.
    - Effect
    - Constructability
    - Environment
    - Safety

- **Repair Strategy**
  - Methods
    - Surface repair
    - Stabilization
    - Strengthening
    - Waterproofing
    - Protection
  - Techniques
  - Materials