Furnace Life Extension Techniques
GlassPex
Mumbai, India
Furnace Life Extension
Proactive/Reactive

- Proactive maintenance plan and culture
  - Periodic scheduled inspections
    - Campaign goal review
  - Maintenance Planning
    - Hot Repairs
  - Contingency Planning

Smaller scope repairs more often
Allows maximum operating life on depreciated asset
Furnace remains in operation until no longer cost effective
Capital spend avoidance
Maximizes profitability
Furnace Life Extension
Proactive/Reactive

- Reactive maintenance plan and culture
  - Random inspections – internal/external
    - Limited campaign goal review
  - Maintenance is justified based on production needs
    - Hot Repair spend is limited
  - Contingency planning is based on need

Larger scope repairs that require funding
Campaign goals are fixed, or moving, as finances dictate
Mitigates possibility of capital spend
Profitability Is not maximized
Inspections
Proactive - Assessment of furnace condition
Proactive – Port Arch Sealing/Repair

Before

After
Proactive – Sealing Skews

Before

After
Proactive: Port floor and/or Port Sill Damage

Solution: Port Floor Restoration

View From Regenerator

Dam Complete – Before Casting

Casting Completed
Solution: Crown Overcoating

Crown insulation package is removed and the crown is cleaned of debris.

A skew channel is installed to support material.

A fused silica shotcast material is applied to the entire surface of the crown structure to be addressed skew to skew till 6 to 9 inches of thickness.
Solution: Checker Cleaning

- Water-cooled lances are inserted to use either high pressure air, high pressure air with blast media, high pressure air with low quantities of water introduced to remove or shock and remove blockages on the top courses of checkers.

- This is only effective on the top courses (courses 1 through 3).

- It breaks up the blockage and blows it down the individual flues to provide a clean air flow.

- The Lancescope™ is critical for this process to ensure the flues are open down below the surface.
Proactive/Reactive: Hot Bottom Repair Process

- Furnace is drained
- Damaged area is cleaned
- AZS refractory material injected using specialized lances, re-establishing furnace bottom stability
- Process undertaken with aid of endoscopes, lance cameras and TV monitors as needed
- Usually with minimal or no contamination
Reactive: Tuckstone Damage

Solution: Anchor Installation

- Drill holes
- Install anchors
- Ceramic weld from outside
Reactive: Breast Wall Movement or Partial Collapse

Solution: Remove breast wall in sections and rebuild with new brick until finished

Removing by section

Rebuilding wall

Finished wall
Reactive: Checker Collapse or Blockage

Solution: Melter Crown Burners Installed

- Best option is to clean checkers or other options listed later in presentation.
- If not possible, then melter crown burner installation can be performed. Other engineering changes to ports may be required based on furnace design.

- Drill hole

- Insert burner sleeve

- Install burner mount and burner
Reactive: Checker Collapse or Blockage

Solution: Checker bypass
A flue is engineered and constructed which extends from the area above the checkers down to an area below the blockage to allow the air a short circuit around the blocked area. This is an expensive project and would be for furnaces that have several years of operation left.
Reactive: Checker Collapse or Blockage

Solution: Hot Checker Change
- Construct Temporary Flues
- Provide Temporary Heat
- Block Off Ports
- Open Access Points
- Remove Old Checkers
- Inspect and Repair Rider Arches
- Install New Checkers
- Close and Seal Access Points
- Heat up New Checker Pack

After cutting

Dampers in position
Contingency: Doghouse Mantle Block Damage

Solution: Doghouse mantle block replacement

- Remove existing arch.
- Install new one piece block.

Existing mantle block being removed

New mantle block

New mantle block being installed
Asset Life Extension
Furnace condition and campaign goals

- Assessment of furnace conditions
  - Alignment with campaign goals
    - Review of disconnects with furnace campaign goals
      - Melters
        - Hot Repairs
          - Ceramic Welding
          - Hot Repairs – Hot Bottom Repair/Bricks/Castables
  - Regenerators
    - Ceramic welding
    - Hot repairs
      - Checker Pack maintenance and repair
      - Ryder arch challenges
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