REINHOLD ENVIRONMENTAL ®

2026 Reinhold/PCUG Round Table Presentation

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IGS SCR Solutions

Winning the Ash Battle:
LPA Screen Maintenance Strategies Proven in the Field

Presenter: Andrew Kline

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Increased Power Demand; Coal is Back!

But what does that mean?

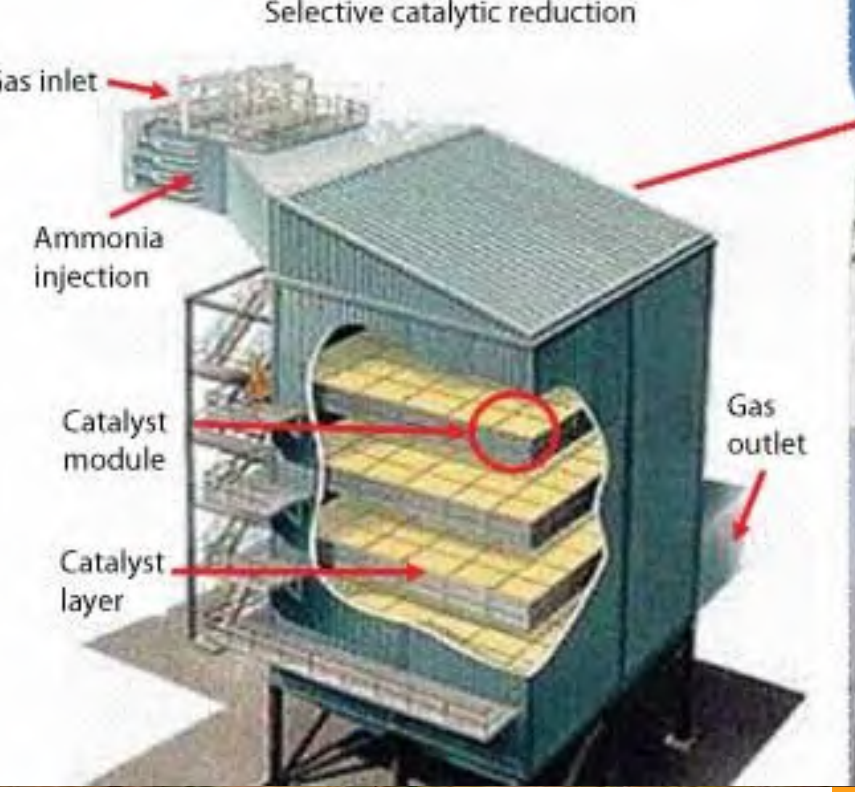
- Many Coal Plants Previously Near End of Life Deferred Maintenance
- Life Extensions + Stricter Regulations
  - *Must address deferred maintenance*
  - *Increased Demand for Reliability*
  - *Must Efficiently meet Emissions*
  - *Many Plants have New Personnel to Train*

It is time to update your SCR maintenance strategies!

Impacts of SCR Buildup

1. DeNOx Reduction
2. Excessive Pressure Drop
3. **De-Rating Boiler** due to 1 and/or 2
4. Severe **Reduction in Catalyst Life**
5. Excessive Ammonia Usage
6. Corrosion damage due to Ammonia Slip
7. **Forced Outages** to Remove Ash
8. Cost of Removing Ash
9. Non-Compliance Penalties

SCR buildup results in higher operating costs, loss of production costs, and can threaten to permanently close plants!



Solid Fuel SCR Buildup

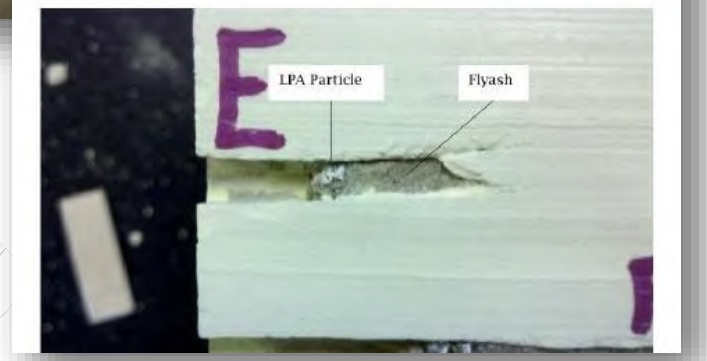
Coal Fired SCR Buildup Root Causes:

1. LPA Present in SCR
2. Gas Flow Distribution
3. Ash Flow Distribution
4. Inadequate Outage Maintenance Procedures

Elimination of SCR Buildup:

- **LPA Screens to Prevent LPA from Reaching SCR**
- Air Cannons to Address Ash Flow and Gas Flow Distribution Issues
- Proper Catalyst and Sonic Horns to Improve Overall Ash Capacity
- CatFlow Screens to Protect Catalyst and Enhance Online Cleaning
- Proper Outage Procedures

10% Buildup Is No Longer Acceptable to Effectively Meet Compliance!



Understanding LPA Buildup:

- A small amount of LPA can cause massive fly ash piling
- Changes in parameters can cause LPA formation including:
  - *Coal Type*
  - *Changes in Combustion*
  - *Cycled Loading*
  - *Fuel Additives*

It is not uncommon for a plant to develop LPA after a seemingly insignificant process change, all SCRs must be defended against it.

LPA Screen Maintenance is Critical – Yet Often Overlooked!

LPA SCREENS ARE LIKE BRAKE PADS, YOU NEED TO CHANGE THEM BEFORE THEY FAIL!!!

- ***Typical LPA Screen Panel Life 4-6 Years***
- *Replace Worn Panels Prior to Failure*
- *When Panels Begin to Fail, they Fail Quickly!*
- *Having 15-20% Spare Panels in Stock Allows for Maintenance during Short Outages*

Developing and implementing an Inspection and Maintenance plan to fit your specific application is the key to reliable SCR protection.

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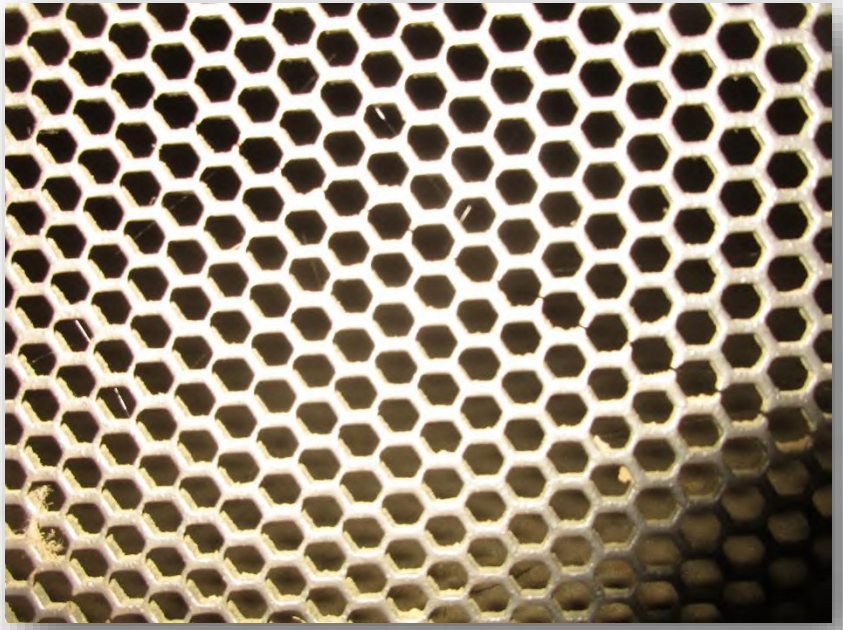


Early Signs of Wear – Time to Plan to Replace @ Next Opportunity

Screen End of Life – Replace ASAP

Severe Failure – Too Late!

A Proven Maintenance Strategy is Critical to Protect the SCR Between Outages

Various Maintenance Strategies:

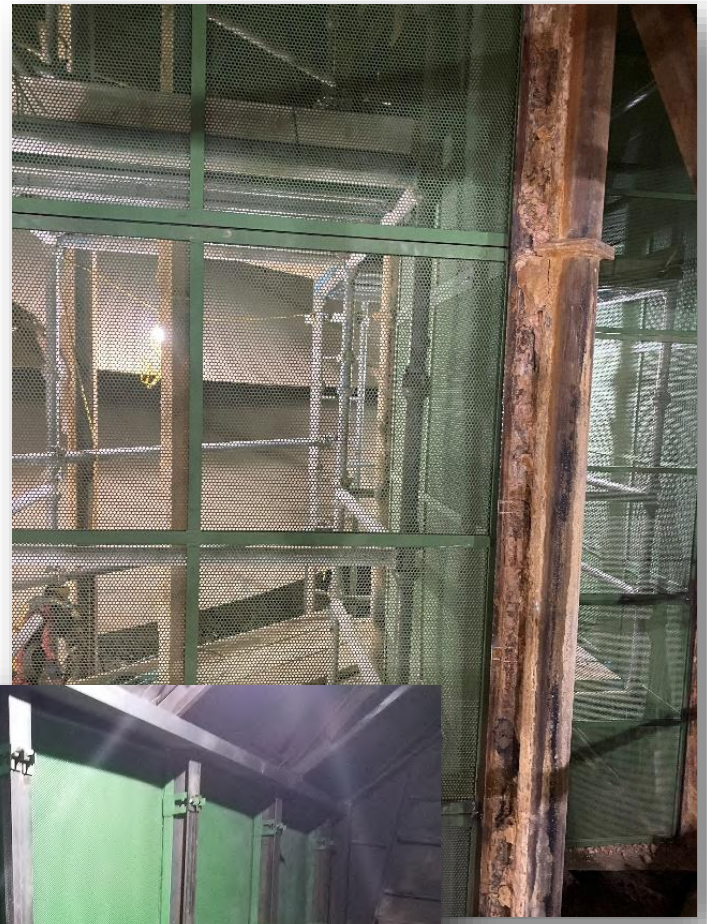
- Full Screen Replacement Schedule
- Partial Screen Replacement Schedule
- Inspection & Partial Replacement
- Inspection & Refurbishment
- System Upgrades & Retrofits

There are Pros and Cons of each method; it is important to determine which plan is right for your facility and application.

Proactive Screen Replacement Based on Schedule:

- *Full Panel Replacement Done at Set Intervals*
- *Interval Depends on System Design (Often between 4-10 years)*
- *Interval Determined by Inspection History and Design Parameters*

- Eliminates Screen Failure Risk
- Minimizes Need for Maintenance and Inspections, Saving Time & Resources
- Predictable Outage Budget



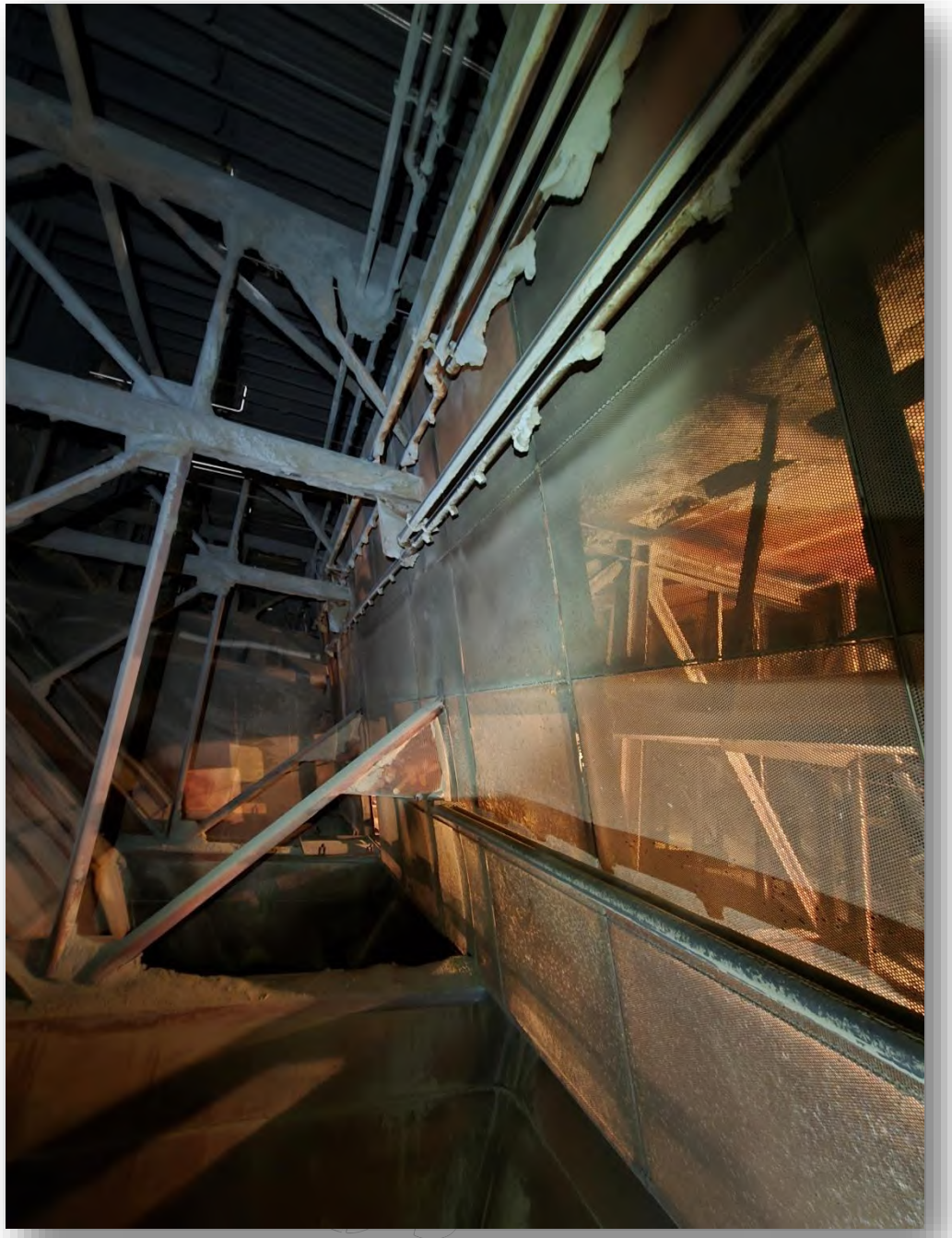
Proactive Screen Replacement Based on Schedule:

- Case Study 1:
  - *700MW x 4 Units in Southeast*
  - *LPA Screens Originally Installed in 2010*
  - *Proactive Full Panel Replacement at 10 Year Regular Intervals*
  - *LPA Present in System, but has not reached SCR*
- Case Study 2:
  - *600MW x 2 Units in Western US*
  - *LPA Screens Originally Installed in 2015/2016*
  - *Proactive Full Panel Replacement at 4 Year Regular Intervals*
  - *LPA Present in System, but has not reached SCR*

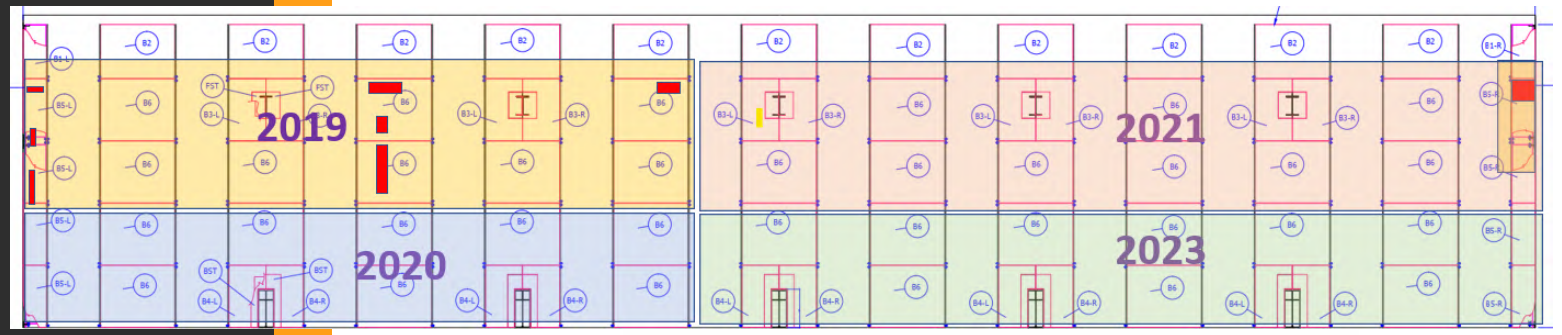
Partial Screen Replacement Based on Schedule:

- *Partial Panel Replacement Done at Set Intervals*
- *Interval Determined by Inspection History and Design Parameters*

- Eliminates Screen Failure Risk
- Requires Screen Replacement Mapping
- Reduces Cost Per Year, but Increases Labor Costs Overall
- Predictable Outage Budget



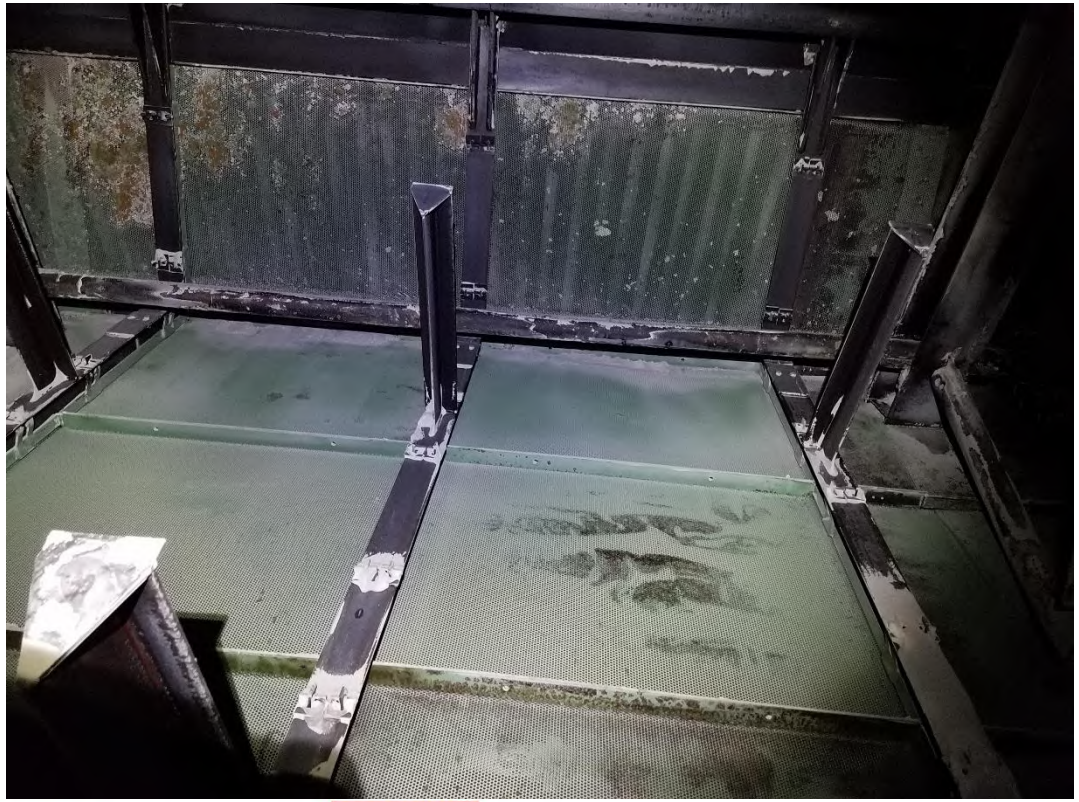
Partial Screen Replacement Based on Schedule:

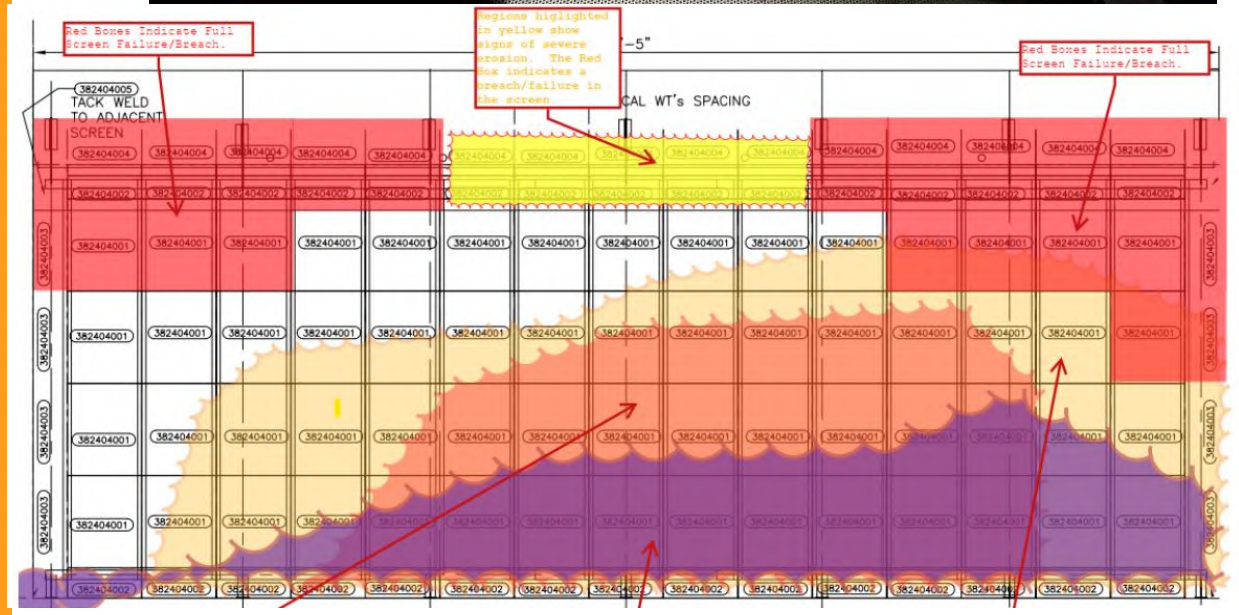


- Case Study 3:
  - *900MW x 4 Units in Southeast*
  - *LPA Screens Originally Installed in 2011-2013*
  - *Inspection and ~25% Panel Replacements Each Major Outage*
  - *LPA Present in System, but has not reached SCR*
- Case Study 4:
  - *800MW x 2 Units in Midwest US*
  - *LPA Screens Originally Installed in 2010*
  - *Inspection and ~10% Panel Replacements Each Annual Outage*
  - *LPA Present in System, but has not reached SCR*

Regular Inspection & As Needed Replacement:

- LPA Screens Inspected for Wear Each Outage
- Higher Risk of Screen Breach Between Outages
- To be effective, screens must be replaced as soon as wear is identified
- Requires qualified inspectors and sufficient spare panels to be kept on hand to replace worn panels when identified.
- Detailed Screen Condition Mapping Required to Accurately Predict Required Replacement Panels



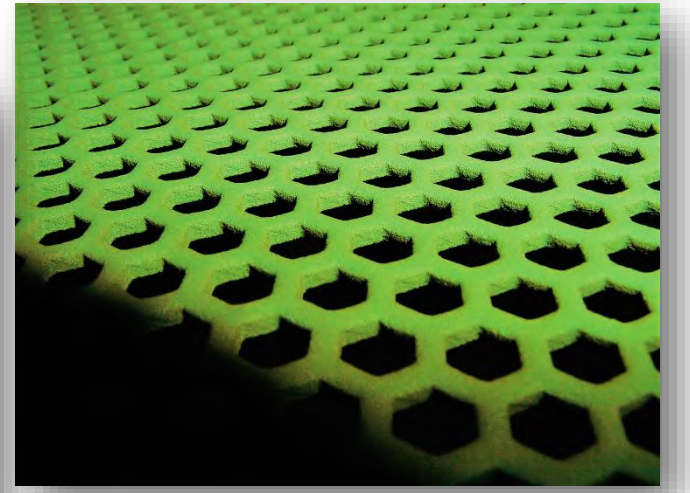


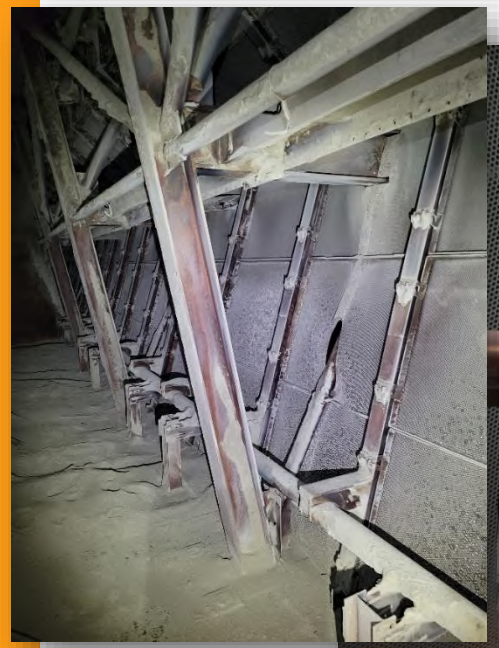
Regular Inspection & Proactive Replacement:

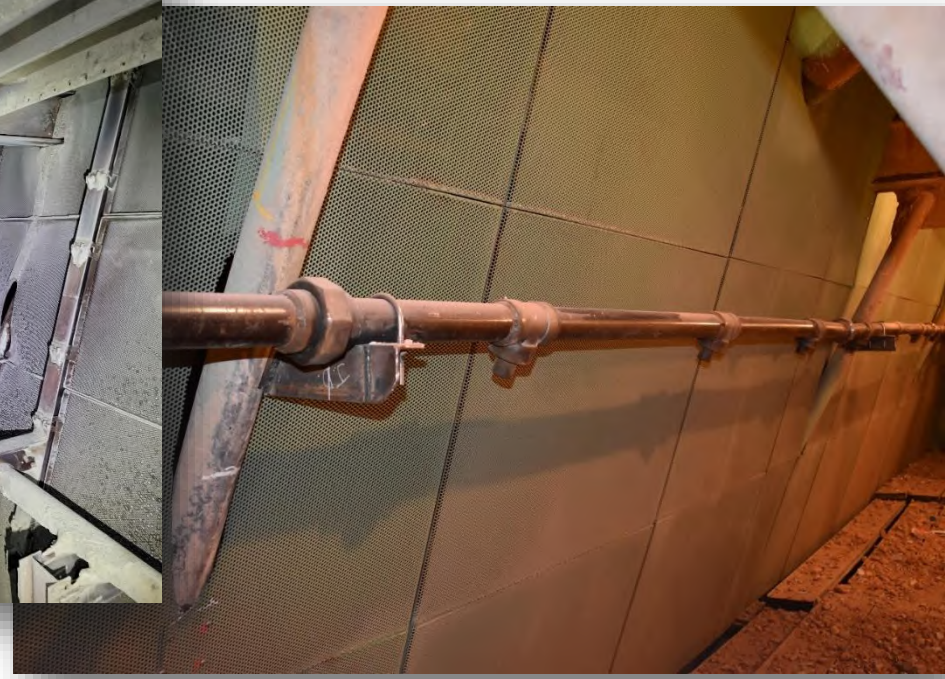
- Case Study 5:
  - *500MW x 2 Units in Midwest*
  - *Inspect & Map Each Outage*
  - *15% Spare Panels Kept on Hand, Typically utilize most on each cycle*
  - *For the most part, screen breaches have been prevented*

Regular Inspection & Proactive Replacement + Refurbishment:

- Utilizes IGS Two-Stage Cladding
- Top Coat Provides Wear Indication, allowing fast inspection
- Top coat can be refurbished/applied in Situ or in the field
- Maximizes LPA Screen Asset Life

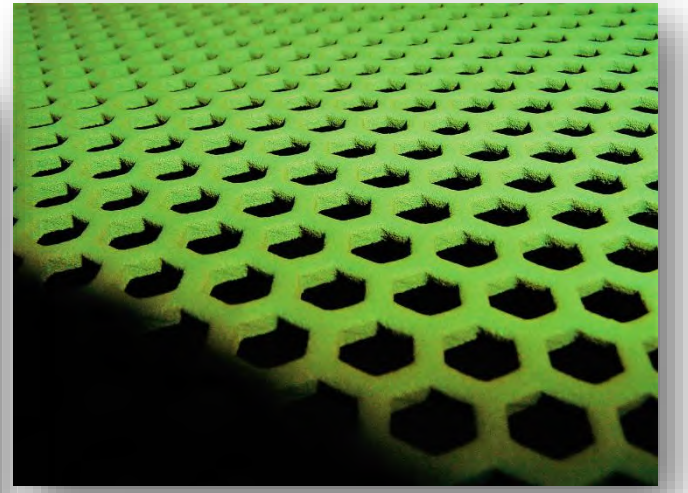


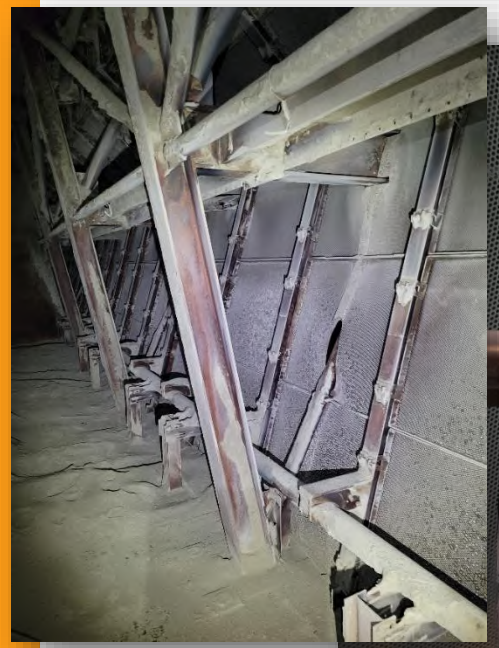


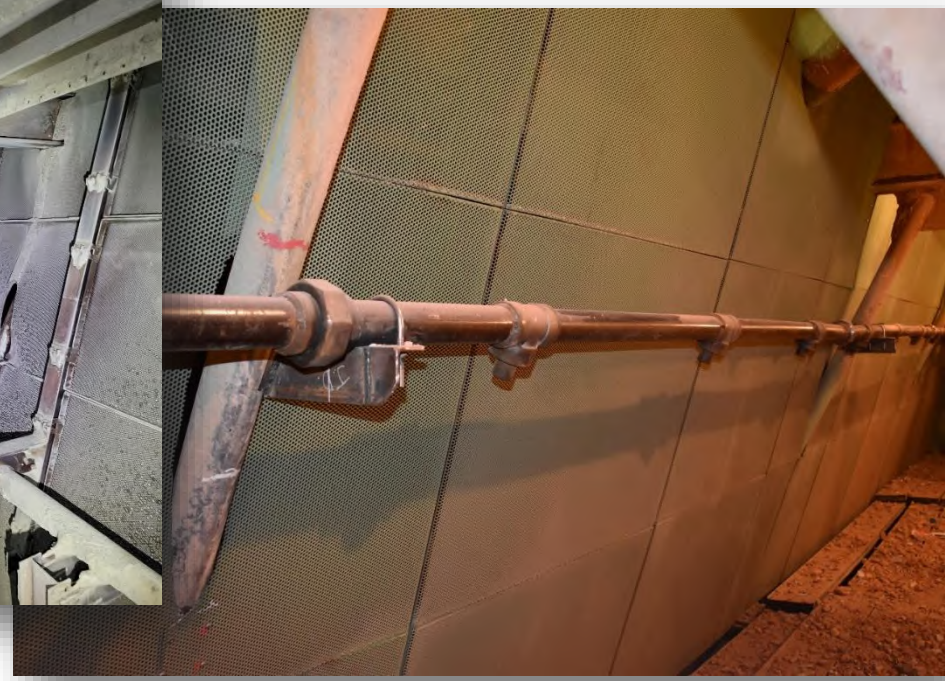


Regular Inspection & Proactive Replacement + Refurbishment:

- Case Study 6:
  - *500MW PC Unit in Midwest*
  - *Originally Installed with Two-Stage Cladding*
  - *Allowed for Easy Inspection*
  - *After 5 Years (2021), IGS Refurbished the Full System in Situ, extending System Life 3+ Years (Inspected in 2026)*
  - *Since a second Refurbishment was deferred, future replacement will be required in 2027*
- Case Study 7:
  - *400MW PC Unit in Southeast*
  - *Worn Out Screens Replaced and Remaining Screens Refurbished in 2020*
  - *System Refurbished again in 2024*
  - *Refurbishment has eliminated need for major replacements*







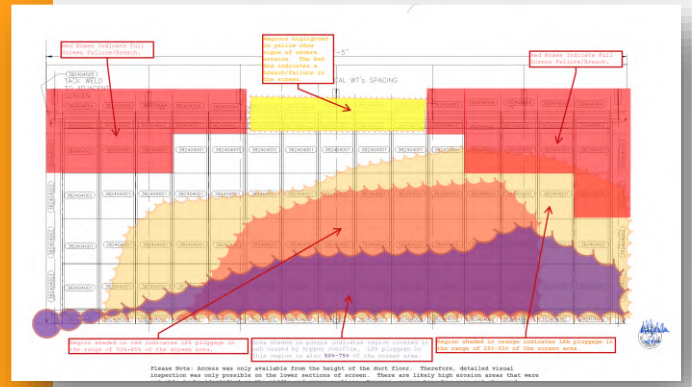
System Upgrades & Retrofits:

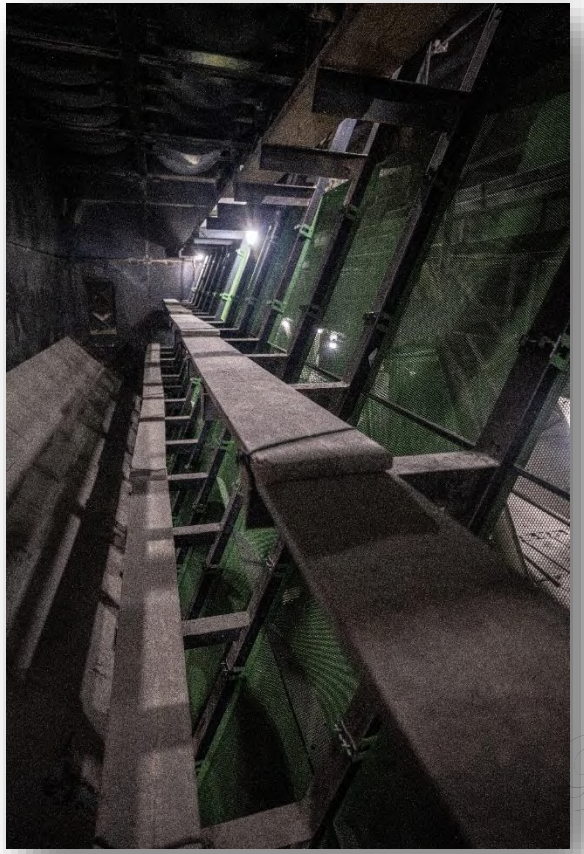
- Custom Panels Can be Built to fit Most LPA Screens to improve erosion resistance
- System Retrofits may be needed to achieve desired screen life

- Case Study 8:
  - *650MW PC Unit in Mid-Atlantic*
  - *Lack of LPA Maintenance threatened to Shut the Plant Down!*
  - *Partial System Replacement to Retrofit LPA Screen, while minimizing cost*
  - *Eliminated SCR Failures due to LPA*

Additional Considerations:

- Reliable Cleaning System will Improve Performance
- Occasional Manual Cleaning may be Necessary
- Keep Wear/Replacement Maps to Track Inspections over time
- Built in Scaffold Brackets allow Quick Maintenance
- Evacuation of Ash Hoppers Is Important





Last Line of Defense:

- CatFlow Catalyst Screens Provide a Last Line of Defense – If LPA reaches the SCR, it will be kept out of the Catalyst Modules
- Simultaneously provide enhancements to the online cleaning systems due to material selection

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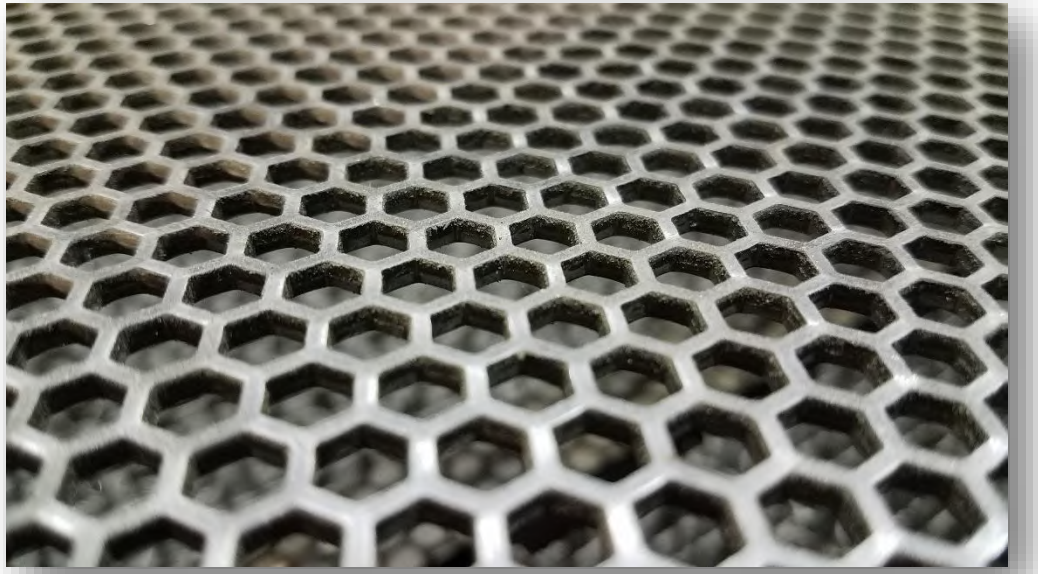

QUESTIONS & DISCUSSION

Andrew Kline

Director – Technical Sales

+ 1 757-777-2591 – Mobile

andrew.kline@integratedglobal.com

www.integratedglobal.com