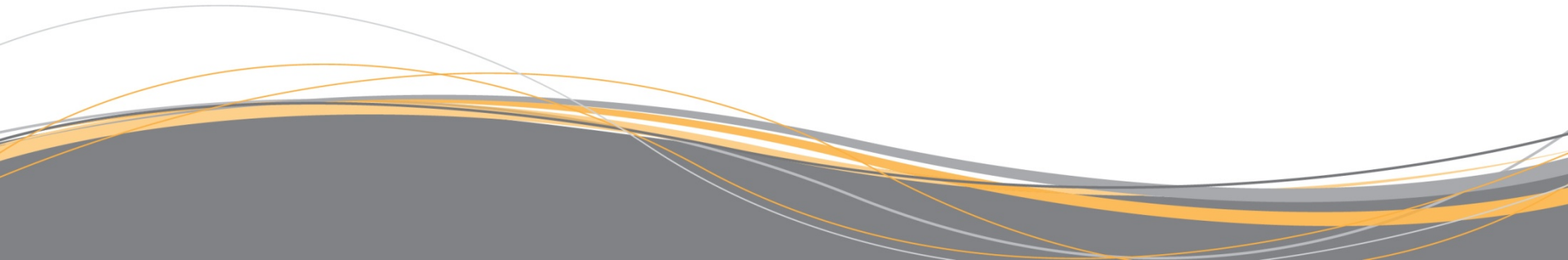




***COMANCHE  
ACC  
IMPROVEMENT PROJECT  
2014 Update***

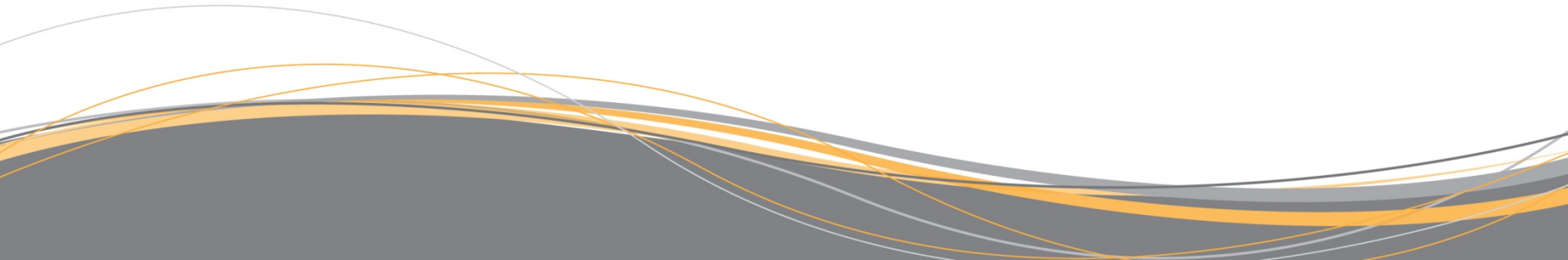


# Xcel Energy – Comanche Station Pueblo, Colorado

- **Coal Fired Plant**
  - **(2) 350 MW (Units 1 & 2)**
  - **(1) 800 MW (Unit 3)**
  - **Unit 3, Utilizes Hybrid Cooling with a GEA 45 Cell, 9X5 ACC**
  - **Unit 3, Commercial Operation July 2010**
- 



# **Gear Box Modifications Completed in 2013**

- **Addition of Extended Bearing Housings with Carrier Bearings**
  - **Modification of the Input Shaft Lip Seal to an In-Pro Mechanical Seal with New Seal Carriers**
  - **Modification of the Output Shaft V-Seal to a Reinforced Viton Seal**
- 
- The bottom of the slide features a decorative graphic consisting of several overlapping, wavy lines in shades of orange, yellow, and grey, creating a sense of motion and modern design.

# **Gear Box Modifications**

- **Redesigned Retaining Ring on Top and Bottom of Hub Gear Utilizing an O-ring to Eliminate Keyway Oil Leaks**
  - **Removal of the Shaft Driven Oil Pumps**
  - **Addition of Externally Mounted Viking Electric Driven Oil Pumps**
  - **Changed to Synthetic Oil rather than Mineral Based**
- 
- The bottom of the slide features a decorative graphic consisting of several overlapping, wavy lines in shades of orange, yellow, and grey, creating a modern, flowing aesthetic.

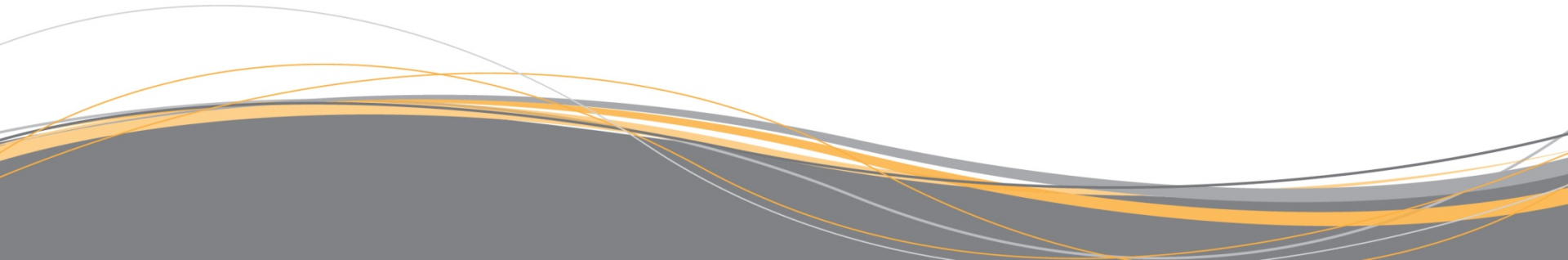
***Completed Gear Box***



***Gear Box Staged for Installation***



# **ACC Resolutions – Wind Screen Installation completed in 2013**

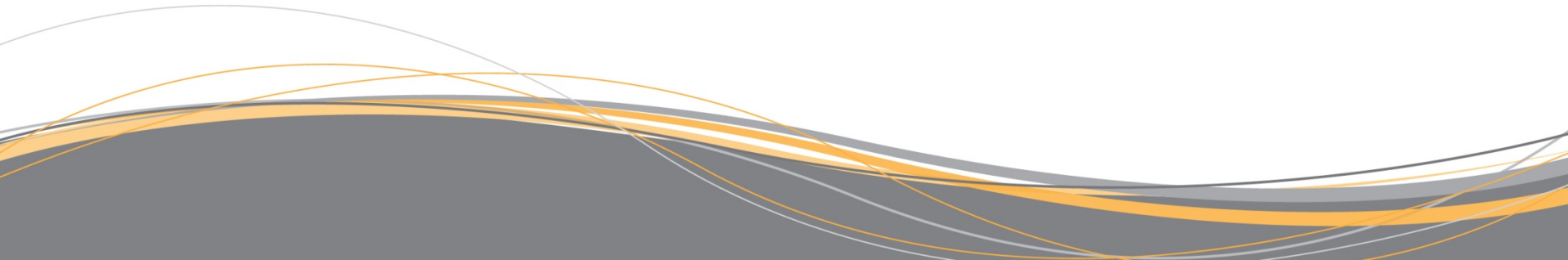
- **Goal was to Minimize Fan Blade Cracking**
  - **Worley-Parsons Engineering Study Conducted on the ACC Structure**
  - **Results Concluded that Extensive Cross Bracing was needed for any type of Wind Screen Material**
  - **Bracing Installed**
  - **Non-movable Screen Installed**
- 



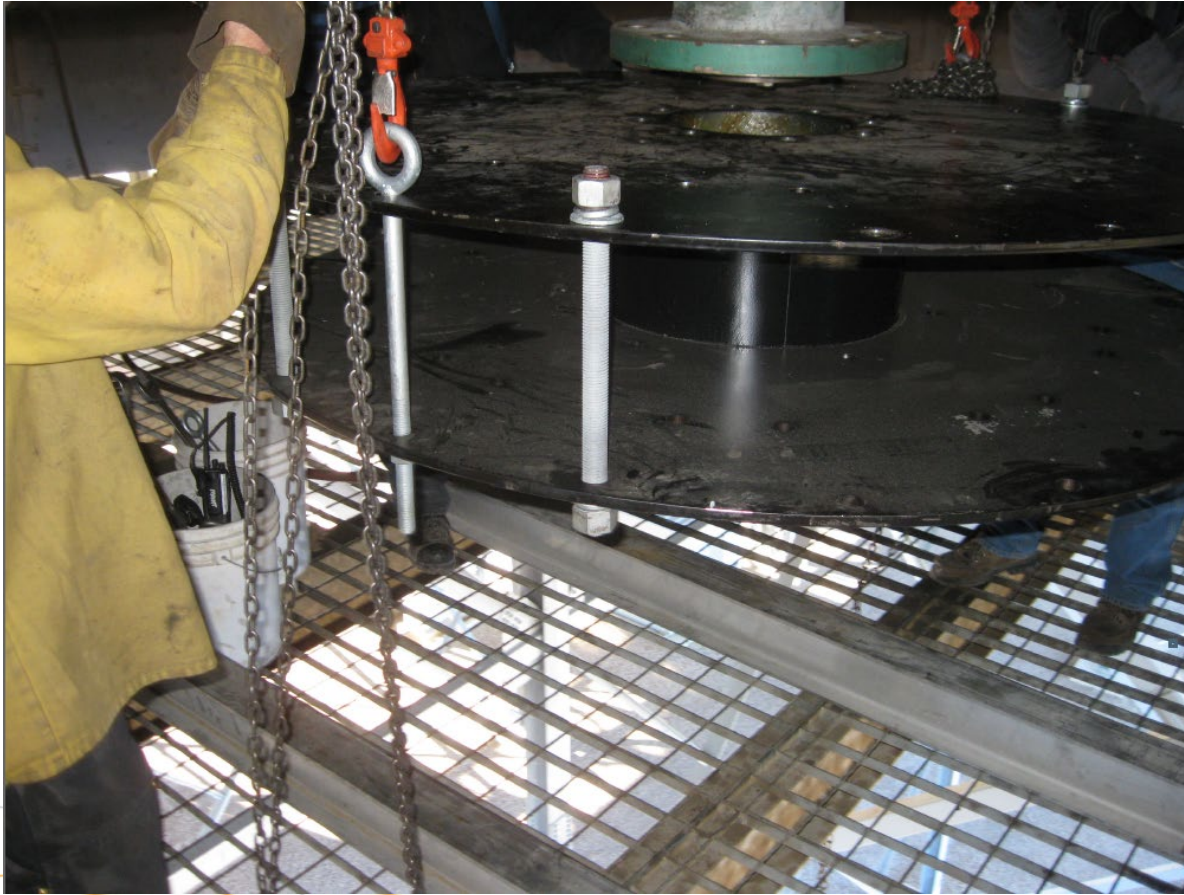
## *ACC Wind Screen Installation*



# Fan Blade Cracking Issues

- **Blade cracking continued after wind screen and gear box modifications**
  - **OEM and an outside vendor conducted resonant and tip speed frequency studies**
  - **Results were varied but decision was made to change from an (8) blade to (9) blade with non-OEM blades**
  - **Blade installation will be completed in December of 2014**
- 

# New Fan Blade Installation



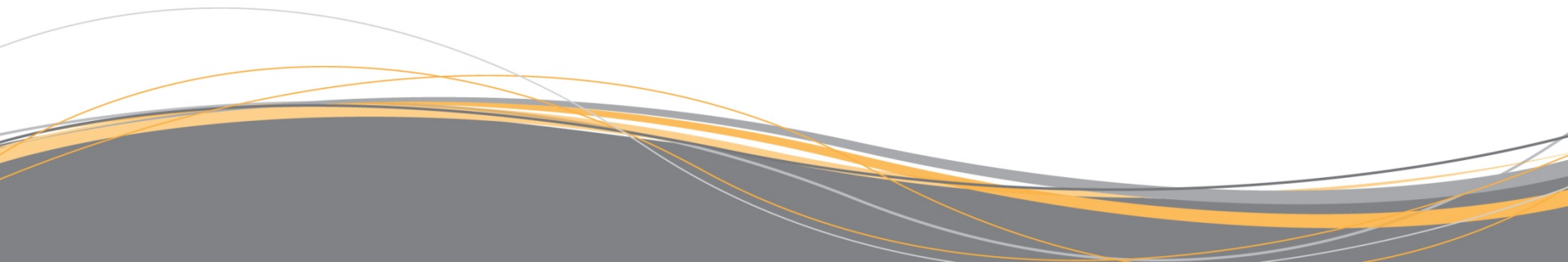
# New Fan Blade Installation



# New Fan Blade Installation

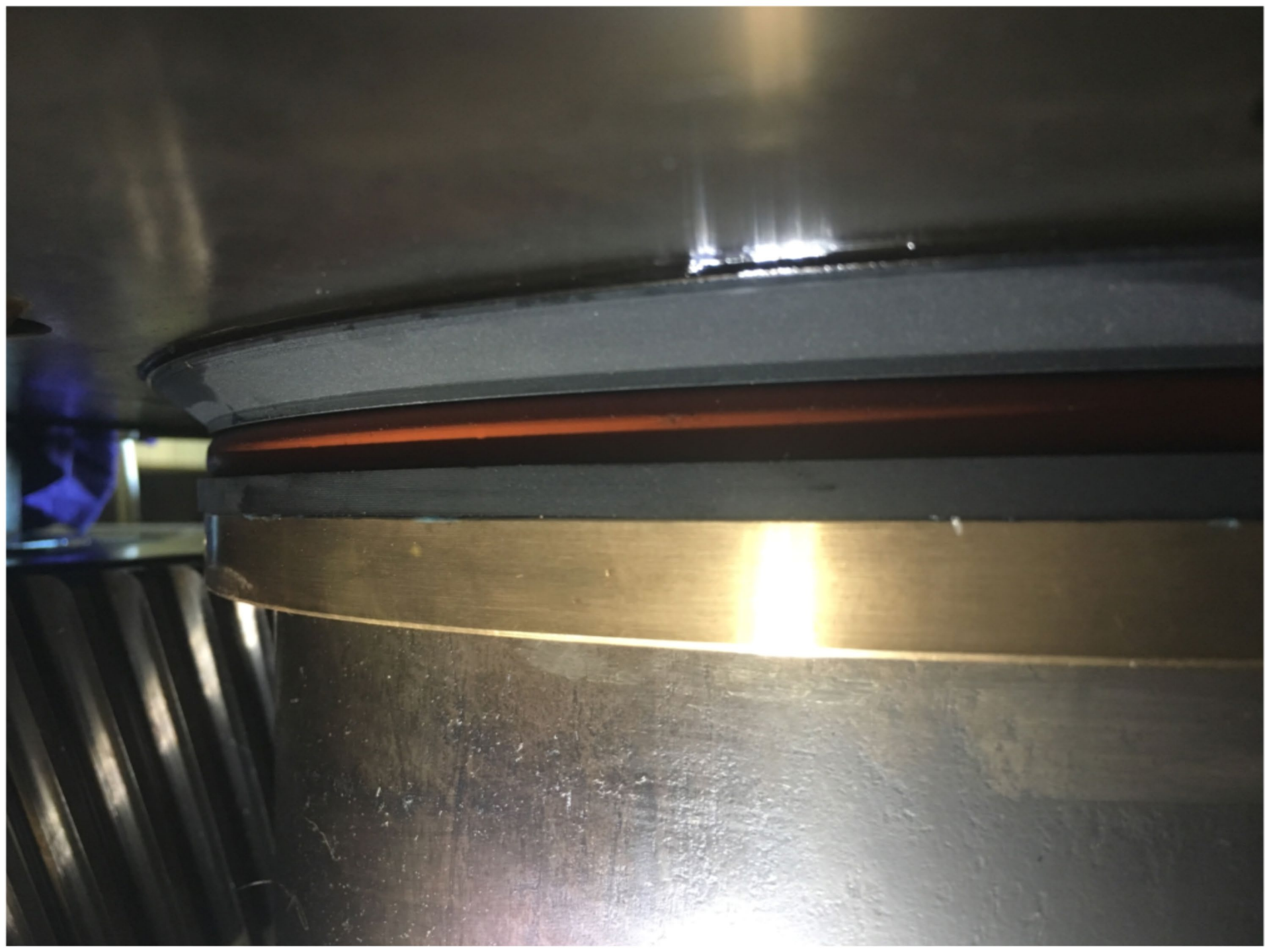


# 2018 Updates



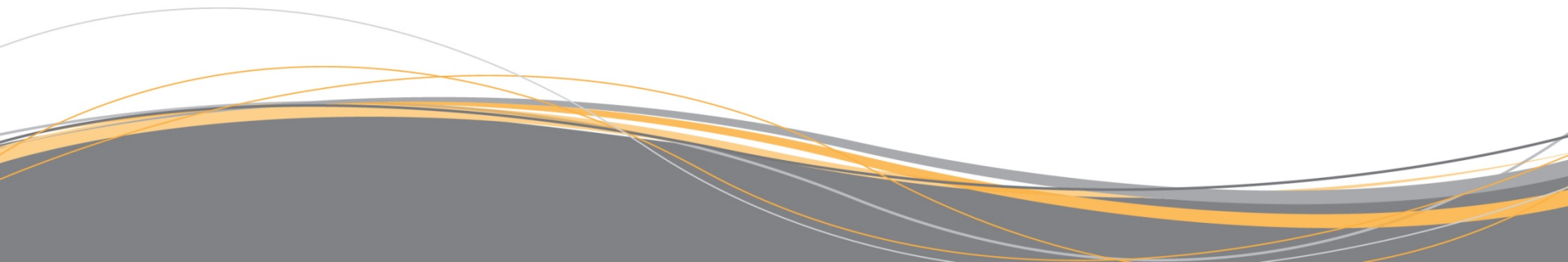
# Gear Box Issues

- **Output Seal Leaks**
  - **Fabricated Seal support ring.**
    - **Supports the seal completely.**
    - **Machined to set seal at design load.**





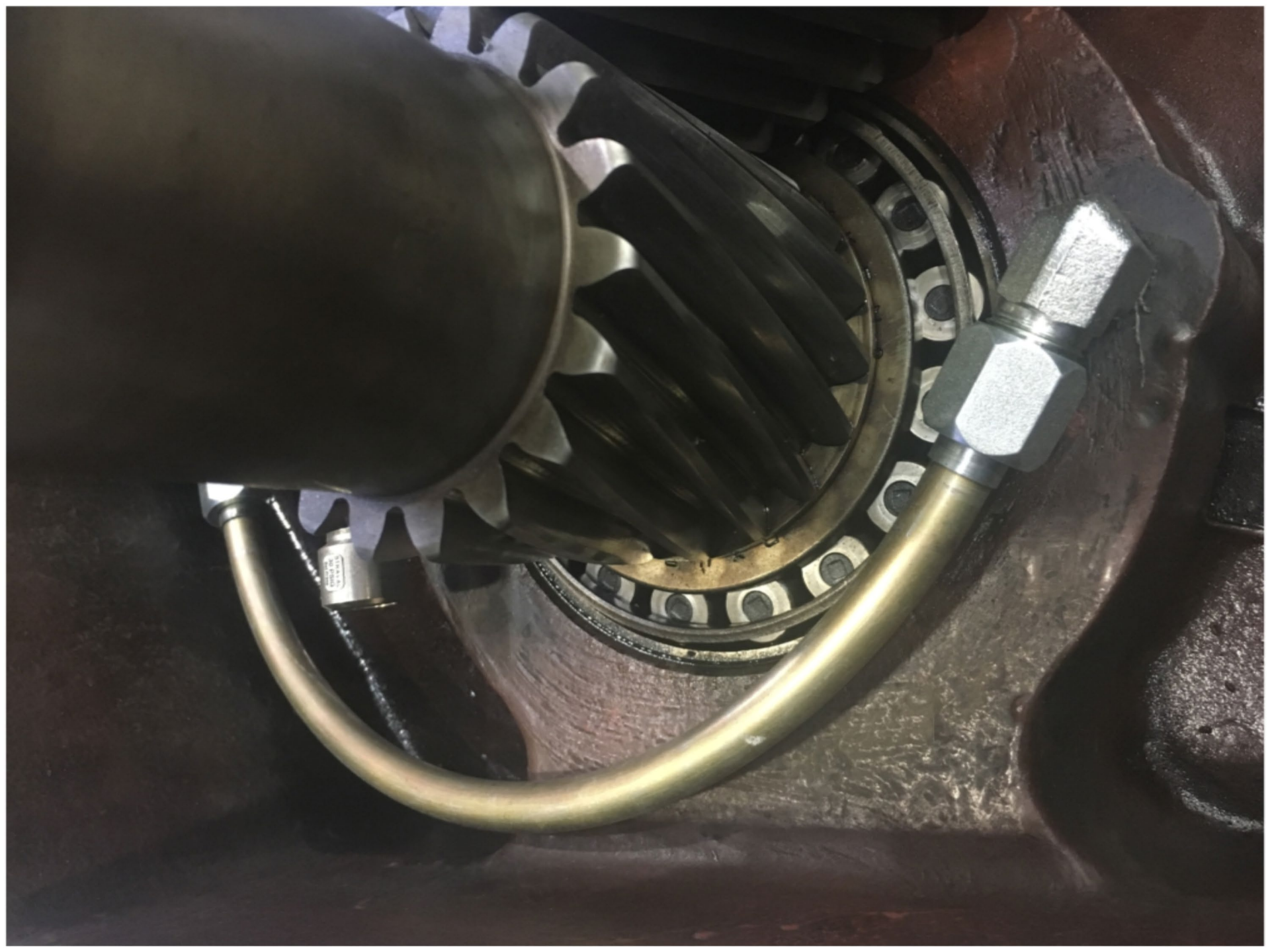
- **Potential Leak Caused by out of spec blade tracking.**
  - **During routine inspection it was discovered that there may be a correlation between excessive blade tracking and output seal leaks.**

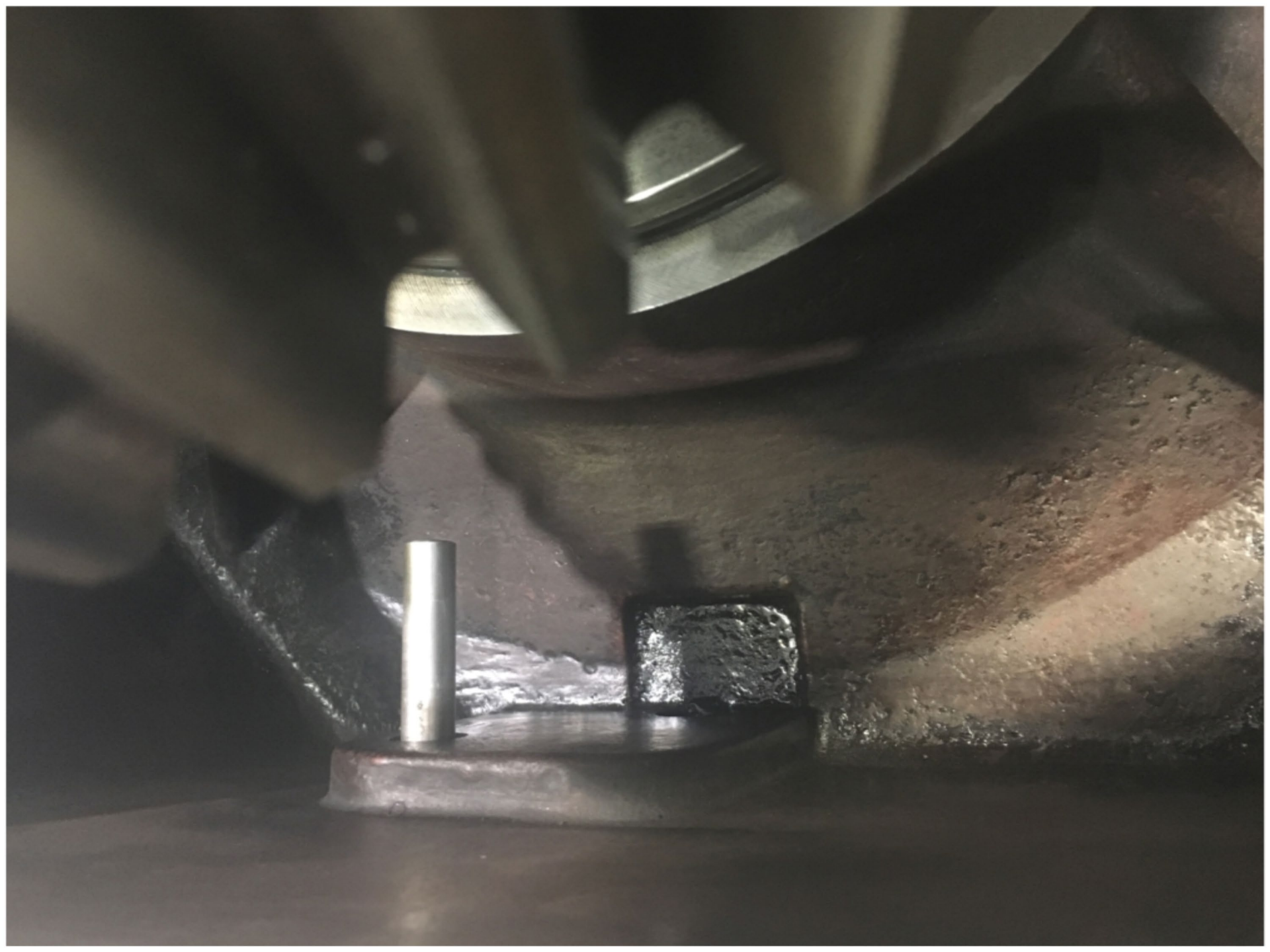


- **Oil Contamination caused by oil heaters.**
  - **Fabricated extended thermal couple.**
  - **Added screen to oil pick up.**
  - **Moved oil pick up to side of gear box with access window.**
  - **Used a hose for oil pick up so that it can be removed and cleaned from access cover**



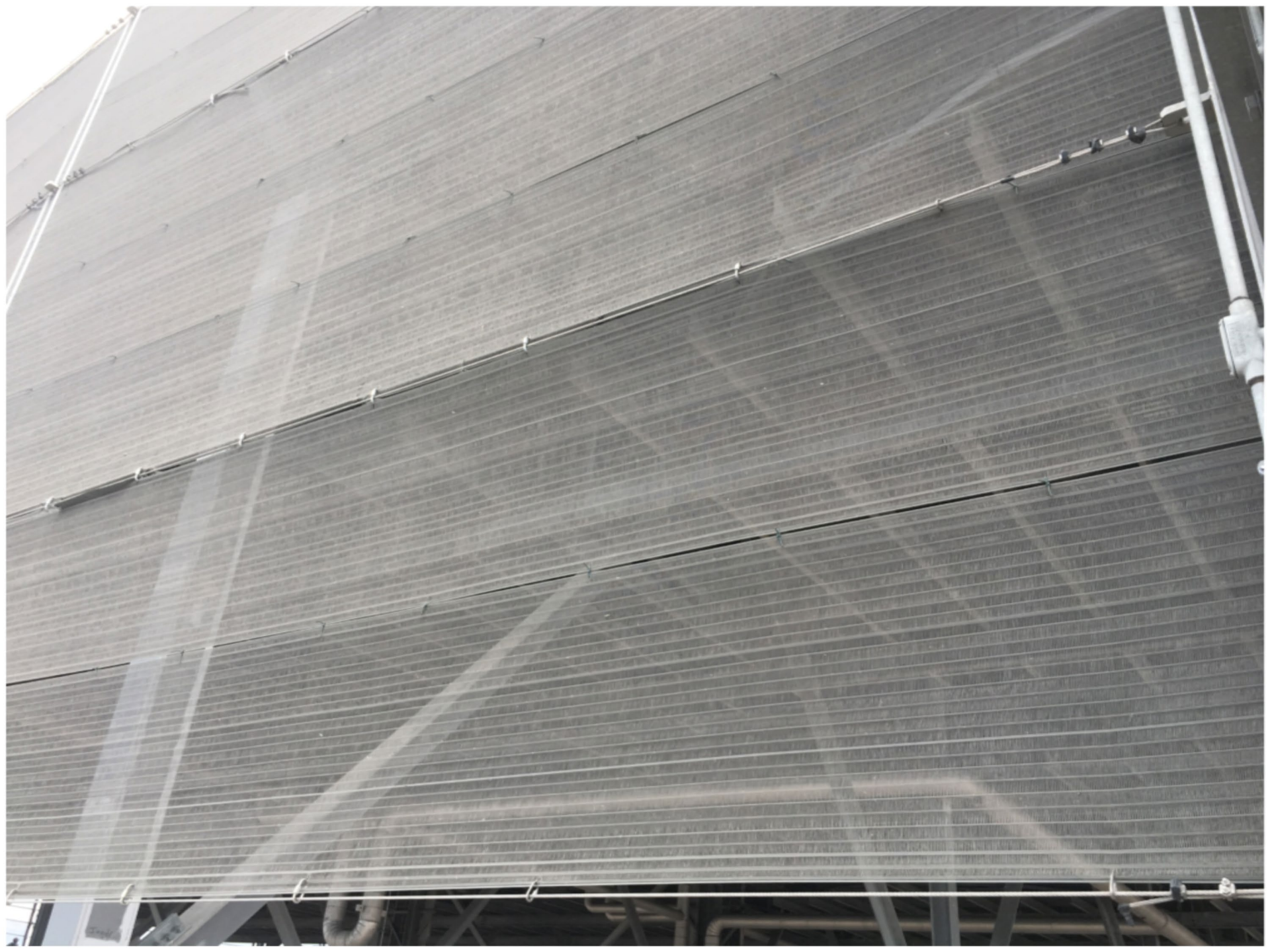
4250 P.S.





# Wind Fence

- **Old wind fence material was weak and would tear easily.**
- **Tested Galebreaker fence on one cell for four years.**
  - **Decided to completely replace fence with Galebreaker fence after evaluation should the material to be virtually maintenance free.**







***Questions?***

