FRONTLINE™
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POWERED BY ASTRO PAK



PROJECT: 631175

Technical Case Study Report

Offline System Decontamination, High-Velocity Oil Flush, Reservoir Decontamination, Fluid Purification, Final Fill

Site Location: Texas, USA

Project Number: #631175

Asset Description: Supply and Return Piping

Overview

Frontline Global Services performed Off-Line System Decontamination, High-Velocity Oil Flushing, Reservoir Decontamination, Fluid Purification, and Final Fill on a condensing steam turbine lube oil system at an industrial facility. These services were required to reduce system contamination prior to recommissioning, supporting reliable turbine operation and protecting critical lubrication system components. Final results exceeded the proposal target cleanliness level of ISO 16/14/11.

Project Objectives

- **Ensure Safety and Efficiency:** Minimize equipment downtime while ensuring all work is executed safely and in alignment with site requirements.
- **Eliminate System Contamination:** Execute High-Velocity Oil Flushing and Reservoir Decontamination activities to dislodge and remove contaminants from the lube oil system.
- **Verify and Document Performance:** Validate each phase using ISO 4406 particle counting and API 614 screening observations, documenting results for QA records and client review.
- **Meet Cleanliness Standards:** Achieve customer-directed specifications of ISO 16/14/11 or better, with API 614 screening confirmation.

Methodology

The lube oil system restoration required a focused High-Velocity Oil Flushing approach with controlled screening and verification to address potential contamination prior to start-up.

The process utilized the customer-specified turbine operating oil (Shell Turbo T32) throughout the oil flushing and conditioning activities. Cleanliness was monitored using ISO 4406 particle counting and the API 614 screening process.

Following completion of oil flushing and screening, the reservoir underwent final cleaning and the system was filled with the specified operating oil. The oil was then circulated and purified until the specified cleanliness acceptance criteria were met.

Process

1. **Mobilization and System Set-Up:** Mobilized to site, staged equipment, installed jumper hoses, and completed system setup for circulation and filtration.

2. **Off-Line System Decontamination:** Extracted oil from the reservoir to support reservoir access and preparation for cleaning.

3. **Reservoir Decontamination, Initial Cleaning:** Performed initial reservoir decontamination to remove residue and contamination prior to oil flushing.

4. **High-Velocity Oil Flushing:** Reintroduced oil and initiated high-velocity oil flushing, monitoring cleanliness using the API 614 screening process.

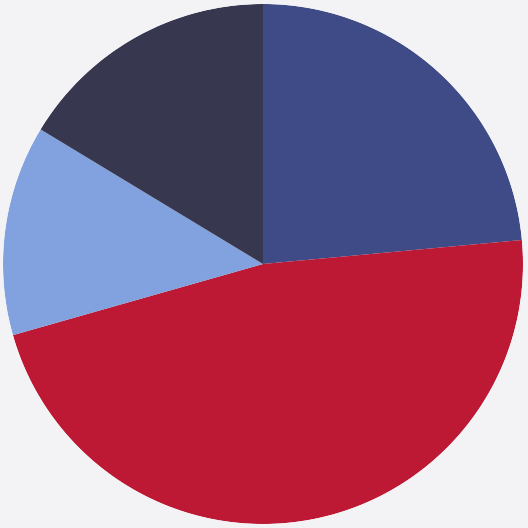
5. **Reservoir Decontamination, Final Cleaning:** Removed oil after flush screening and performed final reservoir decontamination prior to turnover.

6. **Final Fill:** Filled the system with Shell Turbo T32 oil to the required operating level.

7. **Fluid Purification and Circulation:** Circulated and filtered the oil until it met or exceeded the ISO 4406 cleanliness code 16/14/11.

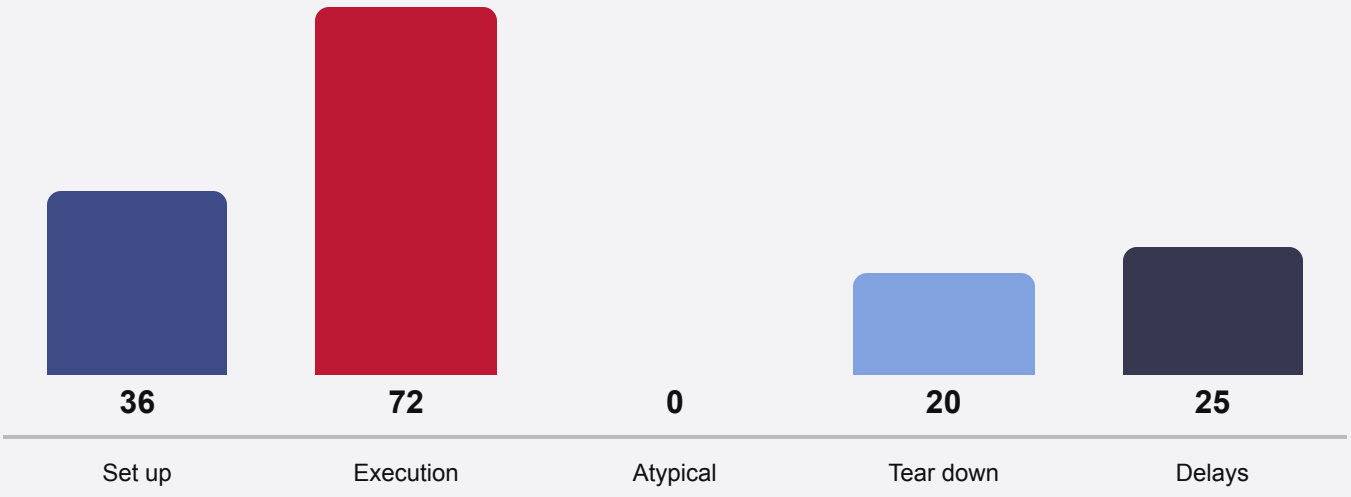
Key Project Metrics

Total Project Hours: 153



- **Project Set Up**
  36 hours · 23.5%
- **Project Execution**
  72 hours · 47.1%
- **Atypical Project Execution**
  0 hours · 0.0%
- **Project Tear Down**
  20 hours · 13.1%
- **Delays**
  25 hours · 16.3%

Hours by Category

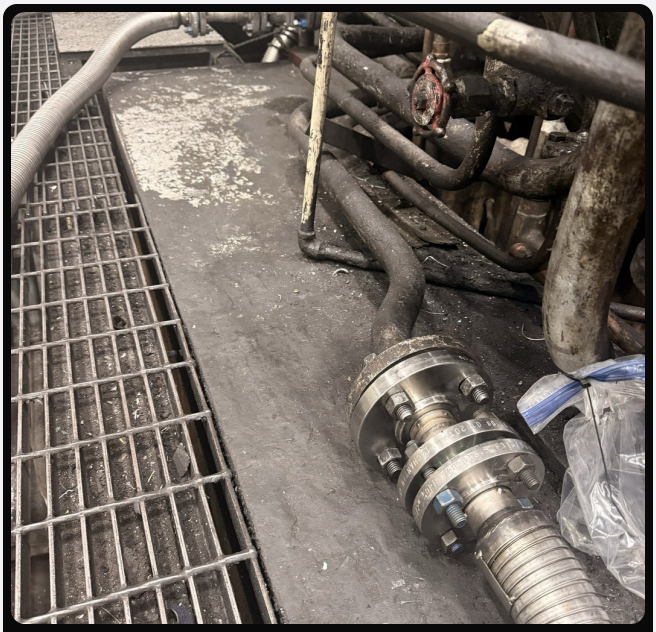


Project Milestones


Bearing Connection


Bearing Connection


Bearing Connection


Control Oil Connection

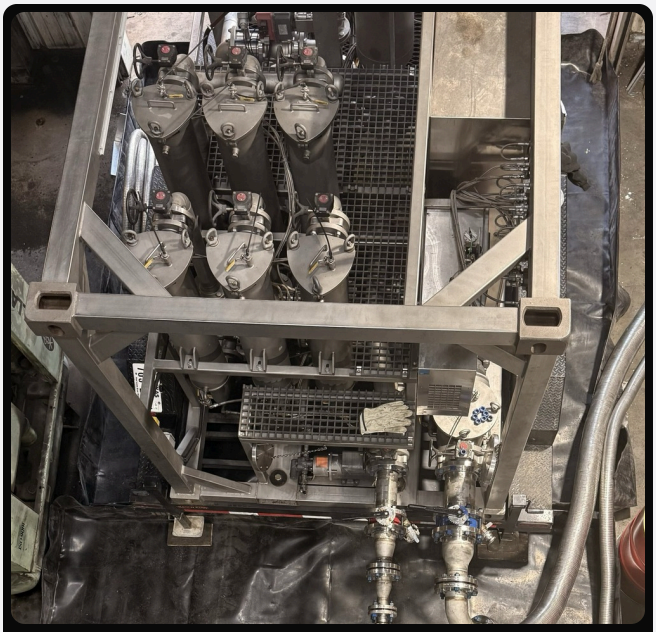
Project Milestones



Reservoir Before Final Hand Cleaning



Reservoir After Final Hand Cleaning



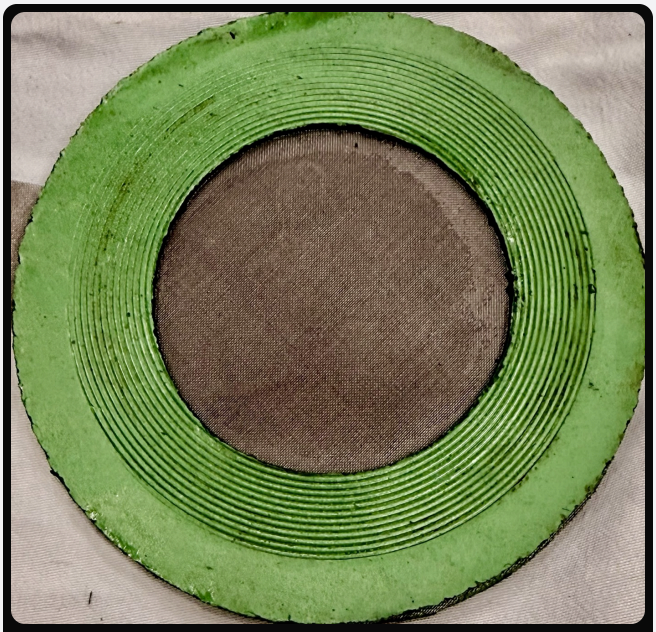
Flush Unit During Setup and Oil Flush

Project Milestones

API 614 Screening



API 614 Screen - Before



API 614 Screen - After

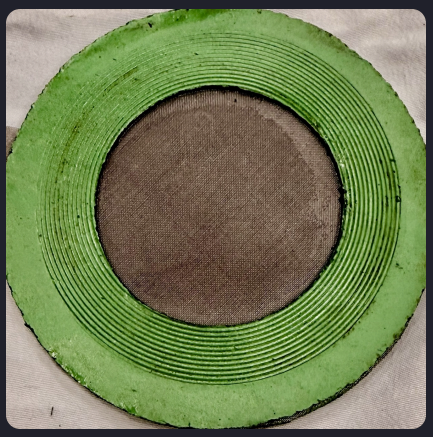
Project Summary

- **Efficient & Safe:**
  The project was completed safely over a six-day field window.
- **Increased Equipment Reliability:**
  Reservoir cleaning, high-velocity oil flushing, and post-fill fluid purification reduced particulate levels and supported lubrication system performance prior to start-up.
- **Cleanliness Improvement:**
  ISO particle count improved from 21/17/14 to 14/12/9, exceeding the 16/14/11 target. API 614 screening improved from rating 3 to rating 1, with no metal or hard particulate observed at completion.

Before



After



Conclusion

The Frontline team successfully executed Off-Line System Decontamination, Reservoir Decontamination, High-Velocity Oil Flushing, Final Fill, and Fluid Purification activities on a steam turbine lube oil system at an industrial facility.

At completion, ISO particle count results improved from 21/17/14 to 14/12/9. API 614 screening started at a rating of 3 and was brought down to a rating of 1, indicating clean screens with no metal or hard particulate observed and confirming the system met cleanliness requirements for turnover. These outcomes support improved equipment reliability and reduced risk of contamination-related issues during recommissioning.

Overall, the work was completed with 100% safety performance, cleanliness results exceeding target, and a smooth transition to customer turnover.

100%	100%	100%	100%
Project Safety Record	Project Environmental Stewardship Record	Project Results Guaranteed	Project Success



Contact Us

1 800 780 6544
info@FrontlineGlobal.com
FrontlineGlobal.com