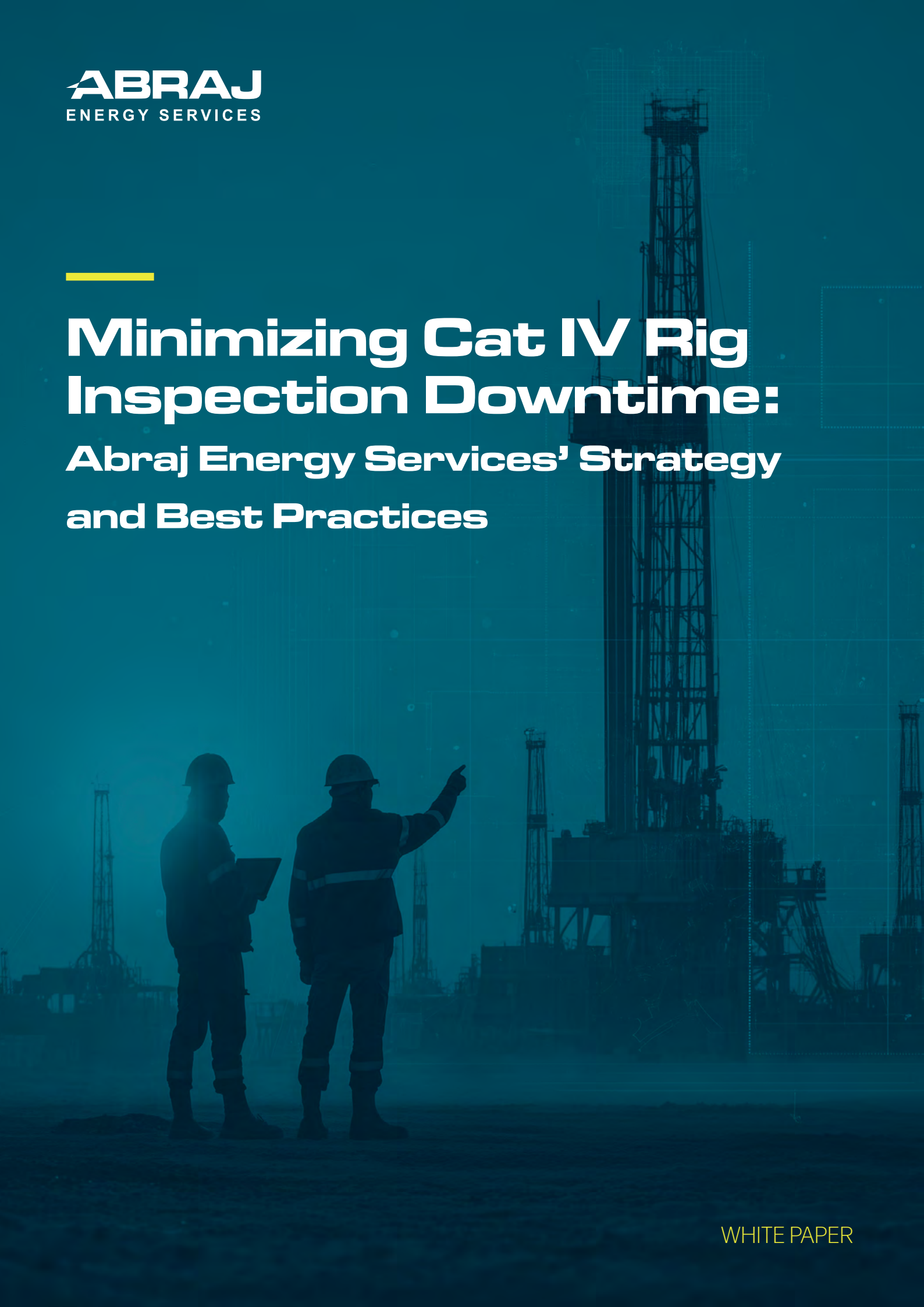
ABRAJ
ENERGY SERVICES

Minimizing Cat IV Rig Inspection Downtime:

Abraj Energy Services' Strategy and Best Practices



WHITE PAPER

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EXECUTIVE SUMMARY

Category IV (Cat IV) rig inspections are comprehensive overhauls required roughly every 10 years to ensure drilling rig structural integrity. While essential for safety, Cat IV inspections can result in extended rig downtime, potentially impacting operational efficiency and revenue. Additionally, in an industry-wide trend, documentation lapses are occasionally reported. These can stem from inadequate quality control (QC) processes and insufficient planning, leading to repeat Cat IV inspections in some instances. Such unplanned situations can introduce substantial operational and financial inefficiencies beyond the initial inspection scope.

In response, Abraj has overhauled its entire Cat IV inspection process, implementing strategies that **not only ensure proper documentation and avoid costly repeat inspections, but also minimize overall inspection downtime without compromising thoroughness.** Key measures now include early planning with original equipment manufacturers (OEMs), advanced procurement of replacement parts, rigorous quality control of inspection documentation, lean execution techniques, and continuous post-inspection learning. By applying these best practices, Abraj has dramatically reduced its own Cat IV downtime, setting a new industry benchmark for efficient major rig overhauls. This report details the challenges encountered, the solutions implemented, and the lessons learned.

INTRODUCTION AND PROBLEM OVERVIEW

A **Category IV inspection** is the most intensive periodic maintenance for a drilling rig. Typically required once every 3,650 operating days, or approximately 10 years, it involves taking the rig out of operation, disassembling critical structures, performing thorough non-destructive examination (NDE) of load-bearing components, and executing any necessary repairs or replacements. Such overhauls ensure the rig's compliance with industry regulations and safety standards, but also mean the rig will be offline for an extended duration. Notably, while the rig's main structure undergoes Cat IV inspection roughly every 10 years, **certain auxiliary components** (e.g. top-drive controllers, lifting gear) require intermediate inspections every 5 years. This staggered maintenance schedule must also be factored into long-term planning.

In the oil and gas industry, where rigs earn revenue only when drilling, **downtime is a key operational challenge;** a single rig idle for a few months can translate to millions of dollars in lost income. Beyond direct revenue loss, prolonged rig downtime can also disrupt drilling schedules and strain client relationships.

In addition to the unavoidable costs of shutting down a rig for a scheduled Cat IV inspection, some companies face an additional financial risk for repeat inspections resulting from lapses in the original inspection's documentation. As an illustration of the potential consequences that can result from lapses as minor as a missing signature, each day that a rig is non-productive can cost anywhere from $100,000 to $200,000 per day. Additionally, if two or more rigs are undergoing Cat IV inspection simultaneously, which is often the case when not pre-scheduled, this can leave multiple operations halted and compound the downtime impact. Moreover, the impact of repeated shutdowns is sometimes amplified by the fact that, due to being unplanned, critical replacement parts are not ordered in advance, causing further delays.

"Minimizing downtime isn't just about saving costs – it's about reliability, trust, and operational excellence. By rethinking our approach to Cat IV inspections, we're not only reducing delays but also reinforcing our reputation as a leader in efficiency and quality."

– Eng Saif Al Hamhami, *CEO, Abraj Energy Services*

Abraj leadership, however, has worked hard to instill a culture of continuous improvement (CI). The company identified this industry trend, and the broader challenges around QC and planning processes as an opportunity to re-examine its approach to major rig inspections and to become an industry leader in efficiency. The company identified several bottlenecks in the typical Cat IV rig inspection process, including but not limited to documentation, and developed a new strategy to address each. The following sections discuss the key challenges that were identified and the best practices Abraj implemented to both minimize Cat IV inspection downtime and to avoid costly, unplanned repeat inspections.

CHALLENGES IN CAT IV INSPECTIONS

Abraj's review of the Cat IV inspection process highlighted these critical problem areas:

Unplanned Parts /Materials Delays

During inspections, work can be delayed by last-minute part requirements. For example, some parts might need to be ordered from abroad mid-project, leading to weeks of waiting during the shutdown. This insight suggests the need for advanced procurement for long-lead items.

Documentation and Compliance Gaps

Potential instances of missing signed documentation required for compliance certification can happen due to an insufficient quality control process. A single missing certificate can invalidate an entire inspection, resulting in a costly redo.

Inefficient Processes

For companies undergoing their initial Cat IV projects, some execution challenges may require optimization. For instance, rigs can be over-disassembled for transport. Teams may not be fully optimized for speed, leading to longer-than-necessary inspection durations.

Simultaneous Rig Downtime

Having multiple rigs down at once for Cat IV inspections, including repeated inspections, can strain resources and extend the operational impact. This underscores the need for a scheduling strategy to stagger major maintenance or mitigate its impact on operations.

Manpower and Scope Challenges

Cat IV projects can also be impacted by limited availability of skilled personnel and the tendency for scope creep. Unforeseen repair needs (extra welding, component replacements not in the original plan) can arise once rigs are opened, and smaller inspection teams might struggle to address issues as they emerge.

Identifying these common industry issues was the first step to improvement. Abraj recognized that addressing them would require changes in planning, resource management, and oversight. The next section outlines the strategy and best practices Abraj has since put in place to reduce Cat IV downtime in the future.

ABRAJ'S BEST PRACTICE STRATEGIES FOR MINIMIZING DOWNTIME

Abraj implemented a multi-pronged strategy to revamp its Cat IV inspection process, focusing on thorough preparation, efficient execution, and risk mitigation:

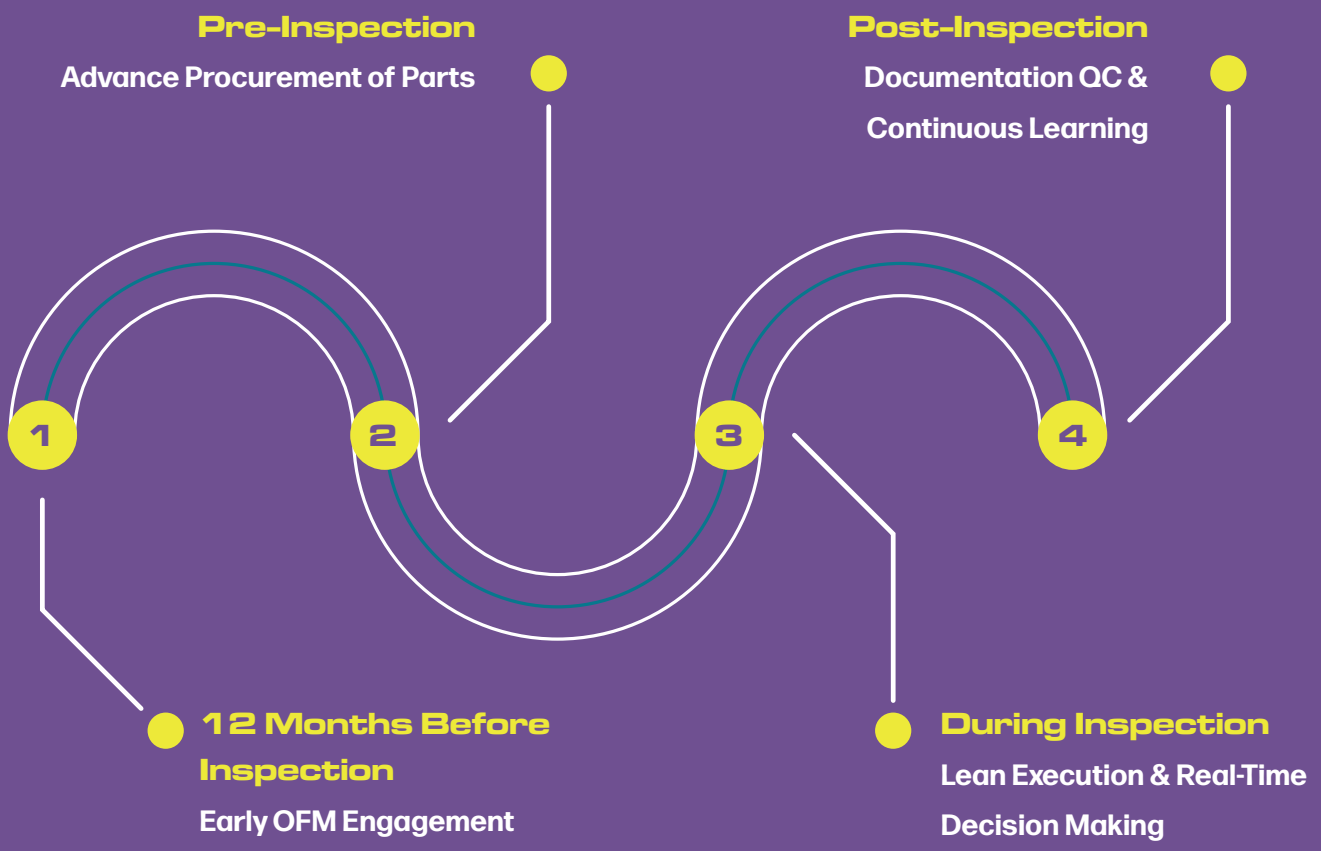
1. Early Planning and OEM Engagement

Industry experts agree that being proactive in maintenance and inspection planning is critical to minimizing rig downtime. At Abraj, thorough preparation now begins up to a year before Cat IV shutdown. About 12 months ahead of a rig's Cat IV inspection, Abraj invites the OEM to perform a preliminary inspection and planning session. In line with industry best practices, OEM experts help assess the rig's condition and identify components likely to require repair or replacement. Research has shown that such predictive maintenance can significantly improve asset reliability and availability. This collaboration also yields a clear **scope of work** for an upcoming Cat IV, so everyone knows exactly what tasks will be done. It also ensures that any special requirements (design drawings, technical procedures, or unique parts) are known in advance.

During this lead-up, Abraj also reviews all regulatory and client requirements and prepares the necessary documentation templates. By the time the rig enters the yard, the project plan and paperwork are ready, leaving no ambiguity about the process. Abraj and the OEM collaboratively scope the project and proactively factor in allowances for potential findings, minimizing operational surprises..

"We don't just contact a third party and say, 'do a Cat IV for us.' We tell them what we need done, how we need it done, and we have OEM involved to make sure that everything meets their guidelines and standards."

– Abraj Operations Manager



2. Advance Procurement of Parts and Materials

To avoid waiting mid-inspection for parts, Abraj emphasizes strategic **proactive procurement**, another industry best practice. All likely replacement parts and consumables are identified during pre-planning, and a comprehensive **material requisition list** is created. Long lead-time items, such as heavy structural components or OEM-specific parts, are ordered well ahead of the shutdown. Previously, overlooking this step meant critical items had to be sourced during the inspection causing major delays and increasing costs. Now, those parts are on-site before the rig is taken apart. By staging all required materials at the workshop in advance, Abraj ensures Cat IV work never stalls due to a lack of components.

3. Rigorous Quality Control for Documentation

Recognizing that **inspection compliance and completeness** are paramount, Abraj created a dedicated quality control process for Cat IV projects. Abraj now assigns **two dedicated QC engineers** working in back-to-back rotations on each Cat IV project. This ensures continuous oversight: as one shift concludes, the second QC engineer resumes so that every inspection hour has a qualified eye verifying work and documentation. These QC engineers are tasked with verifying that every checklist, NDE report, and sign-off is completed properly. Using API-compliant documentation checklists, they catch any omissions or errors before they escalate. Crucially, this process guarantees the **final OEM certificate of inspection is obtained and included.**

4. Lean Execution of the Inspection

Abraj has also applied lean principles to streamline the on-site inspection and repair process:

Efficient rig handling

Major operators in the oil and gas industry emphasize that consistent, optimized maintenance processes directly reduce downtime. As part of Abraj's new approach, the rig is only partially disassembled for transport and inspection, keeping large sections intact to reduce assembly time. For example, instead of dismantling the entire mast into small pieces, it is separated into large modules that can be moved and later reattached more quickly.

On-site, focused teams

The multidisciplinary crew (mechanical, structural, NDE, etc.) works full-time at the workshop during the Cat IV, rather than splitting time with field duties. Keeping everyone co-located and focused ensures steady progress and quick issue resolution.

Parallel workflows

Wherever possible, tasks are done in parallel. For instance, one team can refurbish mechanical equipment while another inspects structural components. Careful scheduling of parallel tasks mean this stage of inspection is shortened and no team is left idle. Abraj also **expanded its in-house maintenance workshops and increased the number of certified technicians**, so that sufficient skilled manpower and facilities are available for each Cat IV. This expansion addresses any workforce bottlenecks and enables more repair work to be done on-site without waiting for external vendors.

Real-time decisions

With engineers, inspectors, and QC present, decisions are made on the spot, eliminating delays in approvals. Progress is reviewed daily against plans, and any emerging bottlenecks are addressed immediately by reallocating resources or tweaking the workflow.

These lean execution tactics eliminate delays during the project and have significantly shortened the duration of Cat IV overhauls.

5. Optimized Scheduling

To reduce the operational impact of Cat IV downtime, Abraj also introduced smarter scheduling:

Sequential scheduling: Cat IV inspections are scheduled with intentional sequencing, never overlapping unless absolutely necessary. This avoids stretching resources thin and prevents multiple revenue-earning rigs from being offline simultaneously. Careful scheduling and compliance planning are also endorsed by industry guidance to reduce downtime risk.

6. Post-Inspection Learning and Continuous Improvement

After each Cat IV project, Abraj conducts a **post-mortem review** to capture lessons learned. The team discusses what went well and what issues arose, and they update procedures accordingly. Insights from one rig are applied to others – for example, if a particular type of wear or damage is discovered during one Cat IV, maintenance plans for sister rigs are adjusted to address it proactively. These reviews continuously refine the Cat IV process. Over time, this institutional knowledge makes each subsequent inspection more efficient and trouble-free. These reviews also scrutinize vendor and contractor performance. If any third-party service provider failed to meet Abraj's standards for quality or timeliness, the team addresses it, potentially **blacklisting vendors who underperformed** to ensure only reliable partners are engaged in future inspections. Lastly, Abraj also leverages technology for ongoing reliability. A preventive maintenance system (SAP) schedules regular checks, and tools like **thermal imaging cameras and vibration sensors** monitor equipment health in between Cat IV overhauls. These predictive maintenance tools help detect wear or anomalies early, so repairs can be made before they escalate into costly downtime events. Academic research corroborates that this kind of maintenance strategy directly correlates with reduced rig downtime.

RESULTS AND OUTCOMES

Implementing these best practices has yielded remarkable improvements for Abraj:

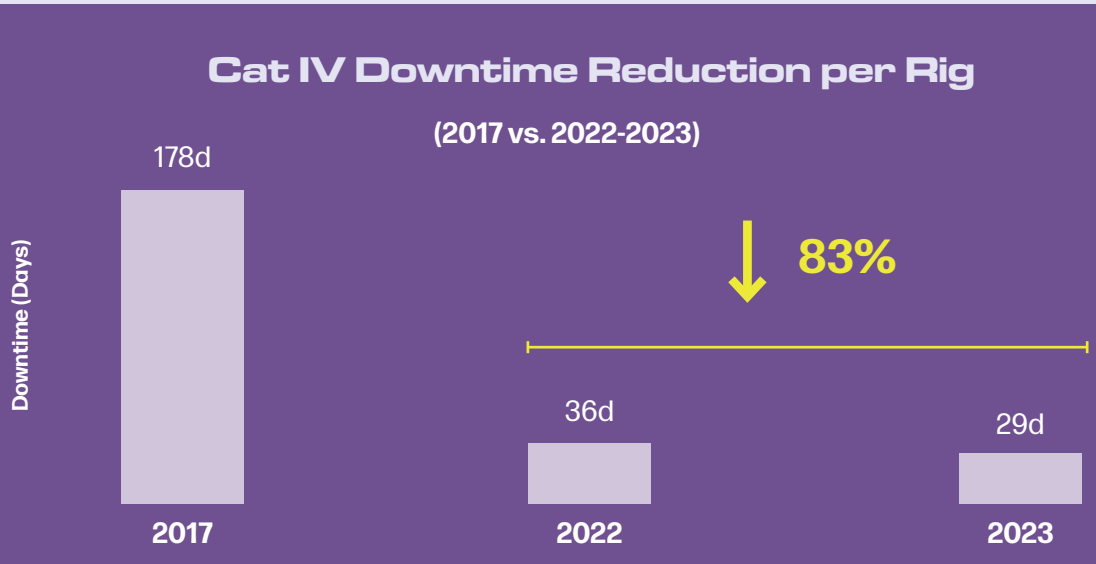
- **Greatly Reduced Downtime:** Recent Cat IV inspections on Abraj's rigs have been completed in roughly **30–36 days each**, whereas earlier efforts typically lasted 3–6 months. For instance, three rigs in 2022 finished their Cat IV overhauls in 36, 31, and 29 days respectively. This is a dramatic reduction in turnaround time.

- **Minimized Revenue Loss:** Reduced downtime maximizes revenue retention. Cutting downtime to around one month (≈30 days) can prevent potential revenue losses of over $1 million per rig inspection.

- **No Repeat Compliance Issues:** With the new QC and documentation procedures in place, every Cat IV has passed client and regulatory scrutiny successfully on the first inspection. All required certificates and reports are obtained and filed, so no further shutdowns or rework have been needed due to paperwork problems. In fact, the combination of rigorous planning and high-tech preventive maintenance has driven unscheduled downtime to negligible levels **(below 1%)**, significantly outperforming industry standards.

- **Improved Client Confidence:** Abraj's ability to carry out major inspections efficiently has strengthened its standing with customers. The company's approach is now regarded as a benchmark for managing Cat IV inspections effectively while upholding safety and quality:

> **"Abraj's inspection and documentation have become highly trusted as a result of efficient methods of confirmation and QC for record keeping."**
>
> - Abraj Energy Services Operations Manager



CONCLUSION

Abraj Energy Services' experience in minimizing Cat IV rig inspection downtime demonstrates that even the most extensive maintenance overhauls can be executed efficiently with the right strategy. By addressing key challenges – ensuring complete documentation, planning parts and work in advance, streamlining execution, and smartly scheduling to mitigate impact – Abraj has turned an industry challenge into an opportunity to excel.

The following best practices, distilled from Abraj's approach, can benefit any drilling contractor facing a Cat IV inspection:

Plan Early and Thoroughly
Engage all stakeholders (including OEMs) far ahead of the due date to define the scope and requirements, and secure necessary parts and resources in advance.

Enforce Rigorous Documentation QC
Paperwork and certifications are integral to the job. Assign a team to verify that every required document and sign-off is completed, ensuring the inspection is fully compliant the first time.

Streamline the Process
Use lean methods to eliminate inefficiencies. Avoid unnecessary disassembly, keep the team focused on-site, parallelize tasks where possible, and make quick decisions to prevent idle time.

Minimize Operational Downtime
Schedule Cat IVs one at a time and, if possible, use spare rigs or creative scheduling so that drilling operations continue uninterrupted, and revenue loss is minimized.

Learn and Adapt
After each inspection, capture lessons and update your processes. Continuous improvement will make future inspections faster and more reliable.

Through proactive planning, disciplined execution, and continuous improvement, Abraj has achieved a level of efficiency in Cat IV inspections that safeguards its rigs' integrity and its operational uptime. This case study serves as a comprehensive resource on how to significantly reduce rig inspection downtime while maintaining high technical standards.

For more information, please visit **our website.**

REFERENCES

- American Petroleum Institute. (2019). Operation, Inspection, Maintenance and Repair of Drilling and Well Servicing Structures; API Recommended Practice 4G ipmgservicios.com.
- Boschee, P. (2013). Optimization of Reliability and Maintenance Unlocks Hidden Value. jpt.spe.org.
- Custeau, K. (2020). Predictive Maintenance for Improved Performance in Oil and Gas. Aveva white paper. gulf.avevaselect.com.
- Drilling Contractor (Official Magazine of the IADC). (2010). Rig NPT: The Ugly Truth drillingcontractor.org.
- International Association of Drilling Contractors (IADC). (2015). Ensuring Reliability and Proving It iadc.org.
- Internal interview with Abraj Energy Services Operations Supervisor, conducted in March 2025.
- Journal of Petroleum Technology (2014). BOP Monitoring Seeks to Reduce Downtime, Increase Insight jpt.spe.org.
- Longyear, B. (2018). How Running Rig Parts to Failure Affects the Bottom Line. mining.com.
- Mburu et al. (2021). Maintenance Impacts on Geo-Thermal Drilling Operations: A Case Study. American Journal of Industrial and Business Management, 11(2). scirp.org.

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