

Total EP has zero unanticipated failures since inception of RAID monitoring center

540

Pieces of equipment monitored from TOTAL RAID center

0

Unanticipated failures on monitored assets since 2013

13

Affiliates supported around the globe by RAID center

Company	TOTAL EP
Industry	Oil & Gas
Products	SmartSignal
Product Categories	Asset Performance Management



Background:

Total EP consistently ranked amongst the top 10 integrated operators globally, employs more than 100,000 workers and operates in more than 130 countries producing 3 million barrel of oil equivalent (BOE) per day. It is also the second largest LNG supplier, with major investments in low carbon electricity production through dams, solar and wind turbines.

Matias PALACIOS, a Rotating Equipment Engineer at Total, champions the company's mission.

“In addition to oil production, we play a big role in the LNG and low carbon energy markets. Our commitment to safe, clean, accessible power is a responsibility we take very seriously to support our ambition to become the responsible energy major.”

Challenges:

Gaps in remote monitoring & analysis lead to costly production disruptions

In 2009 a fire broke out on two compressors on a remote oil production platform in Africa. It all started with a small leak that increased week after week until the centrifugal compressors failed and the pressurized gas was released into the lube oil tank of a gas turbine. The mixture of gas and oil made its way to a 400 degree gas turbine vent and ignited a fire, exactly what no one wants to happen. A week later, on unit 2 of this platform the same event reoccurred. No one was hurt, but it forced a six-month shut down of the platform that had been producing 100,000 barrels of oil per day. And it all started with a small leak that wasn't detected, that if caught early could have easily been fixed.



Unfortunately, these types of failures were not isolated to that plant. Operations in the desert were particularly vulnerable as equipment was exposed to sand. Although vibration levels were being monitored, they were staying within operating parameters and with no way to visually inspect the equipment, damage was not detected until it was severe.

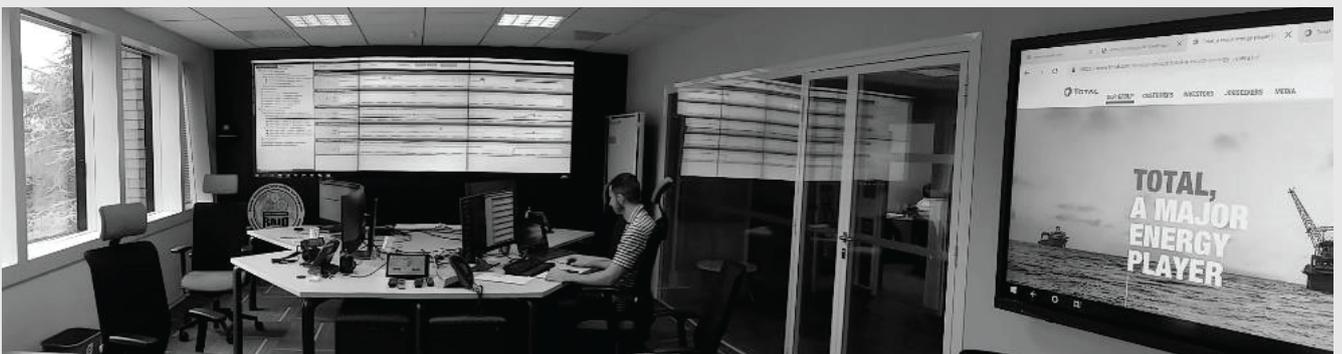
From 2006 to 2010 Total had several gas turbine break downs and compressor failures. Post-incidents analysis revealed that 50% of the failures could have been avoided had monitoring been in place. Not all failures cause the impact of the 2009 compressor breakdown but Total identified a significant opportunity to take a more proactive approach to identify these failures ahead of time.

Solutions:

SmartSignal enabled the organization to move from reactive, to proactive predictive maintenance practices

To proactively identify equipment degradation and avoid these failures, Total set out to establish a remote monitoring center with access to equipment data coming from critical assets across its global exploration and production fleet. In 2013, the Remote Assistance, Intervention and Diagnosis Center (RAID) was launched with GE Digital's SmartSignal product as the software determined to support the center's monitoring activities. SmartSignal provides early and actionable warnings of impending equipment and process problems – moving the organization from reactive to proactive maintenance operations.

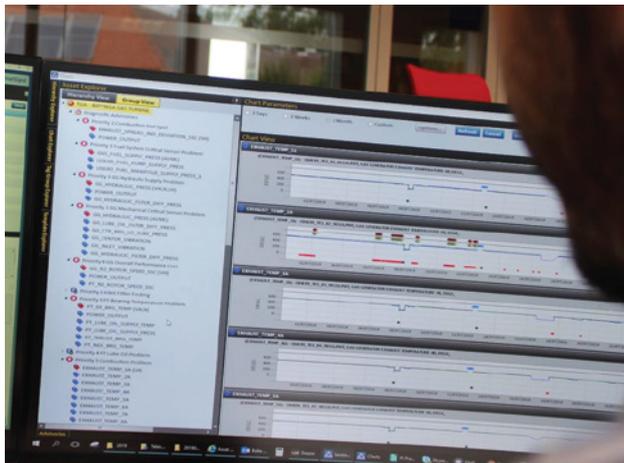
“We chose SmartSignal to anticipate critical equipment failure before production disruption occurred because we knew it could scale to meet our needs and the visualization made it easy to see what actions we needed to take.” Matias explains, “We knew the added insight would not only give us greater confidence, but also would save us millions in lost production.”



When Total first rolled out the RAID system in 2013, four areas were identified as critical to production:

- Power generation
- Water injection
- Gas compression
- Crude oil export

The monitoring operation across these four areas is extensive. 30,000 sensors monitor 260 shaft lines and 540 pieces of equipment. Data is sampled every 10 minutes to limit the burden on data storage without impacting analysis and effectiveness. When SmartSignal identifies a potential deviation, it is flagged directly to the affiliate where it is occurring, along with recommended actions.



Results:

- Extended meantime between maintenance actions while reducing equipment failures
- Eliminated gas turbine and centrifugal compression failures in monitored fleet
- Hundreds of maintenance actions have been recommended and acted upon eliminating millions of dollars in anticipated down time costs

Operational objectives and benefits include:

- Reduce flaring
- Optimize fuel consumption
- Reinject produced gas and produced water

Since the inception of the RAID center, Total's ability to proactively anticipate problems, had resulted in zero breakdowns across all monitored assets. The goal is to have the solution scaled to more than 400+ critical assets at the start of 2020, which the team is on track to achieve.

“With our remote monitoring system, we have strengthened communication between our affiliates and headquarters and our learnings have been extensive.” Matias shares, *“Generally, we operate the same kind of equipment from the same manufacturer in very different conditions across affiliates. Applying the same maintenance schedule across locations was leading to failures. Now, we can isolate every potential issue to determine whether it is a design issue or an operating one. This has been essential to improving operations globally.”*

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