

FROM BIG DATA TO SMART DATA:

AN INDUSTRIAL AUTOMATION STRATEGY

CASE STUDY



KEYSOLUTION

How the key Oil Plant in Italy saved time, drawbacks and resources in Engineering review, Commissioning and Operations upgrading the Integrated Control and Safety System (ICSS) with Hierarchy 4.0

Overview

Centro Olio Val d'Agri (from now on COVA) is the key Oil Plant of ENI Italy. Eni's Southern District (DIME), established in 2008, is the head of Oil & Gas exploration and production activities in Basilicata and Puglia, coordinating activities in Calabria, and is responsible for the development of new sea-going development projects in Sicily. The District headquarter is in Viggiano.

Operational activities are focused on the development of the Val d'Agri field, today the largest onshore oil field in Western Europe.

Under request of ENI an initial inspection of the Cabinets and infrastructure of the Instrumented Safety System was performed to identify the integrity, spare capacity and expansion or upgrade feasibility.



Impact

Key Solution started the impact analysis of the upgrade and expansion activities before the introduction of Hierarchy 4.0 in the equation:

- > 1 year of Engineering studies
- > 3 months of Factory Acceptance Test
- > 40 days of Commissioning and Tests

Problem

As a result of analysis of the status of the Instrumented Safety System, extended to the entire Integrated Control and Safety System (ICSS), the Company evaluated few high criticality requiring immediate action:

- > Emergency Shutdown System (ESD) Safeguard 400, installed in the middle 90's, will enter the end of support phase, critical updates will not be granted and spare parts availability will not be ensured.
- > Distributed Control System (DCS) ABB 800xA 5.0, installed in 2011, will enter the end of support phase. Operator workstations, servers and third party Hardware are obsolete and new Cyber Security regulations and guidelines are not ensured.
- > DCS Power supplies, devices and marshaling elements, all installed in the middle 90's, are already in their lifespan high fault rate.

The Client asked for an upgrade of the ICSS, a Control System expansion and improvements, with minimum impact on normal operations, limited turn-around time and ready to go implementation.

Solution

Key Solution started the integration of Hierarchy 4.0 database with all the updated documentation during the pre-engineering activities of COVA upgrade.

Using Hierarchy 4.0 during the entire process of the activity, and integrating it with the Completions and Commissioning Management System (CCMS) as well, it was possible to:

- > Verify complete I/O allocation during the Factory Acceptance Test (FAT) phase;
- > Identify missing components or equipment before the start of the construction phase;
- > Ensure reliability safety typicals for valves, detectors and fire and gas devices;
- > Verify and evaluate segregation of safety elements to ensure reliability and availability as per design and international standard requirements (IEC 61508/61511);
- > Monitor complete segregation between DCS and ESD/FGS;
- > Monitor visually the progress of loop checking in relation to the Safety Systems;
- > Identify the unlocked and available workfront for Logic checks (Cause & Effects, Complex loops, sequences);
- > Focus on wiring and troubleshooting during loop check;
- > Plan valve alignments for Shutdown and Blowdown test;
- > Record and validate the integrity and performance of the total Shutdown test;
- > Record and validate the Blowdown test;
- > Train the Central Control Room (CCR) operators to quickly identify the upsets causes and how to take corrective action;
- > Provide the maintenance team a flexible tool to prepare Safety Job Analysis and Risk assessment for the HSE department and Permit to Work office while planning preventive and corrective maintenance activities.

Using Hierarchy 4.0 Key Solution managed to plan part of the upgrade and expansion of the ICSS during normal production operation of the Oil Plant, drastically reducing the downtime and optimizing the coordination of all the resources and the parties involved in the activity.

Results

Hierarchy 4.0 proved to be a flexible and user-friendly tool, during the entire activity lifecycle from plant shutdown to plant start-up. No logic modifications were required after:

- > 1335 ESD interlocks implemented and tested
- > 7000 on site punches saved – all HW and SW parameters verified with Hierarchy 4.0 have identified in early FAT stage all missing system configurations:
 - punch list closing point at vendor factory before FAT, anticipating site corrections
 - 3000 man-hours saved implementing the software modifications at vendor factory
- > 3707 loop check ESD
- > 361 loop check DCS

The use of Hierarchy 4.0 in the early stages of engineering and pre-commissioning provided smart planning where:

- > part of the installation and tests were scheduled and executed without plant shutdown required: 8 days saved;
- > the activity has been performed faster, completing the activity in fewer days than the forecasted/planned. Hierarchy 4.0 allowed us to execute in parallel the two activities of I/O and logic testing. Instead of 40 days only 32 days were required to have the plant fully ready for restart.

To sum up some figures

Total amount of shutdown days saved: $(8 \text{ days} * 80.000 \text{ barrels/day} * 70 \text{ \$/barrel}) = \$ 44,8\text{M}$

Total amount saved during project phases: $(3000 \text{ man/h} * 120 \text{ Specialist}) = \$ 360\text{K}$

Use of Hierarchy 4.0:

delivers a ROI of 3X from day one

gives the possibility of multiple users, the availability of many Functions, KPI and Charts

increases personnel utilization and plant efficiency up to 20% per year



HIERARCHY 4.0

The new Hierarchy 4.0 look!

