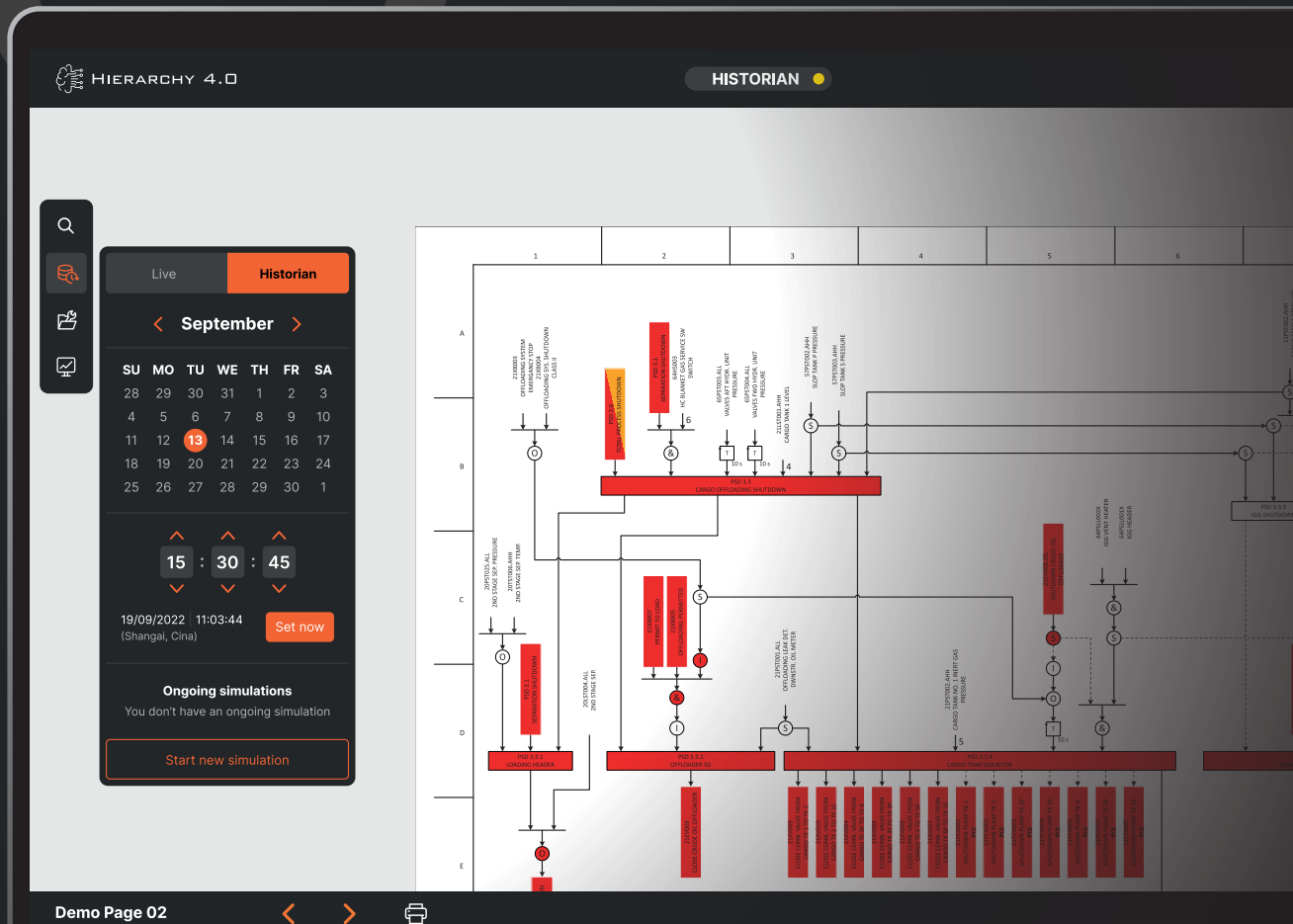




HIERARCHY 4.0

THE NEW FRONTIER OF INDUSTRIAL AUTOMATION

Hierarchy 4.0 is a web-based application developed to support the Big Data Analytics and the activities in different lifecycle stages of a plant.



The screenshot displays the Hierarchy 4.0 interface in the 'HISTORIAN' mode. The top left corner shows the application logo and name. A navigation sidebar on the left includes a search icon, a home icon, and a refresh icon. The main content area is divided into two panels:

Control Panel (Left):

- Buttons for 'Live' and 'Historian' (selected).
- Calendar for 'September' with the 13th highlighted.
- Time display: 15 : 30 : 45.
- Date and time: 19/09/2022 11:03:44 (Shanghai, Cina) with a 'Set now' button.
- 'Ongoing simulations' section: 'You don't have an ongoing simulation' with a 'Start new simulation' button.

Process Flow Diagram (Right):

The diagram shows a complex industrial process with various units and streams. Key components include:

- Unit 1:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 2:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 3:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 4:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 5:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 6:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 7:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 8:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 9:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 10:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 11:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 12:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 13:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 14:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 15:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 16:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 17:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 18:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 19:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 20:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 21:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 22:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
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- Unit 48:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 49:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.
- Unit 50:** NO. 1 STAGE SWP PRESSURE CONTROL SYSTEM AND FLOOD DET. UNIT.

The bottom of the interface shows 'Demo Page 02' and navigation arrows.

Thanks to Hierarchy 4.0 you can analyze plant data in different lifecycle stages through the complex interactions of causes and effects, with aim to perform planned and corrective maintenance plus shutdown analysis.

In developing Hierarchy 4.0, our multidisciplinary team poured in their expertise and background in engineering, commissioning, maintenance and operation.

Therefore, this product gets all the features tuned and optimized in every step of the project, from the beginning to the normal operations.

HOW HIERARCHY 4.0 TACKLES ANY CHALLENGE

Let's have a look to the challenges of a modern plant and how Hierarchy 4.0 can help:

1. Shutdown Analysis (RCA Report)

A challenge in identifying the causes of shutdown. With Hierarchy 4.0, is possible to save 90% of time in finding the reason for shutdown.

2. Training

Security systems do not receive regular updates under OTS. With Hierarchy 4.0, the simulator for training new operators and maintenance technicians is always updated.

3. Impact analysis

Often is not updated with current plant state and requires long time for analysis. With Hierarchy 4.0, the analysis time is reduced by 95% and always updated.

4. Human error

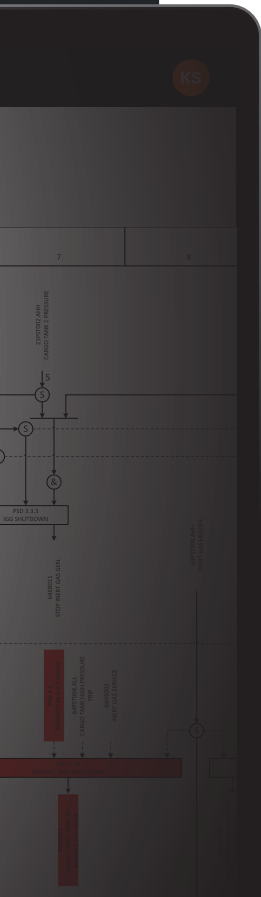
Incorrect documentation and analysis can lead to shutdown with business interruption and safety risk. Hierarchy 4.0 allows to keep procedure up-to-date, validating them with simulator.

5. Logic test

Plans and procedures are difficult to organize and plan with backlog on safety critical maintenance. Hierarchy 4.0 allows to reduce time spent for preparing plan and execute work orders.

6. Segregation

Segregation of signals from safety logics is not clearly defined. Hierarchy 4.0 allows to have a node-to-node visibility of signal allocations and communication variables.



OUR PROCESS



STEP 1

Design Hierarchy
Diagram



STEP 2

Import database
& documentation



STEP 3

Customise
Simulator



STEP 4

Connect Live Data
from EDOF



START

Hierarchy
4.0

A CLOSER LOOK INTO HIERARCHY 4.0

THE DIAGRAM

The hierarchy diagram shows a schematic safety logic plant, supporting the engineers to browse interactively and dynamically through the complex interactions of causes and effects.

UPDATED INFORMATION FOR MAINTENANCE

Every object in the diagram has a dedicated faceplate where all key information related to the main design documentation and the control system are presented.

The faceplates are organized into sections where it is possible to view details such as ranges, alarm thresholds and hardware specifications for each signal: this way, you can perform both planned and corrective maintenance without wasting time collecting documentation from several sources or engineering databases which are not always available or updated. All details related to the system configuration (e.g. I/O

allocation, thresholds, alarm priority) are managed by a dedicated tool: it will update all the data and sections in every faceplate and also will give the possibility to have a detailed report (Excel or Pdf) helpful to track all the changes applied to the plant.

The periodic updates will guarantee the accuracy of the system's information and we will be able to provide part of the documentation related to the control system (C&E, Loop drawings etc).

DIAGRAMS LEVELS

The diagram is layer-based: making the system analysis easier on critical nodes such as ESD, PSD, F&G etc, it allows you to identify all the components and their interconnections.

Continue on the **next page** >>



SEGREGATION

There are several challenges during the Safety System engineering phases: the most critical is related to segregation.

In it, segregation means verifying the assignment of initiators and final elements, their logic, and communication variables: all the aforementioned elements must be assigned to ensure the safety functions are reliable and available.

Engineers can use Hierarchy 4.0 during the design phase to verify the correct assignment of the elements, variables, and logic directly on the diagram. As a result, the engineering team can easily optimize the control system configuration, increasing its performance, security, reliability and efficiency.

LIVE DATA HIERARCHY

In order to reach its highest performance, Hierarchy 4.0 is best used in combination with a real-time data acquisition system (EDOF, OSIsoft PI etc.), so that users can view the actual status of causes, effects and interlocks.

The Hierarchy 4.0 server sends a data request to "EDOF" with a scan time defined by the client, using a Web API.

All live data (such as status, activation, faults, force and blocks, bypass, MOS and override active on the control system) will be displayed on the diagram in every faceplate, providing operators with both an overview and a detailed view of the plant's status.

This feature is specifically meant to support the operators in decision-making, taking into account both the safety and the operability of the asset.

SHUTDOWN ANALYSIS

With shutdown analysis, Hierarchy 4.0 becomes an excellent tool for analyzing plant data: with shutdown analysis, it is possible to determine the root cause - or causes - of a shutdown, and verify that all logics and final elements are activated correctly. Furthermore, it provides a detailed report of all events in the sequence.

By selecting a specific date and time, Hierarchy 4.0 can restore the exact status of the plant and visualize all the historical data on the diagram. Similar to looking at snapshots, Shutdown Analysis will provide a way of evaluating, reviewing, and accessing past events.

SMART MAINTENANCE

In addition, Hierarchy 4.0 can also be integrated with scheduling and planning systems (such as SAP PM etc): all maintenance activities related to initiators, interlocks and final elements can be recorded and monitored.

Hierarchy 4.0 automatically verifies that all interlocks have been activated during a specific timeframe, and that all related causes and effects have been triggered and acted as expected.

Hierarchy 4.0 flags the interlock as tested at that date and time, schedules the next preventive maintenance, sends the new target date to SAP Plant Maintenance or similar, and completes the previous maintenance.

This feature greatly decreases the workload in preventive maintenance and report generation.

DYNAMIC SIMULATION

Hierarchy 4.0 represents a dynamic smart simulation of every implemented cause and effect and can verify the behavior of the logic solvers. This feature brings a great efficiency both as operator training and as a testbench in detailing maintenance procedures and manuals for personnel.

Additionally, events in the past can be simulated by selecting a date and time from the plant register: further conditions can be simulated (e.g. escalation) to verify how the safety logic and the plant will respond.

Moreover, the users will be able to simulate special operations or maintenance activities to verify that the procedures are correct, minimizing human error risks that typically lead to production losses and critical risks for operators, such as pollution of assets or the environment.

IN FEW WORDS:

WHY OUR APPROACH IS DIFFERENT?

Why is Hierarchy 4.0 approach - for transforming Big Data in Smart Data - so different compared to the other tools? Our web-based application allows an easy and immediate visualization of the data as a diagram, with readings in real time provided in a "hierarchical" view that allows a deep understanding of the system's strategy.

All in all, Hierarchy 4.0 represents a very innovative tool to support all user teams to easily upgrade and optimize the control system configuration, increasing its performance, security and reliability.

The result is improving the efficiency of the plant's industrial automation, by the use of raw Big Data transformed in precious Smart Data, and better personnel utilization by saving the time for analysis and daily routine.

Hierarchy 4.0, a Key Solution property, is protected by an international patent.

HIERARCHY 4.0

KEY NUMBERS

3-5x

The **Return of Investment**
from day one

20%

The **Plant efficiency**
(average increase per year)



HIERARCHY 4.0

FOR MORE INFO



SCAN HERE