

Aramco [Saudi Arabia]



Aramco's drive to perfect visualization of data

Oil rules the world, knowledge makes it happen. Aramco is the largest producer in the world of crude oil and literally every second that the pumps are not working it costs millions of dollars, so Aramco needs to ensure the pumps never stop bringing up the black gold. It is for this reason a great vision is required to control and monitor this process. The operations group of Aramco has this vision.

In September 2005, president and CEO Abdallah S. Jum'ah started a new era for the Operation Coordination Center of OSPAS Aramco introducing the use of a large real-time data wall. The impressive curved row of video screens - totaling 67 meters in length and three meters in height - is divided into five sections, each representing a major area of company operations:

- Refined Product Network
- Terminal Planning and Scheduling
- Crude Network
- Gas and NGL Network
- Electric Power Distribution

The Operations Coordination Center (OCC) is part of Saudi Aramco's Oil Supply Planning and Scheduling (OSPAS) Department. "OSPAS is a central planning organization that manages and optimizes hydrocarbon system capacities and inventories to deliver quality products to the customer at the right time and right place, with maximum net revenue to Saudi Aramco," said OSPAS Manager Adel H. Al-Dossary.

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Representation of excellence and reliability

The new OCC video wall serves as a nerve center for all Saudi Aramco operations and displays all activities in real-time. In short, it integrates the critical operations in oil, gas, shipping, pipelines and refining that define Saudi Aramco.

Jum'ah said that the OSPAS facility is a source of pride for Saudi Aramco. "It has been one of the best representations of our values of excellence and reliability," he said. "When visitors from all over the world see the OSPAS OCC, they are impressed with both the technology, and the sense of pride and purpose they see in the people who control the flow of hydrocarbons along this giant system of pipelines and production and shipping facilities."

"Today, due to our efforts to implement tomorrow's technology in the workplace, the OCC's operations are more impressive than ever," Jum'ah added, addressing those attending the inauguration. "This is a significant step

in our corporation's continuous efforts to be best-in-class and to provide an unmatched level of reliability to our customers in the Kingdom and overseas."

The video wall is the largest in the hydrocarbon and power industry. "The map-board information is displayed in a global format, which is easy to view at all times, and this allows us to quickly detect problems before they reach a critical condition," said PMT Senior Project Engineer Saleh Al-Saikhan. "It also helps us find vital information very quickly during field emergency situations."

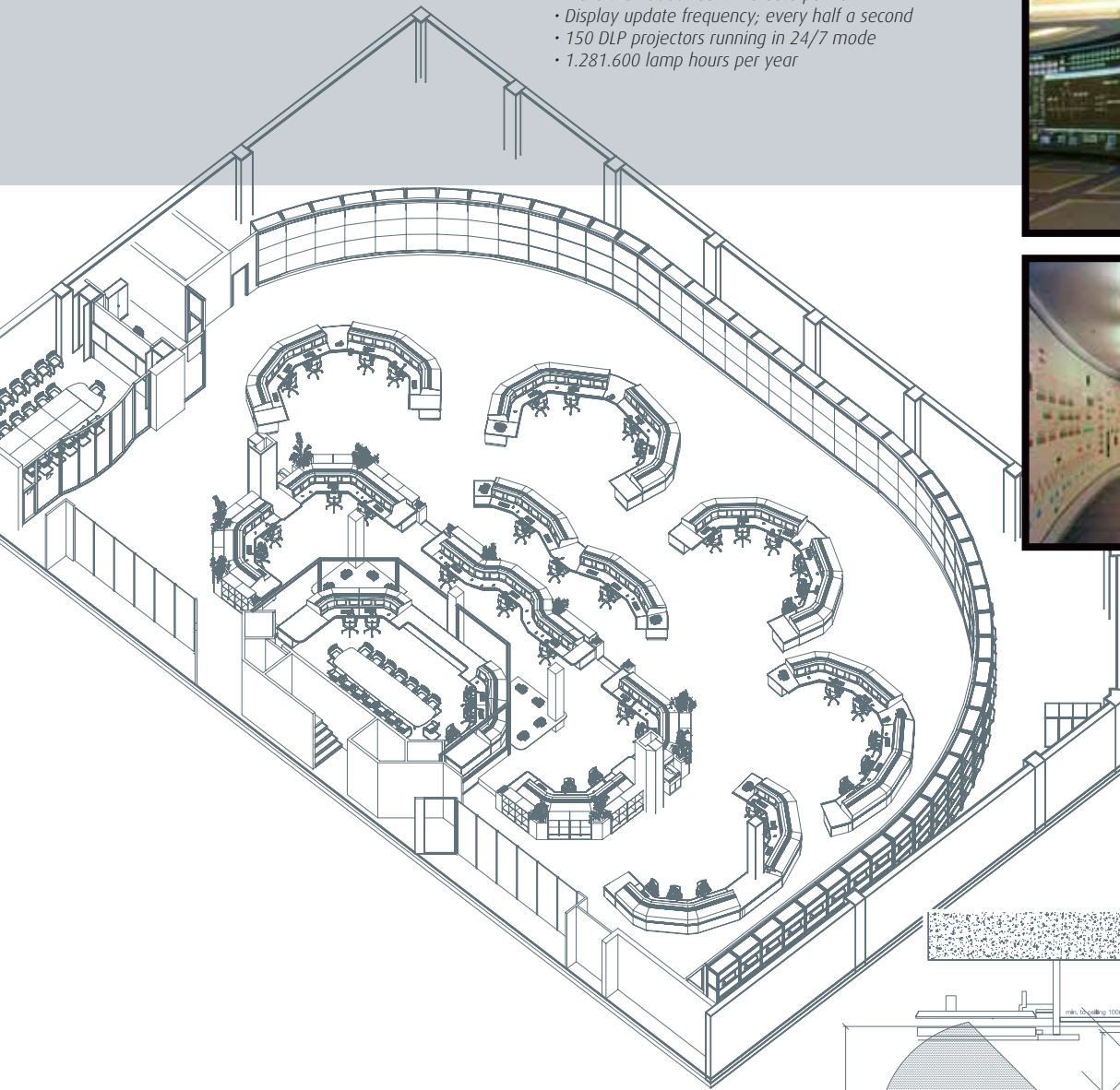
The displayed image on the video wall is the controlling computer screen display. Operators can switch between multiple displays, where each display provides additional useful information. The video wall can also display information from several systems, such as an e-map, drawing management systems, real-time control systems, and live video from sources such as plant surveillance cameras.

Very clear symbols and colors show the relationship between the refining, shipping, and oil and gas operations. The graphics can also drill down to increase the level of detail needed by the planners.

This flexibility allows the control center to closely monitor every activity along the control chain of Saudi Aramco's hydrocarbons. There are thousands of remote terminals that monitor hydrocarbon activity and relay data to the OCC. In addition, OCC staff members are in constant contact with employees at plants, refineries, gas-oil separation plants (GOSP's) terminals and elsewhere.

Barco, together with their local partner Samir Photographic Products in Jeddah, were chosen for the implementation of the new visualization tool. The reason for the choice was Barco's vast experience in visualization technology and the proven track record with large size projects combined with Samir Photographic's local strong presence in the Kingdom.

- 210 square meters (2260 square foot) of rear-projection
- 196.608.000 discrete full color pixels
- More than 3000 real-time data points
- Display update frequency; every half a second
- 150 DLP projectors running in 24/7 mode
- 1.281.600 lamp hours per year

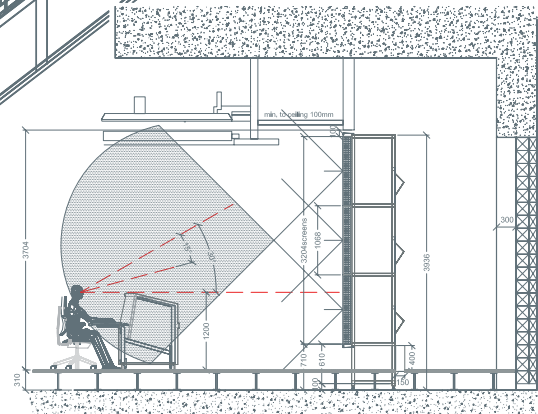


The previous display system composed of tiled map-boards with LED readouts

The challenges

Aramco was looking for a visualization partner who would help them to lift up their visualization tool without touching their existing automation software, and then possibly integrating other tools to improve the situational awareness of the different operators in the room. The challenge was three fold. It was about the physical aspects of having a seamless display wall from floor to ceiling and wall to wall in a curved setting, covering more than 210 square meters that needs to run for 24 hours, 7 days a week in the most reliable way. Secondly, this wall contains more than 196.5 million of discrete pixels that need to be driven in a controlled and correct way. The third challenge was the content on the wall itself.

It needed to visualize hundreds of data points real-time in a single process view aggregating different legacy systems covering hundreds of data points and visualizing them dynamically, while integrating video.





Physically fitting a 50x3 seamless **display wall** in the existing room was not easy as the room needed to remain operational. The large display wall consists of 150 OverView cDR67-DL modules with SXGA resolution, divided over 5 logical displays. From left to right they are organized as follows: the electric power distribution has a 8x3 matrix, the crude oil network a 13x3 matrix, the gas and NLG network a 13x3, the terminal planning and scheduling a 8x3 and the refined product network another 8x3.

Every logical display shows a different graphical application and is driven by a separate Barco **graphic controller**, being the TRANSFORM A with Raid 5 and OMNIBUS with each 2 Quad Video and 2 Dual RGB insertion cards.

Aramco was looking for a way to create a common and unified view of the different operations within the room in order to improve the look and the ergonomics of the visualization. Barco also took the opportunity to improve the efficiency of the real-time processing needed to run and show the applications.

Aramco facts

- Type of company: fully integrated global petroleum enterprise
- Missions: exploration & producing, refining, distribution, shipping, marketing
- No. 1 in the world in crude oil reserves, crude oil production, sustained crude oil production capacity, crude oil exports and natural gas liquids (NGL) exports
- Discoverer and producer of world's largest oil fields Ghawar Field, Eastern Province, Saudi Arabia
- Discoverer and producer of world's largest offshore oil fields Safaniya Field, Persian Gulf
- No. 4 in world gas reserves: 234.5 trillion cubic feet (tcf) as of year-end 2003
- No. 8 in worldwide refining capacity: 3.4 million bpd: owns and operates the world's second largest tanker fleet
- Number of employees: about 54,000, 85% Saudi nationals
- Headquarters: Dhahran, Saudi Arabia
- Ownership: 100% owned by Saudi Arabian Government.
- No. 1 oil company in the world for the 16th straight year, according to Petroleum Intelligence Weekly OSPAS Project

Barco created an extension to their **wall management software** known as APOLLO.

This application is generating an aggregated view designed to cover the total large display and provides the operators the overview they need with the capability to zoom into some of the details, such as valves or pumps. Barco's scoop is purely a monitoring function and uses its API together with a single graphic to visualize the status and data coming out of SCADA, DCS and historian databases.

The visualization tool created for Aramco allows customers with legacy automation systems to combine them on a large canvas rather than a standard monitor or multiple monitor windows even. The total three maps are visualizing more than 3000 data points in a real-time mode providing the operators the real status of their process.

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