

Saudi Aramco Reduces Maintenance of Turbine with Exlar's GSX60 Actuators

APPLICATION

Control of a governor valve on a turbine

CUSTOMER

Saudi Aramco, headquartered in Dhahran, Saudi Arabia, is Saudi Arabia's national oil company and a fully integrated global petroleum enterprise. Saudi Aramco manages the world's largest proven crude oil reserves and the world's fourth-largest gas reserves.

CUSTOMER CHALLENGE

Saudi Aramco had two old DeLaval compressor drive turbine hydraulic governor valve operators at their Uthmaniyah and Shedgum Gas Plants. This equipment was comprised of complex mechanical-hydraulic systems which had multiple single-point failure vulnerabilities as shown in the photo above. These failure points caused concern among Aramco engineers because these turbines feed gas to nearby cities supplying the power for air conditioning. Therefore, it is critical that these systems are always functioning properly.

A further cause for concern was the increasing actuator hysteresis seen on the hydraulic solution. Increasing hysteresis could compromise the turbine control system stability and response capability of the actuator. This actuator hysteresis required constant maintenance and trouble-shooting of the hydraulic system by Aramco engineers.

Saudi Aramco needed a replacement system that would both improve performance and reduce maintenance of the turbines. In addition Saudi Aramco needed a system that could survive in the challenging application environment: the Saudi Desert. With regular sand storms and temperatures exceeding 130°F, the Saudi Desert conditions promote sand intrusion, excessive wear of components, and shortened life.

SOLUTION

Saudi Aramco partnered with Lovejoy Controls Corporation (LCC) of Waukesha, Wisconsin to retrofit their DeLaval hydraulic governor valve operators. After reviewing several options for the retrofit, including multiple hydraulic solutions and Exlar's electromechanical solution, Saudi Aramco decided to utilize Exlar's GSX60 electric actuators. They chose an Exlar solution based on numerous successful military, nuclear power plant, and industrial retrofits performed by LCC using Exlar actuators over the past ten years.

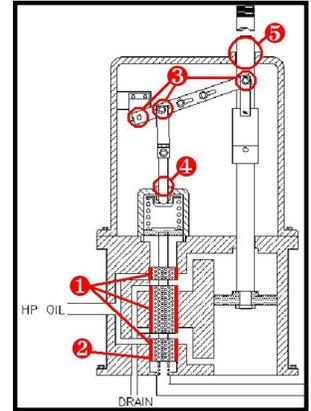


Illustration of failure points on previous hydraulic system.

Solution continued on the next page.

SOLUTION cont'd.

Exlar's GSX60 actuator eliminated the multiple single-point failure vulnerability by replacing the complex hydraulic system with the simple, compact solution shown in the photo at the right. The complete solution includes a fiberglass enclosure, a heavy duty precision trunnion bearing mount system, shock-absorbing minimum travels stops, and a thermoelectrically-cooled servo drive all designed and supplied by LCC. These components ensured the system would require minimal maintenance and trouble-shooting and that the actuator would survive in the desert conditions.



Exlar's GSX60 actuator with shock-absorbing minimum travel stops

Furthermore, Saudi Aramco no longer needed to be concerned about the hydraulic actuator's increasing hysteresis because roller screw actuators like Exlar's GSX60 have very small and very predictable hysteresis. Since the installation of the Exlar actuators, the turbine control system has been performing at a level judged far superior to the previous hydraulics. According to Saudi Aramco engineers, the new solution has been holding turbine speeds to within one RPM of setpoint.

RESULTS

- Eliminated multiple single-point failure risk
- Reduced maintenance and trouble-shooting required
- Significantly decreased hysteresis
- Turbine speeds held to within one RPM of setpoint

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