

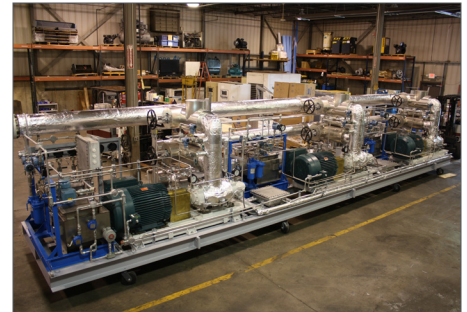
Multi-Pump Oil Pumping Station Provides Economical Solution

The Qarun Petroleum Company of Cairo had a requirement to pump crude oil from its drill site to a storage distribution network as part of its expansion of oil production in the deserts of Egypt. The plan included construction of a new onshore eight-inch by six-inch telescopic pipeline 27 miles long to transport crude oil from its Yomna Storage location to the Karama Central Processing facilities in western Egypt. Sorensen Systems designed, developed and manufactured four crude oil pumping stations needed to boost the oil through the telescopic pipelines utilizing an electric motor-driven series of three pumps per station.

Our solution was the integration of multiple pumps on a single platform. Two pumps are required to meet the boost requirement, while the third in the series serves as a back-up during routine maintenance and any unexpected downtime. The use of multiple pump/motor combinations provides an economical means of transferring the crude oil between various locations. Each pump was of a compact design allowing for reduced horse power electric motors. Mounting multiple pumps on a single platform increased the volume of oil that can be transferred. Each skid contained motorized screw pumps, lubrication systems, large diameter piping, electronic control cabinets and complete instrumentation.

To accommodate the four 1,000 gallon storage tanks, a separate 40-foot skidded pumping station was built for each tank. To meet the design specifications, we engineered a solution that would fit into a standard dry-cargo shipping container. The four 40-foot units were built in Northborough utilizing computerized design software. The multiple-pump configuration consisted of three pump/motor combinations working in parallel. Each pump draws oil from a common supply header and transfers the oil to a common discharge header. The pump/motor combinations operate as separate units; each with its own electrical controls and protective devices. Redundant pressure transmitters insure that the oil flow is continuously monitored and that the precision-ground screw pumps are protected from damage. Vibration transmitters located on each pump monitor the status of the pump end bearings.

Closed-loop lubrication pumps provide the necessary lubricating oil for the screw pump end bearings. The lubricating oil is maintained at the proper viscosity and temperature by integral heating, cooling and filtration systems. A pump system consists of a lubrication unit and its associated screw pump and motor combination. System or component failures within a lubrication pump system resulting in the complete shutdown of the



The compact design of the skid accommodated three pump/motor combinations working in parallel, each pump drawing oil from a common supply and discharge header and each pump/motor has its own electrical controls and protective devices



The electronic control enclosure, which was programmed by Sorensen Systems engineers, is equipped with a stack-light assembly consisting of green, amber and red indicator lights, with each light indicative of the overall status of the three pump stations.

lubrication system will automatically initiate an associated Main Pump shutdown. Gate and ball valves monitored by switches are used to isolate each pump unit from the rest of the system. Any combination of pumps may be on or off line without impeding oil flow from other pumps.

