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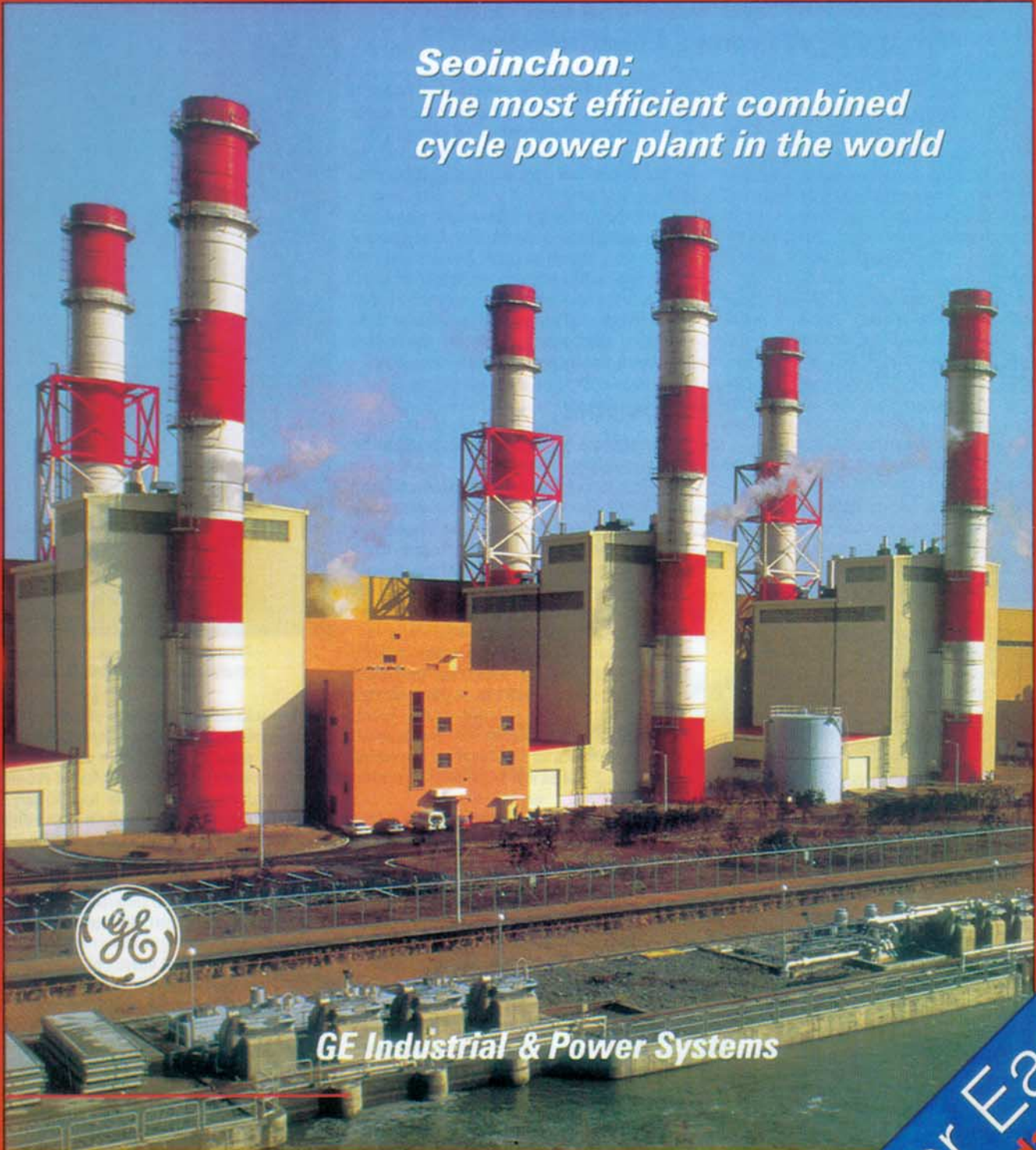
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Seoinchon:
*The most efficient combined
cycle power plant in the world*



GE Industrial & Power Systems

**Far East
Update**

More flow less noise

Fossil fired power stations experience many technical problems linked to wear and noise. Not least are those associated with feed water and fuel valves. From Caracas comes a neat solution.

Generating 1600MW of power on a daily basis, La Electricidad de Caracas (EdC) supplies most of the power for the Venezuelan capital of Caracas. During a recent plant upgrade Chief Maintenance Manager Manuel Calvo focused on replacing both the feedwater regulation valves and the fuel-flow control valves when renovating the plant's boiler units.

The outdated valves used for feedwater recirculation were causing constant problems. "Inadequate sealing was causing seat leakage, with lost energy going to the deaerator," states Calvo. "I realized that the poor valve performance was costing money through both wasted energy and lost production and high maintenance costs."

The feedwater recirculation valves were particularly susceptible to erosion, corrosion and vibration and affecting the plant's bottom line through high labour costs. "Valve stems broke, the valve trims eroded and failed and the noise and vibration levels were unacceptably high," Calvo explained.

"To repair them, we had to cut them out of the line every year. It would take a team of four craftsmen at least one week, sometimes longer, just to do the repair work which involved welding the eroded bodies and machining new parts.

I wanted to replace these valves with some that would not need constant repair and attention, and that were quieter in operation. I also wanted to get away from using expensive, and potentially dangerous X-ray technology to check the integrity of the welds."

To achieve the required recirculating flow for the feedwater pumps, the

existing feedwater-recirculation valves needed to be replaced with a valve solution that could withstand severe pressure and temperature conditions of the boiler feedwater system, and still be reliable.

The other valve problem Calvo had was on the gas-firing system. The fuel-control valves that regulated the flow of natural gas to the boiler burners were also in need of renovation. Calvo was concerned that the existing valves would not be able to provide sufficient flow to meet his increased production targets.

Impurities

Also, impurities, such as heavy oil in the natural gas line, tended to stick to the valve trim, increasing the possibility of reduced flow. It was felt that these fuel flow-control valves needed to be re-designed in such a way that they would be able to provide a greater flow of gas to the boilers.

Which is why Calvo went searching for improved valve technology to meet the increasing demands at the plant.

"I was looking for valves with a record and reputation for reliability and ones that would perform at their design values over the life of the plant. They would need to be dependable and stable when operating at any load," Calvo explained.

It was at this point that Ron Adams from (CCI) who was conducting an aftermarket service call at the station, got into the discussion.

The existing fuel-flow control valves in the boilers that Calvo wanted to upgrade were CCI DRAG valves. "These valves had been purchased in 1976, and employed an original disk-stack design that was effective for the flow conditions originally

specified, but in need of an upgrade if they were to meet current operating demands," said Adams.

"We discussed how the technology had improved since EdC had first purchased the valves and the advances made in the disk-stack design over the past few years, such as varied passage size and disk-stack characterization, and how these could help Calvo achieve what he wanted with the valves."

"First, the original valve could be upgraded with a new disk-stack employing larger passages. This would provide greater natural gas flow through the valve, minimizing the tendency for the oil in the line to adhere to the passages. Secondly, the disks could be designed with more passages to increase the flow through the trim to meet the higher load requirements.

"Finally, by looking at the desired flow rate, and calculating the size of the disk passage, the number of passages, and the number of stages needed, these increases to the flow rate could be accomplished while keeping velocity well within safe levels," said Adams.

Since the fuel-flow control valves were upgraded they have met the Maintenance Manager's requirements. "Our operations crew is happy with the results. The flow-control meters are registering the required capacity," said Calvo.

"They indicate that there is no leakage when the valve is closed, and show the flow is being regulated properly when the valve is operating. There is also no noise, vibration or surge."

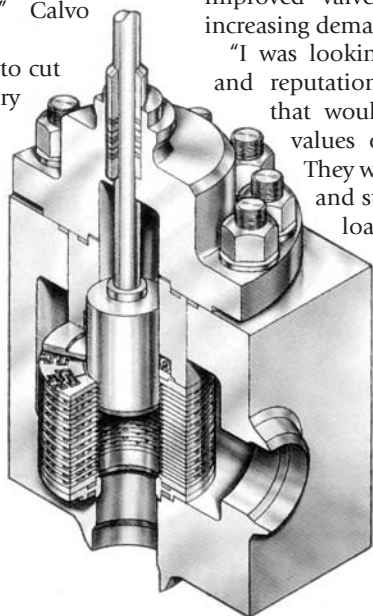
At the same time Calvo was researching solutions to the feedwater-recirculation valve problems. The old valves were designed with a single-stage, pressure-reduction system, and were not capable of withstanding the excessive velocities and cavitation of the condensating steam. "It was apparent that these valves were being used in a severe-service application that they were not designed for. I asked my colleagues in the industry about the types of valves they were using, to see if they were having any better results. They seemed to be experiencing the same problems as I was; excessive noise, vibration, erosion due to cavitation; and excessive leakage" Calvo said.

"We chose to go with the CCI valves in this particular application, because of the company's severe-service reputation and our familiarity with their valve technology. I had researched other valve manufacturer's systems but my findings indicated that these other valves did not fully address the specific things I was looking for," said Calvo.

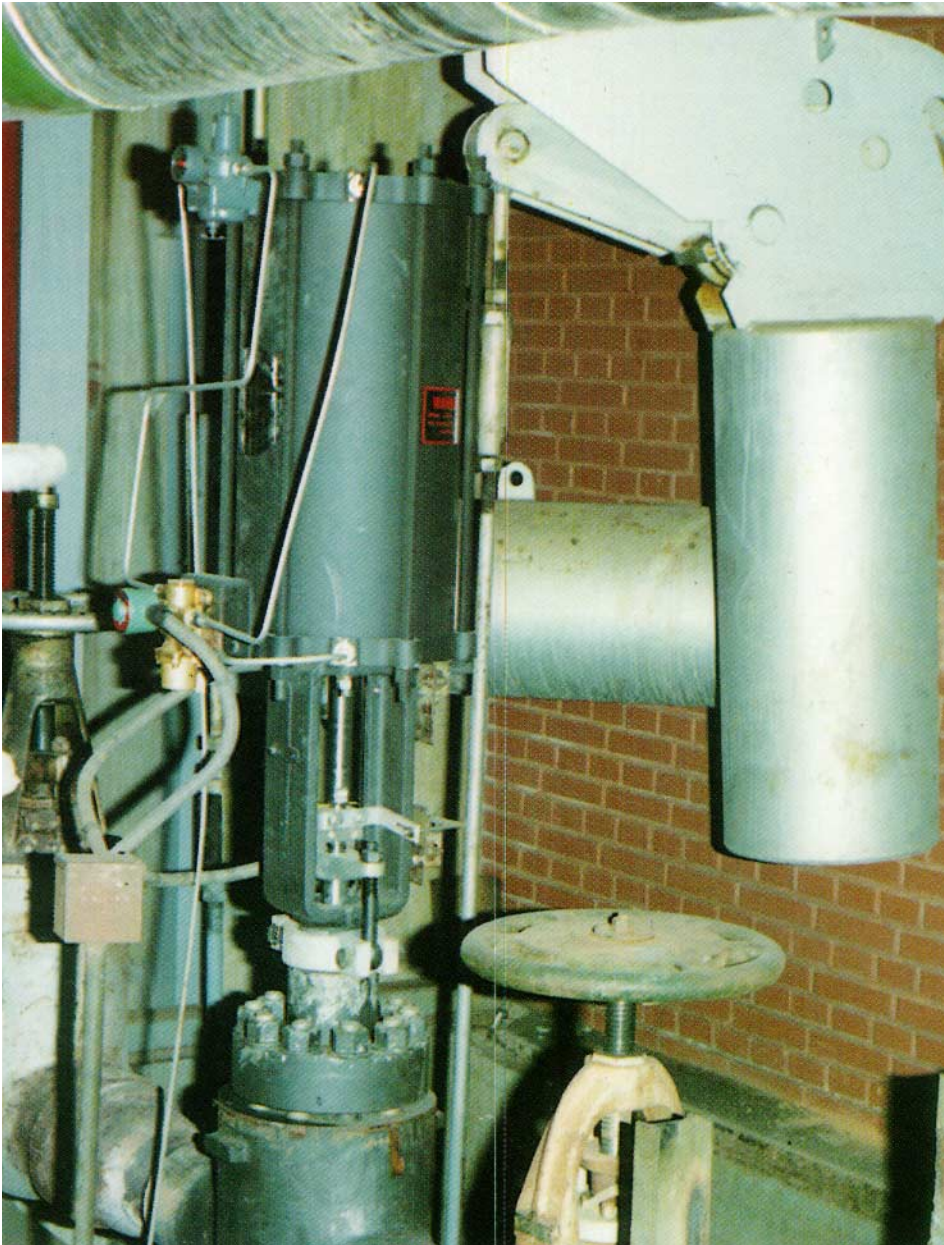
New values

With the plant's first 430MW boiler unit now operating since November 1992, the results of the new valves can be assessed.

"We have no leak-through and therefore we have had a significant energy saving" stated



Under-the plug design for boiler feedwater valves cuts noise and wear.



The original valves at La Electricidad de Caracas needed constant repair and attention from the maintenance staff, increasing both the equipment and labour costs of the power station.

plant operator Gustavo Arrieta. "Normally, if the feedwater valves do not shut off tightly you can hear a swishing inside the piping, that noise means that we were losing energy to the de-aerator. As a result of the tight shut off the new valves and pipes are very quiet."

"We can also tell that cavitation is not occurring since there is no vibration coming from the valves or the pipes," Arrieta continued. "The environment around the system is better for the workers, and we do not need to invest in any noise-control systems, such as acoustic baffling."

Valves play an important part in any power plant's performance. Their reliability must be as high as possible and remain within design specifications over the lifetime of the plant. Their operating stability at all loads must be dependable.

"Poor valve performance is costing the plant money"

The result of employing the new valves with their advanced-trim technology greatly assisted EdC improving its plant performance, increased load capacity in the capacity in the units has been achieved, and the plant is now able to meet the higher energy demands of the growing capital of Venezuela and the surrounding areas.

This article was contributed by Ron Adams of Control Components Inc., Rancho Santa Margarita, CA 92688

Fossil firing round-up

Red Shift

Energy prices in Russia rose on average by 9.6 percent in April this year with electricity prices rising most sharply by 14.4 percent. Oil, coal and natural gas prices went up 9.2 percent.

Russian power stations are ill equipped to face next winter according to the National Power Grid Company (Yeess Rossii) fuel reserves have never been so low as they are now.

Coal reserves at Russian power stations are 42 percent lower than in 1993 and fuel oil reserves are 10 percent lower. Yeess Rossii complains that the full seriousness of the situation is not understood by central and regional authorities. The fall in deliveries of coal is due to the insolvency of the power industry and their consumers growing debt.

Power stations also owe around US\$590 million to their gas suppliers who are pressing for payment.

Roast chicken

A power station fuelled by chicken droppings is now up and running in England. The Fibropower Plant, located near to the Suffolk town of Eye, is in the heart of prime agricultural land. Each year 125,000 tonnes of poultry litter, comprising droppings, straw and wood shavings, will be collected from local farms and burnt to produce sufficient electricity to supply 12,500 homes.

The litter is easy to burn and gives off 70 percent less harmful emissions than conventional fossil fuels. It burns to a nitrogen-free ash used for fertilizer. The process also solves the farmers' problem of disposing of the waste.

Architects Lifschutz Davidson designed the plant to blend in with the rural location. It is a low key structure with a 60 metre radius curved roof.

Export

The US Department of Energy (DOE) is mandated as part of its US\$2.7 billion clean-coal technology programme to find overseas markets for the techniques it develops.

The DOE is looking for government funding to build a demonstration gasification plant (IGCC) in China. Jack Siegel, spokesman for fossil energy said, "The Chinese are building power stations, are concerned about the environment and 75 percent of their generation is from coal. The IGCC process is clean and efficient - it is no wonder they like it."