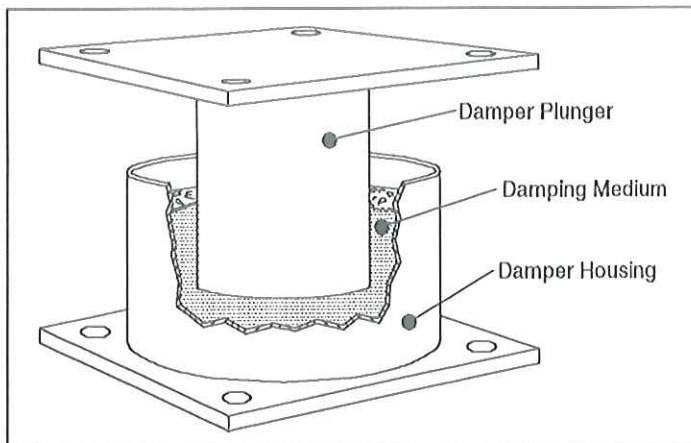
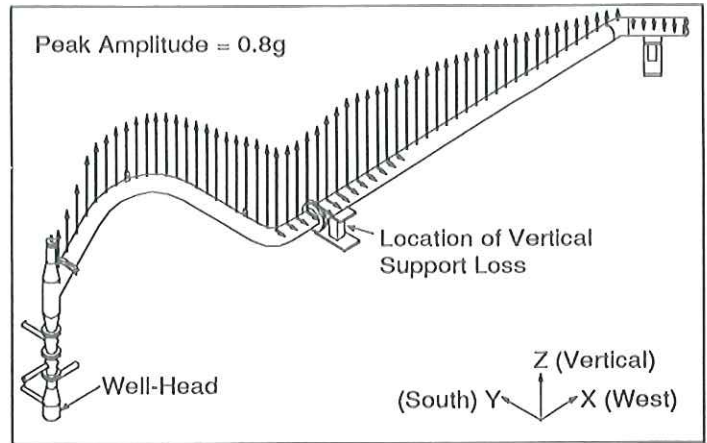


ANCONEWS

ENERGY, SYSTEMS, & STRUCTURES



Sectional View of Viscodamper



COSO 2.9 Hz Premodified Mode Shape

VISCODAMPERS REDUCE THE RISK OF PIPING FATIGUE FAILURE

VIBRATION CONCERNS AT GEOTHERMAL POWER PLANT

A well-head at the California Energy Company's COSO Geothermal Project was experiencing significant vertical thermal growth, sufficient to cause the lift-off of attached 24-inch diameter piping from vertical supports. Loss of this support on lines carrying multiphase flow caused high vibration, and led to concerns for the early fatigue failure of the piping and connections.

ANCO was asked by Mission Power Engineering, the plant A&E, to obtain quantitative measurements and suggest remedial action. Accelerations and displacements on the piping system were found to be as large as 0.8 g's and 0.9 inches, as shown in the accompanying figure. This information, the measured mode shapes, plus engineering calculations indicated that fatigue failure of the piping could occur within a few months to a few years. Hence, ANCO and Mission Power designed and installed a restraint system using a single GERB Viscodamper and constant force spring hanger. This retrofit reduced the pipe vibration to acceptable levels and extended the calculated fatigue life of the piping to the life of the plant. Subsequently, Mission Power ordered 25 additional GERB units for installation on other lines throughout the COSO field.

TRIAxIAL PIPING DAMPER

Viscodampers, manufactured by the GERB company of Germany, are made up of four elements: (1) a vertically mounted container, fixed either to the structure or piping; (2) a plunger which fits into the housing, which is immersed in a viscoelastic medium and is fixed either to the piping or the structure; (3) the viscoelastic medium which partially fills the container and surrounds the plunger; and (4) a flexible, protective boot to keep foreign material from entering the viscoelastic medium.

Depending upon operating temperature and expected temperature range, viscodampers can be provided with either of two viscoelastic damping media. For limited temperature ranges, a bituminous, tar-like medium is used; if wide temperature fluctuations are anticipated, a synthetic, silicone medium is used. Viscodampers conform to the ASME piping code by reference to MSS (SP-58) Type 47, "Restraint Control Devices."

Viscodampers transmit no static load. They are used to triaxially restrain vibration in the frequency range of 1-30 Hz or more. For slow thermal expansion, there is little resistance to movement in any direction. At higher frequencies, the forces generated are proportional to velocity. The damping resistance is approximately constant in the 5-25 Hz range.

EXTENSIVE PRIOR USE

"Over 5,000 viscodampers have been successfully used for vibration control in a variety of utility and non-utility piping installations over the last fifty years throughout the world," explained Mr. Steve Keowen of ANCO. "In the United States there are currently over a thousand damper-years of experience, without failure or loss of function. In many cases, viscodampers have replaced multiple hydraulic and mechanical snubbers. ANCO has used GERB viscodampers to reduce vibration at several plants, including the 25 units at the COSO Geothermal Project, 20 units on 4-inch to 18-inch reheater lines at the Shearon Harris Plant for Carolina Power and Light, 10 units on piping at the Comanche Peak Plant, for TU Electric, and 32 units on air handler systems in Montana Power's Coal Strip electric power plant. Viscodampers offer an excellent and reliable backfit solution to flow, water hammer, and seismic vibration problems. They can also slash restraint costs if considered at the piping design stage."

Viscodampers, in conjunction with helical springs, have also been used to provide full base isolation of turbine pedestals, full-sized buildings, and other industrial structures.

For more information, contact
R. Steve Keowen, Los Angeles

ANCO to "Reduce The Use" for Consumers Power Company

ONE IN A HUNDRED

ANCO was recently chosen to provide commercial and industrial sector Demand Side Management (DSM) implementation services for Consumers Power Company of Jackson, Michigan. Director of Customer Program Services, Mr. Carl Gilzow, explained the selection process, "We requested qualification statements from 100 companies, then solicited proposals from a subset of 14 contenders, from which ANCO was selected as the Implementation Contractor for two of our nonresidential DSM programs. The two programs — **nonresidential direct and custom rebates** — utilize about two-thirds of Consumers Power's DSM budget and are expected to yield close to three-fourths of our energy savings."

Asked why Consumers Power opted to use an Implementation Contractor for its DSM program, Mr. Gilzow responded, "We didn't have the resources in-house and needed someone with strong prior DSM experience. Our joint briefings to customer groups and trade allies have been well received. Consumers Power is meeting one of its major objectives, which is to establish closer relationships with these groups. Based on initial response, our expectations for energy reductions from the ANCO-delivered programs are very high; ANCO has excellent personnel and well conceived plans."

INCENTIVES & PENALTIES

With a budget of \$35 million, ANCO is providing an initial 18-month DSM effort with goals to reduce electricity use by 170 GWh. Dr. George E. Howard, ANCO Chairman, described the challenge, "We have launched a 90-person-year effort and relocated key staff

to assure that program goals are met. There are monetary incentives for meeting these goals and penalties if the goals are not met, imposed by the Public Utilities Commission on Consumers Power, with ANCO sharing in the program risks and rewards. We are, in fact, committed to exceeding the program goal of 170 GWh to ensure that Consumers Power receives the full benefit of its ambitious DSM program."

With this award, ANCO is now the Implementation Contractor for three of the country's largest nonresidential DSM programs. The other two are the "**ENLIGHTENED ENERGY**" program for Consolidated Edison of New York and the "**SMART MONEY**" program for Wisconsin Electric Power Company.

DSM BENEFITS

DSM is the planning and implementation of utility activities which influence customer use of electricity to produce beneficial changes in the utility's electrical load — for example, shifts in the peak amplitude and time pattern of the utility's load, including reduction of consumption. DSM programs benefit customers by enabling the reliable supply of electrical power at the lowest practicable cost; benefit utilities by reducing risks associated with siting and building power stations that would otherwise be needed; and benefit society by decreasing environmental effects via decreased power production and resource depletion.

Incentives-induced modifications of electric power use by utility customers can be a factor of two or more less costly than the costs associated with production of the electrical power that otherwise would be required. As

shown in the figure below from Consolidated Edison of New York, DSM is projected to result in increasingly significant easing of customer annual electricity use.

TURNKEY OPERATION

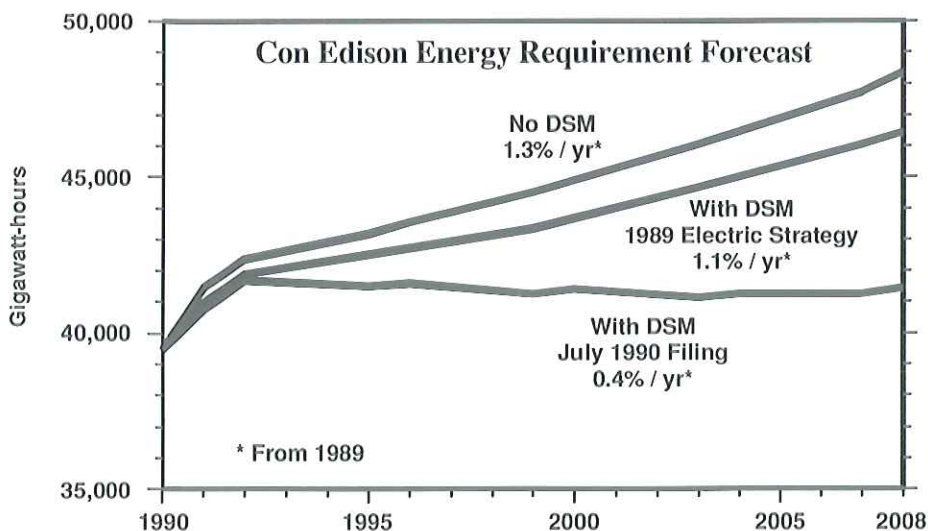
ANCO's primary mission for Consumers Power is to market the DSM program to customers and to support customer applications and engineering evaluations. Trade and professional allies such as equipment vendors, manufacturers, distributors, and architects are also being targeted.

ANCO's General Manager for the Consumers Power program, Fred Dreher, says, "It's been an exciting time. In less than three months we've moved from a three-person startup operation in a hotel room to a 60-person staff headquartered in a 6,000 sq-ft facility near Lansing, Michigan, with another 4,000 sq-ft earmarked for satellite offices in Grand Rapids and Midland."

The Consumers Power program covers direct and custom energy rebates for commercial, industrial, and agricultural customers. Direct rebate measures include installations of off-the-shelf energy improvements in lighting, heating/ventilation/air conditioning, electric motors, refrigeration, and kitchen equipment. Custom measures focus on larger tailored installations, such as thermal energy storage systems, air compressors, energy control systems, and industrial processes. "ANCO performs a total turnkey operation in Michigan," reports Dr. W. G. Bentley, Director of the Milwaukee-based ANCO Consulting Group. "In addition to extensive marketing, ANCO audits factories, office buildings, hospitals, and myriad other sites; assesses potential energy- and cost-saving applications; recommends the best product classes for each circumstance; calculates the rebates; processes and maintains all paperwork from initial applications to post-inspections of installed systems; tracks applications and related materials on a computer network; and notifies the utility electronically when to process a customer's rebate check."

Working with the slogan "**REDUCE THE USE**," Consumers Power and ANCO have embarked on a partnership which promises enduring savings in energy and lasting benefits to the customer community.

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