

# ANCO NEWS

## ENERGY, SYSTEMS, & STRUCTURES

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### STEMCO Chooses ANCO to Deliver "Torture Chamber" Seal Testing System

STEMCO of Longview Texas, a subsidiary of Coltec, is a major manufacturer of truck hub seals. These seals separate the truck axle bearing lubricating oil from harsh road conditions and contaminants. They must also accommodate manufacturing variations and vibration which cause eccentricity and relative oscillating motion between the rotating hub and stationary axle shaft. Until recently, seals were routinely replaced when the truck brakes were serviced, every 50 to 100 thousand miles. New brake designs do not require seal replacement upon brake servicing. This design change and new operating requirements, as well as demands for increased reliability, require longer lasting seals, with lives of 200 thousand miles or more. STEMCO's seal life target is 500 thousand miles.

STEMCO has contracted ANCO to provide an environmental and dynamic seal test system for evaluation of existing and improved seal

products. The test parameters that the system can apply, control, and sense include:

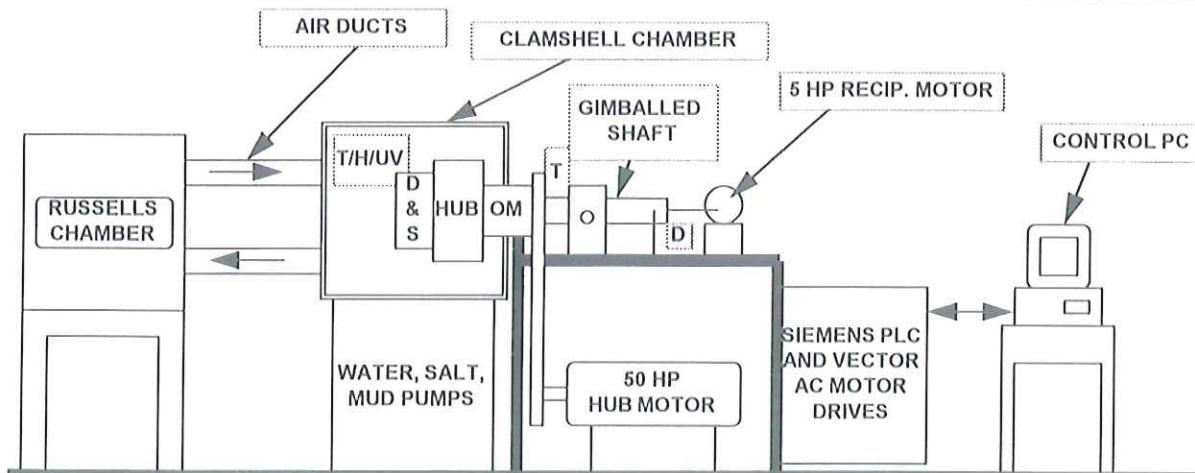
- Air temperature (-70 F to +250 F)
- Water, salt water, and mud spray
- Air blown dust and sand
- Variable hub speed (0-1200 RPM)
- Adjustable shaft to hub axial oscillation (0-0.1")
- Variable shaft to hub oscillating freq. (0-20 Hz)
- Adjustable shaft to hub eccentricity (+/- 0.04")
- Oil temperature (electric heating up to 325 F)
- Oil moisture content (100 -20,000 PPM)
- Oil leakage from seal (Ultra Violet sensor)
- Induced seal temperature
- Induced seal torque (+/- 200 ft-lbs)

The test system has interchangeable shaft and hub inserts. These allow accommodation of

almost any size seal (from 1.5 inch inside diameter to 8.0 inch outside diameter). The system is designed for hundreds of hours of unattended testing. Variable hub rotation and shaft reciprocation are provided by two Siemens AC motor Vector drives.

The test system, shown in the schematic below, is controlled and logged using a Siemens S7300 PLC, programmed and interrogated by a DELL PC using the CITEC graphics interface. The software allows operating in an automatic trip profile mode, and in an operator control mode. Extensive logging and system alarm and hold functions are provided. All data can be graphed. Burst high speed (200 samples/sec) and low speed data logging acquisition are possible.

Using the ANCO-supplied test system, STEMCO plans to document and enhance its product quality and reliability and meet ever more demanding industry requirements.



T/H/V = CHAMBER, SHAFT, OIL TEMPERATURE, OIL HEATER, & UV OIL SENSOR  
D&S = DUST AND SAND BLOWER OM = OIL MOISTURE SENSOR  
T, D = SHAFT TORQUE AND DISPLACEMENT SENSOR

## Energy Management Brings Efficiency in the Automobile Manufacturing Industry

ANCO has been conducting industrial energy audits in the Upper Midwest, including many smaller manufacturing facilities producing components for the automotive industry. Analysis of 100 smaller industrial concerns typically possessing less than 100,000 square feet of manufacturing space identified opportunities to reduce energy (electricity and gas) bills with "baskets" of measures providing aggregate simple paybacks of less than three years.

Depending upon energy use patterns, feasible energy savings of as high as 35% of annual total energy bills have been identified, with 12% annual savings being typical.

*Attractive measures and typical simple payback periods include:*

- *Conversion of electric-driven air compressor systems to natural gas engine-drive compressors, 3 to 7 years*
- *Plant heating by heat recovery from plant exhaust air or compressor discharge air, 1 to 2 years*
- *Insulation of plant exterior block walls, 2 to 3 years*
- *Conversion from electric heating to natural gas-fired heating where feasible (e.g., maintaining temperatures of injection molds, process water and district hot water heating), 2 to 3 years*
- *Replacement of failed electric motors with high efficiency units, 1 to 2 years*
- *Retrofit of plant lighting systems with high efficiency fixtures and lamps, 1.5 to 3 years.*

"Energy audits involve both engineering redesign and economic analysis and may include helping the client find project financing" indicated George E. Howard of ANCO who coordinates these studies. "Automotive component manufacturers must look to all avenues to increase their competitiveness, and energy management is one rewarding venue."

## CU Studies Nonlinear Structural Damper at ANCO

Professor Benson Shing of the University of Colorado Civil, Environmental, and Architectural Engineering Department and PhD Candidate Brian Rose (pictured at right with the damper) are using ANCO's R-5 independent triaxial shake table to investigate unique servo-electric dampers for enhancing civil structure performance in large earthquakes. These devices consist of a DC motor/generator and ball screw arranged to produce an extension/compression strut. When elongated, the motor/generator produces a current flow which is then dissipated by a nonlinear electronic circuit. This circuit is designed to adjust the damping properties of the strut.

"In a typical moment resistant steel frame building," stated Mr. Rose, "the strut can be placed in a frame that introduces interstory damping. We are hoping to demonstrate that an efficient way to control structural vibration induced by wind and earthquake loads is to exploit the maximum damping capability of the device by using the maximum permissible damping coefficient and force under all circumstances. Based on this concept, a nonlinear control strategy similar to "bang-bang" control has been developed. This strategy, when used with our device, does not require any power supply to operate."

The concept is being demonstrated on a 1/4 scale model on the ANCO independent triaxial shake table. The project is sponsored by the National Science Foundation and involves the joint effort of researchers from Civil, Electrical, and Aerospace Engineering.



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