

# LEHIGH ENERGY UPDATE



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## ENERGY LIAISON PROGRAM PROVIDES EASY ACCESS TO CENTER CAPABILITIES

Lehigh's Energy Liaison Program (ELP) was organized in the late 1970's to make it easy for the Energy Research Center to work with industry in solving energy related problems. Twenty years later, the ELP has become the "window" through which the Center's faculty and staff work with company engineers to utilize the latest in techniques and results in solving day-to-day technical problems. "Over the years, as more and more people in industry have become aware of our research and problem solving activities, our reputation has grown. We have become quite well known for the quality, timeliness, and impartiality of our work," says John Sale, Director of the Energy Liaison Program.

ELP activities include feasibility studies, equipment design modifications, third party design reviews, failure analyses, computer software development, literature searches, environmental assessments, problems dealing with economic and social issues, and special educational programs, including on-site training. These activities involve the Center's professional staff and faculty representing academic disciplines such as mechanical engineering, metallurgy, civil engineering, geology, biology, and economics.

Companies participate in the ELP under a letter of agreement that is renewable on a yearly basis. An annual participation fee covers consulting, laboratory tests,

Faculty & Staff Expertise

Laboratory Facilities



University Libraries

Educational Programs

Computer Facilities & Software

computer use, participation in educational programs, and other services.

Typically, each interaction with Lehigh through ELP utilizes from one to three man-days of faculty or staff assistance. Projects requiring more than three or four man-days are arranged on a case-by-case basis.

The ELP Director serves as the primary contact for each member company. His familiarity with the faculty and staff and with equipment resources allows him to find the right combination of experts and equipment to solve a company's problems.

According to Sale, "Some of the companies that belong to ELP participate in the program, in part, because of their needs for quick

response when an urgent plant situation arises. To these companies, the ability to have access to an expert who can provide immediate assistance, without need for a special purchase order, is the key. Other companies value the ability to draw upon an organization with a wide range of technical skills. This contact is handled through the ELP Director, who uses his knowledge of the faculty and staff skills to select the appropriate consultant or team of consultants for a particular problem. Perhaps most important, membership in ELP gives the company convenient access to the latest in new technology and ideas. ELP member companies are invited to all workshops, seminars and short courses held at the ERC. We

## PROBLEM SOLVING AT THE ENERGY RESEARCH CENTER

Listed below are examples of areas in which ERC staff provide problem-solving assistance. Typical investigations include state-of-the-art assessments, field tests, laboratory studies, theoretical analyses, and/or computer simulations.

### ! HEAT RATE IMPROVEMENT STUDIES

Analyses and field tests are performed to identify opportunities for improving unit heat rate. The results are prioritized in terms of potential heat rate savings.

### ! NO<sub>x</sub> CONTROL AND HEAT RATE IMPROVEMENT THROUGH COMBUSTION OPTIMIZATION

The Center staff performs field tests to determine the effects of boiler control settings on heat rate and emissions. The results are used to identify the combustion control settings which meet the station's NO<sub>x</sub> and heat rate goals. The results are provided to the operators in the form of a new set of control curves.

### ! DIAGNOSING THE CAUSES OF OPACITY EXCURSIONS

Center staff conduct field tests to identify the causes of opacity excursions. The test results are used to develop new operating strategies for minimizing opacity problems.

### ! SOOTBLOWING OPTIMIZATION

Field tests and analyses are performed to develop plant-specific solutions to optimized sootblowing. The results can be implemented as written instructions for the operators or can be used as input to automatic sootblowing systems.

### ! SNCR SYSTEM OPTIMIZATION

Field tests and computer analyses are performed to identify boiler control settings and SNCR reagent injection patterns which minimize reagent consumption and reduce by-product emissions.

### ! COAL PIPE BALANCING

Computer analyses are performed to determine orifice sizes needed to achieve balanced primary air (dirty air) flows in coal pipes.

### ! AIR PREHEATER PERFORMANCE IMPROVEMENTS/COLD END FOULING

Analyses are performed to diagnose reasons for heat transfer performance problems with regenerative air preheaters. Field tests and analyses are performed to determine how air preheater cold end fouling rate varies with boiler and air preheater operating conditions.

### ! CEM FLOW MEASUREMENT ACCURACY ISSUES

Field tests and analyses are performed to determine the magnitude of the CEM flow bias and identify the factors which contribute to the error. The results are used to develop the best strategy for reducing bias error. The ERC also has experience and facilities for calibrating S-type and DAT probes.

### ! COMPONENT FAILURE ANALYSES

Laboratory analyses and computer simulations are performed to determine the cause(s) of mechanical failures of power plant components. Recommendations for corrective action are provided.

### ! COMPONENT LIFE PREDICTIONS

Computer simulations are performed to determine the remaining life in components subject to high temperature creep, creep-fatigue, or low-cycle fatigue damage.

### ! EQUIPMENT DESIGN IMPROVEMENTS

Analyses are performed to develop improved designs of power plant components. Design changes often include a modified configuration, change in materials of construction and/or modified welding procedures. The design improvements are typically carried out to increase component life, reduce pressure drop, reduce emissions or improve heat rate.

find that some people attend these events because they have a specific problem to solve, while others attend just to keep up with what is going on.” •

***For more information about the problem-solving capabilities of the Center or about the Energy Liaison Program, contact:***



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## **ELP PROGRAM SCOPE**

Participation in the Energy Liaison Program covers the cost of:

- ! consultation with Lehigh faculty and professional staff
- ! use of special laboratory testing equipment
- ! assistance in developing research projects
- ! attendance at workshops and technical meetings
- ! receipt of research reports and publications

Interactions with Lehigh personal through the ELP are measured in man-days. Members are entitled to fifteen man-days of services annually. Companies typically require from one to three man-days of assistance on any particular problem, but projects requiring significantly more involvement can be arranged on a case-by-case basis.

Considerable effort is given to problem definition and thorough follow-up to assure satisfaction. A staff member from the Center works with the company's representative to provide assistance in coordinating activities and to keep the member company informed of new developments at Lehigh.