

LEHIGH ENERGY UPDATE

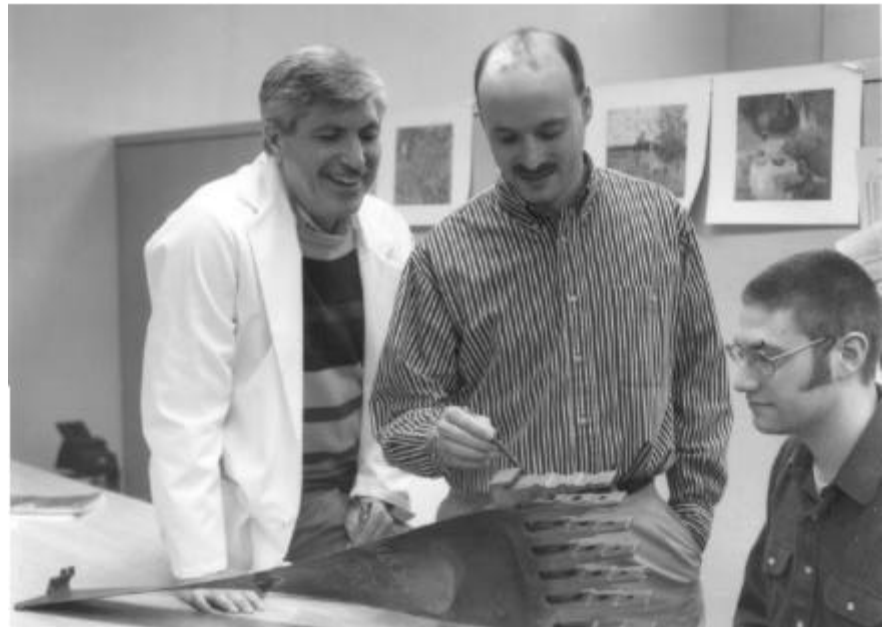


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USING THE ERC TO SOLVE POWER PLANT PROBLEMS

Steve Marbaise, an engineer at PSE&G's Hudson Station, needed help in determining boiler control settings to use at Unit 2 to achieve lower NO_x emissions. Greg Schmidt of PP&L had an upcoming maintenance outage and needed to determine what vertical sag to expect in the tube supports of an economizer during installation of the new tube bundle. Kal Merimets of Ontario Hydro was considering removal of a steam air heater at Nanticoke Station and needed to know the impact on air preheater fouling. Jim Glover of Allegheny Power was concerned about the failure of a fiberglass ladder used by his company's transmission line crews and wanted to know the causes of the failures and possible remedies. Steve Reid of CONECTIV was considering use of chicken waste as a supplementary fuel in one of his boilers and needed information on industry experience in use of similar biomass materials. Bill Bradshaw of CONECTIV had been experiencing failures of welds at the tips of his low NO_x burners. All six engineers turned to Lehigh's Energy Research Center for assistance.

According to John Sale, "The Energy Research Center has been helping industry with its problems for more than 20 years. Our people are specialists in disciplines such as mechanical engineering, chemical engineering, metallurgy, and civil engineering; and the work they perform for our industrial clients includes laboratory investigations, field studies, computer simulations,



Drs. John DuPont (middle) and Arnold Marder (left) work with graduate student Brian Newbury to analyze a failure of a turbine blade.

theoretical analyses, and state-of-the-art assessments."

"For example, the PP&L economizer tube bundle study required a finite element stress analysis, and the burner tip failure analysis for CONECTIV involved a metallurgical examination of the welds, followed by heat transfer calculations and a stress analysis. ERC personnel performed combustion optimization tests at Hudson Station to determine how NO_x , CO and opacity respond to different boiler control settings. They then used software we'd developed to determine the optimal control settings. The steam air heater study at Nanticoke involved predictions of dew point conditions within the air preheater. The fiberglass ladder failure investigation

was performed in one of Lehigh's structural testing laboratories; and the chicken waste evaluation required a literature and vendor survey using the internet and journals and reports in Lehigh's library."

Although experienced researchers are the key to the ERC's success, its success is also due in no small part to Lehigh's unique collection of research equipment that can be applied to practical problem solving. The Center maintains laboratories in several buildings on campus, with access to the latest and most sophisticated instruments and computers.

"Sometimes utilities seek assistance at Lehigh because other consultants haven't helped," Sale

says. “We have the experts and equipment to do what many others can’t.” Sale adds, “One thing in our favor is our ability to see things that others don’t because of our broad experience and research expertise. Coupling this experience and expertise with cutting edge research equipment gives the Center a broad spectrum of tools to draw on to solve our customers’ day-to-day equipment problems.”

Arnold Marder, a Professor in Materials Science and Engineering who has been closely affiliated with the Center since the mid 1980's, believes that much of the success of the Center also comes from a team approach in dealing with

problems. Marder recalls, “Just before a holiday we received a call from an ELP member company at a nearby plant which had a critical problem with a pressure vessel which was thinning to the point where it might not sustain a load. The company had to report immediately on what it intended to do about the problem to avoid complete failure. The engineer called on the ERC to find out what options there were.”

“Despite the pending holiday, three of us—a stress analyst, a welding engineer, and a corrosion specialist—dropped everything to discuss possible approaches to the problem. Among us, we were able

to identify what stresses the vessel could sustain, what welding repair could be done, and where there might be potential sources of corrosion,” Marder says. “This gave the company a total engineering approach to present as a solution.”

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