■ DIAGNOSTIC INSTRUMENTATION & ANALYSIS LABORATORY ■

Propulsion, Thermal & Metrology Center Support

CAPABILITY STATEMENT NOVEMBER 2000

The Diagnostic Instrumentation and Analysis Laboratory (DIAL) at Mississippi State University is a multidisciplinary group of scientists and engineers focused on measurement and testing. DIAL currently has programs in the energy, environmental, infrastructure and industrial sectors. Historically, most of DIAL's funding has come from the Department of Energy. However, DIAL currently has funding from over 20 organizations, representing a wide range of interests. DIAL is a participant in NASA's remote sensing program, and has strong ties to other programs which are relevant to the nation's propulsion enterprise. DIAL has some unique capabilities to offer Lockheed Martin's new effort at the Stennis Space Center.

PROPULSION PRODUCT CENTER

DIAL can support the Propulsion Product Center through innovative monitoring systems for clean room use, and through thermal imaging systems for monitoring control of thermal processes such as welding.

DIAL's cavity ringdown spectroscopy systems are beyond the current state-of-the-art in terms of sensitivity of detection of organic and inorganic material. They are very lightweight and sensitive monitors for detection of airborne contaminants in a clean room environment. The systems are very reliable, and maintenance in the field should be simple. DIAL has demonstrated the ability of these systems to detect metals in air at the microgram per cubic meter level, and even lower levels for some organics.

Imaging of high-temperature systems is one of the best means to control thermal processing equipment, such as automatic welding equipment. DIAL has used its viewing systems to assist industrial customers such as Dow Chemical and TVA in viewing high-temperature features of installed plant equipment, and maintains a very active thermal imaging program. For example, DIAL provided a viewing system to help guide plasma torch operations at Argonne National Laboratory-West. In a seven month period, DIAL built a system, prepared an operating manual, delivered the system and documentation to ANL-W, and participated in initial testing. This work was completed on time, and within the budget allotted for it.

DIAL has adapted standard spectroscopic instrumentation to measure temperatures in thermal processing environments. Using these techniques, DIAL engineers have measured the gas temperature on a real-time basis in an operating glass furnace and in other combustion environments.

INTEGRATED METROLOGY CENTER

DIAL can support the Integrated Metrology Center through the development of innovative measurement techniques for special applications.

As an example of this, DIAL has recently tested a reduced pressure air-ICP unit developed by Ames Laboratory. Using a test bed at DIAL, data from the system was compared to data taken by DIAL personnel using EPA reference methods. The DIAL personnel were able to show that the unit had met its design

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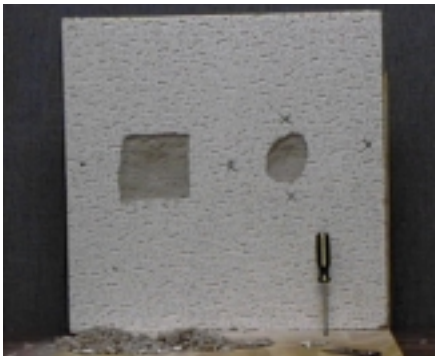
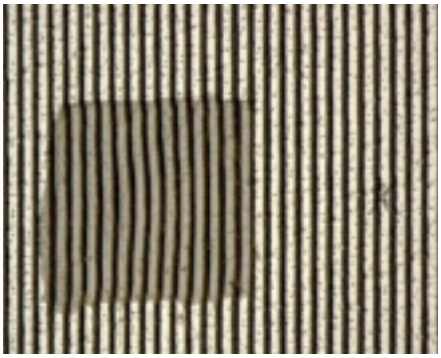
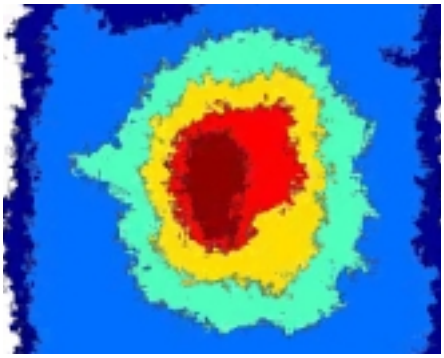


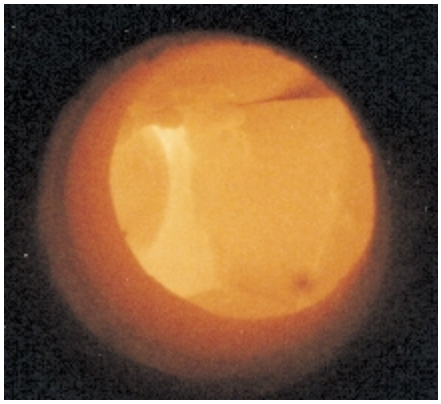


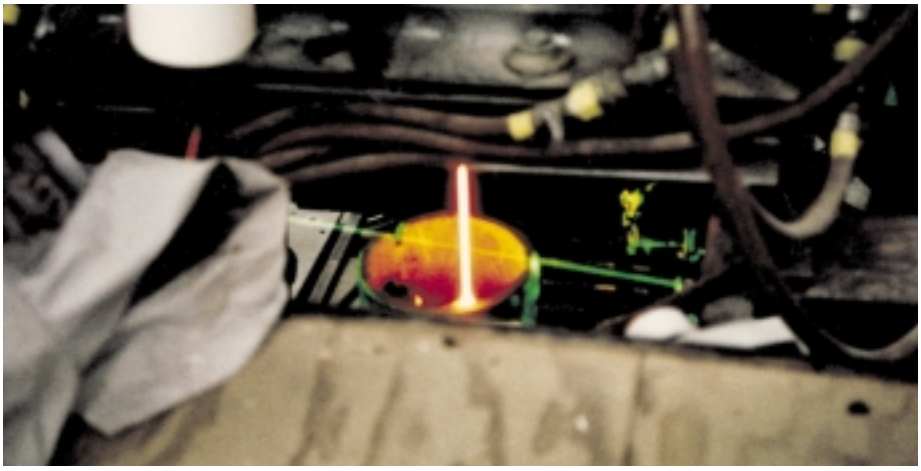


specifications, and thus were able to help the developer justify further funding.

As another example, NASA asked DIAL to determine the cause of noise in the signal from a flowmeter. DIAL engineers developed a test rig, and through rigorous experiments were able to determine the source of the noise. The DIAL team then developed a technique to ameliorate the noise, which was subsequently accepted by NASA.

DIAL has developed a sensitive technique for measuring small variations in surface topography. The technique – called Fourier transform profilometry – is capable of detecting variations of a tenth of a millimeter on the surface of large objects such as walls. The U.S. Army has recently begun using this technique to quantify in real-time the patterns arising from explosions from experimental munitions. The technique can also be an extraordinarily useful non-contact quality control tool.





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