Andrew Thien

Andy is currently pursuing his Master of Science in mechanical engineering at the University of Cincinnati, where he received his Bachelor of Science in mechanical engineering in 2003. He is completing the research for his Master's thesis through the Engineering Institute at the Los Alamos National Laboratory. He first became involved in the research as a participant in the 2004 Los Alamos Dynamics Summer School. During his undergraduate studies, he participated in the International Co-op Program at the University of Cincinnati. Through the program, Andy worked for six months at the Research and Innovation Center (FIZ) for Bavarian Motor Works (BMW, AG) in Munich, Germany. At BMW he researched automobile testing and development methods. Other work experience includes a total of twelve months as a co-op engineer at MANTA Corporation, a consulting firm located in Milford, Ohio. MANTA Corporation specializes in mechanical testing and analysis, and Andy was involved in a variety of projects for many clients, some of which included GE Aircraft Engines, General Motors, Chrysler, A.K. Steel, and International-Navistar. As a member of the 2003 Formula SAE team at U.C, Andy was heavily involved with designing and building the race car's suspension. In his free time, he enjoys backpacking, climbing, and golfing.

The topic of Andy's research is damage detection in pipeline systems. Harsh environmental and operating conditions often leave pipeline systems prone to cracks, corrosion, and other aging defects. If left undetected, these forms of damage can lead to the failure of the pipeline system, which may have catastrophic consequences. Most current forms of health monitoring for pipeline systems involve nondestructive evaluation (NDE) techniques. These techniques often require a pipeline system to be taken out of operation at regularly scheduled intervals so that a technician can perform a prescribed NDE measurement. In his research, Andy is proposing the use of Macro-fiber composite (MFC) patches for damage detection in pipeline structures. Because MFC patches are durable and relatively inexpensive, they can be permanently bonded to the surface of a pipe during installation. Therefore, measurements for damage detection can be performed at any time, even while the system is still in operation. The piezoelectric properties of MFC patches enable them to be commonly used in active-sensing techniques. Therefore, each MFC patch mounted on a structure can be implemented as both an actuator and a sensor, allowing for active sensing measurements. By installing arrays of MFC patches at various locations on a pipeline

structure, Andy is using multiple techniques for damage detection, including impedance methods and Lamb wave propagation methods. In the end, Andy's research will provide a means of detecting the location and extent of damage present in a pipeline structure. This information could then be implemented as a component of a structural health monitoring (SHM) system for pipeline structures.