

Air Force Aircraft Squadron Research Program



FUEL SYSTEMS INSPECTION AND REPAIR TECHNIQUES

Isolating and correcting the source of leaks in aircraft fuel systems results in high levels of maintenance labor expenditures. Each type of fuel system storage in an aircraft has unique and specific damage mechanisms and failure types which lead to leaks that are often hard to isolate and correct. Troubleshooting the leaks tends to require repetitive fueling and de-fueling of the aircraft, purging the tanks to “gas free” conditions and difficult repair tasks in very confining spaces. All of these attributes cause large labor expenditures and significant reductions in aircraft availability.



The external fuel tanks for H-53 helicopters are made up of composite materials with an aluminum liner on the inside wall. With time the aluminum liner corrodes making it necessary to discard the tank and replace it with a new one. The goal of the project was to build upon research performed at Texas A&M University to develop and validate a Quantitative Nondestructive Evaluation (QNDE) technique as a means of detecting corroding areas in the aluminum inner liners of external filament wound tanks more quickly, and reduce the labor hours necessary to arrest the corrosion. Our goal was to develop a comprehensive theoretical model specifically for the fuel tank/aluminum liner assembly.



The TCAT, Texas A&M Engineering, and Georgia Tech Research team utilized their extensive experience and expertise in ultrasonic NDI techniques and mechanical engineering to produce a robotic device that could be inserted into a fuel tank, then manipulated to inspect the tank inner surface. The result was a solution to a problem of immediate concern to Warfighter readiness.

TEXAS CENTER FOR APPLIED TECHNOLOGY

There are many problems that require the careful and proper integration of applied technologies to find solutions. The Texas Center for Applied Technology (TCAT) was created to focus on these specific problems and to develop effective and efficient solutions. TCAT's core competency is the innovative application of existing technologies and advanced research to solve complex real-world problems.

TCAT's primary objective is to apply and test technologies to address targeted problems and engage basic research as required. TCAT has employees in a variety of locations with the ability to perform research that cuts across multiple technologies, disciplines, and cultures. The Center's employees are knowledgeable regarding customers' requirements and are ready to respond effectively to provide the best value for the customers' needs including expertise in technology insertion, technology assessments, and test and evaluation.

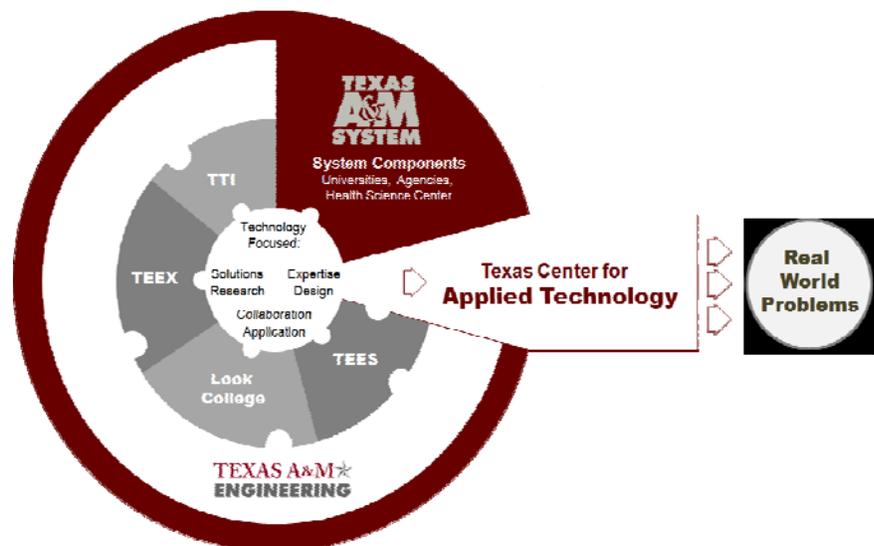
TCAT is part of the Texas A&M Engineering Experiment Station (TEES), a member of The Texas A&M University System. The A&M System is one of the largest and most comprehensive systems of higher education in the United States. Through a statewide network of eleven university campuses, seven state agencies, and a comprehensive health science center, the A&M System educates more than 120,000 students on its university campuses, conducts more than \$780 million in research, and reaches another 22 million people through service each year. TEES is an engineering research agency for the state of Texas and conducts over \$147 million in research annually. Because of the Center's position within the Texas A&M Engineering program, TCAT's expertise can easily be extended by rounding out its team with world class faculty researchers, as appropriate. TCAT is in an excellent position for collaboration not only with The Texas A&M University System components and their customers but with other universities, institutions, centers, and industry.

TCAT'S CORE COMPETENCIES

Energy Sustainability ★ Environmental Sustainability
Manufacturing & Systems Engineering ★ Information Technology ★ Modeling & Simulation
Technology Insertion ★ Test & Evaluation

TEXAS A&M ENGINEERING

Texas A&M Engineering consists of the Dwight Look College of Engineering, and three engineering agencies, including TEES: Texas A&M Transportation Institute (TTI) conducts research and professional education in all modes of transportation. The Texas A&M Engineering Extension Service (TEEX) works to develop a highly skilled and educated workforce and enhances public safety through training, continuing education, and technical assistance.



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