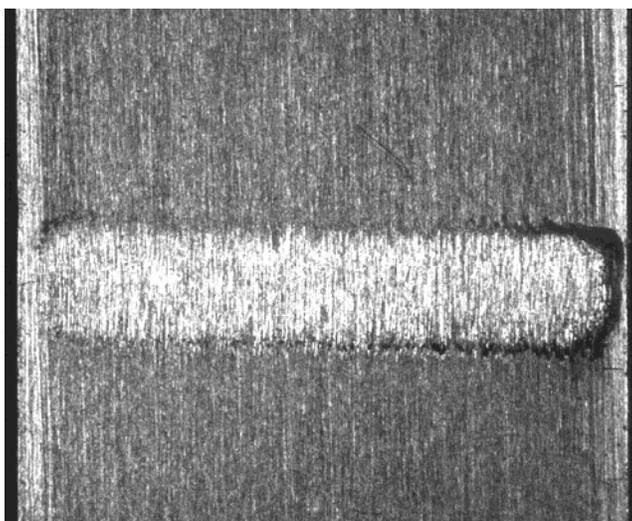


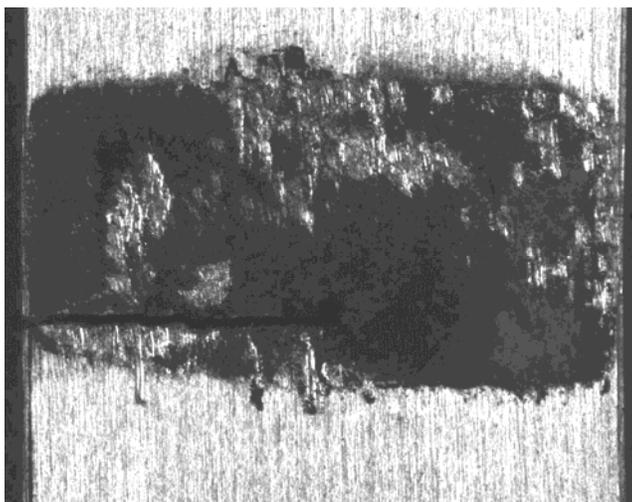
Spalling, Fretting, and Galling Characteristics



Under the direction of the Wright-Patterson AFB Aging Aircraft Squadron (AFAAS) and the Joint Council on Aging Aircraft, TCAT led the efforts of Army and NAVAIR engineers in addressing a variety of readiness and depot production issues. Metal spalling, fretting, and galling are often invoked as the reason for rejecting parts of dynamic systems during depot maintenance; yet, standards are not available for rejecting or repairing damaged components that exhibit such failure modes. This study focused on the H-47 helicopter, two-piece horizontal hinge pin (HHP) assembly, which had been identified as a high cost driver. One of the causes for early rejection of the HHP resided in spalled end sleeves, presumably due to fretting fatigue.



TCAT's charge was to identify the technical issues to be resolved, coordinate the activities of the joint services in identifying mutually acceptable technical solutions, conduct the requisite testing, and prepare a recommendation to the AFAAS for approval.



The technical expertise and analytical ability of the team's researchers enabled them to develop generic guidelines validated on the HHP assembly and applicable to a range of metallic dynamic components. The team specifically looked at the current guidelines in use by the military, including the NAVAIR O1-A-503 Technical Manual "Maintenance of Aeronautical Anti-friction Bearings for Organizational, Intermediate and Depot Maintenance Levels," developed by the Navy as a starting point for the development of go/no-go criteria based on combined testing and failure analysis. Surface damage characterization was used to correlate "true" damage (wear, fretting, cracking, galling, spalling) to "visual" damage (pits, dents, flaking) on objective grounds. Static strength testing was used to investigate the tearing resistance of the base metal. Fatigue testing was used to develop conservative no-go criteria for fretted sleeves based on the degradation of the fatigue strength limit as the key element in refining the rejection criteria currently used per the DMWR and TM used at field and depot levels, respectively.

TCAT was able to deliver to the DoD comprehensive user guides and inspection guidelines for use in the depot and at the field level.

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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.

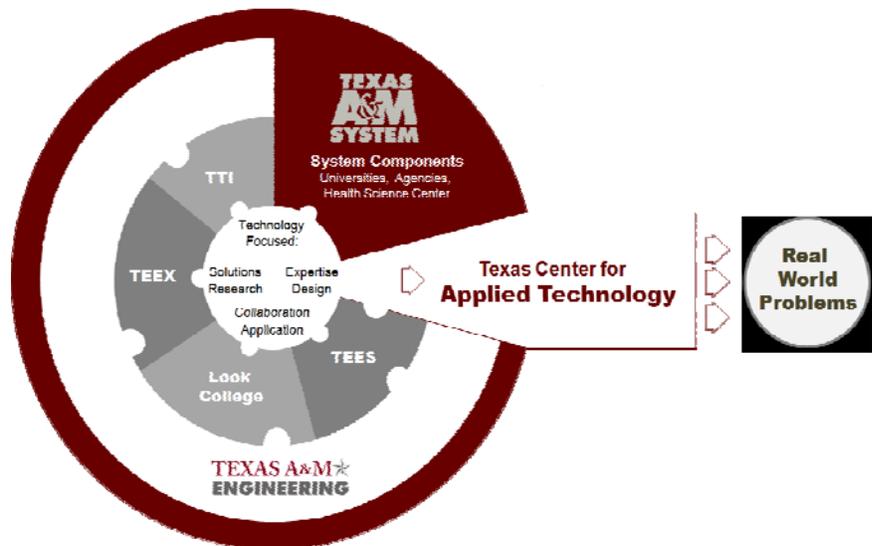
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