

Application Title: **An Unmatched Multidisciplinary Vibration Testing Facility**

Lead contact for RDF Application:

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Key Participating Units: 7 TAMU Colleges, CAMDA and TAMIDS.

RDF Amount Requested (\$): \$2.999M

Executive Summary

The goal of this proposal is to create a multidisciplinary testing facility that is used across various colleges and centers at Texas A&M. A facility that would become an international testing site serving the state, the country, and our foreign partners. We propose (our objective is) to acquire an unmatched six-degree of freedom vibration (shaker) table (Tensor 18kN by TEAM Corp) capable of emulating linear (and rotational) vibration in (and about) all 3D axes. Acquiring this shaker table will make Texas A&M the only university in the nation possessing such testing capabilities, aligning and complementing groups such as the Bush Combat Development Complex (BCDC), Center for Infrastructure Renewal (CIR), Texas A&M Institute for Data science (TAMIDS), Texas A&M Turbomachinery Laboratory, and Center for Approximation & Mathematical Data Analytics (CAMDA); making Texas A&M a destination site for extramural work.

From certifying printed-circuit-boards, to testing engine noise, to studying motion induced artifacts in electrophysiological recordings, to bone therapy, and much more; the shaker has many applications encompassing several colleges at Texas A&M. These colleges include: 1) Architecture, 2) Agriculture and Life Sciences (AgriLife), 3) Arts and Science, 4) Engineering Medicine, 5) Education and Human Development, 6) Performance, Visualization and Fine Arts and 7) Engineering. For example, in the college of Architecture, the shaker can be used for construction and design-based studies; in animal science (AgriLife), it will be used to complement current vibrations-based rehabilitation studies and equipment design; in Kinesiology it will be used to study artifacts in electrophysiological recordings. Across engineering, it has multiple applications such as electronic/mechanical certification studies, and dynamics analysis of harsh environments. The acquired rich and unique data from these examples can be used by mathematics and statistics departments for data-driven modeling, data processing techniques, and AI/ML applications.

The shaker will have direct application to the aeronautics/aerospace industries and the Department of Defense. Furthermore, the shaker will facilitate novel areas of research in therapy and biomedical applications relevant to ARPA-H and NIH initiatives and will help support our college of medicine programs with the medical center. Likewise, the Chips and Science Act will provide several challenges in R&D associated with manufacturing, certification, and supply chain management that this facility can address in an unparalleled way.

Beyond the walls of Texas A&M, the proposed facility will provide local businesses with vibration certification services not available otherwise in the heart of the Texas Triangle, allowing us to connect with the ever growing business industry in this area. This will provide income to the facility, but more importantly will provide small businesses the ability to become more competitive in SBIR, STTR, and product certification.

As an example of the need for the shaker, we point to recent visits from Kansas City National Security Campus, LANL, ARL, ERDC, Space Force, and Sandia National Lab, looking to establish a workforce pipeline. Texas A&M is primed to capitalize on industrial and government workforce needs due to A&M's sterling reputation in vibrations, acoustics, earthquake, rehabilitation therapy, construction, and data science, to name a few. Therefore, if the shaker is acquired, we can present a compelling case for securing extramural funding directed at hosting a national testing site at Texas A&M through a "federal appropriations and exceptional item" within the budget process. Texas A&M's partnership and association with the U.S. Army Future Command provides extra attraction for our partners.

The timing is also right: Penn State's recent closure of the Acoustics and Vibrations division of their Applied Research Lab provides an opening. On the other hand, the UK's recent [Lab on Verification and Validation](#) at the University of Sheffield – an endeavor costing over £6M – will become a focal point in this field: time is of the essence.