

Department of the Navy SBIR/STTR Transition Program

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NAVAIR Public Release 2021-920

Topic # N19B-T032

Strength Loss Indicator for Webbing

TDA Research, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA202
Aircrew Systems

Transition Target: PEO JSF/F-35
program

TPOC:
(760)382-7321

Other transition opportunities: Non-aircraft Naval equipment utilizing webbing; Army and Air Force aviation maintenance; Safety equipment

Notes: The image shows TDA's concept for the non-destructive determination of webbing strength utilizing magnified photos of degraded webbing. The resulting algorithm can be implemented on a cell phone, computer, or a dedicated hand held device with imaging capabilities at the point of use of the webbing. Point-of-use operation will prevent the webbing's removal from service and destructive testing, and provide cost savings over current webbing replacement schedules by providing actual strength data for determination of "use" or "replace".

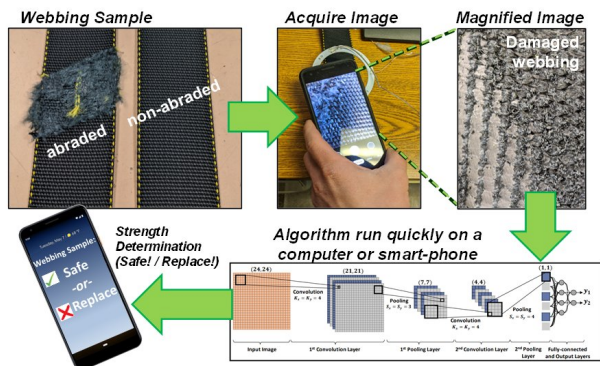


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WHAT

Operational Need and Improvement: Due to its extensive use, the strength of the webbing is a key component of equipment design, as lives may be dependent on the strength and proper performance of the webbing. However, webbing inspection methods are limited to visual inspection. This severely limits the assessment of strength, since webbing is degraded by many unseen factors such as abrasion and UV radiation. Mechanical testing is costly and requires equipment to be taken out of use, resulting in an undesirable trade-off between costly destructive testing, premature replacement, and unnecessarily putting personnel in danger. The Navy is seeking a portable, non-destructive testing capability to detect when the strength of webbing is no longer capable of withstanding the load for which it is designed.

Specifications Required: A capability is needed to detect when the load-bearing strength of webbing has decreased into an unsafe zone. The method of webbing strength assessment should be portable for analysis at the point of use, be non-destructive and compatible with common webbing types and end-items in situ (e.g., on a restraint seat harness in an aircraft). Degradation caused by UV radiation, heat, humidity, abrasion from regular use, blowing sand or dust, and exposure to salt fog, stack gas and other chemicals, should be detectable. The ability to detect a 25% decrease in strength and elongation caused by any of these factors is desired.

Technology Developed: TDA has developed a portable, non-destructive analysis method for the inspection of webbing and determination of its mechanical properties. Using images of webbing samples obtained from a smartphone camera, webbing samples that were abraded and had tensile strengths of 20-100% of the undamaged webbing, TDA developed a predictive algorithm that determines the tensile properties of damaged webbing from the image files. With this algorithm and using a metric of 25% loss in tensile strength as a "fail", we can predict "safe" or "replace" with 95% accuracy in a "blind" test of abraded webbing samples for which tensile strength was not known prior to testing.

Warfighter Value: TDA's technology can be utilized on a computer, smartphone, or a handheld device at the point of webbing use. TDA's technology will result in cost savings over current webbing replacement schedules that require the replacement of webbing that does not need to be replaced. Webbing that needs to be replaced can be easily and quickly identified, thus providing an increased level of safety for soldiers who routinely use equipment that relies on webbing's strength to function properly.

WHEN

Contract Number: N68936-21-C-0024

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Successful Phase I performance evaluation completed by Navy	N/A	Demonstration of strength evaluation methodology	3	March 2020
Improvement of technology and hand held device design completed	N/A	Increase in method accuracy and design drawings	4	May 2021
Delivery of software/held held device to Navy at end of Phase II	High	Successful deployment of software on a computer and/or dedicated device	6-7	March 2023
Begin Phase II Option optimization of technology and device	Med	Award of gated Phase II Option	6-7	June 2023

HOW

Projected Business Model: TDA plans to commercialize this system through an internal business unit. The initial market will be DoD. Once the military has adopted the product, we expect commercial sales to follow. The product to be developed consists of a stand-alone device, or an app for a smartphone that images the webbing surface. In either case, the commercial technology here is an algorithm that is built to determine webbing mechanical properties, and that algorithm can be incorporated into any portable computing platform that can be equipped with a camera. Prior to beginning sales, TDA will need to consider the final form factor, standalone device or smartphone app, for its webbing strength indicator, though it could potentially provide both, since it is relatively inexpensive to publish and market a smartphone app. For a standalone device, TDA could manage production in our current facilities using common off-the-self (OTS) parts.

Company Objectives: TDA's goal is develop an algorithm for determining webbing strength using computational devices. Our goal is to start this business by meeting the Navy's need for a webbing strength indicator. After meeting the need for this market, TDA will first grow our technology and business to meet the demands of first responders for testing their safety equipment. Finally, and with unlimited potential, we will enter the commercial textile market for quality control of webbing and additional textiles.

Potential Commercial Applications: A commercial market for this technology will immediately exist, as the textiles market has long sought a non-destructive method for inspecting worn, fielded webbing and other textiles. Another market that would benefit from this technology is the first responder/PPE industry. Webbing is commonly used in PPE and first responder equipment (e.g., a firefighters SCBA harness). Finally, this technology could easily be adapted to analysis of other textiles (e.g., truck tie-down straps) that would benefit from regular inspection and determination of their mechanical properties once fielded. Following an initial market entry focusing on webbing, TDA could develop technology to extend to other textiles and fabrics and even expand to the clothing industry, as portable, non-destructive measurement systems for determination of textile properties could be useful in many industries for both safety and quality control applications.

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