

PRESS RELEASE

Lithoz partners with MITRE on additive manufacturing of underwater acoustic transducers | Three-way partnership also includes MSI Transducers Corp.

Davide Sher, 3D Printing Media Network, June 18, 2020

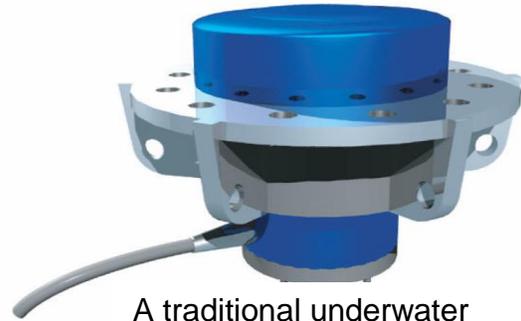
Lithoz, one of the leaders and pioneers in advanced ceramic 3D printing technology, is making its technology available to develop more advanced underwater acoustic transducers for communication systems. MITRE and **MSI Transducers Corp** are collaborating on this project that shows how ceramic 3D printing is emerging as a key option for the future of communication systems, on land, and now underwater as well.

Currently, the interest in underwater acoustic communication and monitoring is growing rapidly as more and more underwater monitoring systems are deployed around the world. Compact and autonomous underwater sensing platforms rely on acoustic transducers for transmitting and receiving signals in marine environments. These systems may be constrained to battery power and thus critically limited by less efficient or sensitive transducers. Transducers that use piezo-composites as an active layer exhibit improved efficiency and sensitivity, but have been commercially restricted by manufacturing processes that constrain possible transducer geometries to those that can be molded or cut.

Additive manufacturing can overcome the shortcomings in conventional manufacturing techniques to create novel-shaped transducers with augmented properties. Enhanced sensitivity and sidelobe reduction may be achieved through the spatial distribution of the printed material that leverages AM's ability to print voids and lattice shapes easily and iteratively without expensive tooling redesign. However, printing these shapes repeatably using a benchmark material has not yet been accomplished.

MITRE, a not-for-profit organization that works across federal, state and local governments, as well as industry and academia, did not possess the expertise and equipment to print piezoelectric material, and thus a three-way partnership was established between MITRE, **MSI Transducers Corp.** and Lithoz-America, LLC. This collaborative agreement enabled MITRE to

develop and implement a finite element transducer model to design transducer geometries for specific performance benefits. **MSI** brought to the table a wealth of knowledge on piezoelectric material processing, packaging and testing. Lithoz contributed with AM hardware and material development expertise to develop printable piezoelectric materials and geometries. Introductions to both Lithoz and **MSI** were made possible through the extensive network of Bridging Innovation partnerships that MITRE maintains.



A traditional underwater acoustic transducer

THE OUTCOME: Starting in FY19, the collaborative research team achieved success by manufacturing and testing the first AM samples, which had measured material and piezoelectric results that were the same or better than conventionally manufactured materials. This success served as a major project milestone and gave confidence that the printed material could compare well to conventional material and thus would be suitable in underwater transducers.

In FY20, the team began focusing on novel geometries that would realize performance benefits over conventional geometries. Early indications based on preliminary printed samples suggest that these structures will be printable and open the door to previously unreachable and novel performance.



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About MSI Transducers Corp.

MSI Transducers specializes in custom transducers and arrays for both commercial and defense markets. MSI's broad design and manufacturing capabilities has enabled us to build everything from state-of-the-art synthetic aperture sonars...to low cost commercial arrays. MSI is here to help you turn your idea into a design, or manufacture your build to print product, in piezocomposite, solid ceramic, or any other material to meet your performance needs.

For more information on MSI, please visit www.msitransducers.com.