

# ULTRASONIC LEADING EDGE FOR LUNAR EXCAVATION TOOLS

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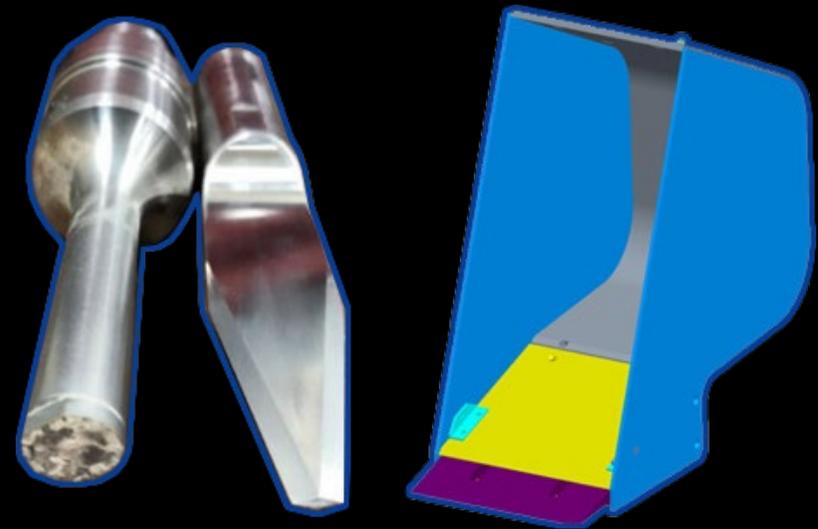
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Heavy construction and excavation machinery.

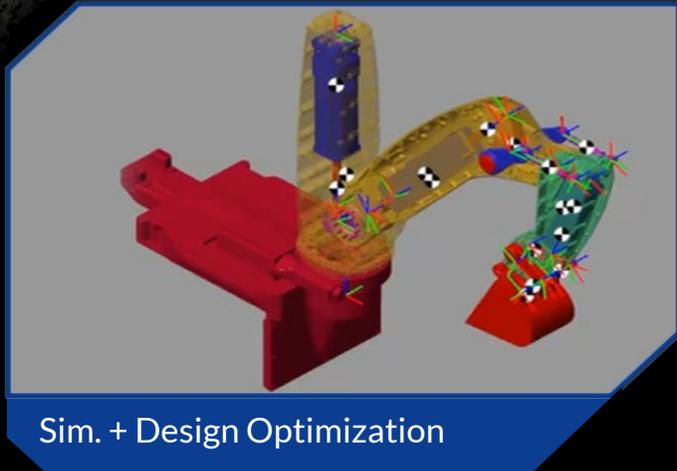
- Tools with resonantly vibrating leading edges could significantly reduce soil penetration forces.
- Such tools could decrease the power consumption and mass of lunar excavation systems.

- Regolith and granular ice excavation is critical to produce resources on the lunar surface.
- Current terrestrial excavation equipment designs are not suitable for lunar applications.



Ultrasonic forced vibration tools. L: Vibration probe. R: Bucket concept.

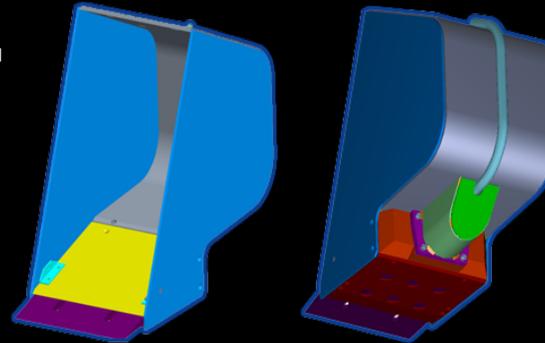
# ULTRASONIC LEADING EDGE TOOL DESIGN PIPELINE



Subscale Component Testing in Vacuum



Hardware Testing



Full Scale Component Testing in Vacuum

