Ultrasonic Drilling and Coring

Yoseph Bar-Cohen
NDEAA, JPL, 818-354-2610, yosi@jpl.nasa.gov

Participants:
JPL: Stewart Sherrit and Benjamin Dolgin
Cybersonics: Thomas Peterson and Dharmendra Pal

NASA Space Mechanisms Working Group
Video Conference, December 15, 1998
FLEXIBLE GUIDEWIRE ULTRASONIC DRILLING

- UT drilled holes
- Ultrasonic device demonstrated to drill rocks.
- Tungsten carbide flexible wire is guided in arteries to destroy blockages.
Ultrasonic Corer

General view of the corer actuator and end effector
FEM of Ultrasonic Driller/Corer
Commercialization potential

- Medical application to orthopedic operations and others

- Construction tools

- Robotic drilling and hammering

- Potential consumer product (e.g., concrete drilling tool at Homedepot).

- Effective grinder and marker, ceramic machining, etc.
Summary

• A novel drilling and coring device, driven by a combination of sonic and ultrasonic vibration, was developed.

• The device is applicable to soft and hard objects using low axial load and potentially operational under extreme conditions.

• The device has numerous potential planetary applications.

• Significant potential for commercialization in construction, demining, drilling and medical technologies.