

Exercise Equipment: Neutral Buoyancy

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HAT: 6.3.d-E TA:•Human Health, Life Support, and Habitation Systems (TA 6) TRL: start 4 / current 5

ICA PROJECT OVERVIEW

Load Bearing Equipment for Neutral Buoyancy (LBE-NB) is an exercise frame that holds two exercising subjects in position as they apply counter forces to each other for lower extremity and spine loading resistance exercises. Resistance exercise prevents bone loss on ISS, but the ISS equipment is too massive for use in exploration craft. Integrating the human into the load directing, load generating, and motion control functions of the exercise equipment generates safe exercise loads with less equipment mass and volume.

INNOVATION

LBE-NB integrates man and machine to allow exercise partners to train each other. LBE-NB uses pulleys suspended on the exercising subject to redirect loads optimally for squats, which enhances exercise effect on bone and reduces equipment size and mass. The astronauts' position prevents interference with motion as they act as both motor and controller. Human control applies safe, controlled eccentric overload for greater exercise effect. LBE-NB reduces volume required for exercise, important for exploration missions in small spacecraft. This prototype can be tested in neutral buoyancy.

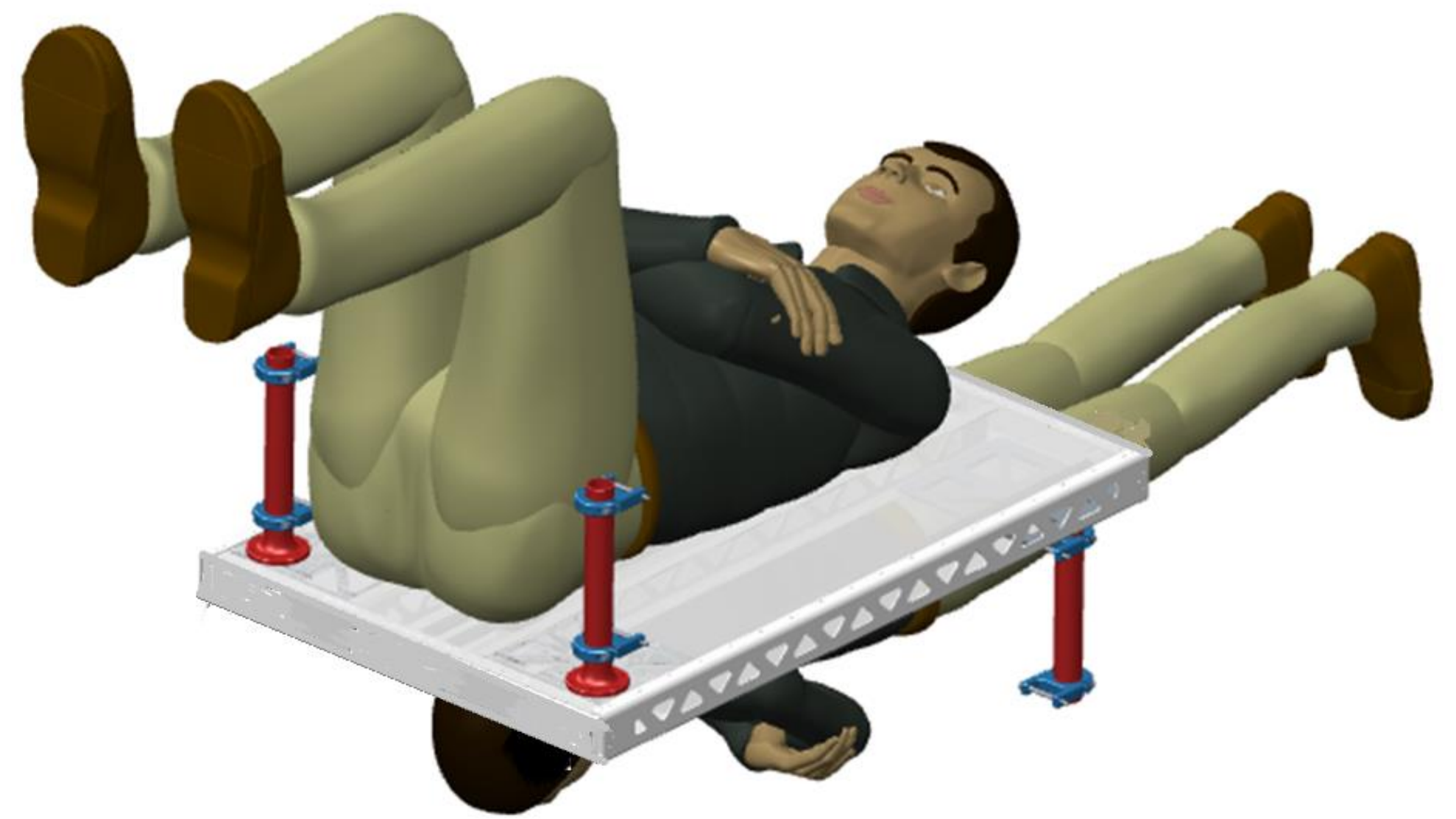
OUTCOME / RESULTS

- Components for body restraint and pulley suspension systems were tested on the horizontal LBE.
- Test article has completed design review and components have been manufactured.

INFUSION FOR SPACE / EARTH

- This technology may be used on any space mission over 30 days requiring exercise.
- Design may be modified for home exercise.

PICTURE OF ICA DEVELOPED PROTOTYPE



PARTNERSHIPS / COLLABORATIONS

This technology is a collaborative effort between Engineering and Human Health and Performance directorates at NASA JSC.

FUTURE WORK

Instrumentation for force measurement and NBL testing plans have been submitted for funding opportunities.

Based upon results and lessons learned from NBL testing, a lighter weight unit for use in space can be proposed.

