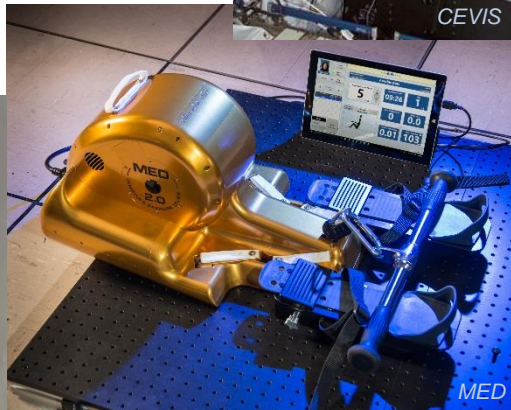
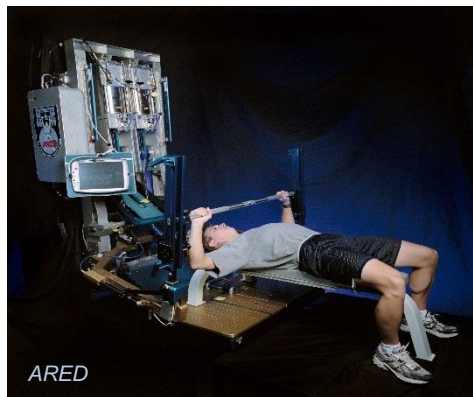


Crew Exercise

Johnson Space Center (JSC) provides research, engineering, development, integration, and testing of hardware and software technologies for exercise systems applications in support of human spaceflight. This includes sustaining the current suite of on-orbit exercise devices by reducing maintenance, addressing obsolescence, and increasing reliability through creative engineering solutions. Advanced exercise systems technology development efforts focus on the sustainment of crew's physical condition beyond Low Earth Orbit for extended mission durations with significantly reduced mass, volume, and power consumption when compared to the ISS.

Services Provided

- Systems Engineering
 - Functional Architecture Definition
 - Concept of Operations
 - Development and Management of Requirements and Interfaces
 - Design Integrations
 - Verification and Validation
 - Flight Certification
- On-Orbit Systems Management
 - Treadmill (T2)
 - Recumbent Bike (CEVIS)
 - Resistive Exercise (ARED)
 - Health Monitoring (HRM)
- Design and Testing
 - Design and development of human health interfaces
 - Reduced gravity testing in the Active Response Gravity Offload System (ARGOS)
 - Digital Astronaut (DAS) – advanced human & machine simulation to test and evaluate new exercise effectiveness during design/prototyping



Services Provided (Continued)

- Computer controlled exercise devices that can be tailored to a variety of loading profiles
- Zero gravity countermeasure systems: aerobic and resistive exercise devices.
- Flight Systems anomaly investigation, trouble shooting, and resolution.
- Integrated Exercise Software, ease of use for crew, improved data collection, and virtual training assistance.

Exercise Technology Development

JSC offers expertise in research and development, staying current on the latest technology advances to continuously evolve innovative exercise capabilities for long duration exploration-class vehicles and habitats.

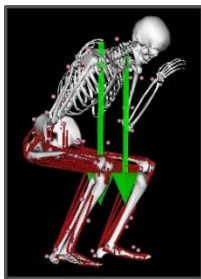
- Improves reliability and modularity to minimize sparing logistics and crew time required for maintenance
- Has intuitive operational interfaces
- Integrates multiple exercise modalities and other exercise benefits (e.g. sensorimotor, monitoring)
- Integrates other non-exercise functions where appropriate (e.g. augmentation, rehabilitation)
- Integrates (collects and adjusts) exercise prescriptions based on sensor data



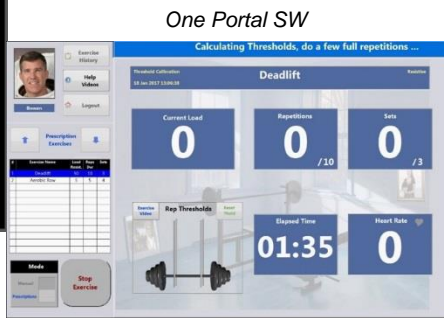
Force Shoe

New Technology Pursuits

- Miniature Exercise Device (MED) – compact motorized exercise device providing both resistive and aerobic exercise capability
- Hopper – configurable multi-exercise device providing variable eccentric and concentric loading
- Force Shoes – advanced exercise load measuring concept
- Portable Knee Dynamometer



DAS



One Portal SW



Hopper



ARGOS Testing

Next Generation Crew Exercise Software

JSC offers expertise in the development of the next generation of crew exercise (One Portal) software; a comprehensive system that incorporates Bluetooth technology, sensors, and biometric data with an easy to use app like interface. This system reduces crew training, provides an integrated dashboard, a virtual training assistant, and integrates new instructional, motivational, and socialization techniques (including the incorporation of virtual reality environments) into a crew's health and conditioning program.

We have developed customer-friendly agreements to streamline business relationships and are eager to share our unique facilities and expertise with new customers. We invite your inquiries regarding application or adaptation of our capabilities to satisfy your special requirements. Briefings on general or specific subjects of mutual interest can be arranged at JSC or at your business site.



For the benefit of all

For more information:
<http://jsceng.nasa.gov>

Point of contact:
 Associate Director
 JSC Engineering Directorate
 281.484.8991
jsc-ea-partnerships@mail.nasa.gov