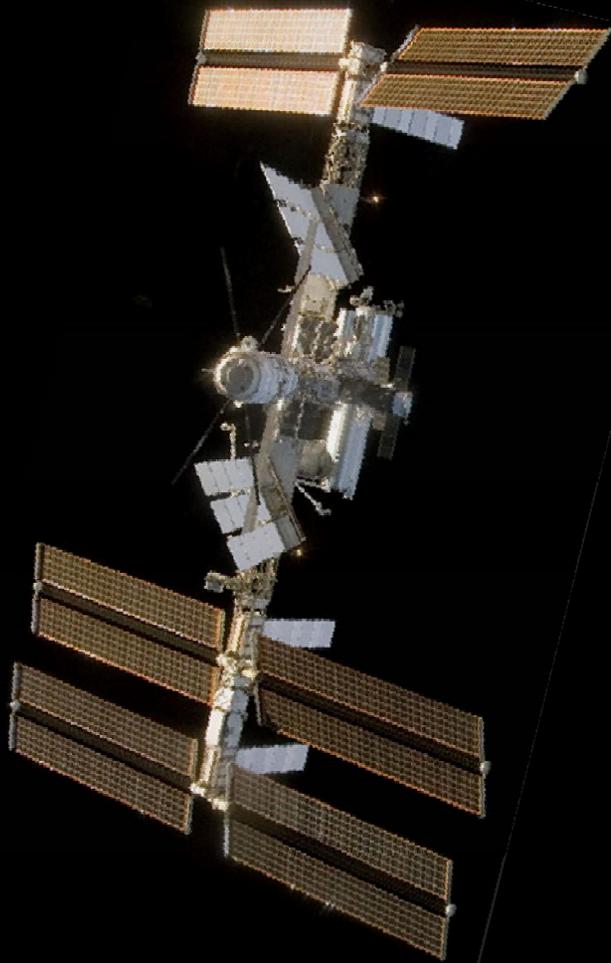




# An experienced company

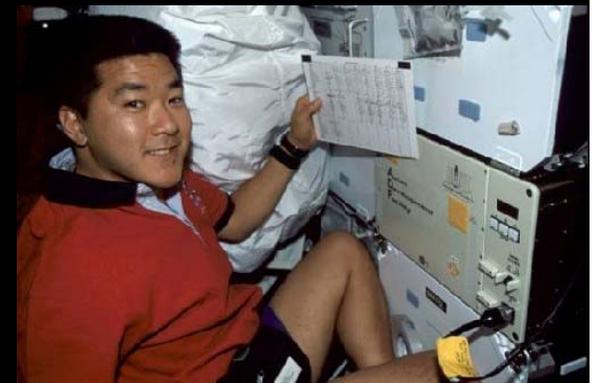


- Founded in 1988
- Expert **designers, builders and integrators** of life science research equipment for space flight
- Seven shuttle missions, three sub-orbital launches and several sorties of parabolic-flight aircraft
- Mechanical, electrical, software, chemical engineers and technicians on staff
- Scientific staff led by Paul W. Todd, Ph.D., biophysicist and past president of the American Society for Gravitational and Space Biology



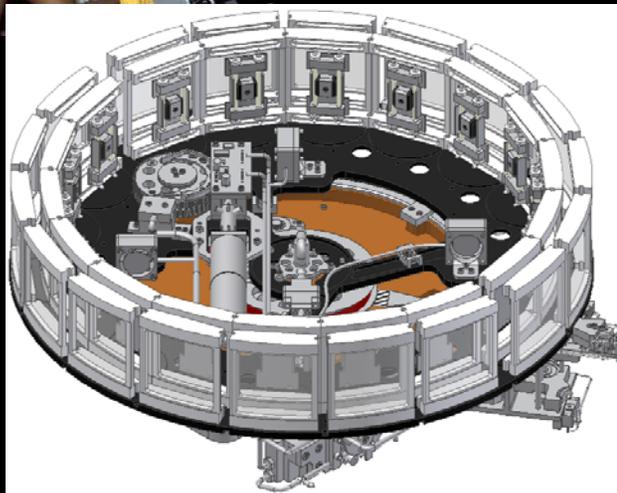
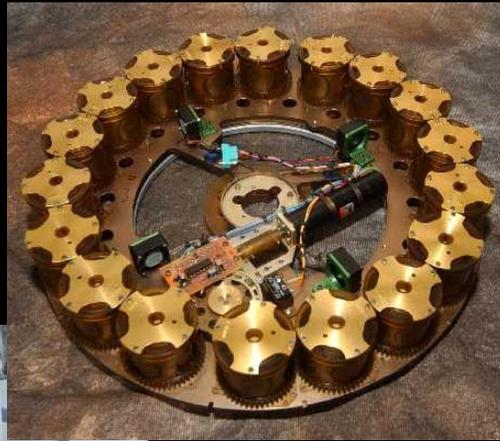


# Flight-proven hardware





# Flight-proven hardware



## ADF

### Includes 2 internal centrifuges!

- Accommodates a broad range of specimens of interest to diverse fields of study.
- Fully programmable, closed environment system, including monitored and controlled temperature, relative humidity, acceleration, O<sub>2</sub> level and CO<sub>2</sub> level.
- Full telemetry capability to downlink data and uplink commands for real time telepresence and telerobotic experiment manipulation (flight crew interaction not essential for operations).
- Two **identical carousels rotate independently** and are served by a chemical robot that injects solutions into one sample at a time on a predetermined program or by remote control. Each sample holder rotates.
- Various levels of artificial gravity by programming either/both carousel(s) to rotate.

# Flight-proven hardware

## ADSEP

### Mini-laboratory Cassettes



- Fully automated, multi-use single locker processing facility for interface with middeck, SPACEHAB, or International Space Station EXPRESS racks.

- ADSEP contains three independent thermal zones, each accommodating one cassette, and an internal computer that controls the internal functions of all three cassettes.

- Modular, on-board microprocessors and motor driver cards accommodate a variety of biotechnology and life science experiments.

- Several applications:

#### **Cell Dynamics**

1. Cell Culturing (CellCult)
2. Dynamic Culturing (DynaCult)

#### **Pharmaceutical Development**

3. Microencapsulation
4. Protein Crystal Growth

#### **Separations**

5. Biphasic Separation (BISEP)
6. Electrophoretic Separation (ELECSEP)

#### **Fluid Processing**

7. C-elegans studies
8. Bacteria studies



# Flight-proven hardware

## CELLCULT

### Rotating Bioreactor



- Flight proven: flown on STS-95
- Rotating bioreactor
- Feed bag & pump
- Collects up to 6 samples: cells or medium
- Adds fixative at any time point
- Perfusion, batch feed, aeration modes
- Double containment
- Operated in ADSEP Processing Facility

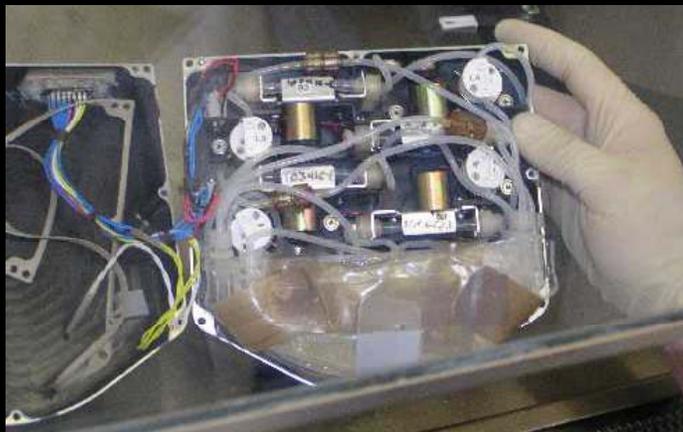


# Flight-qualified hardware



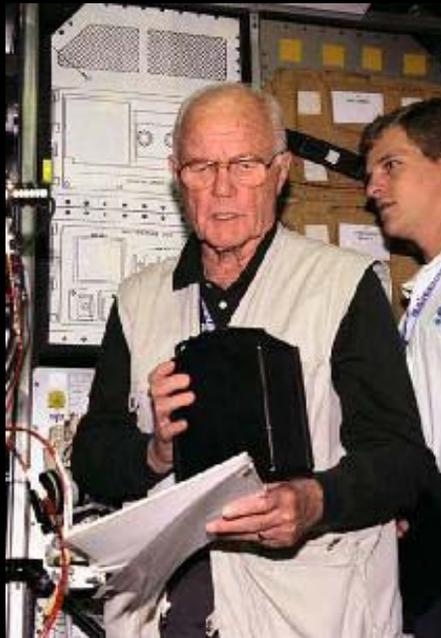
## Fluid Processing Cassette Processed in ADSEP or Generic Thermal Carriers

- Reconfigurable bags, pumps, valves
- Feed, treat and fix organisms in liquid suspensions
- Triple containment
- Processed in ADSEP or generic thermal carrier
- Bacteria for gene expression experiments
- *C. elegans*
- Other uses





# Flight Integration Services



## Complete Mission Support Payload Development through Payload Recovery

- Ground-trainer mockup development
- Crew hardware training and scientific familiarization
- Payload integration and mission support
- Launch site assistance in payload processing.
- Experiment loading and handover for integration into the shuttle
- Payload monitoring while on orbit using Techshot's hardware data downlink and command uplink capabilities
- Payload collection and return during post-landing recovery operations
- Bonded storage of flight hardware, parts and materials
- Traceability of parts and materials (esp. safety critical)

