



Proposed Access Methods

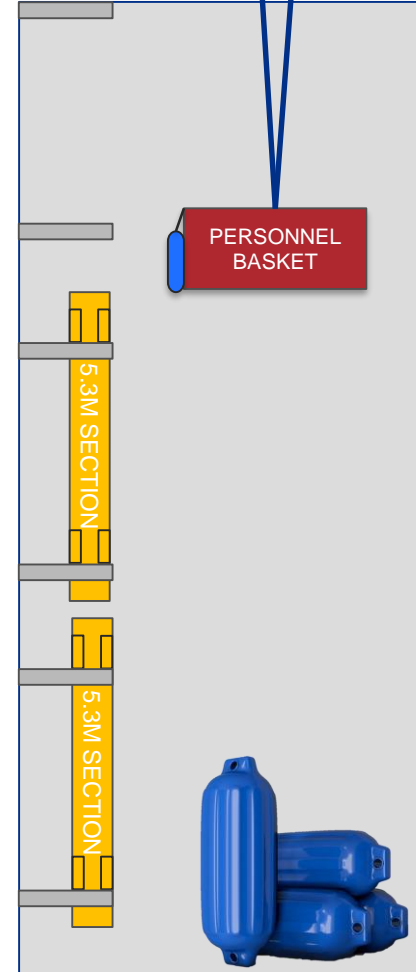
Noah Curfman

12 July 2022

Unrestrained Basket Access

The weight of the basket is relied upon to keep things steady and bumpers are fitted to allow light contact with the experiment.

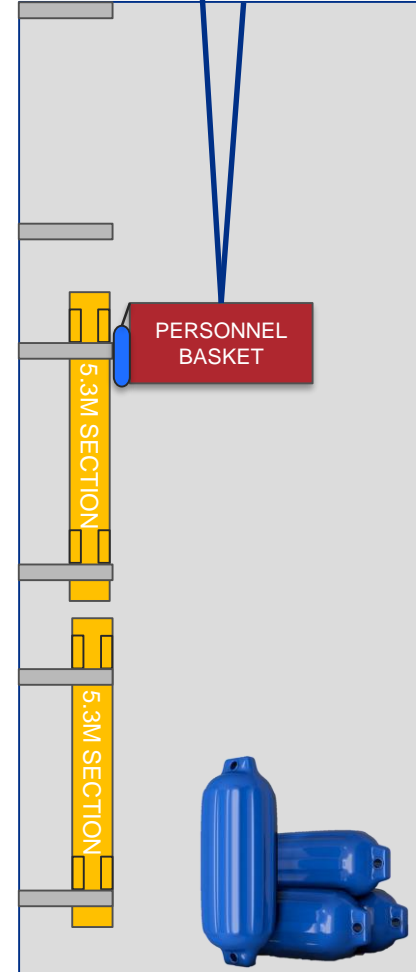
- If basket rider is incapacitated the basket can be raised easily.
- No design required beyond the personnel basket design.
- Aligns well with currently used basket procedures.
- Pinch hazards may still be present.
- No stabilization provided for assembly tasks.
 - Assembly tasks include tightening bolts to 200 ft-lbf.
- Basket impact with sections could affect alignment (unlikely).
- When basket begins to sway time to settle is very long affecting productivity
- Technicians are generally not in favor of this solution.



Unrestrained Basket Access

The weight of the basket is relied upon to keep things steady and bumpers are fitted to allow light contact with the experiment.

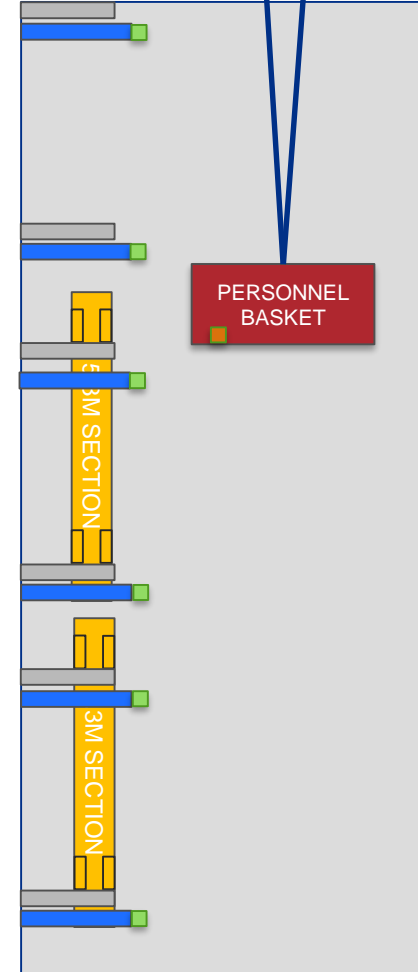
- If basket rider is incapacitated the basket can be raised easily.
- No design required beyond the personnel basket design.
- Aligns well with currently used basket procedures.
- Pinch hazards may still be present.
- No stabilization provided for assembly tasks.
 - Assembly tasks include tightening bolts to 200 ft-lbf.
- Basket impact with sections could affect alignment (unlikely).
- When basket begins to sway time to settle is very long affecting productivity
- Technicians are generally not in favor of this solution.



Restrained Basket Access

The basket is restrained to the experiment or dedicated wall supports at discrete points. Basket restraints must be disconnected before moving.

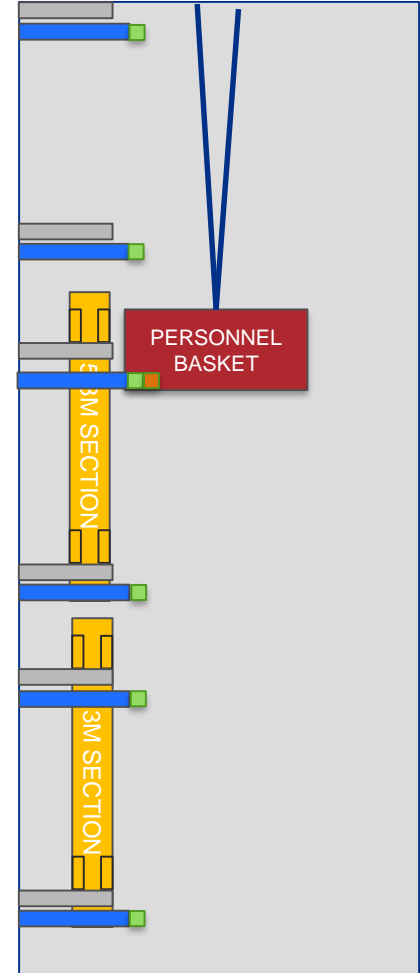
- Wall mounted restraint points provide 5-6 axis stability for assembly.
 - Eliminates pinch hazards if implemented correctly.
 - Cost effective stabilization if overhead crane can be used.
 - Separate stabilization points possible for modular sections and atom sources.
 - Adhesive restraint points could be employed for civil construction.
-
- Basket cannot be moved without disconnecting restraints in an emergency.
 - Accidental crane movement while basket is restrained very dangerous.
 - Strict procedures or interlocks required for safe operation.



Restrained Basket Access

The basket is restrained to the experiment or dedicated wall supports at discrete points. Basket restraints must be disconnected before moving.

- Wall mounted restraint points provide 5-6 axis stability for assembly.
- Eliminates pinch hazards if implemented correctly.
- Cost effective stabilization if overhead crane can be used.
- Separate stabilization points possible for modular sections and atom sources.
- Adhesive restraint points could be employed for civil construction.
- Basket cannot be moved without disconnecting restraints in an emergency.
- Accidental crane movement while basket is restrained very dangerous.
- Strict procedures or interlocks required for safe operation.



Restraint Mechanisms

Manual – bolts, latches, ratchet straps

- Simple, cost effective
- No way to disconnect easily if personnel incapacitated

Remotely Operable – electric, pneumatic, etc.

- Complex design task with likely no OTS options
 - Must have unquestionable reliability or manual override
 - Must be very robust to handle assembly forces

Breakaway – limited strength straps, shear pins, unconstrained axes

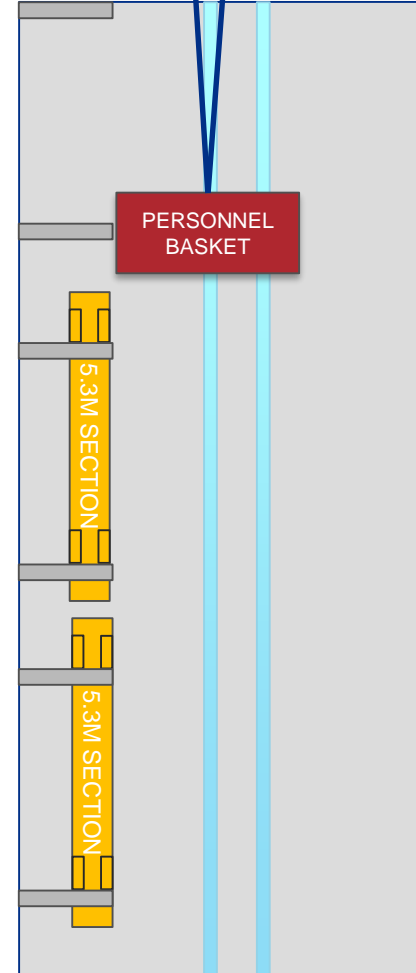
- Possible last resort if personnel in PAS incapacitated
- Complex design task with likely no OTS options
- Potentially dangerous under unintentional breakaway conditions
 - Breakaway would need to be designed for high forces



Rail Guided Basket Access

The basket is attached to a rail or rails to provide stability. Rail attachment could be only at the top of the shaft, or as needed in the shaft.

- If basket rider is incapacitated the basket can be raised easily.
- Dual rails can provide robust stabilization.
- Basket may be disconnected from rails for normal operations.
- Rail(s) must be well aligned over the 100m to prevent binding.
 - Alignment of a rail over 100m is challenging!
- Rail binding may result in an extremely dangerous situation.
- System performance reliant on crane alignment by crane operator
- Stabilization may not be possible when accessing Atom Sources.



Rail Guided Basket Access

The basket is attached to a rail or rails to provide stability. Rail attachment could be only at the top of the shaft, or as needed in the shaft.

- If basket rider is incapacitated the basket can be raised easily.
- Dual rails can provide robust stabilization.
- Basket may be disconnected from rails for normal operations.
- Rail(s) must be well aligned over the 100m to prevent binding.
 - Alignment of a rail over 100m is challenging!
- Rail binding may result in an extremely dangerous situation.
- System performance reliant on crane alignment by crane operator
- Stabilization may not be possible when accessing Atom Sources.

