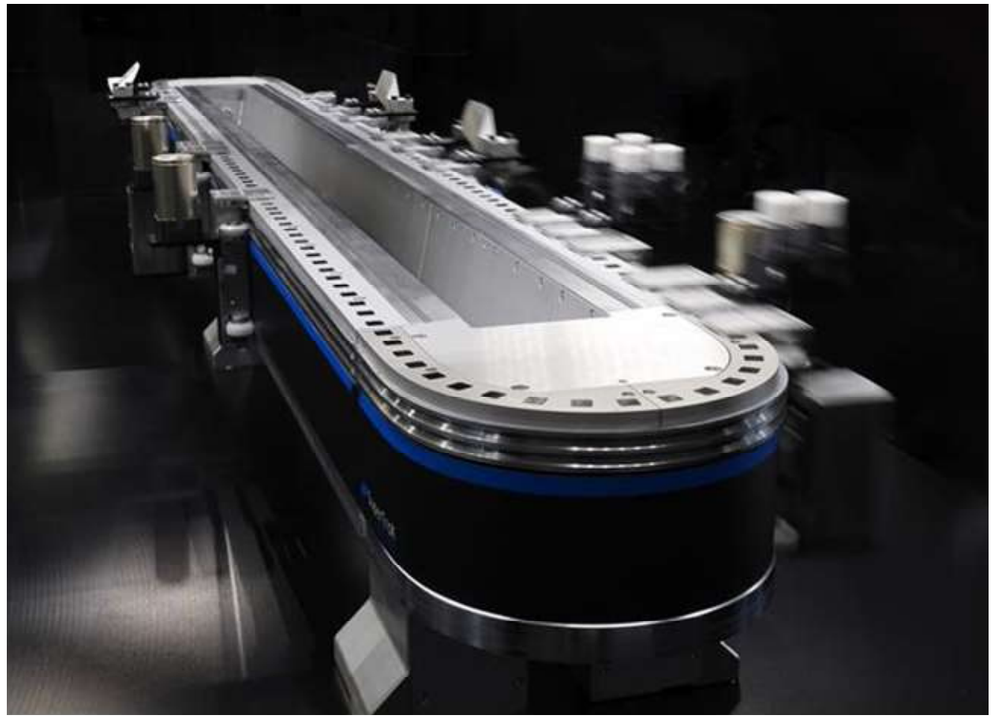
SuperTrak HORIZON3™ Conveyance Platform Design Considerations

This document provides design guidance for mechanical designers when incorporating the SuperTrak CONVEYANCE™ platform into a machine or system. It covers important general information for new users and serves as a quick reference for experienced designers. More details can be found in the Operations and Maintenance Manual (OMM) and in the Design Package.

Contents:

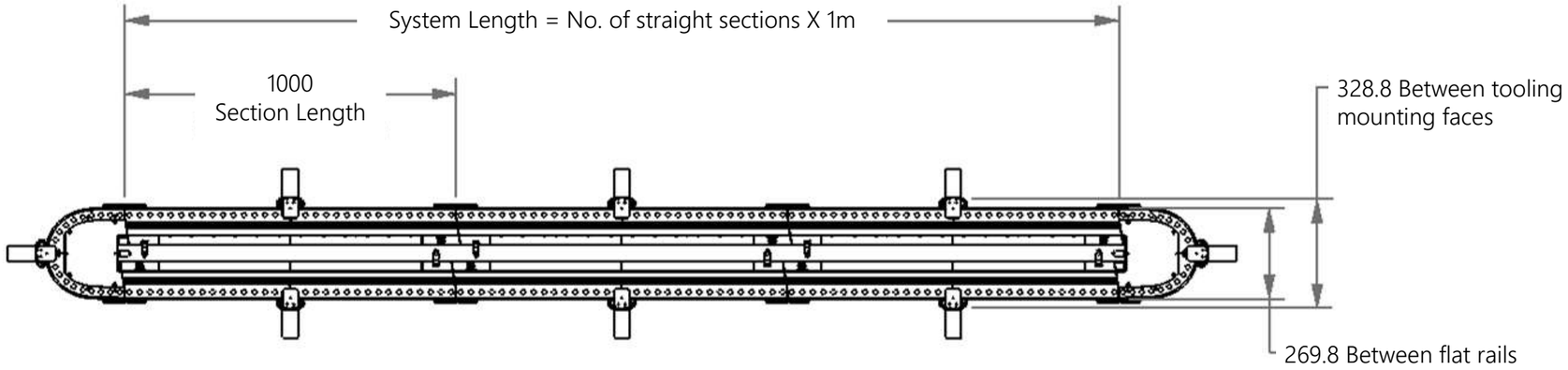


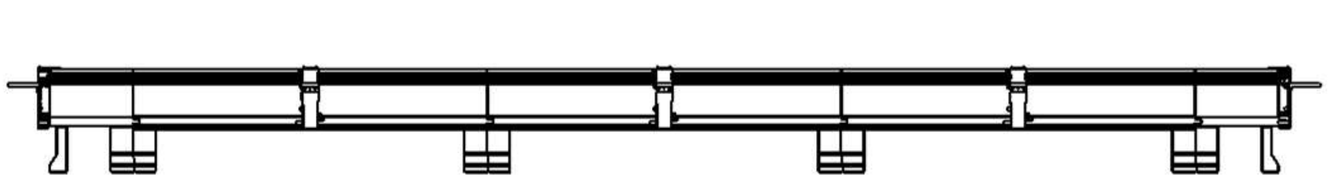
For further information, please contact us at: support@supertrakconveyance.com

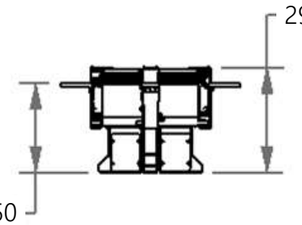
Other Resources:

- SuperTrak HORIZON3™ Operations and Maintenance Manual
- SuperTrak HORIZON3™ Component Data Sheets
- SuperTrak HORIZON3™ Design Package – 2025-05.zip
- Ask about our SuperTrak Academy™ training program

1. System





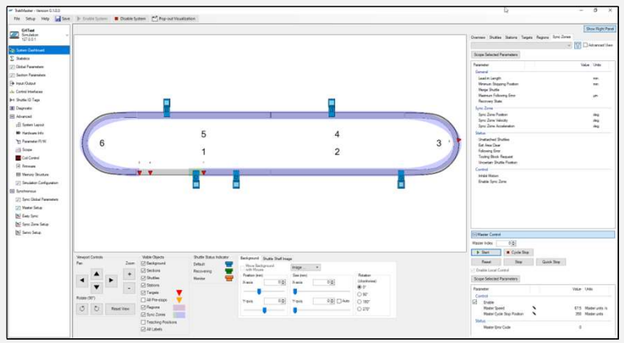


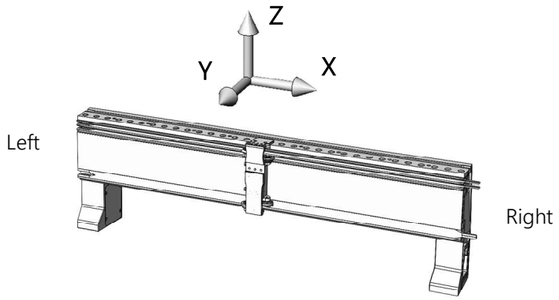
<u>System Limitations:</u>
Max System Length, Beta*: 7m
Max System Length, Final: 100m
Max Number of Shuttles, Beta*: 50
Max Number of Shuttles, Final: 500
Max Payload: 3kg
Orientation: Horizontal only
Ingress Protection Rating: IP55

System Simulations:
Simulations in TrakMaster can be used to validate system layouts and process flows while in the concepting or early-design phase. Simulations also provide a visualization of the whole system which can include a custom background showing your process stations. The visualization is a great sales tool to show your customers.

Outcomes of a Simulation:
- Identify process bottlenecks
- Validate a layout has adequate space for shuttle queueing
- Confirm the number of shuttles
- Confirm the number of motor power supplies required to achieve throughput
- Confirm shuttle index and shuttle exchange times

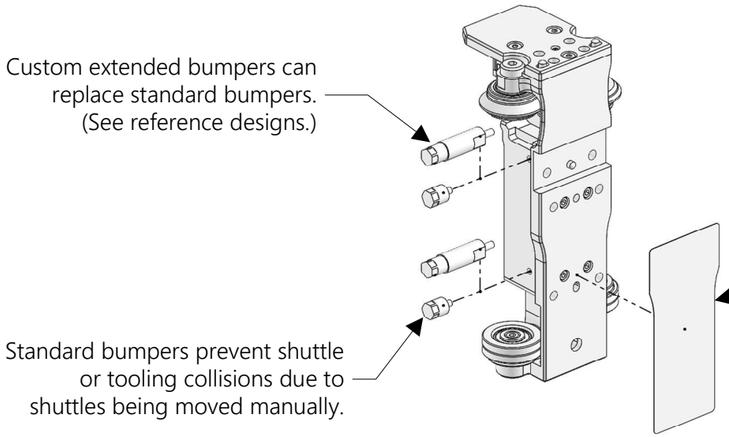
Contact Support@supertrakconveyance.com for a simulation.

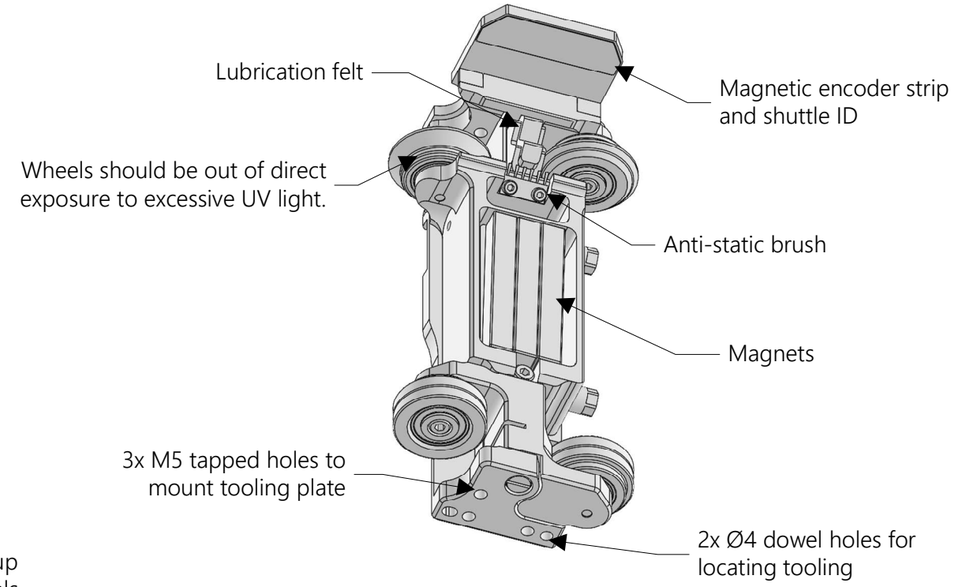


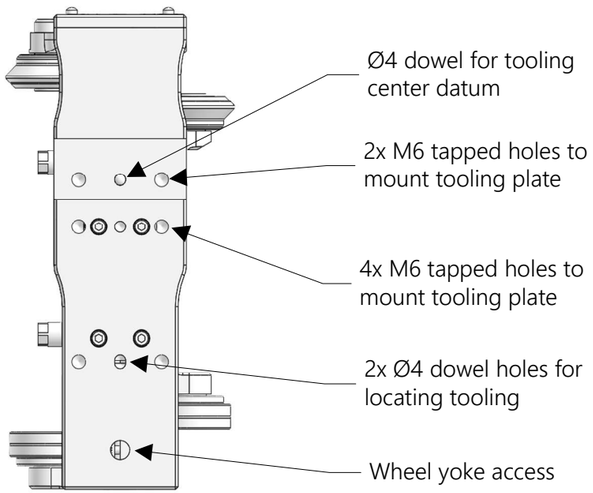


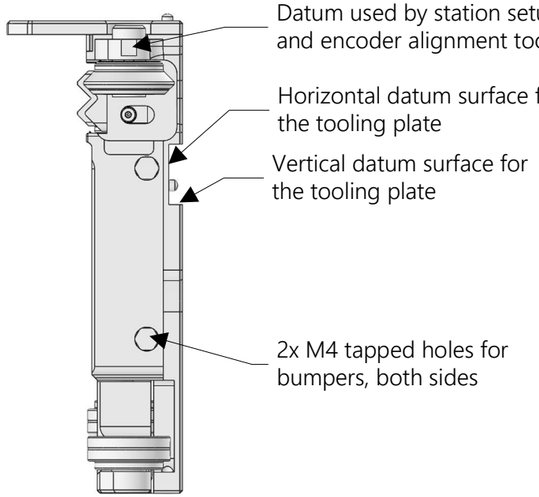
Note: All dimensions are reference. Consult Design Package for dimensions and tolerances. All dimensions in millimeters unless otherwise noted.
*Beta system limitations are software dependent not hardware dependent. Contact support@supertrakconveyance.com for more information.

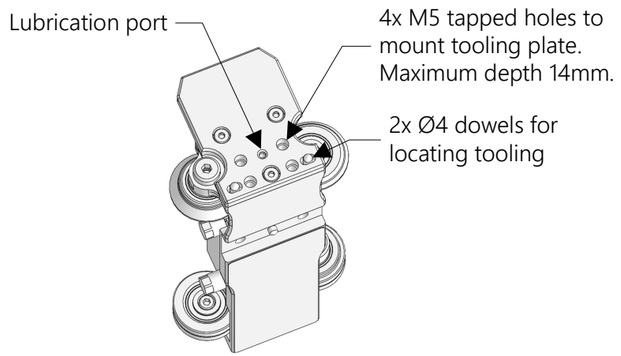
2. Shuttle



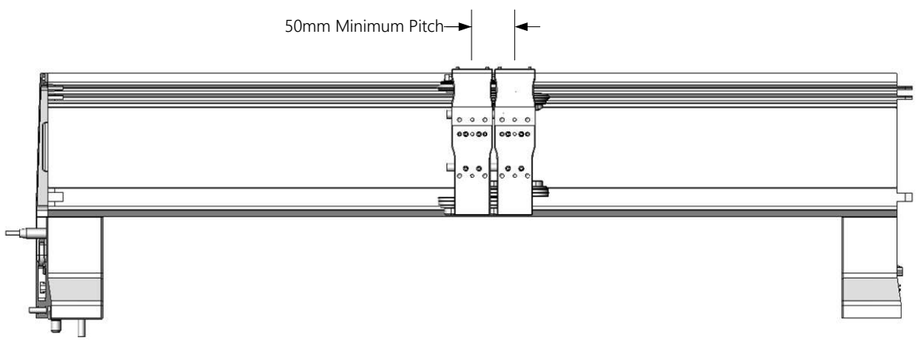








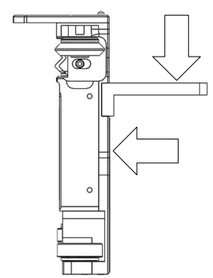
Magnetic Field Strength:
Although the shuttles contain powerful magnets, the field is well contained. For most applications, no special provisions are required. When a shuttle is removed from the track, a keeper plate is used to contain the magnetic field.



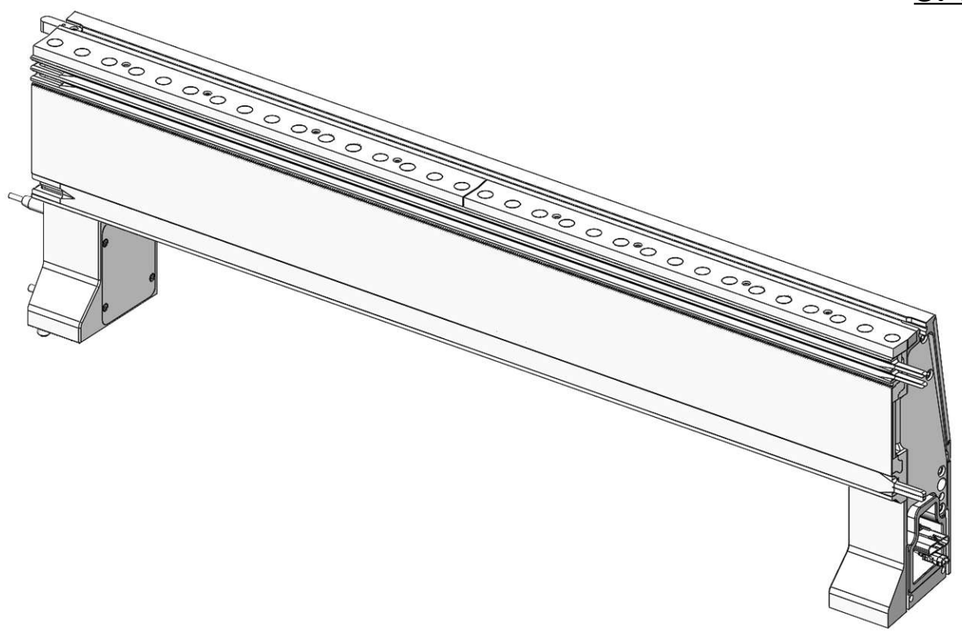
Force Applied to Shuttle on a Straight Section*:
The applied force/moment includes process force, product fixture weight, and product weight. The pivot point for a moment causing downward rotation is the flat wheels and the pivot point for a moment causing upwards rotation is the v-wheels. Forces on the shuttle must not exceed any of the criteria below.

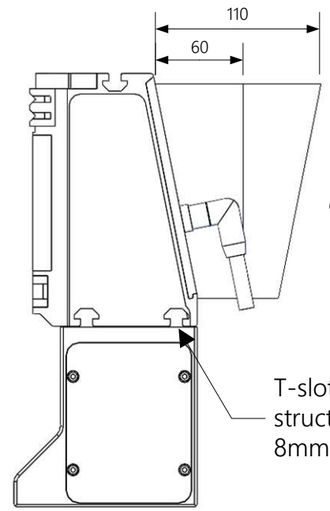
- Maximum force applied down on the shuttle (Z): 150 N
- Maximum unsupported process torque (about X): 8 Nm
- Maximum static force applied toward the track (Y): 250 N in the center of the shuttle
- Maximum dynamic force applied toward the track (Y): 150 N in the center of the shuttle

*See Data Sheets for other sections.



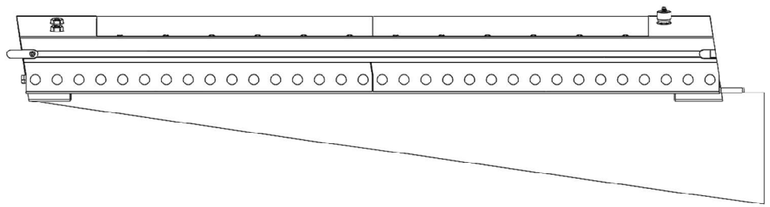
3. Straight Section

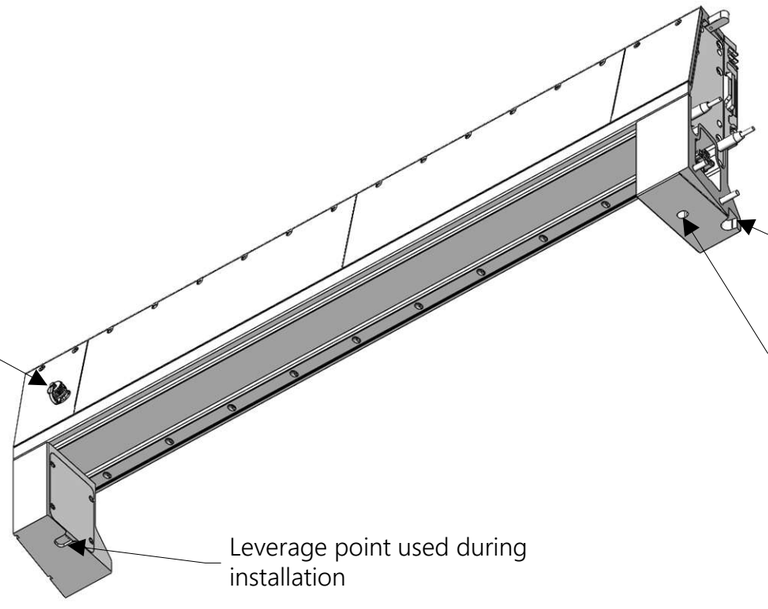




Recommended electronics maintenance clearance: 110mm
Minimum electronics maintenance clearance: 60 mm

T-slots available for light duty structures. Compatible with Bosch 8mm T-Nuts and T-Bolts.





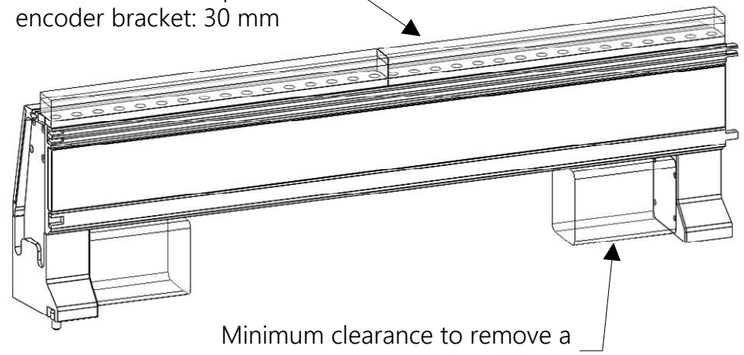
Slot for Ø16-Ø12 stepped dowel (provided with section)

M10 mounting screw

Cable entry location for power supply

Leverage point used during installation

Recommended clearance to replace encoder bracket: 40mm
Minimum clearance to replace encoder bracket: 30 mm



Minimum clearance to remove a section: 150mm

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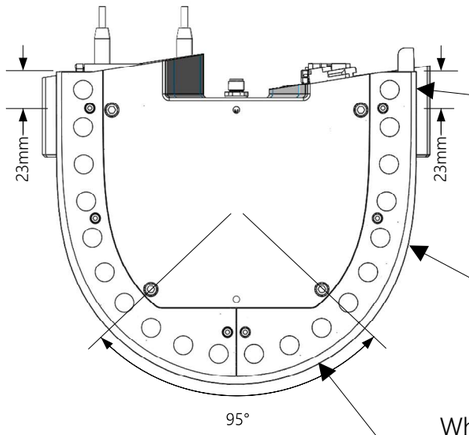
4. 180° Section

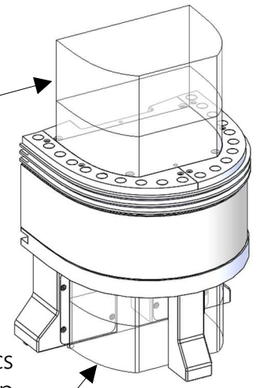


When the center of the shuttle is within this region, the profile is straight.

Transitional profiles minimize jerk for gentle transition to/from curves.

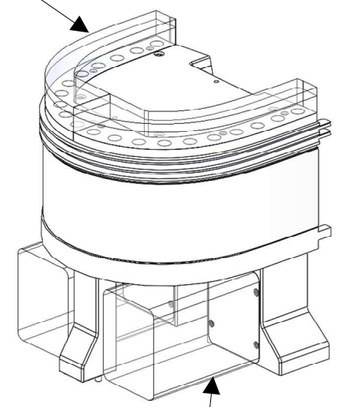
When the center of the shuttle is within this region, the profile is circular.

Recommended clearance to replace encoder bracket: 40mm
Minimum clearance to replace encoder bracket: 30 mm

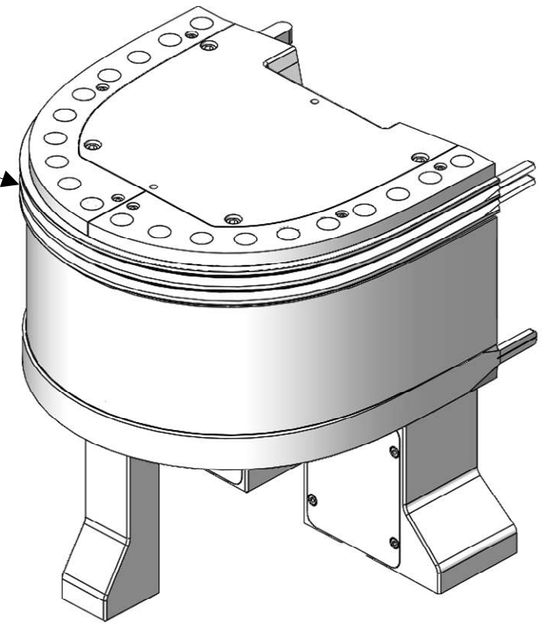


Recommended electronics maintenance clearance: 150mm
Minimum electronics maintenance clearance: 60 mm

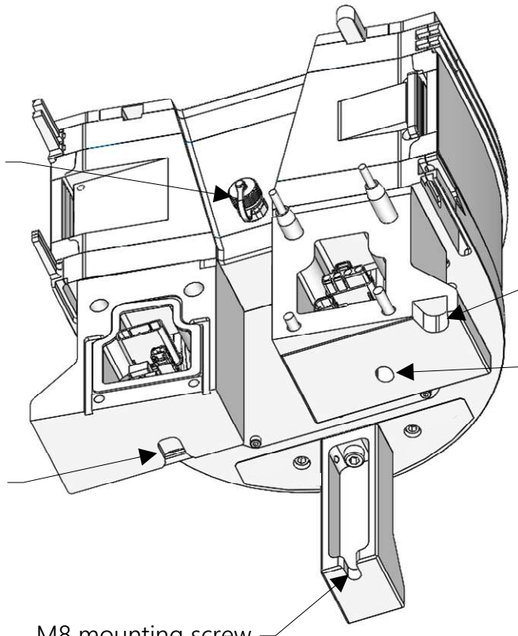
Recommended electronics maintenance clearance: to table top
Minimum electronics maintenance clearance: 60 mm



Minimum clearance to remove a section: 150mm



Length of track is equivalent to 0.62m



Cable entry location for power supply.

Slot for Ø16-Ø12 stepped dowel (provided with section)

M10 mounting screw

Leverage point used during installation.

M8 mounting screw

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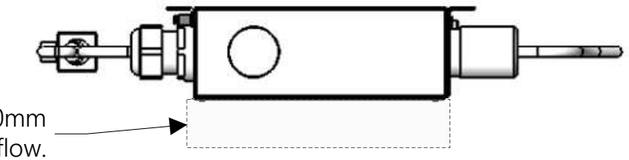
5. Power Supply

Top View



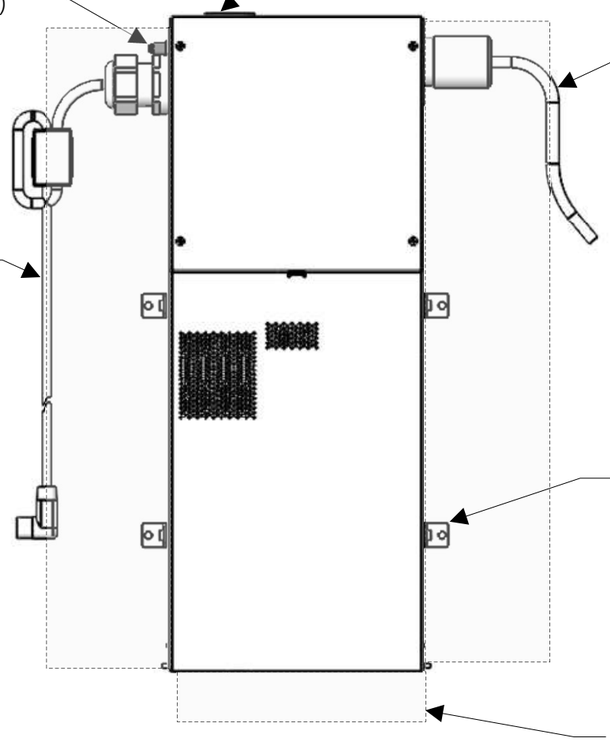
Leave minimum 50mm clearance for cooling air flow.

Alternate DC cable orientation

Output for "Power Supply Alarm" 24V signal to PLC (3 pin M8)

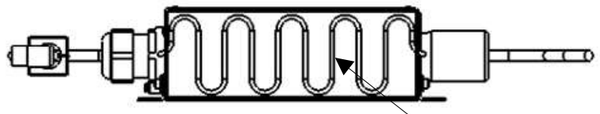
AC power input from control panel; allow 100mm clearance for cable.

DC power output to motor section; allow 100mm clearance for cable.
Standard length: 2m
Optional length: 5m
All cables on a system must be the same length.



Mounting tabs

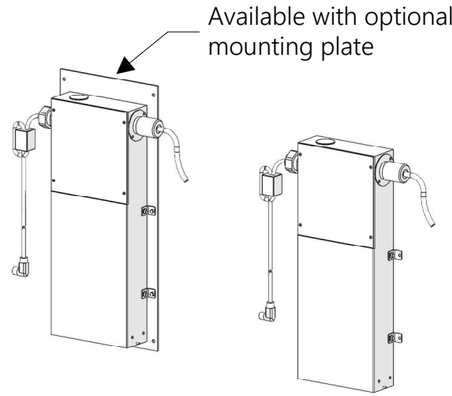
Leave minimum 50mm clearance for cooling air flow and filter replacement.

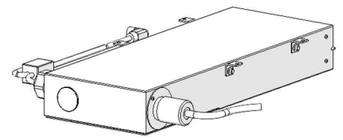


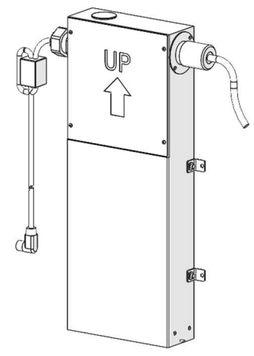
Bottom View

Filter to be replaced when dirty

Available with optional mounting plate







Power supply can be field mounted vertically or horizontally facing down.

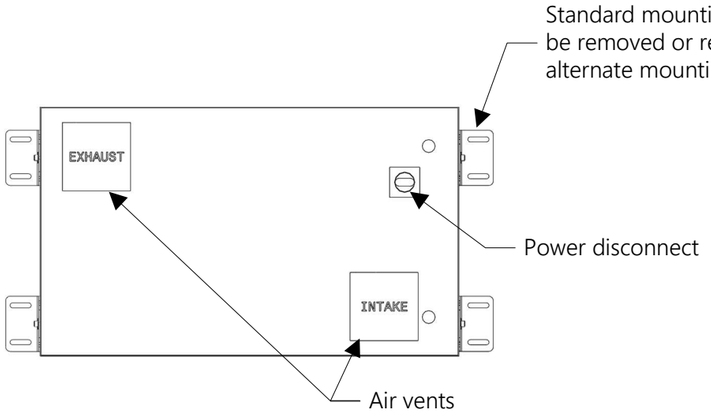
Any orientation is permitted when protected from environmental conditions inside a secondary enclosure.

Tip:

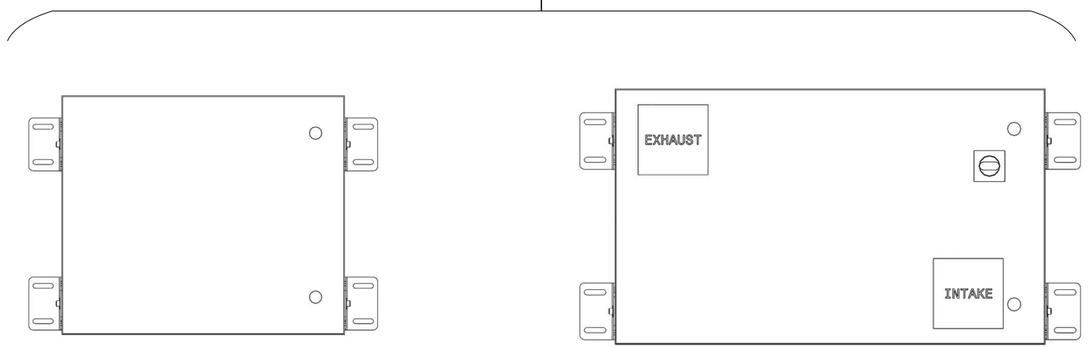
- Design the system with an extra power supply so that the machine can continue running if one of the power supplies faults. The PLC can provide a warning using the "Power Supply Alarm" output.

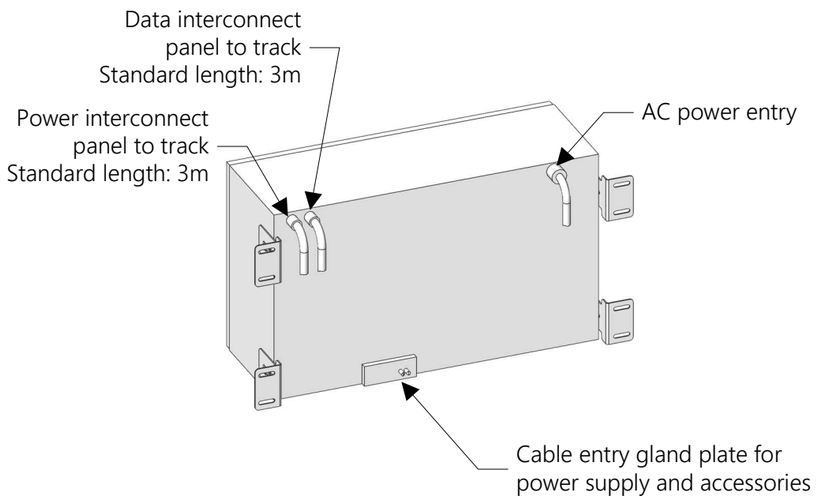
6. Control Panels

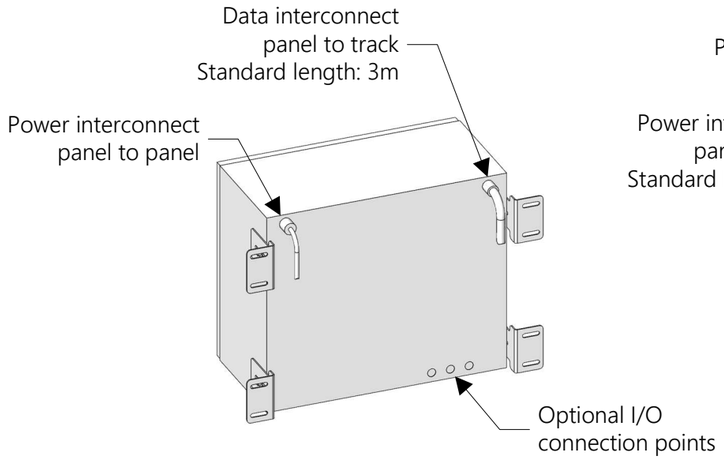
Combined Panel Configuration:

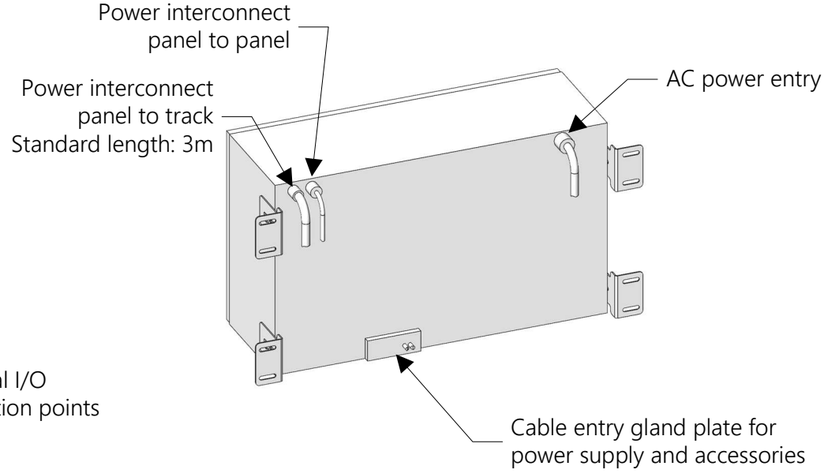


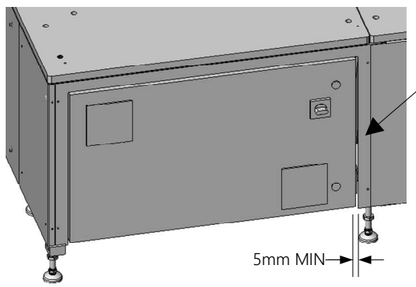
Split Panel Configuration:









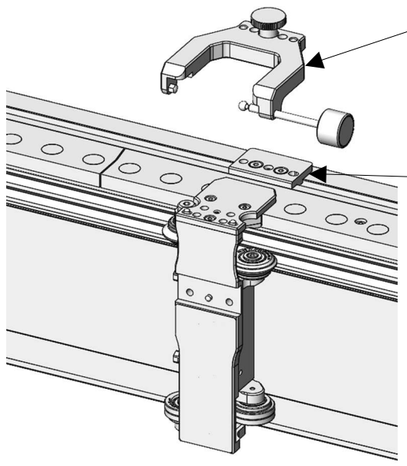


The control panel can be mounted flush with table skirting. Allow a minimum of 5mm between the control panel and the skirt.

7. Accessories and Tools

Station Setup Tools

The station setup tools are used to repeatably datum a shuttle during station setup.

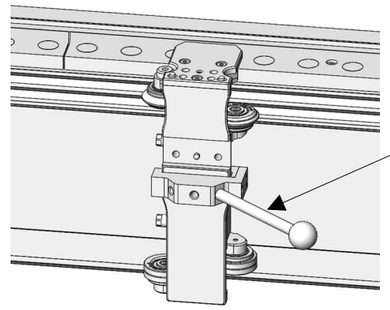


Station setup removable locate –
locks a shuttle into a repeatable, known position for station tooling alignment while power is removed from track system. At least one is needed per system.

Station setup stationary mount –
provides a permanent fixed mounting datum for the station setup tool. One is needed per station.

Shuttle Removal Tool

The shuttle removal tool hooks onto the shuttle body, allowing for quick and easy removal and placement of shuttles at any point along straight or curved sections.

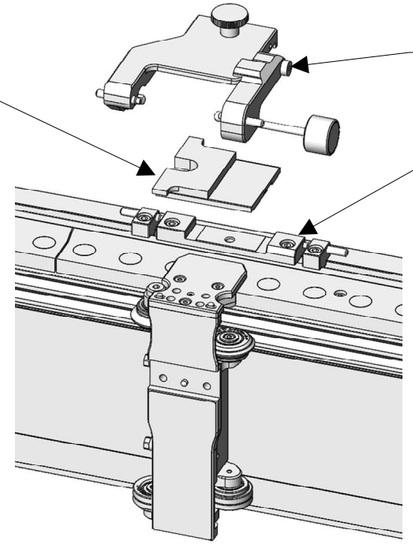


Shuttle removal tool

Shuttle Encoder Alignment Tool

The Shuttle Setup Tool Kit is used to align shuttle cap assembly if it is replaced.
Only one setup kit is needed per system.

Encoder alignment adjustable chip finder –
accurately positions the stationary mount.

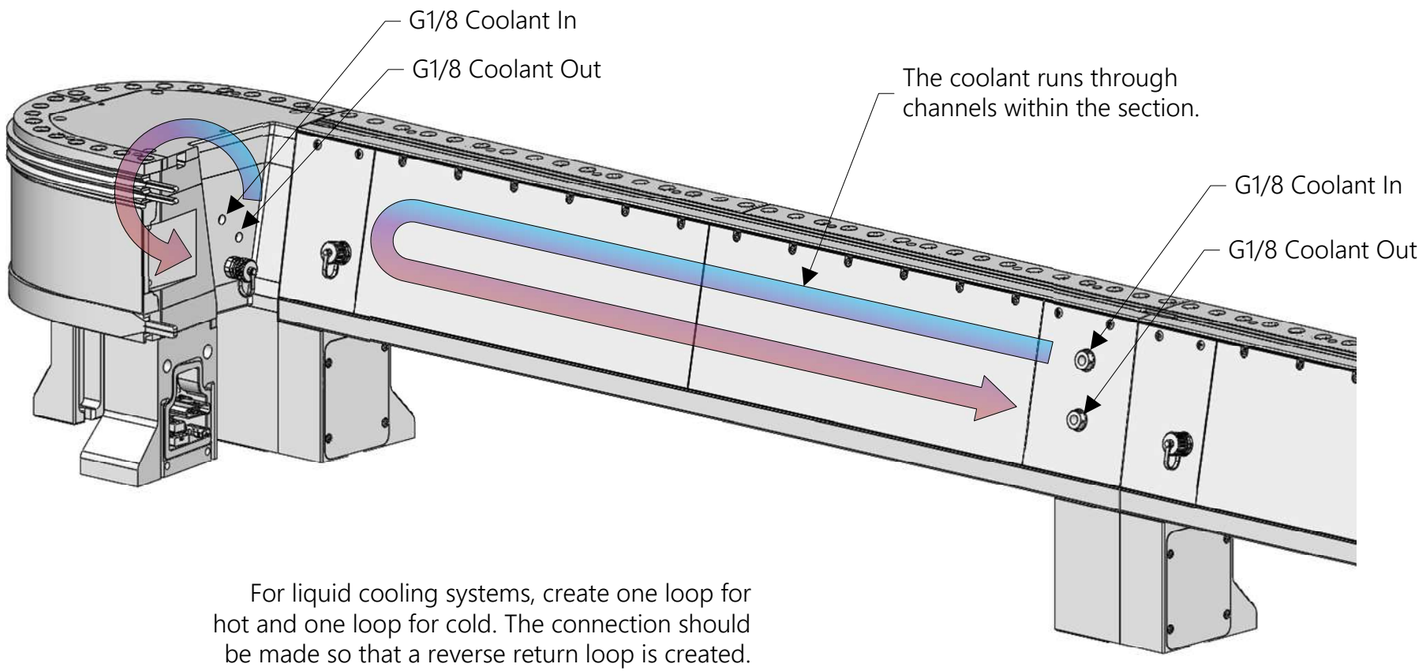


Encoder alignment removable locate –
locates the shuttle during adjustment of the shuttle cap assembly.

Encoder alignment stationary locate –
provides a permanent mounting surface for the shuttle setup tool.

8. Cooling

In high-temperature environments an added cooling system may be required. A cooling system may also be beneficial in situations where the conveyance system transports heavy shuttle payloads, accelerates shuttles quickly, or where there is a high-percentage duty cycle.



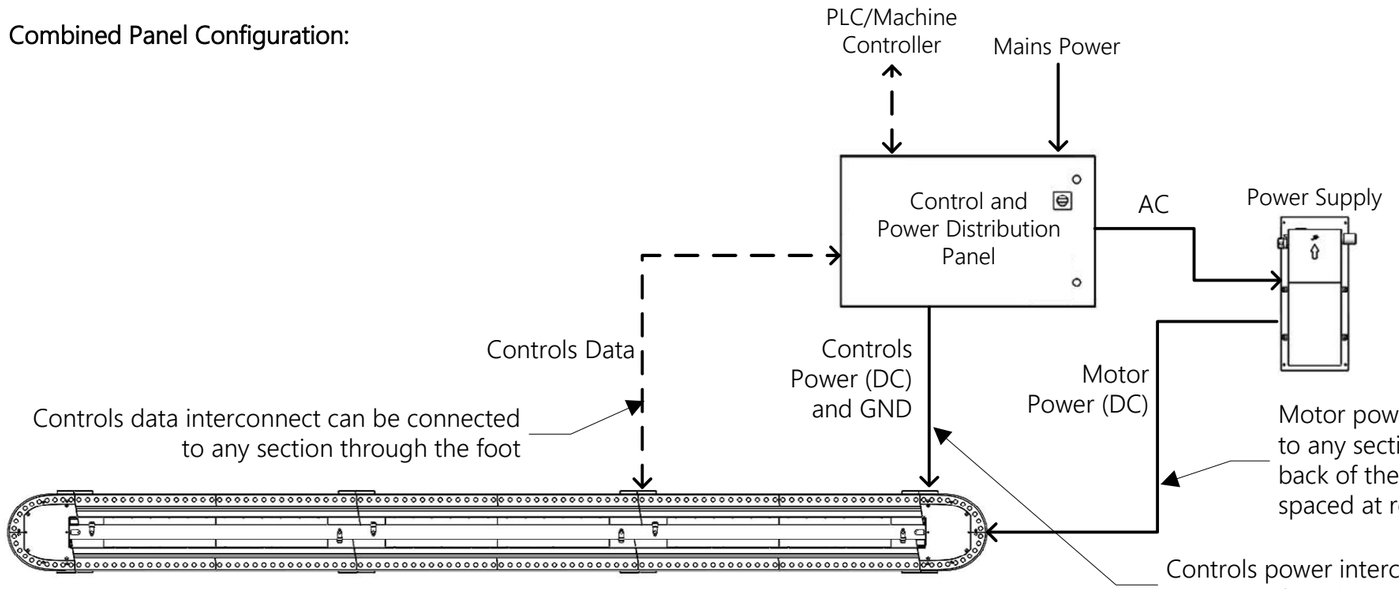
For liquid cooling systems, create one loop for hot and one loop for cold. The connection should be made so that a reverse return loop is created.

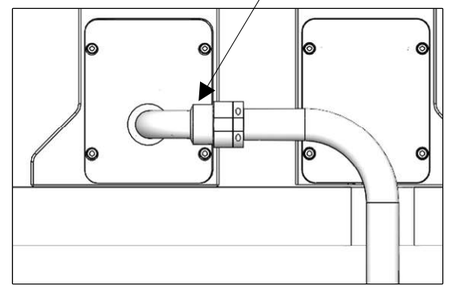
Notes:

- Size chiller according to the needs of the application.
- Use water for coolant.
- To avoid condensation, do not run chiller below ambient temperature. The maximum fluid temperature is 50°C.
- Maximum fluid pressure is 3.4Bar (50psi).

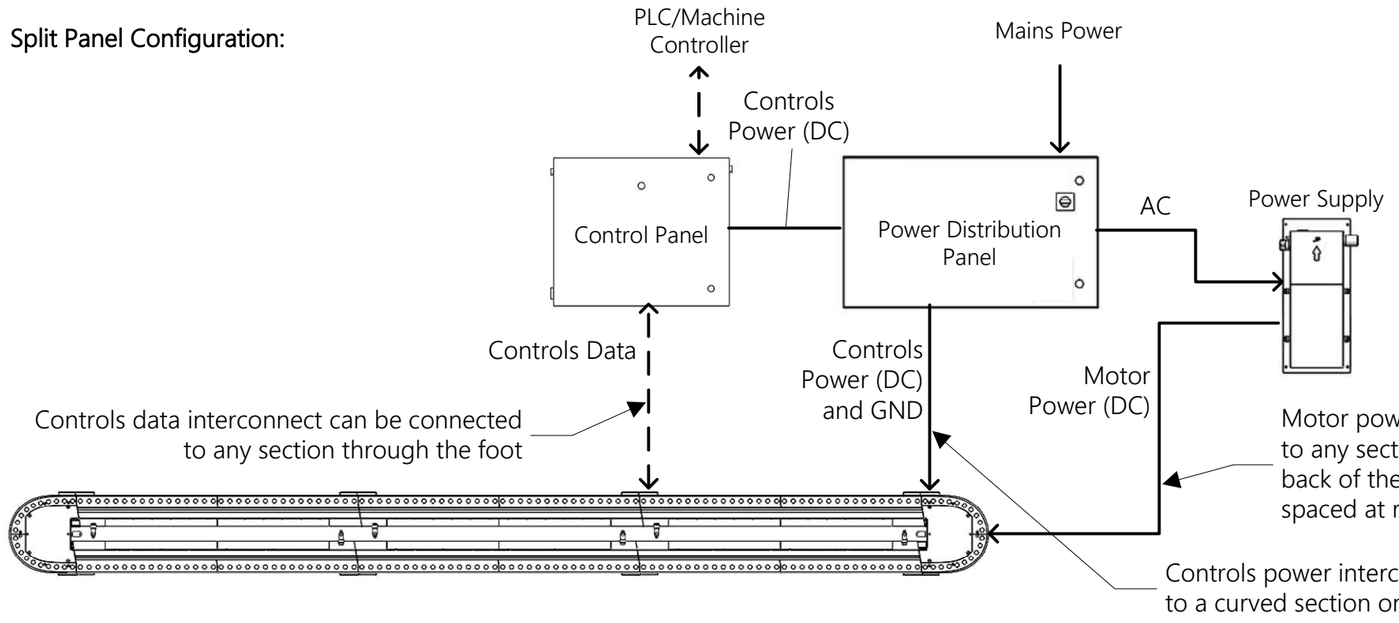
9. Power and Controls Layout

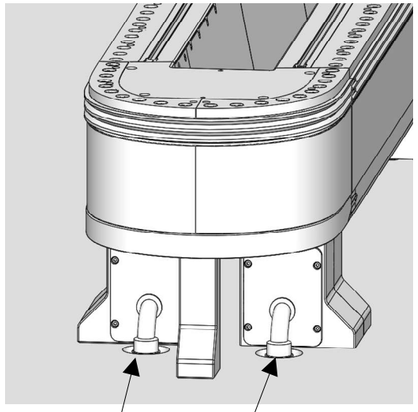
Combined Panel Configuration:



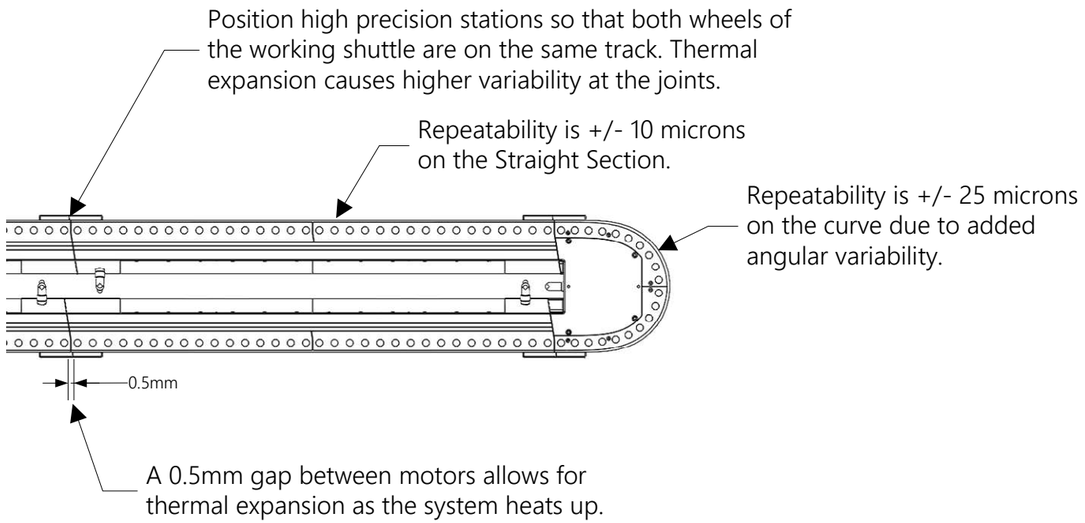


Split Panel Configuration:





10. Repeatability and Accuracy



Improving Station Repeatability:

- Use a station setup tool to hold a shuttle in position while setting up the station.
- For a specific station, always use the same station setup removable locate.
- Inspect and replace wheels as recommended in scheduled maintenance.
- For stations requiring precise processes, avoid positioning station tooling at section joints.

Improving Shuttle-to-Shuttle Repeatability:

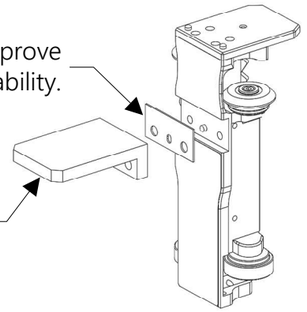
- Include a grind spacer between the tooling shelf and shuttle.
- Build adjustability into tooling shelf.
- Use shuttle ID to program unique offsets for each shuttle.
- Do not adjust the encoder bracket. Always use software offsets.
- When using vision systems, add fiducials to the tooling plate.

11. Reference Designs and Example Solutions

Reference: Tooling Plate

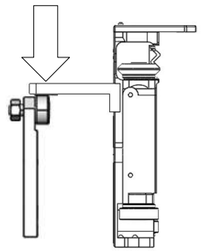
A grind spacer may be used to improve fixture-to-fixture repeatability.

A reference tooling plate with recommended mounting features and tolerances is provided in the Design Package.

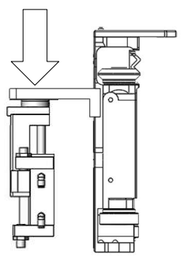


Example: Backups

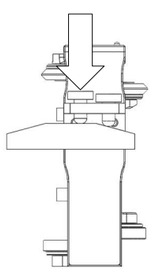
Backups can be added to support the tooling shelf or parts during pressing operations so that the maximum force and moment are not exceeded.



Fixed backup - load is transferred from shuttle to backup only when the shuttle is deflected slightly. It is recommended to use a grindable striker plate with lead-in and a cam follower. Grind each plate to reduce variation across shuttles. The cam follower should be adjusted with a slight air gap (0-0.1mm) on all shuttles.



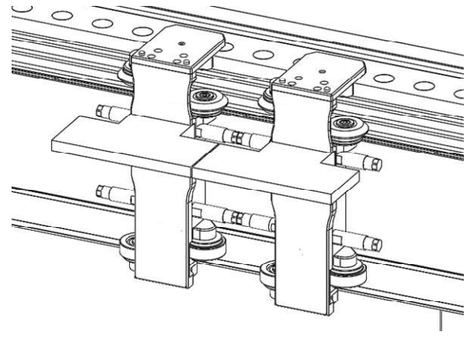
Active backup - backup extends and is configured to suit applied force. Hard stops prevent over extension.



Isolated product - product is supported by auxiliary tooling such that the load is transferred through the auxiliary tooling, not the shuttle.

Reference: Custom Bumpers

During normal operation, SuperTrak's TrakMaster™ software automatically prevents collisions. However, when power is removed (for example during maintenance), the shuttles can easily be moved manually. Custom extended bumpers can be added to the shuttles to prevent impacts between tooling plates when the plates are wider than the base shuttle.

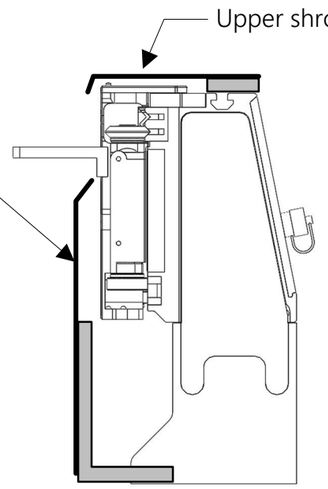


Example: Shrouding

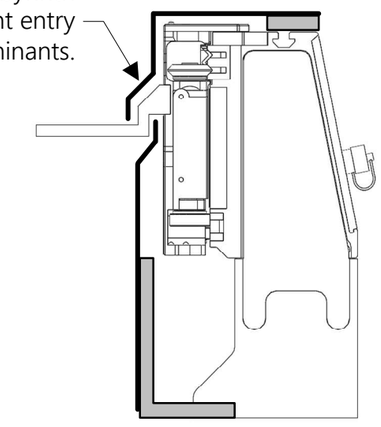
Shrouding can be used to protect the SuperTrak CONVEYANCE™ platform from harsh processes, abrasive contaminants and UV exposure.

Upper shroud

Lower shroud



Example labyrinth design to prevent entry of contaminants.



HORIZON3
Design Considerations
May 2025

SuperTrak™ HORIZON3