There are many things to consider when spec’ing a turret or stockpicker application: floor considerations, type of guidance system to use and whether End Aisle Control (EAC) is required. Use this guide to familiarize yourself with each system and its operation, as well as review installation considerations.

**Floor Considerations Overview**

Very narrow aisle (VNA) trucks (Turret trucks and Stockpickers) operate in aisles designated as “Defined Traffic Pattern” floors. Defined traffic patterns describe floors that limit traffic to fixed wheel paths such as VNA trucks operating in guided aisles. An $F_{min}$ numbering system has been established as the industry standard for measuring and specifying floor flatness and levelness of these floors.

Customers often expect lift truck manufactures to specify the floor flatness required for safe, optimized performance of their VNA trucks. Lift truck manufacturers believe the final decision should be made by the customer after considering the importance of floor flatness and its impact on vehicle operations.

Crown has established general guidelines and recommendations that are outlined below. Review this with your customer to assist them in determining the desired $F_{min}$ number for their facility.

**Floor Flatness**

Crown recommends that “VNA” trucks operate on floors with an $F_{min}$ number between 50 to 100 to optimize operator and truck performance, minimize maintenance costs and reduce operating costs over the life of the truck. Crown VNA trucks will operate on existing “Defined Traffic Pattern” floors less than $F_{min}$ 50. However, in order to achieve maximum productivity and reduced operating costs, $F_{min}$ 75 and above is recommended.

Operating a truck on uneven and rough floor conditions with low $F_{min}$ ratings can lead to:

- Severe vehicle vibrations
- Undesirable mast sway
- Loss of wire guidance
- Improper fork positioning
- Wheel and axle fatigue
- Reduced travel speeds

**Running Clearance**

Crown has established general floor flatness recommendations for turret and stockpicker trucks as shown in the following charts. However, additional factors must be considered in order to determine the appropriate amount of running clearance.

These factors include:

- Floor flatness / levelness
- Maximum lift height
- Load handler length
- Load characteristics
  - (load stability, shrink wrap, overhang)
- Housekeeping standards
  - (deviations in clear aisle due to load placement)

**Guidance Systems Overview**

There are two types of guidance systems: wire and rail. More often than not, choosing a guidance system that’s best suited for a customer is often based on economic and operational considerations. For this reason, wire guidance is generally more prominent since it eliminates the added expense of steel. However, furniture applications and smaller warehouses may see advantages to rail guidance systems. Furniture warehouses typically utilize stockpickers equipped with long platforms that extend the length of the truck. The platform extends well beyond where the truck’s wire guide sensor is mounted. Therefore, by using rail guidance and extending the entry rail further, the truck is captured in the rail enabling straight tracking before entering the aisle, minimizing the risk of damage.

Customers should consider several factors before selecting a guidance system.

- Initial investment
- On-going maintenance considerations
- Ease and flexibility to change guide path
- Housekeeping
- Operational characteristics: floors, loads, operator skill level, impact on vertical cube utilization
**Application Tips**

An Excel tool is available for cost comparisons of rail and wire. This is located in the Electronic Briefcase in the Warehouse Products\Sales Training\Calculator.

**Note:** This cost comparison tool is designed to compare the cost of implementing a wire vs. rail system. Due to fluctuating steel prices and varying installation costs based on individual markets, this tool is to be used for rough estimation purposes only.

**Advantages of Guidance Systems**
- Optimizes cube utilization by minimizing aisle widths
- Increases productivity and efficiency through faster in-aisle travel speeds and reduced operator fatigue
- Promotes uniform storage and retrieval of products
- Minimizes the risk of damage to products, trucks, and facility through automatic steering control

**Wire Guidance Overview**
Wire guidance systems control the truck’s steering by using sensors mounted on the truck to detect an electronic signal transmitted through a wire embedded in the floor, in the center of the aisle. The electronic signal is generated by a device called a line driver.

**Wire Pros and Cons vs. Rail Guidance**

**Pros:**
- Less expensive for larger warehouses
- No bottom beams promotes good housekeeping
- Minimal guide path maintenance
- Flexibility and ease to change guide path
- PTH can access pallets on the floor
- No loss of vertical cube due to lack of bottom beams
- No operator trip points
- Results in less truck and rack damage

**Cons:**
- Initial expense for smaller warehouses
- Damage to rack or product if operator does not acquire wire (refer to manual wire sense)
- Some Line Driver systems do not have an uninterrupted power supply or battery backup in the event of a power surge or loss

**System Components**
- **Crown Line Driver:**
  - Crown’s line driver can supply an electronic signal of a specific frequency through a maximum of 5000 linear feet of guide wire. Larger installations require additional line drivers.

- **Crown Line Driver Details**
  - Voltage: 120 or 240
  - Install on a dedicated circuit
  - Four frequency options:
    - kHz (5.2, 6.25, 7.0, 10.0)
    - 6.25 is the Crown Standard
  - Internal battery backup
  - Priced and ordered through Crown Parts Department

- **Truck Wire Guidance System with Sensor Bars**
  - Crown’s sensor bars, containing four coils each, are positioned near the floor in the center of the truck at both ends and act as antennas to receive the transmitted signal. The closer a coil is to being directly over the wire, the higher the amplitude of the signal received. Using the signal amplitude comparisons, the truck will “sense” the signal path and electronically steer the truck down the aisle.

- **Crown’s sensor bars are available with two different signal ranges:**
  - Up to 200 mA (Crown recommended)
  - 200 mA and greater (Sometimes necessary for existing competitor systems)

**Installation Considerations**
- Hire a qualified and knowledgeable installer
- Obtain approval of layout drawings showing guide path and line driver locations prior to installation date
- Epoxy over grout to cover wire (16 AWG) because it is more flexible and permanent
- Loop wire at all expansion joints and cracks
- Do not use steel or rebar within 6” of the wire
- Consult your Access 1 2 3® guide and follow the calibration procedures for correct truck system calibration.
To insure the best performance during a demo and/or new truck installation, determine the frequency and signal strength. Arrange for the signal strength to be checked using Crown’s field strength meter (part # 112953) prior to bringing the equipment on site.

• Acquiring the Wire
A wire guidance selector switch offers choice of manual or automatic steering. In manual mode, the truck steering is controlled by the operator. When selecting automatic steering, steering is controlled by the operator until the truck acquires the wire and then steering is automatically changed to the truck guidance system.

To align a truck to the wire guide signal, the approach angle must be no greater than 30 degrees and traction speed should be below 2.5 mph (4.02 KPH). The brakes are automatically applied when the approach angle is exceeded in the automatic mode. If the approach speed is greater than 2.5 mph (4.02 KPH), the truck will decelerate to 2.5 mph (4.02 KPH). Truck speed is limited to 2.5 mph (4.02 KPH) in the automatic mode until the truck is aligned with the wire. When aligned the acquisition speed limit is removed and the applicable speed versus height curve will be in force.

• Manual Wire Sense
This exclusive feature is installed on both Crown turrets and stockpickers. The purpose of this feature is to reduce or eliminate the operator from forgetting to turn the guidance switch on. There are two selectable manual wire sense modes: “Sense and Slow” and “Sense and Stop”. When enabled and the truck is being driven in the manual steering mode over an active wire, the truck will either slow down or come to a stop within the preprogrammed distance (5 to 20 feet).

In general, it’s best to increase your end aisle and place the return wire farther away from the end aisles when using the Manual Wire Sense feature. This will help to e through the warehouse in manual steer mode.

Rail Guidance Overview
Conventional rail guidance confines the truck mounted guide rollers between guide rails anchored to the floor. Steering is controlled by the trucks control system.

- Pros:
  • Simple design
  • Truck captured between rails, gives operator a added level of comfort
  • Slightly narrower aisle
  • Cannot be affected by power outages

- Cons:
  • Poor housekeeping - hard to sweep under rack
  • More expensive - especially in large applications
  • Requires the added cost of bottom beams
  • Harder to reconfigure guide path
  • Guide path rails require maintenance
  • Extra cost to fix floors if anchors pull out of concrete
  • More truck maintenance from abuse

In some cases, customers will utilize the benefits of both Wire and Rail throughout their application.

• System Components
- Truck mounted guide rollers
  • When determining the rail width, the guide rollers must be ¼" less than the inside dimension of the rail. Specify out-to-out aisle guide rollers in ¼" increments.
  • Refer to turret or stockpicker price pages for minimum and maximum dimensions allowable beyond overall truck width.
- Bottom load beams – positions floor level loads above the rail.
- Guide Rail(s)
  • Rail Types:
    - Double Rail: Low or High Profile (95% of all Rail Guidance systems)
    - Single Rail: Installed on one side of the aisle, typically next to racking mounted to the floor.
    - Inverted rail (SP 3500): - Attached to racking or mounted to floor in an inverted position
- Anchors
- Installation Considerations
  • Hire a qualified and knowledgeable installer
  • Know the entry rail design and specifications
    • Rail Size – For standard applications, 3" x 4" rail is most common or in abusive applications, 4" x 4" or 4" x 6" is recommended.
    • Rail Thickness – ½" thick rail is recommended for all aisle entries.
    • Anchor Size – Depending on the application, anchor diameters can range from ½" to ⅝" and lengths from 4" to 4 ½".
    • Anchor Spacing – Anchors should be set at 6" centers throughout the entire aisle entry
    • Bracing Options – Additional steel bracing is commonly used in aisle entries for added strength and support. In abusive applications, it’s not uncommon to fill the end aisles with concrete.
  • Below are a few common entry rail designs. It’s best

Example of Rail Guidance
to review these designs with the customer so they can decide on which design best fits their application:

- **In-aisle rail design and specifications**
  - **Rail Size** – For standard applications, 3” x 4” rail is most common. However, if the application is subject to abuse, then a 4” x 4” or 4” x 6” is recommended.
  - **Rail Thickness** – ½” thick rail is recommended for the first 20’, and then the thickness may be reduced to ⅜” for internal rail in non-abusive applications (Stockpicker Only).
  - **Anchor Size** – Depending upon the application, common anchor diameters are ½” with lengths from 3 ½” to 4 ½”.
  - **Anchor Spacing** – For the first 20’ the anchors should be set at 12” centers of the internal rail, then they can expand to 24”.

**End Aisle Control (EAC) System Overview**

Integrated with Access 1 2 3® technology, Crown’s EAC system provides programmable methods for slowing or stopping the truck at the end of aisles and cross aisles.

- **How does EAC work?**
  The system relies on sensors mounted to the truck which detect magnets installed in the warehouse floor. As the sensors encounter the magnets a signal is sent to the Access controller, activating the programmed mode. Magnet location determines where slowdown or stop occurs. Magnets should be placed at the appropriate distances from the end of the aisles and cross aisles to encourage safe operation without hindering productivity.

- **What does EAC do?**
  - Slows or stops the truck at predetermined points
  - Can be programmed to slow the truck to a selectable speed at a selectable distance
  - Can be programmed to resume top speed at a predetermined distance after slowdown.

- **Installation Considerations**
  - All magnets must have the same side (North or South polarity) facing up consistently throughout the warehouse. Crown trucks with EAC come standard with sensors for sensing North facing magnets.
  - Standard magnet placement is 38’ from the end of the aisle for Crown turret and stockpickers. This distance can be reduced if the customer’s specific application requires it, however, adjustments to truck performance may be necessary to promote safe operations.
  - Ensure the truck is programmed in Access 1 2 3, to match the polarity of the magnets as installed.
  - For additional information on magnet installation and end aisle control, refer to the Crown turret and stockpicker service document PF6717A.

*Note: Competitor magnet placement and type may not be compatible with Crown EAC. Please consult Crown Factory for additional information.*