

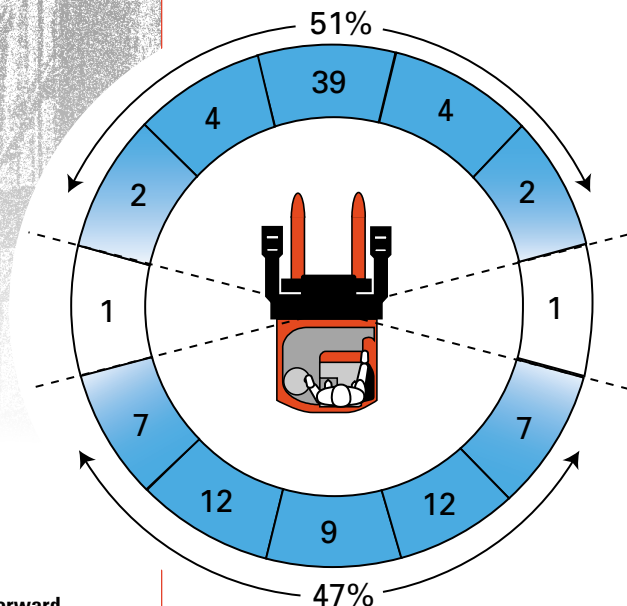
SmartSites™

STANDING UP FOR PRODUCTIVITY

Truck to Task? Or Task to Truck?

Because You Drive the Design

In the same way that a craftsman reaches for quality tools, drivers are drawn to well-designed lift trucks.



Drivers Face the Task – Rack Interface Requirements

A reach truck’s primary function is the placement and removal of pallets within a rack system. With only inches between locations, storing and retrieving pallets is precision work – especially with today’s higher cycle rates and lift height requirements. Studies show that a reach truck operator’s visual focus is facing the forks 51% of the time, with the most time (39%) spent facing full-forward and lifting. The operator’s visual focus is facing tractor-forward 47% of the time (Fig. 1). Visual focus immediately to the left and right of the truck occurs just 2% of the time.

Thus, most drivers operate trucks with their head and shoulders facing squarely in the direction of the task to be performed. The “universal” or “fore and aft” operational stance provides the clearest, most comfortable view of the load, rack and truck direction. This may be one reason why 4 out of 5 drivers in national competitions choose *Raymond®* reach trucks, which are designed for the universal stance.

Front and Center to the Load

Because a reach truck is designed primarily to interface with pallets and racking, being square to the load has its advantages. Without significantly turning or twisting the neck and upper body, the driver of a universal stance reach truck is able to work in the racks and still maintain a view of activity up and down the aisles (Fig. 4). Drivers of sidestance trucks have a limited view of activity to the right side of the truck, which is behind the driver, even when turning the head fully to the left or right (Fig. 5). And repeatedly turning the head left or right, out of the ergonomically neutral position, for long periods of time may cause damage to soft muscle tissues in the neck and back. This is especially harmful when twisting and looking upward at loads.

Operators face forward a majority of the time. While sidestance designs are an option, the best selling reach truck in North America continues to be Raymond’s universal stance (fore/aft facing) *Reach-Fork®* truck.



Fig. 1 – Occurrence of visual focal events around a reach truck

Studies in ergonomics by authorities such as Cornell University and the *Journal of Biomedical Engineering* have shown that increasing the operator’s comfort provides quantifiable business benefits in the form of:

- Higher productivity.
- Improved health and energy levels.
- Reduced absence from work.
- Increased job satisfaction.

Twisting muscles, repetitive motions and restrictive work areas can contribute to a variety of common work related stress injuries.

The challenge today is to choose equipment that puts the efficiency and comfort of the operator first, and eliminate poorly designed equipment that may be counter-productive or even harmful to the operator.

“Lift truck ergonomics means minimizing potentially harmful muscle movements and increasing operator comfort.”

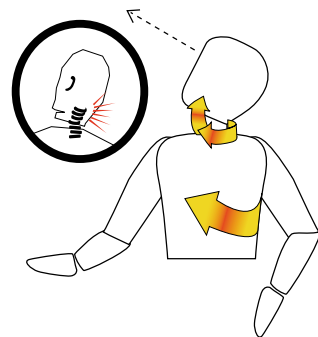


Fig. 2 – Compound movements

Muscles moving in multiple directions, side-to-side and up-and-down at the same time, increase the likelihood of injury or trauma.

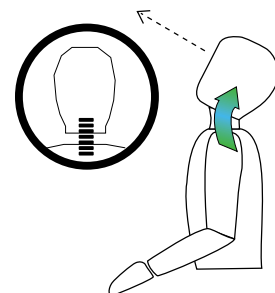


Fig. 3 – Singular stance

Universal stance reach truck drivers can view upper rack locations without using compound muscle movements (Fig. 3).

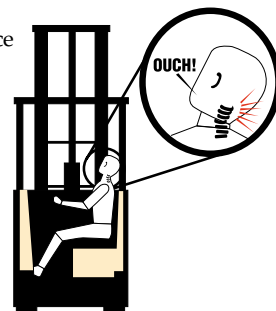
Potentially Harmful Compound Muscle Movements

Standing front and center to the task helps operators avoid potentially harmful compound muscle movements, such as twisting the neck while tilting the head back to look up (Fig. 2). Compound movements are commonly used when operating sidestance and seated-operation reach trucks, and increase the likelihood of injury or cumulative stress trauma.

Sitting Sideways Increases the Possibility of Neck Injury

Reach trucks are heavy equipment and, as with other heavy equipment, the optimum orientation of the operator is facing the task to be done. Tractors, earth-moving equipment, cranes and sit-down counterbalance forklift trucks are all designed to face the operator in the direction of the primary work activity.

Drivers working on seated sidestance lift trucks report shoulder and neck problems more than three times as often as operators of Raymond's classic universal stance trucks.*



Drivers who are forced to remain seated while working sideways limit motion to the upper body. The effect on the body is similar to sitting sideways while working at a computer. Seated operation of a sidestance truck also restricts the driver's ability to move around to see both the load and pedestrians. To increase visibility, operators seated sideways must turn and stretch neck muscles. Backrests on the driver's seat restrict movement and their position sometimes places the driver behind the mast upright, further restricting visibility.

Standing is the Optimal Working Position

Because reach truck operators are required to get off and on a reach truck as often as once for every pallet moved, standing is the optimal working position. The Raymond EASi™ reach truck's low step-height allows easier on/off of the truck, reducing operator fatigue. Stand-up operation also allows eye, head, torso and hip rotation, as well as stance adjustment to meet the task (Fig. 6).

Flexible, Comfortable, Efficient Visibility

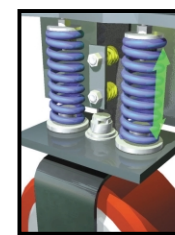
The large, roomy operator's compartment, standard on all Raymond stand-up reach trucks, provides operators with plenty of space in which to move around, adjust stance, or lean throughout the work day – minimizing harmful twisting motions and increasing visibility. Operators can turn around to fully face the direction of travel, whether traveling tractor- or forks-first. By turning the whole body slightly, operators can also increase peripheral visibility.

Raymond offers Dockstance reach trucks to provide an ergonomic alternative for those who are accustomed to sidestance operation. Raymond's Dockstance trucks allow a wider variety of positions than traditional sidestance trucks, and the location of the truck mast permits a clear view between the uprights and along the side of the mast (Fig. 6).

* Eklund, Jorgen, et. al. Head posture measurements among work vehicle drivers and implications for work and workplace design. Ergonomics, Vol 37, No. 4. pp. 623-639 (1994)

Three Tier Design Wraps the Operator in Comfort

Operators may spend eight to ten hours a day in their trucks. The operator's compartment—which is often equipped with computer displays, RF terminals and clipboards—should be roomy and absorb shocks. But most importantly, it should be stable.



Raymond's unique three-tier design provides operator comfort throughout the day. The first tier of comfort is provided by a built-in spring suspension and

a patented inertial dampener which reduce shocks and sways before they reach the operator's compartment. The second tier, a thick, impact-absorbing floor cushion, provides shift-long comfort for the operator's feet. Finally, the third tier is provided by a secure wrap-around compartment that offers multiple lean points plus generous foot and leg room.

SAE and ASME tests for comparative ride quality corroborate the three tier design as less fatiguing for operators.



Single Axis vs. Four Quadrant Controls

Reach truck operators rely on the truck's controls for almost every aspect of their work. The controls should permit simultaneous functions, such as travel, lift and lower, reach and retract, tilt, side-shift, and warning horn. Logically, the controls should be easy to learn, intuitively operated and responsive. Because of the repetitive nature of operating any vehicle, including lift trucks, good ergonomic design is critical to avoid repetitive motion injuries.

Raymond reach trucks reduce repetitive motions through the ergonomic design and use of the single-axis control handle. Shaped to fit the natural contours of the hand, the Raymond control handle is moved by pushing or pulling the whole arm and hand, rather than twisting or rotating the hand, wrist, elbow, or shoulders. This “whole arm motion” eliminates repetitive motions in the wrist commonly linked to carpal tunnel syndrome (Fig. 7).

In addition, the single axis design of Raymond's control handle does not require any movement from side to side. A single axis control handle requires less effort to operate than a four quadrant control handle, which requires pushing and pulling in four directions. When inadequate body stability is also a factor, lack of support to the operator's hand and arm when operating a four quadrant control handle may also stress the wrist and shoulders, because hand muscle tension is needed in all four directions (Fig. 8).



Raymond's single axis control handle combines stable operation with controls that operate in a logical manner. Push forward and the truck moves forward. Pull back, the truck reverses. Note below (Fig. 8) how 4-axis movement requires rolling, pushing, and pulling in four directions.

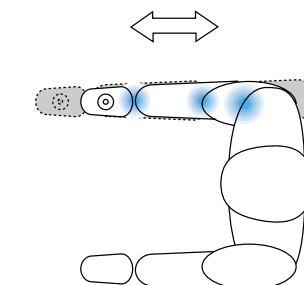


Fig. 7 – Single Axis Control

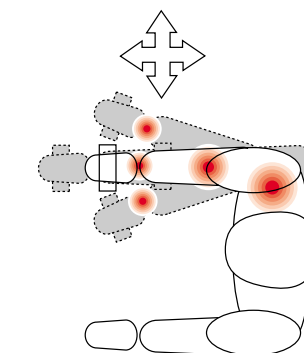


Fig. 8 – Four Quadrant Control

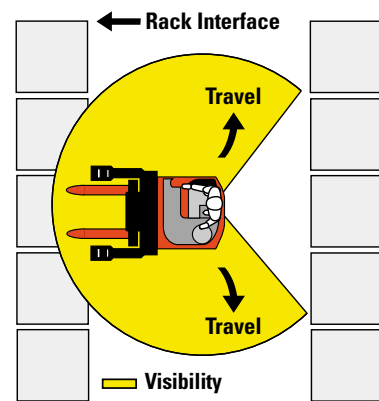


Fig. 4 – Universal stance enables operators to see in the direction of travel, reducing the chance of blind spots and providing maximum visibility up or down the aisle. Raymond's universal stance provides superior visibility to the load and aisle.

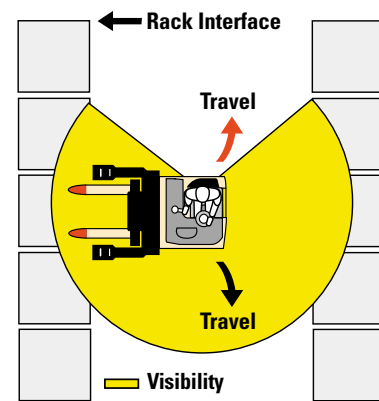


Fig. 5 – Sidestance designs increase blind spots up and down the aisle.

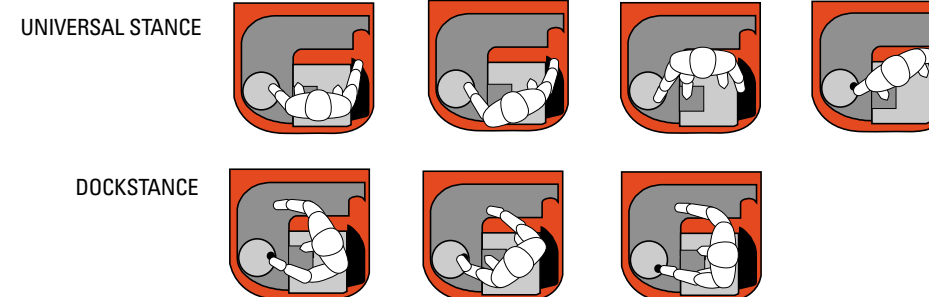


Fig. 6 – The large, roomy operator compartments, with comfortable lean points standard on all Raymond reach trucks, enable frequent change of stance for increased comfort and visibility. Ample room to frequently change stance and position has been proven to minimize operator fatigue – resulting in increased productivity.

“Increasing operator comfort results in higher productivity and reduced absenteeism.”

"4 out of 5 drivers in national rodeo competitions prefer Raymond reach trucks."

A High visibility mast.

The mast design provides a superior view of the load, forklifts, and racking.

B Mobile work station.

A user-friendly truck means a more productive operator. Every task is less than an arm's length away.

C Three-tier comfort.

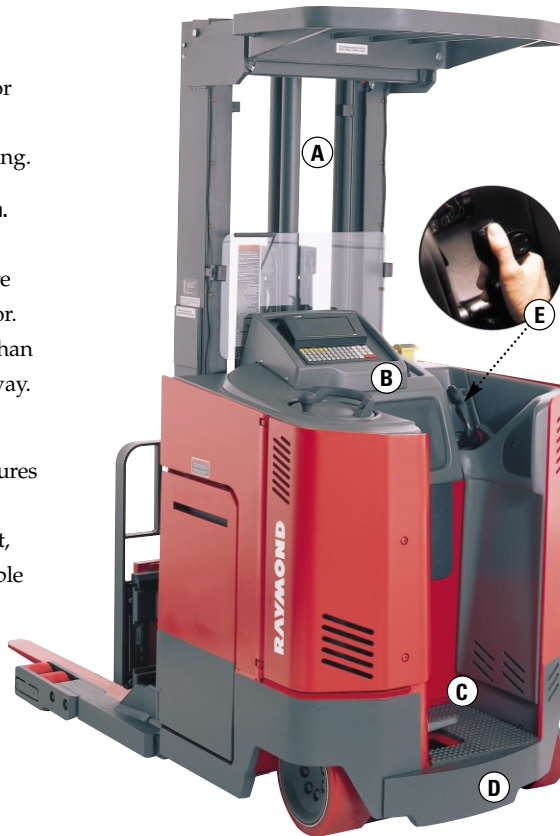
Special design features reduce shocks and sways, cushion feet, and provide multiple lean points with plenty of foot and leg room.

D Natural step height.

9" step height helps minimize operator fatigue.

E Logical, intuitive control.

Raymond's control handle works simply and logically on a single axis: push forward and the truck moves forward; pull back and the truck reverses.



"I have been using Raymond® reach trucks for 20 years. The fore and aft stance and all the controls at your finger tips make Raymond easier to use."

– Jeff, British Columbia

"I look at the long term effects on the user. The operators say they like the smoother ride, lower step height, and all-in-one controls. These make Raymond's trucks easier to use."

– Larry, Oklahoma

"The controls give you good hand, arm, and wrist support while operating. This reduces operator fatigue."

– John, Tennessee

"The speed of the truck and the ability to operate the controls with one hand make them safe and productive. The operators feel the trucks move smoothly. They are not as fatigued because of the good ride."

– Jeff, North Carolina

"Raymond is by far the most user friendly. Raymond is more comfortable on the feet than other models. Less pressure is needed to operate the deadman. You don't get cramps in the arches of your feet."

– Jimmy, California

"The fore and aft stance is a great feature."

– Jim, Illinois

"The all-in-one control handle allows operators to perform multiple functions at the same time. The ride is smoother, therefore operators get less back and leg strain."

– Norman, Ontario

Noonan, Tom. *Ergonomic and Reach Truck Applications*. The Raymond Corporation (1994)

Noonan, Tom. *So Why do we Stand?* The Raymond Corporation (1998)

Eklund, Jorgen, et. al. *Head posture measurements among work vehicle drivers and implications for work and workplace design*. *Ergonomics*, Vol 37, No. 4. pp. 623-639 (1994)

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