



# Jacking & Rolling: Best Practices

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# WHO WE ARE

A world leader in educational and technical services for organizations that utilize cranes, rigging, and load handling equipment.



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# AGENDA **LEARNING OBJECTIVES**

1. Jack Components
2. Industrial Roller Components
3. Blocking Material
4. Inspection
5. Equipment Interface-to-Load
6. Placement and Usage
7. 3 vs. 4 Rollers
8. Load Share
9. Parking
10. Crib Piles
11. Incline Planes



# AGENDA #1 – JACK COMPONENTS

- Mechanical



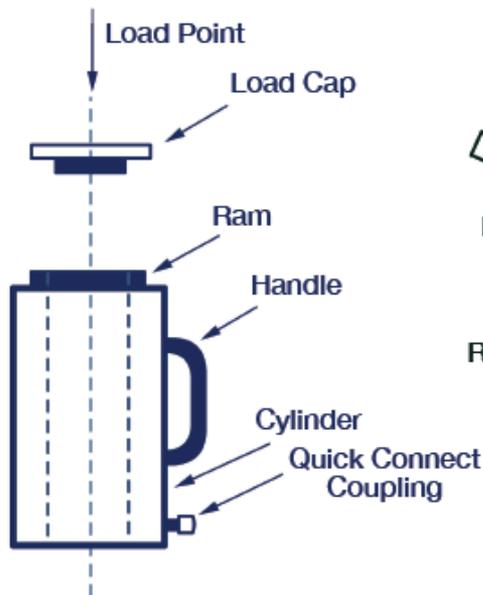
- Hydraulic



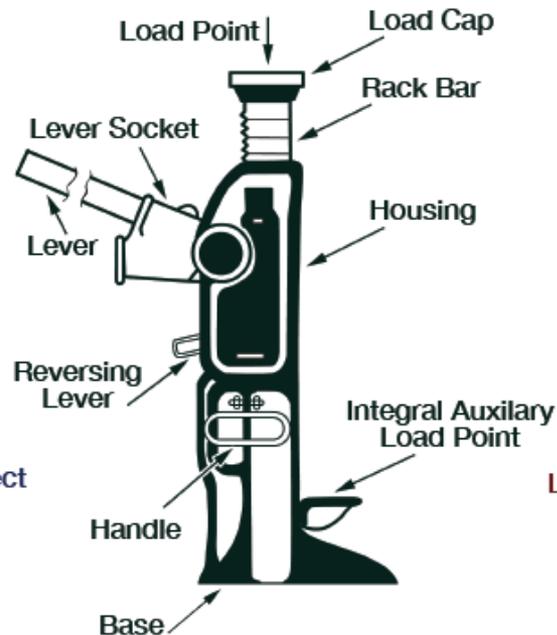
# AGENDA #1 – JACK COMPONENTS

## Jack Components

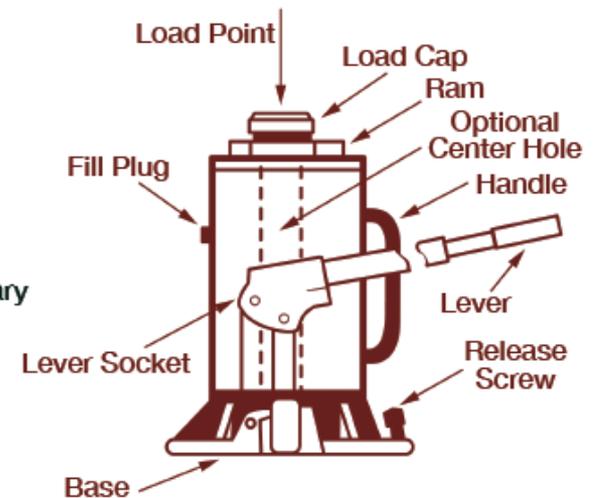
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**Figure 1**  
Single-Acting  
Hydraulic Jack



**Figure 2**  
Ratchet Jack



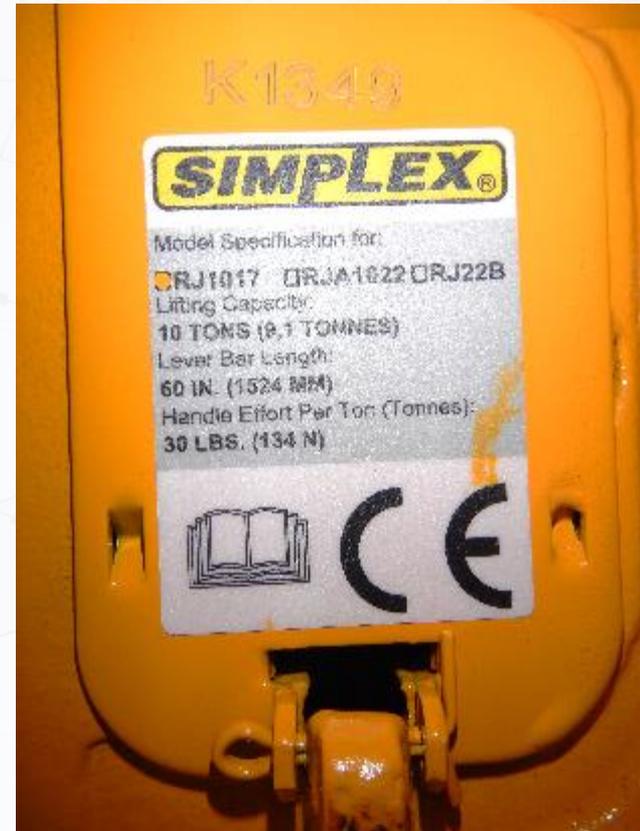
**Figure 3**  
Self-Contained  
Hydraulic Jack

# AGENDA #1 – JACK COMPONENTS

- Right Handle for the Jack
  - True fit
  - Proper leverage
- Remove handles when not in use



# AGENDA #1 – JACK COMPONENTS

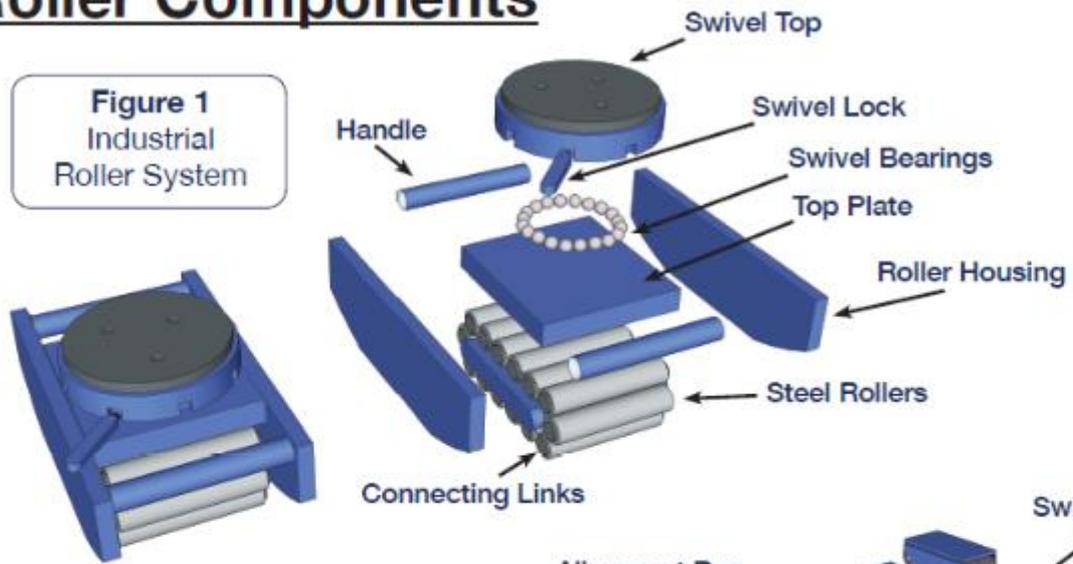


# AGENDA #2 – INDUSTRIAL ROLLERS COMPONENTS

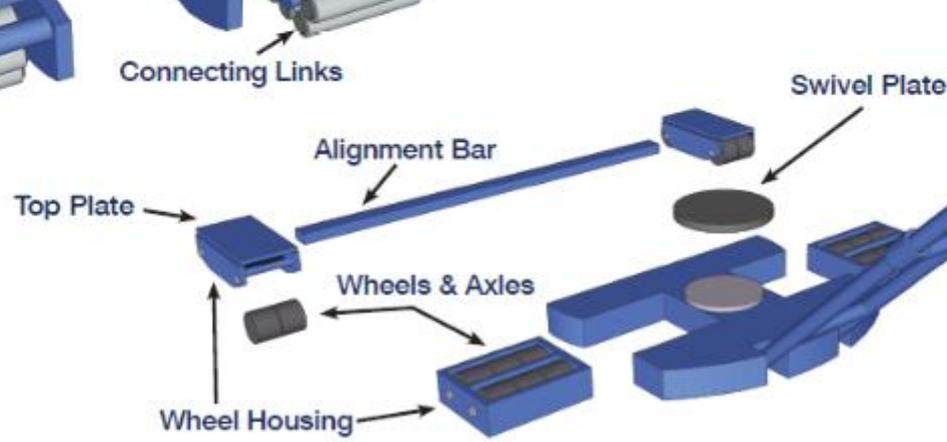
## Roller Components

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**Figure 1**  
Industrial  
Roller System



**Figure 2**  
Three-Point  
Wheel System



# AGENDA #2 – INDUSTRIAL ROLLERS COMPONENTS

- Conventional
  - Roller type



# AGENDA #2 – INDUSTRIAL ROLLERS COMPONENTS

- Three-point Rolling System



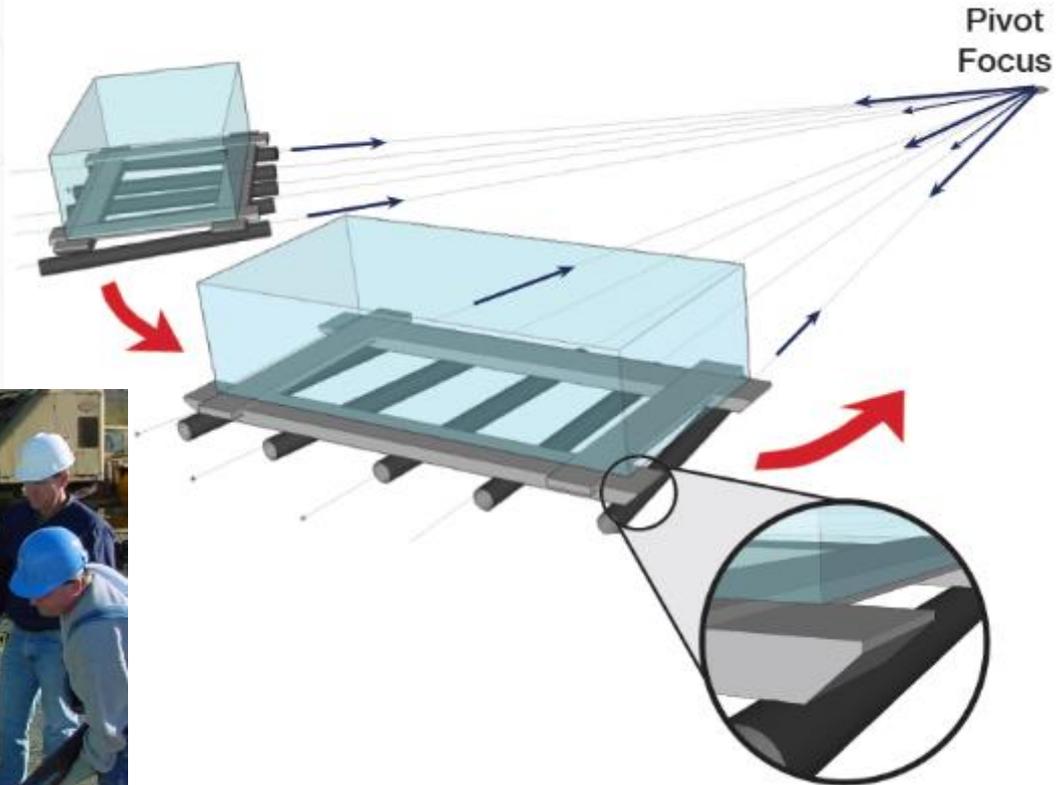
# AGENDA #2 – INDUSTRIAL ROLLERS COMPONENTS

- Steering Handles
  - Use palm down in case load strikes handle
  - Allow other people or equipment to propel, not by steering handle unless designed



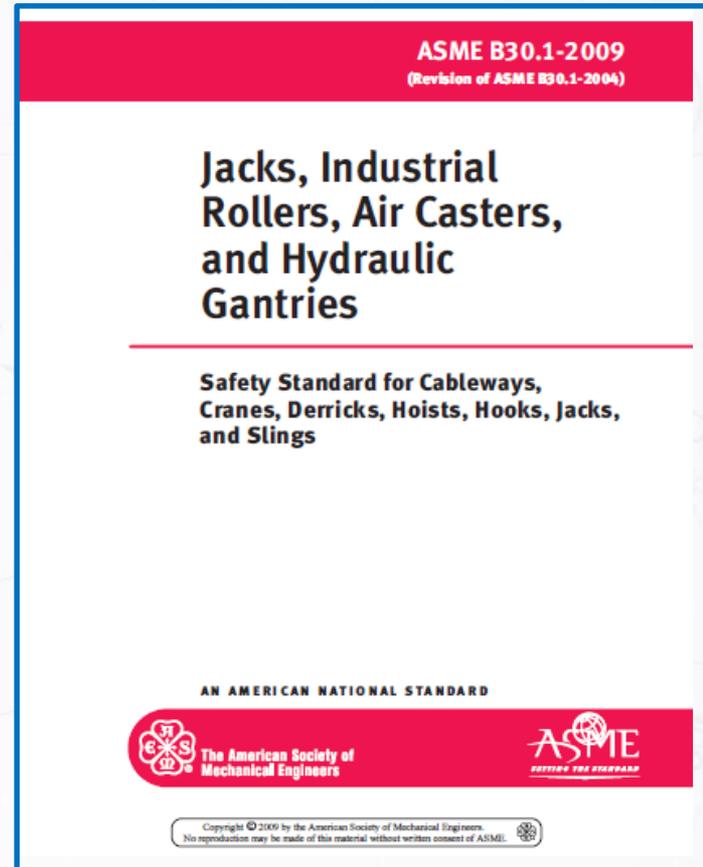
# AGENDA #2 – INDUSTRIAL ROLLERS COMPONENTS

- “Old School” Pipe or Round Stock



# AGENDA #4 – INSPECTION

- Missing or Illegible Identification
- Deformation
- Leaks (Hyd.)
- Ratchet Operation



# AGENDA #5 – EQUIPMENT INTERFACE-to-LOAD

- Mechanical / Hydraulic
  - Primary Load Point
  - Auxiliary Load Point
- Use wood or compressive material



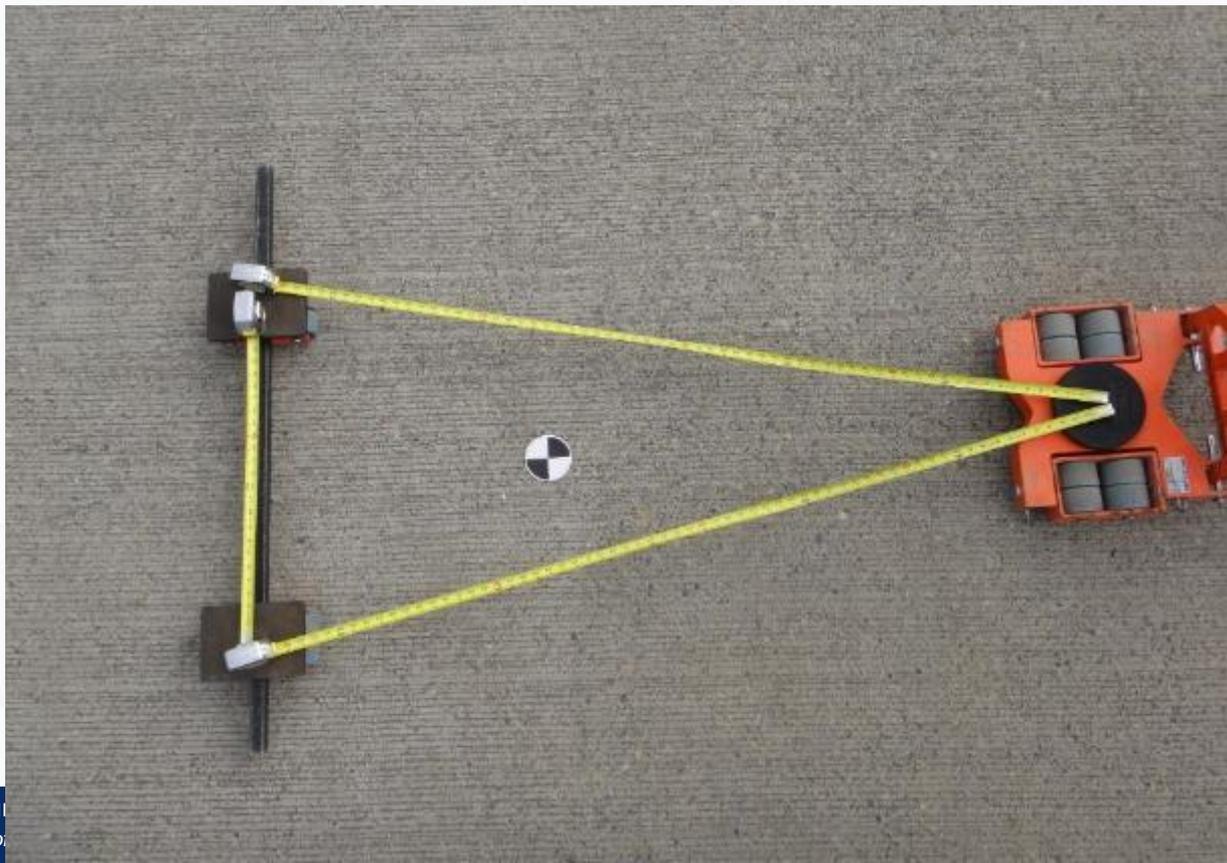
# AGENDA #6 – PLACEMENT AND USAGE - Jacks

- Solid and Level Surface
  - Can be jacked sideways
- Stay within Rated Capacity
  - Be aware of cross-corner loading
- If Two, Synchronize Up / Down
- 2 / Side, 2 / End



# AGENDA #6 – PLACEMENT AND USAGE Jacks or Rollers

- Stability Triangle



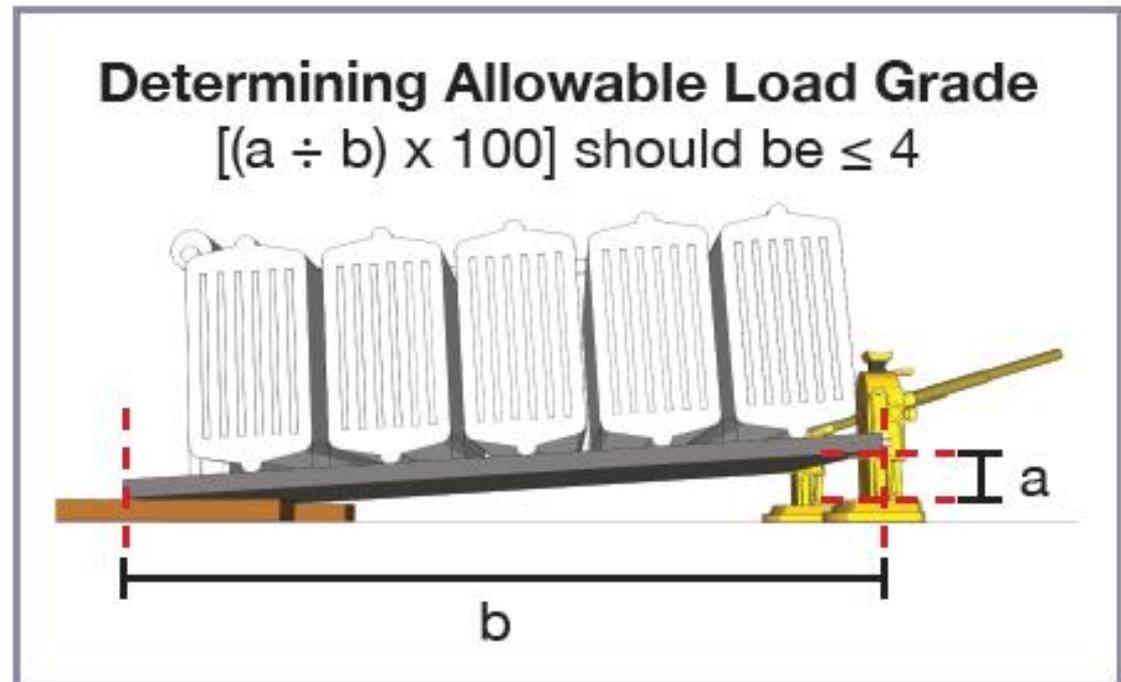
# AGENDA #6 – PLACEMENT AND USAGE - Rollers

- Single Steering When Possible



# AGENDA #6 – PLACEMENT AND USAGE - Grade

- Do Not Exceed 4% Grade
  - Load tipping
  - Jack Tipping
  - 4/100



# AGENDA #6 – PLACEMENT AND USAGE - Rollers

- Floor and travel path must be free of debris

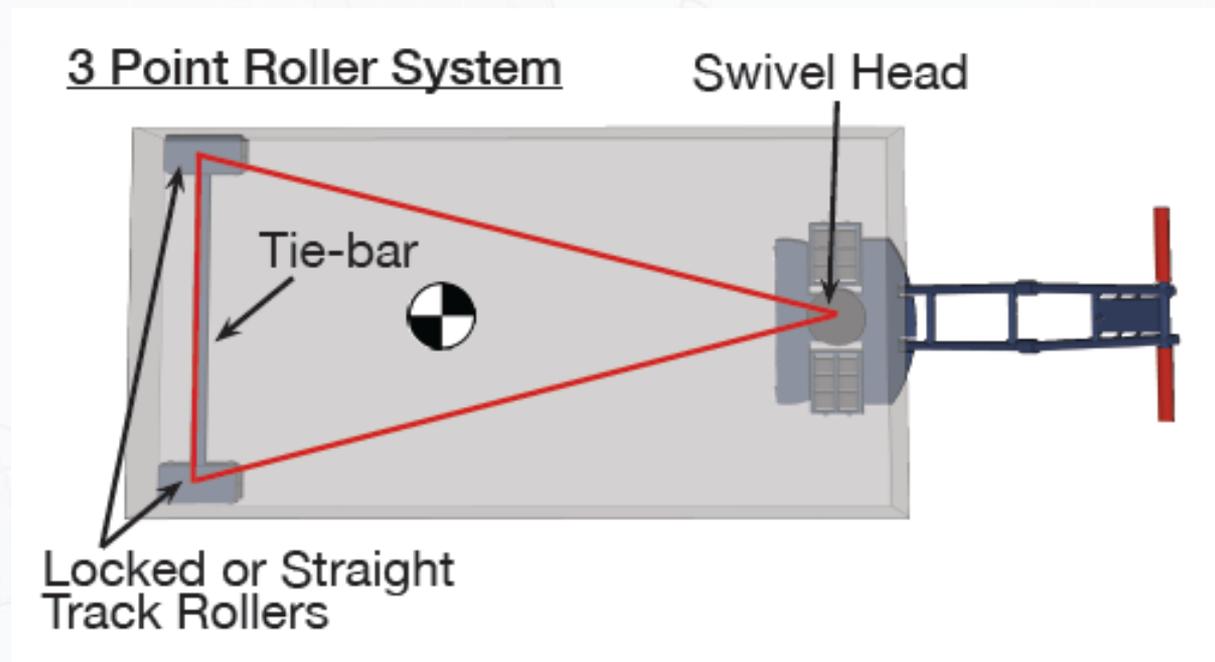
# AGENDA #7 – 3 vs. 4 ROLLERS

- Load Supported on 4 Rollers
  - Undulations in floor can cause loss of 1-2 rollers
  - Lose load support, teeter-totter opposite corners
  - Overload rollers or floor (psi)



# AGENDA #7 – 3 vs. 4 ROLLERS

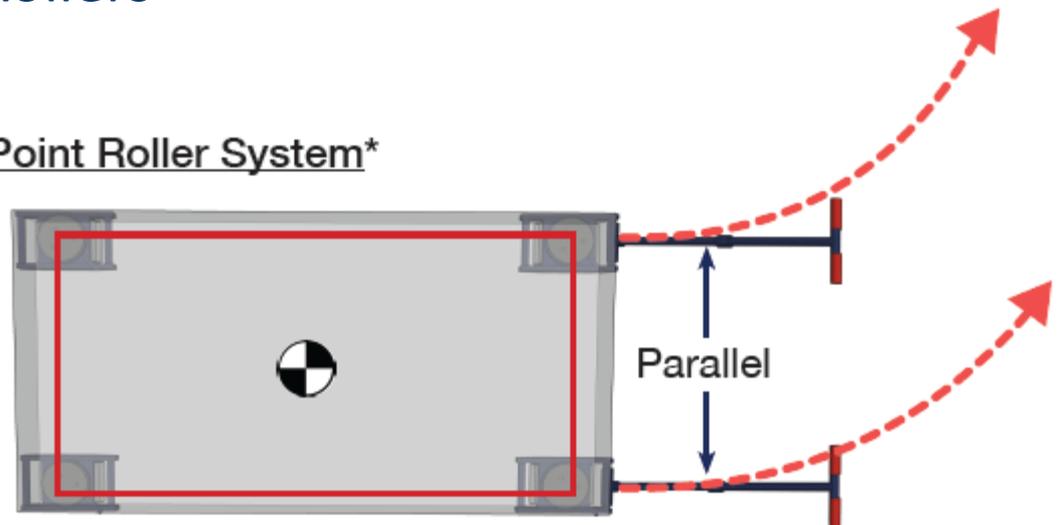
- Load Supported on 3 Rollers
  - Common to impose 50% load on steering roller
  - Maintains constant load to all rollers
  - 3-leg milking stool concept



# AGENDA #7 – 3 vs. 4 ROLLERS

- Generally, 4 Rollers
  - Steering on one end
    - Primary steering roller
    - Secondary steering roller
  - Trailing straight on other end
- Slalom Ski the Steering Rollers
  - Avoid snow plowing
- On Steering Rollers  
Find the Direction that  
Provides the Least  
Resistance

4 Point Roller System\*



# AGENDA #7 – 3 vs. 4 ROLLERS, STEERING – 3 Rollers

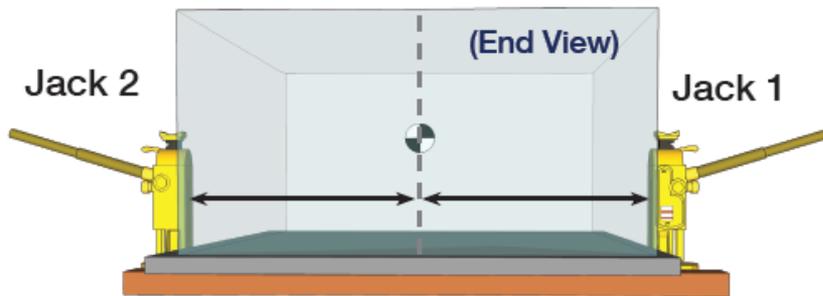
- Generally
  - Single steering on one end
    - Handle can pass under the load end if needed
  - Trailing straight on other end with alignment bar
  - Produce tighter turns using “school bus” set-up



# AGENDA #8 – LOAD SHARE

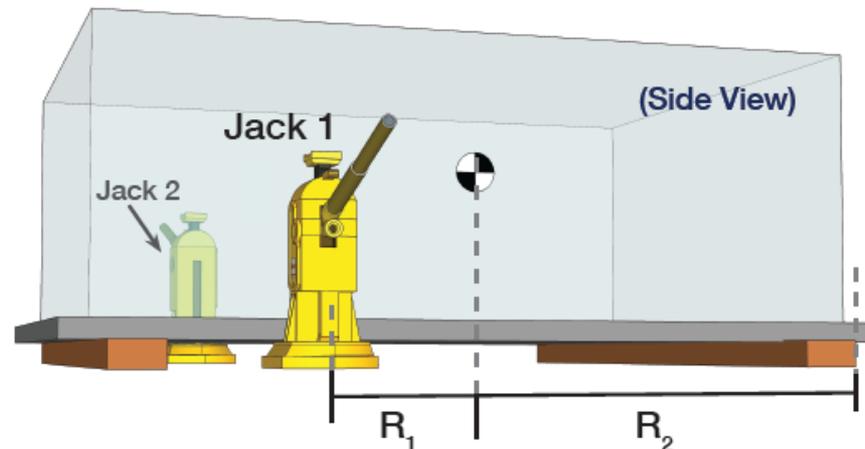
## Calculating Load Share

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Load Share @ Jack 1	Legend
$R_1 + R_2 = TS$	$R_1 = \text{Run, Side 1}$
$R_2 \div TS = P$	$R_2 = \text{Run, Side 2}$
$P \times W \div 2 = \text{Load Share @ Jack 1}$	$TS = \text{Total Span}$
	$P = \text{Percentage}$
	$W = \text{Weight of Load}$

**NOTE:**  $R_1$  is the same for both Jack 1 & Jack 2



# AGENDA #8 – LOAD SHARE

$$R1 + R2 = TS$$

$$R2 / TS = P$$

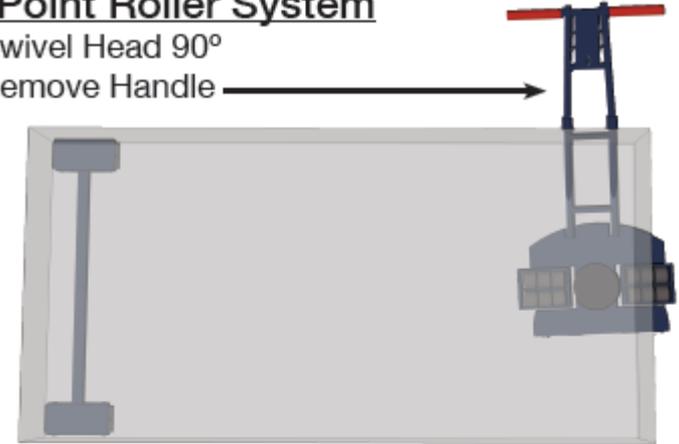
$$P \times W / 2 = J1 \text{ Load}$$

# AGENDA #9 – PARKING

- Block an End or Side of the Load
- Restrain the Load with Stay Lines or Winch Lines
- Turn the Rollers to Create Immobility

## 3 Point Roller System

- Swivel Head 90°
- Remove Handle



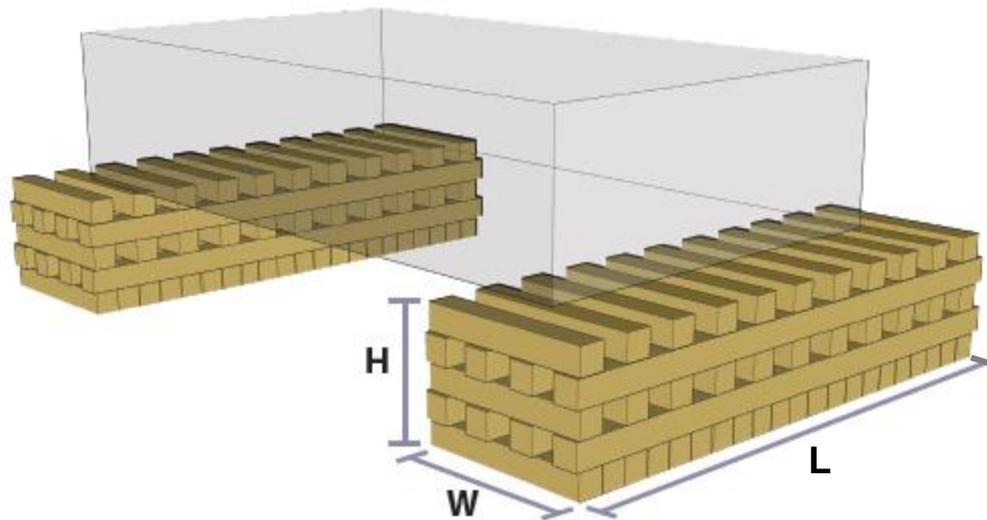
## 4 Point Roller System

- Remove Handles
- Orient Skates to Center
- Only 2 Skates required to be turned for parking



# AGENDA #10 – CRIB PILES

- “Lincoln Log Cabin Style”
- Create Columns in the Crib Pile
  - Height  $\leq 2 \times$  Width



# AGENDA #10 – CRIB PILES

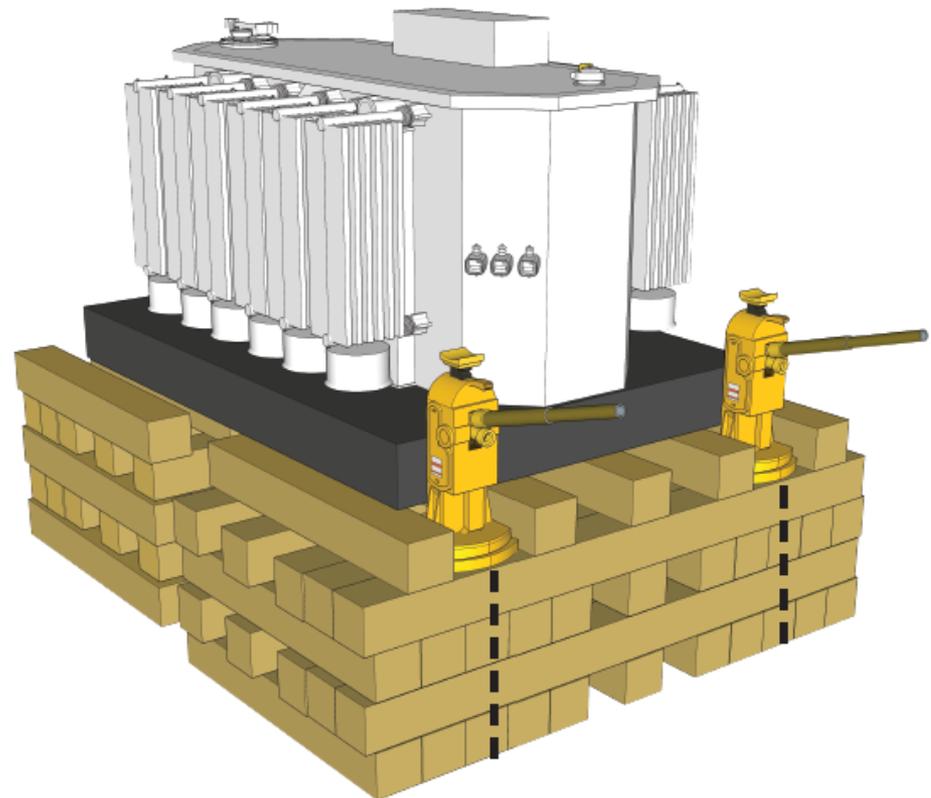
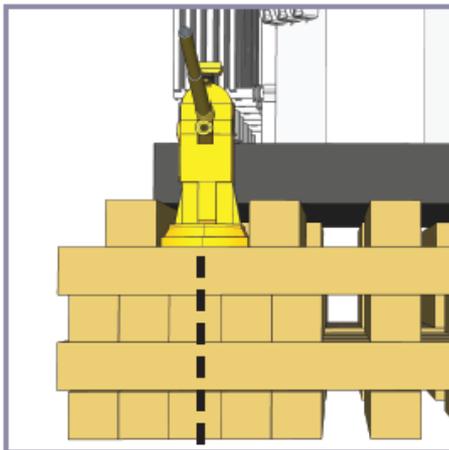
## Jacking From The Crib Pile

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Ensure that a column of crib material is aligned below the jack.

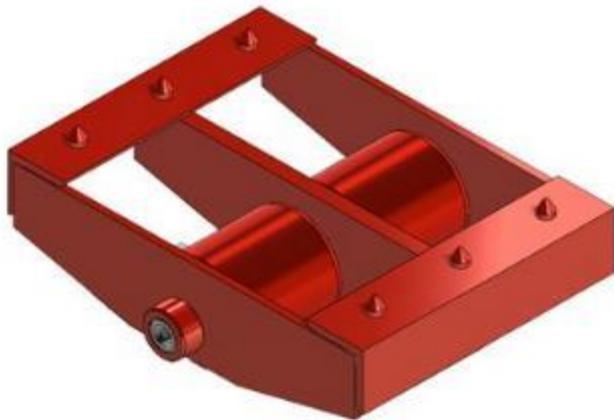
The jack's primary or auxiliary load point fully engages the load.

The jack base is fully supported.

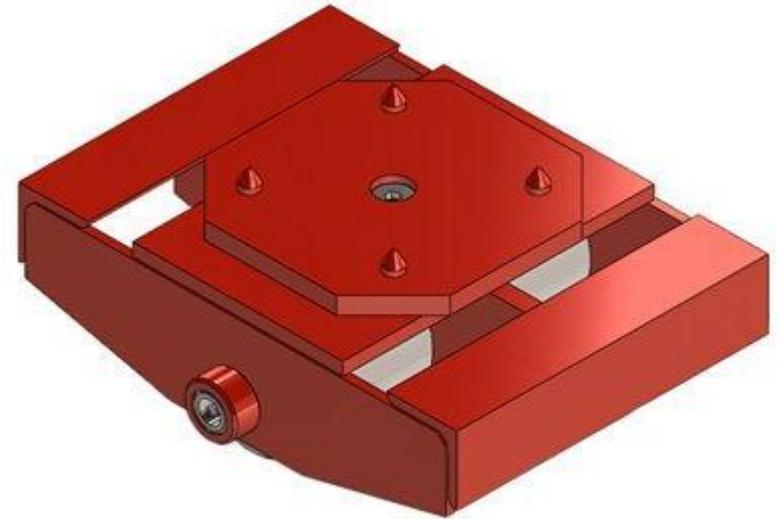


# AGENDA #11 – INCLINE PLANES

- Ensure Rollers are Designed to Maneuver over Transition Point



Tilt Type Rigid Roller



Tilt Type Swivel Roller

# AGENDA #11 – INCLINE PLANES

- Calculate the Added Force on the Winch Caused by the Incline

## Level & Incline Planes [For Estimation Only]

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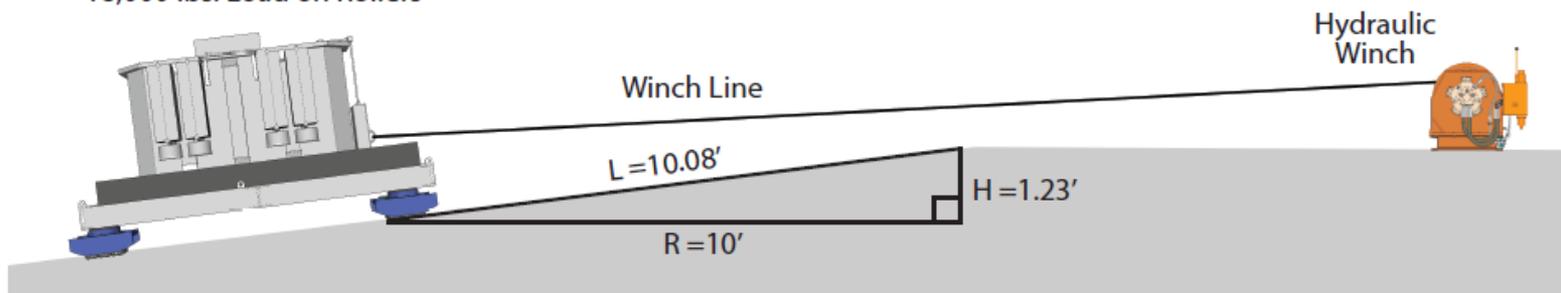
Formulas	Legend
Level: $CF \times W = F$	<b>W</b> = Weight of load
Uphill: $[CF \times W \times (R \div L)] + [(H \div L) \times W] = F$	<b>CF</b> = Coefficient of Friction
Downhill: $[CF \times W \times (R \div L)] - [(H \div L) \times W] = F$	<b>F</b> = Force required to move load
	<b>H</b> = Height in feet
	<b>R</b> = Run, horizontal distance in feet
	<b>L</b> = Length of ramp in ft.

Coefficients of Friction	
Concrete on concrete	.65
Metal on concrete	.60
Wood on wood	.50
Wood on concrete	.45
Wood on metal	.30
Cast iron on steel	.25
Steel on steel	.10
Load on rollers	.05
Load on ice	.01
Load on air	.002

$$R^2 + H^2 = L^2$$

$$L = \sqrt{(10')^2 + (1.25')^2} = 10.08'$$

18,000 lbs. Load on Rollers



Example: Uphill:  $[.05 \times 18,000 \times (10 \div 10.08)] + [(1.23 \div 10.08) \times 18,000] = F$   
 $891 + 2,160 = F$   
 $3,051 \text{ lbs.} = F$

# QUESTIONS?



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