Innovation, Safety and Customization in Crane Transportation

June 4, 2016

2016 Conference

June 1 - 4, 2016

CALGARY

Presented by: Tony Niese

CRANE RENTAL ASSOCIATION OF CANADA
ASSOCIATION CANADIENNE DE LOCATION DE GRUES

Innovation, Safety and Customization in Crane Transportation

- Overview of Nelson
- Pin ‘n Go for Rough Terrain Cranes
- Boom Dollies for Truck and AT Cranes
- Boom Launch Trailers for AT Cranes
- Boom Dolly Safety Guide

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ASSOCIATION CANADIENNE DE LOCATION DE GRUES

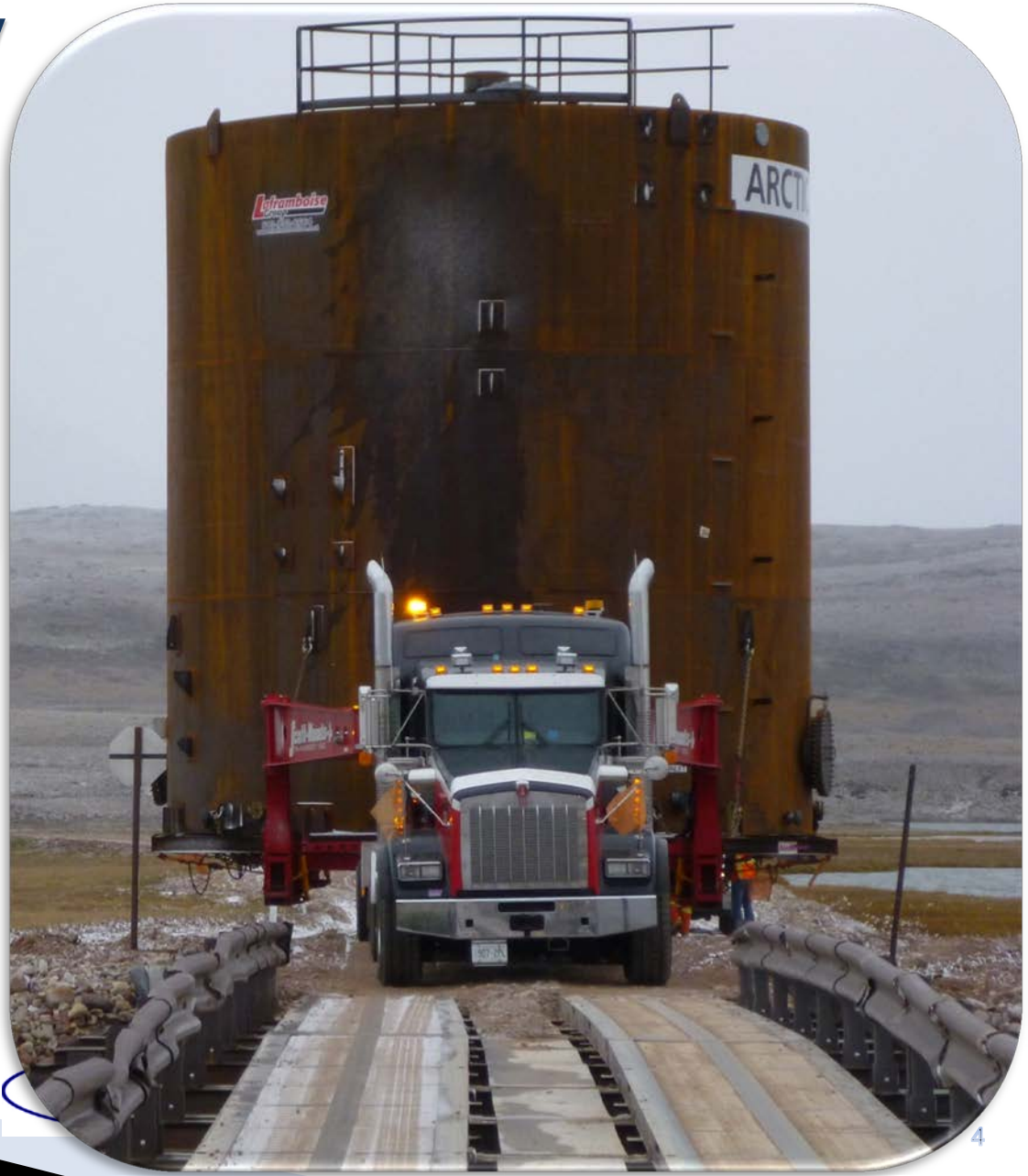
NELSON MANUFACTURING

Nelson Manufacturing Company

- Established in 1947 by Jack and Virginia Nelson as a “Lowboy” Trailer Manufacturer.
- Located at Present Location in Ottawa, Ohio since 1956.
- Designs and builds specialty trailers for numerous industries including: heavy haul trucking, aerospace, automotive, nuclear, crane and rigging.
- Provides transportation solutions for cranes with crane boom carriers and boom launch trailers.
- Offers structural repairs and complete rebuilds of trailers and boom dollies.

Nelson Multi-Axle Trailers

For the Heavy Haul Industry



Nelson MA-80 Hydraulic Adjustable Width Deck 80 Ton Capacity Trailer

Owned by Scott Woods Transport, Inc.

House Boat Transport Trailer

Maximum House Boat Size: 120’ Long x 20’ Wide x 15’ Tall

NELSON MANUFACTURING

Nelson 100 Ton Multi-Axle Trailer

Trailer features:

(20) Axles with Disc Brakes

Nelson Air Ride Trunnion Axle Suspensions

Hydraulic Steering on (3) Axle Groups

Recessed Well Deck Section

NELSON MANUFACTURING

Modular Concrete Beam Hauler

4 + 4 + 4 Unit Converts into multiple different smaller units

NELSON MANUFACTURING

Mobile Transformer Trailers

Nelson provides custom trailers for several mobile transformer and sub station integrators including CG Power Solutions, Delta Star and Elgin Power.

Airbus A319/A320 72’ Van

NELSON MANUFACTURING

Airbus A319/A320 72’ Van

Wing is loaded with door rotated down. The door rotates closed and providing a water proof seal for shipment.

Grain Dryer Transport / Erector Trailer

Transports and erects flow through Brock Grain dryers

NELSON MANUFACTURING

Nuclear Power Plant Module Up-ender

Shaw “Up-ender”
Empty Weight: 170,670 LBS
Capacity: 100,000 LBS
Overall Length: 86’- 0”
Overall Vertical Height: 85’- 7”
Overall Width: 17’- 3”

Atlas V Centaur Shipping Van

NELSON MANUFACTURING

James Webb Space Telescope Transport Assembly

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JWST "Mini" STTARS

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High Capacity Rollover Fixtures

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Spacecraft Shipping Container

Container Rated for 2.25 PSI Internal Pressure
Payload Isolation System
Environmental Controls
Steering / Raise and Lower / Removable Axles
Mass Simulator

NELSON MANUFACTURING

Nelson Crane Transportation Equipment History

- First boom dolly was built in 1962 for a P & H truck crane
- Our first load transfer axle was built in 1968 for a P & H crane
- Our first boom launch trailer was built in 1995 for a Krupp KMK6275

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- **Pin ‘n Go for Rough Terrain Cranes**

NELSON MANUFACTURING

Pin ‘n Go for Rough Terrain Cranes

Can be designed to accommodate most any RT crane. Nelson works with the crane manufacturers to ensure a structurally sound connection.

Pin ‘n Go for Rough Terrain Cranes

- Advantages of the Pin ‘n Go vs a lowboy trailer
- Front and Rear Pin Together for “empty” travel
- No Tie Down Required
- Quick Load and Unload
- Lighter weight

Pin ‘n Go system offers a simpler, easier and safer loading / unloading operation.

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- **Boom Dollies for Truck and AT Cranes**

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Nelson Crane Boom Carriers

- Nelson works with all of the crane manufacturers to ensure that we use an “approved” boom connection.
- We work with the crane manufacturer’s to develop an estimated axle weight configuration that will meet the local transportation requirements.
- Nelson has an internal 60/40 rule.
  - 60% minimum of the gross weight on the crane axles
  - 40% maximum of the gross weight on the dolly axles

Nelson Crane Boom Carriers

Nelson CBC-30ST shown with a Link-Belt HTC-86110 crane

Nelson CBC-40RT shown with a Link-Belt HTC-86100 Crane

NELSON MANUFACTURING

Nelson Crane Boom Carriers

Nelson CBC-30WS on a
Tadano ATF-220G-5

Nelson CBC-50RT on a
Grove GMK5275

NELSON MANUFACTURING

Nelson CBC-50RT Shown with Liebherr LTM1130-5.1 Crane

Nelson Crane Boom Carriers

Nelson CBC-30RT on a Link-Belt HTC-3140 Truck Crane

Nelson CBC-30P with a Potain Self Erecting Tower Crane

NELSON MANUFACTURING

Nelson Crane Boom Carriers

Nelson CBC-30RT shown with a Liebherr LTM-1160-5.1 Crane

Nelson CBC-30S shown with a Terex AC250 Crane

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- **Boom Launch Trailers for AT Cranes**

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Nelson Boom Launch Trailer

The Nelson boom launch trailer safely removes the boom from an AT crane for over the road transport in 30 – 45 minutes.

Nelson Boom Launch Trailer

- The launch trailer provides a safe method to transport large cranes without the use of a boom dolly.
- Launch times are approximately 30 – 45 minutes depending upon the crane, operator experience, site conditions and weather conditions.
- All Nelson launch trailers are test loaded prior to shipment.
- Nelson provides on site training with each boom launch trailer.

NELSON MANUFACTURING

Nelson Boom Launch Trailer

Nelson Boom Launch Trailer undergoing test loading prior to shipment.

Why Test Load?

Confirms structural integrity of the trailer frame and launching mechanism.

Verifies that the hydraulic system is set correctly, all functions operate properly and all hoses are installed correctly.

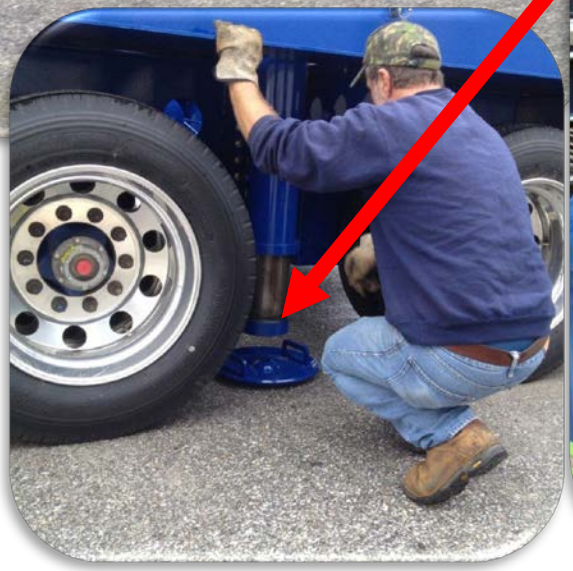
Allows for a thorough inspection for hydraulic leaks in the hoses, fittings, valves and cylinders.

Verifies wireless remote operation.

Nelson Boom Launch Sequence

BACK THE LAUNCH TRAILER UP TO THE CRANE TO THE REQUIRED DISTANCE.

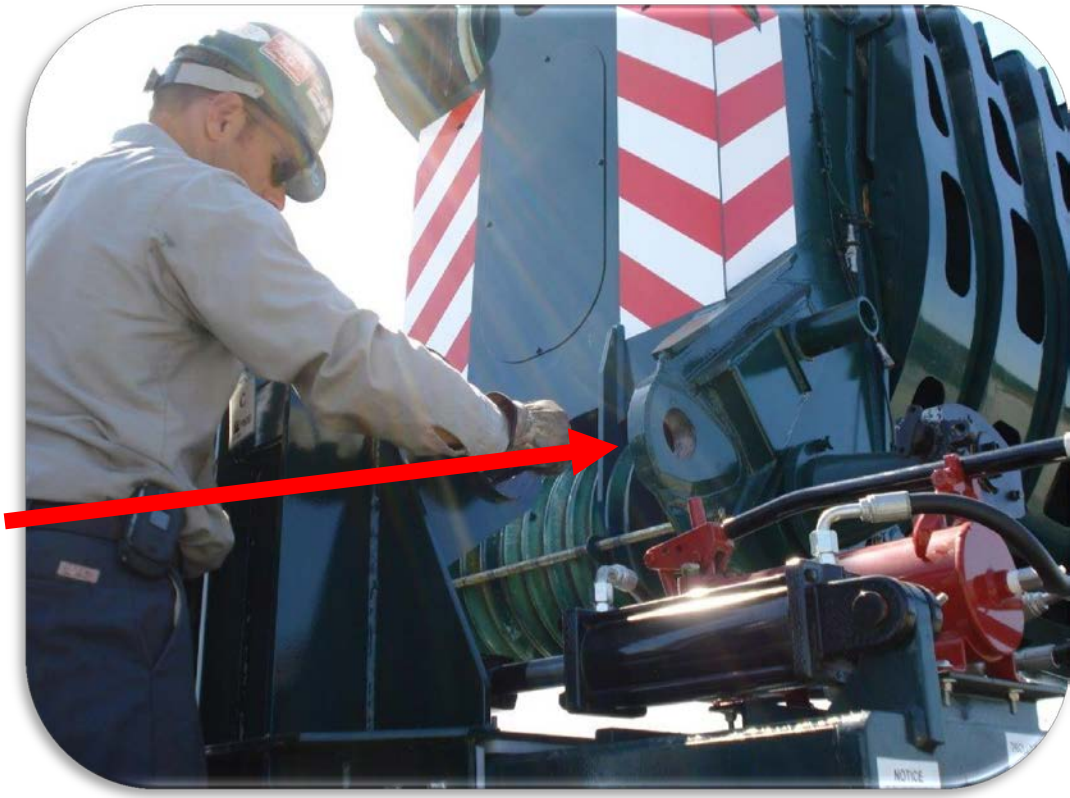
RUN THE HYDRAULIC JACKS DOWN TO LEVEL THE TRAILER AS YOU WOULD THE CRANE



NELSON MANUFACTURING

Nelson Boom Launch Sequence

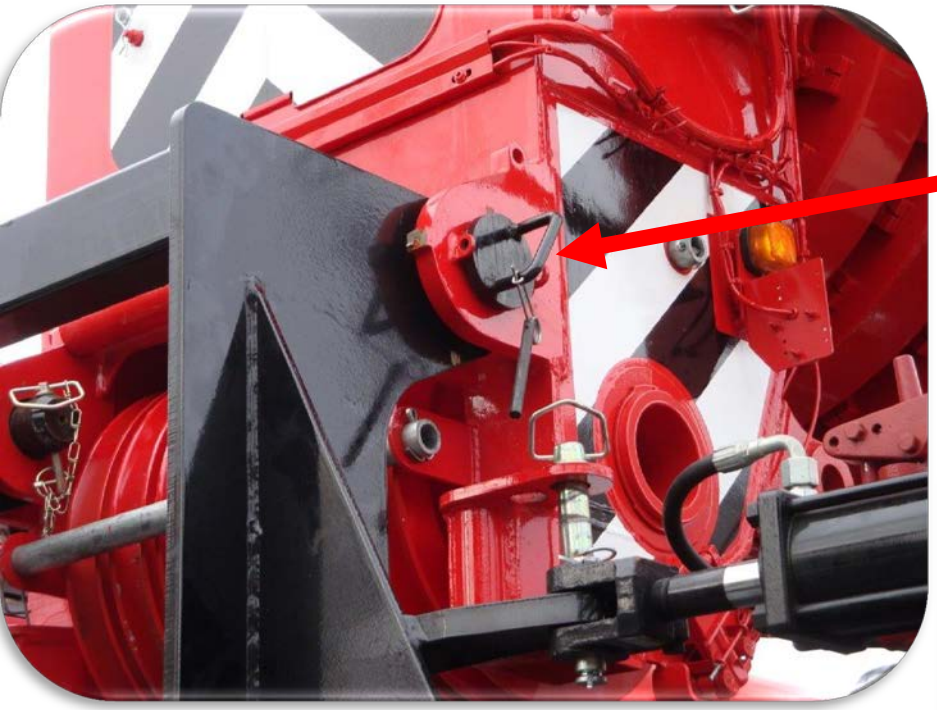
WITH THE JIB OFF THE BOOM, BLOCK OFF, HEADACHE BALL REMOVED; START TO LOWER DOWN THE BOOM.



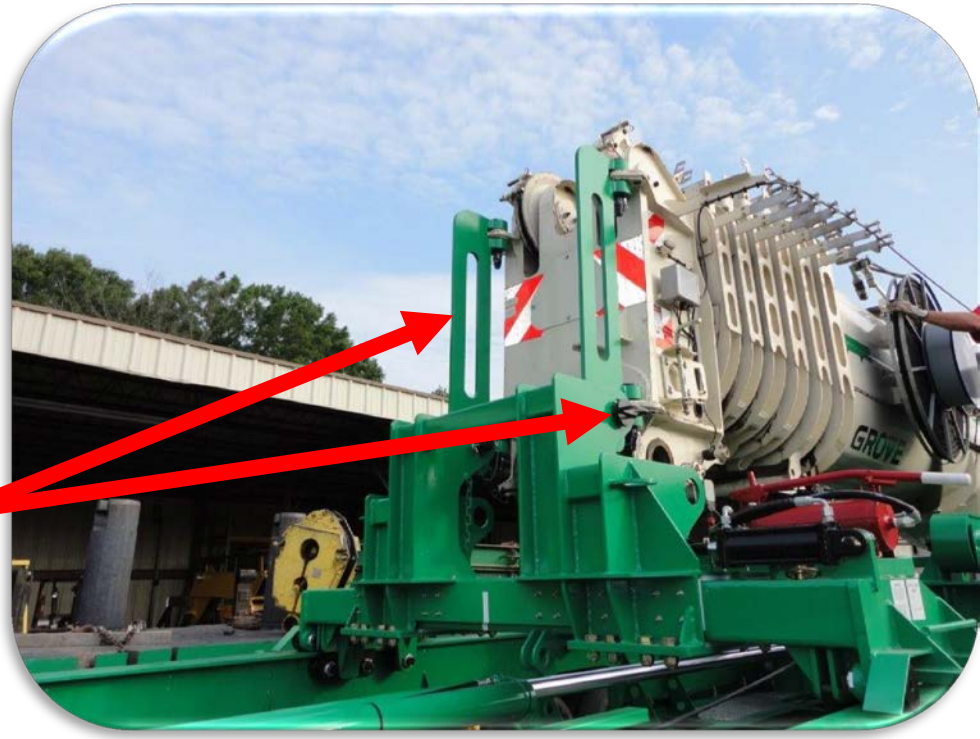
MANUALLY ROLL THE FRONT TROLLEY AND PIN OFF TO THE REQUIRED LOCATION ON THE CRANE BOOM HEAD

NELSON MANUFACTURING

Nelson Boom Launch Sequence



Boom head pinning to the front trolley varies per crane model.



Some use the Jib swing away brackets which requires an adaptor plate that we furnish.

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Nelson Boom Launch Sequence

Once the boom head is pinned move the main trolley to engage the boom pick point. These pick points vary depending upon the crane model.

Pick points include shafts on the side of the boom, lugs welded to the boom and Nelson supplied saddles that cradle the boom**. All Nelson launch trailers have crane manufacturer approved pick points**.

NELSON MANUFACTURING

Nelson Boom Launch Sequence

Depending upon the boom and your specific travel requirements the luffing cylinders may or may not be “launched” with the boom.

The crane manufacturer typically will have provisions to support the luffing cylinders either on the boom during or crane carrier for transport. These provisions by crane manufacturer and boom

NELSON MANUFACTURING

Nelson Boom Launch Sequence

Using the remote to operate the trailer the operator can position him or her self to where they can see the rear boom pins.

With the trailer hydraulics begin to put pressure on the boom and release the boom but pins. The trailer now has the full weight of the boom supported.

NELSON MANUFACTURING

Nelson Boom Launch Sequence

The launch trailer provides all the functionality to travel the boom. Crane hydraulics are NOT needed to launch the boom onto the trailer.

Once the main trolley is connected to the boom hydraulically travel to the transport position on the boom.

NELSON MANUFACTURING

Nelson Boom Launch Sequence

Once the boom is into the proper position hydraulically lower the boom into the rear boom support saddles. Remove the weight from the main trolley for transport.

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Nelson Boom Launch Sequence

Raise up the hydraulic legs, turn off they pony motor on the trailer, strap the boom down and complete your pre-trip inspection. The boom is now ready to be transported.

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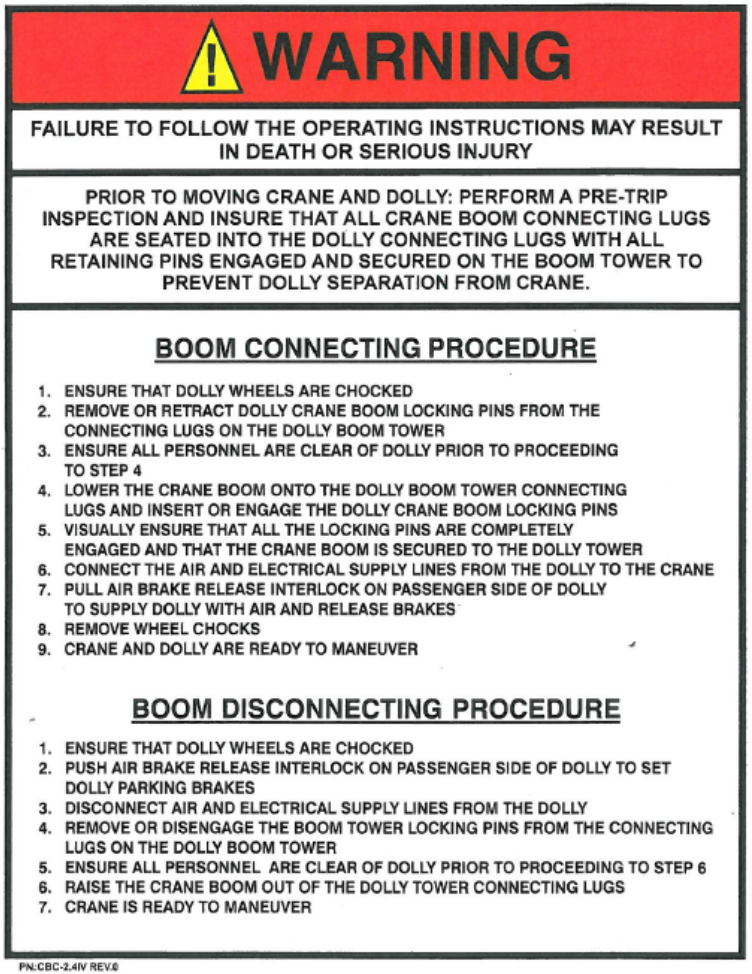
- **Boom Dolly Safety Guide**

NELSON MANUFACTURING

Boom Dolly Safety

- Always follow trailing boom dolly operation procedures in your crane manual.
- Always follow the boom connection procedure provided with the dolly.
- Nelson places the connection procedure on the dolly.
- Procedures vary depending upon the dolly type and crane.



WARNING

FAILURE TO FOLLOW THE OPERATING INSTRUCTIONS MAY RESULT IN DEATH OR SERIOUS INJURY

PRIOR TO MOVING CRANE AND DOLLY: PERFORM A PRE-TRIP INSPECTION AND INSURE THAT ALL CRANE BOOM CONNECTING LUGS ARE SEATED INTO THE DOLLY CONNECTING LUGS WITH ALL RETAINING PINS ENGAGED AND SECURED ON THE BOOM TOWER TO PREVENT DOLLY SEPARATION FROM CRANE.

BOOM CONNECTING PROCEDURE

1. ENSURE THAT DOLLY WHEELS ARE CHOCKED
2. REMOVE OR RETRACT DOLLY CRANE BOOM LOCKING PINS FROM THE CONNECTING LUGS ON THE DOLLY BOOM TOWER
3. ENSURE ALL PERSONNEL ARE CLEAR OF DOLLY PRIOR TO PROCEEDING TO STEP 4
4. LOWER THE CRANE BOOM ONTO THE DOLLY BOOM TOWER CONNECTING LUGS AND INSERT OR ENGAGE THE DOLLY CRANE BOOM LOCKING PINS
5. VISUALLY ENSURE THAT ALL THE LOCKING PINS ARE COMPLETELY ENGAGED AND THAT THE CRANE BOOM IS SECURED TO THE DOLLY TOWER
6. CONNECT THE AIR AND ELECTRICAL SUPPLY LINES FROM THE DOLLY TO THE CRANE
7. PULL AIR BRAKE RELEASE INTERLOCK ON PASSENGER SIDE OF DOLLY TO SUPPLY DOLLY WITH AIR AND RELEASE BRAKES
8. REMOVE WHEEL CHOCKS
9. CRANE AND DOLLY ARE READY TO MANEUVER

BOOM DISCONNECTING PROCEDURE

1. ENSURE THAT DOLLY WHEELS ARE CHOCKED
2. PUSH AIR BRAKE RELEASE INTERLOCK ON PASSENGER SIDE OF DOLLY TO SET DOLLY PARKING BRAKES
3. DISCONNECT AIR AND ELECTRICAL SUPPLY LINES FROM THE DOLLY
4. REMOVE OR DISENGAGE THE BOOM TOWER LOCKING PINS FROM THE CONNECTING LUGS ON THE DOLLY BOOM TOWER
5. ENSURE ALL PERSONNEL ARE CLEAR OF DOLLY PRIOR TO PROCEEDING TO STEP 6
6. RAISE THE CRANE BOOM OUT OF THE DOLLY TOWER CONNECTING LUGS
7. CRANE IS READY TO MANEUVER

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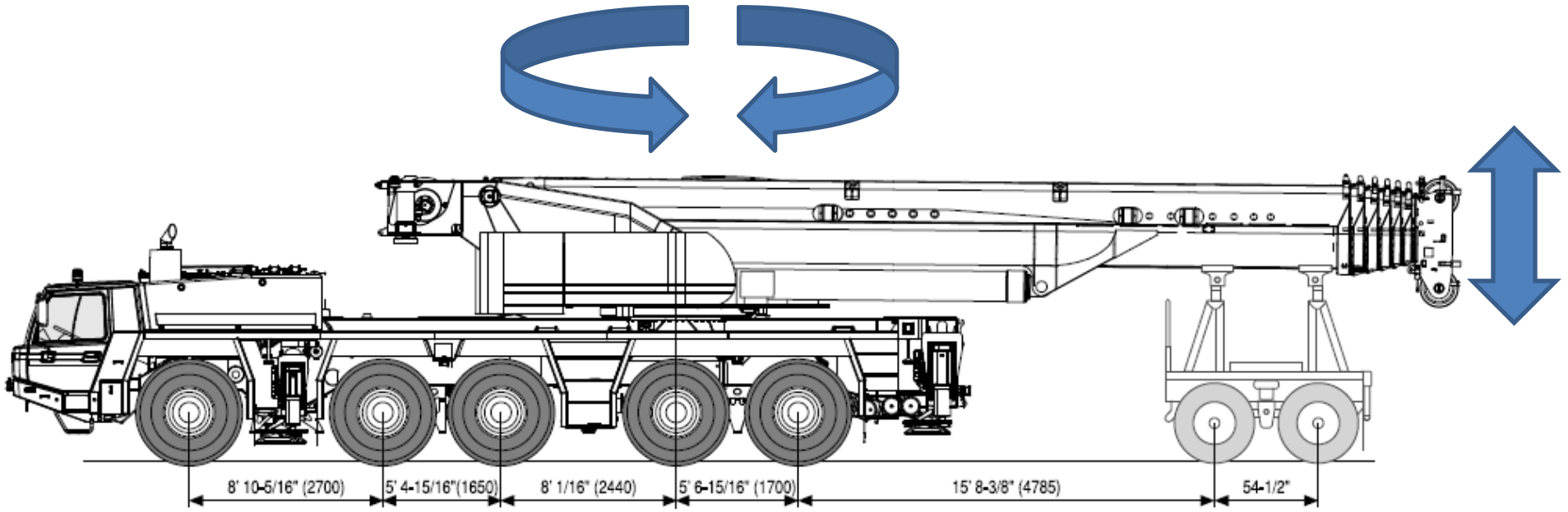
NELSON MANUFACTURING

Boom Dolly Safety

- Always complete a DOT pre-trip inspection
- Ensure that the boom is securely attached to the dolly as part of the pre-trip inspection.
  - This is not covered in this presentation due to the numerous methods of boom attachment.
  - This is an extremely important part of the pre-trip inspection.
- Some points of emphasis for the pre-trip inspection are pointed out in the following slides.
- Conduct an annual DOT safety inspection on the dolly

NELSON MANUFACTURING

Boom Dolly Safety – Boom Float Kit



- Engage the boom float valve per Crane Manufacturer manual.
  - Allows the boom to float up and down during travel
  - Allows the boom to pivot during travel.

Boom Dolly Safety – Dolly Roll Back

There have been a couple of known instances where boom dollies have rolled pinning the crane operator between the rear of the crane and the front of the dolly. There are multiple contributing causes:

- Wheel chocks on the dolly not utilized
- Incorrect dolly connect of disconnect sequence used
- Operating instructions on the dolly and manual were not followed
- Crane air lines automatically supplying air to the dolly when connected
- Dolly parked on an incline

NELSON MANUFACTURING

Boom Dolly Safety – Dolly Roll Back

- Several years ago we began supplying boom dollies for all terrain cranes with an Automatic Brake Interlock valve.
- Please Note that the Link-Belt all terrain cranes (ATC3210 and ATC3275) do NOT receive this Brake Interlock valve.
- Truck Cranes and the above mentioned All Terrain cranes contain a trailer brake release valve similar to what is on a standard semi-tractor.
- We never want to have an Automatic Brake Interlock Valve on a dolly and a trailer brake release in the crane cab on the same unit.
- This creates a situation where the operator would have to release the brakes on the crane and then get out and release the brakes on the dolly.

NELSON MANUFACTURING

Boom Dolly Safety – Dolly Roll Back

- The Automatic Brake Interlock Valve will prevent inadvertent dolly road back!
- After connecting the dolly to the crane the operator then will need to release the dolly brakes by pulling out the Automatic Brake Interlock Valve handle which is located on the passenger side of the dolly.
- Do NOT disable this safety feature as this is a real safety concern!
- We strongly recommend that ALL dollies on cranes that do NOT have a trailer release valve in the cab be equipped with this safety feature.

Boom Dolly Safety Guide

Nelson Manufacturing Company takes your safety seriously. For years our crane boom carriers have been equipped with parking brakes and wheel chocks to prevent them from unintentionally rolling. Warning decals and operating instructions have been continuously refined and improved over time.

There have been a couple of known instances where boom dollies have rolled pinning the crane operator between the rear of the crane and the front of the dolly. During our investigation of these events it has been determined that there were multiple contributing causes:

- Wheel chocks on the dolly not utilized
- Incorrect dolly connect of disconnect sequence used
- Operating instructions on the dolly and manual were not followed
- Crane air lines automatically supplying air to the dolly when connected
- Dolly parked on an incline

These instances can be eliminated by the following the connect and disconnect procedures which includes properly chocking the dolly wheels.

Nelson has recently launched several initiatives to prevent unintentional dolly movement / roll.

1. We have added the following statement to all dolly quotes and acknowledgements to improve awareness of this issue. “PLEASE BE AWARE SOME CRANES ARE EQUIPPED WITH AUTOMATIC SHUT OFF GLAD HANDS THAT WILL RELEASE THE DOLLY PARKING BRAKES IMMEDIATELY UPON CONNECTION OF THE AIR LINES TO THE DOLLY. THIS DOLLY IS EQUIPPED WITH WARNING LABELS, CONNECTING PROCEDURES AND WHEEL CHOCKS THAT WHEN USED PROPERLY WILL KEEP THE OPERATOR AND EQUIPMENT SAFE. WHEEL CHOCKS MUST BE USED WHEN CONNECTING OR DISCONNECTING THE DOLLY FROM THE CRANE!”

2. We have also begun equipping new dollies that will be used on cranes that have automatic air supply glad-hands with a “Parking Brake Interlock Valve”. This valve is located on the passenger side and prevents the air brakes from releasing inadvertently if air is unexpectedly supplied to the dolly. To release the brakes the operator must move to the side of the dolly and pull the valve handle out. The valve automatically resets when the air supply is shut off.

3. Additional warning labels have been added to the air lines that connect to the rear of the crane carrier.

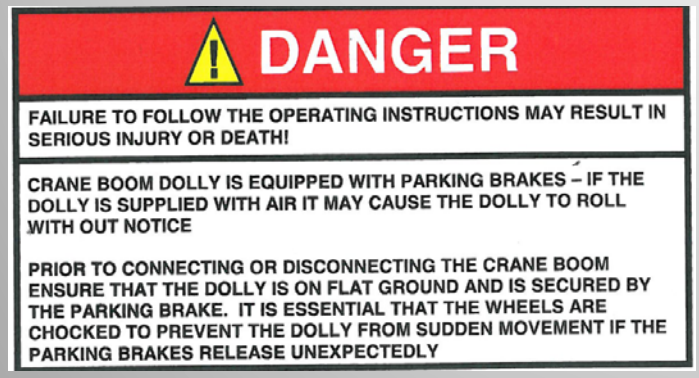
4. All Nelson crane boom carriers will continue to be supplied with wheel chocks

Parking Brake Interlock Valve

Wheel Chocks Shown Properly Installed on the Front and Rear of the Tire

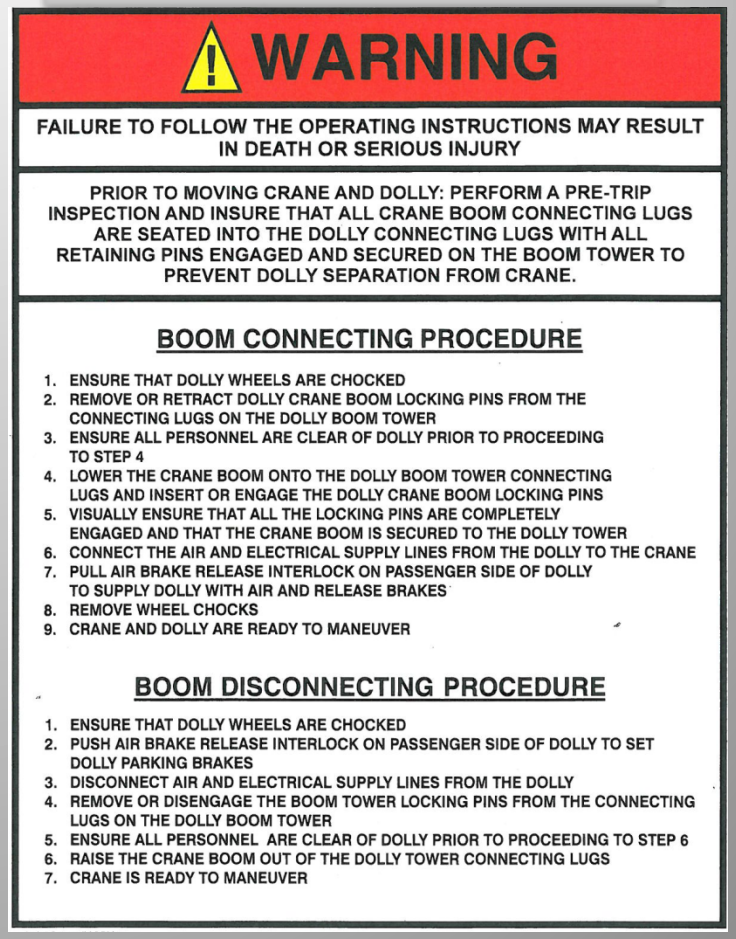
Boom Dolly Safety Guide

Nelson Manufacturing Company will supply the “Danger Decal” as shown below at no charge upon request. Please contact our parts department if you would like to be sent some of these decals. Our parts department can be reached by calling 419-523-5321 or e-mail: parts@nelsontrailers.com



Our parts department also has available a kit to retrofit your Nelson dolly with the Parking Brake Interlock Valve. This kit includes the valve, bolt on mounting bracket and decal (shown below). The cost for this kit is $20.00 plus tax and shipping. If you would prefer to procure these components locally we will supply an installation diagram complete with part numbers free of charge. Please note: this valve should only be used on dollies where the crane has automatic air supply glad-hands.

Typical Boom Dolly Connect / Disconnect Procedure



Nelson Manufacturing Company will also supply new connect / disconnect procedure decals for your dolly at no charge. Please provide our parts department with the Nelson serial number so that we can ensure sending you the correct decals.

Boom Dolly Safety – Dolly Roll Back

- Use the proper precautions as listed in the Nelson “Boom Dolly Safety Guide” to prevent dolly rollback
- I have copies of this safety guide available if anyone would like a copy.
- They can be downloaded from our website www.nelsontrailers.com
- I will also be happy to email anyone a copy that would like one.

Boom Dolly Safety - Drawbars

Boom Dolly Safety - Drawbars

The rubber bushing hinge mount provides a secure connection to the dolly and a “cushion” that puts lets stress into the dolly frame.

Safety chains from the dolly to the drawbar provide a redundant restraint in the unlikely event of a hinge failure.

The hinge pivot bolt should be visually inspected as part of the drivers pre-trip inspection.

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Boom Dolly Safety - Drawbars

- The towing eye on the dolly should be compatible with the pintle hitch on the crane.
- Safety chains should be connected to the rear of the crane
- Safety chain length should be checked to make sure that they do not pull tight when making a sharp turn.
  - Damage may occur if this happens.
- Visually inspect the safety chain, mounting points and safety latches as part of the pre-trip inspection.
- Visually inspect the drawbar towing eye and mounting bolts as a part of each pre-trip inspection.

NELSON MANUFACTURING

Boom Dolly Safety – Moving the Tower

As an option Nelson offers a removable hand crank to locate the tower.

NELSON MANUFACTURING

Boom Dolly Safety – Moving the Tower

Hand crank is easily removable and has storage provisions.

Hand crank allows the tower to be moved without getting on top of the dolly. This assists in connecting to the crane and accessing counterweight storage.

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Boom Dolly Safety – Access

Use the mounted ladders, steps and grab handles to access the deck of the dolly.

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Boom Dolly Safety – Summary

- Follow the 60/40 Rule
- Follow the Instructions in the Dolly and Crane Manual
- Take the proper precautions to prevent dolly roll back when connecting and disconnecting the dolly
- Always conduct a pre-trip inspection
  - Ensure that the boom is connected securely
  - Ensure that the drawbar is connected properly
  - Ensure that the safety chains are connected properly
  - Verify that the boom float valve is engaged

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- Thank you for your time!
- Questions?

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