



Taylor SIRR Program

**Structural Inspection, Reporting, &
Repair (SIRR) Program
For Powered Industrial Trucks**



IMPORTANT!

Read contents carefully prior to operation.

Model _____

Serial No. _____

S I R R

Structural Inspection, Reporting, And Repair

For Powered Industrial Trucks

This document contains information of vital importance concerning the inspection, reporting, and repair of fatigue cracks. If fatigue cracks are not corrected they can lead to a catastrophic failure causing serious injury to personnel and / or property.

It is important that the machine be inspected regularly. Any existing fatigue cracks should be reported to the Taylor Machine Works, Inc. engineering department immediately. Repairs must be made in accordance with AWS methodologies.



WARNING:

Dangerous Action. Operating a powered industrial truck without inspecting, identifying, and repairing fatigue cracks in the mast, carriage, attachment, steer axle, and frame weldments.

What Can Happen. If the fatigue crack is allowed to grow, catastrophic failure could occur in the mast or other welded components causing serious injury to personnel and / or property.

How To Avoid The Danger. Follow the OSHA rules, 29 CFR, 1910.178 (q)(1), (5), & (7) which require inspecting industrial trucks daily before being placed in service, removing trucks from service if cracks are found, and making repairs only as authorized by the manufacturer. If trucks are used on a round-the-clock basis, they shall be examined after each shift. OSHA 29 CFR 1910.178 (p)(1) requires that trucks in need of repair be taken out of service.

Structural Inspection and Reporting Procedure

General instructions are provided within this procedure to aid maintenance personnel in understanding proper inspection methods. Although all welds should be inspected regularly, Illustrations and general instructions are included to aid in identifying joints which may need special attention.

Inspection for Fatigue Cracks

Welded steel structures always contain undetectable cracks, especially at welded joints. When these joints are subject to fluctuating stresses of sufficient magnitude, these cracks will grow. This is known as fatigue crack growth. No matter how low the stress levels are kept some fatigue crack growth will occur in all welded structures.

Eventually, these fatigue cracks will become large enough to be detectable by nondestructive testing methods, i.e. VT, MT, DPT, or UT.



WARNING: Fatigue cracks which are allowed to grow can lead to catastrophic failure and possible death or serious injury. Periodic inspection is required to detect fatigue cracks that have grown to a significant

size in order to avoid serious failure of the structural weldment. When a crack is found, the truck must be immediately taken out of service and repaired.

Restoring the weld to its original condition by complete penetration welding is usually acceptable. Sometimes this is not practical and a change in geometry by means of cutting, grinding or adding additional material is more economical. However, the user must be cautioned that OSHA 29 CFR 1910.178 (a)(4) requires manufacturer's **prior written approval** for modifications and additions which affect capacity and safe operation.

Cracking may occur due to overloading, rough operation, poor yard conditions, severe duty cycles, failing to keep lift chains properly adjusted, improper shimming of mast rails, carrying the loads too high or not properly centered, using attachments that clamp the load to the forks, etc. If such cracking is found, a review of the operation should be made to see if any of the above listed problems are occurring, and, if so, a change in the operation should be made to avoid future problems. Some cracking may be due to geometry, modifications or due to the attachments welded to the structure. If this is the case, the geometry may need to be changed, the modification corrected, or the attachment changed or relocated to correct the cracking problem. OSHA requires that you have **prior written approval** of the manufacturer for such changes.

Test Procedures

Type of Test	Symbol
Visual	VT
Magnetic Particle	MT
Dye-Penetrant	DPT
Ultrasonic	UT

Basic Testing Symbols

These symbols are in accordance with AWS A2.4-76, "Symbols for Non-Destructive Testing."

- 1. Visual (VT).** Dirt and grease should be removed from the surface by wiping with a rag. One should look for cracked paint and rust showing through the paint. Also, look for movement at bolted joints, irregular lines in welds or dents, or deformations in the material. Proper lighting is required in order to

obtain satisfactory results.

2. **Magnetic Particle (MT).** The test surface must be free of loose rust, scale, moisture, and painted surfaces must be cleaned at all points of electrode contact. Grinding, brushing, or blasting do not affect results of this method of testing in most instances.

A magnetic field can be applied to the test material with:

- a. Permanent magnet.
- b. Yoke which is an electromagnet type of device.
- c. Passing high amperage current through the part.

3. **Dye-Penetrant (DPT).** The test surface must be thoroughly cleaned and dried. This can be done with chemical solvents, vapor degreasing, or by mechanical methods. However, cleaning mechanically, such as grinding, blasting, or wire-brushing, might prove detrimental to the test because surface discontinuities can be masked by cold working of the surface. Therefore, mechanical cleaning methods must be kept to a minimum.

One of the following type penetrants should be used in conjunction with the proper procedure to get satisfactory results:

- a. Water soluble penetrant
- b. Post emulsifiable penetrant
- c. Solvent removable penetrant

Follow the directions supplied with the dye-penetrant for best results.


4. **Ultrasonic (UT).** Testing should be done in accordance with AWS D1.1 approved methods.

Frequency of Inspection. There are three (3) levels of inspection:

1. **Daily.** Mandatory daily examination of the truck as required by OSHA. (See Operator's Guide and Safety Check for details.) This examination is usually performed by the operator (or other designated person).
2. **Three-month inspection.** A thorough visual inspection (VT) following the guidelines shown in this procedure should be made every three months (refer to sketches for details). These inspections should be performed by qualified maintenance personnel.

3. **6,000 Hour Inspection.** Full-scale inspection (FS) including all examinations outlined in this procedure (VT, MT, and DPT) should be made after the first year of operation and then every two years or 6,000 hours, whichever is sooner, thereafter. These inspections should be performed by qualified maintenance personnel.

NOTE: *Duty cycles vary from extremely severe (capacity loads, high frequency of loading, rough yards, etc.) to very light (partial capacities, few load cycles, good yard conditions, etc.). Duty cycle directly affects product life and maintenance requirements. Depending on the quality and thoroughness of the daily inspections and the service experience of the vehicle, the three-month visual inspection interval and the full-scale inspection interval may be adjusted (increased or decreased) to levels appropriate for an individual vehicle duty cycle.*

 **WARNING: Death or serious injury could result from structural failure. Inspect structure for cracks.**

Reporting Procedure. Taylor Machine Works, Inc. should receive reports of the results of any inspections.

Photocopy a sketch from your maintenance manual, make your own sketch, or photograph, and show indication of crack if any are evident, stating the following:

1. Location (right, left, inner, outer, machine side etc.);
2. Size of crack;
3. Extent of crack;
 - a. In toe of weld;
 - b. Propagating into the base metal;
 - c. Other description, etc.
4. Method of testing to detect cracks.


If no cracks are found by yearly inspections, please confirm by a fax or a short letter.


Repair Procedure

1. Contact Taylor Machine Works, Inc.
2. If rewelding is suggested, use AWS approved welding procedures.
3. If design modification is indicated, contact

Taylor Machine Works, Inc. OSHA 29 CFR 1910.178 (q)(5) requires that replacement parts be equivalent as to safety with those used in the original design. Different steel grades are used for different components. Different steel grades require different welding procedures, pre-heatings, rods, etc.

Inspection Locations

 **WARNING: The areas being inspected must be properly cleaned prior to performing the inspection. If not properly cleaned potentially dangerous cracks may not be detected.**

 **WARNING: Never go under a raised mast, carriage or forks unless proper blocking has been securely placed to prevent the mast, carriage or forks from falling in event of hydraulic failure or drift. See Safety Check.**

The following illustrations are a representative set for the general weld joints used on Taylor Machine Works trucks. These illustrations should be used as a reference for specific details, but do not necessarily represent exact details used in the construction of your truck. The weld joints specifically identified in the following illustrations are representative of all similar weld joints in the structure and indicate that all such weld joints must be inspected. Also, all welds on opposing sides of the indicated weld joint must be inspected. Additionally, there may be multiple occurrences of a specific weld joint. All occurrences of the weld joint specified must be inspected.

Some welds may be hidden from plain view during normal operation and will have to be positioned to ensure a clear view for inspection.

In addition to the OSHA required daily inspections, the inspection methods for both the three-month inspection (VT), and 6,000 hour inspection (FS) should be performed. Representative joints which contain welds that need to be inspected are listed below. Should further information be needed on weld inspection, including detailed welds and weld joints, contact Taylor Sudden Service, Inc.

Chassis - Masted Trucks

- Drive axle mounting structure
- Mast hanger structure
- Frame rails and all attachments to frame rails

- Cab support structure
- A-frame structure (members which attach tilt cylinders to chassis on overhead-tilt equipped trucks)
- Tilt cylinder mount structure
- Frame rail connections at counterweight
- Engine, transmission, radiator mount structures
- Steer axle mounting structure

Additional Joints for Chassis on Telescoping Boom Trucks

- Entire boom tower structure
- Boom pivot structure
- Hoist cylinder anchor structure

Inner Mast

- All connections from crossmembers to mast rails
- Chain roller mounting structures
- Hoist cylinder anchor structure
- Mast roller stub shafts

Outer Mast

- All connections from crossmembers to mast rails
- Hoist cylinder anchor structure
- Tilt cylinder anchor structure
- Chain anchor mount structure
- Mast hanger structure

Carriage

- Carriage roller stub shafts
- Crossmember connections to carriage plates
- Crossmember connections to end plates
- Fork pin mounting plates
- Braces and gussets
- Chain anchor mounting structure

Top-Pick Container Handling Attachments

- Expansion beam structure
- Crossmember connections to expansion beams
- Structures used to connect attachment to carriage
- Braces and gussets
- Expansion cylinder mounting structure

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- Connection between expansion beams and twistlock end beams
 - Twistlock end beams
 - Twistlock box structure

Side-Pick Container Handling Attachments

- Beam structure
- Connection between beams
- Structures used to connect attachment to carriage
- Braces and gussets
- Expansion cylinder mounting structure
- End post structure
- Twistlock box structure

Telescoping Booms

- Boom box structures
- Braces and gussets
- Boom pivot structure
- Hoist cylinder anchor structure
- Attachment mount structure
- Extension cylinder mount structure

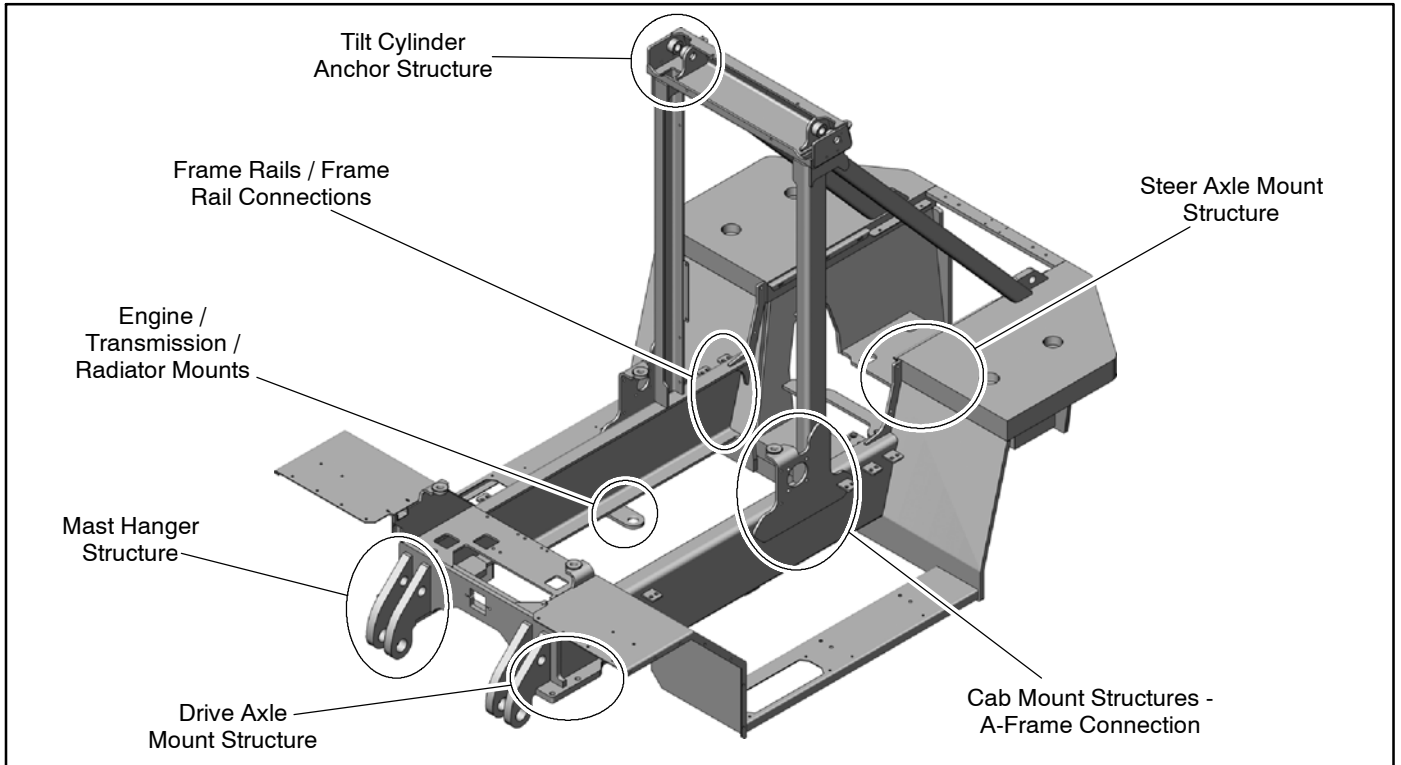


Illustration 1. Typical Chassis Inspection Locations

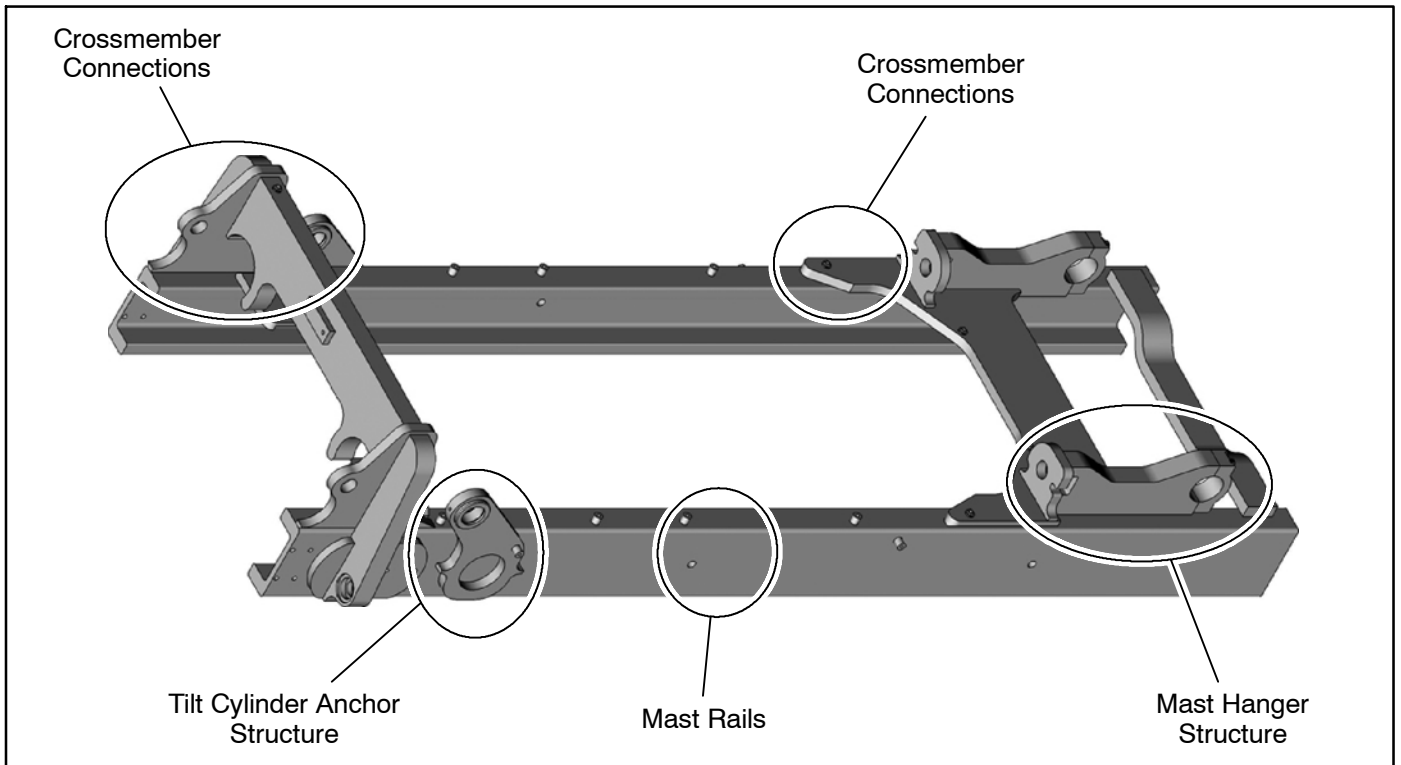


Illustration 2. Typical Outer Mast Inspection Locations

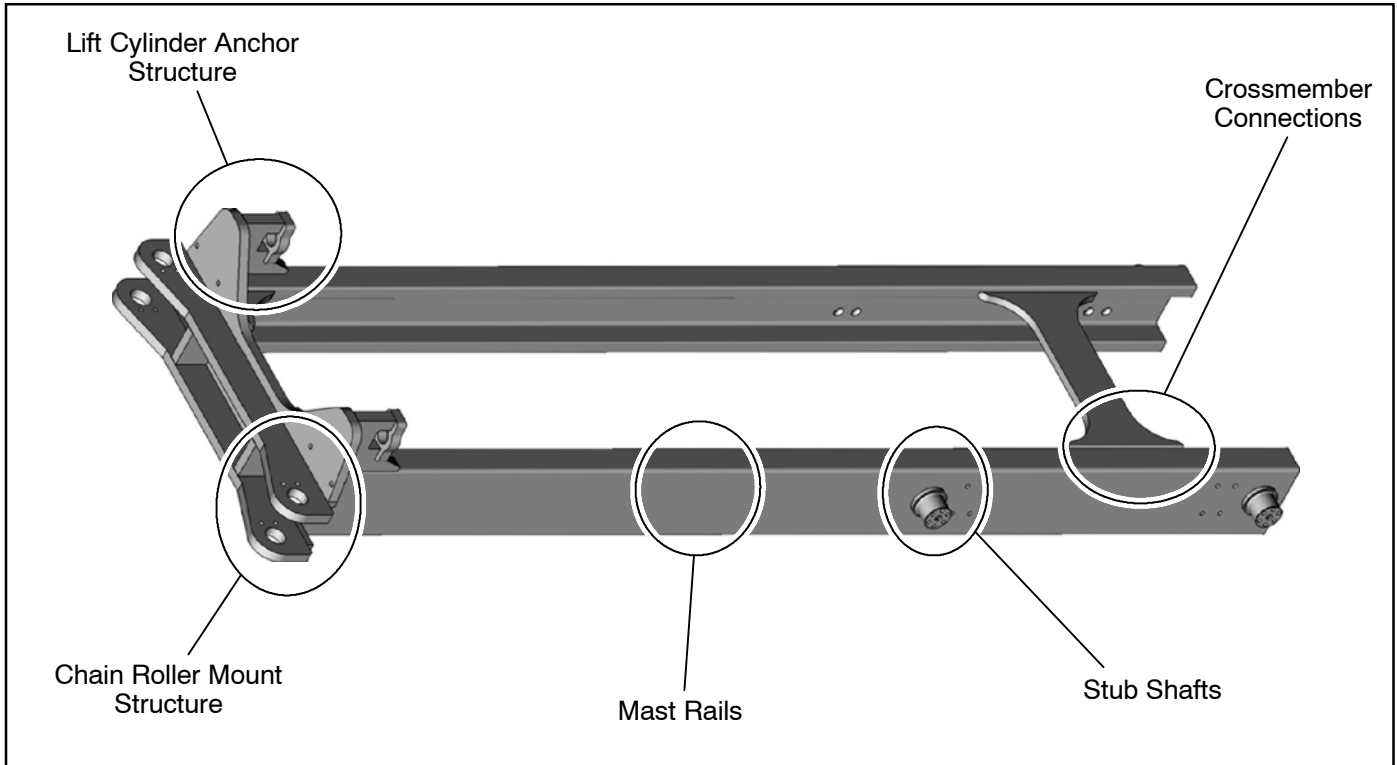


Illustration 3. Typical Inner Mast Inspection Locations

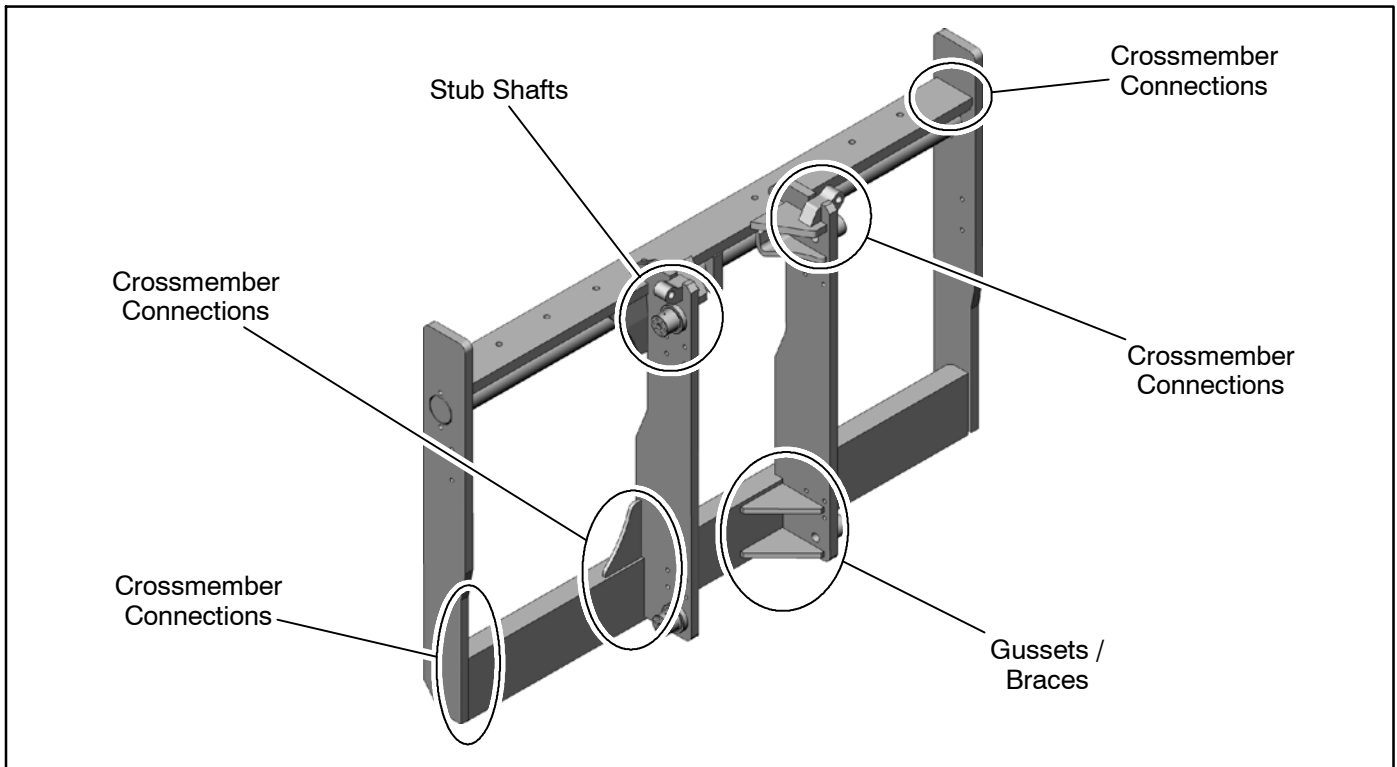


Illustration 4. Typical Carriage Inspection Locations

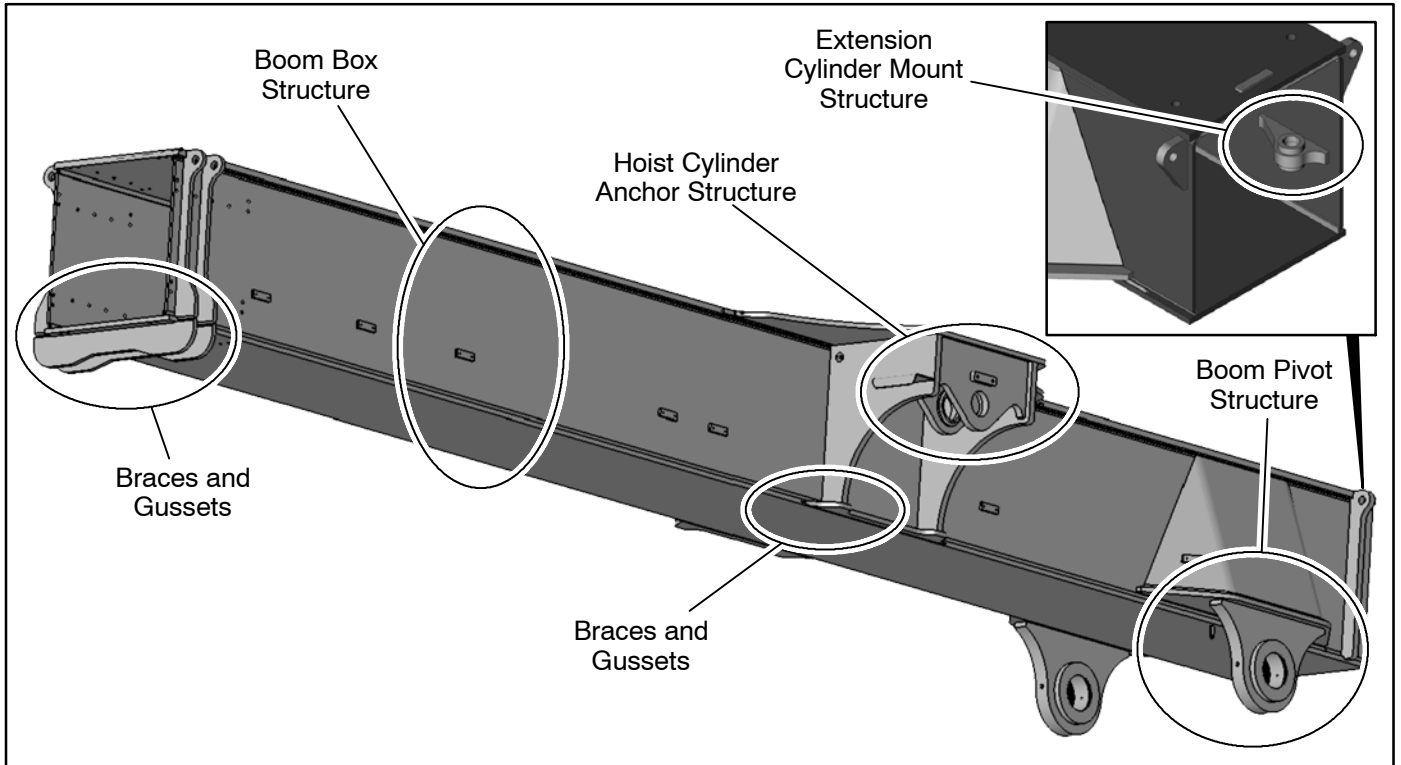


Illustration 5. Typical Outer Boom Inspection Locations

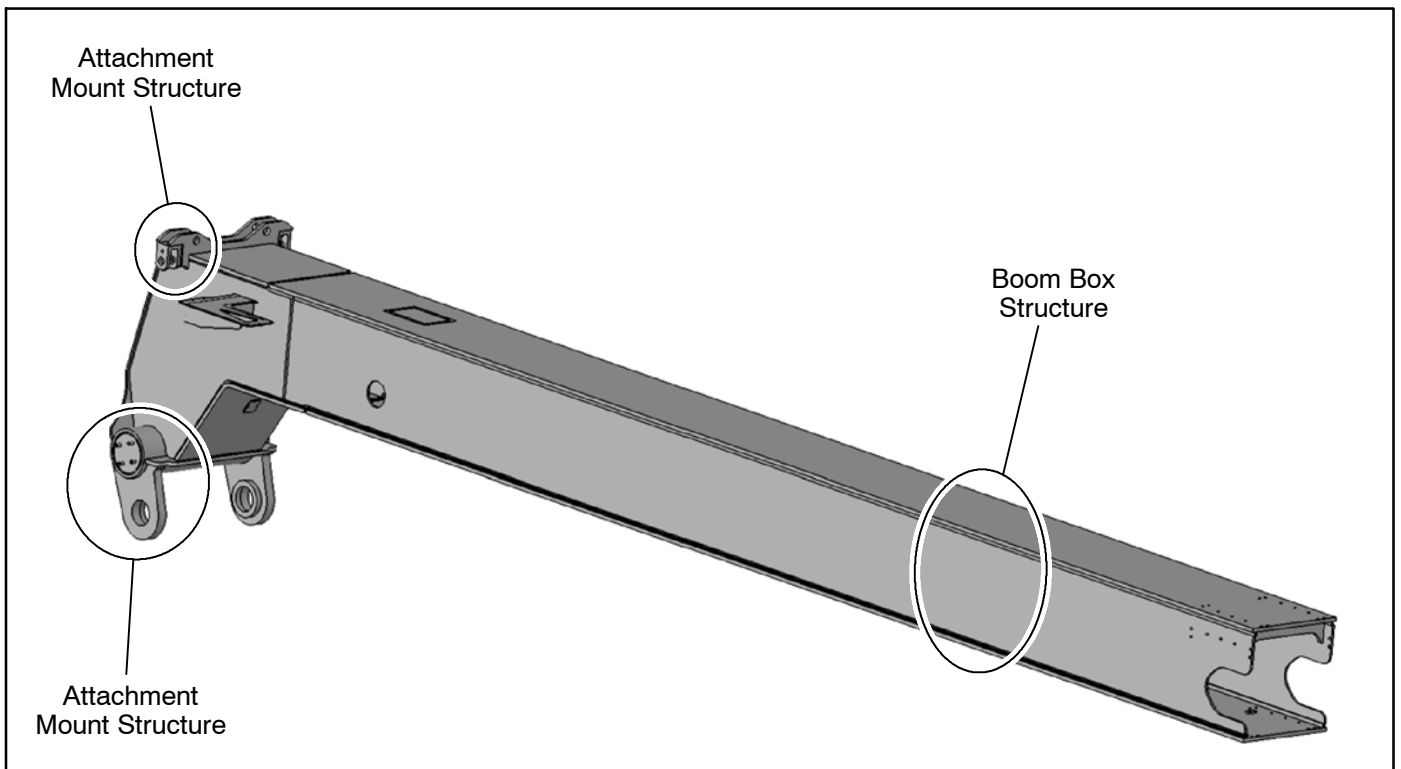


Illustration 6. Typical Inner Boom Inspection Locations

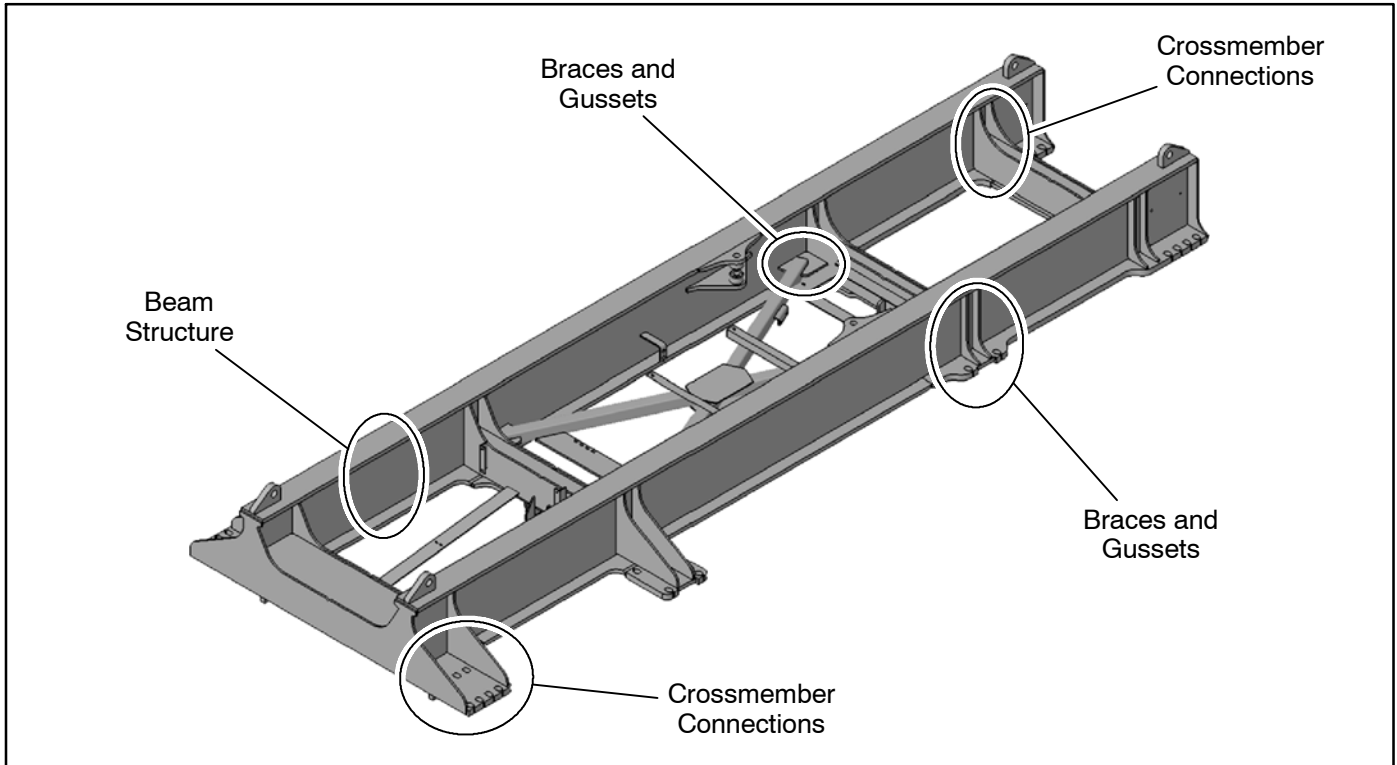


Illustration 7. Typical Center Frame Inspection Locations

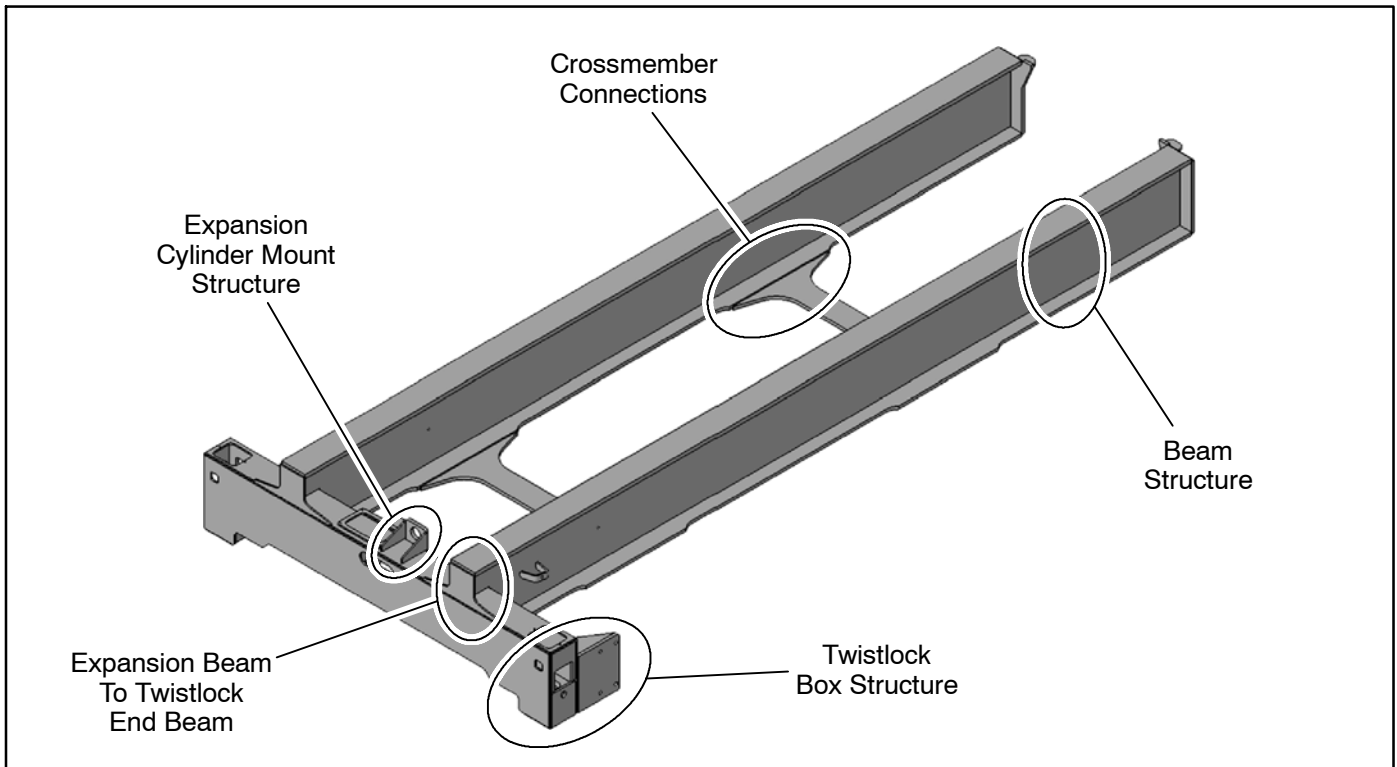


Illustration 8. Typical Narrow Frame Inspection Locations

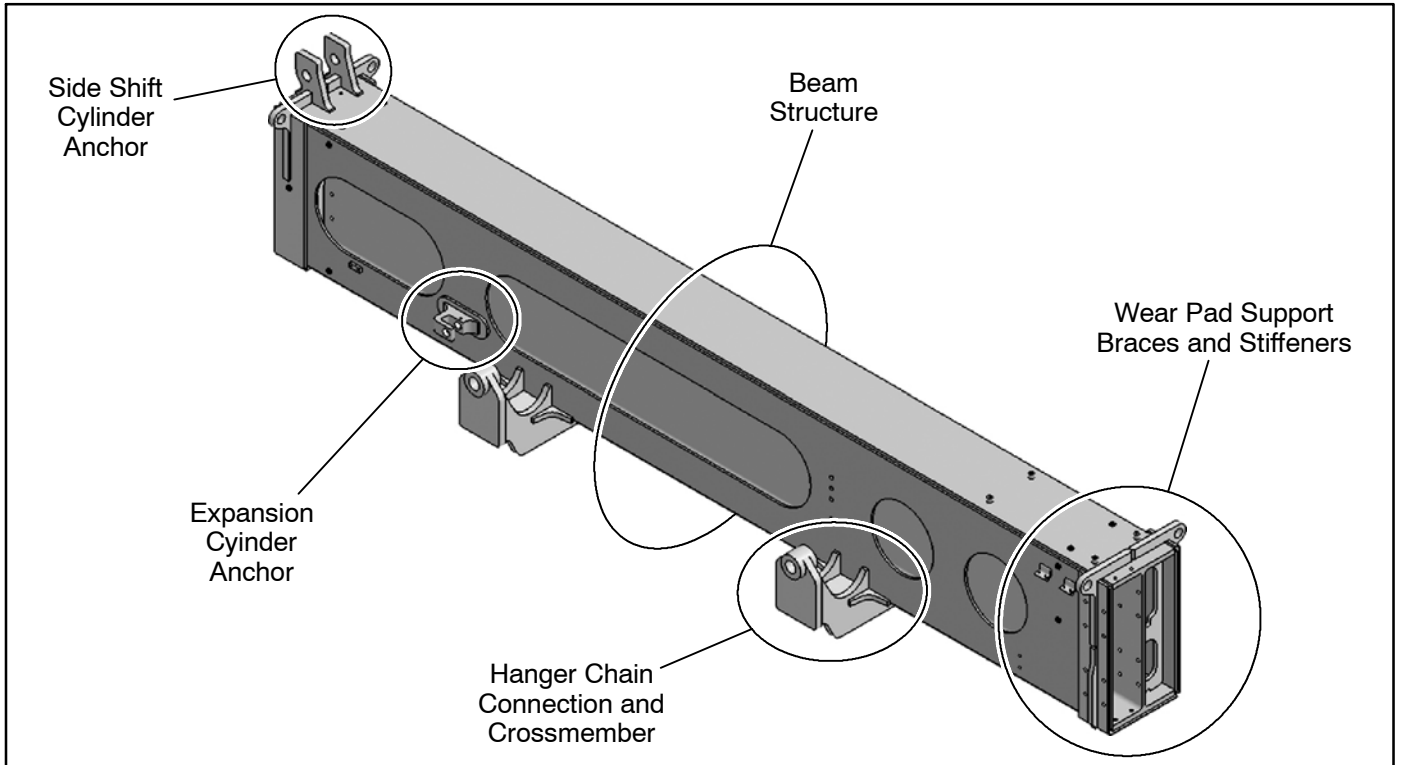


Illustration 9. Typical Center Frame Inspection Locations

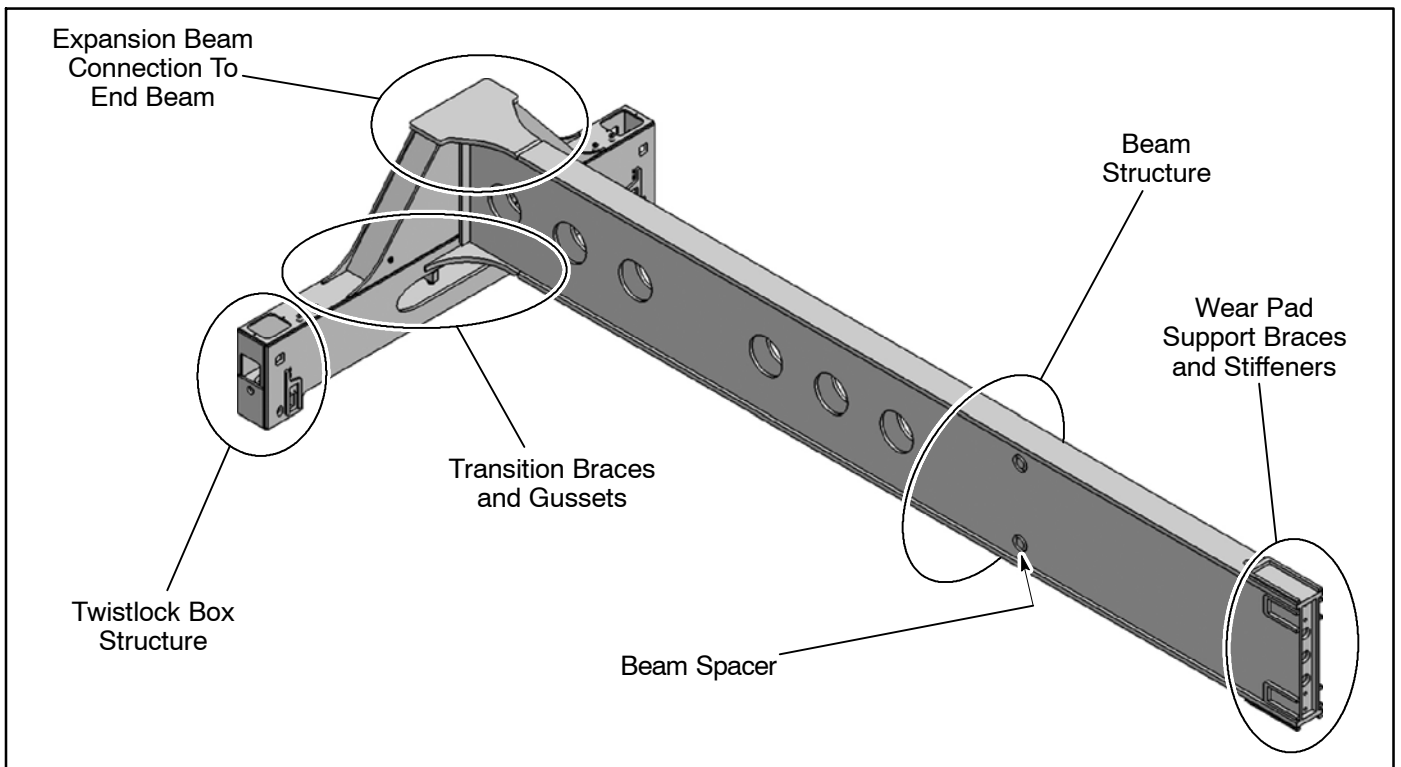


Illustration 10. Typical Expansion Frame Inspection Locations

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