The Crane Industry Council of Australia
PO Box 136
Mt Waverley, Victoria 3149
(03) 9501 0078
www.cica.com.au
ABN 73 002 565 773
Lifting Industry Standards

CICA Major Inspection Verification Plate Requirements

I. Purpose

As the average age of cranes in use in Australia continues to increase it is likely that the crane will require a major inspection for continued safe use. The intent of this document is to be used by crane owners and competent persons involved in major inspections to clearly guide the user through what CICA expects in the content of a major inspection report. Following this guide provides the minimum criteria for application for a CICA Major Inspection Verification Plate.

It will be reinforced multiple times that the manufacturer's recommendations for maintenance and inspection should be followed and supersedes the guidance in this document.

II. Report Format

The following sections should be included in a major inspection report.

A. Summary of Findings

This section of the report should clearly state the suitability of the crane for continued use. A copy of this section could be kept in the crane operator's manual as evidence of completion of a major inspection. Important details should include the following:

1. Crane Make, Model, and Serial Number
2. In Service Date
3. Design Registration Number
4. Owner Information
5. Hour meter and Odometer reading at the time the crane is re-introduced into service
6. Signature and certification statement from a Professional Engineer, or equivalent, regarding compliance to relevant Code of Practice and/or Australian Standard for major inspection.
7. Recommendation statement from a Professional Engineer, or equivalent, regarding when the next major inspection should be completed based on an assumed duty cycle.
8. Recommendation statement from competent person specifying future maintenance program and particular components that should be monitored in future periodic inspections.
9. Inspection report number

B. Supporting Documentation – see example list in Section III and note what references were used.

The Crane Industry Council of Australia
PO Box 136
Mt Waverley, Victoria 3149
(03) 9501 0078
www.cica.com.au
ABN 73 002 565 773
Lifting Industry Standards

C. Competent Persons

It is important to list all persons and their qualifications who were involved in the completion of the major inspection. It is not expected that the supervising engineer be qualified in all components of a major inspection. Sub-contracting qualified professionals to carry out specific components of the major inspection is assumed and recommended since they are the expert in their field. However, it is the responsibility of the engineer as the final signatory to confirm that individuals sub-contracted for work are qualified to carry out the work. Examples of competent persons and their qualifications are listed below:

1. Professional Engineer
    a) Charter Engineer / NPER / RPEQ number
    b) Area of emphasis (mechanical, civil, structural)
    c) Years working in the crane industry
2. NDT Technician
    a) NATA accreditation number (recommended or alternative quality system)
    b) AINDT accreditation number
    c) NDT method certification (i.e. Level 2 Magnetic Particle Testing)
    d) Years working in the crane industry
3. The Maintenance / Repairer, Hydraulic Specialist, and Welder / Boilermaker shall all provide the following:
    a) Trade Qualifications
    b) Years working in the crane industry
    c) Previous employment in the crane industry
    d) Other relevant accreditations / qualifications

This list is intended only to be a guide. If there are other persons involved in the major inspection they should be included in the report.

D. Inspection Components

The inspection and testing of crane components is the most critical section of the Major Inspection report. All other sections support the findings identified during the inspection.

A Major Inspection requires the use of critical thinking to diagnose and respond to findings during the inspection process. One of the many differences between an Annual Inspection and a Major Inspection is that the Major Inspection is more than a visual inspection. As components are removed from the crane measurements can and should be taken to determine the level of wear on the component. In all cases, the manufacturer's guidelines should be adhered to and take precedence over the recommendations of this report.

The Crane Industry Council of Australia
PO Box 136
Mt Waverley, Victoria 3149
(03) 9501 0078
www.cica.com.au
ABN 73 002 565 773
Lifting Industry Standards

As stated in the CICA Guide to Major Inspections, a comprehensive checklist cannot be used to complete a Major Inspection and it is not the intention of this document to provide a definitive list of inspection criteria. Where the manufacture does not provide a *Major Inspection Guide* the

supervising engineer should review components and make engineering judgement regarding their reuse, replacement, or further testing required.

The accompanying Major Inspection Report, being discussed here, should reflect the engineer's logical progression of thought during the inspection and their verification of a component's suitability for use. This also applies if the engineer deviates from the manufacturer's recommendations. Deviation from the OEM recommendations is not recommended by CICA.

During discussions with regulators about Major Inspections an engineer asked, "When is enough, enough for Major Inspections?" One seemingly reasonable response was to start at the hook and follow the load path through the crane back to the ground to check for wear or fatigue in components.

The variability of the Major Inspection process is often frustrating because of its undefined nature. When the manufacturer's recommendations are available, they should be followed. It is highly recommended that copious amounts of pictures are taken to ensure that each component and inspection is thoroughly documented.

Quantitative measurements should be taken wherever possible and are beneficial for future inspections. If data presentation in tabular form is preferred this is an acceptable report format for the inspection components. An example of this data table is shown in the Appendix.

If records are available that show components have recently been refurbished or replaced it is up to the professional engineer to determine the level of inspection and validation those components need at the time of the major inspection. Rationale should be stated if a reduced level of inspection is completed.

The following crane components should be reviewed at a minimum:

1. Winches

    a) The manufacturer's recommendation should take highest precedence.

    b) In the absence of manufacturer's recommendations engineering judgment should show why the winch was not replaced and what the predicted fatigue life of continued use of the existing winch would be.

2. Braking Systems, including slew brake

    a) Measure critical wear components and confirm they are within manufacturer's guidelines or replace.

    b) NDT critical structural components and note type of NDT method completed. Photos should accompany any NDT method showing the area on components that were reviewed.

3. Hydraulic System

The Crane Industry Council of Australia
PO Box 136
Mt Waverley, Victoria 3149
(03) 9501 0078
www.cica.com.au
ABN 73 002 565 773
Lifting Industry Standards

a) Hydraulic Pump – Inspect the pump for flow and pressure according to the manufacturer's specification.

b) Hydraulic Cylinders – Inspect cylinders for creep and leaks per the manufacturer's instructions. Cylinders should be checked at a minimum of three extension positions, preferably under load in the installed position.

c) Load Holding Valves – inspect valves for correct operation with and without oil flow per manufacturer's instructions.

d) Hydraulic Hoses

i. Inspect all hoses for damage, wear, leaks, brittleness, and replace, if necessary, with OEM part or equivalent. If non-OEM part used, note the hose and fitting in the report.

ii. Replace hoses as recommended by the manufacturer's guide.

4. Slew Ring

a) Slew Ring Bolts – follow manufacturer's recommendations for inspection. If manufacturer's recommendations are not available, bolts should be ultrasonically tested for cracks if reused or replace with new.

b) Slew Bearing – measure slew bearing tolerance and confirm the clearance does not exceed the manufacturer's guideline.

c) Slew Motor – monitor motor operation for smoothness and abnormal noises. If either exists an overhaul or replacement should be completed.

5. Boom

Hydraulic Boom - The boom assembly should be disassembled into individual sections for inspection.

a) The following boom shape inspections should be completed according to the manufacturer's guidelines:

i. Boom Straightness

ii. Boom Camber

iii. Boom Concavity / Convexity

iv. Boom Twist

b) Inspect critical welds on the boom section using the manufacturer's recommended NDT method. For reference, use the CICA "Guidelines for the Crack Inspection of Mobile Cranes for CraneSafe Assessment" for additional areas of inspection.

c) The boom is an assembly of components, some of which are wear items (i.e. wear pads). All the wear items should be measured to ensure they are still within the manufacturer's recommendation or replaced with new.

The Crane Industry Council of Australia
PO Box 136
Mt Waverley, Victoria 3149
(03) 9501 0078
www.cica.com.au
ABN 73 002 565 773
Lifting Industry Standards

d) Each boom should be inspected for corrosion as an indication of a high stress area or damage that may have occurred. Excessive corrosion should be noted and the appropriate rectification should be taken based on the manufacturer's recommendation or the recommendation of the supervising engineer.

e) Pins and bushings should be inspected for excessive wear or damage.

f) Where extension and retraction ropes or chains are in use, refer to the manufacturer's guidelines regarding wear and replacement.

g) Engineering judgement should be used if other components should be reviewed.

Lattice Booms

a) Inspections of the chords and lacings should be in accordance to the manufacturer's recommendations.

b) NDT should be completed as defined in "Guidelines for the Crack Inspection of Mobile Cranes for CraneSafe Assessment"

c) Cords and lacings should be inspected for damage in the form of dents or bends

d) Corrosion should be noted and, where excessive, thickness measurements should be taken to confirm structural integrity.

6. Carrier

a) Use the "Guidelines for the Crack Inspection of Mobile Cranes for CraneSafe Assessment" as a guide for potential cracks in all high stress areas.

i. Slewing platform

ii. Carrier

b) The superstructure should be inspected for mechanical wear of components in the axle, braking, suspension, and steering systems. Refer to the manufacturer's recommendations for the acceptable level of wear.

7. Crane Outriggers – particular attention should be paid to the crane outriggers both for crack inspection and corrosion. Often internal corrosion can significantly reduce the structural integrity of the outrigger without any external signs of degradation.

8. Hook Blocks

a) Hook blocks must be NDT inspected

b) All hook blocks must be clearly, permanently marked with a serial number, SWL capacity, and hook block weight

c) All sheaves need to be inspected for free spinning and excessive groove wear.

d) Hook swivels must move freely, but without excessive play

e) Hook throat dimensions should be measured and recorded for elongation

f) All safety latches must be present and in working order.

9. Wire Ropes

a) 100% of the wire rope should be inspected in accordance to AS2759

b) Confirm that the wire ropes are the same, or equivalent, for the crane as specified by the manufacturer.

10. Operator Aids

All operator aids need to be functioning as designed at the time of manufacture. Where reasonably practicable, the operator aids should be updated to the latest Australian Standard (AS1418). If an update is not performed, a risk assessment needs to be completed to demonstrate how an equivalent level of safety to the controls specified in the latest Australian Standard was achieved. This risk assessment should be included in the major inspection report.

E. Testing

1. Brake overload test at 110% to confirm brake holding, refer to appropriate AS1418.

2. If repairs have been completed, a static strength test at 125%, unless manufacturer specifies otherwise, should be completed, refer to appropriate AS1418.

3. Confirm LMI is operating accurately in accordance to the load charts supplied with the crane.

F. Certificates

1. Rope Certificates

2. LMI Certificates

3. NDT Test Certificates

III. Reference Documents

Several existing documents should be used in conjunction with this guide. These documents should be readily available at the time of inspection and the competent person completing the major inspection should have a thorough understanding of these documents. Relevant documents for a mobile crane are shown, for other crane types the specific Code of Practice and Australian Standards should be referenced.

A. Routine maintenance and/or service history

B. Prior CraneSafe annual inspections or similar maintenance records

C. Queensland Mobile Crane Code of Practice 2006 (available from http://www.deir.qld.gov.au/workplace/resources/pdfs/mobile-crane-cop-2006.pdf)

D. Australian Standard 2550.1 – 2011 Cranes, hoists and winches – safe use, General Requirements (available from www.saiglobal.com.au)

E. Australian Standard 1418.1 – 2002 Cranes, hoists and winches, General Requirements (available from www.saiglobal.com.au)

The Crane Industry Council of Australia
PO Box 136
Mt Waverley, Victoria 3149
(03) 9501 0078
www.cica.com.au
ABN 73 002 565 773
Lifting Industry Standards

F. Australian Standard 1418.5 – 2002 Cranes, hoists and winches, General Requirements (available from www.saiglobal.com.au)

G. CICA Guide to Major Inspections July 2011 (available from www.cica.com.au)

H. Guidelines for the Crack Inspection of Mobile Cranes for CraneSafe Assessment (available from www.cica.com.au)

Additional standards may be required for reference (i.e. rope or steel structures)

IV. Gold Plate Procedure

A. The Repairer should follow this "Major Inspection Guide" while completing major inspection.

B. The Owner should submit the final report to CICA for review

C. CICA will review report and confirm that a thorough major inspection has been completed according to the manufacturer's recommendations and this guide

D. If necessary, CICA may request the Major Inspection Report be revised if additional information is required.

E. If the Major Inspection Report meets CICA guidelines and payment is received, a CICA Major Inspection Gold Plate will be issued for the crane.

V. Major Inspection Report Checklist

□ Summary of Findings

□ Supporting Documents

□ Competent Persons

□ Inspected Components

□ Winches

□ Braking Systems

□ Hydraulics

□ Slew Ring

□ Boom

□ Carrier Superstructure

□ Outriggers

□ Hook Blocks

□ Wire Rope

□ Operator Aids

□ Testing

The Crane Industry Council of Australia
PO Box 136
Mt Waverley, Victoria 3149
(03) 9501 0078
www.cica.com.au
ABN 73 002 565 773
Lifting Industry Standards

□ Brake Test

□ Static Strength, if necessary

□ LMI

□ Certificates

VI. Appendix – Sample Checklist

This is not inclusive, but an example of information to include in a checklist.

Item No.	Component Description	Acceptance Criteria	Acceptance Criteria Source	Measurement	Date	Pass / Fail	Remedial Action	Inspected By
1	Camber, boom section 1	< 5mm in all locations	Manufacturer's Recommendation	LH: 4mm RH: 3mm	22/01/2012	Pass	None Required	Joe Blogs, Repair Services
2	Hydraulic Hose, valve to main winch	Visual inspection for damage, wear, leaks, brittleness Hose age <2 years	Manufacturer's Recommendation	No Visual Defects Hose is 5years old	12/12/2011	Fail	Replace with OEM part 543-343-:1	Peter Stein, Hydraulics Inc.
3	Hook Block NDT, serial number 12345	100% crack inspection, No Crackes Allowed	Manufacturer's Recommendation Not Available Used Guideline for Crack Inspection of Mobile Cranes for CraneSafe Assessment	Mag Particle Inspection: 2 cracks found, see NDT report # 6789	25/01/2012	Fail	Repair crack according to AS1418, reinspect	Sam Plumber, Crack Inspections
3.1	Hook Block NDT, serial number 12345	100% crack inspection, No Crackes Allowed	Manufacturer's Recommendation Not Available Used Guideline for Crack Inspection of Mobile Cranes for CraneSafe Assessment	Reinspect - Mag Particle Inspection: 0 cracks found, see NDT report # 6789	26/01/2012	Pass	None Required	Sam Plumber, Crack Inspections