

TLILIC0009  
Operate A Portal Boom



# Learner Guide

# TABLE OF CONTENTS

|  |           |
|--|-----------|
| <b>Review Log .....</b>  | <b>5</b>  |
| <b>Module Basis.....</b>   | <b>5</b>  |
| <b>1.1 Introduction .....</b>  | <b>6</b>  |
| 1.1.1 Course Overview.....   | 6         |
| 1.1.2 What Is A Portal boom crane? .....   | 7         |
| 1.1.2.1 Parts Of A Slewing Mobile Crane.....   | 8         |
| 1.1.3 High Risk Work And WHS Legislation.....  | 9         |
| 1.1.4 Making The Application .....   | 9         |
| 1.1.5 High Risk Work Licences .....  | 11        |
| <b>1.2 Occupational Health &amp; Safety/Work Health &amp; Safety Legislation .....</b> | <b>12</b> |
| 1.2.1 Harmonisation Of Work Health & Safety Legislation .....                          | 12        |
| 1.2.2 Key Elements Of The Work Health & Safety Legislation .....                       | 13        |
| 1.2.3 Duty Of Care .....   | 15        |
| <b>1.3 Workplace Requirements .....</b>  | <b>16</b> |
| 1.3.1 Safe Work Practices.....   | 17        |
| 1.3.2 Safe Work Method Statements .....  | 18        |
| 1.3.2.1 Completing A SWMS .....  | 19        |
| <b>1.4 Gather Site Information And Plan Job.....</b>                                   | <b>20</b> |
| 1.4.1 Planning And Preparing For Slewing Mobile Crane Operations.....                  | 21        |
| 1.4.2 Applying Site Information .....  | 22        |
| <b>1.5 Risk Management.....</b>  | <b>23</b> |
| 1.5.1 Consultation And Communicating With Others .....                                 | 25        |
| 1.5.2 Risk/Hazard Identification.....  | 26        |
| 1.5.2.1 Task-Specific Hazards .....  | 27        |
| 1.5.2.2 Site-Specific Hazards.....   | 28        |
| 1.5.2.3 Identify Hazards .....   | 28        |
| 1.5.2.4 Safe Electric/Power Line Working Distances .....                               | 30        |
| 1.5.2.5 Working Around Electric/Power Lines.....                                       | 32        |
| 1.5.2.6 Tiger Tails .....  | 33        |
| 1.5.3 Risk Assessment.....   | 34        |
| 1.5.3.1 Risk Analysis.....   | 34        |
| 1.5.3.2 Risk Evaluation .....  | 35        |
| 1.5.4 Risk Treatment.....  | 36        |
| 1.5.4.1 Consider Hazard/Risk Control Strategy Options .....                            | 37        |
| 1.5.4.2 Task-Specific Control Strategies.....  | 39        |
| 1.5.4.3 Identify Resources Required For The Control Strategy .....                     | 41        |
| 1.5.4.4 Personal Protective Clothing And Equipment .....                               | 41        |
| 1.5.4.5 Implement The Control Strategy .....   | 43        |
| 1.5.5 Monitoring And Review Of Risk Management.....                                    | 44        |
| 1.5.6 Reporting And Record Keeping.....  | 45        |
| <b>1.6 Check The Path Of Movement.....</b>   | <b>46</b> |
| <b>1.7 Identify Communication Methods.....</b>   | <b>47</b> |

|  |           |
|--|-----------|
| <b>2.1 Load Assessment .....</b>                           | <b>49</b> |
| 2.1.1 Common Loads.....                                    | 50        |
| <b>2.2 Choosing The Right Crane For The Job.....</b>       | <b>51</b> |
| <b>2.3 Crane And Equipment Checks.....</b>                 | <b>52</b> |
| 2.3.1 Visual Checks .....                                  | 53        |
| 2.3.1.1 Check Signage And Labels.....                      | 54        |
| 2.3.2 Ensuring Safe Access .....                           | 54        |
| 2.3.3 Pre-Operational Checks .....                         | 55        |
| 2.3.3.2 Lifting Hook.....                                  | 57        |
| 2.3.3.3 Sheaves.....                                       | 58        |
| 2.3.3.4 Drums .....  | 59        |
| 2.3.3.5 Wedge Sockets.....                                 | 60        |
| 2.3.3.6 Boom Pawl.....                                     | 61        |
| 2.3.3.7 Lifting Equipment.....                             | 61        |
| <b>2.4 Locate And Identify Controls .....</b>              | <b>62</b> |
| <b>2.5 Check Crane Service Logbook .....</b>               | <b>63</b> |
| <b>2.6 Start The Crane .....</b>                           | <b>64</b> |
| <b>2.7 Test Crane Safety Devices .....</b>                 | <b>65</b> |
| <b>2.8 Conduct Post-Start Checks.....</b>                  | <b>66</b> |
| <b>2.9 Check Communication Equipment.....</b>              | <b>67</b> |
| <b>2.10 Use Inspection Checklist/Logbook.....</b>          | <b>68</b> |
| 2.10.1 Report Any Faults.....                              | 69        |
| <b>2.14 Configure The Crane.....</b>                       | <b>70</b> |
| 2.15 Input Data Into The Crane Computer .....              | 70        |
| <b>2.16 Apply Hazard Control Measures .....</b>            | <b>71</b> |
| 2.16.1 Lighting The Work Area.....                         | 72        |
| <b>2.17 Test Communications Equipment .....</b>            | <b>73</b> |
| <b>3.1 Determine Crane Capacity.....</b>                   | <b>74</b> |
| 3.1.1 Load Charts.....                                     | 75        |
| 3.1.2 Factors That Affect The Amount A Crane Can Lift..... | 77        |
| 3.1.2.1 Crane Capacity Calculations.....                   | 79        |
| 3.1.3 Review Work Plans And Information.....               | 82        |
| <b>3.2 Position The Crane Hook.....</b>                    | <b>83</b> |
| <b>3.3 Conduct A Test Lift .....</b>                       | <b>84</b> |
| <b>3.4 Apply Crane Movements .....</b>                     | <b>85</b> |
| <b>3.5 Follow Communication Signals .....</b>              | <b>87</b> |
| <b>3.6 Operate The Crane .....</b>                         | <b>89</b> |
| 3.6.1 Loading and Unloading Vessels .....                  | 90        |
| 3.6.2 Double Blocking .....                                | 91        |
| 3.6.3 Lifting Personnel/Workers .....                      | 91        |
| 3.6.4 Monitoring Load Movement.....                        | 92        |
| <b>3.7 Check the Path of Movement .....</b>                | <b>93</b> |

|   |            |
|---|------------|
| <b>3.8 Configure the Crane to Mobile the Load .....</b>                         | <b>94</b>  |
| <b>3.9 Mobile The Load.....</b>   | <b>95</b>  |
| 3.9.1 Using Taglines .....  | 95         |
| 3.9.2 Monitoring Weather Conditions .....                                       | 96         |
| <b>3.10 Landing The Load .....</b>  | <b>97</b>  |
| <b>3.11 Respond to Unplanned And Unsafe Situations .....</b>                    | <b>97</b>  |
| 3.11.1 Problem With A Limiting Device .....                                     | 99         |
| 3.11.2 Abnormal Noises And Movements .....                                      | 99         |
| 3.11.3 Loose Connection Pins .....  | 100        |
| 3.11.4 Problem With The Crane's Computer Or Visual Display .....                | 100        |
| 3.11.6 Contact With Electric/Power Lines And Other Electrical Emergencies.....  | 101        |
| <b>3.12 Respond to Workplace Emergencies .....</b>                              | <b>102</b> |
| 3.12.1 Emergency Response .....   | 103        |
| 3.12.2 Reporting An Emergency .....   | 103        |
| 3.12.3 First Aid.....   | 103        |
| <b>3.13 Conclude Operations .....</b>   | <b>104</b> |
| 3.13.1 PLACING THE CRANE IN WEATHER VANE MODE .....                             | 104        |
| 3.13.2 Apply Motion Locks And Brakes.....                                       | 104        |
| 3.13.4 Shutting Down And Securing The Crane.....                                | 105        |
| <b>3.14 Conduct Post-Operational Checks .....</b>                               | <b>106</b> |
| 3.14.2 Recording And Reporting Damage And Defects .....                         | 107        |
| <b>Appendix 1A – Work Health &amp; Safety Common Terms And Definitions.....</b> | <b>108</b> |
| <b>Appendix 1B – Safe Work Method Statement.....</b>                            | <b>109</b> |
| <b>Appendix 1C – Hazard Report Form .....</b>                                   | <b>115</b> |
| <b>Appendix 3A – Crane Specifications – Portal Boom Crane.....</b>              | <b>119</b> |

# **REVIEW LOG**

| <b><i>Version Number</i></b> | <b><i>Date Updated</i></b> | <b><i>Details of Updates</i></b>  |
|------------------------------|----------------------------|---|
| Version 4                    | Released<br>January, 2012  |   |
| Version 4A                   | May 2014                   | <ul style="list-style-type: none"><li>• Updated competencies.</li></ul>   |
| Version 4H                   | Updated<br>October, 2014   | <ul style="list-style-type: none"><li>• Course code updated.</li></ul>  |
| Version 5                    | Released<br>February, 2015 | <ul style="list-style-type: none"><li>• Major review to reflect new logbooks</li><li>• Remove practical activities from activity book</li><li>• Add Trainee declaration</li></ul> |
| Version 5.1                  | Updated<br>March, 2015     | <ul style="list-style-type: none"><li>• Updated front and back cover art</li></ul>  |
| Version 5.2                  | Released<br>March, 2016    | <ul style="list-style-type: none"><li>• Updated Unit Codes<br/>TLILIC2005A<br/>Remove A</li></ul>   |
| Version 6.1                  | Updated<br>January, 2020   | <ul style="list-style-type: none"><li>• Updated version control and unit numbers</li></ul>  |

# **MODULE BASIS**

This module is based on the unit of competency TLILIC0009 Licence To Operate A Portal Boom Crane

# 1.1 INTRODUCTION

This training course is based on the National High Risk Licence Unit of Competency **TLILIC0009 Licence To Operate a Portal Boom Crane**

The National Standard for Licensing Persons Performing High Risk Work aims to facilitate the operation of a nationally uniform, competency-based licensing system for persons performing certain types of high risk work.



## 1.1.1 COURSE OVERVIEW

Throughout this unit you will learn about:

- ▶ Planning the job.
- ▶ Selecting and inspecting equipment.
- ▶ Preparing the site and equipment.
- ▶ Performing the task.
- ▶ Shutting down the job and cleaning up.

Upon successful completion of this course participants will be eligible to be assessed for a National High Risk Work Licence.

## **1.1.2 WHAT IS A PORTAL BOOM CRANE?**

A slewing mobile crane is a crane with a boom or jib that is capable of being slewed. This course covers slewing mobile cranes with a capacity up to 100 tonnes.



### **1.1.2.1 PARTS OF A SLEWING MOBILE CRANE**

Each slewing mobile crane is different. Always refer to the manufacturer's information before conducting any crane operations. The following diagram outlines the general parts of a slewing mobile crane.

- A. Hook
- B. Hook Block
- C. Boom
- D. Hydraulics
- E. Cabin
- F. Counterweight
- G. Outriggers
- H. Access Point



## 1.1.3 HIGH RISK WORK AND WHS LEGISLATION

Any person who is undertaking training for a High Risk Work (HRW) licence according to the Work Health & Safety (WHS) regulations must be currently enrolled in a course of HRW training and being supervised at the workplace by a person with a current HRW licence for the work.

As a person under training you are learning everything you need to know to ensure that you are going to be working safely and efficiently.

Once you have completed your training and have been assessed you will be able to make your application for a high risk work licence.



## 1.1.4 MAKING THE APPLICATION

Under the requirements of Work Health & Safety (WHS) legislation, all applicants for High Risk Work (HRW) licenses must provide the following information:



- ▶ Their name.
- ▶ Evidence of identity (e.g. driver's licence, passport).
- ▶ A passport-sized photograph of themselves (to be used on the HRW photo licence).
- ▶ A copy of the statement of attainment/certification that they have successfully completed and been assessed for the relevant unit of competency for the HRW licence they are applying for.

Under no circumstances can any applicant provide false or misleading information. Applicants are expected to make the following declarations:

- ▶ That they do not currently hold an equivalent HRW licence granted under corresponding WHS law by another WHS regulator.
- ▶ Any details of convictions or of being found guilty of any offence under the WHS Act or the WHS regulations in any jurisdiction in Australia.
- ▶ Whether or not they have ever entered into an enforceable undertaking under the WHS Act or WHS regulations in any jurisdiction in Australia, and providing the details if they have.
- ▶ Whether or not they have ever previously had an equivalent HRW licence refused, suspended or cancelled under the WHS Act or the WHS regulations in any jurisdiction in Australia.



The application for a HWR licence must be made within 60 days of receiving a statement of attainment (issued by a registered training organisation – RTO) or a notice of satisfactory assessment issued by an assessor.

## 1.1.5 HIGH RISK WORK LICENCES



The holder of a HRW licence is responsible for taking reasonable care and not adversely affecting the health and safety of other people while performing the HRW.

Failing to work safely when performing high risk work can lead to the licence holder being penalised under WHS regulations:

- ▶ Their licence may be **suspended** or **cancelled**.

**OR**

- ▶ The regulator may refuse to renew the licence (if the matter is raised at the time of renewal). High risk work licences will need to be renewed **every 5 years**.

***Under no circumstances*** may an employer/PCBU allow a person to conduct high risk work if they are not competent to do so, unless the person is enrolled in a course of HRW training and is supervised at the workplace by a person with a current HRW licence for the work. If a holder of a high risk work licence is no longer competent to carry out the work they hold a licence for they must stop doing the work and retrain to become fully competent, or return the HRW licence to the WHS regulator.



# **1.2 OCCUPATIONAL HEALTH & SAFETY/WORK HEALTH & SAFETY LEGISLATION**

Occupational Health & Safety/Work Health & Safety (OHS/WHS) legislation is defined as laws and guidelines to help keep your workplace safe.

Legislation can be broken down into four main types:

|                             |  |
|-----------------------------|--|
| <b>Acts</b>                 | Laws to protect the health, safety and welfare of people at work.                            |
| <b>Regulations</b>          | Give more details or information on particular parts of the Act.                             |
| <b>Codes of Practice</b>    | Provide practical instructions on how to meet the terms of the Law.                          |
| <b>Australian Standards</b> | Give you the minimum levels of performance or quality for a hazard, work process or product. |

## **1.2.1 HARMONISATION OF WORK HEALTH & SAFETY LEGISLATION**

In response to industry calls for greater national consistency, the Commonwealth, states and territories have agreed to implement nationally harmonised Work Health & Safety (WHS) legislation to commence on 1 January 2012.

While not all states and territories have actually implemented the model WHS legislation as of the start of 2012, it is important to be aware of these changes, as all states and territories will eventually implement them.



Harmonisation aims to develop consistent, reasonable and effective safety standards and protections for all Australian workers through uniform WHS laws, regulations and codes of practice.



## 1.2.2 KEY ELEMENTS OF THE WORK HEALTH & SAFETY LEGISLATION

The following key elements of the WHS legislation will impact the way you do your job, and the responsibilities of your workplace:

- 1** There is a primary duty of care requiring **persons conducting a business or undertaking (PCBU)** to ensure, so far as is **reasonably practicable**, the health and safety of **workers** and others who may be affected by the carrying out of work.
- 2** A requirement that **officers** of corporations and unincorporated bodies exercise **due diligence** to ensure compliance.
- 3** **Workers** must exercise reasonable care that their acts or omissions do not adversely affect the health and safety of persons at a workplace.

The legislation also outlines requirements for:

- ▶ The reporting requirements for notifiable incidents.
- ▶ Licences, permits and registrations (e.g. for persons engaged in high risk work or users of certain plant or substances).
- ▶ Provision for worker consultation, participation and representation at the workplace.
- ▶ Provision for the resolution of health and safety issues.
- ▶ Protection against discrimination.



Many specific details relating to WHS will be negotiated within the workplace in accordance with the legislation.

It is important that you speak with your Health and Safety Representative or supervisor for more information on how these elements will effect your day-to-day operations, or if you have any concerns relating to health and safety.

A list of common WHS terms and their definitions can be found in Appendix 1A.

The following OHS/WHS legislative requirements will affect the way that you work:

- ▶ Australian Standards.
- ▶ Industry OHS/WHS Standards and Guidelines.
- ▶ Duty of Care.
- ▶ Health and Safety representatives, committees and supervisors.
- ▶ Licences, tickets or certificates of competency.



- ▶ Job Safety Analysis (JSA) and Safe Work Method Statements (SWMS).
- ▶ National safety standards.
- ▶ OHS/WHS and Welfare Acts and regulations.
- ▶ Safety Codes of Practice.

Talk to your OHS/WHS officer or representative if you have any questions about OHS/WHS legislation.

## **1.2.3 DUTY OF CARE**

All personnel/workers have a legal responsibility under duty of care to do everything reasonably practicable to protect others from harm by complying with safe work practices.

This includes activities that require licences, tickets or certificates of competency or any other relevant state and territory OHS/WHS requirements.



Duty of care involves:

- ▶ Employers/PCBsUs and self-employed persons.
- ▶ Persons in control of the workplace.
- ▶ Supervisors.
- ▶ Designers.
- ▶ Manufacturers.
- ▶ Suppliers.
- ▶ Workers.
- ▶ Inspectors.



## 1.3 WORKPLACE REQUIREMENTS

Each workplace or worksite has a series of requirements, rules and procedures that need to be followed to help ensure the safety of everyone on and around the site.

These requirements and procedures may be different from site to site so it is very important that you determine the rules for the site when you arrive.



Before you start any crane work you need to consult with authorised personnel/workers such as:

- ▶ Supervisors.
- ▶ Safety officers.
- ▶ Other personnel/workers.
- ▶ Site engineers (if applicable).
- ▶ Site or operations managers.

## 1.3.1 SAFE WORK PRACTICES

Safe work practices are methods that must be implemented to make sure a job is carried out as safely as possible.

Safe work practices include:

- ▶ Day-to-day observation of OHS/WHS policies and procedures.
- ▶ Emergency procedures.
- ▶ Risk assessment.
- ▶ Use of basic fire-fighting equipment.



Safe work practices are governed by legislative requirements and workplace procedures. They relate to:

- ▶ Drugs and alcohol at work.
- ▶ Access to site amenities, such as drinking water and toilets.
- ▶ General requirements for safe use of plant and equipment.
- ▶ General requirements for use of personal protective equipment and clothing.

- ▶ Smoking in designated areas.
- ▶ Housekeeping to ensure a clean, tidy and safe work area.
- ▶ Preventing bullying and harassment.
- ▶ Storage and removal of debris.

Safe work practices should be referred to, and documented, when completing Safe Work Method Statements as a guideline for how to carry out a task safely.



## 1.3.2 SAFE WORK METHOD STATEMENTS

A Safe Work Method Statement (SWMS) details how specific hazards and risks, related to the task being completed, will be managed. It is developed by the employer/PCBU for their employees/workers.

The form is titled 'SAFE WORK METHOD STATEMENT'. It includes fields for SWMS Name, SWMS Created By, Date of Creation, Last Reviewed Date, SWMS Summary, Client, Project Details, Name, Contact Name, ABN, Site Address, Address, Contact Number, Start Date, and Email. A section titled 'How to Complete this SWMS' lists 7 steps: 1. CONSULT: Consult with all persons who will be involved in the completion of the work. 2. DETERMINE: Identify each of the health and safety hazards and risks arising from each step in the work. 3. ASSESS: Assess the level of risk associated with each hazard listed. 4. RISK ASSESSMENT: Decide how the risks will be controlled, and describe what hazard control measures will be put in place. 5. CONTROL: Describe how the risks will be controlled, and describe what hazard control measures will be put in place. 6. RESPONSIBILITY: Allocate a person responsible for the hazard control measure. 7. REVIEW: Review the effectiveness of the control measures and apply further hazard control measures as required. Below this, there are tables for Training Qualifications required to carry out work, Equipment required to carry out work, Legislation, Australian Standards & Codes Of Practice Relevant To Work (Where Applicable), Equipment Required To Carry Out Work, and Environmental Statement.



Safe Work Method Statements fulfill a number of objectives:

- ▶ They outline a safe method of work for a specific job.
- ▶ They provide an induction document that workers must read and understand before starting the job.
- ▶ They assist in meeting legal responsibilities for the risk management process, hazard identification, risk assessment and risk control.
- ▶ They assist in effectively coordinating the work, the materials required, the time required and the people involved to achieve a safe and efficient outcome.
- ▶ They are a quality assurance tool.

### **1.3.2.1 COMPLETING A SWMS**

To complete a SWMS:

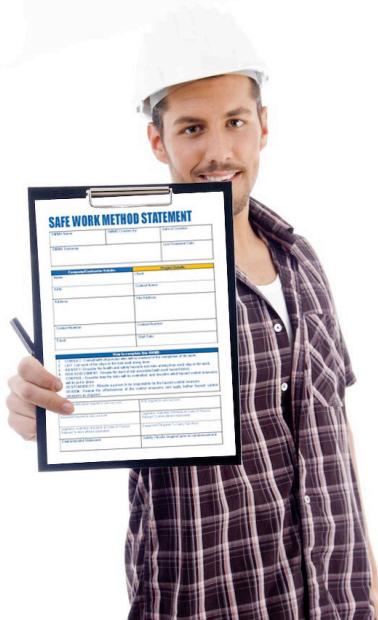
- 1** Break the job down into logical steps taking into consideration what is required to be achieved by the task.
- 2** Against each step, identify the workplace hazards in this activity i.e. the ways that a person (or plant) could be injured or harmed (or damaged) during each step.
- 3** Decide on measures required to mitigate hazards. i.e. what could be done to make the job safer and prevent the injuries or harm that may occur.
- 4** Identify roles and responsibilities for actions and outcomes to make ensure risk/hazard controls are carried out and supervision of the process occurs.
- 5** Ensure the SWMS is fully understood by all workers prior to commencing the task.

**A SWMS must be prepared in consultation with those people who will be doing the job.**

The Safe Work Method Statement must be available for inspection at any given time. It must also be reviewed each year and amended if necessary.

Safe Work Method Statements may also be referred to as Safe Work Procedures (SWP) or Job Safety Analysis (JSA).

A Safe Work Method Statement Template can be found in Appendix 1B.



## **1.4 GATHER SITE INFORMATION AND PLAN JOB**

Planning the job before you start is an important step in any high risk work. You need to plan and be well prepared for crane operation to ensure each task is completed safely and to a high standard. You also need to obtain the relevant site information and relate it to your work activities.



## 1.4.1 PLANNING AND PREPARING FOR SLEWING MOBILE CRANE OPERATIONS

Before beginning a job remember to consider:

- ▶ **Job or Task Requirements** – Think about everything the job involves such as: What is the job? Where is the job? What do I need for the job? What type of crane will be used? What are its functions, capabilities and limitations?
- ▶ **Priorities or Sequencing** – Break the entire job into tasks and put them in a logical order. When prioritising the tasks make sure you consider what tasks need to be completed before others can begin.
- ▶ **Site Rules and Regulations** – Find out and understand any regulations or site rules that affect your job. If you are unsure about any rules or regulations, speak to your supervisor.



- ▶ **Permits and Procedures** – Find out if you need a permit to complete this job. If so you need to ensure that you have one and that it is current. You also need to understand and apply any site procedures that are in place for this task. If you have any questions about permits or procedures talk to your supervisor.
- ▶ **Risk Management** – This involves managing any risks or hazards that are present throughout the worksite and in relation to your task.

## 1.4.2 APPLYING SITE INFORMATION



Site information such as local conditions (access and egress) or work method statements will help you determine how the job is to be performed.

It is important to consult with the relevant workplace personnel/workers and OHS/WHS officer before starting work to make sure that all site specific hazards and ground conditions have been identified and that all workplace procedures and site-specific procedures are adhered to while you carry out the work.

You may need to obtain approval for any crane work to be performed on site. For example, if you needed to set up a crane in a busy street you would need to check with the local authorities to see if there are any permits required for traffic control, if there are any conditions under which you would need to operate the crane at that location or if any exclusion zones are necessary.



## 1.5 RISK MANAGEMENT

Risk management is the process of reducing or managing the risks when working with a hazard or in a hazardous situation and should take into consideration the context of the organisation and worksite.



Risk management must be conducted in accordance with:

- ▶ Legislative, organisation and site requirements/procedures.
- ▶ Australian Standards (AS/NZS ISO 31000:2009).
- ▶ Codes of Practice.
- ▶ Employment and workplace relations legislation.
- ▶ Equal employment opportunity and disability legislation.

Risk management is made up of the following stages:



Consultation and communicating with others and monitoring and review should be planned for and carried out at every stage of the risk management process.

## **1.5.1 CONSULTATION AND COMMUNICATING WITH OTHERS**



Communication and consulting with others is an important part of the risk management process and should take place at all stages.

Identifying risks and hazards and coming up with ways of controlling them includes talking to the people with knowledge of the situation, or who are directly affected by any action you may take.

You should always talk to any workers involved in the hazard control measures as well as the OHS/WHS officer or supervisor.

This will help ensure that risks and hazards are not only effectively identified but that those involved with controlling and treating them are clear of their role and responsibilities in the risk management process.

It also allows different skills, expertise and views to be brought together to enhance and support the risk management process.



It is important that different views and concerns are identified and recorded as part of the consultation and then taken into account during the decision-making process.

Controlling a hazard can be a team effort and it's important that everybody knows what they need to do and how/if they need to change their work process to suit.

## 1.5.2 RISK/HAZARD IDENTIFICATION

**HAZARDS CREATE RISK. CHECK FOR HAZARDS.**

A **RISK** is the chance of a hazard hurting you or somebody else or causing some damage.

A **HAZARD** is the thing or situation that causes injury, harm or damage.

If you can remove or at least control a **HAZARD** you can reduce the **RISK** involved.

Each worksite has its own specific risks and hazards.



Before commencing work on a site you should consult with safety officers, supervisors, site engineers, managers responsible for the site or other relevant workplace personnel/workers.

They can inform you of any site-specific hazards and ground conditions and ensure that you adhere to any workplace policies and site-specific procedures.

A site induction needs to inform you of any hazards which exist on site. Some of these hazards can be removed through staff training, better equipment and safe work methods. Talk to the OHS/WHS officer for more information.

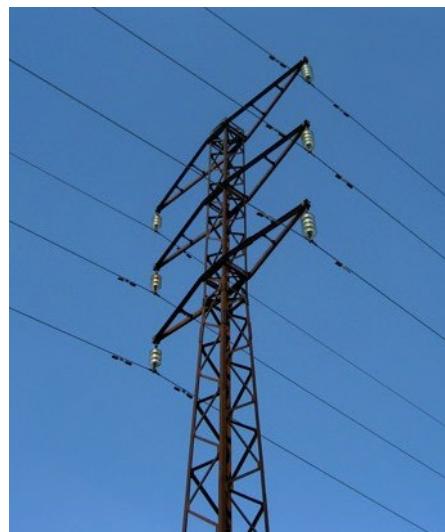
Each worksite will have specific risk management procedures, safety systems and information, and procedures for communication, reporting and record keeping.

Before conducting a risk assessment at a worksite, check to see what systems and procedures are in place as they may affect the outcomes of the risk assessment.

It is important that suitably knowledgeable personnel/workers are involved in the risk identification process.



## 1.5.2.1 TASK-SPECIFIC HAZARDS



Common workplace hazards related to slewing mobile crane operations include:

- ▶ Electric/Power lines.
- ▶ Overhead service lines/pipes.
- ▶ Underground services.
- ▶ Recently filled trenches.
- ▶ Slopes.
- ▶ Ground/floor surfaces that may not bear the weight of the crane or other equipment.

- ▶ Bad weather conditions such as dangerously strong winds.
- ▶ Insufficient lighting/lack of illumination.
- ▶ Vehicle traffic.
- ▶ Plant and equipment.
- ▶ Pedestrians and personnel/workers.



- ▶ Dangerous materials.
- ▶ Ground stability and condition.
- ▶ Trees.
- ▶ Buildings, facilities and other surrounding structures.
- ▶ Obstructions.
- ▶ Circumstances that may cause potential crane instability.

## 1.5.2.2 SITE-SPECIFIC HAZARDS



The hazards you identify may depend on the particular kind of worksite you may be operating in.

For instance, if you were working on a demolition site the following factors may cause a stability hazard for the crane:

- ▶ Empty spaces underground (e.g. stairways, lift wells, hidden chambers, cavities).
- ▶ Ground instability caused by rubble.
- ▶ Lack of knowledge of the weight of loads (e.g. parts of structures).
- ▶ Lifting plant items onto surfaces that cannot hold their weight.
- ▶ Collapse of structures onto the crane.

## 1.5.2.3 IDENTIFY HAZARDS

Part of your job is to look around to see if you can find any hazards before you start moving the crane and load.

A good tip is to check:

- ▶ **Above head height** – Remember the crane will be working well above your head!
- ▶ **At eye level** – Look around to see if there is anything in the way of where you want to move the load/crane.
- ▶ **On the ground (and below)** – Unstable surfaces, slippery surfaces and rubbish can all be dangerous. Also make sure that the path of travel is clear and can bear the weight of the crane.



Make a note of any hazard you identify in the area. Remember, a hazard can also be a situation so keep an eye on how the people around you are working too.

You should also check records of injuries and incidents, safety tags and talk to other workers.

Material Safety Data Sheets (MSDS) can be useful tools in identifying potential hazards so make sure you check the MSDS documents for your site.

Hazards are not only environmental; they may be caused by the way a job is carried out, or by the equipment being used.



Each task/procedure/function needs to be evaluated for risks, as well as the work area where the activity is being carried out.

You need to recognise the type and scope of risks that are yet to be resolved and understand the likely impact so as to evaluate the situation and begin to implement control measures.

Once a risk has been identified, check for any existing procedural documentation, workplace procedure or workplace policy which describes how to eliminate or control the risk.

It is important that all records, policies and procedures are kept up to date so that the most relevant information is available and used.

Talk to other workers, your manager, supervisor, team leader or health & safety representative to find out if the risk has already been addressed, and what techniques are available to you to resolve it.

If you find that there is no documentation or guideline in place to resolve an identified risk, you need to assess the risk and identify a feasible course of action to deal with it.



## 1.5.2.4 SAFE ELECTRIC/POWER LINE WORKING DISTANCES

The different states and territories have standards and regulations for working near electric/power lines. It is important that you identify possible risks when working around electric/power lines and follow relevant safe electric/power line working distances.



### SA / TAS / ACT (AS2550.1)

In South Australia, Tasmania and the ACT, equipment must not be closer than the following distances to electric/power lines:

| Electric/Power Line Type                                     | Distance                                |
|--|---|
| Distribution lines up to and including 133kV (usually poles) | 6.4m or 3.0m with a qualified 'spotter' |
| Transmission lines greater than 133kV (towers)               | 10m or 8m with a qualified 'spotter'    |

A 'spotter' is a competent person who watches and guides plant and equipment around electric/power lines. Check with each state authority for their spotter requirements.

### VIC

In Victoria the *Framework for Undertaking Work Near Overhead and Underground Assets* states that equipment must not be closer than the following distances to electric/power lines:

| Electric/Power Line Type                                  | Distance                                |
|---|---|
| Distribution lines up to and including 66kV (power poles) | 6.4m or 3.0m with a qualified 'spotter' |
| Transmission lines greater than 66kV (towers)             | 10m or 8m with a qualified 'spotter'    |

## NSW

In New South Wales, equipment operation may not be any closer than the following distances to electric/power lines:

| Electric/Power Line Type | Distance |
|--------------------------|----------|
| Up to 132kV              | 3.0m     |
| 132kV up to 330kV        | 6.0m     |
| more than 330kV          | 8.0m     |

To work closer than these distances requires authority from the relevant electrical authority and adherence to cl.64(2)(e) of the regulations.

## QLD

The Queensland *Electrical Safety Regulation* breaks down the distances in detail. Exclusion zones are broken down not only by size of electric/power line but also by the competency level of the operator. This means that the requirements should be clarified with the electrical authority before work commences even if the distance appears to be outside the zones.

The Code of Practice gives the following minimum distances as guidance:

| Electric/Power Line Type | Distance |
|--------------------------|----------|
| Up to 132kV              | 3.0m     |
| 132kV up to 330kV        | 6.0m     |
| 330kV to 500kV           | 8.0m     |

## WA

In Western Australia this falls under *Regulation 3.64* from the *OSH Regulations* and states the following as the minimum distances:

| Electric/Power Line Type | Distance |
|--------------------------|----------|
| Less than 33kV           | 3.0m     |
| Over 33kV                | 6.0m     |
| Over 133kV               | 8.0m     |

## NT

In the Northern Territory safe electric/power line working distances falls under the *Electricity Reform (Safety and Technical) Regulations*. Table 2, Schedule 3 gives the following minimum distances:

| Electric/Power Line Type | Distance |
|--------------------------|----------|
| Up to 33kV               | 1.5m     |
| Above 33kV to 132kV      | 3.0m     |
| Above 132kV to 275kV     | 4.0m     |
| Above 275kV to 330kV     | 6.0m     |
| Above 330kV to 500kV     | 8.0m     |

### 1.5.2.5 WORKING AROUND ELECTRIC/POWER LINES



If you are required to work closer to electric/power lines than the minimum safe working distance allows you should:

- ▶ Seek an exemption from the relevant authority.
- ▶ Where possible, have the power shut off. If this is not possible, an authorised/competent person must insulate the electric/power lines.
- ▶ Use a spotter within the exclusion zone – this will be dependent on the relevant state/territory legislation.

These are general guidelines only – you should always comply with the requirements of the relevant state/territory.

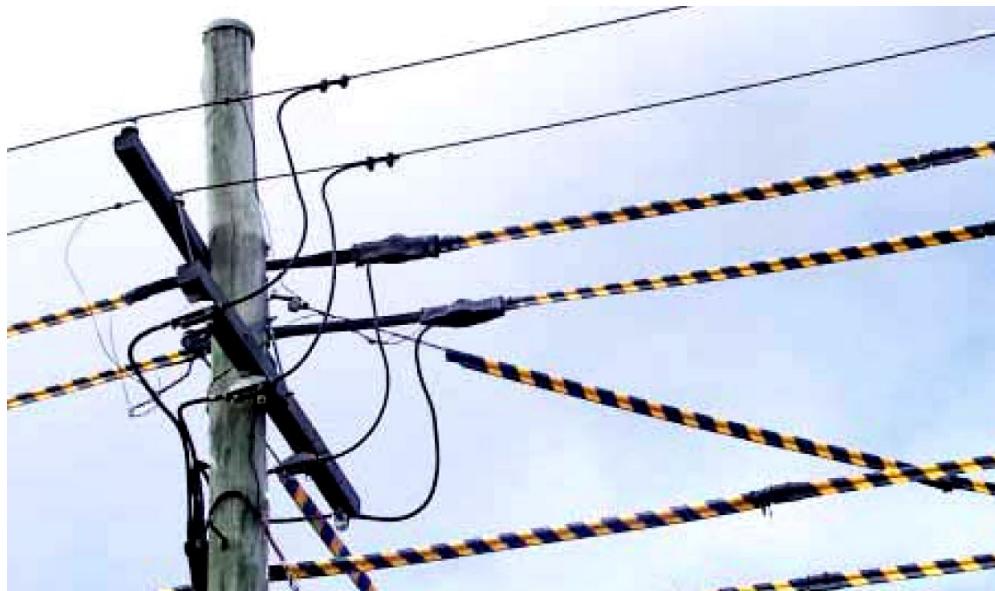
If you are unsure of the voltage of the overhead electric/power lines you should consult the relevant local electrical authority for advice.



## 1.5.2.6 TIGER TAILS

Tiger tails are used as a visual aid to identify the location of overhead electric/power lines.

It is important to note that tiger tails **DO NOT** insulate the electric/power lines so exclusion zones and safe operating distances must still be maintained, even when tiger tails are present.



## 1.5.3 RISK ASSESSMENT

A risk assessment involves completing a risk analysis and a risk evaluation. By assessing the likelihood and consequence of the risk, you are able to understand the situation better and respond in an appropriate way.



### 1.5.3.1 RISK ANALYSIS

Risk analysis involves considering what are the causes and sources of risks and comprises 3 factors:

|             |   |
|-------------|---|
| Consequence | What would be the outcome of the event occurring?<br>How severe would the outcome be?                                     |
| Likelihood  | What is the chance of the event/consequence occurring?<br>Has the event happened before?<br>Is it likely to happen again? |
| Risk Level  | The combined result of likelihood and consequence.  |

Using a table similar to the one shown here you can analyse how high the risk level is:

| LIKELIHOOD     | CONSEQUENCE   |                          |  |   |  |
|----------------|---------------|--------------------------|--|---|--|
|                | Insignificant | Minor First Aid Required | Moderate Medical Attention and Time Off Work | Major Long Term Illness or Serious Injury | Severe Kill or Cause Permanent Disability or Illness |
| Almost Certain | M             | H                        | H  | VH  | VH   |
| Likely         | M             | M                        | H  | H   | VH   |
| Possible       | L             | M                        | H  | H   | VH   |
| Unlikely       | L             | L                        | M  | M   | H  |
| Rare           | L             | L                        | M  | M   | M  |

### 1.5.3.2 RISK EVALUATION

Risk evaluation is based upon the outcomes and results of the risk analysis.

Risk evaluation involves making decisions about which risks need to be treated and the order in which they should be treated. It should take into consideration the context of the risks in relation to:

- ▶ The organisation.
- ▶ The worksite.
- ▶ The relevant laws.
- ▶ Regulations.
- ▶ Other policies, procedures and requirements.



Using a table similar to the one shown you can evaluate how soon you should act to remove or control the hazard to achieve an acceptable level of risk:

| RISK LEVEL | ACTION  |
|------------|---|
| VERY HIGH  | <u>Act immediately:</u><br>The proposed task or process activity must not proceed. Steps must be taken to lower the risk level to as low as reasonably practicable using the hierarchy of risk controls.  |
| HIGH       | <u>Act today:</u><br>The proposed activity can only proceed, provided that: <ol style="list-style-type: none"><li>1. The risk level has been reduced to as low as reasonably practicable using the hierarchy of risk controls.</li><li>2. The risk controls must include those identified in legislation, Australian Standards, Codes of Practice etc.</li><li>3. The risk assessment has been reviewed and approved by the Supervisor.</li><li>4. A Safe Working Procedure or Safe Work Method has been prepared.</li><li>5. The supervisor must review and document the effectiveness of the implemented risk controls.</li></ol> |
| MEDIUM     | <u>Act this week:</u><br>The proposed task or process can proceed, provided that: <ol style="list-style-type: none"><li>1. The risk level has been reduced to as low as reasonably practicable using the hierarchy of risk controls.</li><li>2. The risk assessment has been reviewed and approved by the Supervisor.</li><li>3. A Safe Working Procedure or Safe Work Method has been prepared.</li></ol>  |
| LOW        | <u>Act this month:</u><br>Managed by local documented routine procedures, which must include application of the hierarchy of controls.  |

Any task with a Very High risk level is absolutely unacceptable to carry out. Steps must be taken to reduce the risk level.

## **1.5.4 RISK TREATMENT**

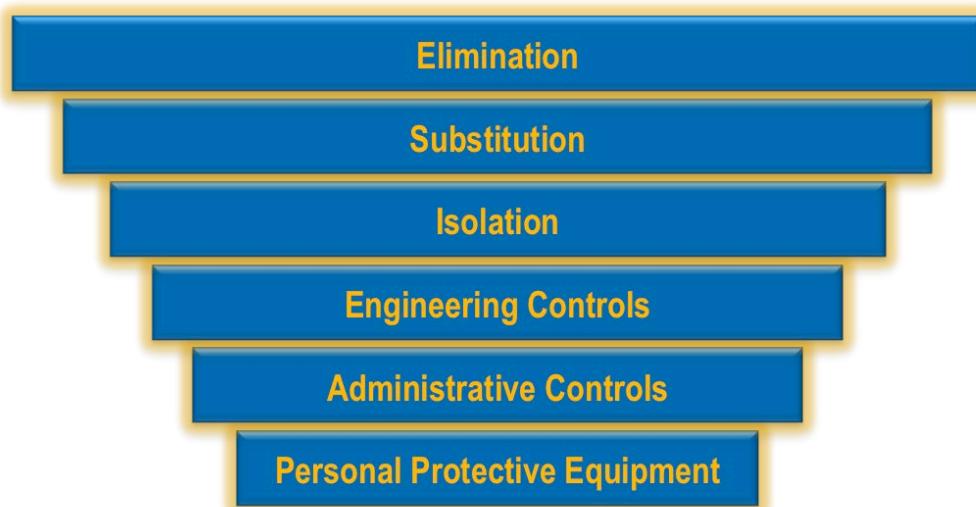
Once risks have been identified, analysed and evaluated, risk treatment options need to be considered and applied. Risk treatment involves selecting one or more options to modify a risk and then implementing the selected option/s. Risk treatments should be recorded in a risk treatment plan.

Once an option has been implemented it may be referred to as a risk control.



## **1.5.4.1 CONSIDER HAZARD/RISK CONTROL STRATEGY OPTIONS**

The Hierarchy of Hazard Control is the name given to a range of control methods used to eliminate or control hazards and risks in the workplace. The Hierarchy has 6 levels:



It is important to understand what each level in the Hierarchy stands for and how they can be implemented into your work.

|   |  |
|---|--|
| <b>1. Elimination</b>                             | Completely remove the hazard. This is the best kind of hazard control.   |
| <b>2. Substitution</b>                            | Swap a dangerous work method or situation for one that is less dangerous.  |
| <b>3. Isolation</b>                               | Isolate or restrict access to the hazard.  |
| <b>4. Engineering Measures</b>                    | Use equipment to lower the risk level.   |
| <b>5. Administrative/<br/>Safe Work Practices</b> | Site rules and policies attempt to control a hazard.   |
| <b>6. Personal Protective<br/>Equipment</b>       | The least effective control. Use PPE while you carry out your work – this should be selected at the planning stage of your work, and checked before starting the task. |

Follow all appropriate standards when deciding hazard control strategies including:

- ▶ Codes of practice for mobile cranes.
- ▶ Legislation.
- ▶ Australian Standards.
- ▶ Manufacturer's specifications.
- ▶ Industry standards (where applicable).



Pay special attention to such factors as:

- ▶ The positioning of the crane.
- ▶ The safe operation of the crane.
- ▶ Risks associated with overhead electric/power lines and electrical cables.
- ▶ Risks associated with wind.
- ▶ Risks associated with the erection of the crane.
- ▶ Risks associated with packing up of the crane.
- ▶ Risks associated with crane stability.

It is important to consider all of the options available when deciding on the best course of action.

Not all options are feasible or possible under some circumstances.

You may need to use a number of control strategies in conjunction to reduce the risk level to an acceptable level.

The risk treatment plan should clearly identify the order in which to implement the individual risk treatments.



## 1.5.4.2 TASK-SPECIFIC CONTROL STRATEGIES

Some examples of risks/hazards and their possible controls include:

**Situation:**

A person or object near the chassis or outriggers of a slewing crane.



**Hazard:**

The person or object could be hit or crushed by the crane and/or load when it is moving.

**Control:**

- ▶ Exclusion zones.



**Situation:**

Retracting/folding a boom.

**Hazard:**

Someone being trapped or crushed by the boom.  
Someone being hit by the boom or load.

**Control:**

- ▶ Placing the operator safely out of the entrapment zone.



**Situation:**

Working near pedestrians or site personnel/workers.

**Hazard:**

Hitting or crushing a person with the crane or load.

**Control:**

- ▶ Pedestrian exclusion zones.
- ▶ Warning signs.
- ▶ Protective barriers.
- ▶ Flashing hazards lights.
- ▶ Traffic control (e.g. a flag person).
- ▶ Gantry.
- ▶ Hoardings.
- ▶ Scaffolding.

**Situation:**

Working near other mobile plant or vehicles.

**Hazard:**

Hitting other plant or vehicles with the crane or load.

**Control:**

- ▶ Vehicle exclusion zones.
- ▶ Warning signs.
- ▶ Protective barriers.
- ▶ Flashing hazards lights.
- ▶ Traffic control (e.g. a flag person).



### **1.5.4.3 IDENTIFY RESOURCES REQUIRED FOR THE CONTROL STRATEGY**

These resources should also be outlined in the risk treatment plan and could include:

- ▶ Fencing or traffic control.
- ▶ New or different equipment.
- ▶ Staff training.
- ▶ More personnel/workers.
- ▶ Creation of procedures and instructions.



### **1.5.4.4 PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT**



As a minimum, a person involved in crane operations must wear personal protective clothing such as:

- ▶ A safety helmet (hard hat).
- ▶ Safety boots/footwear.
- ▶ High-visibility clothing.

Other PPE includes:

- ▶ Gloves.
- ▶ Safety goggles/glasses.
- ▶ Reflective vest.
- ▶ Relevant breathing apparatus.
- ▶ Hearing protection.
- ▶ Skin and sun protection.
- ▶ Any other items required by the site.



All safety equipment such as PPE should be selected and inspected while the work is being planned and before any tasks are carried out.

Make sure any piece of PPE you are wearing is in safe working condition and is suitable for the job.

If you find any item of PPE that is not in serviceable condition, tag it and remove it from service. Report the fault to your supervisor who will organise the repair or replacement of the item.



## 1.5.4.5 IMPLEMENT THE CONTROL STRATEGY

Once you have come to the conclusion that the action is appropriate, feasible and reduces the level of risk to an acceptable level, it is time to take action and implement the control measures.

Plan out, in detail, the steps required to implement the control strategies. This plan is called the Risk Treatment Plan.

Consult with other workers and management to ensure the implementation is done correctly and does not have a negative bearing on other trades, procedures or workers.



Once the risk control measure is in place you will need to review the level of risk to determine if more needs to be done to lower the risk level.

The acceptable level of risk is determined by an organisation's policy, goals and objectives towards safety. Talk to your supervisor or health & safety representative if you are not sure about whether or not the risk has been reduced enough to carry out the work.

If you determine the risk to be at an unacceptable level, the work must not be carried out until the situation can be reviewed by an authorised person.

Part of preparing the site includes setting up any hazard controls. This might include erecting barricades to keep pedestrians outside of the work area, setting up extra lighting or having electric/power lines insulated or disconnected.

Make sure that any control measures are consistent with workplace and safety standards. If you are unsure about any safety or control measures, check with your OHS/WHS officer or supervisor.



## **1.5.5 MONITORING AND REVIEW OF RISK MANAGEMENT**

Monitoring and review are an important part of the risk management process and should be planned for at every stage.

Monitoring and review involves regular surveillance and checking and responsibilities concerning it should be clearly defined.

The risk treatment plan should be complete and adhere to workplace policies and procedures.

The risk treatment plans should be discussed with appropriate personnel/workers and included within the management process of the organisation.



Monitoring and review should:



- ▶ Be used to detect any changes, including changes to risks, which may require revision of treatments, or the emergence of new risks.
- ▶ Ensure that treatments and controls are effective and efficient.
- ▶ Aim to improve risk assessment through obtaining further information.
- ▶ Be used to analyse events and changes that have occurred through the implementation of the process and any lessons that may be learned from this.

It is important that monitoring and review results are recorded and reported according to organisational policies and procedures.



## **1.5.6 REPORTING AND RECORD KEEPING**



Make sure you record any action you've taken and talk to your supervisor and OHS/WHS officer about the control strategies in place.

Reports and records could include:

- ▶ Risk Assessment Reports.
- ▶ Incident Reports.
- ▶ Job Safety Analysis.
- ▶ Safe Work Method Statements.

Keeping records is important as they can help ensure that any risk management activities are traceable.

Records also provide a basis for improving methods and tools in the risk management process, as well as improving the overall process.

An example of a Hazard Report Form can be found in Appendix 1C.



## 1.6 CHECK THE PATH OF MOVEMENT

Before you get started it is a good idea to check the route that you are intending to take to make sure that you have identified all hazards or obstructions in the path of movement and implemented effective control measures.



Obstructions you should check for when inspecting the path of movement for the crane will include:

- ▶ Equipment.
- ▶ Materials.
- ▶ Other vehicles, plant and personnel/workers.
- ▶ Buildings and other structures.
- ▶ Overhead electric/power lines.

Inspect the pick up and landing areas to make sure they are suitable for the crane and load. Check the dimensions of the crane and load to make sure that they can pass safely along the route of travel and through access/egress points without encountering any difficulties.

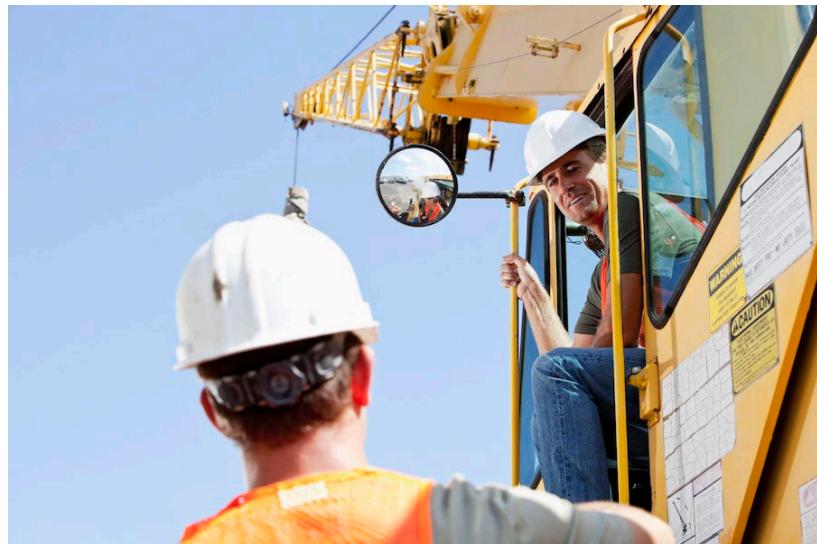
You will also need to check for any other equipment or people working in the area. You may need to prevent access to certain areas.

It may be necessary to arrange appropriate communication methods with the dogger when planning to travel to the work area.



## 1.7 IDENTIFY COMMUNICATION METHODS

As a crane operator you need to be able to communicate effectively with those around you while you work. This may include personnel/workers such as doggers and riggers.



It is important that you are able to understand all the instructions necessary to use all relevant equipment safely.

These can include:

- ▶ Manufacturer's guidelines (instructions, specifications, checklists).
- ▶ Industry operating procedures.
- ▶ Workplace procedures (work instructions, operating procedures, checklists).

You need to select appropriate workplace communications methods while planning and preparing for crane operations.

Communication methods may take the form of:

- ▶ Verbal and non-verbal language.
- ▶ Listening.
- ▶ Questioning to confirm understanding.
- ▶ Written instructions.
- ▶ Signage.
- ▶ Hand signals.
- ▶ Whistle signals.
- ▶ Use of communication equipment such as fixed channel two-way radio.
- ▶ Appropriate worksite protocol.



Choosing the most appropriate communication method for the job will depend on the specific circumstances you may encounter during operations.

For instance, if the crane operator remains constantly in view of the person dogging the load, then hand signals would be an effective communication method.

If, however, the load is not always going to be in sight of the crane operator, then whistle signals could be employed.

Fixed channel two-way radios can be used when they are going to prove more effective than other methods.

They are particularly useful when the operator is out of view of the load and whistle signals could not be heard or would prove confusing due to other crane operators in the area.



## 2.1 LOAD ASSESSMENT



Part of putting together a job plan includes assessing the load itself. Different types of loads will have different requirements for safe lifting.

The person who slings the load (usually a person holding a dogging or rigging licence) is responsible for establishing the weight of the load that is to be lifted.

The crane operator needs to communicate with the person slinging the load and give them appropriate information such as the capacity of the crane that is to be used.

By identifying the weight of the load you will be able to properly assess whether or not the crane will be able to shift the load and the limitations of operation for the crane.

It is extremely dangerous to attempt to lift a load of unknown weight – you could cause structural damage to the crane and damage to the lifting gear and load.



You can determine the weight of a load a number of ways. These include:

- ▶ Checking with the driver who delivers the load. The weight may be marked on the delivery docket or on a weighbridge certificate.
- ▶ Checking the load itself. The weight may be marked on the load or the packaging it arrives in.
- ▶ Weighing the load.
- ▶ Estimating the weight of the load through appropriate calculations.



## 2.1.1 COMMON LOADS

The table below lists the weights of common loads:

| Material          | Weight              | Material          | Weight              |
|-------------------|---------------------|-------------------|---------------------|
| Aluminium         | 2.7t / cubic metre  | Granite           | 2.6t / cubic metre  |
| Bricks            | 4.0t / 1000         | Gypsum            | 2.3t / cubic metre  |
| Bronze            | 8.5t / cubic metre  | Iron, ore         | 5.4t / cubic metre  |
| Cast Iron         | 7.2t / cubic metre  | Lead              | 11.2t / cubic metre |
| Cement (25 bags)  | 1.0t                | Mild Steel        | 7.85t / cubic metre |
| Clay              | 1.9t / cubic metre  | Poly Pipe         | 1.1t / cubic metre  |
| Coal              | 864kg / cubic metre | Timber (hardwood) | 1.1t / cubic metre  |
| Concrete / Cement | 2.4t / cubic metre  | Timber (soft)     | 0.6t / cubic metre  |
| Copper            | 9.0t / cubic metre  | Water             | 1.0t / cubic metre  |
| Earth             | 1.9t / cubic metre  |                   |                     |

## 2.2 CHOOSING THE RIGHT CRANE FOR THE JOB

Part of planning the job is to check that the crane will be able to shift the load safely. This means you need to check the crane capabilities, load charts and limitations of the crane.



When choosing the right crane or cranes for the job it is important to take into account:

- ▶ Environmental conditions you are going to work under, including weather and ground conditions.
- ▶ Size of work access points.
- ▶ Number and frequency of lifts.
- ▶ Weights and dimensions of loads.
- ▶ Maximum height and radius of lifts.
- ▶ Procedure for the movement of loads (e.g. lifting only, mobiling).

Refer to the manufacturer's specifications, crane chart and range diagrams to see if the crane is appropriate for the job.

You will be able to use this information to configure the crane for operation.



## 2.3 CRANE AND EQUIPMENT CHECKS

Before using a crane or item of equipment you will need to check that it is in safe working order and is suitable for the task.

Routine checks include:

- ▶ Visual and pre-operational checks (checks done before the crane is started up).
- ▶ Operational checks (checks made after the crane is started up).



If you find a danger/safety tag attached to the crane or an item of equipment while carrying out an inspection then you must leave it in place.

Do not remove the tag or use the crane or equipment.

The only person that can remove the tag is the person who put it there or a person authorised to remove it in accordance with workplace safety procedures.

## 2.3.1 VISUAL CHECKS



Walk around the crane and carry out a visual inspection.

Important things to check for include:

- ▶ Any signs of structural damage or wear (e.g. damage to the boom/jib).
  - Cracks – particularly in the boom, superstructure or welds.
  - Bends or twists in the boom or superstructure.
  - Paint flaking off the surface.
  - Loose bolts.
  - Rust from joints or welds.

- ▶ Fluid leaks under the crane (e.g. oil, water).
- ▶ All signs and labels/decals are present and readable (WLL, crane chart/load chart/data plate and other crane decals). This information will inform you of the crane's capacity and capabilities.
- ▶ Crane motor.



## 2.3.1.1 CHECK SIGNAGE AND LABELS

CRANE SPECIFICATIONS – SLEWING MOBILE CRANE (UP TO 100 TONNES)

This load chart is for assessment use only and must not be used for any other purpose.

| OPERATING<br>RADIUS IN<br>METRES | 360° LOAD RATING IN KILOGRAMS WITH OUTRIGGERS AT MAXIMUM EXTENSION |               |               |               |               |               |               |               |
|----------------------------------|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|                                  | 10.90  | 16.10         | 21.40         | 25.00         | 31.30         | 37.10         | 42.30         | 46.10         |
| SWL<br>BOOM a                    | SWL<br>BOOM a  | SWL<br>BOOM a | SWL<br>BOOM a | SWL<br>BOOM a | SWL<br>BOOM a | SWL<br>BOOM a | SWL<br>BOOM a | SWL<br>BOOM a |
| 70,000<br>55°                    |  |               |               |               |               |               |               |               |
| 64,400<br>52°                    | 55,000<br>67°  |               |               |               |               |               |               |               |
| 59,300<br>50°                    | 55,000<br>65°  | 45,000<br>72° |               |               |               |               |               |               |
| 54,900<br>47°                    | 52,900<br>63°  | 43,000<br>70° | 32,000<br>73° |               |               |               |               |               |
| 51,000<br>43°                    | 49,600<br>60°  | 41,000<br>68° | 32,000<br>71° | 20,000<br>75° |               |               |               |               |
| 42,000<br>35°                    | 41,700<br>57°  | 38,500<br>65° | 31,000<br>68° | 20,000<br>73° | 16,000<br>76° |               |               |               |
| 35,000<br>25°                    | 34,800<br>53°  | 32,000<br>62° | 29,000<br>66° | 20,000<br>71° | 15,500<br>74° | 13,000<br>77° |               |               |
| 28,300<br>9°                     | 29,600<br>48°  | 28,000<br>59° | 26,000<br>64° | 20,000<br>69° | 15,000<br>72° | 13,000<br>75° | 8,800<br>77°  |               |
| 25,600<br>43°                    | 24,800<br>56°  | 23,500<br>61° | 19,500<br>67° | 14,500<br>71° | 12,900<br>73° | 8,800<br>75°  | 6,500<br>78°  |               |
| 22,100<br>34°                    | 21,000<br>53°  | 21,000<br>59° | 18,500<br>65° | 14,000<br>69° | 12,700<br>71° | 8,800<br>74°  | 6,500<br>74°  |               |
| 16,100<br>25°                    | 15,800<br>45°  | 16,000<br>53° | 16,100<br>62° | 12,700<br>67° | 11,800<br>69° | 8,800<br>71°  | 6,500<br>72°  |               |
| 13,800<br>38°                    | 13,300<br>48°  | 13,000<br>57° | 11,300<br>63° | 10,300<br>68° | 10,300<br>70° | 8,800<br>68°  | 6,500<br>70°  |               |
| 11,200<br>30°                    | 10,700<br>42°  | 10,200<br>53° | 10,000<br>59° | 10,000<br>63° | 10,000<br>66° | 8,000<br>68°  | 6,500<br>68°  |               |
| 9,200                            | 8,700  | 8,200         | 8,500         | 8,800         | 7,500         | 6,200         |               |               |

Inspect the crane to make sure that all appropriate signs and labels are present and that they can be easily viewed and are not damaged or illegible.

Signs and labels you would check for include:

- ▶ Crane data plates/labels.
- ▶ Load charts.
- ▶ Crane decals.
- ▶ Control labels.

## 2.3.2 ENSURING SAFE ACCESS

Access the crane safely using any ladders, steps, footholds or grab rails provided. Always face the crane when mounting or climbing down from the crane. Do not stretch or twist your body when accessing the crane. Never jump from the crane.

Climb into the cabin safely using three points of contact at all times. This means having two hands and one foot or two feet and one hand in contact with the crane at all times. Make sure all points of contact are free from slipping or tripping hazards (e.g. grease or debris).



## 2.3.3 PRE-OPERATIONAL CHECKS

Routine pre-operational checks should be carried out according to procedures including:

- ▶ The manufacturer's guidelines. This may include a range of instructions and specifications such as the operator's manual or appropriate checklists.
- ▶ Industry operating procedures.
- ▶ Workplace procedures, instructions, operating procedures and checklists.



Routine pre-operational checks include:

- ▶ All fluid levels including:
  - > Oil (e.g. motor, hydraulic, gearbox).
  - > Fuel.
  - > Battery water level.
  - > Radiator water/coolant level.
  - > Lubrication (grease).
- ▶ Oil and water leaks under the crane.

- ▶ Hydraulic rams and hoses for damage or leaks.
- ▶ Outriggers/stabilisers and packing.
- ▶ Crane configuration.
- ▶ All ropes, wires, anchorages, wedge sockets and splices.
- ▶ Winch drum condition.
- ▶ Slew ring (where visible).





- ▶ Jib.
- ▶ Needle (where applicable).
- ▶ Flywheel (where applicable).
- ▶ Rooster sheave (where applicable).
- ▶ Retaining pins.
- ▶ Rope.
- ▶ Auxiliary hoist (where applicable).
- ▶ Wedge sockets.
- ▶ Crane security/attachment to the truck.
- ▶ Check that there are no safety tags on the crane.

- ▶ Service logbook is present, current and checked for maintenance records and defects.
- ▶ Load charts are present and appropriate to the crane.
- ▶ Operator's manual is present and appropriate to the crane.
- ▶ Communications system.
- ▶ Seating is adjusted adequately.
- ▶ Windows and windscreens are clean and free from cracks.



### **2.3.3.2 LIFTING HOOK**

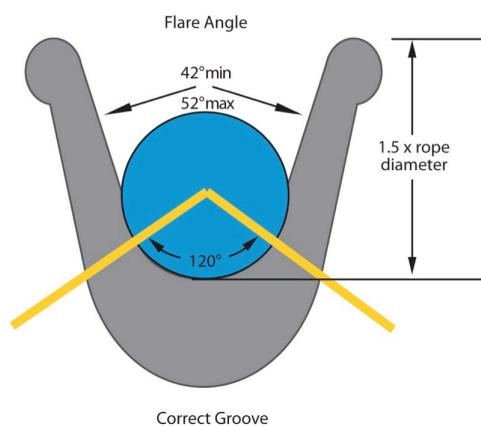


Inspect the lifting hook for damage or excessive wear.

Defects that would render a lifting hook unusable include:

- ▶ Cuts or gouges of more than 10%.
- ▶ Bill stretched more than 5%.
- ▶ Cracks or twisting.
- ▶ Exposure to excessive heat.
- ▶ Damaged safety latch, no WLL.

### 2.3.3.3 SHEAVES

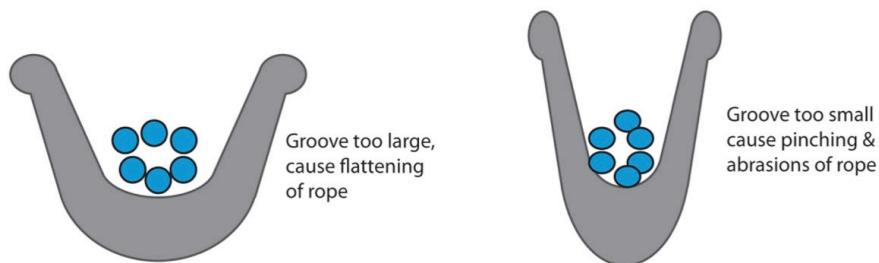


Sheaves lead the rope over the head of cranes and hoists and are used in pulley systems to gain a mechanical advantage.

Make sure that the Flexible Steel Wire Rope (FSWR) sits neatly in the base of the sheave groove. The amount of FSWR sitting in the groove should be either one third (1/3), 120° or as per the manufacturer's specifications.

The groove depth of a sheave should not be less than 1.5 times the diameter of the FSWR (or in accordance with the manufacturer's specifications).

If the grooves are too large then the rope will be flattened and deformed. If the grooves are too small the rope will be pinched and abraded. Any damage to the FSWR may lead to its failure.



Inspect the sheaves for damage or excessive wear.

Defects that would render a sheave unusable include:

- ▶ Sheave is twisted or deformed out of shape.
- ▶ Excessive wear in the groove.
- ▶ Damage (e.g. cracks) in the flange.
- ▶ Worn sheave or hinge pins.
- ▶ Damage to cheek plates or cheek plate walls/partitions are too far or too close from the sheave.



## 2.3.3.4 DRUMS



The drum is the pulling mechanism that rotates, hauls in and stores surplus wire.

The braking mechanism is connected to either the drum or the gearing. The drum or gearing is joined to the drive mechanism.

Drums are measured from the centre to the inside of the flange. A drum that measures 1m from flange to flange is therefore a 0.5m drum.

The rope should lie neatly on the drum and not be bunched up. When the hook block is at its lowest possible point there should still be a minimum of two full turns on the drum (or as per the manufacturer's specifications).

When the drum has been wound to its maximum turns the flange must still extend 2 rope diameters above the outer layer of the rope.



The rope must be anchored to the drum with a fixed mechanical anchorage such as a socket and wedge or a clamp and bolts.

Be aware of the danger of not properly tightening an anchorage.

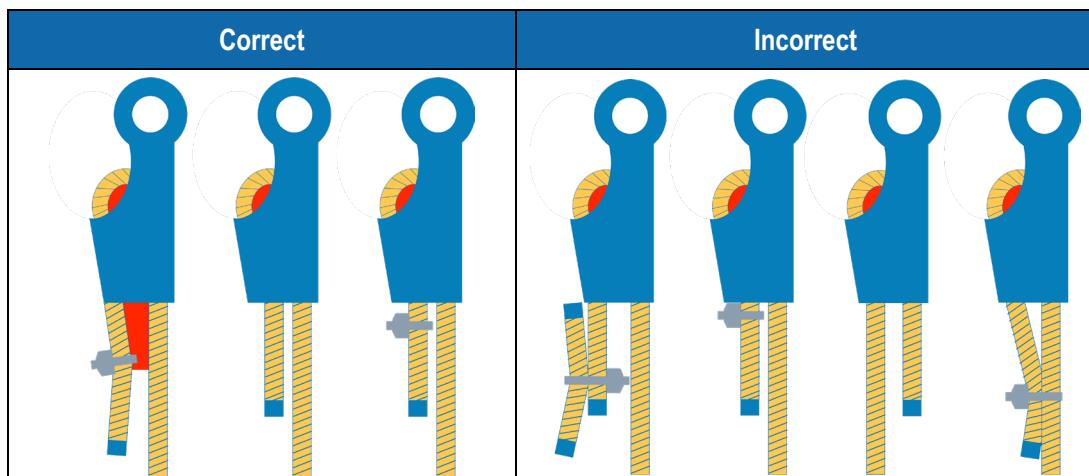
Do not rely on the frictional grip relayed by the two turns on the drum.

### 2.3.3.5 WEDGE SOCKETS

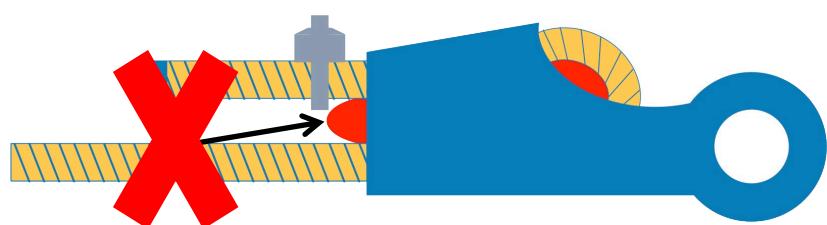
A wedge socket is used to securely hold the tail of a hoist wire rope. A minimum of 200mm of tail on the dead end of the rope should project from the wedge socket.

A clamp and bolts (bulldog clamp) should be applied to the tail of the rope below the socket.

Methods of terminating a hoist rope in a wedge rope socket are shown here:



Under no circumstances should the wedge protrude at the narrow end of the socket.



### **2.3.3.6 BOOM PAWL**

Check to see if the boom pawl has engaged the ratchet. This could mean that the boom brakes are creeping due to mechanical failure, moisture or the condition of the brakes.



### **2.3.3.7 LIFTING EQUIPMENT**

Inspect lifting equipment for damage or defects before each use.

Check for more than 10% wear in the following:

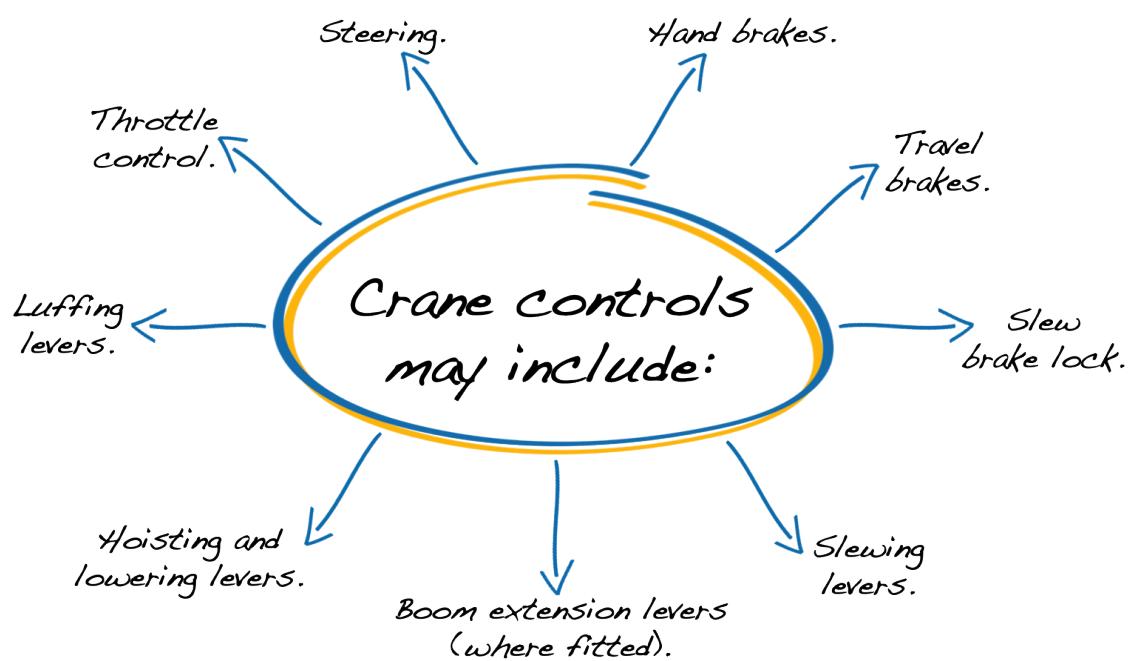
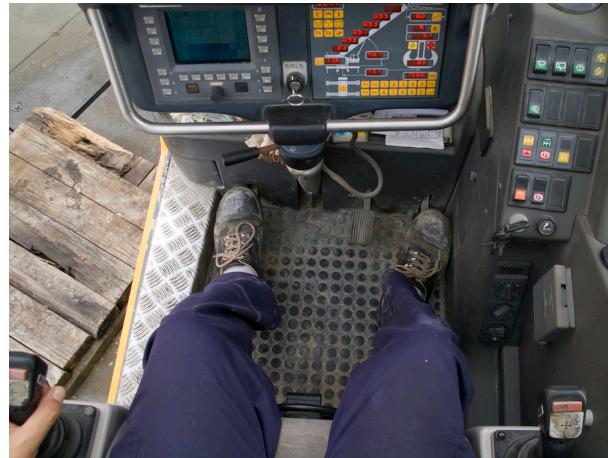
- ▶ Shackles.
- ▶ Chains.
- ▶ Crane sling shorteners.
- ▶ The bite of a hook.



## 2.4 LOCATE AND IDENTIFY CONTROLS

Before starting up the crane and carrying out operational checks, it is important that you are familiar with the location of various controls and their functions.

Make sure all control labels are present and legible.



## 2.5 CHECK CRANE SERVICE LOGBOOK



The crane service logbook is used to record information on crane operation, servicing and repairs, daily safety checks and the reporting and rectification of defects.

All defects must be recorded in the service logbook, along with any action taken to return the crane to service.

Do not start up the crane if previously reported defects have not been fixed.

The service logbook is also useful for checking that crane operators across numerous shifts are conducting the correct routine checks in accordance with procedures.

The service logbook you use may be any appropriate logbook, service book or history record system used to chart service and maintenance history.

Make sure the logbook is applicable to the crane you are operating.



## 2.6 START THE CRANE

Start the crane according to the manufacturer's start-up procedure.

If you hear any abnormal noises after you have started up the crane you will need to shut it down. Put a danger tag on the crane and report the noise to the appropriate person.



## 2.7 TEST CRANE SAFETY DEVICES

Check and test all safety devices on the crane including:

- ▶ Horns and sirens.
- ▶ Audible and visual reversing devices.
- ▶ Operator restraint devices (e.g. safety belt).
- ▶ Lights.
- ▶ Two-block/double block system.



The load mass indicator should be calibrated every six months (or in accordance with the manufacturer's specifications).

You can test the accuracy of the load mass indicator by selecting a load that you already know the weight of, then lifting it and comparing the result on the indicator against the known weight of the load.



## 2.8 CONDUCT POST-START CHECKS

Make sure you have plenty of room to test out the crane before starting it up. It is important that all of the controls are tested to their full capacity to ensure that the crane is safe and functioning correctly.

All hazard controls should be in place before operational checks are carried out.

Check that you have a clear view from the operating position across all work zones. This will ensure that your view is not obscured when carrying out operations.



Post-start checks include:

- ▶ Testing all crane movements and controls to the full extent of their capacity including luffing, hoisting and extending/telescoping.
- ▶ Testing all travel limits.
- ▶ Checking all crane movements are smooth.
- ▶ Checking for abnormal noises that may indicate defects or other potential problems.
- ▶ Checking that the steering and brakes are working correctly.
- ▶ Checking the drive indicators are functioning correctly.
  
- ▶ Checking gauges are functioning correctly.
- ▶ Checking that the crane has a safe slewing radius.
- ▶ Checking maximum radius and load radius indicator.
- ▶ Inputting data into the crane's computer (if applicable) and making sure that it is accurate.

## 2.9 CHECK COMMUNICATION EQUIPMENT

Inspect all communication equipment before use to make sure that it is working correctly and that effective communication can be established and maintained at all times.



Communication equipment used in crane operations may include whistles, bells, buzzers or fixed channel two-way radios.

Where radio communication equipment is used, the transmitting frequencies of the equipment must be selected to prevent interference to or from other radio equipment being used in the vicinity of the crane.



## 2.10 USE INSPECTION CHECKLIST/LOGBOOK

You must use an inspection checklist/logbook to record all checks carried out and all defects identified.

An example of an inspection checklist is shown here:

| Slewing Mobile Crane<br>Inspection Checklist  |                 | Date:          |                               |
|---|-----------------|----------------|-------------------------------|
| Company Name:   |                 | Site:          |                               |
| Machine Number:   |                 | Operator Name: |                               |
| Item to be checked by operator:   | ✓               | ✗              | Fault Report                  |
| Crane structure (damage, wear, leaks)   |                 |                | .....                         |
| Boom and Jib (damage, wear)   |                 |                | .....                         |
| Signs and decals, load chart, control labels  |                 |                | .....                         |
| Truck tyre condition, pressure (where applicable)   |                 |                | .....                         |
| Track tension and condition (where applicable)  |                 |                | .....                         |
| All fluids (fuel, engine oil, transmission fluid, hydraulic oil, brake fluid, water, radiator water, battery water) |                 |                | .....                         |
| Lubrication points  |                 |                | .....                         |
| Hydraulics (lines, rams, connections)   |                 |                | .....                         |
| Outriggers and packing/mats   |                 |                | .....                         |
| Crane hook, attachments, lifting gear   |                 |                | .....                         |
| Drum and wire rope (where applicable)   |                 |                | .....                         |
| Cabin windows and mirrors   |                 |                | .....                         |
| All crane controls, emergency stop  |                 |                | .....                         |
| Safety devices (lights, horn, limits)   |                 |                | .....                         |
| Fire extinguisher (where applicable)  |                 |                | .....                         |
| Communication equipment (where applicable)  |                 |                | Danger Tag Attached? Yes / No |
| Action Taken to Repair Crane:   |                 |                |                               |
| .....<br>.....  |                 |                |                               |
| Name:   | Date of Repair: |                |                               |
| Return to Service Authority by Supervisor   |                 |                |                               |
| Supervisor Name:  | Comments:       |                |                               |
| Signature:  | Date:           |                |                               |

## 2.10.1 REPORT ANY FAULTS



If you find any faults or the crane cannot function to the full range of its movements, you must report and record the details according to workplace and industry procedures:

- ▶ Immediately stop operating the crane or using the equipment.
- ▶ Isolate the crane/equipment and attach a danger tag to it.
- ▶ Record the fault as per site procedures (e.g. in the crane logbook or service logbook).
- ▶ Report the fault to an authorised person for corrective action.

Report any evidence of tampering or interference with the crane to your supervisor or other responsible person.

**DO NOT** use the crane or equipment until it has been fixed and returned to service.



## 2.14 CONFIGURE THE CRANE

The crane will need to be configured properly to suit the tasks that are to be done.

This may include the configuration of the boom/jib, fly-jib or counterweights.

Carry out all crane configuration procedures according to the crane manufacturer's instructions.

Consult the crane's load charts to make sure the crane is configured correctly for the loads that need to be lifted.



## 2.15 INPUT DATA INTO THE CRANE COMPUTER



**Note:** Not all cranes are fitted with a crane computer. Check the operator's manual for the crane you are using to see if it has a crane computer installed.

The crane computer is used to help configure the boom/jib and counterweights.

It also includes the load limiting/indicating system used to warn you in situations where the crane is overloaded or likely to become unstable.

When setting up the crane, all relevant details should be entered into the crane computer (where applicable). This may include:

The weight of the load to be lifted.

The boom length.

The operating radius.

The total weight of the lifting gear.

Test that the crane computer is working by comparing the computer results with the crane load chart.

## 2.16 APPLY HAZARD CONTROL MEASURES



Once the crane has been set up it is important to put any hazard control measures into place. These may include:

- ▶ Safety tags on electrical switches/isolators.
- ▶ Insulated electric/power lines.
- ▶ Safety observer used inside exclusion zone.
- ▶ Disconnected power.

- ▶ Traffic barricades and controls.
- ▶ Adequate illumination/lighting.
- ▶ Pedestrian and traffic controls.
- ▶ Trench covers.
- ▶ Movement of obstructions.
- ▶ Personal Protective Equipment (PPE).



## **2.16.1 LIGHTING THE WORK AREA**

If the crane work is being carried out at night or in a darkened area there must be adequate temporary lighting in place for the work to begin. The entire work area must be sufficiently lit up to ensure the work can be carried out safely.



## 2.17 TEST COMMUNICATIONS EQUIPMENT

Before starting work you will need to make sure any communication equipment you are using on-site is working properly. Consult the manufacturer's instructions to make sure all items are functioning correctly.



Check for radio interference and make sure you are not interfering with other workers on the site who may also be using radios. Use a dedicated frequency to prevent interference with other equipment. Make sure batteries are fully charged and you have spare batteries in case they are needed.



## 3.1 DETERMINE CRANE CAPACITY

You will need to determine the characteristics and capabilities of the crane you are going to use so that it can be configured to suit the loads that are to be moved.

Information relating to the capabilities of a crane can be found in the appropriate load charts, in the manufacturer's specifications, in the operator's manual or marked on the crane itself.

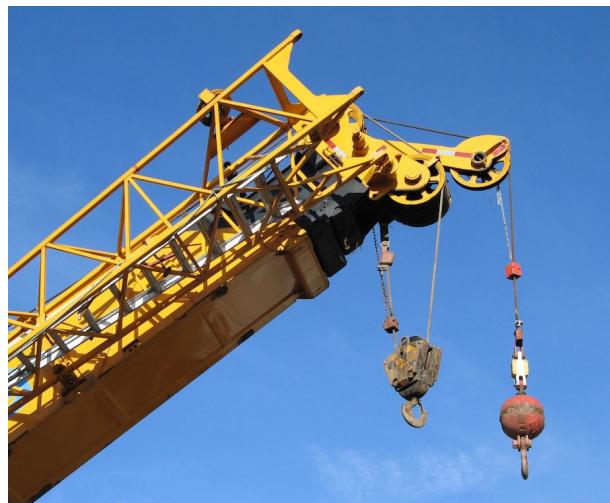
The lifted capacity of a crane is limited by structural strength (when the operating radius is small) and stability (when the operating radius is large).



### **3.1.1 LOAD CHARTS**

Load charts or crane charts contain details of the crane and the information you need to properly calculate the crane's capacity in any given configuration. This information includes:

- ▶ The crane's dimensions and weight.
- ▶ Operating radius of the crane.
- ▶ Rubber ratings.
- ▶ Weight of the hook block.
- ▶ Winch line pull in tonnes or kilograms.



- ▶ Rated capacity/working load limit (WLL), for a given crane configuration (crane radius and boom length). It may include the maximum amount a crane can pick and carry.
- ▶ Multiple rope fall capacities (e.g. 2-fall and 4-fall hook block configurations).

Check the load chart to determine how different boom and counterweight configurations will affect the capacity of a crane.

Load charts may have a solid line running across them.

- ▶ All numbers **ABOVE** the line are based on structural strength.

Overloading the crane in these configurations will result in structural damage to the crane.

- ▶ All numbers **BELLOW** the line are based on stability.

Overloading the crane in these configurations will result in crane instability.

**CRANE LOAD CHART**  
Showing Rated Lifting Capacity (in tonnes) On Fully Extended Outriggers

| Radius<br>(m) | 10.1m Boom |           | 18.1m Boom |           | 26.0m Boom |           |
|---------------|------------|-----------|------------|-----------|------------|-----------|
|               | Over Rear  | Over Side | Over Rear  | Over Side | Over Rear  | Over Side |
| 3.0           | 25.00      | 25.00     | 14.00      | 14.00     |            |           |
| 3.5           | 21.70      | 21.70     | 13.40      | 13.40     |            |           |
| 4.0           | 18.50      | 18.50     | 12.75      | 12.75     |            |           |
| 4.5           | 15.50      | 15.50     | 12.15      | 12.15     |            |           |
| 5.0           | 12.80      | 12.80     | 11.60      | 11.60     | 7.40       | 7.40      |
| 5.5           | 10.50      | 10.50     | 10.00      | 10.00     | 7.10       | 7.10      |
| 6.0           | 8.80       | 8.80      | 8.70       | 8.70      | 6.65       | 6.65      |
| 6.5           | 7.70       | 7.55      | 7.70       | 7.70      | 6.40       | 6.40      |
| 7.0           | 6.85       | 6.60      | 6.85       | 6.60      | 6.10       | 6.10      |
| 7.5           | 6.20       | 5.70      | 6.20       | 5.70      | 5.75       | 5.75      |
| 8.0           | 5.60       | 4.95      | 5.60       | 4.95      | 5.40       | 5.40      |
| 8.5           | 5.05       | 4.36      | 5.05       | 4.35      | 5.00       | 4.80      |
| 9.0           |            |           | 4.60       | 3.85      | 4.60       | 4.35      |
| 10.0          |            |           | 3.90       | 3.10      | 3.90       | 3.50      |
| 11.0          |            |           | 3.30       | 2.65      | 3.30       | 2.95      |
| 12.0          |            |           | 2.80       | 2.25      | 2.80       | 2.50      |
| 13.0          |            |           | 2.40       | 1.95      | 2.40       | 2.15      |
| 14.0          |            |           | 2.10       | 1.55      | 2.10       | 1.80      |
| 16.0          |            |           |            |           | 1.55       | 1.30      |
| 18.0          |            |           |            |           | 1.20       | 0.95      |



Load charts will contain a range diagram, which may provide the following information:

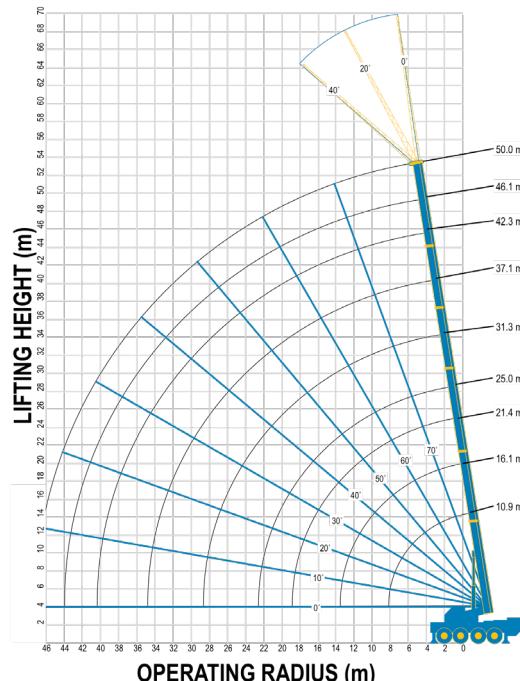
- ▶ Boom elevation height versus height of a building or structure.
- ▶ Crane configuration requirements.
- ▶ Jib attachment operating radius.
- ▶ Minimum allowable clearance between load blocks and the head sheave (tip of boom).

As the name suggests the range diagram is used to work out the lifting range of the crane. This chart indicates what boom length is required to pick up and lift a load in relation to distance and height.

Where a precise reading is not available on the load chart you must always use the higher operating radius. The increased operating radius decreases the load capacity.

**DO NOT** risk overloading the crane.

If the load chart is unreadable from age or wear you must not operate the crane. Have the load chart replaced before attempting to lift anything with the crane.



## 3.1.2 FACTORS THAT AFFECT THE AMOUNT A CRANE CAN LIFT

One of the most important things you need to know in order to work out the crane's capacity is the operating radius. This is the distance of the hook from a known point on the crane at which a crane can operate safely with a known load.

The operating radius changes depending on the angle of the boom and angle of the fly-jib. The fly-jib may be offset at an angle causing the rated capacity/WLL of the crane to decrease.



Boom/jib deflection should also be taken into account when determining the capacity of a crane.

Boom/jib deflection is the slight bending of the boom/jib under the weight of the load.

It can result in a slight increase in the operating radius, which reduces the amount of weight that can be lifted safely by the crane.

Luffing the boom up will decrease the operating radius, allowing the crane to safely lift more.

Before attempting to lift anything you need to calculate the amount of weight that the crane will be lifting.

This includes:

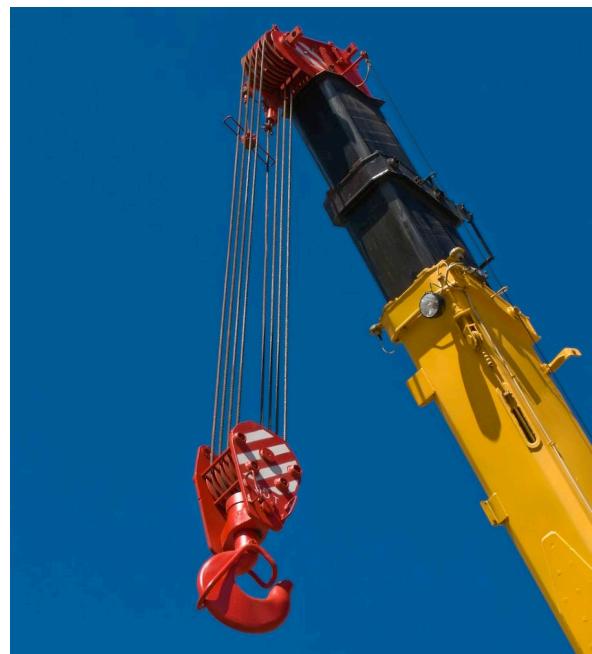
- ▶ The weight of the hook block.
- ▶ The weight of any lifting gear including hook block, slings, spreader beams kibbles and ladles.
- ▶ The weight of the load.

All of these items must be deducted from the rated capacity of the crane to determine the actual WLL of the crane at a particular radius.

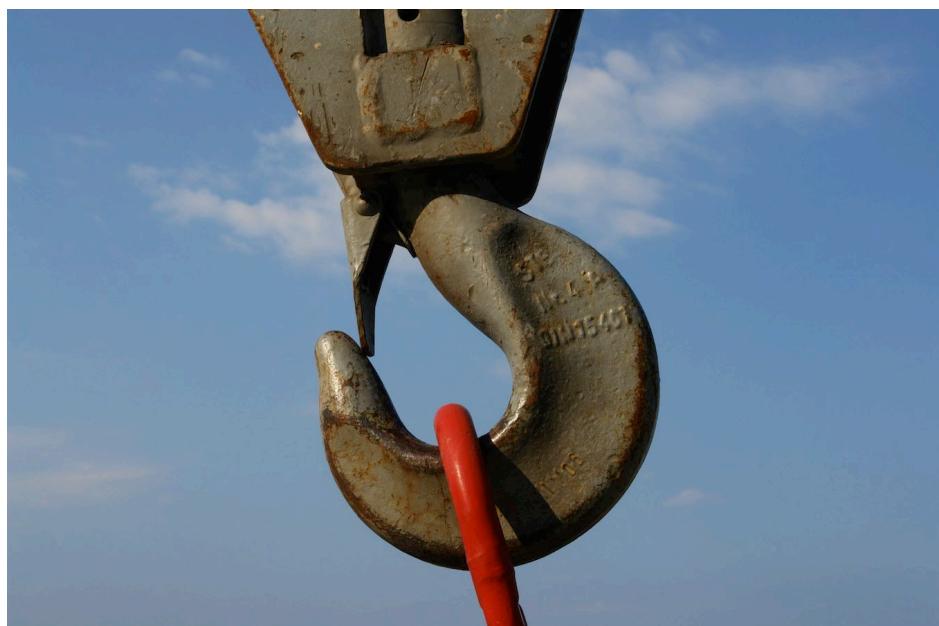


The hook block may be reeved to gain a mechanical advantage in the lifting gear. A hoist that is using a block with multiple falls of rope (parts) may be able to raise a heavier load. Always make sure the load is within the safe range for the crane.

It is important to take into account the forces and loads placed on the crane and the load when conducting operations. This may include dynamic forces (caused by the movements of the crane and load) and wind loads (caused by the pressure of wind on the crane or load).



Check that the crane hook has an adequate WLL for the loads that are to be lifted. You can find the WLL of a hook stamped or marked on the hook itself.



### 3.1.2.1 CRANE CAPACITY CALCULATIONS

It is important that you are able to calculate the capacity of different crane configurations using information found on the load chart.

The following are examples of how to use crane specifications using the “Crane Specifications – Slewing Mobile Crane (Up To 100 Tonnes)” that can be found in Appendix 3A.

Each crane has a set of documents that outline its unique specifications. The “Crane Specifications – Slewing Mobile Crane (Up To 100 Tonnes)” is being used only for these examples and should not be used for any other purpose.



#### Example 1

Use the “Crane Specifications – Slewing Mobile Crane (Up To 100 Tonnes)” found in Appendix 3A to work out the maximum load that can be lifted and the amount of parts of rope required to carry the load over the front at creep speed using the following configuration:

| Crane Configuration |                                       |
|---------------------|---------------------------------------|
| Outriggers          | Maximum extension                     |
| Main Boom Length    | 46.1m                                 |
| Operating Radius    | 18m                                   |
| Jib                 | 9.2m Jib erected with 250kg Ball hook |
| Jib Offset Angle    | 20°                                   |
| Lifting Gear        | Two Sheave Hook Block                 |

The first step in working out the maximum load is to work out which section of the specifications relate to the configuration of the crane.

This configuration is with outriggers to maximum extension and jib attached and erected, so we will be referring to the “360° Load Rating In Kilograms With Outriggers At Maximum Extension With Jib Erected” chart.

| OPERATING<br>RADIUS IN<br>METRES | 360° LOAD RATING IN KILOGRAMS WITH OUTRIGGERS AT MAXIMUM EXTENSION WITH JIB ERECTED |       |       |             |       |       |                                 |       |       |             |       |     |
|----------------------------------|---|-------|-------|-------------|-------|-------|---------------------------------|-------|-------|-------------|-------|-----|
|                                  | 9.2m JIB WITH 250 kg BALL HOOK  |       |       |             |       |       | 17.6m JIB WITH 250 kg BALL HOOK |       |       |             |       |     |
|                                  | 46.1 m BOOM   |       |       | 50.0 m BOOM |       |       | 46.1 m BOOM                     |       |       | 50.0 m BOOM |       |     |
| 10                               | 3,900   |       |       | 0°          | 20°   | 40°   | 0°                              | 20°   | 40°   | 0°          | 20°   | 40° |
| 12                               | 3,900   |       |       |             | 3,000 |       |                                 |       | 1,700 |             |       |     |
| 14                               | 3,900   | 3,400 |       | 3,000       | 3,000 |       |                                 | 1,700 |       |             | 1,200 |     |
| 16                               | 3,900   | 3,400 | 3,000 | 3,000       | 3,000 | 2,700 | 1,700                           |       |       | 1,200       |       |     |
| 18                               | 3,900   | 3,300 | 3,000 | 3,000       | 2,900 | 2,700 | 1,700                           | 1,400 |       | 1,200       |       |     |
| 20                               | 3,700   | 3,200 | 2,900 | 2,900       | 2,800 | 2,600 | 1,600                           | 1,400 |       | 1,200       | 1,100 |     |

This configuration has a 9.2m Jib attached so we will focus on this section of the chart.

| OPERATING<br>RADIUS IN<br>METRES | 360 ° LOAD RATING IN KILOGRAMS WITH OUTRIGGERS AT MAXIMUM EXTENSION WITH JIB ERECTED |       |       |             |       |       |                                 |       |    |             |     |       |
|----------------------------------|--|-------|-------|-------------|-------|-------|---------------------------------|-------|----|-------------|-----|-------|
|                                  | 9.2m JIB WITH 250 kg BALL HOOK   |       |       |             |       |       | 17.6m JIB WITH 250 kg BALL HOOK |       |    |             |     |       |
|                                  | 46.1 m BOOM  |       |       | 50.0 m BOOM |       |       | 46.1 m BOOM                     |       |    | 50.0 m BOOM |     |       |
| 0°                               | 20°  | 40°   | 0°    | 20°         | 40°   | 0°    | 20°                             | 40°   | 0° | 20°         | 40° | 0°    |
| 10                               | 3,900  |       |       |             |       |       |                                 |       |    |             |     |       |
| 12                               | 3,900  |       |       | 3,000       |       |       | 1,700                           |       |    |             |     |       |
| 14                               | 3,900  | 3,400 |       | 3,000       | 3,000 |       | 1,700                           |       |    | 1,200       |     |       |
| 16                               | 3,900  | 3,400 | 3,000 | 3,000       | 3,000 | 2,700 | 1,700                           |       |    | 1,200       |     |       |
| 18                               | 3,900  | 3,300 | 3,000 | 3,000       | 2,900 | 2,700 | 1,700                           | 1,400 |    | 1,200       |     |       |
| 20                               | 3,700  | 3,200 | 2,900 | 2,900       | 2,800 | 2,600 | 1,600                           | 1,400 |    | 1,200       |     | 1,100 |

The second step in working out the maximum load involves using the chart to find the safe working limit (SWL) that corresponds to the main boom length, the jib offset angle and the boom angle. The main boom length is 46.1m, the jib offset angle is 20° and the operating radius is 18m.

| OPERATING<br>RADIUS IN<br>METRES | 360 ° LOAD RATING IN KILOGRAMS WITH OUTRIGGERS AT MAXIMUM EXTENSION WITH JIB ERECTED |       |       |             |       |       |                                 |       |       |             |       |       |
|----------------------------------|--|-------|-------|-------------|-------|-------|---------------------------------|-------|-------|-------------|-------|-------|
|                                  | 9.2m JIB WITH 250 kg BALL HOOK   |       |       |             |       |       | 17.6m JIB WITH 250 kg BALL HOOK |       |       |             |       |       |
|                                  | 46.1 m BOOM  |       |       | 50.0 m BOOM |       |       | 46.1 m BOOM                     |       |       | 50.0 m BOOM |       |       |
| 0°                               | 20°  | 40°   | 0°    | 20°         | 40°   | 0°    | 20°                             | 40°   | 0°    | 20°         | 40°   | 0°    |
| 10                               | 3,900  |       |       |             |       |       |                                 |       |       |             |       |       |
| 12                               | 3,900  |       |       | 3,000       |       |       | 1,700                           |       |       |             |       |       |
| 14                               | 3,900  | 3,400 |       | 3,000       | 3,000 |       | 1,700                           |       |       | 1,200       |       |       |
| 16                               | 3,900  | 3,400 | 3,000 | 3,000       | 3,000 | 2,700 | 1,700                           |       |       | 1,200       |       |       |
| 18                               | 3,900  | 3,300 | 3,000 | 3,000       | 2,900 | 2,700 | 1,700                           | 1,400 |       | 1,200       |       |       |
| 20                               | 3,700  | 3,200 | 2,900 | 2,900       | 2,800 | 2,600 | 1,600                           | 1,400 |       | 1,200       | 1,100 |       |
| 22                               | 3,500  | 3,100 | 2,800 | 2,800       | 2,700 | 2,500 | 1,500                           | 1,400 |       | 1,100       | 1,100 |       |
| 24                               | 3,300  | 2,900 | 2,700 | 2,600       | 2,500 | 2,300 | 1,500                           | 1,400 | 1,200 | 1,100       | 1,100 | 1,000 |
| 26                               | 3,100  | 2,800 | 2,600 | 2,500       | 2,400 | 2,200 | 1,400                           | 1,400 | 1,100 | 1,000       | 1,100 | 1,000 |
| 28                               | 3,000  | 2,600 | 2,500 | 2,300       | 2,200 | 2,100 | 1,400                           | 1,400 | 1,100 | 1,000       | 1,000 | 1,000 |
| 30                               | 2,800  | 2,500 | 2,400 | 2,200       | 2,100 | 2,000 | 1,300                           | 1,300 | 1,100 | 1,000       | 1,000 | 1,000 |
| 32                               | 2,700  | 2,400 | 2,300 | 2,100       | 2,000 | 1,900 | 1,300                           | 1,200 | 1,100 | 1,000       | 1,000 | 1,000 |
| 34                               | 2,400  | 2,300 | 2,200 | 2,000       | 1,900 | 1,900 | 1,200                           | 1,100 | 1,100 | 900         | 1,000 | 1,000 |
| 36                               | 2,000  | 2,200 | 2,100 | 1,900       | 1,800 | 1,800 | 1,200                           | 1,100 | 1,100 | 900         | 900   | 900   |
| 38                               | 1,600  | 1,800 | 1,900 | 1,500       | 1,800 | 1,800 | 1,100                           | 1,100 | 1,000 | 900         | 900   | 900   |
| 40                               | 1,300  | 1,500 | 1,600 | 1,200       | 1,400 | 1,600 | 1,100                           | 1,100 | 1,000 | 800         | 900   | 900   |
| 42                               | 1,000  | 1,200 |       | 900         | 1,100 |       | 1,100                           | 1,100 | 1,000 | 800         | 900   | 900   |
| 44                               | 800  | 900   |       | 700         | 900   |       | 1,000                           | 1,100 | 1,000 | 700         | 800   | 900   |
| 46                               |  | 600   |       |             | 600   |       | 800                             | 1,100 | 1,000 | 700         | 800   | 800   |
| 48                               |  |       |       |             |       |       | 600                             | 1,100 | 1,000 |             | 800   | 800   |
| 50                               |  |       |       |             |       |       |                                 | 800   | 1,000 |             | 600   |       |
| 52                               |  |       |       |             |       |       |                                 | 600   |       |             |       |       |

The intersecting point between the “jib offset” column and “operating radius” row contains all of the SWL and boom angle information relating to this configuration.

The SWL for this configuration is 3,300kg.

| OPERATING<br>RADIUS IN<br>METRES | 360 ° LOAD RATING IN KILOGRAMS WITH OUTRIGGERS AT MAXIMUM EXTENSION WITH JIB ERECTED |             |             |                                 |       |       |       |       |       |       |
|----------------------------------|--|-------------|-------------|---------------------------------|-------|-------|-------|-------|-------|-------|
|                                  | 9.2m JIB WITH 250 kg BALL HOOK   |             |             | 17.6m JIB WITH 250 kg BALL HOOK |       |       |       |       |       |       |
|                                  | 46.1 m BOOM  | 50.0 m BOOM | 46.1 m BOOM | 50.0 m BOOM                     | 0°    | 20°   | 40°   | 0°    | 20°   | 40°   |
| 10                               | 3,900  |             |             |                                 |       |       |       |       |       |       |
| 12                               | 3,900  |             |             | 3,000                           |       |       | 1,700 |       |       |       |
| 14                               | 3,900  | 3,400       |             | 3,000                           | 3,000 |       | 1,700 |       | 1,200 |       |
| 16                               | 3,900  | 3,400       | 3,000       | 3,000                           | 3,000 | 2,700 | 1,700 |       | 1,200 |       |
| 18                               | 3,900  | 3,300       | 3,000       | 3,000                           | 2,900 | 2,700 | 1,700 | 1,400 |       | 1,200 |
| 20                               | 3,700  | 3,200       | 2,900       | 2,900                           | 2,800 | 2,600 | 1,600 | 1,400 |       | 1,200 |
| 22                               | 3,500  | 3,100       | 2,800       | 2,800                           | 2,700 | 2,500 | 1,500 | 1,400 |       | 1,100 |
| 24                               | 3,300  | 2,900       | 2,700       | 2,600                           | 2,500 | 2,300 | 1,500 | 1,400 | 1,200 | 1,100 |
| 26                               | 3,100  | 2,800       | 2,600       | 2,500                           | 2,400 | 2,200 | 1,400 | 1,400 | 1,100 | 1,000 |
| 28                               | 3,000  | 2,600       | 2,500       | 2,500                           | 2,200 | 2,100 | 1,400 | 1,400 | 1,100 | 1,000 |
| 30                               | 2,800  | 2,500       | 2,400       | 2,400                           | 2,100 | 2,000 | 1,300 | 1,300 | 1,100 | 1,000 |
| 32                               | 2,700  | 2,400       | 2,300       | 2,100                           | 2,000 | 1,900 | 1,300 | 1,200 | 1,100 | 1,000 |
| 34                               | 2,400  | 2,300       | 2,200       | 2,000                           | 1,900 | 1,900 | 1,200 | 1,100 | 1,100 | 900   |
| 36                               | 2,000  | 2,200       | 2,100       | 1,900                           | 1,800 | 1,800 | 1,200 | 1,100 | 1,100 | 900   |
| 38                               | 1,600  | 1,800       | 1,900       | 1,500                           | 1,800 | 1,800 | 1,100 | 1,100 | 1,000 | 900   |
| 40                               | 1,300  | 1,500       | 1,600       | 1,200                           | 1,400 | 1,600 | 1,100 | 1,100 | 1,000 | 900   |
| 42                               | 1,000  | 1,200       |             | 900                             | 1,100 |       | 1,100 | 1,100 | 1,000 | 800   |
| 44                               | 800  | 900         |             | 700                             | 900   |       | 1,000 | 1,100 | 1,000 | 700   |
| 46                               |  | 600         |             |                                 | 600   |       | 800   | 1,100 | 1,000 | 700   |
| 48                               |  |             |             |                                 |       |       | 600   | 1,100 | 1,000 | 800   |
| 50                               |  |             |             |                                 |       |       | 800   | 1,000 |       | 600   |
| 52                               |  |             |             |                                 |       |       | 600   |       |       |       |

The third step in working out the maximum load limit involves subtracting the weight of any lifting gear from the SWL of this configuration.

The lifting gear being used in this example is the Two Sheave Hook Block and it weighs 600kg.

We do not have to make any adjustments for the 250kg Ball Hook because the deduction is included in the jib.

| WEIGHT OF HOOK BLOCKS    |                       |                         |                        |                            |
|--------------------------|-----------------------|-------------------------|------------------------|----------------------------|
| SINGLE SHEAVE HOOK BLOCK | TWO SHEAVE HOOK BLOCK | THREE SHEAVE HOOK BLOCK | FIVE SHEAVE HOOK BLOCK | WEIGHTED BALL HOOK FOR JIB |
| 400 kgs                  | 600 kgs               | 800 kgs                 | 1200 kgs               | 250 kgs                    |

The maximum load that can be lifted by a configuration can be found by using the following formula:

**Maximum Load That Can Be Lifted =  
SWL – Weight Of Lifting Gear**

Maximum load that can be lifted = 3,300kg – 600kg.

Maximum load that can be lifted = 2,700kg.

### **3.1.3 REVIEW WORK PLANS AND INFORMATION**

Before starting any crane operations you will need to make sure that all necessary factors have been considered:

- ▶ What are the weights and sizes of the loads you need to move?
- ▶ Have you chosen a crane that is capable of lifting these loads?
- ▶ Is there adequate access to and egress from the areas you are working in or the routes you need to take?
- ▶ Have all potential hazards and obstructions been dealt with?
- ▶ Have you taken into consideration the working radius of the crane?
- ▶ Have you accounted for potential boom deflection when releasing a load?



When you are confident that all necessary factors have been considered and all potential problems dealt with, you will be able to start operations.

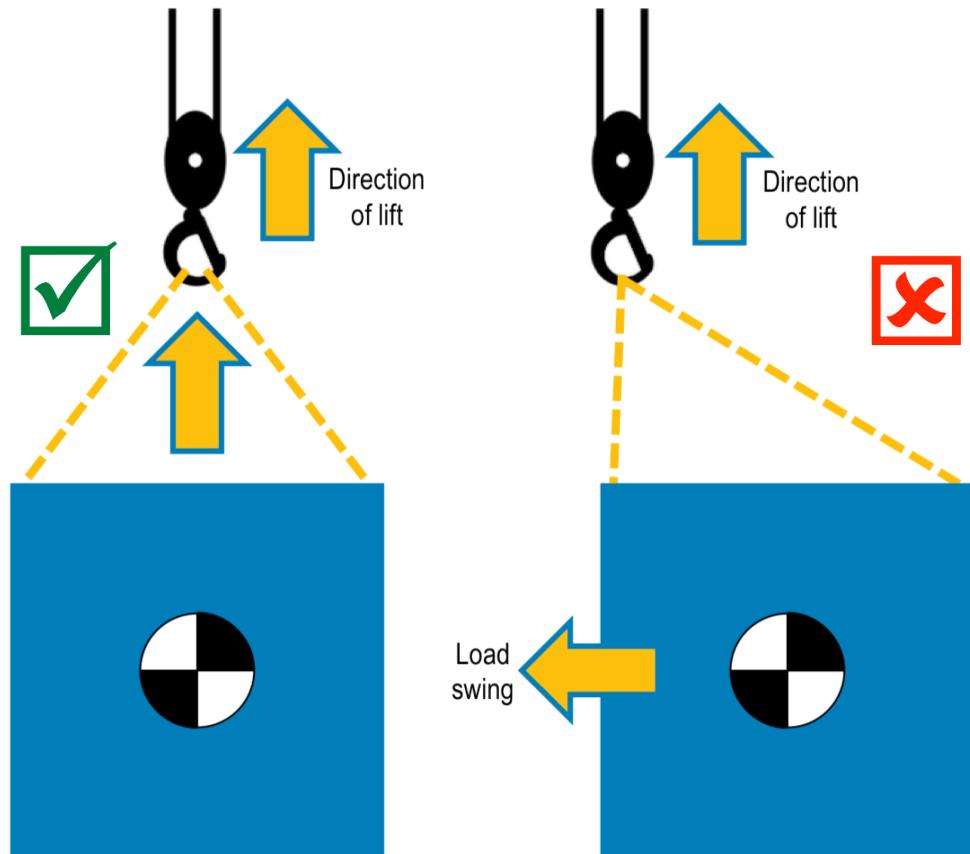


## 3.2 POSITION THE CRANE HOOK

The crane hook should be positioned above the centre of gravity of the load before lifting operations are commenced.

This will help to keep the load from swinging out of control, slipping from the sling arrangement when it is lifted, or being dragged or snagged when it is moved.

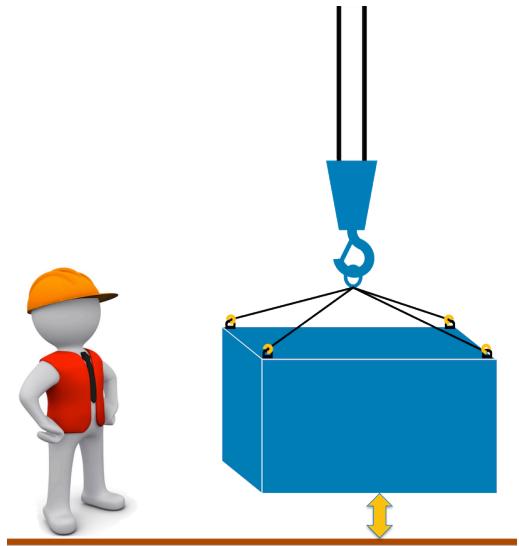
Get the dogger or rigger to guide you to make sure the boom/jib and hoist block, and therefore the crane hook, are positioned correctly above the load.



## 3.3 CONDUCT A TEST LIFT

Before moving the load it is important to conduct a test lift. Test lifts can also be used to ensure that:

- ▶ Loads remain stable and secure.
- ▶ The crane stays stable and that all crane functions are working correctly.
- ▶ Near capacity loads do not overload the crane.
- ▶ Loads of unusual shape or weight distribution have been slung correctly.
- ▶ Load measuring equipment can be used to verify the calculated weight of the load.
- ▶ All crane equipment is functioning properly.
- ▶ Adjustments to the slinging can be made in a safe manner.



A test lift is performed by raising the load slightly off the lifting plane. Associated personnel/workers such as doggers and riggers will be able to determine if the load is slung correctly by the amount the load moves as it is lifted.

When conducting a test lift it is important to check that the slinging method is correct, there are no obstructions or loose parts under the load and that there is no possibility of the load being dragged or snagged.

If there are any problems with the lift (e.g. the load is unstable or slung incorrectly) then you should lower the load immediately and make the necessary adjustments before conducting another test lift.

## 3.4 APPLY CRANE MOVEMENTS

Follow all appropriate procedures and standards when transferring loads.

Make sure all crane movements are controlled and smooth.

Quick or jerky movements may cause the load to swing.



Consult the load chart to find out what effect slewing the boom from the front of the vehicle to the rear will have on the lifting capacity of the crane (it may vary greatly).

Always stay within the safe operating radius of the crane.

Crane movements that you may use when shifting loads with a portal boom crane include:

- ▶ **Luffing** – the up and down movement of the boom.
- ▶ **Hoisting** – the raising and lowering of the hook block using the hoist rope.
- ▶ **Slewing** – the circular movement of the boom.
- ▶ **Mobilizing** – travelling the crane along the rails with a load.

## 3.5 FOLLOW COMMUNICATION SIGNALS

Always follow the directions given to you by the person dogging the load. They may use hand/whistle signals or two-way radios to direct you. If at any point you are unsure of the directions being given to you, stop and confirm the instructions with the dogger/rigger.

Shown here are the hand signals used in Australia:

| HAND SIGNALS  |   |  |   |
|---|---|--|---|
| Motion  | Signal  | Motion                                   | Signal  |
| Hoisting Raise  |    | Hoisting Lower                           |    |
| Luffing Boom Up   |  | Luffing Boom Down                        |  |
| Slewing Right   |  | Slewing Left                             |  |
| Jib/Trolley Out; Telescoping Boom Extend  |  | Jib/Trolley In; Telescoping Boom Retract |  |
| Stop  |   |  |   |
|  |   |  |   |
| Creep Speed: Appropriate hand signal for motion with hand opening and closing       |   |  |   |

Shown here are the whistle signals used in Australia:

| <b>WHISTLE, BELL AND BUZZER SIGNALS</b>        |                          |  |                           |
|--|--------------------------|--|---------------------------|
| <b>Motion</b>                                  | <b>Signal</b>            | <b>Motion</b>                                  | <b>Signal</b>             |
| Hoisting Raise                                 | 2 short<br>..            | Hoisting Lower                                 | 1 Long<br>—               |
| Luffing Boom Up                                | 3 Short<br>...           | Luffing Boom Down                              | 4 Short<br>....           |
| Slewing Right                                  | 1 Long, 2 Short<br>— ..  | Slewing Left                                   | 1 Long, 1 Short<br>— •    |
| Jib/Trolley Out;<br>Telescoping Boom<br>Extend | 1 Long, 3 Short<br>— ... | Jib/Trolley In;<br>Telescoping Boom<br>Retract | 1 Long, 4 Short<br>— .... |
| Stop   |                          | 1 Short<br>•                                   |                           |

## 3.6 OPERATE THE CRANE

Once you are satisfied that the load is ready to be moved safely, begin the lift.

If new or unforeseen hazards appear while operations are being carried out, you will need to stop and control them before carrying on with your work.



Always operate the crane according to procedures.

For example:

- ▶ Manufacturer's guidelines (instructions, crane charts /specifications, checklists).
- ▶ Industry operating procedures.
- ▶ Workplace procedures (work instructions, operating procedures, checklists).

Do not operate the crane beyond the limits set down in the manufacturer's specifications.

Staying within the crane's capacity will ensure that the crane is operated safely and is not overloaded.



## **3.6.1 LOADING AND UNLOADING VESSELS**

When loading and unloading vessels you will need to follow these procedures:

- ▶ If you are unloading a ship, you must make sure that it remains stationary. If the vessel begins to move while you are unloading it you could risk hitting the mast or other parts of the ship.
- ▶ Stop operations if the vessel needs to be moved.
- ▶ Consult with an authorised person before starting work if you need to long travel.
- ▶ Pay attention for any abnormal sounds when moving a vessel (e.g. a sudden load noise from just below the main deck). If this occurs you will need to stop the crane, inspect the slew ring and report the problem to an authorised person.



## 3.6.2 DOUBLE BLOCKING

Double blocking, sometimes known as two-blocking, occurs when the hook block jams into the head sheaves. It also occurs when the load suspended from the hook becomes jammed against the crane structure, preventing further winding up of the hoist drum.



Double blocking can result in the following:

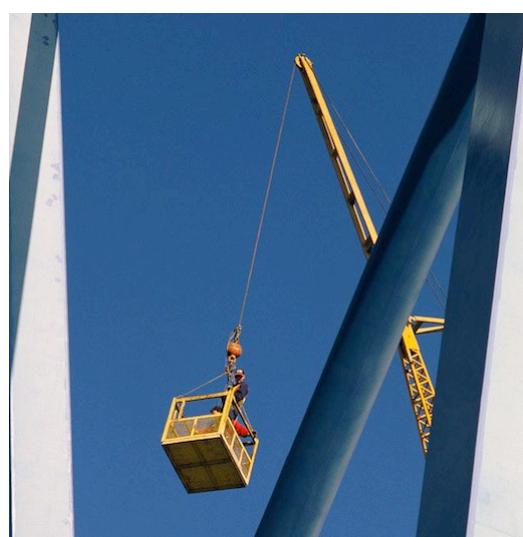
- ▶ Broken Flexible Steel Wire Rope (FSWR).
- ▶ Dropped load.
- ▶ Damaged sheave.
- ▶ Structural damage to the crane.

A hoist-limit or cut-out switch can be used to stop the winch or warn the operator before the hook block makes contact with the head block. Ensure that the hoist-limit/cut-out switch is checked and fully functioning before operating the crane.

## 3.6.3 LIFTING PERSONNEL/WORKERS

If you are going to lift personnel/workers with a crane you will need to use a workbox that meets all the necessary requirements of the workplace, the crane manufacturer and Australian Standards.

When lifting personnel/workers with the crane, ensure that the dogger is located in the workbox at all times.



## **3.6.4 MONITORING LOAD MOVEMENT**

It is important to continually monitor the movement of the load to make sure that:

- ▶ The load remains safe.
- ▶ No personnel/workers are put in danger.
- ▶ The crane remains stable.

You need to identify and control any hazards that may occur while moving a load.



Do not raise or lower the boom or load over workers or pedestrians. This would be extremely dangerous and could result in a serious injury or death.

Never drag or snig the load as this may overload the crane or cause damage to the crane and/or load or lifting equipment. It may also cause the crane to become unstable.

## 3.7 CHECK THE PATH OF MOVEMENT

Check the suitability of the planned route of travel for the crane and load.

Make sure that new hazards or obstructions have not entered into the path of movement (e.g. vehicles, people).

Inspect the effectiveness of existing hazard control measures and control all new hazards before mobilizing the load.

Make sure that you have arranged appropriate communication methods with the dogger before travelling the crane.



## **3.8 CONFIGURE THE CRANE TO MOBILE THE LOAD**

Configure the crane to mobile the load according to the manufacturer's instructions and workplace procedures.

Release any brakes and prepare for travel.



## 3.9 MOBILE THE LOAD

It is important to use the following procedures when mobiling a load with a portal boom crane:

- ▶ Travel at the minimum speed.
- ▶ Use gentle acceleration and braking (to minimise load swing).
- ▶ Do not exceed the minimum boom/jib radius.
- ▶ Wherever practical, carry the load as near to the ground surface as you safely can.
- ▶ Use handheld taglines when necessary.

If you are working with the boom over a ship and you are able to travel the crane, there may be a significant danger of the boom hitting the ship's superstructure.



You will need to have a dogger or a spotter to help guide you throughout the travelling operations.

Do not drag or snig the load as this may cause damage to the crane, load or lifting equipment or cause the crane to become unstable.

### 3.9.1 USING TAGLINES

If associated personnel/workers are involved in the lift, the dogger/rigger may use a tagline to control the rotation of the load while in motion.

It is necessary to use a tagline when working near overhead electric/power lines or if there is a risk of a loss of control during the landing process.

Non-conductive ropes should be used as taglines to reduce conductivity.

If taglines are being used you should consider the following:

- ▶ Weather conditions.
- ▶ Electrical hazards.
- ▶ Changeover of tagline.
- ▶ PPE of person holding the tagline.
- ▶ Make sure the tagline does not become fouled or caught up on any obstructions.
- ▶ Make sure the tagline is at least 16mm diameter.

## 3.9.2 MONITORING WEATHER CONDITIONS

Keep an eye on the weather conditions around the crane.

Be particularly careful of the effect of wind. The force of wind may cause the load to swing or spin around or cause the uncontrolled slewing of the crane.

Load swing/spin and uncontrolled slewing may cause the load to move beyond the crane's safe operating radius, resulting in instability and/or structural damage to the crane.



Facing the crane into the wind may force the boom back, causing structural damage or tipping the crane backwards.

The effect of wind during load shifting operations can be minimised by applying the slew brake, lowering the load and making it safe, confirming that the slew brake is applied, applying guy ropes and braces or by stopping work completely. If wind speeds exceed the allowable limits and/or unsafe limit for the crane you will need to stop working, lower the load if safe to do so and not recommence operations until the weather conditions are safe again.

Check the manufacturer's specifications or the crane itself for information related to maximum allowable wind speeds for operations.

If a severe electrical storm is approaching you should lower the load and pack up the crane. Do not operate the crane if lightning is present.

If it begins to rain heavily and you have to stop operating the crane for a period of time, you must re-check the ground conditions before recommencing work.

If the ground has become unsuitable you must move the crane to a new, stable position.



## 3.10 LANDING THE LOAD

It is important to minimise upwards boom/jib movement when releasing a heavy load from the crane hook.

Slowly and smoothly release the load, lowering the boom/jib a fraction to compensate for any upward movement.

Land the load at the prepared load destination.

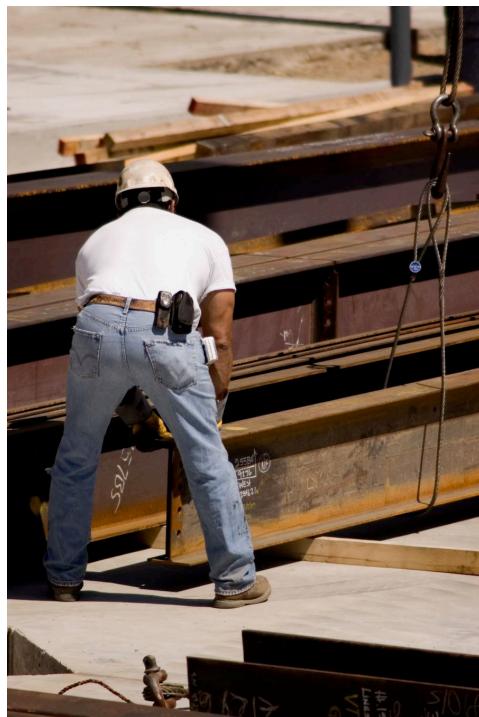
The load destination should be prepared to ensure that the load is stable and secure from movement once it is landed.

If the load is not secure or stable it could move, causing damage to the load or injury to workers

Loads should be landed on blocks or packing (where necessary) to allow the safe removal of the lifting gear.

Round loads should be chocked to prevent the load from rolling or shifting once the lifting gear is removed.

No load should be allowed to remain suspended on the hook if the crane is going to be left unattended. This may cause winch and boom creep or cause boom slew movement.



## 3.11 RESPOND TO UNPLANNED AND UNSAFE SITUATIONS



Unplanned or unsafe situations can occur at any time while you are operating a crane. These may include:

- ▶ Failure/loss of control (e.g. brakes, steering).
- ▶ Failure of equipment (e.g. hydraulic system).
- ▶ Environmental conditions (e.g. wind, lightning, storms).

If an unsafe incident occurs whilst you are operating a crane you will need to:

**Stop work immediately (if safe to do so).**

**If needed, seek advice and assistance.**

**Report the incident according to procedures and legislative requirements.**

Keep a look out for warning lights, cut-outs and alarms during crane operations. They may indicate that a defect has occurred.

If you observe these warning signs you will need to do the following:

- ▶ Identify the problem.
- ▶ Lower the load if it is raised.
- ▶ Tag the crane out.
- ▶ Do not use the crane again until the issue has been fixed.
- ▶ Report the incident to the appropriate person.



### **3.11.1 PROBLEM WITH A LIMITING DEVICE**



If you found a limiting device had been damaged or was not working correctly, you would need to take the following steps:

1. Stop working immediately.
2. If you are carrying a load then it should be lowered to the ground (if safe to do so).
3. Put a danger tag on the crane.
4. Report the problem to an appropriate person so any defects can be fixed.

### **3.11.2 ABNORMAL NOISES AND MOVEMENTS**

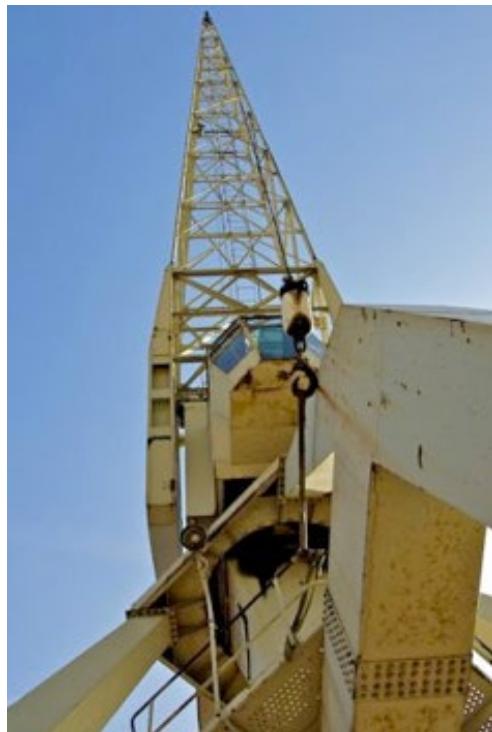
If at any time during the shifting of loads there is an abnormal movement of the boom or hoist, or you hear any abnormal noises, you should immediately:

- ▶ Inform the dogger and any other people in the work area.
- ▶ If you are carrying a load then it should be lowered to the ground (if safe to do so).
- ▶ Stop operations.
- ▶ Put a danger tag on the crane.
- ▶ Have an inspection carried out to check if there has been any damage to the crane.



### **3.11.3 LOOSE CONNECTION PINS**

If you notice during operations that the connection pins on the lattice boom section are loose on a pin jib crane, you will need to stop work straight away and contact an authorised person (e.g. supervisor).



### **3.11.4 PROBLEM WITH THE CRANE'S COMPUTER OR VISUAL DISPLAY**



If the computer or visual display is not working correctly when lifting loads you will need to:

- ▶ Lower the load slowly and under control.
- ▶ Shut the crane down.
- ▶ Tag out the crane.
- ▶ Report the fault to an authorised person.

## 3.11.6 CONTACT WITH ELECTRIC/POWER LINES AND OTHER ELECTRICAL EMERGENCIES

Emergency situations involving electricity are extremely serious as injury or death can occur very quickly. A timely and effective response is necessary to deal with the situation.



If the crane comes into contact with overhead electric/power lines or the dogger shows signs of electrocution from the crane hook, you will need to:

- ▶ If possible, move the boom away from the source of electricity or lift the hook clear of the person dogging the load. You should not operate the crane if it is not safe for you to do so (e.g. the crane controls are electrified).
- ▶ If you cannot break contact with overhead electric/power lines then you will need to stay in the crane if it is safe to do so. Call for help but be careful not to touch any metal parts of the crane.
- ▶ If it is not safe to stay in the crane then you will need to exit safely. Apply the following procedure when exiting the crane:
  - Check that there is no water or obstacles on the ground.
  - Jump clear of the crane without touching the metal parts of the crane and the ground at the same time (if safe to do so).
  - Move away from the crane by hopping or shuffling along with both feet together until you are at least 8 metres away from the nearest part of the crane. **DO NOT** run or walk as the ground may be electrified.



- DO NOT attempt to touch any person being electrocuted or in contact with wires.
- When you are a safe distance away from the crane, you must warn other people to stay at least 8 metres away from the crane until the power has been isolated and the area is safe.
- ▶ Follow all incident reporting and first aid procedures if necessary.
- ▶ Do not use the crane again until it has been inspected and is deemed ready to be used again.

## 3.12 RESPOND TO WORKPLACE EMERGENCIES

Site emergencies may include:

- ▶ Fire (electrical, chemical, gas, mechanical, paper, wood or natural).
- ▶ Gas leak.
- ▶ Toxic and/or flammable vapours emission.
- ▶ Vehicle/machine accident.
- ▶ Chemical spill.
- ▶ Injury to personnel/workers.
- ▶ Structural collapse.



Always communicate with the person dogging the load prior to leaving the crane.

**Dial ‘000’ if there is  
an emergency!**

## **3.12.1 EMERGENCY RESPONSE**



In the case of an emergency:

- ▶ Remain calm.
- ▶ Raise the alarm with your supervisor and/or first aid officer.
- ▶ Alert all personnel/workers, communicating the nature of the emergency and informing them of any unsafe areas.
- ▶ Get help from emergency services (dial 000).
- ▶ Evacuate if necessary (refer to site emergency plans).

## **3.12.2 REPORTING AN EMERGENCY**

When calling emergency services (dial 000) let the operator know the following details:

- ▶ Where the emergency is.
- ▶ What has happened.
- ▶ What is being done to address the emergency.
- ▶ Your name.

Do not hang up the phone until you have been given instructions on how to proceed.



## **3.12.3 FIRST AID**



First aid kits must be supplied by your employer/PCBU. The location of these kits should be clearly marked with signage.

In the case of an emergency where somebody requires first aid, notify your supervisor or first aid officer and they will take action.

## 3.13 CONCLUDE OPERATIONS



Once the job has been completed you will need to conclude operations in accordance with site procedures and manufacturer's specifications.

Do not leave the portal boom crane controls until you have taken the following precautions:

- ▶ Made sure the crane is not still carrying a load.
- ▶ Raised the crane hook to a safe height.
- ▶ Shut down the crane according to the manufacturer's specifications.
- ▶ Retract or fold boom (if applicable).
- ▶ Secured the crane against unauthorised use.

### 3.13.1 PLACING THE CRANE IN WEATHER VANE MODE

Place the portal boom crane in weather vane mode if necessary.

This means that the crane will be able to slew freely in the wind to avoid the risk of instability and possible collapse if the force of the wind pressure exceeds the crane's limitations.

### 3.13.2 APPLY MOTION LOCKS AND BRAKES

It is important that all relevant motion locks and brakes are applied before shutting the crane down. Ensure that all site safety procedures and manufacturers' specifications are followed.

### 3.13.3 SECURING THE CRANE AND EQUIPMENT

Secure the crane and store any equipment you have used according to procedures and the appropriate standard.

When you have shut down the crane you will need to isolate and lock the cabin in order to secure it against unauthorised use.

Store all lifting equipment in a clean dry storage cabinet or area and hang them or coil them neatly according to site procedures.

### **3.13.4 SHUTTING DOWN AND SECURING THE CRANE**

Once the crane is in the designated shutdown location, ensure that you follow the manufacturer's specifications and site safety procedures to shut the crane down.

A typical shutdown procedure may include:

- ▶ Raising the boom/jib assembly clear of obstructions (e.g. structures, buildings, vessels).
- ▶ Retracting the hoist rope/hook block.
- ▶ Travelling the crane to the park position.
- ▶ Engaging the luff pawl (if applicable).
- ▶ Making sure the hoist and slew brakes are applied (if applicable).



- ▶ Applying the storm brakes/clamps (if applicable).
- ▶ Making sure all controls are in neutral (if applicable).
- ▶ Idling the engine to stabilise the temperature.
- ▶ Turning off the engine.
- ▶ Isolating the cabin with the main switch.

- ▶ Removing the ignition key (where applicable).
- ▶ Locking and securing the cabin (where applicable).
- ▶ Removing hazard controls if no longer needed.



## 3.14 CONDUCT POST-OPERATIONAL CHECKS



After completing shutdown procedures it is important to conduct all post-operational checks to ensure that the crane is ready for the next operator.

Carry out these checks in accordance with the manufacturer's instructions and the relevant site procedures. You are checking the crane for any damage or defects that have occurred during use.

Refer to the service logbook or inspection checklist for a list of items that should be checked on the crane.

### 3.14.1 REMOVING HAZARD CONTROL MEASURES

Any hazard control measures that are no longer required should be removed from the work area (e.g. temporary fences/barricades or signage).



## **3.14.2 RECORDING AND REPORTING DAMAGE AND DEFECTS**

Any faults that you find during the post-operational need to be recorded, reported and appropriately rectified, in line with workplace procedures.

Generally this will involve:

- ▶ Isolating the crane or faulty equipment and attaching a danger tag to it.
- ▶ Recording the fault as per site procedures (e.g. in the crane logbook or service logbook).
- ▶ Reporting the fault to an authorised person for corrective action.
- ▶ All required documents should be completed adequately and on time. There may be strict timeframes set for completion or submission.
- ▶ Clear and concise language should be used when completing written documentation. Avoid unnecessary repetition and overly technical terminology.
- ▶ Thoroughly check all information that is entered into written documents. Inaccurate, missing or misleading information can cause confusion, delays, hazards or legal issues.
- ▶ Use only approved forms and documents when communicating in writing. Make sure the documents you are using are appropriate for their intended purpose.
- ▶ Documents may need to be passed on to other personnel/workers, departments or agencies. This should be done promptly, make sure that the written documentation is being sent to the appropriate individual or department.
- ▶ Some forms may need to be reviewed and/or signed by appropriate authorities. You may be authorised to sign some documents yourself.



# APPENDIX 1A – WORK HEALTH & SAFETY COMMON TERMS AND DEFINITIONS

|   |  |
|---|--|
| <b>Person Conducting a Business or Undertaking (PCBU)</b> | A ‘person conducting a business or undertaking’ (PCBU) replaces the term ‘employer’. A PCBU includes all employers, sole traders, principal contractors, unincorporated associations, partnerships and franchisees. Volunteer organisations that also employ people will be PCBUs.<br><br>A PCBU’s primary duty of care is to ensure the health and safety of everyone in the workplace, so far as is reasonably practicable.  |
| <b>Officers</b>   | An ‘Officer’ is a person who makes, or participates in making, decisions that affect the whole or a substantial part of a corporation. This includes Health and Safety Representatives (HSR).  |
| <b>Workers</b>  | ‘Worker’ replaces the term ‘employee’. It is defined broadly to mean a person who carries out work in any capacity for a PCBU.<br><br>A ‘worker’ covers employees, contractors, sub-contractors (and their employees), labour hire employees, outworkers, apprentices, trainees, work experience students and volunteers.  |
| <b>Reasonably Practicable</b>                             | Reasonably Practicable is defined as action that is, or was at a particular time, reasonably able to be done to help ensure health and safety based on the following factors: <ol style="list-style-type: none"> <li>Chances of the hazard or risk occurring (likelihood).</li> <li>The degree of harm (consequence).</li> <li>The knowledge of persons involved in the situation relating to the hazard or risk and methods of eliminating or controlling it.</li> <li>The availability and suitability of ways to eliminate or control the hazard or risk.</li> <li>The costs involved in taking action to eliminate or control the hazard or risk including consideration of whether the cost involved is inconsistent to the level of risk.</li> </ol>   |
| <b>Due Diligence</b>                                      | The Work Health and Safety Act 2011 (the WHS Act 2011) imposes a specific duty on officers of corporations to exercise due diligence to ensure that the corporation meets its work health and safety obligations. In short, they have a responsibility to ensure that the PCBU is doing everything it should to ensure health and safety.<br><br>The duty requires officers to be proactive in ensuring that the corporation complies with its duty.<br><br>Due diligence may be demonstrated through the following courses of action: <ol style="list-style-type: none"> <li>Acquiring knowledge of health and safety issues.</li> <li>Understanding operations and associated hazards and risks.</li> <li>Ensuring that appropriate resources and processes are used to eliminate or minimise risks to health and safety.</li> <li>Implementing processes for receiving and responding to information about incidents, hazards and risks.</li> <li>Establishing and maintaining compliance processes.</li> <li>Verifying the provision and use of the resources mentioned in 1-5.</li> </ol> |

# APPENDIX 1B – SAFE WORK METHOD STATEMENT

|               |                  |                     |
|---------------|------------------|---------------------|
| SWMS Name:    | SWMS Created By: | Date of Creation:   |
| SWMS Summary: |                  | Last Reviewed Date: |

| Company/Contractor Details: | Project Details: |
|-----------------------------|------------------|
| Name:                       | Client:          |
| ABN:                        | Contact Name:    |
| Address:                    | Site Address:    |
| Contact Number:             | Contact Number:  |
| Email:                      | Start Date:      |

| How to complete this SWMS:  |
|---|
| <ol style="list-style-type: none"><li><b>CONSULT:</b> Consult with all persons who will be involved in the completion of the work.</li><li><b>LIST:</b> List each of the steps in the task work being done.</li><li><b>IDENTIFY:</b> Describe the health and safety hazards and risks arising from each step in the work.</li><li><b>RISK ASSESSMENT:</b> Review the level of risk associated with each hazard listed.</li><li><b>CONTROL:</b> Describe how the risks will be controlled, and describe what hazard control measures will be put in place.</li><li><b>RESPONSIBILITY:</b> Allocate a person to be responsible for the hazard control measure.</li><li><b>REVIEW:</b> Review the effectiveness of the control measures and apply further hazard control measures as required.</li></ol> |

|   |  |
|---|--|
| <p>Training/Qualifications Required To Carry Out Work:</p> <p>Are All Workers Adequately Trained And Qualified?</p> <p>Yes / No</p> | <p>PPE Required To Carry Out Work:</p>   |
| <p>Legislation, Australian Standards &amp; Codes Of Practice Relevant To Work (Where Applicable):</p>                               | <p>Equipment Required To Carry Out Work:</p>   |
| <p>Environmental Statement:</p>   | <p>Safety Checks Required Prior To Commencement Of Work:</p>   |
| <p>Coordination With Other Trades:</p>  | <p>Permits Required For Commencement Of Work:</p> <p>Have These Permits Been Acquired?</p> <p>Yes / No</p> |

## Risk Analysis Matrix

Use this table to determine the level of risk associated with an identified hazard.

| LIKELIHOOD     | CONSEQUENCE   |                          |  |   |  |
|----------------|---------------|--------------------------|--|---|--|
|                | Insignificant | Minor First Aid Required | Moderate Medical Attention and Time Off Work | Major Long Term Illness or Serious Injury | Severe Kill or Cause Permanent Disability or Illness |
| Almost Certain | M             | H                        | H  | VH  | VH   |
| Likely         | M             | M                        | H  | H   | VH   |
| Possible       | L             | M                        | H  | H   | VH   |
| Unlikely       | L             | L                        | M  | M   | H  |
| Rare           | L             | L                        | M  | M   | M  |

| RISK LEVEL | ACTION   |
|------------|--|
| VERY HIGH  | <u>Act immediately:</u><br>The proposed task or process activity must not proceed. Steps must be taken to lower the risk level to as low as reasonably practicable using the hierarchy of risk controls.   |
| HIGH       | <u>Act today:</u><br>The proposed activity can only proceed, provided that: <ol style="list-style-type: none"> <li>The risk level has been reduced to as low as reasonably practicable using the hierarchy of risk controls.</li> <li>The risk controls must include those identified in legislation, Australian Standards, Codes of Practice etc.</li> <li>The risk assessment has been reviewed and approved by the Supervisor.</li> <li>A Safe Working Procedure or Safe Work Method has been prepared.</li> <li>The supervisor must review and document the effectiveness of the implemented risk controls.</li> </ol> |
| MEDIUM     | <u>Act this week:</u><br>The proposed task or process can proceed, provided that: <ol style="list-style-type: none"> <li>The risk level has been reduced to as low as reasonably practicable using the hierarchy of risk controls.</li> <li>The risk assessment has been reviewed and approved by the Supervisor.</li> <li>A Safe Working Procedure or Safe Work Method has been prepared.</li> </ol>  |
| LOW        | <u>Act this month:</u><br>Managed by local documented routine procedures, which must include application of the hierarchy of controls.   |

## Safe Work Method Statement

| Work Step  | Associated/Identified Hazards                 | Risk Level (L, M, H, VH) | Hazard Controls   | Revised Risk Level (L, M, H, VH) | Person Responsible  |
|--|---|--------------------------|---|----------------------------------|---|
| Work your way through each step in the work process, giving a brief description of what is required at each stage. | What hazards can be identified for this step? | What is the risk level?  | What hazards controls will be put into place to deal with the identified hazards for this step? | Has the risk been reduced?       | Who is responsible for carrying out the work and maintaining the hazard controls? |
|  |   |                          |   |                                  |   |
|  |   |                          |   |                                  |   |
|  |   |                          |   |                                  |   |
|  |   |                          |   |                                  |   |

| Work Step | Associated/Identified Hazards | Risk Level<br>(L, M,<br>H, VH) | Hazard Controls | Revised<br>Risk<br>Level<br>(L, M, H,<br>VH) | Person<br>Responsible |
|-----------|-------------------------------|--------------------------------|-----------------|--|-----------------------|
|           |                               |                                |                 |  |                       |
|           |                               |                                |                 |  |                       |
|           |                               |                                |                 |  |                       |
|           |                               |                                |                 |  |                       |

## Personnel/Worker Signoff

All personnel/workers required to carry out this task need to be listed below.

By signing this SWMS, each person declares that they have carefully read the SWMS and that they understand their responsibilities and requirements to complete the work.

| Name (please print) | Position / Qualification | Signature | Date |
|---------------------|--------------------------|-----------|------|
|                     |                          |           |      |
|                     |                          |           |      |
|                     |                          |           |      |
|                     |                          |           |      |
|                     |                          |           |      |
|                     |                          |           |      |

## Senior Management Signoff

Does this SWMS meet the necessary safety requirements? Yes / No

Does this SWMS require review? Yes / No                      Review Date:

|                      |           |            |       |
|----------------------|-----------|------------|-------|
| Additional Comments: |           |            |       |
| Name:                | Position: | Signature: | Date: |

# APPENDIX 1C – HAZARD REPORT FORM

|               |                    |                       |
|---------------|--------------------|-----------------------|
| Company Name: | Form Completed By: | Date of Inspection:   |
| Site:         | Address:           | Contact Phone Number: |

|                      |                        |
|----------------------|------------------------|
| 1. Identified Hazard | Hazard Type:           |
| 2. Hazard Details    | Description of Hazard: |

| LIKELIHOOD     | CONSEQUENCE   |                          |  |   |  |
|----------------|---------------|--------------------------|--|---|--|
|                | Insignificant | Minor First Aid Required | Moderate Medical Attention and Time Off Work | Major Long Term Illness or Serious Injury | Severe Kill or Cause Permanent Disability or Illness |
| Almost Certain | M             | H                        | H  | VH  | VH   |
| Likely         | M             | M                        | H  | H   | VH   |
| Possible       | L             | M                        | H  | H   | VH   |
| Unlikely       | L             | L                        | M  | M   | H  |
| Rare           | L             | L                        | M  | M   | M  |

| RISK LEVEL | ACTION   |
|------------|--|
| VERY HIGH  | <u>Act immediately:</u><br>The proposed task or process activity must not proceed. Steps must be taken to lower the risk level to as low as reasonably practicable using the hierarchy of risk controls.   |
| HIGH       | <u>Act today:</u><br>The proposed activity can only proceed, provided that: <ol style="list-style-type: none"> <li>The risk level has been reduced to as low as reasonably practicable using the hierarchy of risk controls.</li> <li>The risk controls must include those identified in legislation, Australian Standards, Codes of Practice etc.</li> <li>The risk assessment has been reviewed and approved by the Supervisor.</li> <li>A Safe Working Procedure or Safe Work Method has been prepared.</li> <li>The supervisor must review and document the effectiveness of the implemented risk controls.</li> </ol> |
| MEDIUM     | <u>Act this week:</u><br>The proposed task or process can proceed, provided that: <ol style="list-style-type: none"> <li>The risk level has been reduced to as low as reasonably practicable using the hierarchy of risk controls.</li> <li>The risk assessment has been reviewed and approved by the Supervisor.</li> <li>A Safe Working Procedure or Safe Work Method has been prepared.</li> </ol>  |
| LOW        | <u>Act this month:</u><br>Managed by local documented routine procedures, which must include application of the hierarchy of controls.   |

|                    |  |                         |             |
|--------------------|--|-------------------------|-------------|
| 3. Risk Assessment | Risk Likelihood Level:   | Risk Consequence Level: | Risk Level: |
|                    | Is there an existing safety system or procedure that deals with this hazard?<br><br>Yes / No<br><br>Details: |                         |             |

| 4. Control Strategies | Intended Control Strategy (Details and Resources Required) | Tick Box |
|-----------------------|--|----------|
| Elimination           |  |          |
| Substitution          |  |          |
| Isolation             |  |          |
| Engineering           |  |          |
| Safe Work Practices   |  |          |
| PPE                   |  |          |

Is the control strategy feasible? Yes / No

|                |   |                    |
|----------------|---|--------------------|
| 5. Action Plan | Has a plan for the implementation of the control strategy been completed?           |                    |
|                | Have the required resources been obtained?  |                    |
|                | Does the implementation meet the requirements of workplace policies and procedures? |                    |
|                | What is the intended date of implementation?  | ____ / ____ / ____ |
|                | Who is responsible for implementing the control strategy?                           |                    |
|                | Date of review of action taken:   | ____ / ____ / ____ |
| 6. Review      | Date of Review:   | ____ / ____ / ____ |
|                | Review completed by:  |                    |
|                | Has the hazard control been successfully implemented?                               |                    |
|                | New risk level:   |                    |
|                | Is this risk level acceptable?  |                    |
|                | Further action required?  |                    |

# APPENDIX 3A – CRANE SPECIFICATIONS – PORTAL BOOM CRANE

## CRANE SPECIFICATIONS – PORTAL BOOM CRANE

This load chart is for assessment use only and must not be used for any other purpose.

| OPERATING RADIUS IN METRES | LOAD RATING IN KILOGRAMS |               |
|----------------------------|--------------------------|---------------|
|                            | 40m BOOM LENGTH          |               |
|                            | SWL                      | BOOM $\alpha$ |
| 10.0                       | 32,000                   | 78°           |
| 11.0                       | 32,000                   | 76°           |
| 12.0                       | 30,000                   | 74°           |
| 14.0                       | 30,000                   | 71°           |
| 16.0                       | 30,000                   | 68°           |
| 18.0                       | 30,000                   | 65°           |
| 20.0                       | 30,000                   | 63°           |
| 22.0                       | 30,000                   | 59°           |
| 24.0                       | 30,000                   | 56°           |
| 26.0                       | 30,000                   | 53°           |
| 28.0                       | 28,000                   | 50°           |
| 30.0                       | 28,000                   | 46°           |
| 32.0                       | 28,000                   | 40°           |
| 34.0                       | 25,000                   | 35°           |
| 36.0                       | 22,000                   | 30°           |
| 38.0                       | 20,000                   | 25°           |
| 40.0                       | 18,000                   | 20°           |

| KEY           |                        |
|---------------|------------------------|
| SWL           | Safe Working Load (kg) |
| BOOM $\alpha$ | Boom Angle             |

