



Ministry of Labor &
Social Development
Kingdom of Saudi Arabia



Safety in Using Cranes

OSH Guidelines





Ministry of Labor &
Social Development
Kingdom of Saudi Arabia



Towards Attractive Work Environment

This booklet does not eliminate, replace or substitute the current regulations and national or international standards

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Inspection & Work Environment Development Deputyship- OSH Directorate

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Preface

The Ministry of Labor and Social development is seeking to improve the Occupational Safety and Health (OSH) systems and practices across the Kingdom of Saudi Arabia. This is in pursuit of protecting safety & health of employees as well as the preservation of property and the environment. The Ministry of Labor and Social Development therefore keens to educate employers as well as employees of the importance of compliance with rules, regulations, and implement OSH best practices. The Ministry aims to develop practical tools, such as this booklet, in the hope that the users find it resourceful in their daily activities. Note: this booklet does not eliminate, replace or substitute the current regulations and national or international standards.

The purpose of this booklet

The purpose of this booklet is to draw attention to Occupational Safety and Health considerations in the workplace.

The booklet also aims to:

- Raise awareness of OSH concepts and procedures in the workplace
- Provide practical guidance and direction to employers, OSH responsible, employees and self-employed personnel on methods to improve OSH in the workplace
- Contribute in enhancing OSH culture in the Kingdom of Saudi Arabia

The target audience for this booklet

This booklet aims to reach and educate most employers (including senior management), employees, OSH responsible within organizations and self employed personnel in the field of OSH.

This is to outline the occupational safety and health requirements and considerations for the use of a crane in a basic form and can be used as a checklist for site managers, supervisors and employees who work with, around or in the vicinity of the crane and associated lifting operations.

Note 1: This guide is not intended as a technical document for the crane drivers or operators, it is to remind the workers listed above about the key safety considerations for cranes on site.

Note 2: although this booklet contains examples solely of the construction industry, the technical material can be applied to several industries, including but not restricted to manufacturing, mining, oil & gas, agriculture, telecommunication etc.

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- Planning and selecting the crane
- Locating and erecting the crane
- Using operating the crane
- Management and supervision of the cranes' operations
- Dismantling the cranes



Part I | Introduction





Common types of cranes

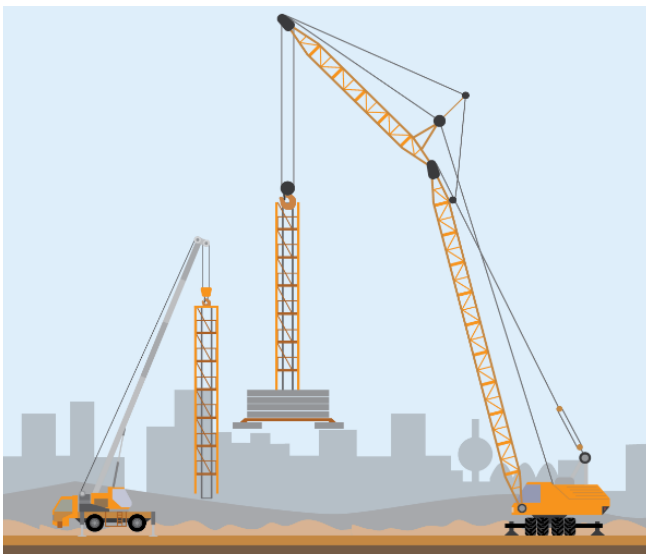
Tower cranes



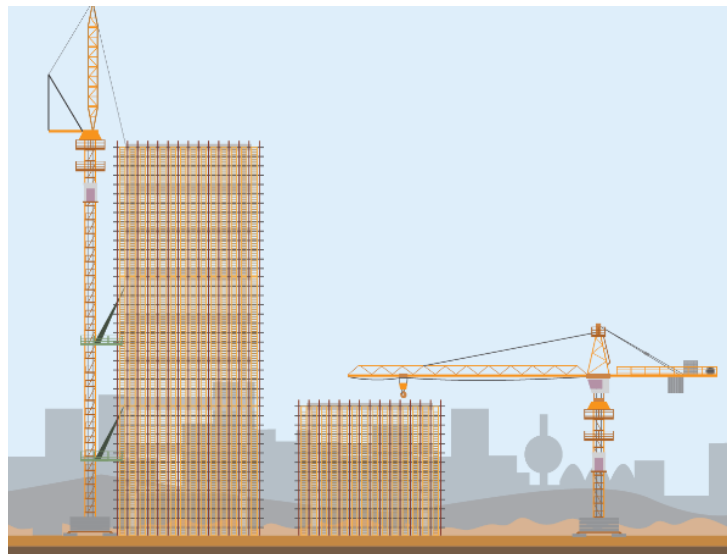
Tower cranes are the most common crane found on a construction site.



They are usually operated from a cab below the lifting jib so the operator has a good view of the lifting operation as it is carried out.



They are assembled and erected on site



Tower cranes can be:

- **self-supporting** where they are anchored to a concrete foundation or
- **supported** where they are attached to the side of the building that is being constructed. These are the two most common types of tower crane.

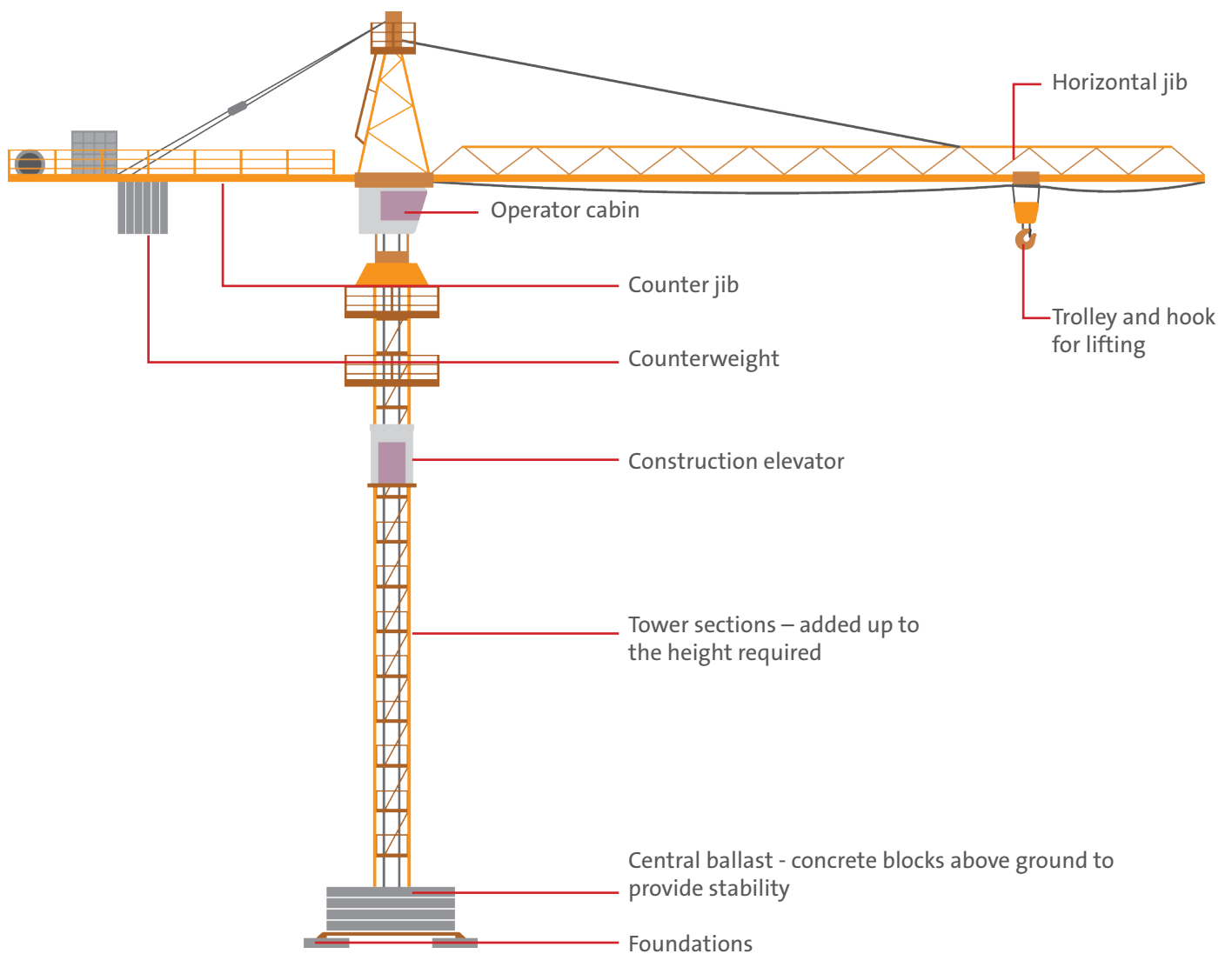
Tower cranes are made up of the following parts

1. **Foundations** or foundation anchors (underground)
2. **Central ballast** – concrete blocks above ground to provide stability
3. **The undercarriage cross frame and bogies** – that form the base from which the tower rises
4. **Tower sections** up to the height required
5. **Climbing units** within the tower for access
6. **Slewing unit** – that allows the jib of the crane to rotate
7. **Horizontal jib** – The main arm of the crane that contains the hook block and the trolley that the hook moves along on.
8. **The counter jib** – That houses the counterweight blocks and the hoist unit and hoist drum



Common types of cranes

Constituents of tower cranes



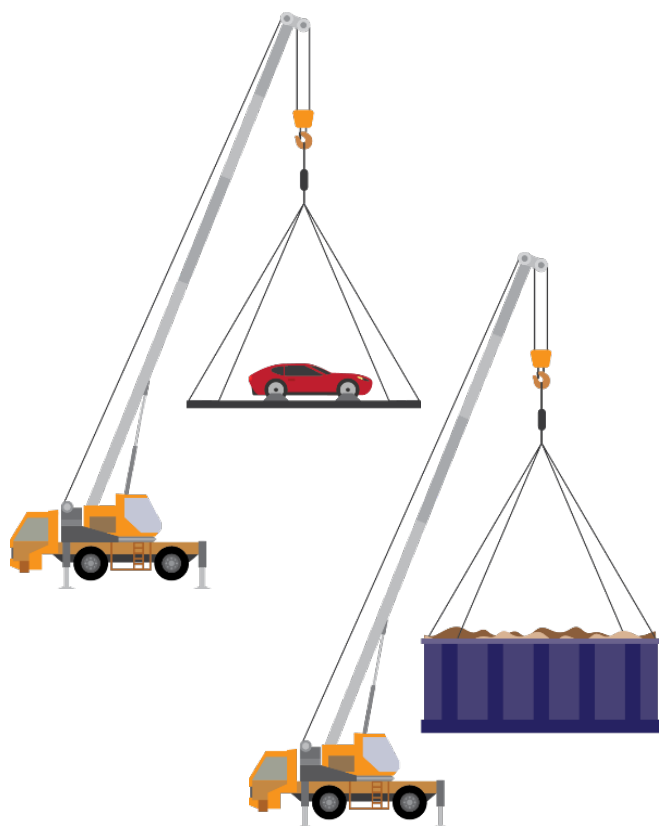
Common types of cranes

Mobile and Crawler Cranes

Mobile Cranes



On construction sites the wheel-mounted types are most common.



Mobile cranes are normally used for short duration lifting requirements and for medium to lighter weights. However, heavy weight cranes could be used in large construction areas



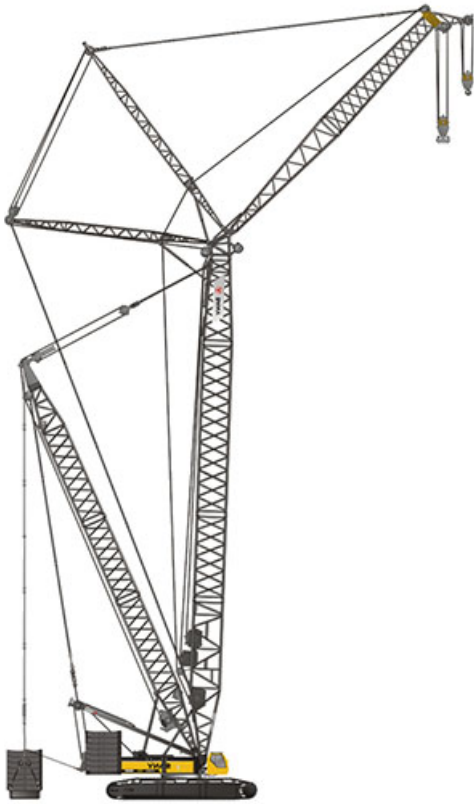
They can be maneuvered to the required location on site.



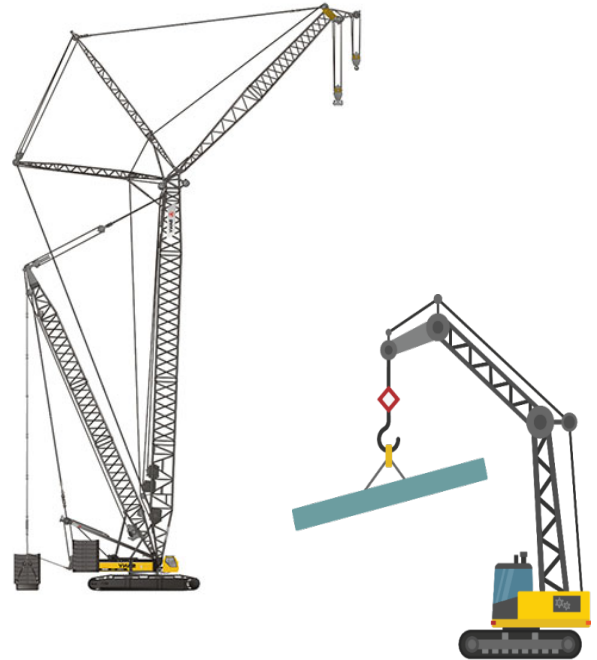
Common types of cranes

Mobile and Crawler Cranes

Crawler Cranes



Crawler cranes are used for specific construction sites



Crawler cranes are normally used for heavy weights lifting requirements. It is used in large construction sites

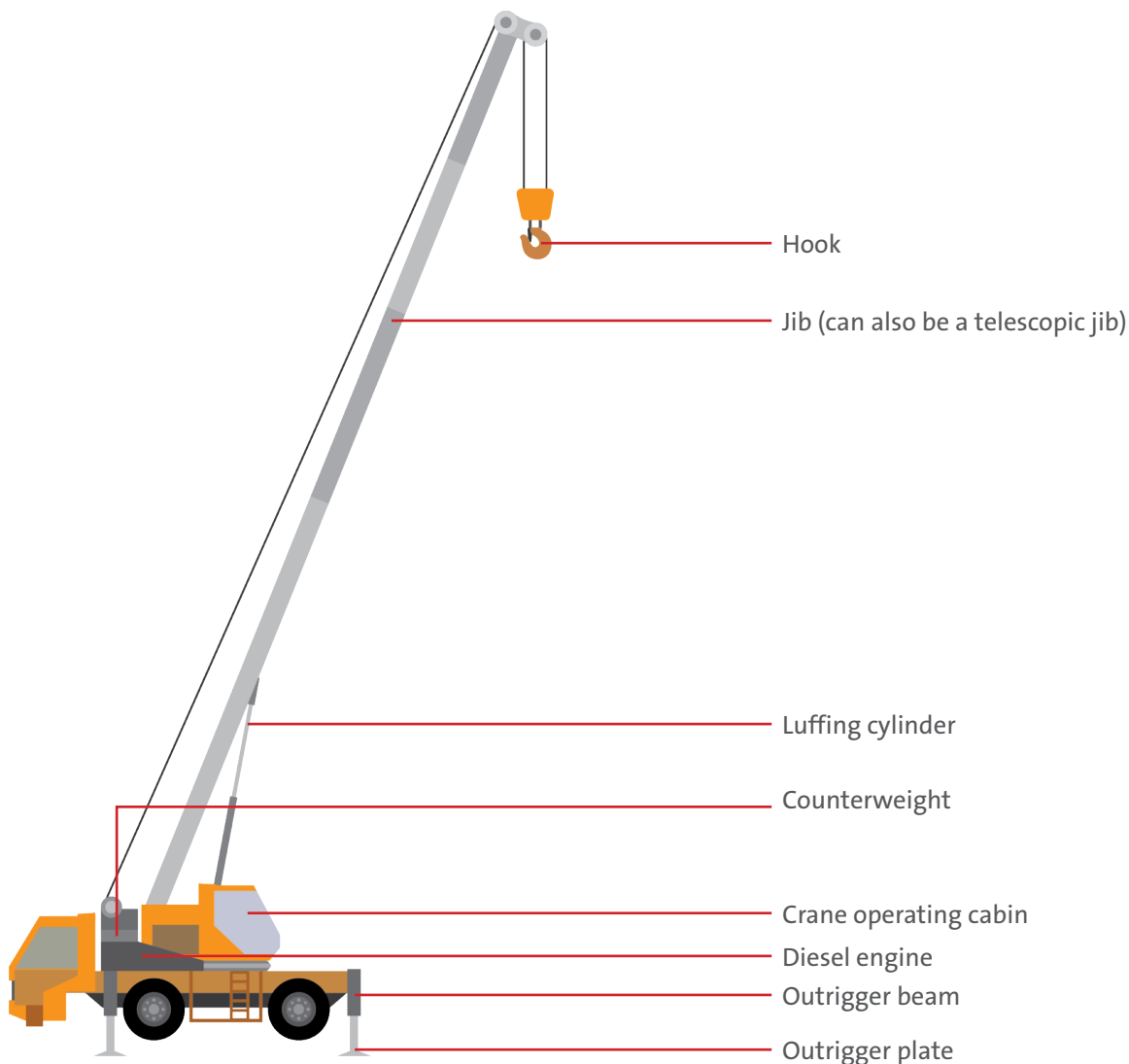


They can be maneuvered to the required location on site.

Tower cranes are made up of the following parts

1. The structure – or central frame
2. The wheeled mobile base – for transportation and stability purposes
3. The main boom/jib that extends upwards – this can sometimes be a telescopic jib
4. Fixed and additional counterweights – to provide stability when lifting heavier loads
5. The boom head and hook block – for lifting objects
6. Outriggers – to ensure stability
7. A drivers cab

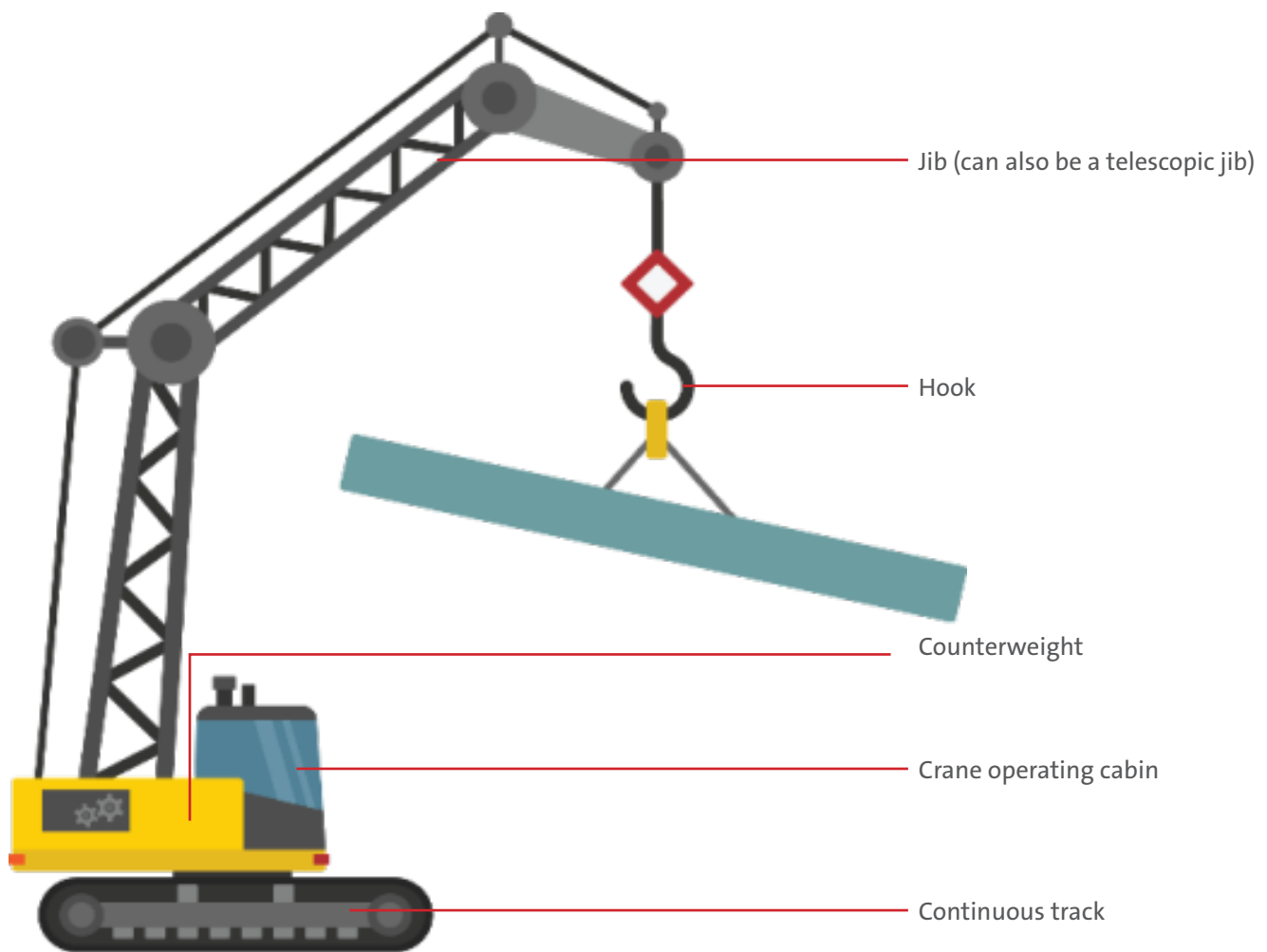
Mobile cranes are made up of the following parts





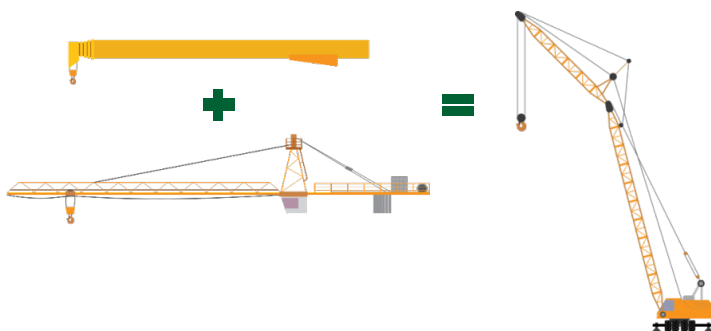
Common types of cranes

Constituents of crawler cranes

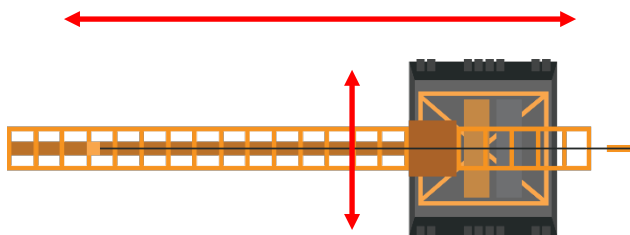


Common types of cranes

Self-erecting tower crane



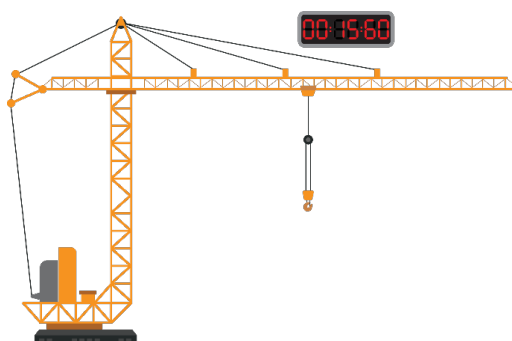
A new type of jib crane and are between telescopic handlers and large tower cranes in terms of size and capacity.



Self-erecting tower cranes have a small on site footprint.



Self-erecting tower cranes are all pedestrian operated ensuring ease of use by way of remote control from ground level.



Cranes have the ability to unfold in less than fifteen minutes and fold away in less than eight minutes once installed.

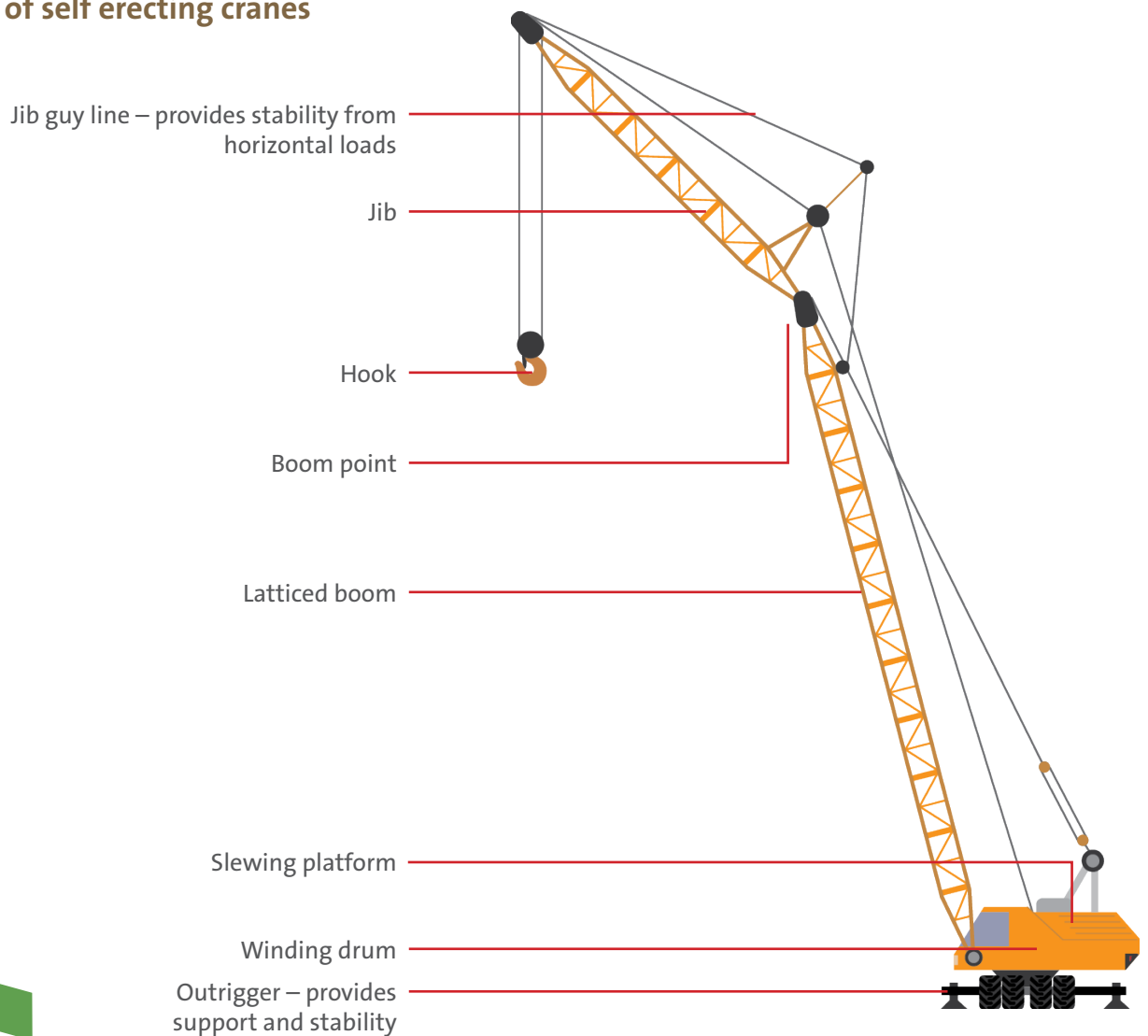


Common types of cranes

Self-erecting tower crane are made up of the following parts

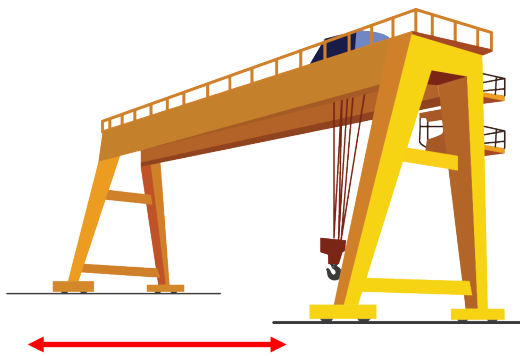
1. Latticed Boom
2. Slewing platform (to allow the crane to rotate)
3. Outriggers for stability
4. The winding drum
5. Boom guy lines
6. The hoist rope
7. The Jib and jib guy lines
8. Hook.

Constituents of self erecting cranes

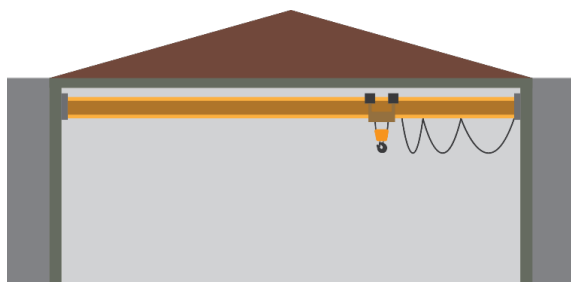


Common types of cranes

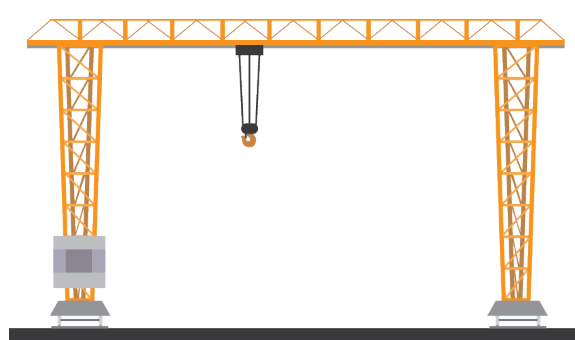
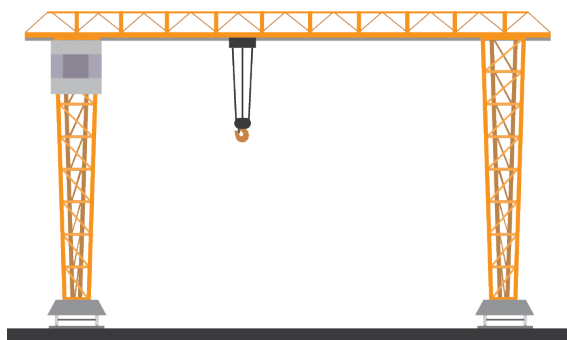
Gantry and overhead cranes (manufacturing industry)



Gantry cranes move along a fixed track and are typically constructed with two A-frames that run on parallel tracks connected cross members from which the lifting mechanisms are located



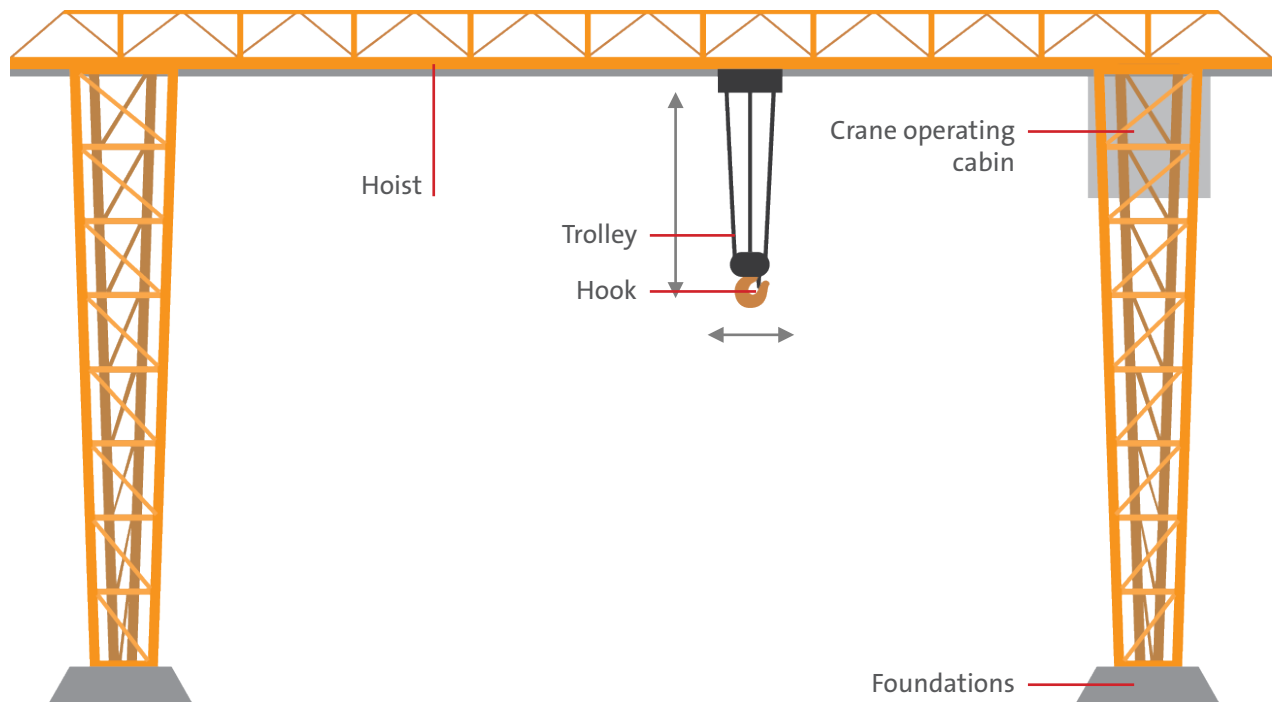
Overhead cranes differ in that the cross member moves along a fixed overhead track and are often located inside large workshops or industrial units.



They can be operated from a cab beneath the lifting beam or smaller versions are operated from other ground using a pendant / hand control.



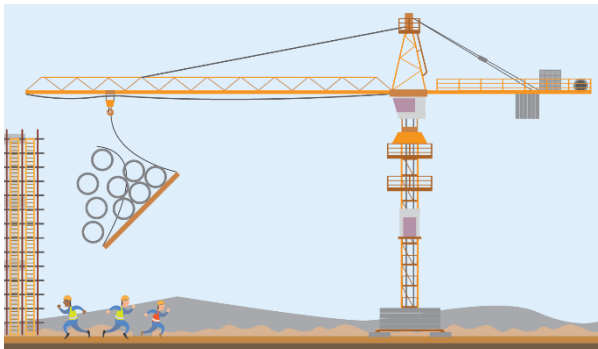
Constituents of gantry cranes



Risks associated with cranes

What to watch out for

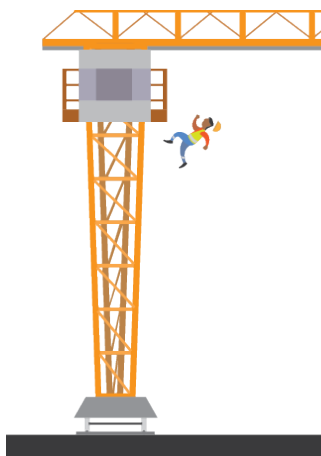
There are number of risks associated with the use of cranes throughout its life cycle from the arrival on site, during the erection of the crane, during use and then finally when it is being dismantled or removed from site. These include;



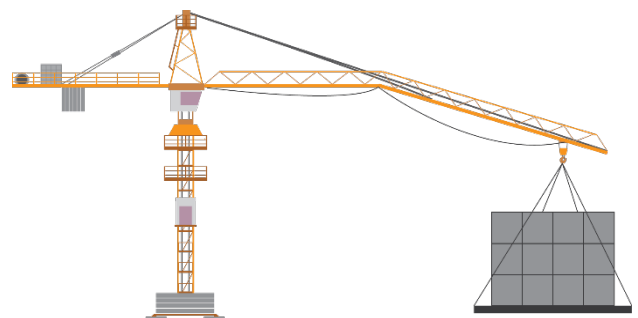
01 Falling objects from the crane



02 Collapse, overturning or catastrophic failure of the crane and/or its lifting accessories



03 Workers falling from heights



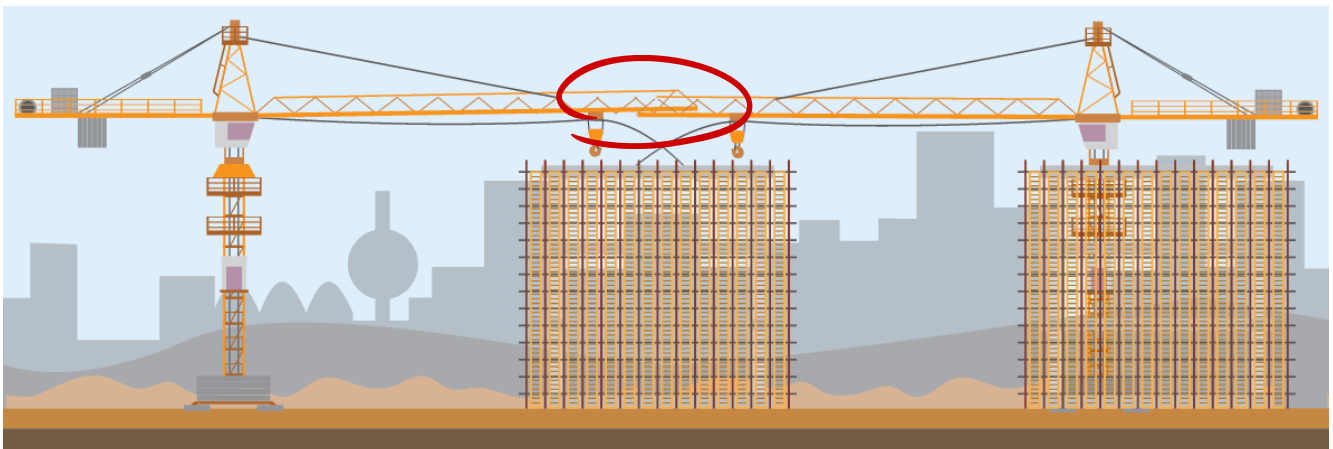
04 Overloading the crane



Risks associated with cranes

What to watch out for

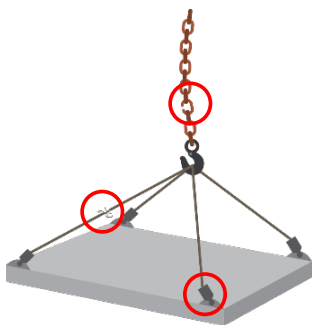
There are number of risks associated with the use of cranes throughout its life cycle from the arrival on site, during the erection of the crane, during use and then finally when it is being dismantled or removed from site. These include;



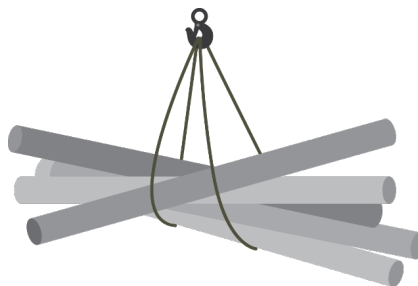
05 Collision with another crane and/or structures nearby

Causes of crane accidents

Why do accidents happen?



01 Using unsuitable or damaged lifting and accessories



02 Lifting material that is not packed and/or secured properly

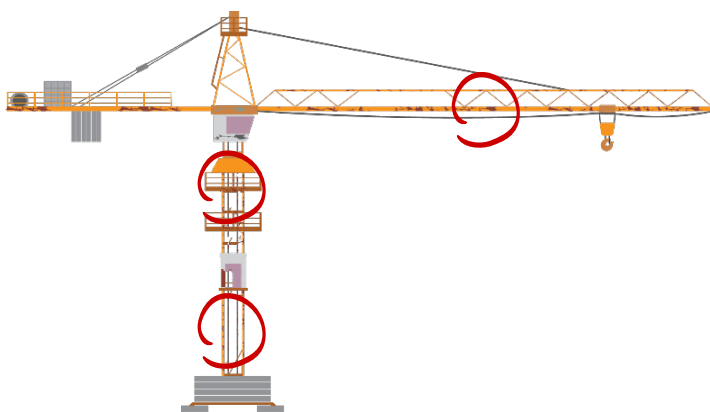


03 Untrained and/or incompetent crane operators

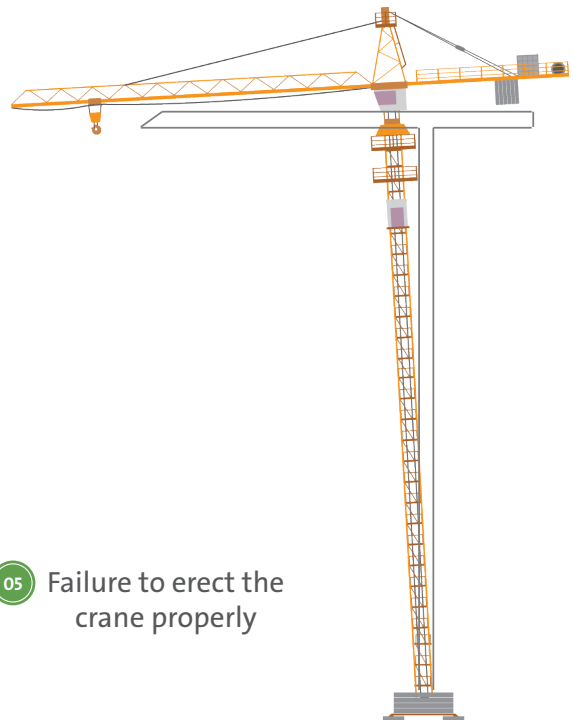
Lack of PPE is the most common cause of accidents in the workplace

Causes of crane accidents

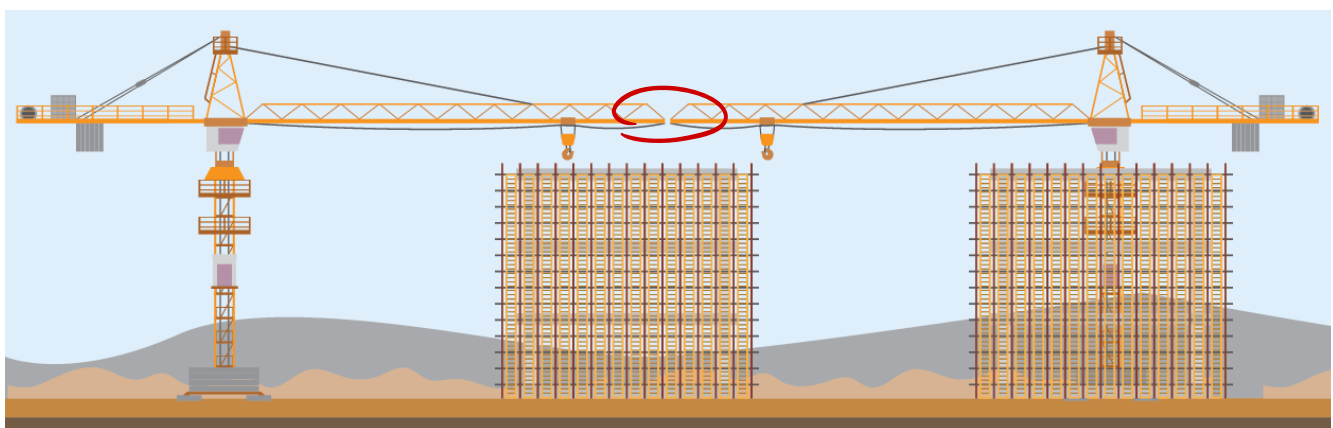
Why do accidents happen?



- 04 Failure to maintain the crane and consistently check it for defects and damage



- 05 Failure to erect the crane properly



- 06 Failure to allow sufficient space between cranes and adjacent cranes and structures

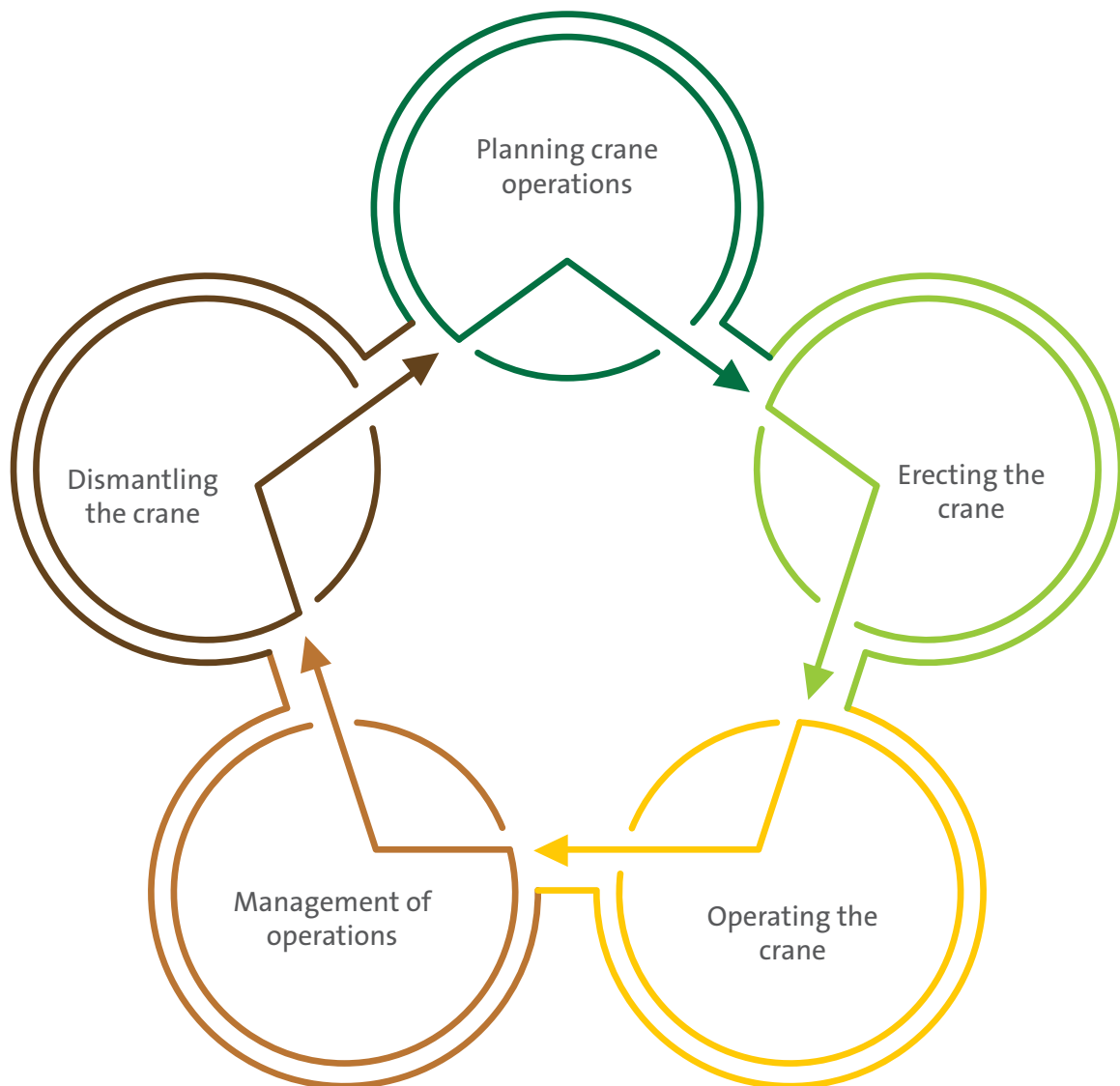


Part 2

Guidelines associated with the lifecycle of the crane



Guidelines associated with the lifecycle of the crane



Guidelines associated with the lifecycle of the crane

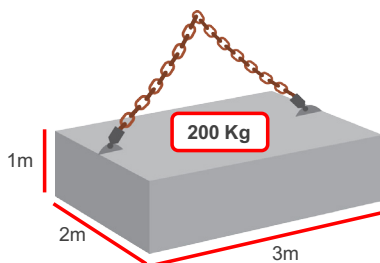
Planning crane operations

Erecting the crane

Operating the crane

Management of operations

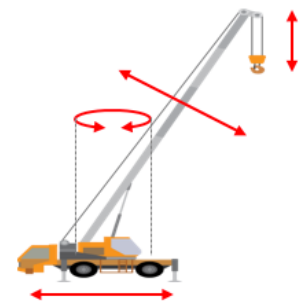
Dismantling the crane



Weights and dimensions of the load

SCHEDULE Lift Operations			
	# of Lifts per day		
Day 1	3	1	2
Day 2	4	2	4
Day 3	2	4	3
Day 4	5	1	1

Number and frequency of lifting operations



Range of movement of the crane



Duration of operation



Site access and restrictions



Available space for erection and dismantling



Guidelines associated with the lifecycle of the crane

Planning crane
operations

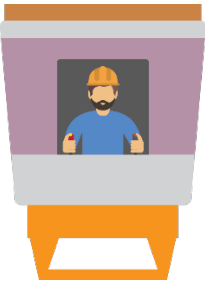
Erecting
the crane

Operating
the crane

Management
of operations

Dismantling
the crane

(Dos and Don'ts)



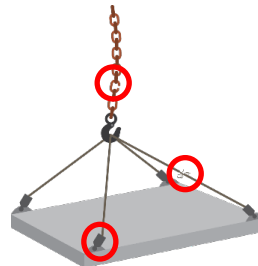
ensure all operators
and signallers are
properly trained and are
competent



allow uncertified
personnel to operate
the crane and/or work
in its vicinity



ensure all correct slings
and chain combinations
are used



use damaged or
uninspected slings
and chains



have a detailed plan
and precautionary
measures are in place



commence crane
operations without a
predefined plan and risk
assessment in place

Guidelines associated with the lifecycle of the crane

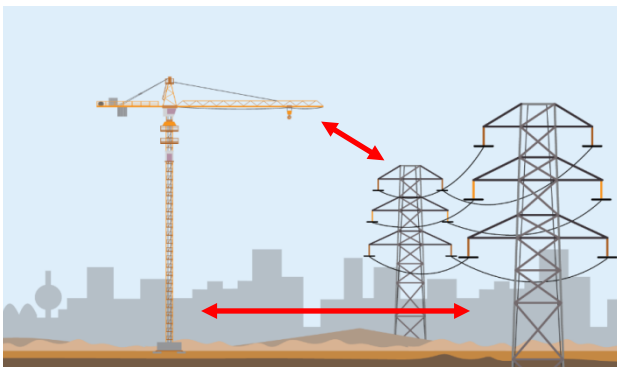
Planning crane operations

Erecting the crane

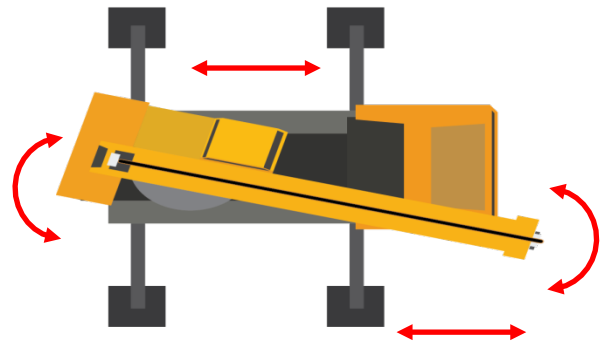
Operating the crane

Management of operations

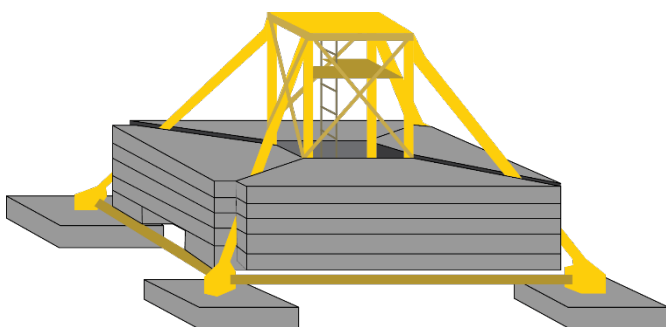
Dismantling the crane



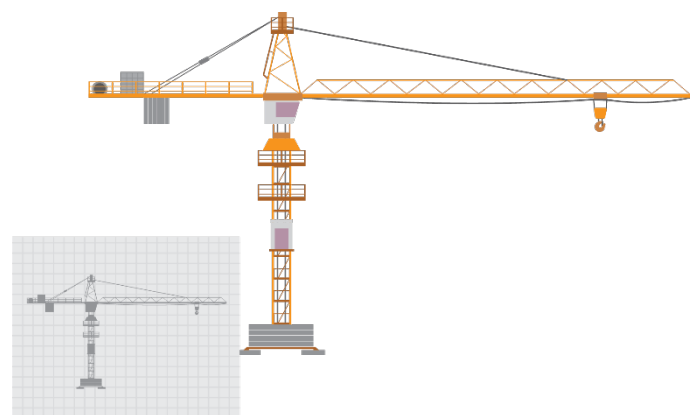
Allow a safe distance between the crane and the overhead power lines and/or structures



Allow enough space around the crane for it to move unobstructed and function in its full range of movement



Ensure the crane is located on secure foundations and on suitable ground that can take the weight of the crane and the load



Ensure the crane is erected as per the engineering diagrams and instructions by a competent and experienced engineer



Guidelines associated with the lifecycle of the crane

Planning crane
operations

Erecting
the crane

Operating
the crane

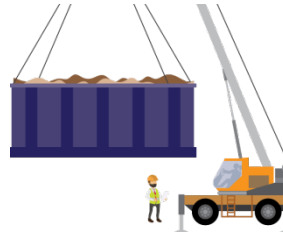
Management
of operations

Dismantling
the crane

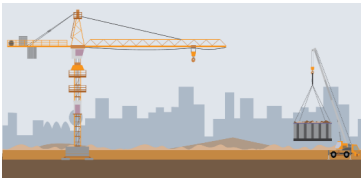
(Dos and Don'ts)



perform frequent
inspections and checks
on the crane before
operation commence



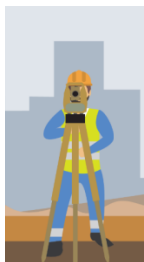
operate the crane
until erection is
complete and has
been inspected and
is deemed fit to use
by engineers



ensure adequate space
is provided between
cranes and other
structures



locate cranes close
enough to each
other allowing
them to collide



ensure stability and
levelness of the ground
before installation



install crane on
sloping or unstable
ground

Guidelines associated with the lifecycle of the crane

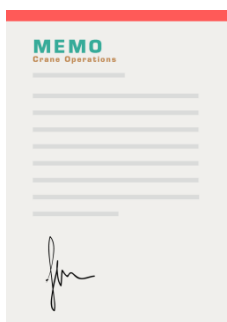
Planning crane operations

Erecting the crane

Operating the crane

Management of operations

Dismantling the crane



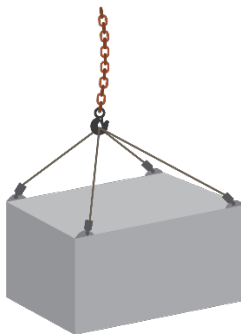
Brief and inform all people involved in the lift about the schedule and plan of action of the crane



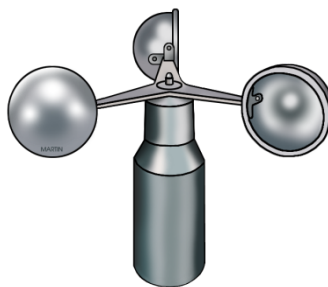
Ensure good communication between all working members and management



Ensure loads are not fixed to the ground (cranes are not designed to detach loads from fixings)



Ensure loads are properly secured by slings and/or chains using tag line to steady the load if necessary



Ensure taking accurate and frequent wind readings and ceasing activities when wind reaches dangerous levels



Ensure fall prevention equipment are used to climb and descend the crane



Guidelines associated with the lifecycle of the crane

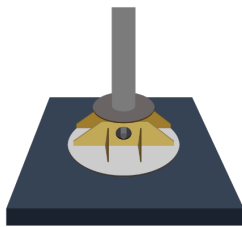
Planning crane
operations

Erecting
the crane

Operating
the crane

Management
of operations

Dismantling
the crane



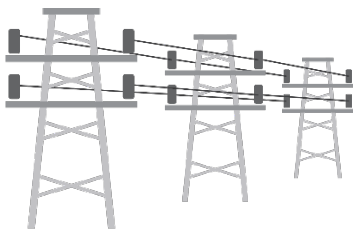
Deploy outriggers and
support them properly



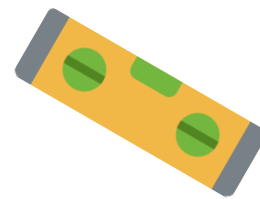
Chock all wheels on inclines
surfaces and ensure
deploying the brakes



If used for a long period
of time, ensure to lock
control switches

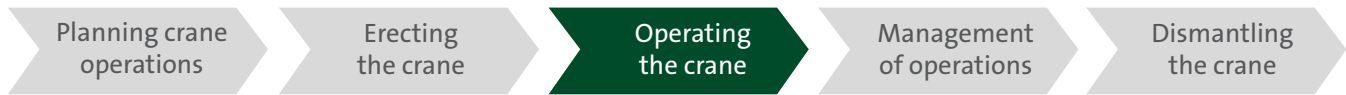


Check the location for
overhead power-lines and
obstacles



Only locate mobile crane on
even, firm and dry ground

Guidelines associated with the lifecycle of the crane



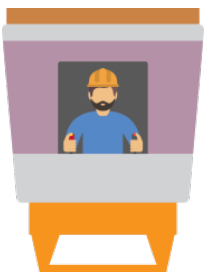
(Dos and Don'ts)



schedule and plan all lifting operations



carry out any unplanned lifts



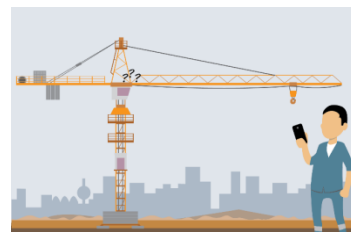
ensure skilled and qualified operators and workers around the crane



allow untrained workers onto the crane



ensure uninterrupted communication between operator and signaller/workers



lose contact between operator and signaller



Guidelines associated with the lifecycle of the crane

Planning crane
operations

Erecting
the crane

Operating
the crane

Management
of operations

Dismantling
the crane

(Dos and Don'ts)



frequently check the
weather and operate
in safe conditions



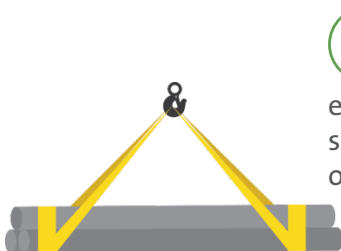
operate crane in
adverse weather
conditions



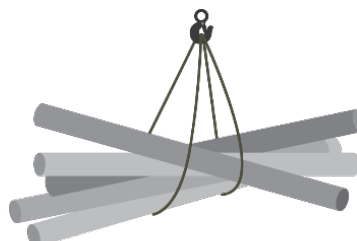
ensure load is not
directly above people
and/or structures



carry loads over areas
where workers are
below the load

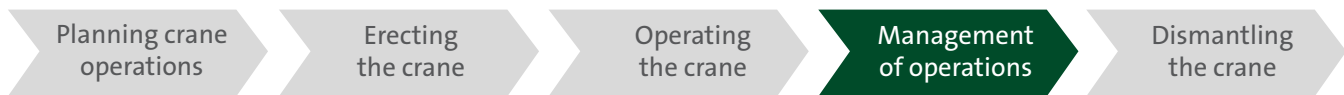


ensure stability,
solidity and steadiness
of the load

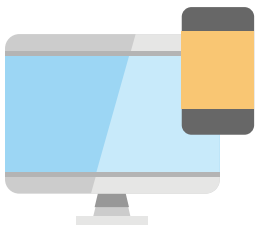


carry split or unstable
loads

Guidelines associated with the lifecycle of the crane



Part A: Management of the crane



Ensure lifting plans are communicated to all relevant management personnel



Ensure cranes are inspected on a regular basis



Ensure all safety precautions are in place and/or followed

Part B: Management of the site around the crane



Ensure a rescue/emergency plan is in place for workers in the vicinity of the crane



Provide barriers around the base of the crane to keep vehicles from colliding with it



Ensure PPE is worn by all workers on and around the crane



Guidelines associated with the lifecycle of the crane

Planning crane
operations

Erecting
the crane

Operating
the crane

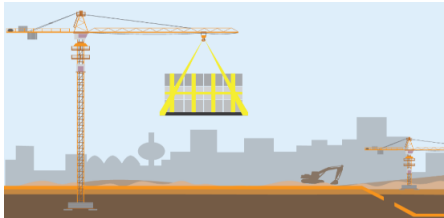
Management
of operations

Dismantling
the crane

(Dos and Don'ts)



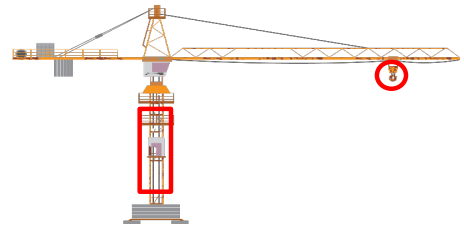
regularly check and maintain all
crane parts



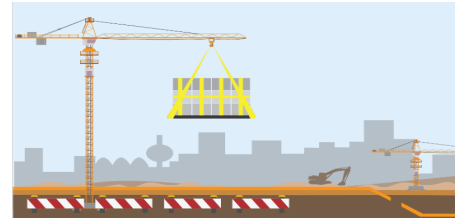
ensure sufficient available space on solid
ground before setting down the load



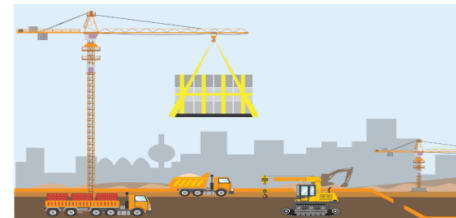
ensure that the crane base is safe from
vehicle collision and other hazards



allow damaged or unmaintained
cranes to be used

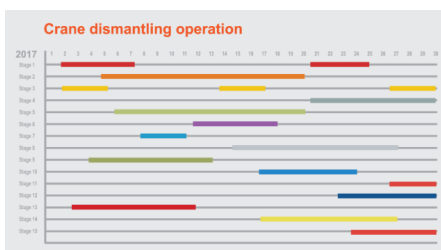
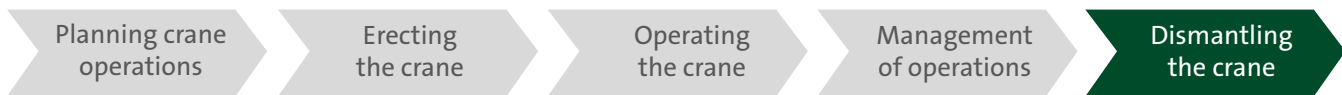


set down the load unless there is
enough space to so



allow vehicles in the area close to the
crane premises

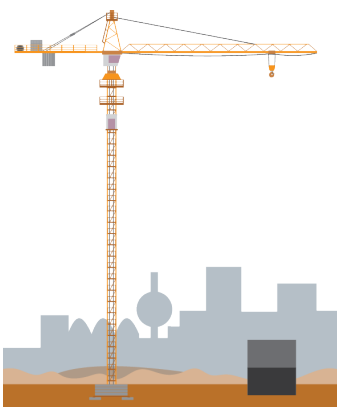
Guidelines associated with the lifecycle of the crane



Plan the dismantling process meticulously with a full risk assessment



Ensure crane is locked when not in use to prevent unauthorized access



Lower load to ground level and un-attach when crane is not in use



Guidelines associated with the lifecycle of the crane

Planning crane
operations

Erecting
the crane

Operating
the crane

Management
of operations

Dismantling
the crane

(Dos and Don'ts)



ensure stability of
the ground and its
ability to take loads
for prolonged periods
of time



leave the crane on
uneven, soft or wet
ground



ensure that the crane is
sully switched off and
locked when not in use



leave keys in the
ignition when the
crane is not in use



ensure hook is properly
stowed away at
crane idle time and is
completely dismantled
before dismantling



leave hook swinging
freely when not in use
for longer times



Ministry of Labor &
Social Development
Kingdom of Saudi Arabia



Towards Attractive Work Environment

This booklet does not eliminate, replace or substitute the current regulations and national or international standards

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