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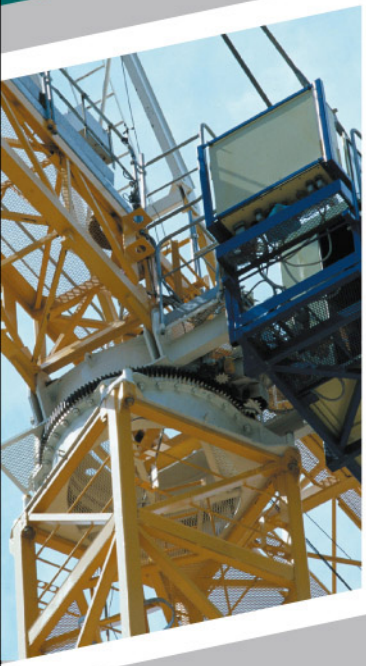

GUIDELINES ON SAFETY OF TOWER CRANES

www.hkcic.org

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Preface

The Construction Industry Council (CIC) is committed to seeking continuous improvement in all aspects of the construction industry in Hong Kong. To achieve this aim, the CIC forms Committees, Task Forces and other forums to review specific areas of work with the intention of producing Guidelines, Codes of Practice and Codes of Conduct to assist participants in the industry to strive for excellence.

The CIC appreciates that some improvements and practices can be implemented immediately whilst others may take more time to complete the adjustment. It is for this reason that three separate categories of communication have been adopted, the purpose of which is as follows:

Guidelines

These are intended to guide industry participants to adopt new standards, methodologies or practices. The CIC strongly recommends the adoption of these Guidelines by industry stakeholders where appropriate.

Codes of Practice

The CIC expects all industry participants to adopt the recommendations set out in such Codes as soon as practicable and to adhere to such standards or procedures therein at all times.

Codes of Conduct

The CIC encourages the upholding of professionalism and integrity within the industry through self discipline. The Codes of Conduct set out the relevant principles that all industry participants are expected to follow.

The Labour Department has agreed to make reference to the content of this publication when enforcing the relevant safety legislation.

If you have attempted to follow this publication, we do urge you to share your feedback with us in order that we can further enhance them for the benefit of all concerned. On this basis the CIC Secretariat is in the process of developing a “feed-back” mechanism, whereby your views can be consolidated for such purposes. With our joint efforts, we believe our construction industry will develop further and will continue to prosper for years to come.

Disclaimer

This publication is prepared by the Construction Industry Council (CIC) to report findings or promote good practices on specific subjects for reference by the industry but is NOT intended to constitute any professional advice on these or any other subjects. The parties using this publication should therefore seek appropriate advice from their professional advisers. The CIC (including its members and employees) will NOT accept responsibilities for any consequences resulting from the use of or failure to use this publication. The parties adopting the practices set out in this publication will normally be considered by the CIC in general as adopting good practices (where relevant) on the specific subjects.

Enquiries

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Guidelines on Safety of Tower Cranes

A. Purpose

This publication sets out the good practices recommended by the Construction Industry Council (CIC) for enhancing the safety of tower crane operation.

B. Definitions

2. In this document, unless the context otherwise requires –

(a) "Competent Person" means a person who is employed by a Specialist Contractor to supervise the erection, dismantling and height alteration of a tower crane;

(b) "Competent Mechanical Engineer" (CME) means a Registered Professional Engineer registered under the Engineers Registration Ordinance (Cap 409) in the Mechanical Engineering or Naval Architecture & Marine discipline;

(c) "height alteration" means climbing of a tower crane or the addition or removal of mast section to or from its main tower;

(d) "operation" means the erection, dismantling or height alteration of a tower crane;

(e) "owner" means person or company owning a tower crane and/or a derrick crane;

(f) "Principal Contractor" means any person who enters into a contract with a client organization to perform construction works;

(g) "Registered Contractor" means a person whose name is for the time being on the registers maintained under section 8A of the Buildings Ordinance (Cap 123) and is appointed to carry out building works or street works on a site;

(h) "Registered Safety Officer" means a person registered under regulation 7 of the Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations (Cap 59Z);

(i) "Project Engineer" means the "Registered Structural Engineer" whose name is for the time being on the structural engineers' register kept under section 3(3) of the Buildings Ordinance (BO); or for project(s) with exemption granted by the Building Authority from the procedures and requirements relating to the appointment of a RSE under section 4 of the BO, a competent person whose appointment is, subject to prior agreement of the Building Authority, to take up

the responsibilities and duties of a RSE; or the supervising officer of similar capacity in project(s) of the Housing Authority; or the engineer(s) as specified in the works contracts appointed to act on behalf of the client organization for the supervision and management of the works project(s) of the government departments of the Hong Kong Special Administrative Region; or any independent checking engineer(s) of similar capacity appointed by the Principal Contractor at the request of the government departments of the Hong Kong Special Administrative Region, as the case may be;

(j) "Specialist Contractor" means any person who enters into a contract with a Principal Contractor, or a subcontractor of a Principal Contractor to perform the erection, dismantling and height alteration of tower crane;

(k) "Safety Supervision Personnel" means the "Technically Competent Person of Grade T5" (TCP T5) who possesses the academic or professional qualifications and experience of building works or street works that satisfy the requirements set out in the Code of Practice for Site Supervision issued by Buildings Department for a particular type of site supervision or management tasks; or the person responsible for engineering safety supervision as specified in the works project(s) of the government departments of the Hong Kong Special Administrative Region, as the case may be.

C. Introduction

3. Tower cranes are widely used for conveying of building materials on construction sites. Given that collapse of tower crane could result in serious threats to the safety of site personnel and members of the public, organizations and individuals responsible for safety of tower cranes should take appropriate measures to assure their safety.

4. The Factories and Industrial Undertakings Ordinance ("FIUO") (Cap 59), the Factories and Industrial Undertakings (Lifting Appliances and Lifting Gear) Regulations ("LALGR") (Cap 59J) and the Occupational Safety and Health Ordinance ("OSHO") (Cap 509) impose duties on stakeholders to assure the safety of tower cranes. Furthermore, the Code of Practice on the Safe Use of Tower Crane has been published by the Commissioner for Labour under Section 7A of the FIUO providing practical guidance on selection, operation, erection and dismantling, maintenance, inspection, examination and testing of tower cranes.

5. This publication makes recommendations on the measures for further enhancing the safety of tower cranes based on the good practices suggested by the concerned industry stakeholders including tower crane owners, specialist contractors and professionals. The

Hong Kong Construction Association and the Construction Industry Council Training Academy (CICTA) also contributed on technical and administrative aspects.

6. While this publication does not have any legal effects, Labour Department has indicated that it may take non-compliances of the recommended practices into account in considering serving suspension notices under section 10 of the OSHO to the concerned Principal Contractors or Specialist Contractors. *For the avoidance of doubt, notwithstanding such intention, this publication is issued by CIC for reference by industry stakeholders only and will not constitute professional advice on tower crane operations or any other issues. The parties using this publication should therefore seek appropriate advice from their professional advisers. CIC (including its members and employees) will NOT accept responsibilities for any consequences resulting from the use of or failure to use this publication.*

D. Measures for Enhancing Safety of Tower Cranes

7. The following groups of measures are recommended for enhancing the safety of tower crane operations –

(a) checking before erection of tower cranes;
(b) improvements of site supervision;
(c) qualification and experience of Specialist Contractors; and
(d) qualification and experience of Competent Persons and workmen.

E. Checking before Erection of Tower Cranes

(i) Pre-delivery Checking

8. The owner of a tower crane should engage a CME to conduct pre-delivery checking in accordance with the procedures at Annex A before the tower crane is delivered onto the site.

9. As stipulated at Annex A, the CME should issue the following documents for the checking –

(a) Report on Pre-delivery Verification of Components with sample at Appendix A.1 to Annex A; and
(b) Report on Pre-delivery Checking with sample at Appendix A.2 to Annex A.

10. The Report on Pre-delivery Checking of Tower Crane is valid for 12 months.

(ii) Checking of anchorage

11. The anchorage of the tower crane should also be certified by a CME before the tower crane may be erected.

(iii) Checking of supporting structure

12. Where a tower crane forms part of the temporary works which may have effect on the permanent structure by way of overstressing or overloading, the Registered Contractor/ Principal Contractor is required to appoint a Safety Supervision Personnel to certify the plans, design information and/or method statement of the works which are to be submitted to the Project Engineer. The person so appointed will also certify the completion of works.

13. Where the supporting frame or bearing platform for the telescoping/climbing of a tower crane is anchored to a permanent structure, the Safety Supervision Personnel is required to certify the plans, which are to be submitted to the Project Engineer after the anchorage has been made. If the supporting frame or bearing platform of a telescoping/climbing tower crane is different from the original submission, the Safety Supervision Personnel is required to design and certify the plans on this special circumstance. After the telescoping/climbing operation, a CME is responsible for certifying the safety of the tower crane in its new position or state.

14. The supporting frame or bearing platform of the tower crane erected in H-corridor, concrete turnbuckle, river channel and at sea should follow the original design as far as possible. If the use of non-original design is necessary, the Safety Supervision Personnel is required to design and certify the plans and re-submit for verification by the Project Engineer.

15. In other cases, the Principal Contractor should, before a tower crane is erected, appoint a Safety Supervision Personnel to certify the adequacy of the design of the temporary works for supporting and anchoring the crane paying particular attention to the foundation set-up, wall ties, guy ropes and sitting structure. The assessment report should be submitted to the Principal Contractor before concreting of the foundation and supporting structures.

Derrick crane

16. Where a derrick crane is used to erect or dismantle a tower crane, the procedures in paragraphs 8 to 15 above should apply. The owner of the derrick crane should comply with the requirements for pre-delivery check of critical parts of derrick crane as set out in Annex E. In particular, where a derrick crane is supported on the roof, the adequacy of the roof for supporting the derrick crane should be assessed and certified by the Safety Supervision Personnel.

17. The Report on Pre-delivery Checking of Derrick Crane is valid for 12 months.

F. Improvements of Site Supervision

(i) Appointment of supervising engineer

18. The Principal Contractor should appoint in writing a supervising engineer with the following qualifications, experience and competences to control, monitor and supervise operations on tower cranes –

(a) an engineering degree of relevant discipline or an engineer with the qualification of RPE/ MHKIE or equivalent;

(b) not less than four years of related working experience. One year of related working experience means 1 erection, 4 telescoping/ climbing and 1 dismantling in 12 months;

(c) capability in administering the "Hold Points" on critical parts;

(d) capability in communicating with the Competent Person and the crane operator throughout the operation and is empowered to stop work if necessary; and

(e) capability to conduct a visual inspection on the parts of a tower crane to ensure that they are in good working order before commencement of any operations.

19. A supervising engineer must directly supervise on site the operations (erection, telescoping and climbing, dismantling) of tower cranes except in the period where there is no such operation. Before the commencement of tower crane operation, a debriefing session led by the supervising engineer should be held with the Competent Person, the Registered Safety Officer, the crane operator and the associated working crew to discuss the whole process of the operation and to ensure a safe system for the operation, including working procedures, checklists and programme, is properly in place. Upon completion of each operation, the supervising engineer is responsible for certifying the completion of such operation.

20. The appointment letter of supervising engineer should mention the model of tower crane at the site and its identification and site location. The appointment letter is valid on site basis. Details of appointment of the supervising engineer with his/her name and contact phone number should be clearly posted up at the prominent place near the tower crane.

(ii) Risk Assessment

21. The Principal Contractor should arrange to conduct a risk assessment in good time before the commencement of any operation on tower cranes to identify the hazards inherent in the operation and the hazards which could result from adjacent activities. The assessment should be conducted by a safety professional (e.g. a Registered Safety Officer) and Registered Professional Engineers with suitable qualification and experience in appropriate disciplines should be consulted on issues related to structural and mechanical stability. The assessment should be updated immediately before the start of the operations to take into account any changes in circumstances.

22. The Principal Contractor should formulate measures for avoiding the hazards identified in risk assessment, or where this is not possible, devise measures for minimizing their likelihood of occurrence or mitigating their consequences. These measures include –

(a) installation of fall protection system for workers working at height;
(b) suspension of work activities within an exclusion zone around the tower crane until an operation is completed;
(c) provision of personal protective equipment such as protective gloves, ear protectors and reflective vests;
(d) sufficient rest breaks;
(e) provision of proper safety training for Competent Person and workmen engaged in tower crane operations;
(f) provision of adequate lighting between floors; and
(g) employment of qualified workmen and Competent Person.

23. Chinese version of the risk assessment report should be made available on site for reference by Specialist Contractors engaged in tower crane operations.

24. The Principal Contractor and the Specialist Contractor should jointly prepare a method statement in Chinese to define the procedures of tower crane operations covering –

(a) all measures for avoiding or mitigating the hazards identified in the risk assessment;
(b) step-by-step procedures supplemented by diagrammatic illustrations;
(c) highlighting of critical hazards and safety precautions by words such as “Danger”,

"Caution" and "Hold Points";

(d) procedure and instruction on dealing with "Hold Points" of critical parts;

(e) procedures for avoiding hazards to site personnel working adjacent to the tower crane;

(f) clear statements on the role and tasks of members of the working crew; and

(g) arrangements for effective communication.

25. The guidelines for preparing reports for risk assessment are at Annex B.

(iii) Pre-installation checking

26. The Principal Contractor should check the availability of the following documents before proceeding with the erection of a tower crane or a derrick crane for dismantling a tower crane –

(a) report on verification of components referred to in paragraph 9(a) above;

(b) report on pre-delivery checking referred to in paragraph 9(b) above;

(c) report on assessment of supporting structure referred to in paragraph 15 above where applicable; and

(d) maintenance logbook recording the maintenance and inspection history of the crane.

(iv) Pre-operation checking

217. The Principal Contractor should make the following documents available before conducting any operation on a tower crane –

(a) report of the risk assessment for the operation including the method statement;

(b) records of the qualification and experience of the supervising engineer and the Competent Person responsible for the operation; and

(c) all relevant certificates of test and examination of mobile cranes and derrick cranes used in the operation.

28. Copies of risk assessment report (including the method statement) should be distributed to the Specialist Contractor who should be advised of the estimated duration of the operation and the boundaries of the exclusion zone.

(v) Pre-use Verification

29. After the completion of each operation, the Principal Contractor should engage a CME to conduct a thorough examination and a load test to verify that the tower crane is fit for use. The use of the tower crane should resume only after satisfactory completion of the verification process.

30. The anchorage of the tower crane should also be certified by a CME before the tower crane may be used.

(vi) Inspection and Maintenance

31. Principal Contractors should engage inspection and maintenance technician(s) holding "the Training Certificate of Routine Inspection and Maintenance of Tower Cranes" to perform inspection and maintenance for the tower crane(s) erected on construction site at least once a month. The inspection and maintenance results should be properly kept under an inspection and maintenance form for record. The qualifications and the responsibilities of inspection and maintenance technicians are stipulated under Annex F.

G. Qualification and Experience of Specialist Contractors

32. Principal Contractors should only engage competent Specialist Contractors registered on the specialty of "Erection, dismantling and climbing" (Code 4.1.1) of the Tower Crane trade of the Voluntary Subcontractor Registration Scheme (the VSRS) administered by CIC to execute tower crane operations. Specialist Contractors should possess relevant experience and sufficient technical capability and directly employ at least one (1) Competent Person and three (3) Senior Workmen with appropriate skills and experience. Specialist Contractors should comply with the basic requirements as stipulated under Annex G. In addition, Specialist Contractors should provide the information as listed under Annex G for submission under the VSRS application or for reference by the Principal Contractors on a voluntary basis.

33. A Specialist Contractor should be able to understand the method statement for tower crane operations and to explain the details to his working crew including a full explanation on the risks associated with improper working procedures and those safety hints and precautions set out in the warning/attention sections of the method statement marked "Cautions", "Danger" or "Hold Points".

H. Qualification and Experience of Competent Persons and Workmen

34. Specialist Contractors should employ Competent Persons and workmen with appropriate qualifications, training and experience for performing all operations on tower cranes taking into account the requirements set out at Annex C.

35. The manufacturer or his local agent should organize familiarization training on tower cranes for Competent Persons.

36. The representative of manufacturer, local agent of the tower crane or any other personnel who have received training from tower crane manufacturer may provide training on operations of the same model series of the tower crane to competent persons.

I. Summary of Recommendations

37. The improvement measures recommended in the foregoing paragraphs are summarized at Annex D together with the corresponding implementing parties.

Annex A

Procedures for Pre-Delivery Checking

Purpose

This Annex sets out procedures for pre-delivery checking of tower cranes.

Engagement of CME

2. The owner of a tower crane should engage a CME to conduct a pre-delivery checking of the tower crane before its erection on site.

Provision of Documents by the Owner

3. The owner should provide the following information to the CME –

(a) origins of parts and components - written confirmation that all parts and components are identical or equivalent to the tower crane manufacturer's original equipment parts and components;

(b) unique identification of parts and components - unique identification to all main structural parts, motors, gearboxes and braking systems of tower cranes to be used when referring to components in reports for inspection and testing, and certifications for repairs and modifications; (A sample list is included at Appendix A.1.)

Unique identification will not be required for pins and bolts used for connecting main structural parts if systems are in place for separating those that have passed non-destructive tests from the others. However, if the crane manufacturer specifies any limitations on the usage of the pins and bolts (e.g., with useful life based on the number of uses, etc.), unique identifiers should be provided;

(c) verification checklist – listing the main components making up the tower crane to help in verifying that these main components conform to the manufacturer's specifications;

(d) relevant sections from the user manual - to demonstrate conformance of parts and components with the manufacturer's specifications;

(e) maintenance logbook - details of the most recent repair and maintenance work performed on the critical parts as listed below –

(i) main structural parts;

(ii) motors;

(iii) gearboxes;

(iv) braking systems;

(v) slewing ring mounting bolts; and

(vi) other information requested by the CME.

(f) In the absence of any previous maintenance logbook for imported tower cranes, certifications of fitness for use from previous owners and thorough examinations for the tower cranes by CME should be obtained.

Checking by CME

4. The CME should conduct pre-delivery checking of the critical parts of a tower crane before it is delivered to the construction site by making appropriate reference to the information provided by the owner. A checklist illustrating the possible scope of the checking is at Appendix A.2. As the checklist is for illustration only and is not meant to be exhaustive, the CME should verify its applicability and validity by making reference to manufacturer's specifications and manual of the specific tower crane and other relevant information.

5. If the operation manual of tower cranes stipulates any specific standard of hardware (e.g. wires, clips, bolts and nuts) such as British Standards and the standard is specified on the hardware; or any laboratory can prove that the non-original hardware reaches the standard as specified in the operational manual, the use of tower crane hardware may be accepted. On the contrary, where there is no indication of the standards and specifications of hardware in the operation manual, no production or imitation on the hardware is allowed. The aforesaid only refers to hardware of tower cranes, excluding any structural parts.

6. In addition, tower crane components after repair by welding must be inspected by CME followed by the issue of an Inspection Report before use.

7. A pre-delivery checking and issuance of Report on Pre-delivery Checking by CME is required for the additional mast sections used for mast height alteration and any replacement motors for the telescopic cage.

8. The results of the pre-delivery checking on a telescopic cage by a CME should make reference to the tower crane for which the telescopic cage will be used. The Report on Pre-delivery Checking of Telescopic Cage is also valid for 12 months, including the period for which the telescopic cage is stored at the workshop and re-delivered to the site for use.

9. The telescopic cage can also be used for other tower cranes on the same site provided that a copy of the existing Report on Pre-delivery Checking of Telescopic Cage is attached with the Report on Pre-delivery Checking of Tower Crane for the other tower cranes. If the telescopic cage is transferred to another construction site, a further pre-delivery checking and issuance of Report on Pre-delivery Checking of Telescopic Cage by CME will be required.

Non-destructive Tests

10. The non-destructive tests on the critical components including bolts and pins and welded connections should be conducted by qualified personnel. All bolts and pins (i.e., 100%) used for connecting main structural parts should be tested. Items with cracks should be replaced.

11. When new pins, bolts and nuts produced by original manufacturers for first-time use are provided with original manufacturer's certification, the CME could determine whether non-destructive test is required for such parts; however, the CME is still required to prepare the Report on Pre-Delivery of Checking. Non-destructive test such as visual check and dye check is recommended for used structural parts such as nuts. For bolts connecting panels of a mast section, no non-destructive test is required on such bolts.

12. The CME should prescribe the non-destructive tests to be conducted on welded connection based on the result of visual inspection of critical parts. The CME should decide on the need to conduct non-destructive tests to new cranes or to used cranes. For critical parts over 15 years old or of unconfirmed age, the minimum amount of welded connections to be tested should be 10%. A higher percentage may be specified by the CME where deemed necessary (e.g. due to a history of cracking).

13. If cracks are detected on any component, then all remaining welded connections on that component should be tested. Components with cracks should be replaced or repaired in accordance with the manufacturer's specifications, and should be inspected by the CME.

14. All non-destructive test reports should be forwarded to the CME for review.

Appendix A.1

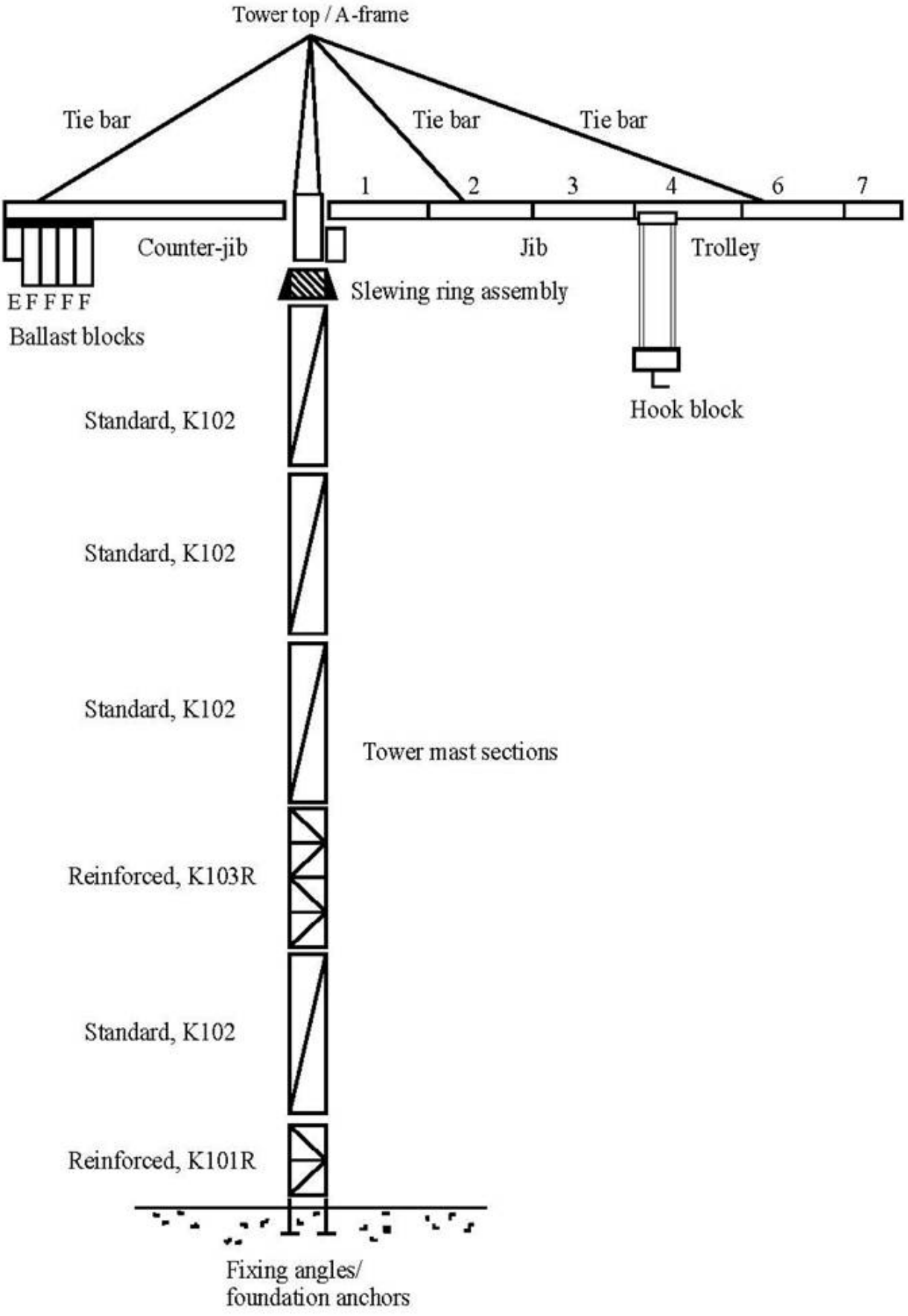
Sample Verification Checklist

1. Particulars of Tower Crane

Site details	:	Block 1, 88 ABC road, Kowloon Tong
Site identification	:	TC1
Make	:	ABC
Model	:	TX100
Jib length	:	55m
Mast height	:	28.2m
Hook height	:	30.7m
Serial No.	:	123456
Year	:	2007

(Note : The checklist is by no means exhaustive. Owners should examine its applicability and validity by making reference to manufacturer's specifications and manual of the specific tower crane.)

2. Manufacturer Specifications



I have verified that the following main components and critical parts making up the tower crane conform to the manufacturer's specifications as follows:

Item	Main components	Qty	Owner's identification	Manufacturer's code	Main dimensions	Year	Remarks
1	Fixing angles / anchors	4	F1, F2, F3, F4	Q200	200mm high	2007	Non- reusable
2	Tower base undercarriage / chassis	Nil					
3	Tower mast sections	1	M1	K103R	1.6m x 1.6m x 5m high	2007	Reinforced
		4	M2, M3, M4, M5	K102	1.6m x 1.6m x 5m high	2007	Standard
		1	M6	K101R	1.6m x 1.6m x 3m high	2007	Base section, reinforced
4	Slewing ring assembly	1	M1	S300		2007	Reinforced
5	Tower top / A-frame	1	T1	A202	5m high	2007	
6	Counter-jib	1	C1	C204	12m	2007	
7	Jib	5	J1,J2,J3,J4,J6	1,2,3,4,6	10m long	2007	
		1	J7	7	5m long	2007	
8	Ballast blocks	4	B1,B2,B3,B4	Type F	4mx2mx0.3m thk	2007	4 tonnes each
		1	B5	Type E	2mx2mx0.3m thk	2007	2 tonnes each
9	Wire drum	1	WD1		Φ500mm drum	2007	Hoisting
		1	WD2		Φ200mm drum	2007	Trolley
10	Hook block	1	H1			2007	4-fall
11	Trolley	1	T1			2007	4-fall
12	Telescopic cage	1	TC1			2007	

Date of Verification: _____ Signature: _____

Date of This Report: _____ Name of CME: _____

Registered Professional Engineer (RPE) Reg. No.: _____

Appendix A.2

Scope of the Pre-delivery Checking

Report reference :

Report date :

PRE-DELIVERY CHECKING OF CRITICAL PARTS

FOR TOWER CRANE

(Note: The checklist shown in this report is by no means exhaustive. CME should examine its applicability and validity by making reference to manufacturer's specifications and manual of the specific tower crane.)

Inspected by

_____

Name of Competent Mechanical Engineer (CME) :

Registered Professional Engineer (RPE) Registration No. :

Date of Checking :

CONTENTS

1. INTRODUCTION

This report presents details of the pre-delivery checking carried out on the critical parts of the tower crane before they are delivered to a construction site.

2. PARTICULARS OF TOWER CRANE

Tower crane owner	:
Checking location	:
Site address	:
Site identification	:
Make	:
Model	:
Jib length	:
Mast / hook height	:
Serial No.	:
Year	:

3. VISUAL INSPECTION

Visual inspection was carried out to check the state of the critical parts listed in Sections 3.1 and 3.2.

(Note: Visible damage includes cracking, deformation, corrosion, wear and abrasion)

Critical parts	Acceptance criteria	Condition acceptable Yes	No	Remarks

3.1 Main structural parts

(a) Fixing angles / foundation anchors	No visible damage affecting safety	☐	☐	
(b) Tower base undercarriage / chassis				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Connection pins / bolts	No visible damage affecting safety	☐	☐	
(c) Tower mast sections				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Connection pins / bolts	No visible damage affecting safety	☐	☐	
(d) Slewing ring assembly				
Structural frame	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Slewing ring mounting bolts	No visible damage affecting safety	☐	☐	
(e) Tower top / A-frame				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Connection pins / bolts	No visible damage affecting safety	☐	☐	
(f) Counter-jib				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Tie bars	No visible damage affecting safety	☐	☐	
Connection pins	No visible damage affecting safety	☐	☐	
(g) Jib				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Tie bars	No visible damage affecting safety	☐	☐	
Connection pins	No visible damage affecting safety	☐	☐	

Critical parts	Acceptance criteria	Condition acceptable Yes	No	Remarks

3.2 Accessories

(a) Ballast blocks				
Undercarriage / chassis	No visible damage affecting safety	☐	☐	
Counter-jib	No visible damage affecting safety	☐	☐	
(b) Pulleys	No visible damage affecting safety	☐	☐	
(c) Wire drums				
Hoisting	No visible damage affecting safety	☐	☐	
Trolley	No visible damage affecting safety	☐	☐	
Luffing	No visible damage affecting safety	☐	☐	
(d) Wire ropes				
Hoisting	No visible damage affecting safety	☐	☐	
Trolley	No visible damage affecting safety	☐	☐	
Luffing	No visible damage affecting safety	☐	☐	
(Note: Acceptance criteria shall include any special recommendations from the manufacturer)				
(e) Hook block	No visible damage affecting safety	☐	☐	
(f) Trolley	No visible damage affecting safety	☐	☐	
(g) Collars				
Climbing collars for floor climbing	No visible damage affecting safety	☐	☐	
Climbing ladders for floor climbing	No visible damage affecting safety	☐	☐	
Wall tie collars for telescoping	No visible damage affecting safety	☐	☐	
Hydraulic assembly	No visible damage affecting safety	☐	☐	
(h) Telescopic cage				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Connection pins / bolts	No visible damage affecting safety	☐	☐	
Hydraulic assembly	No visible damage affecting safety	☐	☐	

4. DIMENSIONAL CHECKING

Measurement of the pin and hole diameter for pinned connections was carried out to check for out-of-tolerance against the manufacturer's recommendations.

Critical parts	**Acceptance criteria**	**Condition acceptable**	
		Yes No	**Remarks**
(a) Mast section connections			
Pin diameter	As per manufacturer's recommendations	☐ ☐	_____
Hole diameter	As per manufacturer's recommendations	☐ ☐	_____
(Note: Connections with fixing angles / foundation anchors, between adjoining mast sections, and with slewing ring support)			
(b) Jib section connections			
Pin diameter	As per manufacturer's recommendations	☐ ☐	_____
Hole diameter	As per manufacturer's recommendations	☐ ☐	_____
(Note: Connections between adjoining jib sections)			
(c) Tie bar connections			
Pin diameter	As per manufacturer's recommendations	☐ ☐	_____
Hole diameter	As per manufacturer's recommendations	☐ ☐	_____
(Note: Connections between adjoining tie bars, and with fixing plate)			

5. REVIEW OF MAINTENANCE LOGBOOK

The repair and maintenance record prepared by the tower crane owner should include details of work performed on the following critical parts.

Critical parts	Acceptance criteria	Condition acceptable		
		Yes	No	Remarks
(a) Main structural parts	As per manufacturer's instructions	☐	☐	
(b) Motors				
Hoisting	As per manufacturer's instructions	☐	☐	
Slewing	As per manufacturer's instructions	☐	☐	
Trolley	As per manufacturer's instructions	☐	☐	
Luffing	As per manufacturer's instructions	☐	☐	
(c) Gearboxes				
Hoisting	As per manufacturer's instructions	☐	☐	
Slewing	As per manufacturer's instructions	☐	☐	
Trolley	As per manufacturer's instructions	☐	☐	
Luffing	As per manufacturer's instructions	☐	☐	
(d) Braking systems				
Hoisting	As per manufacturer's instructions	☐	☐	
Slewing	As per manufacturer's instructions	☐	☐	
Trolley	As per manufacturer's instructions	☐	☐	
Luffing	As per manufacturer's instructions	☐	☐	
(e) Slewing gear mounting bolts				
Tightening torque	As per manufacturer's instructions	☐	☐	

6. SUMMARY OF FINDINGS

6.1 Critical parts inspected

☐ All critical parts inspected are in acceptable condition, and are considered suitable for site installation.

☐ The critical parts listed below are **not** in acceptable condition, and are required to be replaced or repaired in accordance with the manufacturer's specifications. The replaced or repaired parts are required to be further inspected by a CME when they become available.

	Critical part	**Details of non-conformance**
(a)	_____	_____
(b)	_____	_____
(c)	_____	_____

6.2 Maintenance logbook

☐ Record of repair and maintenance work performed on the critical parts is available.

☐ Record of repair and maintenance work performed on the following critical parts is **not** available. When all the outstanding repair and maintenance work have been performed, the relevant record should be updated by the owner and further reviewed by a CME.

	Critical part
(a)	_____
(b)	_____
(c)	_____

6.3 Non-destructive test reports

(a) Bolts and pins

Non-destructive test report for bolts and pins used for connection of main structural parts is available to confirm that they are in acceptable conditions.

☐ Yes ☐ No

Remarks: _____

_____

(b) Welded connections

Non-destructive test report for welded connections is available to confirm that they are in acceptable conditions.

☐ Yes ☐ No

Remarks: _____

_____

Annex B

Report for Risk Assessment

Purpose

This Annex sets out the guidelines for reporting on risk assessment for tower crane operations.

Overview

2. A report for risk assessment should consist of the following sections –
   (a) introduction;
   (b) hazard assessment;
   (c) method statement;
   (d) record of key personnel; and
   (e) manufacturer's manual for tower crane.

(A) Introduction

3. This section should cover –
   (a) purpose of the risk assessment report;
   (b) scope and detailed description of the project; and
   (c) operations covered by the report.

(B) Hazard assessment

4. This section should cover the hazards identified taking into account all relevant matters including –
   (a) preparation work
      - deployment of crew for work supervision;
      - checks on the suspension points of various accessories (items should be specified);
      - checks on the lifting appliances and lifting gears (items should be specified);

- operating frequencies of walkie-talkies;
- checks on hand tools and fall arresting stripes;
- checks on full body harness;
- location of the exclusion zone;
- checks on personal protective equipment;
- storage of material;
- safety training;
- wind speed monitoring and the maximum allowable wind speed; and
- arrangement of the control ropes;

(b) work commencement procedures specifying the potential risk and mitigation measures of all procedures;

(c) work completion procedures including tests, examination and certification; and

(d) contingency plan for emergencies.

5. A sample hazard analysis is included at Appendix B.1 for reference.

(C) Method statement

6. The method statement should be drawn up in consultation with the Competent Person, the Registered Safety Officer and other persons concerned and should clearly define the procedures for every step of the operations. It should be issued to the working crew for effective compliance with the prescribed procedures.

7. The method statement should include –

(a) details of the construction site and construction works including a site layout plan;

(b) general safety measures for the works;

(c) pre-construction plan;

(d) operating procedures with key points illustrated by diagrammatic illustrations;

(e) personal protective equipment; and

(f) safety measures for the operation.

8. Example of a site layout plan is included at Appendix B.2 while a sample method statement for dismantling of tower crane is at Appendix B.3.

(D) Personal particulars of crew members

9. This section should list the personal particulars of –

   (a) staff responsible for drawing up the method statement;

   (b) members of the working crew –

      (i) Competent Person;

      (ii) senior workmen; and

      (iii) junior workmen.

10. Personal particulars should include the following –

   (a) name of the person;

   (b) position held;

   (c) qualifications held (including certificates issued in accordance with statutory provisions); and

   (d) year of experience.

11. A sample of personal particulars is at Appendix B.4.

(E) Manufacturer's Manual

12. Contractor should enclose a copy of the manufacturer's manual in the risk assessment report.

Appendix B.1

Report of Hazard Analysis for Addition of Mast to Tower Crane
ABC Construction Company

SAMPLE

Safety : xxxxxx
Revision : 3
Date :

Findings of Analysis into Works Hazards

Description of work	:	Addition of mast to heighten a tower crane		Location of Operation	:	
Post of operator	:	Tower Crane Operator of XX				
Members of Hazard Analysis Group	:	xxx (Superintendent), xxx (Representative of XX), xxx (Quality Control Manager) xxx (Chief Mechanic) and xxx (Safety Officer)		Date of Analysis	:	
Reviewed by	:	xxx Superintendent (Vetting)	Recorded by xxx (Safety Officer)	Date of Review	:	
Personal Protective Equipment Required	:	Safety Harness NH60/Sala / P+P, Fall Arrestor FUJII DENKO, Mask 3M 8210 N95, Ear Plug 3M EP1250, Eye Goggles UVEX 9161-014, Safety Helmet Centurion 1100, Safety Boots				

Basic Operation Procedure	Existing and Potential Hazard	Entities being affected	Possibility(P)	Hazard Level(C)	Risk Level	Mitigation Measures	Residual Risk Level	Action
		Workers(W)	Very Possible(5)	Mild(1)	P*C			
		Public(P)	Possible(4)	Affected(2)				
		Environment(E)	May be Possible(3)	Serious(3)				
		Asset(A)	Slimly Possible(2)	Disastrous(4)				
			Impossible(1)					
(1) Preparation Work								
Item 1.1	Item 1.1					Item 1.1		
Formulation of safe working procedure on the addition of mast to tower crane.	Danger caused by non-specific working procedure. (Potential danger: Danger triggered because of no works statement was prepared or works statement being inappropriate)	W,A	4	3	12	Representative of XX draws up works hazard analysis, risk control measures and works programme together with QCM, Chief Mechanic, Superintendent and Safety Officer.	9(3x3)	QCM/SO Superintendent /Chief Mechanic
Item 1.2	Item 1.2					Item 1.2		
Staffing arrangement for dedicated personnel to monitor the addition of mast to tower crane.	Unclear or inadequate definition by monitoring officer triggers danger. (Potential danger: Danger triggered because monitoring officers are not at site to monitor the addition of chassis to mast)	W,A	4	3	12	XX appoints experienced works supervisor to monitor all procedures of the addition of mast to tower crane. (the supervising officer is XXX/XXX/XXX)	9(3x3)	

Item 1.3	Item 1.3					Item 1.3		
Examination of every hanging point. (such as ballasts etc.) (It is necessary to specify which hanging points are included.)	There is the danger that an accessory may fall during the process of hoisting. (Potential danger: defects of hanging points may lead to falling.)	W,A	4	3	12	Works Supervisor to check all hanging points are fit before assigning workers to carry out proper hoisting.	9(3x3)	
Item 1.4	Item 1.4					Item 1.4		
Inspect all lifting appliances and lifting gears. (It is necessary to specify which lifting appliances and lifting gears are included.)	Hoisting may lead to the falling of materials. (Potential danger: hoisting danger occurs because lifting gears have not been inspected by public surveyor or they are in poor conditions.)	W,A	4	3	12	Works Supervisor to check that lifting gears and cranes have been issued with certificates of inspection and are in good condition before proceeding to works procedures.	9(3x3)	
Item 1.5	Item 1.5					Item 1.5		
Frequency channel of walkie-talkie.	Danger occurs during hoisting of material and communication. (Potential danger: poor reception leads to danger.)	W,A	4	3	12	Works Supervisors are responsible for ensuring the proper reception of walkie-talkie.	9(3x3)	
Item 1.6	Item 1.6					Item 1.6		
Inspection of hand tools and fall arrest strips.	Hand tools may fall down. (Potential danger: such as tools slipping from hand when in use may fall down.)	W,A	4	3	12	Works Supervisors are responsible for ensuring all hand tools are tied to fall arrest strips.	9(3x3)	
Item 1.7	Item 1.7					Item 1.7		
Inspection of full body harness.	Potential danger of fall of person. (Potential danger: irregularity of full body harness or failure to use full body harness may lead to fall of person.)	W,A	4	3	12	Works Supervisors are responsible for a pre-works procedure inspection to ensure full body harnesses are proper and to supervise workers to use them during the works procedure. Also to instruct workers to use the harnesses properly before any works procedure.	9(3x3)	
Item 1.8	Item 1.8					Item 1.8		
Fencing-off of site. (It is necessary to specify the location.)	Affect workers at lower working area. (Potential danger: danger occurs because of improper fencing-off of site or there are workers working at lower working area.)	W,A	4	3	12	Foremen, Chief Mechanic and Works Supervisor are jointly responsible for determining the area to be fenced off. Works Supervisor is to send someone to guard against workers of other trades getting into the crane erection area.	9(3x3)	Foreman

Basic Operation Procedure	Existing and Potential Hazard	Entities being affected	Possibility(P)	Hazard Level(C)	Risk Level	Mitigation Measures	Residual Risk Level	Action
		Workers(W)	Very Possible(5)	Mild(1)	P*C			
		Public(P)	Possible(4)	Affected(2)				
		Environment(E)	May be Possible(3)	Serious(3)				
		Asset(A)	Slimly Possible(2)	Disastrous(4)				
			Impossible(1)					
Item 1.9	Item 1.9					Item 1.9		
Inspection of personal protective equipment (PPE).	PPE cannot fully perform its protection function. (Potential danger: improper PPE can not perform its protective function or improper use of PPE by worker may lead to danger.)	W,A	4	3	12	Works Supervisor to inspect PPE before assigning work and to instruct workers of the proper use of it.	9(3x3)	
Item 1.10	Item 1.10					Item 1.10		
Placing of materials.	Improper placing of materials triggers danger. (Potential danger: such as material obstructing passage, tall stacking and insecure placing, etc.)	W,A	3	3	9	Works Supervisor and Foreman to jointly work out the arrangement for placing of materials and to choose a suitable and secure place for the placing of materials. To instruct and supervise workers to place materials suitably and less than 2 metres high.	6(3x3)	Foreman
Item 1.11	Item 1.11					Item 1.11		
Safety training.	Inadequate training of workers leads to danger. (Potential danger: Inadequate hazard awareness of worker leads to danger.)	W	4	3	12	Works Supervisor to arrange training for workers before works procedures commence, including manual handling work.	9(3x3)	
Item 1.12	Item 1.12					Item 1.12		
Monitoring of wind speed. (It is necessary to specify the greatest wind allowable.)	Wind speed exceeding 62 km per hour will result in danger. (Potential danger: The turning of chassis and insecure hoisting may result in danger.)	W,A	4	3	12	Works Supervisor and Chief Mechanic are responsible for monitoring. (Receiving weather report) when wind speed exceeds 62 km per hour, operation of tower crane should be stopped immediately.	9(3x3)	
Item 1.13	Item 1.13					Item 1.13		
Arrangement for control rope.	Collision of objects endangers workers. (Potential danger: Inadequate and improper control rope may lead to danger in hoisting.)	W,A	4	3	12	Works Supervisor to arrange adequate and suitable control rope and monitor the use of it.	9(3x3)	

(2) Commencing works procedure								
(Erection of telescopic cage)								
Item 2.1	Item 2.1.1					Item 2.1.1		
Use the tower crane and two long chain slings and two short chain slings to hoist the telescopic cage to the mast at the bottom of chassis and then open the door of the telescopic cage. After fixing it to the mast at the bottom of chassis, use lifting gear to adjust the door of the telescopic cage and fix it properly, and then hammer the pins until they are firm, so that the telescopic cage is firmly fixed on the mast. Jack up the telescopic cage to the position of the chassis and then secure the 4 pins of the telescopic cage to the bottom of the chassis. After that remove the hook and connection wire.	Potential danger of fall of person ~1. (Potential danger: As workers work on the mast of the tower crane, there is the danger of fall of person.)	W,A	4	3	12	Works Supervisor to instruct workers to fix the full body harness firmly with fall arrestor before starting the works procedure.	9(3x3)	
						Works Supervisor to check if the access leading up and down is secure and suitable.		
	Item 2.1.2					Item 2.1.2		
	Potential danger of load falling down~1. (Potential danger: Inappropriate hanging point of telescopic cage or unsuitable hoisting device may lead to the danger of load falling down.)	W,A	4	3	12	Works Supervisor to ensure the hanging point is proper before assigning workers with rigging certificate and experience to carry out rigging and lifting operation.	9(3x3)	
						Works Supervisor to fence off the lower working area before works procedures commence.		
						Works Supervisor to check the valid certificates of all lifting devices and to ensure all lifting devices are in good condition by visual inspection.		
	Item 2.1.3					Item 2.1.3		
	Potential danger of falling of tools~1. (Potential danger: hand tools slipping from hand may fall down.)	W,A	4	3	12	Works Supervisor to instruct and monitor workers to use fall arrest strips to prevent hand tools from falling.	9(3x3)	
Item 2.2	Item 2.2.1					Item 2.2.1		
To install two monorails at the bottom of chassis and use the tower crane to fix the trolley on the monorail. When the telescopic cage is installed at the bottom of chassis, lift counter-jib to balance the tower crane.	Potential danger of fall of person~1. (Potential danger: As workers work on the mast of the tower crane, there is the danger of fall of person.)	W,A	4	3	12	Works Supervisor to instruct workers to fix the full body harness firmly with fall arrestor before starting the works procedure.	9(3x3)	
	Item 2.2.2					Item 2.2.2		
	Potential danger of load falling out~1. (Potential danger: Inappropriate rigging method of monorail or unsuitable hoisting device may lead to danger of load falling down.)	W,A	4	3	12	Works Supervisor to ensure the rigging method of monorail is appropriate before assigning workers with rigging certificate and experience to carry out rigging and lifting operation.	9(3x3)	

Basic Operation Procedure	Existing and Potential Hazard	Entities being affected	Possibility(P)	Hazard Level(C)	Risk Level	Mitigation Measures	Residual Risk Level	Action
		Workers(W)	Very Possible(5)	Mild(1)	P*C			
		Public(P)	Possible(4)	Affected(2)				
		Environment(E)	May be Possible(3)	Serious(3)				
		Asset(A)	Slimly Possible(2)	Disastrous(4)				
			Impossible(1)					
						Works Supervisor to fence off the lower working area before works procedures commence.		
						Works Supervisor to check the valid certificates of all lifting devices and to ensure all lifting devices are in good condition by visual inspection.		
	Item 2.2.3					Item 2.2.3		
	Potential danger of falling of tools~1. (Potential danger: hand tools slipping from hand when in use may fall down.)	W,A	4	3	12	Works Supervisor to instruct and monitor workers to use fall arrest strips to prevent tools from falling.	9(3x3)	
	Item 2.2.4					Item 2.2.4		
	Potential danger of fall of ballasts~1. (Potential danger: Inappropriate rigging point may lead to falling during hoisting)	W,A	4	3	12	Works Supervisor to assign workers with rigging certificate to carry out hoisting procedures.	9(3x3)	
						To instruct worker of the proper rigging method before works procedures commence.		
						To ensure rigging operator possesses relevant crane operation certificates and all lifting devices are in good condition and to check that they can be used.		
	Potential danger of fall of ballasts~2. (Potential danger: inappropriate hanging point may lead to fall during hoisting.)	W,A	4	3	12	Ganger to check that the hanging points of ballests are proper before hoisting them.	9(3x3)	

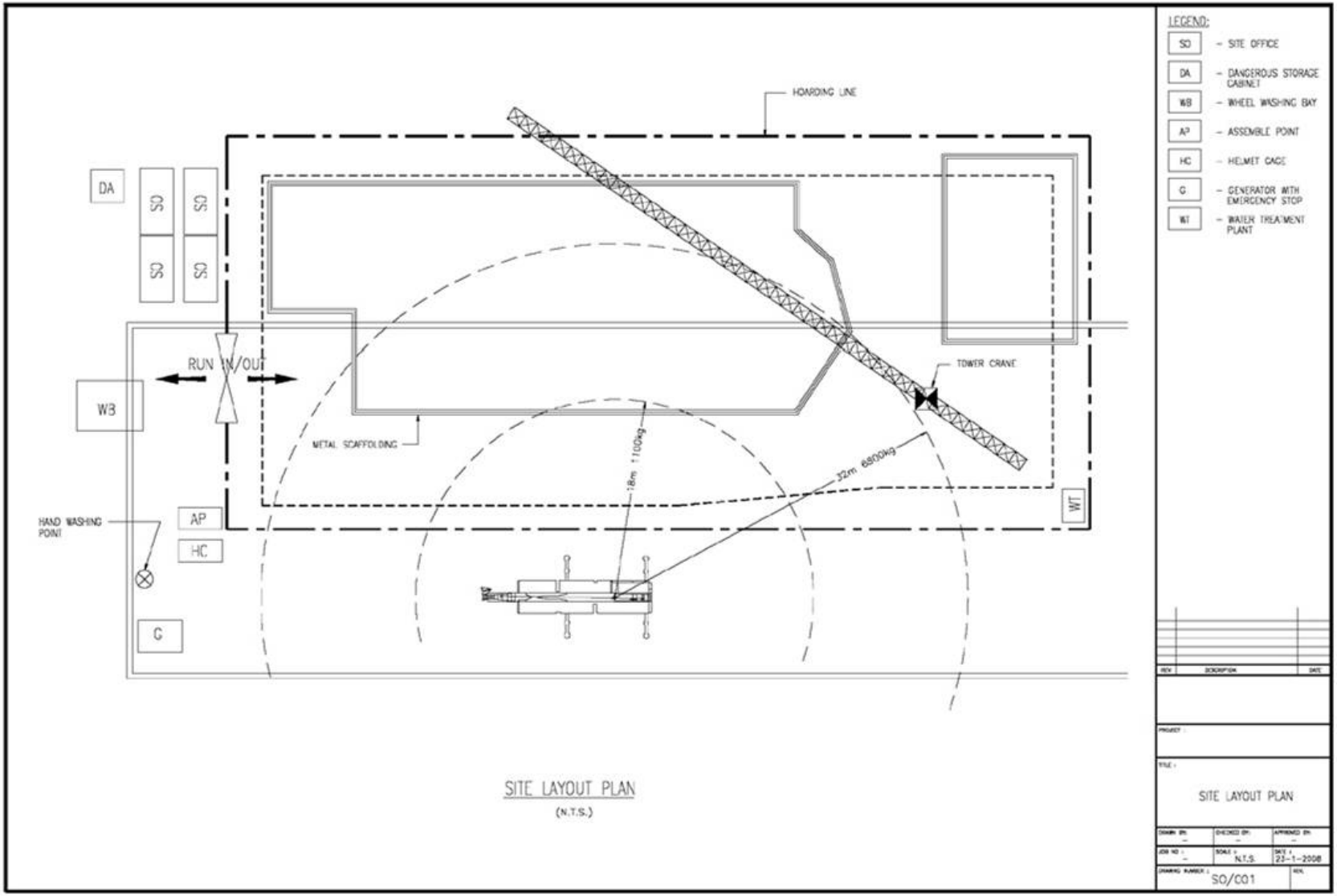
						Works Supervisor to ensure chain slings are checked and are issued with valid certificate and are suitably locked before assigning experienced workers with rigging certificate to carry out rigging procedure.		
Item 2.3	Item 2.3.1					Item 2.3.1		
When the tower crane is balanced, hammer out the 8 pins at the bottom of the chassis and jack up the part of tower crane above the chassis until the two temporary supporting wedges can be laid on the shackle of the mast, and then slightly lower the tower crane so that it is firmly supported. Use hydraulic jack to jack up the tower crane. Use tower crane to hoist monorail to the position of the mast and put the mast into the telescopic gear. Hammer the 8 groups of pins at the bottom of chassis until they are firm enough and then hammer the 4 groups of pins joining the mast until they are firm enough. The telescoping procedure of tower crane is completed.	Potential danger of fall of person~1. (Potential danger: As workers work on the mast of the tower crane, there is the danger of fall of person.)	W,A	4	3	12	Works Supervisor to instruct workers to fix the full body harness firmly with fall arrestor before starting the works procedure.	9(3x3)	
	Item 2.3.2					Item 2.3.2		
	Potential danger of pin falling out~1. (Potential danger: Inappropriate hammering of pin or unsuitable hoisting device may lead to fall down of pin.)	W,A	4	3	12	Works Supervisor to instruct and monitor worker to hold pins firmly before putting them in the correct position and to start the procedure of hammering when they are firm.	9(3x3)	
						Works Supervisor to fence off the lower working area before works procedures commences.		
	Item 2.3.3					Item 2.3.3		
	Danger of tower crane falling~1. (Potential danger: Inappropriate installation of shackle may lead to the fall of tower crane.)	W,A	4	3	12	Works Supervisor to check shackle is properly installed before assigning workers to commence the tower crane telescoping procedure.		
	Item 2.3.4					Item 2.3.4		
	Danger of tower crane falling~2. (Potential danger: Inappropriate installation of temporary support wedges may lead to the fall of tower crane.)	W,A	4	3	12	Works Supervisor to check the wedges are properly installed before assigning workers to commence the tower crane telescoping procedure.	9(3x3)	
(Dismantling of telescopic cage.)								
Item 2.4	Item 2.4.1					Item 2.4.1		
When the tower crane has climbed to the appropriate height, lower the telescopic cage until it sits firmly on the mast, and then hammer out	Potential danger of fall of person~1. (Potential danger: As workers work on the mast of tower crane there is the danger of fall of person.)	W,A	4	3	12	Works Supervisor to instruct workers to fix the full body harness firmly with fall arrestor before starting the works procedure.	9(3x3)	

Basic Operation Procedure	Existing and Potential Hazard	Entities being affected	Possibility(P)	Hazard Level(C)	Risk Level	Mitigation Measures	Residual Risk Level	Action
		Workers(W)	Very Possible(5)	Mild(1)	P*C			
		Public(P)	Possible(4)	Affected(2)				
		Environment(E)	May be Possible(3)	Serious(3)				
		Asset(A)	Slimly Possible(2)	Disastrous(4)				
			Impossible(1)					
the 8 groups of pins at the bottom of chassis and dismantle the telescopic cage with the following procedure: 1. Use wires to secure the gate of the telescopic cage and dismantle the gate. 2. Secure two groups of two long and two short chain slings to four appropriate positions and hammer out the four groups of pins each at the chassis and the four corners of the mast. 3. Use wires to secure the telescopic cage. 4. Retrieve the shackle and loosen the hydraulic jack. 5. Use chain slings to pull out the telescopic cage along the monorail and hoisthe telescopic cage back to the ground. (Remark: Other method of dismantling the telescopic cage can also be used.)	Item 2.4.2					Item 2.4.2		
	Potential danger of pin falling down~1. (Potential danger: Inappropriate hammering of pins or unsuitable hoisting devices may lead to danger of pins falling down.)	W,A	4	3	12	Works Supervisor to instruct and monitor worker to hold pins firmly before putting them in the correct position and to start the procedure of hammering when they are firm.	9(3x3)	
						Works Supervisor to fence off the lower working area before works procedures commence .		
	Item 2.4.3					Item 2.4.3		
	Potential Danger of telescope cage falling~1. (Potential danger: Inappropriate installation of monorail may lead to falling of the mast.)	W,A	4	3	12	Works supervisor to check the monorail is secure before proceeding.	9(3x3)	
						Works Supervisor to fence off the lower working area before works procedures commence.		
						Works Supervisor to check the valid certificates of all lifting devices and to ensure all lifting devices are in good condition by visual inspection.		
						Works Supervisor to ensure the telescopic cage has been secured with wires.		
	Item 2.4.4					Item 2.4.4		
	Potential danger of falling of hand tools~3. (Potential danger: when tightening bolts, there is the danger of hand tools or bolts falling.)	W,A	4	3	12	Works Supervisor to instruct and monitor worker to use hand tool and control rope.	9(3x3)	
						Works Supervisor to fence off the lower working area before works procedures commence.		

	Item 2.4.5					Item 2.4.5		
	Danger of tower crane falling. (Potential danger: Inappropriate installation of pins may lead to falling of the tower crane.)	W,A	4	3	12	Works Supervisor to check pins are properly installed before assigning workers to start the tower crane dismantling procedure.	9(3x3)	
Item 2.5	Item 2.5					Item 2.5		
Transport the hydraulic jack and tools etc. back to the ground.	Potential danger of load falling down~2. (Potential danger: Inappropriate hanging points for the hoisting of hydraulic jack and telescopic cage may lead falling.)	W,A	4	3	12	Works Supervisor to ensure the hanging points for the hoisting of hydraulic jack and telescopic cage are proper before assigning workers with rigging certificate and experience to carry out rigging operation.		
						Works Supervisor to check the valid certificates of all lifting devices and to ensure all lifting devices are in good condition by visual inspection.		
						Works Supervisor to instruct and monitor workers to use skip that have been checked for bulk handling.		
						Works Supervisor to fence off the lower working area before works procedures commence.		
Item 2.6	Item 2.6					Item 2.6		
Assign competent examiner to the site to carry out the tests and examine the tower crane. The tower crane can only be used after electrician has adjusted the safe device and CME has issued a valid certificate.	Potential danger of fall of testing block~1. (Potential danger: Inappropriate rigging may leads to falling down during hoisting.)	W,A	4	3	12	Works Supervisor to assign workers with rigging certificate to carry out hoisting procedure.	9(3x3)	
						Works Supervisor to assign workers with rigging certificate to carry out hoisting of mast.		
						Before the works procedure is carried out, instruct workers of the proper rigging procedure.		
						To ensure crane operators possess relevant crane operation certificate and all lifting devices are in good condition and are checked suitable for use.		
	Potential danger of fall of testing block ~2. (Potential danger: Inappropriate hanging point may lead to falling during hoisting.)	W,A	4	3	12	Ganger to check that hanging point of the testing block is proper before hoisting them.	9(3x3)	

Basic Operation Procedure	Existing and Potential Hazard	Entities being affected	Possibility(P)	Hazard Level(C)	Risk Level	Mitigation Measures	Residual Risk Level	Action
		Workers(W)	Very Possible(5)	Mild(1)	P*C			
		Public(P)	Possible(4)	Affected(2)				
		Environment(E)	May be Possible(3)	Serious(3)				
		Asset(A)	Slimly Possible(2)	Disastrous(4)				
			Impossible(1)					
						Works Supervisor to ensure chain slings are checked and are issued with valid certificate and are suitably locked before assigning experienced workers with rigging certificate to carry out rigging procedure.		
(3) Completion of works								
Item 3.1	Item 3.1					Item 3.1		
	Fall of object. (Potential danger: If tools are not properly put away, and a tower crane is in operation, there is the danger of falling of object.)	W,A	4	3	12	When the works procedures are completed, Works Supervisor to check that all tools are put away properly.	9(3x3)	
(4) Emergency								
Item 4.1	Item 4.1					Item 4.1		
	Fire breaks out and workers cannot get away and get injured.	W,P,E,A	4	3	12	Works Supervisor to inform Chief Mechanic and head of Emergency Action Team (Superintendent) immediately and to take action accordingly.	9(3x3)	Superintendent
						Superintendent to inform first aider to stand-by for rescue.		Superintendent & first aider
						After receiving the message, the Superintendent immediately appoints someone to have a vehicle ready in case there is the need to send casualties to hospital.		Superintendent
						After the fire, the Superintendent shall convene a meeting to review the causes of the fire and the accident and draw up precautionary measures to prevent the same from happening.		Superintendent

Appendix B.2

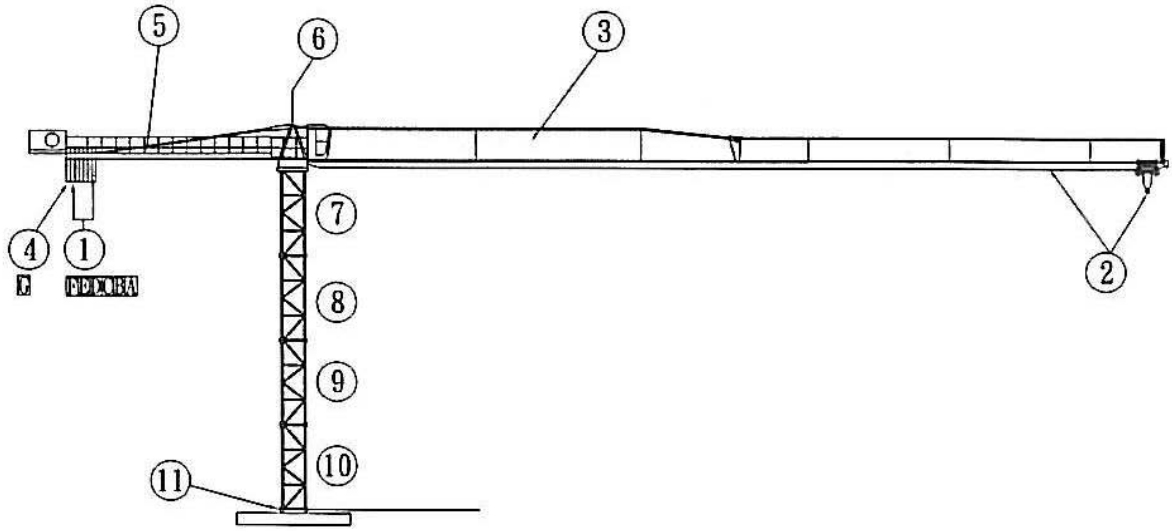

HOARDING LINE
DA
SO
SO
SO
SO
RUN IN/OUT
WB
METAL SCAFFOLDING
TOWER CRANE
18m 1100kg
32m 6800kg
WT
HAND WASHING POINT
AP
HC
G
SITE LAYOUT PLAN
(N.T.S.)
LEGEND:
SO - SITE OFFICE
DA - DANGEROUS STORAGE CABINET
WB - WHEEL WASHING BAY
AP - ASSEMBLE POINT
HC - HELMET CAGE
G - GENERATOR WITH EMERGENCY STOP
WT - WATER TREATMENT PLANT
REV
DESCRIPTION
DATE
PROJECT :
TITLE :
SITE LAYOUT PLAN
DRAWN BY:
CHECKED BY:
APPROVED BY:
JOB NO :
SCALE :
N.T.S.
DATE :
23-1-2008
DRAWING NUMBER :
SO/C01
REV.

Appendix B.3

Sample Method Statement for Dismantling of Tower Crane

Site Name : _____

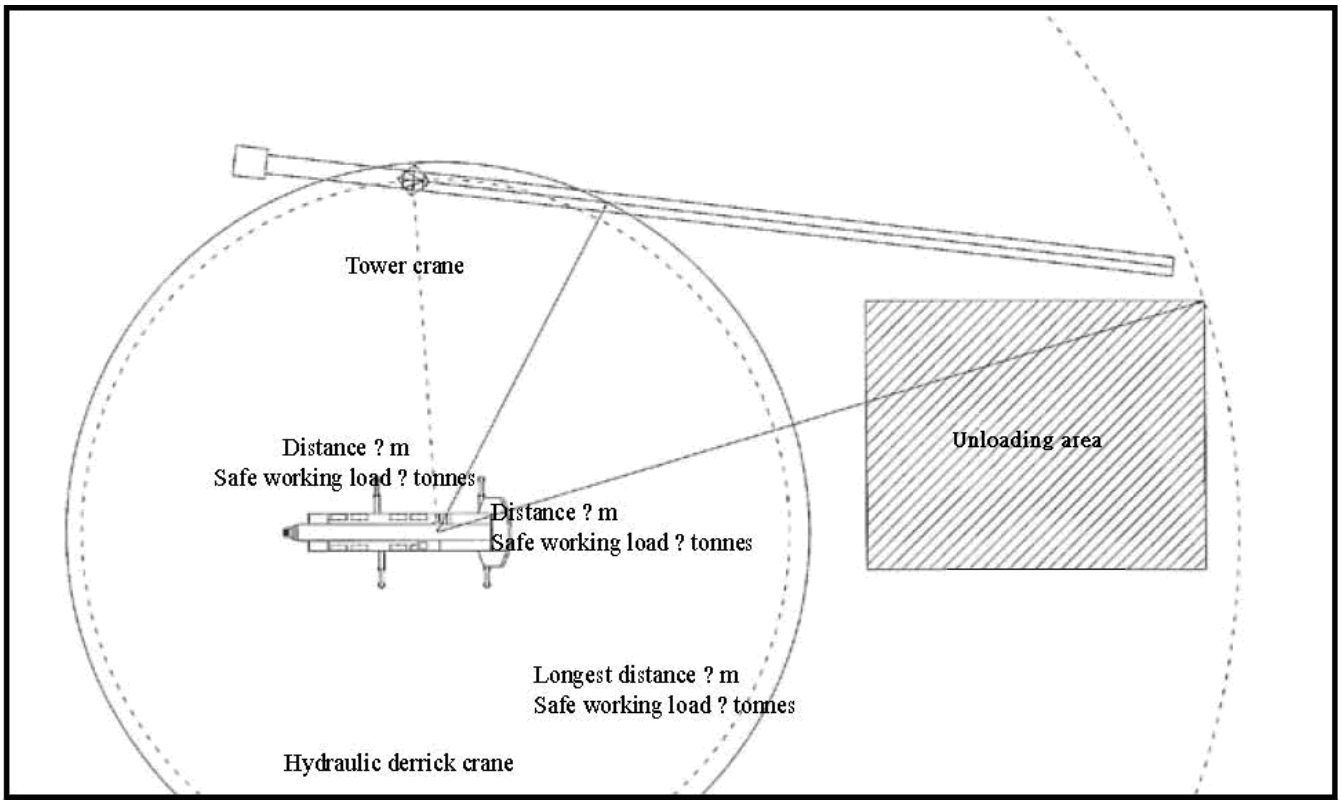
Project Item : _____



Dismantling sequence and weight and length of various parts

Dismantling steps	Name of parts	Weight	Length
1A	counter-jib ballast	2.1 tonnes	1940 mm
1B	counter-jib ballast	2.1 tonnes	1940 mm
1C	counter-jib ballast	3.15 tonnes	2840 mm
1D	counter-jib ballast	3.15 tonnes	2840 mm
1E	counter-jib ballast	3.15 tonnes	2840 mm
1F	counter-jib ballast	3.15 tonnes	2840 mm
2	hook	0.53 tonnes	1710 mm
3	jib + trolley	9.3 tonnes	60000 mm
4G	counter-jib block	3.15 tonnes	2130 mm
5	counter jib + hoisting drum	9.2 tonnes	15840 mm
6	A-frame + slewing ring + cabin	7.3 tonnes	4720 mm
7	mast	1.86 tonnes	6000 mm
8	mast	1.86 tonnes	6000 mm
9	mast	1.86 tonnes	6000 mm
10	mast	1.86 tonnes	6000 mm
11	concrete footing		

Sample Layout Plan

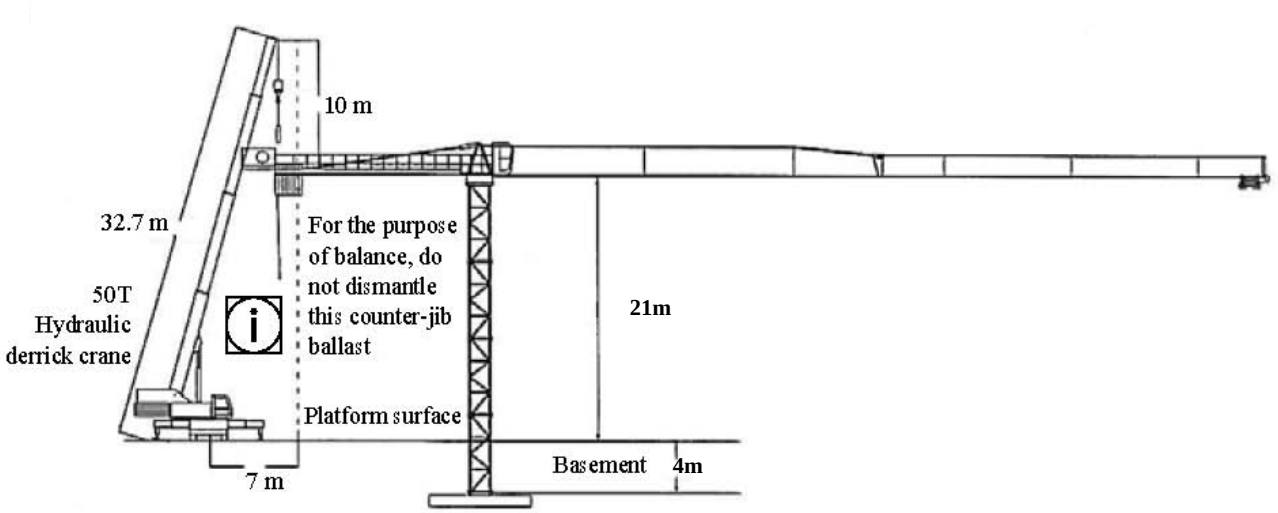


A layout plan should show the following information –

1) distance between hydraulic derrick crane and the centre of tower crane
2) name of hoisting facilities for dismantling a tower crane
3) brand name of hoisting facilities
4) model number of hoisting facilities
5) distance between storage area for hoisting facilities and centre of the tower crane
6) hoisting area of the hoisting facilities
7) radius of the hoisting facilities and their maximum safe working load
8) exclusion zone for the dismantling work
9) storage area for parts of the tower crane
10) storage area for jib and counter-jib
11) if hydraulic derrick crane is used, the condition of the ground for supporting the derrick crane, way and materials for cushioning
12) weight to be carried by ballast of hydraulic derrick crane

Sample Tower Crane Dismantling Procedures

Step 1: Dismantle the counter-jib block



Works Procedures:

1. Dismantle 1A to 1F counter-jib ballast with a derrick crane!

Important Points	**Hazard Identification**
Distance between the tower crane and the derrick crane is 7 m, the safe working load is 13 tonnes	Fall of person: 1. Technicians must use safety belts
Reserve one counter-jib ballast for balance when dismantling the jib	Fall of object: 1. Enclose the affected area, no access except for tower crane dismantling workers 2. Hand tools must be tied to the appropriate position with a rope

Sample Tower Crane Dismantling Procedures

Step 2: Dismantle the hook and retrieve the hoisting wire rope

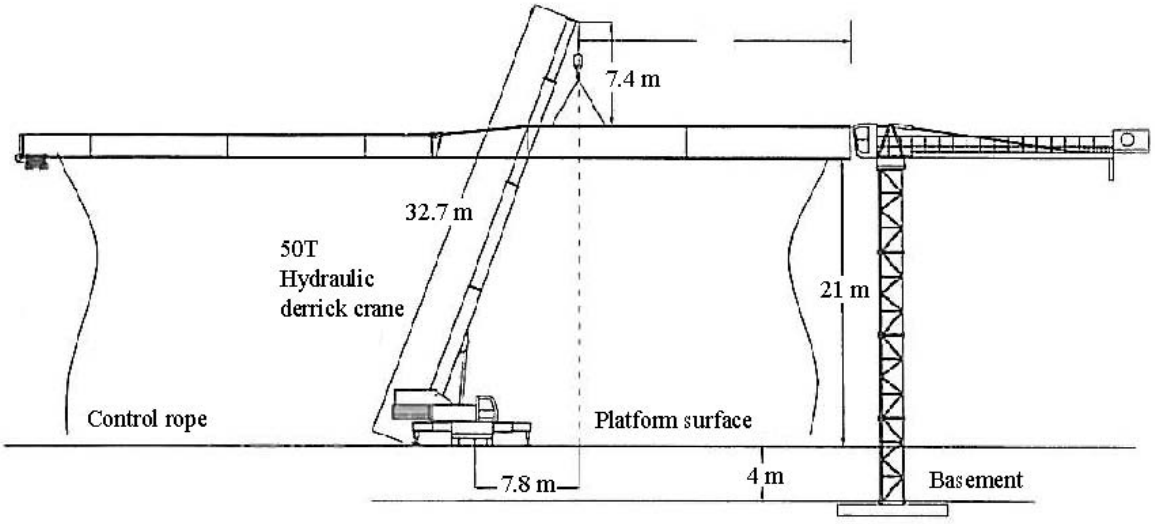
Works Procedures:

1. Use wires and shackles to secure the hook on the jib.
2. Use the tower crane to coil hoisting wire back to hoisting drum.

Important Points	**Hazard Identification**
Good communication must be maintained with the tower crane operator when retrieving the hoisting wire rope	Fall of person: 1. Technicians working at the jib must use "double shackle" safety belts
Only tower crane operators with a certificate will be allowed to operate the tower crane	Fall of object: 1. Enclose the affected area, no access except for tower crane dismantling workers 2. Hand tools must be tied to the appropriate position with a rope

Sample Tower Crane Dismantling Procedures

Step 3: Dismantling the jib

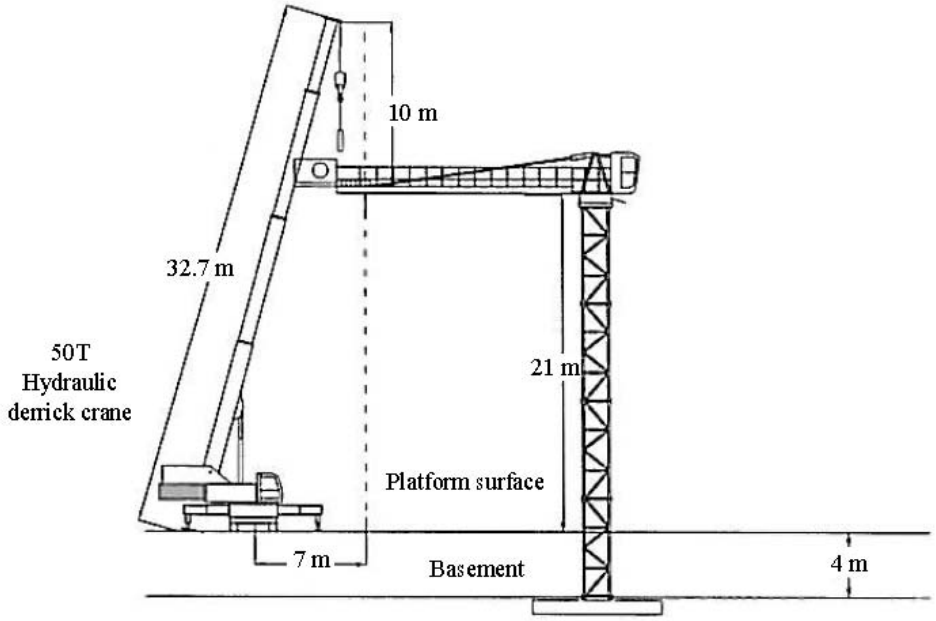


Works Procedures:

1. Use 4 chain slings of 2.4 m long and 2 wires to hoist the centre of the jib according to the manual.
2. Tie the trolley properly with rope and retrieve the cable.
3. Hammer out the square-shaped pins and the steel plate which are connected to A-frame.
4. Afterwards, hammer out the small pins joining the wedge lock and the slewing ring.
5. Slightly hoist up the jib to a 5 degree angle with the ground level and hammer out the pins of the oval core within the wedge lock.
6. Use the derrick crane to dismantle the whole jib and lay it on the ground before continuing with the dismantling process.

Important Points	Hazard Identification
Distance between the tower crane and the derrick crane is 7.8 m, the safe working load is 12.3 tonnes	Fall of person: 1. Technicians working at the jib must use “double shackle” safety belts
Before dismantling the jib, the trolley must be tied to the jib with a coarse string	Fall of object: 1. Enclose the affected area, no access except for tower crane dismantling workers 2. Hand tools must be tied to the appropriate position with a rope
Must use a control rope to keep the jib within the radius of safe hoisting of the derrick crane	Overloading of derrick crane: 1. The derrick crane operator and signaller must ensure the object for hoisting must not exceed the safe working load
Must use a block to secure the jib so as to maintain a correct central position and prevent the release of too much energy during the dismantling process	
Adequate space must be reserved on the ground level for placing the jib of 60 m long	

Sample Tower Crane Dismantling Procedures



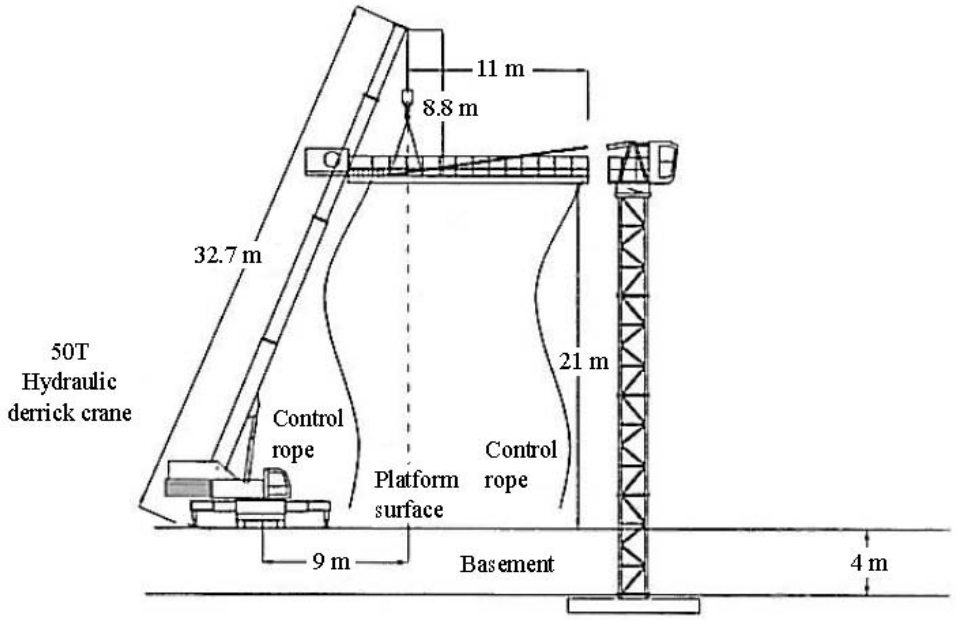
Step 4: Dismantle the last ballast

Works Procedures:

1. Dismantle the 4G ballast with a derrick crane

Important Points	**Hazard Identification**
Distance between the tower crane and the derrick crane is 7 m, the safe working load is 13 tonnes	Fall of person: 1. Technicians must use safety belts
	Fall of object: 1. Enclose the affected area, no access except for tower crane dismantling workers 2. Hand tools must be tied to the appropriate position with a rope

Sample Tower Crane Dismantling Procedures



Step 5: Dismantle the counter jib (with hoisting drum)

Works Procedures:

1 Use 4 chain slings of 2.4 m long to lift up the centre of the counter jib according to the manual.

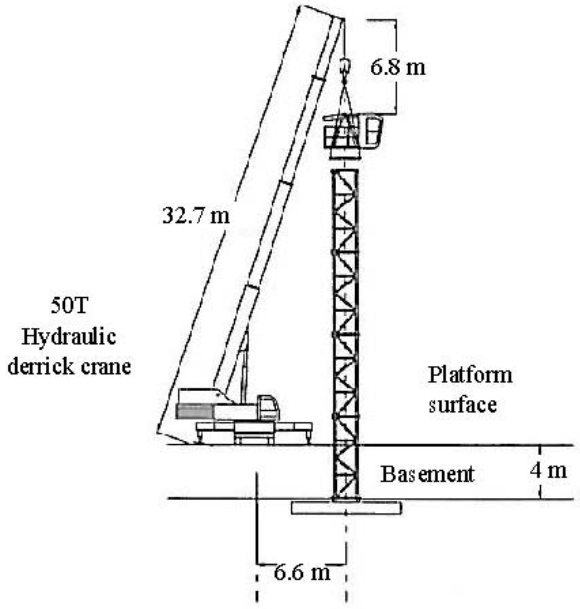
2 Hammer out the small pins joining the wedge lock and the slewing ring.

3 Slightly lift up the counter jib to a 5º angle, hammer out the connecting pins on the tie bar of the counter jib. Then, hammer out the small pins of the oval core within the wedge lock.

4 Use the derrick crane to dismantle the whole counter jib and lay it on the ground before continuing with the dismantling process.

Important Points	Hazard Identification
Distance between the tower crane and the derrick crane is 9 m, the safe working load is 11 tonnes	Fall of person: 1. Technicians must use safety belts
Must use a control rope to keep the dismantled counter jib within the radius of the safe hoisting of the derrick crane.	Fall of object: 1. Enclose the affected area, no access except for tower crane dismantling workers 2. Hand tools must be tied to the appropriate position with a rope
Must use a block to secure the counter jib so as to maintain a correct central position and prevent the release of too much energy during the dismantling process	Overloading of derrick crane: 1. The derrick crane operator and signaller must ensure the object for hoisting must not exceed the safe working load
Adequate space must be reserved for placing the whole piece of counter jib	

Sample Tower Crane Dismantling Procedures



Step 6: Dismantle the A-frame + slewing ring + cabin

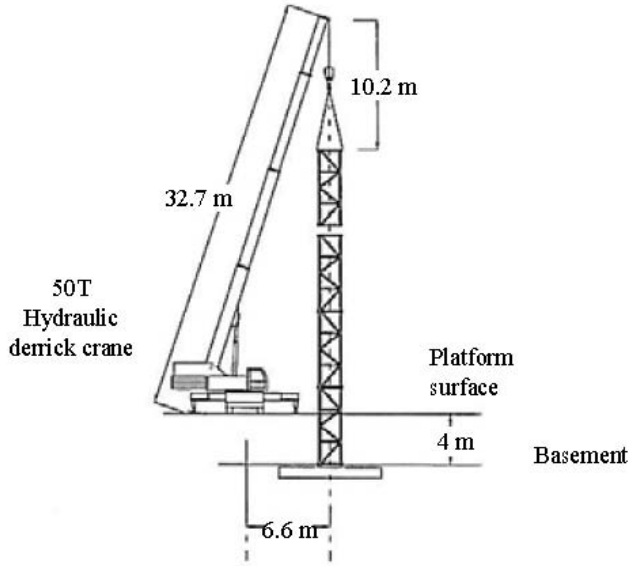
Works Procedures:

1. Use 4 chain slings of suitable length to lift up the A-frame + slewing ring + cabin according to the instruction manual.
2. Loosen the screws connecting the slewing ring and the mast with a hydraulic block.
3. Use a derrick crane to dismantle the A-frame + slewing ring + cabin and lay them on the ground.

Important Points	**Hazard Identification**
Distance between the tower crane and the derrick crane is 6.6 m, the safe working load is 13 tonnes	Fall of person: 1. Technicians must use safety belts
	Fall of object: 1. Enclose the affected area, no access except for tower crane dismantling workers 2. Hand tools must be tied to the appropriate position with a rope
	Derrick crane overloading: 1. The derrick crane operator and signaller must ensure the object for hoisting must not exceed the safe working load

Sample Tower Crane Dismantling Procedures

Steps 7 to 10: Dismantle the four masts



Works Procedures:

1. Use 4 chain slings of suitable length to lift up one mast.
2. Loosen the screws connecting the masts with a hydraulic block.
3. Use a derrick crane to dismantle the masts and lay them down to the ground one by one.

Important Points	**Hazard Identification**
Distance between the tower crane and the derrick crane is 6.6 m, the safe working load is 13 tonnes	Fall of person: 1. Technicians must use safety belts
	Fall of object: 1. Enclose the affected area, no access except for tower crane dismantling workers 2. Hand tools must be tied to the appropriate position with a rope

Sample Tower Crane Dismantling Procedures

Step 11: Dismantle the concrete footing

Works Procedures:

1. Cut away the outcrop of the concrete footing with oxy-acetylene torch.
2. Use a derrick crane to dismantle the cut-off outcrop down on the ground.

Important Points	**Hazard Identification**
Only oxy-acetylene torch operators with a certificate will be allowed to operate the oxy-acetylene torch	Fire/explosion 1. Hot works must be carried out in accordance with the requirements of the hot works safe working procedures 2. Prepare a fire extinguisher 3. Technicians must use appropriate safety personal protective equipment

End

Appendix B.4

Sample Appointment Letter of Competent Persons of Tower Crane Dismantling

To: ABC construction company

Site Name:

Attention: Safety Officer

The following persons are appointed as Competent Persons to supervise the dismantling of tower crane MD-175 at site xxxx of your company until completion of the works. The Competent Persons have 10 years' relevant experience and have worked on tower crane of the same model line.

Name	Post	Green Card	Crane Operation Certificate	Contact Telephone	Site Position
	Competent Person				Up on the tower crane

_____ _____

[Specialist Contractor's name] Date

Sample Appointment Letter of Senior/Junior Workmen

To: ABC construction company

Site Name:

Attention: Safety Officer

The following personnel are appointed as senior/junior workmen for dismantling tower crane MD-175 at site xxxx of your company until completion of the works.

Name	Post	Types of Certificate Held and their Serial Numbers				
		Green Card	Crane Operation Certificate	Certificate of Rigger Safety Operation	Certificate of Gas Safety Training	Years of Relevant Experience
	Senior Workman					
	Senior Workman					
	Junior Workman					
	Junior Workman					

_____ _____

[Specialist Contractor's name] Date

Sample Workers Engaged in the Dismantling of Tower Crane

To: ABC construction company

Site Name:

Attention: Safety Officer

The following personnel will attend the works safety meeting before the start of works.

Name	Post	Types of Certificate Held and their Serial Numbers				
		Green Card	Crane Operation Certificate	Certificate of Rigger Safety Operation	Years of Service	Site Position
	Senior Workman					
	Senior Workman					
	Senior Workman					
	Junior Workman					

_____ _____

[Specialist Contractor's name] Date

Annex C

Qualification and Experience of Site Personnel Engaged in Tower Crane Operations

Competent Person

(A) Role

- A competent person supervises the working crew of the operation.

(B) Qualification

- Registered Skilled Worker of the trade "To carry out erection, dismantling, telescoping/climbing of tower crane, and the hoisting of materials, tools and equipment related to the aforesaid work" under the Construction Workers Registration Ordinance (CWRO). (Cap 583) (To be implemented in six months after the trade is available for registration)

(C) Experience

- At least 10 years of relevant experience; and
- Experience in operating tower crane in the same model line, or completion of familiarization training on the same model line.

(D) Training

- Completion of following courses –
  - Safety Training Course For Construction Workers of Specified Trade (Silver Card Course)–Tower Crane Worker (Erecting, Dismantling, Telescoping & Climbing) ("EDTC Course") offered by CICTA; and
  - Training for Tower Crane Competent Person (Erecting, Dismantling, Telescoping & Climbing) offered by CICTA. (To be implemented in six months after launching of the course) Training offered by CICTA will become the academic qualifications of competent person.

- Competent Person in charge of erection or dismantling of a tower crane using derrick crane should also have completed the Certification Course with Imbedded Certification Test for Derrick Crane Operator offered by CICTA.

(E) Competencies

- A Competent Person should be able to –
  - brief and instruct his crew to execute the operation in accordance with the method statement;
  - draw the attention of his crew to important safety warnings and precautions stipulated in the manufacturer's manual, method statement, critical parts checklist and risk assessment report (in particular the parts marked as "Danger", "Cautions" and "Hold Points");
  - response to questions raised by his crew members and provide appropriate directives to them; and
  - conduct visual inspection to ascertain the integrity of key components of the tower crane prior to commencement of the operation.

Senior Workman

(A) Qualification

- Registered Skilled Worker of the trade "To carry out erection, dismantling, telescoping/climbing of tower crane, and the hoisting of materials, tools and equipment related to the aforesaid work" under CWRO. (To be implemented in six months after the trade is available for registration)

(B) Experience

- At least four years of related work experience.

(C) Training

- A senior workman should have completed the following courses organized by CICTA –
  - Safety Training Course for Construction Workers of Specified Trade (Silver Card Course) – Construction Materials Rigger ("Rigger Course"); and
  - EDTC Course.

Junior Workman

(A) Qualification

- Registered General Worker under CWRO.

(B) Training

- A junior workman should have completed the Rigger Courses organized by CICTA.

(C) Supervision

- A junior workman with less than four years of experience should work only under the direct one-to-one supervision of a senior workman.

Annex D

Summary of Recommended Improvement Measures

Section and subsection in main text	Improvement measures	Implementing parties
E	**Checking before Erection of Tower Crane**	
(i)	Pre-delivery checking	Tower crane owners
(ii)	Checking of anchorage	Tower crane owners Principal Contractors
(iii)	Checking of supporting structure	Tower crane owners Principal Contractors
(iv)	Derrick Crane	Derrick Crane owners
F	**Improvement of site supervision**	
(i)	Appointment of supervising engineer	Principal Contractors
(ii)	Risk assessment and method statement	Principal Contractors Specialist Contractors
(iii)	Pre-installation checking	Principal Contractors
(iv)	Pre-operation checking	Principal Contractors Specialist Contractors
(v)	Pre-use verification	Principal Contractors
(vi)	Inspection and maintenance	Principal Contractors
G	**Qualification and experience of specialist contractors**	Principal Contractors Specialist Contractors
H	**Training and experience of competent persons and workmen**	Principal Contractors[1] Specialist Contractors[1]

[1] Except for (i) Registration as Skilled Worker of the trade "To carry out erection, dismantling, telescoping/climbing of tower crane, and the hoisting of materials, tools and equipment related to the aforesaid work" under the Construction Workers Registration Ordinance (CWRO); and (ii) Completion of training for Tower Crane Competent Person (Erecting, Dismantling, Telescoping & Climbing). These will be implemented in six months after the availability of the trade for registration and in six months after launching the course respectively.

Annex E

Pre-delivery Checking of Critical Parts of Derrick Crane

The owner of a derrick crane (used for the purpose of dismantling tower crane) shall ensure that it is not used unless pre-delivery checking of its critical parts has been carried out by a CME at least once in the preceding 12 months. The pre-delivery checking could be carried out at the derrick crane depot, or at any other suitable locations.

1. Documentation to be provided by the derrick crane owner

Prior to the pre-delivery checking of critical parts by a CME, the derrick crane owner shall provide the following information to the CME for review:

1.1 Identification

Provide unique identification to all main structural parts, motors, gearboxes and braking systems of derrick cranes. The unique identification should be used when referring to components in reports for checking and testing, and certifications for repairs and modifications.

1.2 Configuration details

Provide details of the main components (critical parts) making up the derrick crane to show its configuration. Details should include the main dimensions of the main boom and the kingpost.

Refer to Appendix E.1 for a sample of the configuration details.

1.3 Maintenance logbook

Provide details of the most recent repair and maintenance work performed on the critical parts as listed below. Details dating further back shall be provided if requested by the CME :

(a) Main structural parts

(b) Motors

(c) Gearboxes

(d) Braking systems

2. Pre-delivery checking of critical parts by CME

After reviewing the configuration details and the maintenance logbook, the CME shall carry out the pre-delivery checking on the critical parts of the derrick crane.

The scope of the pre-delivery checking is shown in Appendix E.2. The checklist is by no means exhaustive. CME should make his/her own professional judgement on its applicability and validity.

3. Non-destructive tests by qualified personnel

3.1 Bolts and pins

The critical load bearing bolts and pins used for connection of main structural parts shall be subject to non-destructive test at least once during the preceding 12 months. Items with cracks detected must be replaced, and then further inspected by a CME.

The CME shall confirm the locations of the critical load bearing bolts and pins. The non-destructive test reports shall be presented to the CME for review.

3.2 Welded connections

The welded connections for the critical load bearing structural parts shall be subject to non-destructive tests at least once during the preceding 12 months. Items with cracks detected must be repaired or replaced, and then further inspected by a CME.

The CME shall confirm the locations of the critical load bearing structural parts. The non-destructive test reports shall be presented to the CME for review.

APPENDIX E.1

CONFIGURATION DETAILS

(To be provided by the derrick crane owner)

Configuration details

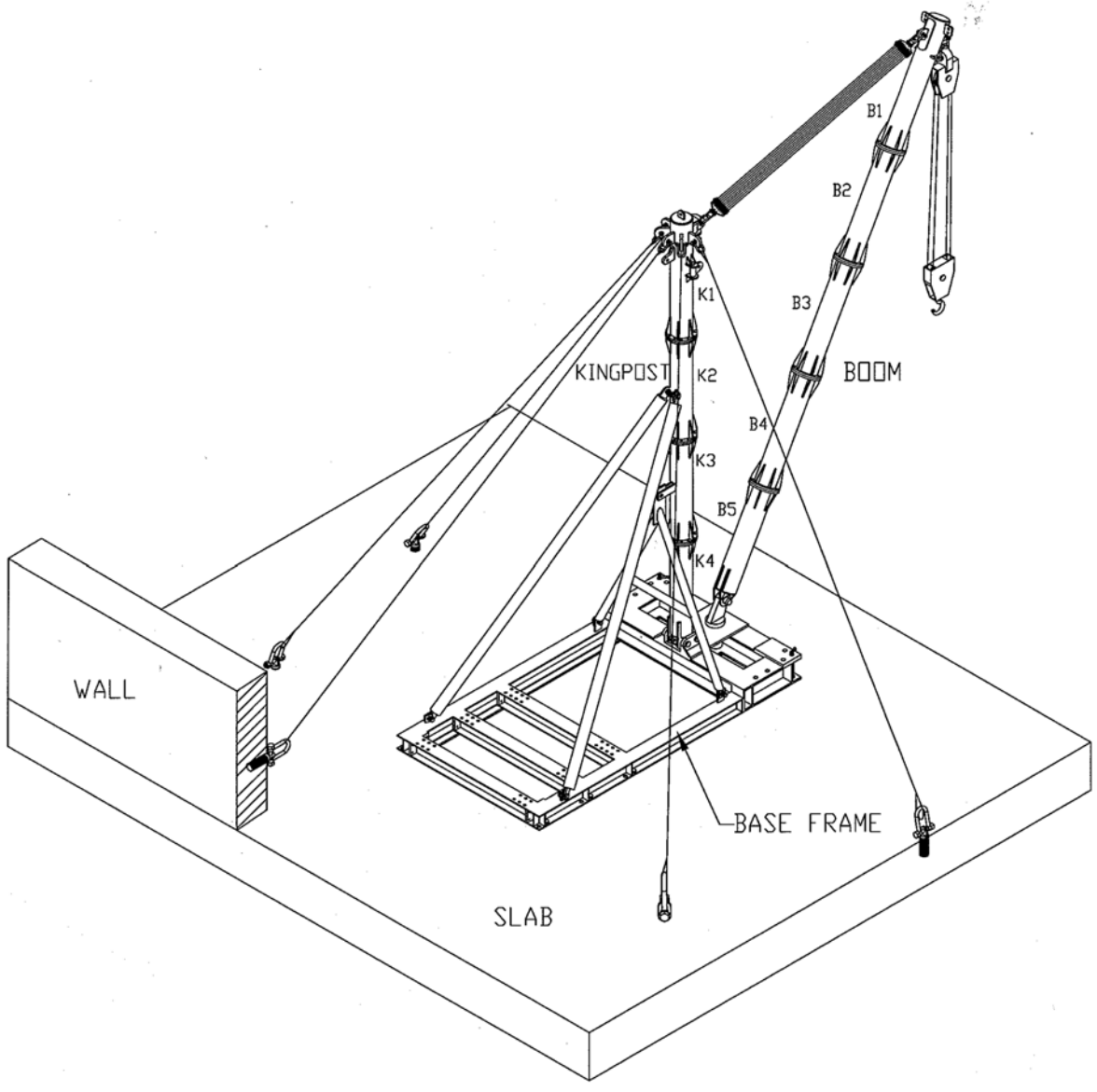
Make :

Model :

Owner's identification :

Boom dimensions :

Kingpost dimensions :



APPENDIX E.2

PRE-DELIVERY CHECKING OF CRITICAL PARTS
FOR DERRICK CRANE

Report reference :

Report date :

PRE-DELIVERY CHECKING OF CRITICAL PARTS
FOR DERRICK CRANE

(Note : The checklist shown in this report is by no means exhaustive. CME should make his/her own professional judgment on its applicability and validity.)

Inspected by

_____

Name of Competent Mechanical Engineer (CME) :

Registered Professional Engineer (RPE) Registration No. :

Date of Checking :

CONTENTS

1. INTRODUCTION

This report presents details of the pre-delivery checking carried out on the critical parts of the derrick crane.

2. PARTICULARS OF DERRICK CRANE

Derrick crane owner	:
Checking location	:
Make	:
Model	:
Owner's identification	:
Boom dimensions	:
Kingpost dimensions	:

3. VISUAL INSPECTION

Visual inspection was carried out to check the state of the critical parts listed in Sections 3.1 and 3.2.

(Note : Visible damage includes cracking, deformation, corrosion, wear and abrasion)

Critical parts	Acceptance criteria	Condition acceptable Yes	No	Remarks
3.1 Main structural parts				
(a) Base frame				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Connection pins / bolts	No visible damage affecting safety	☐	☐	
(b) Boom				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Connection pins / bolts	No visible damage affecting safet	☐	☐	
Boom heel swivel fitting	No visible damage affecting safety	☐	☐	
(c) Kingpost				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Connection pins / bolts	No visible damage affecting safety	☐	☐	
(d) Back stay				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
Connection pins / bolts	No visible damage affecting safety	☐	☐	

Critical parts	Acceptance criteria	Condition acceptable Yes	No	Remarks
3.2 Accessories				
(a) Hoisting winch				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
(b) Luffing winch				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
(c) Winches for lateral swing				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
(d) Hoisting hook block				
Structural members	No visible damage affecting safety	☐	☐	
Welded connections	No visible damage affecting safety	☐	☐	
(e) Pulley blocks				
Structural members	No visible damage affecting safety	☐	☐	
Pulleys	No visible damage affecting safety	☐	☐	

4. REVIEW OF MAINTENANCE LOGBOOK

The repair and maintenance record prepared by the derrick crane owner shall include details of work performed on the following critical parts.

Critical parts		Acceptance criteria	Condition acceptable		
			Yes	No	Remarks
(a)	Main structural parts	As per manufacturer's instructions	☐	☐	_____
(b)	Motors				
	Hoisting	As per manufacturer's instructions	☐	☐	_____
	Luffing	As per manufacturer's instructions	☐	☐	_____
	Lateral swing	As per manufacturer's instructions	☐	☐	_____
(b)	Gearboxes				
	Hoisting	As per manufacturer's instructions	☐	☐	_____
	Luffing	As per manufacturer's instructions	☐	☐	_____
	Lateral swing	As per manufacturer's instructions	☐	☐	_____
(c)	Braking systems				
	Hoisting	As per manufacturer's instructions	☐	☐	_____
	Luffing	As per manufacturer's instructions	☐	☐	_____
	Lateral swing	As per manufacturer's instructions	☐	☐	_____

5. SUMMARY OF FINDINGS

5.1 Critical parts inspected

□ All critical parts inspected are in acceptable condition, and are considered suitable for site installation.

□ The critical parts listed below are **not** in acceptable condition, and are required to be replaced or repaired. The replaced or repaired parts are required to be further inspected by a CME when they become available.

Critical part	Details of non-conformance
(a) _____	_____
(b) _____	_____
(c) _____	_____

5.2 Maintenance logbook

□ Record of repair and maintenance work performed on the critical parts is available.

□ Record of repair and maintenance work performed on the critical parts is not available for the items listed below. The record is required to be updated and further reviewed by a CME when all the outstanding repair and maintenance work have been performed.

Critical part
(a) _____
(b) _____
(c) _____

5.3 Non-destructive test reports

(a) Bolts and pins

Non-destructive test report for critical load bearing bolts and pins used for connection of main structural parts is available to confirm acceptable condition.

□ Yes □ No

Remarks : _____

_____

(b) Welded connections

Non-destructive test report for welded connections is available to confirm acceptable condition.

□ Yes □ No

Remarks : _____

_____

Annex F

Qualifications and Responsibilities of Inspection and Maintenance Technicians for Tower Cranes

(A) Qualifications

Inspection and maintenance technicians should possess:

- at least four years of experience in inspection and maintenance for mechanical parts of tower cranes, including apprenticeship training and on-the-job technical experience;
- technical or trade test certificates; and
- the Training Certificate of Routine Inspection and Maintenance of Tower Cranes issued by the Construction Industry Council Training Academy.

or

- at least eight years of experience in inspection and maintenance for mechanical parts of tower cranes, including apprenticeship training and on-the-job technical experience; and
- the Training Certificate of Routine Inspection and Maintenance of Tower Cranes issued by the Construction Industry Council Training Academy.

(B) Responsibilities

Inspection and maintenance technicians should:

- perform inspection and maintenance for tower cranes erected on construction site at least once a month;
- record the inspection and maintenance result in an inspection and maintenance form;
- submit the completed inspection and maintenance form at Appendix F.1 to the Principal Contractor; and
- immediately inform the Principal Contractor of the parts that require instant repair based on the inspection and maintenance result.

Appendix F.1

Monthly Inspection, Maintenance and Repair Records of Tower Crane (to be completed by mechanical department or technician)

Date (DD/MM/YY): _____

Site		Site Reference No.		Model No.		Internal Reference	
Hour	h	Power	V	Wind Speed	m/s	Crane Owner	

Index	Inspection Details	Normal/ Abnormal	Not Applicable	Lubrication	Maintenance Condition
1	Hoisting Parts 1) Inspection and adjustment to the braking system for hoisting				
	2) Inspection and adjustment to the auxiliary hydraulic braking system				
	3) Inspection of the electrical parts for hoisting				
	4) Inspection and adjustment to the hook height limit switch				
	5) Inspection and adjustment to moment cutout switch and overload cutout switch				
	6) Inspection of gearbox oil level and refill				
	7) Inspection of hoist winch and main axle, lubrication and oiling				

Index	Inspection Details	Normal/ Abnormal	Not Applicable	Lubrication	Maintenance Condition
1	8) Fixing of the base for hoisting parts, connection pins/bolts for gearbox and footings				
	9) Inspection of the connections for all pulleys, hooks and pins				
	10) Inspection of the lubrication, wear and tear condition of wire ropes				
	11) Inspection of swivel/ anti-twist device for wire ropes at jib				
2	Luffing Parts 1) Inspection and adjustment of hydraulic braking system				
	2) Inspection and adjustment to luffing travel limit switch				
	3) Inspection and adjustment to trolley limit cutout switch				
	4) Inspection of electrical Parts for luffing				
	5) Fixing of luffing parts, pins, bolt and nuts				
	6) Inspection of the lubrication, wear and tear condition of trolley pulleys				
	7) Inspection of the lubrication, wear and tear condition of wire ropes				
3	Slewing Parts 1) Inspection and adjustment to slewing limit switch				
	2) Inspection of electrical parts for slewing				
	3) Inspection and securing of V-belt to the slewing motor				
	4) Inspection of slewing gearbox oil level and refill				
	5) Inspection and fixing of the bolts of slewing bearing				
	6) Lubricate the slewing bearing with grease				
	7) Lubricate the slewing ring with grease				
	8) Fixing of connection pins/bolts for gearbox				

Index	Inspection Details	Normal/ Abnormal	Not Applicable	Lubrication	Maintenance Condition
4	Steel Structure and Main Structural Parts 1) Inspection of tower base and mast base				
	2) Inspection of the connection of all mast Sections; check for any missing split pins / bolts and nuts				
	3) Inspection of the connections and split pins at jib and other steel structural parts / bolts and nuts				
	4) Inspection of the welding parts of all structural components such as mast sections, slewing ring, tie bar and foundation anchor etc				
	5) Inspection for any deformation at tower mast sections, jib and counter-jib (vertical parts and tie bars)				
	6) Inspection of the connections of climbing collars (or wall ties)				
	7) Inspection of pins and bolts of ballast blocks				
	8) Inspection of climbing ladders of tower crane				
5	Condition of Hook Block (single fall / 2 falls / 4 falls & catch)				
6	Availability of "Daily Inspection Records", "Repair Logbook" and "Inspection and Maintenance Logbook" for Tower Crane				
Remarks:					

Note: 1. Normal "✓", Abnormal"×". 2. Any abnormal situation in maintenance or adjustment process should be recorded in the "maintenance condition" column or in the "Remarks" section of the form.

Mechanic In-charge / Site Representative: Inspection and Maintenance Technician:

_____ _____

(Note: The content and format of this checklist is for reference only. By making reference to the manufacturer's manual, a checklist to suit specific brand/ type/ model shall be used.)

Annex G

Requirements of Specialist Contractors

(A) Requirements of Specialist Contractors

The Specialist Contractors should:

- directly employ at least one (1) Competent Person;
- directly employ at least three (3) Senior Workmen;
- understand the Chinese version of the method statement;
- possess relevant experience and sufficient technical capability in telescoping/ climbing, erection, dismantling and relocation of tower cranes; and
- compile and maintain accurate safety records.

(B) Supplementary Information to be provided during application under the VSRS

Supplementary information to be provided by the Specialist Contractors should include:

- relevant company information with:-
  - the name and number of Competent Person, Senior Workmen and Junior Workmen directly employed;
  - Whether any derrick crane is owned;
  - Whether any engineer (with mechanical engineering degree) is directly engaged; and
  - Whether any safety supervisor is employed

- Safety records, including those dangerous occurrence(s) but without causing any construction injuries, in relation to tower crane operation.