

Vegetation Management System and Safety Work Practices

樹藝工作管理系統 及安全作業模式

Mr. K C Ng
Deputy Director – North Region
CLP Power Hong Kong Ltd
15-Dec-2012

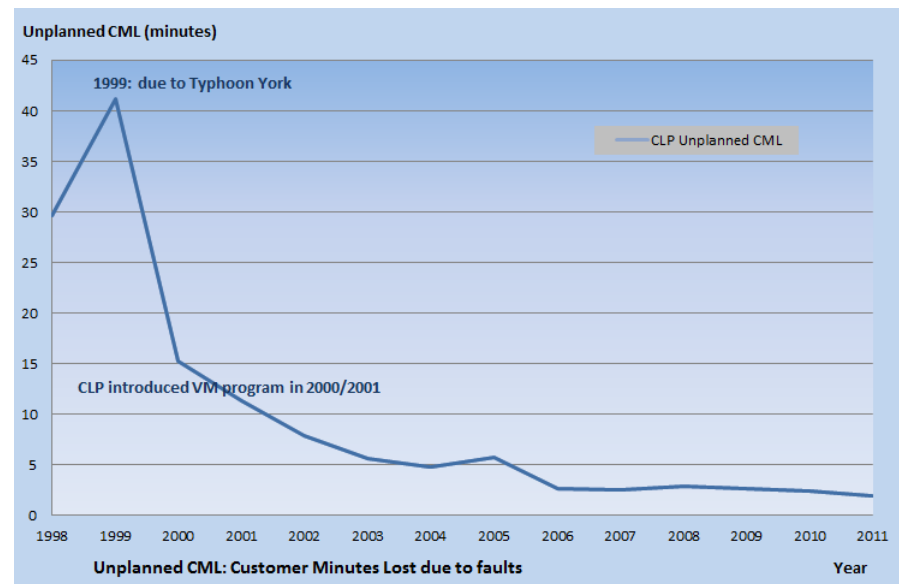
Background

- Many transmission and distribution equipment such as the power lines, transformers are installed in outdoor environment
- CLP has over 3000km length of overhead power lines
- External interferences such as adverse weather, animals and birds, third party damage. In particular, interference by trees and vegetation is very common
- Trees in contact with overhead lines cause power interruption
- Trees have lives and power lines are live



Business Needs

- Deliver high reliability and good quality of power supply
- Maintain a sufficient clearance between the power lines and vegetation in accordance with regulatory requirements
- Operational safety and efficiency
- Establish an Integrated Vegetation Management (IVM) System
- Develop a professional VM team



Challenges

- Tree work contractors with adequate arboricultural skill and knowledge are insufficient in the local Hong Kong market
- Contractors with utility vegetation management experience are limited
- Poor tree management cause public safety risk and inconvenience
- Work in close proximity to power line is risky
- “Work at Height” is the major safety concern for VM team

跌出工作台 折斷頸椎 吊捲筒銑鐵撞死工人

【本報訊】粉嶺坪輦一間鋼鐵貨倉發生奪命意外，一名工人昨在八呎高工作台上，操作起重機吊運巨型筒狀銑鐵時，疑被其撞及墮下，頭部着地令頸椎骨折斷，送院證實死亡，勞工處正調查意外原因。

家人相擁痛哭

死者歐陽榮國（五十四歲），與妻育有一名讀中五女兒，是家庭經濟支柱。歐陽在坪輦路一間鋼鐵廠貨倉做搬運工人二十多年，貨倉存放大批條狀鋼鐵及捲成筒狀的銑鐵，

後者直徑五呎，闊約六呎，估計重達數噸。

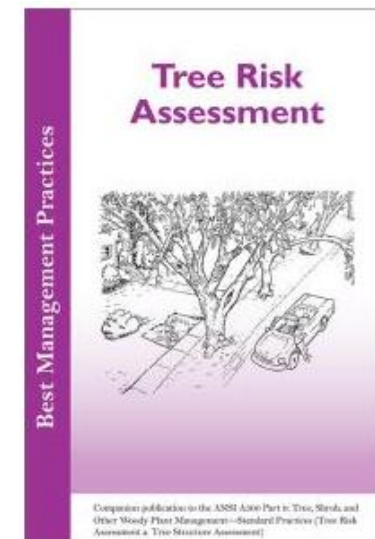
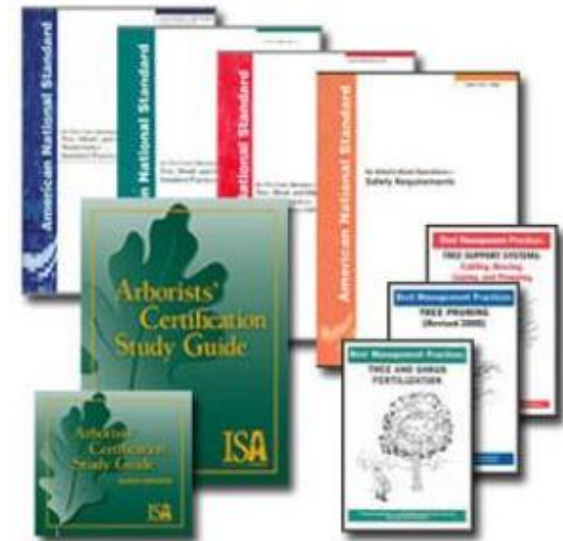
昨晨十時許，歐陽在貨倉工作台上，操控橫跨貨倉上空的滑輪起重機，吊運捲筒狀銑鐵，不料他被銑鐵撞及，失足跌出工作台墮地，當場受創重傷昏迷。

工友報警，由救護員將他送院，但搶救後不治，工人指無目睹事發經過，醫生懷疑他頭先着地，撞斷頸椎致死。歐陽的妻子、胞姊及姊夫接通知到醫院了解，驚聞噩耗，相擁痛哭。

Fall from height accident
12.12.2012 東方日報 A26

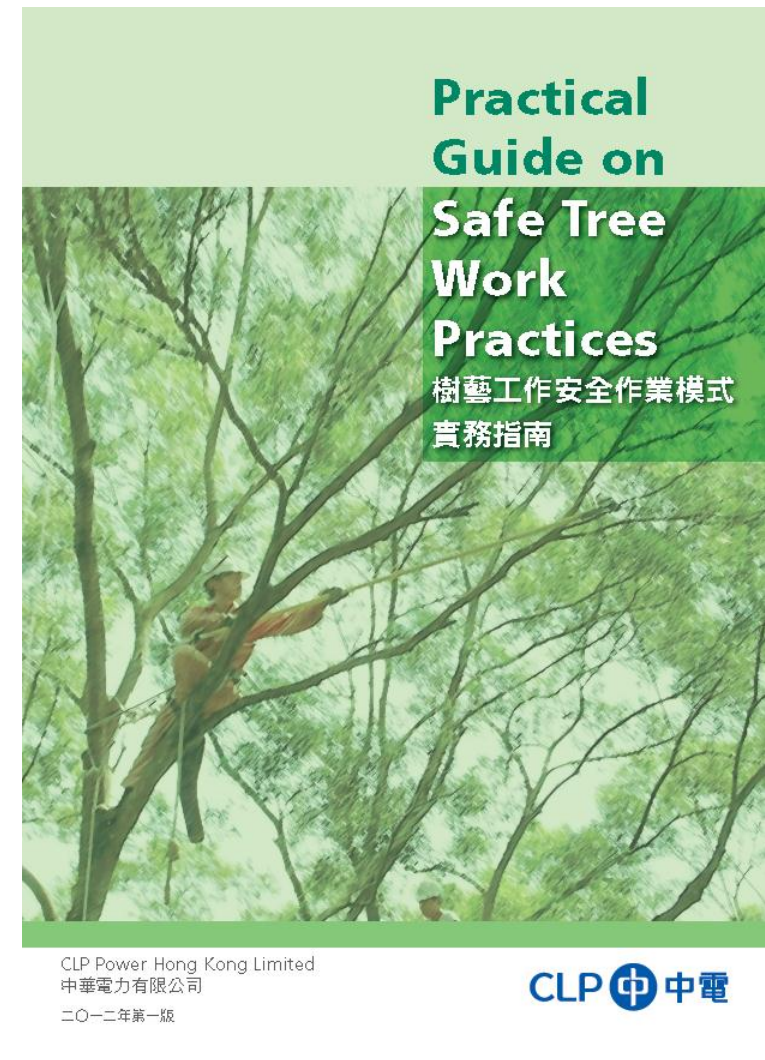
Strategies

- Acquire the most advanced vegetation management technology
- Develop in-house arborists and tree climbing team as well as a local train-the-trainer system
- Conduct regular competence training and OSH training
- Develop risk assessment program and training
- Establish system and documentation
- Enforce competence assessment and certification (internal program)



Safety Work Practices

CLP is the first commercial company in Hong Kong to apply practical arboriculture practices on tree management. With its more than 10 years of IVM experience, CLP has developed a systematic and comprehensive work practices to enhance the tree work safety.



Safe System of Work



Planning the Activity

- Define the roles and responsibility of manager, supervisor, frontline tree worker, safety officer
- Understand the work and conduct proper work planning
- Obtain permissions from stakeholders
- Conduct pre-work site assessment



Identifying the Risks and Hazards

- Apply Occupational Safety and Health analysis on potential risks, hazards and causes
 - *work at height*
 - *falling objects*
 - *environmental risks*
 - *busy traffic*
 - *manual and mechanical handling*
 - *improper work methods*
 - *temperature and adverse weather*
 - *electrical and other utilities*
 - *chemicals*
 - *fire etc*
- Conduct risk assessment on different working methods



Developing Safe Work Methods and Procedures

- Common tree work methods in Hong Kong including vehicular mounted platform or aerial rising platform, working platform, ladder or rope climbing
- Develop risk-based operational procedures, guidelines, training programs, method statements
- Acquire proper personal protective equipment, tree work gears, machinery

決定攀登方法的風險評估



高空修樹攀登方法包括使用升降台 / 升降台車、工作平台（例如流動式工作平台或臨時搭建工作平台）、梯具及繩索攀爬。中電的修樹隊員會根據以下的風險評估去決定適當及安全的攀登方法。

建議攀登方法	考慮因素	當建議的攀登方法不切實可行時
1 升降台或升降台車	<ul style="list-style-type: none"> 現場實際環境狀況（足夠的空曠地方、會否阻塞通道、車輛視線會否受阻） 地面情況結實及平穩 工作會否超出設備的高度限制 風速及側力使用是否符合生產商指引限制 	由工作負責人員決定考慮搭建工作平台
2 搭建工作平台	<ul style="list-style-type: none"> 地面狀況及樹木附近有否足夠空間搭建工作平台 搭建工作平台時需要暴露於高空墮下危害的時間；同時亦須考慮該時間與實際修樹時間及採用其他攀登方法的高空工作時間之比較。 	由工作負責人員決定考慮使用梯具配合配戴防護設備
3 認可的梯具	<ul style="list-style-type: none"> 運輸及步行距離（山上斜坡或崎嶇位置） 地面情況能否穩固梯具（結實及平穩） 梯具及其上落位置是否設置於車路上或公路防撞欄外 梯具能否可以到達一個穩固的站位點，及可以使用正確的工作姿勢 	由攀樹員使用繩索攀爬上樹
4 使用樹木攀爬工具包括使用繩索作樹木攀爬	<ul style="list-style-type: none"> 樹木結構適合攀爬 	停止工作並通知所屬主管

此乃一般的風險評估情況，工作人員亦需跟據現場實際環境狀況，包括不同高空修樹攀登方法的設置時間風險作詳細考慮。



Implementing the Work

- Perform a comprehensive Pre-Work Risk Assessment (PWRA) 
- Only trained, qualified and appointed person can operate aerial platform
- Only trained, qualified and appointed tree climber can perform tree climbing 
- Utility tree workers have to receive additional electrical knowledge training and pass an assessment
- All personal protective equipment, gears and machinery have to be checked before use
- Maintain good communication
- Follow approved work procedures



Monitoring

- Maintain effective communication and supervision in the work site
- Feedback comments to review and continuous improve the work system
- Implement an audit system to identify opportunities for improvement
- Continue to acquire the latest industry technology update



Where use of elevating work platforms or scaffolds or ladder is not practicable.....

Use of rope access or other work positioning techniques may be considered .



Tree climbing PPE and gears



高空作業用途安全帽
(Safety helmet)
符合下列標準
EN397
EN12492
EN50365



胸式安全帶
(Chest harness)
符合下列標準
EN 361



樹上作業坐式安全帶
(Arborist harness)
符合下列標準
EN 358 及 EN 813
ANSI A10.14
ANSI Z359.1



繩索專用移動防墮器
(Fall arrest device)
符合下列標準
EN 353



吸震裝置
(Energy absorber)
符合下列標準
EN 355



安全短繩
(Lanyard)
符合下列標準
EN 358



手套
(Grip type gloves)



鉤環/連接器
(Auto-locking carabiner)



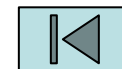
攀樹繩索
(Tree climbing rope)
符合下列標準
ANSI Z133.1 / EN1891



Pre-Work Risk Assessment (PWRA)

- Tools and equipment
- Tree identification, growth condition, decay conditions, leaning or up-rooted
- Site environment, private properties, location of power lines, traffic condition
- Fence off the work site and display notice
- Appoint an observer for monitoring, and as the aerial rescuer in case of emergency

人 - 機 - 物 - 法 - 環



中華電力有限公司 (香港及新電網範圍) CLP 中電

安全工作系統 - 工作前風險評估(PWRA) 表格

(注意: 此表格適用於所有的工作範圍)

工作內容: 高空修樹 日期: 28-Nov-2012

工作地點: 石塘咀 11KV 線路 P15 時間: 07:45

高壓工作(如有): ☐ 低壓工作 ☐ 電力設備 ☐ 電力化學品 ☐ 電力工作 ☐ 其他:

監督/評估員: 林振輝 (只限獲授權人員填寫)

人員: 黃志輝 劉志威 何作強

其他工作地點:

1. 以下列明「工作前風險評估」表格的目的, 在實施及進行前應由安全方面填上「/」號, 如「/」號, 表示工作前風險評估表格已填妥, 並已符合安全標準。若未填妥, 則表示工作前風險評估表格尚未填妥, 必須填妥後, 方可進行工作。

人	機	物	法	環
<input checked="" type="checkbox"/> 工作前風險評估表格已填妥 <input type="checkbox"/> 工作前風險評估表格尚未填妥 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準	<input checked="" type="checkbox"/> 工作前風險評估表格已填妥 <input type="checkbox"/> 工作前風險評估表格尚未填妥 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準	<input checked="" type="checkbox"/> 工作前風險評估表格已填妥 <input type="checkbox"/> 工作前風險評估表格尚未填妥 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準	<input checked="" type="checkbox"/> 工作前風險評估表格已填妥 <input type="checkbox"/> 工作前風險評估表格尚未填妥 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準	<input checked="" type="checkbox"/> 工作前風險評估表格已填妥 <input type="checkbox"/> 工作前風險評估表格尚未填妥 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準 <input type="checkbox"/> 工作前風險評估表格已填妥, 但尚未符合安全標準

PWRA

Tree Work by Rope Climbing

- Plan the route for ascending and descending
- Select anchorage points and setup the climbing rope and independent lifeline
- Conduct tree climbing and carry out tree work, maintain effective communication between the climber and the ground workers
- Always maintain three contact points during the work
- Ensure no people nor vehicle to enter the work zone during the work, especially when removing the branches



Is tree work at height a high risk job?



Conduct pre-work risk assessment, select the route for ascending and descending, and decide the anchorage points



Conclusion

The risks and hazards can be eliminated or mitigated through a Safe System of Work:

- Proper training and risk assessment
- Use of personal protective equipment
- Select the most suitable work method
- Carry out pre-work risk assessment
- Conduct regular site inspection and work monitoring

Safety is our number one priority
Tree work at height can be very safe.

Thank You