



## 中電、醫院管理局及機電工程署合作提供應對電壓驟降的方案

### Solutions to Mitigate Impact During Voltage Dip with Joint Effort by CLP Power, Hospital Authority & EMSD

#### 團隊背景 Background of the Team

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#### 項目背景

醫院管理局(“醫管局”)為香港提供世界級水平的醫療服務。中電也為客戶提供可靠及穩定的供電，但受外在環境因素影響，例如：第三方損毀地底電纜、惡劣天氣和外物干擾架空電纜等，有機會引致電壓驟降，對客戶造成不便。QCC 團隊積極尋求中電、醫管局及機電工程署管理層的支持，成立一個策略性小組，找出應對電壓驟降的最佳方案，以支援醫管局維持高水平的服務質素。

#### Background of the project

Service reliability is a major concern of Hospital Authority (HA), which provides world-class health care to Hong Kong. While CLP Power strives for providing reliable and stable electricity to its customers, some external factors such as underground cables damaged by the third party and overhead lines interfered by adverse weather and foreign objects, etc., will cause voltage dips and bring inconveniences to the customers. The QCC team proactively sought management support from three parties (CLP Power, HA & Electrical and Mechanical Services Department) to set up a Strategic Taskforce to identify the best solutions for HA to mitigate voltage dips.

#### Causes of the Problem

- Third party cable damage.
- Equipment without ride through capability for voltage dips.
- Customers may not aware all the technologies in the market for the best mitigation solutions for their equipment.

#### 問題成因

- 第三方損毀中電電纜。
- 客戶設備沒有應對電壓驟降的能力。
- 客戶未能完全掌握各樣設備最好的改善方法以應對電壓驟降。

#### 解決方法

- 有系統及有效地為電壓驟降影響的設備進行評估，準則包括：(1) 數量 (2) 受影響的頻率 (3) 故障時的衝擊。
- 確定位於 5 家醫院的 5 個不同的試驗解決方案，將來可以複製到相同或其他醫院的類似設備。
- 解決方案包括：瑪嘉烈醫院安裝不間斷電源幫助冷水泵的控制電路通過電壓驟降。伊利沙伯醫院使用繼電器具有延時功能，解決供電系統錯誤啟動問題。屯門醫院採用修改後的控制電路，使空氣壓縮機能自動重新啟動。將軍澳醫院和那打素醫院更改延時計時器的設定，使空氣調節機能自動重新啟動。

#### Solutions

- Systematic and effective evaluation of equipment which were mostly affected by voltage dips based on the following criteria: (1) Large in quantity (2) High frequency to be affected (3) High impact in case of failure.
- 5 different systems located at 5 hospitals were identified for finding pilot solutions and these solutions could be replicated to similar equipment in same or other hospitals.
- The solutions are: Dip-proofing inverters were used to help the control circuit of chilled water pump to ride-through voltage dips in Princess Margaret Hospital. Under voltage repeat relay with time delay function to improve the LV supply changeover scheme in Queen Elizabeth Hospital. Modification of relay control circuitry to enable the air-compressor unit to auto restart in Tuen Mun Hospital. Change of delay timer setting to enable the Air Handling Unit to auto restart Tseung Kwan O Hospital and AH Nethersole Hospital.

#### 成果及效益

##### 有形得益

- 電壓驟降後，需要資源跟進。以第一期 5 間醫院計算可節省 31 萬元。於第二期全面實施解決方案後，將會為 41 間醫院 (包括香港島的醫院) 節省成本，共 255 萬元。

##### 無形得益 (中電)

- 中電能為醫院提高服務水平以達至雙贏，醫院對於這方面的增值服務相當滿意。

##### 無形得益 (醫管局)

- 醫管局可以為病人提供可靠的服務。

##### 無形得益 (機電工程署)

- 機電工程署可以為醫管局的醫院提供更佳的維修服務。

#### Achievements & Benefits

##### Tangible Benefits

- Manpower resources were required to follow up voltage dip cases. In Phase 1 including 5 hospitals, the cost saving is \$311,000. After full implementation in Phase 2 for 41 hospitals (including hospitals in Hong Kong Island), the total cost saving for 41 hospitals will be \$2,550,000.

##### Intangible Benefits (CLPP)

- CLP Power can support HA to enhance service level for win-win situation. HA is satisfied with this value-added service.

##### Intangible benefits (HA)

- HA can provide reliable services to patients.

##### Intangible benefits for (EMSD)

- EMSD can provide better maintenance service to HA's hospitals.



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