MTR 港鐵公司 MTR Corporation

減少將軍澳S700KM轉轍機制動鎖件於維修時的更換次數
Reduction in the Number of Replacements of Pawl Locking Housing of TKL S700KM Point Machine during Overhaul

團隊名稱 Team Name	活力圈 Active Circle
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背景 BACKGROUND

同事在進行大修時，發現將軍澳綫S700KM波口機經長時間使用後，鎖件的表面會出現嚴重磨蝕，需要更換全新的鎖件導致開支增加。活力圈團隊於是構想出一套有效的方法，在保持安全質素的同時，又可以善用資源，減少棄置制動鎖件。

During the overhauls, colleagues had observed that excessive abrasion would occur over a long period of time in the pawl locking housing of Tseung Kwan O Line S700KM Point Machines, which incurred expenses for replacement parts. The Active Circle team came up a new solution to reduce wastageand fully utilise resources while also maintaining the quality of the components.

問題成因 CAUSE OF THE PROBLEM

- S700KM波口機在進行波口轉動時，其金屬鎖緊桿會移動，與制動鎖件的表面產生磨擦，造成損耗。由於鎖緊桿由較硬的鋼鐵製成，而制動鎖件是由較脆弱的鋁青銅合金製成，經長時間使用，鎖件的表面會出現嚴重磨蝕。
- 在進行大修時，同事要檢查制動鎖件的表面。如出現過度磨損，便要更換全新的鎖件，並棄置原有的鎖件，導致每年購買新鎖件的開支龐大。

- When S700KM point machine operates, its metal locking rod moves, and causes friction with the pawl locking housing surface, resulting in metal loss. Since the locking rod is made of harder steel, and the pawl locking housing is made of a more fragile aluminum bronze alloy, the surface of the lock will have severe abrasion over a long period of time.
- During overhaul, the team is required to check the surface of the pawl locking housings. If excessive abrasion occurs, new locks are replaced, and the original locks are discarded, resulting in a considerable annual expense of purchasing new locks.

解決方法 SOLUTION

- 同事仔細研究制動鎖件的產品說明書後，訂出更換制動鎖件的新標準，再與信號及設計組同事確認在制動鎖件符合標準的情況下，可經打磨後（減少接觸面摩擦帶來的磨損）重用。
- 基於上述新標準，制動鎖件的磨蝕厚度由單一接受標準少於0.5mm，改為複合接受標準少於1.5mm。
- 在新標準下，2016和2017年需棄置的制動鎖件分別由75%減至10%和100%減至0%。由於制動鎖件的壽命延長，每年更換鎖件的預計開支得以大大減少。

- After carefully studying the product manual, the team set new standards for replacing the pawl locking housings and confirmed with the Signal and Design Team that the pawl locking housings can be reused after polishing (reducing wear caused by friction on the contact surface) if they meet the standards.
- Based on the above new standards, the abrasion thickness of the pawl locking housings changed from less than 0.5 mm by a single acceptance standard to less than 1.5 mm by a compound acceptance standard.
- Under the new standard, the pawl locking housings disposed in 2016 and 2017 were reduced from 75% to 10% and 100% to 0% respectively. Due to the extended life of the pawl locking housings, the estimated expenditure of replacing the locks per year is greatly lowered.

成果及效益 ACHIEVEMENT & BENEFIT

有形得益

- 每年購買全新制動鎖件的成本可節省約港幣2,195,506元（即：港幣59,338
- 元 x 每年37 套制動鎖件）。
- 打磨一套PAWL道岔的制動鎖件的時間約30分鐘，即每年額外增加了18.5小時工時，約港幣4,255元的工資。
- 提案回本期只需約3天。

無形得益

- 優質服務：新修訂的標準能減少浪費部件，物盡其用，有效運用資源。
- 互敬互重：圈員透過提出本提案明白到多方溝通和了解對團隊工作和解決問題的重要性。
- 創造價值：延長制動鎖件的壽命，為公司減少開支。
- 勇於進取：圈員主動研究延長制動鎖件壽命的方法，勇於思考改善現況的做法。

Tangible Benefits

- The cost of purchasing a new pawl locking housing per year can be saved about HKD2,195,506 (i.e. HKD59,338 x 37 sets).
- It takes about 30 minutes to polish a pawl locking housing, i.e. an additional 18.5 hours of work and a wage of about HKD4,255 per year.
- The payback period is only 3 days.

Intangible Benefits

- Excellent service: The newly revised standards can reduce wastage and fully utilize resources.
- Mutual respect: The team understands the importance of communication, teamwork and problem solving.
- Value creation: The life of the pawl locking housings is extended to save costs.
- Enterprising spirit: The team has taken the initiative to study ways to extend the life of the locks and seek improvements.

已打磨的制動鎖件正進行閉合衝程測試
The polished pawl locking housing is being tested for a closed stroke