



四十五年齊臻善 創新蛻變展佳績

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## 臻善圈 決賽隊伍 提案摘要

### PROJECT SUMMARIES OF WIT FINALISTS



#### 智取世界圈 Robotics Circle

## 引入自主移動機器人 - 提升九龍灣車廠物流及 配送中心的效率與生產力 Improvement in Efficiency and Productivity by Introducing Autonomous Mobile Robot (AMR) to KBD L&DC

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#### 問題剖析

- 九龍灣物流及配送中心每天需要處理約500張訂單，當中涉及大量重複性的行走時間、揀貨和補貨的工序。這帶來了大量人力需求。
- 如果只依賴人手執行上述重複性工序，庫存流動、生產率和效率未能達至效益最佳化，亦因為工作時間長而相對較容易出現人為錯誤。
- 隨着公司業務的拓展，面對日益增加的訂單需求，貨品的庫存量亦因而提升，物流及配送中心內的儲存空間面臨一定的挑戰和壓力。

#### 改善方法

- 使用自主移動機器人 (AMR) 系統把庫存流動的流程自動化，採用機械人減省部份體力操作，生產率和效率亦得以提升。
- AMR與現時的倉存管理系統作相互溝通，機械人能有效地規劃行走路線，安全高效地運送所需的庫存物品。
- 通過分析各庫存特性，挑選合適的貨品存放在已標準化的可移動貨架上；通過收窄貨架與貨架之間的通道，來釋放更多的儲存空間。

#### 總結成果

##### 有形得益

- 創新的「倉架到人」方案，減少人手巡邏和步行的時間，並提升倉庫運營的生產率和效率，每年節省人力開支達120萬港幣。
- 以自動化系統取代人工分貨，減少步行和人手執行重複性工序的時間，提高準確度及效率。
- 使用配備標準化移動貨架的自主移動機器人 (AMR)，令貨架之間的通道收窄，儲存空間提升8%。

##### 無形得益

- 透過減少人手操作的工序和降低安全風險，使工作安全可以大大提升。
- 透過與全球創新部、資訊科技部和採購及供應鏈部合作，去幫助我們創建先進的物流科技，使AMR能夠令物料處理過程變得自動化。
- 通過提供適當的工具和訓練，我們培養了一個讓成員可以探索新想法並利用AMR去提高整體效率和效益的環境。
- 採用數位自動化思維方式使我們能夠迅速適應變化，而AMR的可擴展性使其易於與現有和未來的自動化系統融合，提高整體物流效率。



## Problem Analysis

- KBD Logistics & Distribution Centre handles more than 500 Move Orders (MO) daily, which involves repetitive travelling time, stock picking and replenishment tasks. This incurs significant manpower demand.
- If we solely relied on manual operations for daily repetitive tasks, both efficiency of stock movement and productivity cannot be optimized. Rate of human errors may increase as well due to long working hours.
- With MTR's expansion of business, demand for stock items increases, resulting in the need for a higher inventory level. Therefore, Logistics Centres are facing arduous challenges and under immense pressure on tackling storage space issue.



## Improvement Methods

- Automating stock movement workflow with the use of Autonomous Mobile Robot (AMR) to replace traditional manual works. This results in increased productivity and efficiency.
- By communicating with the existing Warehouse Management System, AMR can dynamically plan delivery route to deliver the required stock item safely and efficiently.
- By identifying suitable items to place in standardized movable shelves, more storage space can be freed up through shortening aisles distance between shelves.



## Summary of Achievements

### Tangible Benefits

- The innovative 'Shelf-to-Person' operating system significantly reduces manual involvement in repetitive delivery tasks. Also, it increases productivity and warehouse operation efficiency and saves annual manpower cost at around \$1.2 million HK Dollars.
- By enabling smart sorting methods, AMR minimizes travelling time as well as improving warehouse sorting efficiency and accuracy compared to traditional repetitive manual sorting methods.
- The use of AMR with standardized movable shelves shortened the distance between aisles and achieved a larger storage capacity by increasing storage area by 8%.

### Intangible Benefits

- Safety at work is enhanced by reducing the involvement of manual operation in the entire process and mitigating potential safety risks.
- Through collaborating with GID, ITSD and P&SCD, it helped us to create advanced logistics technology, which enables AMR to automate our material handling process.
- By providing the right tools and training, we foster an environment where team members can explore new ideas and use AMR to boost their efficiency and effectiveness.
- Embracing a digital automation mindset allows us to quickly adapt to changes, and AMR's scalability makes it easy to integrate with both existing and future automation systems, enhancing overall logistics efficiency.



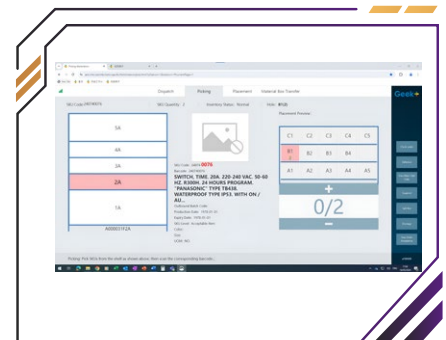
在自動化之前，同事們必須推著手推車在我們的物流中心的貨架間移動，進行上架、揀貨和補貨流程。這導致重複的揀貨工序和行走時間，亦未能達至最高效率。

Prior to automation, colleagues had to travel around the shelves with trolleys in our Logistics Centre for binning, goods-picking and replenishment processes. This led to repetitive picking process and long travelling time within the workplace and led to inefficiency.



使用自主移動機器人(AMR)後，同事們現在可以站在工作站輕鬆執拾貨品，不再需要在物流中心內走來走去。這有助於節省大量同事的行走時間，防止同事過度勞累，並降低工作中潛在的安全風險。

After the usage of Autonomous Mobile Robot (AMR), colleagues can now easily pick the items by standing at the workstation instead of having to travel around the Logistics Centre like before. This can help save an immense amount of travelling time around the Logistics Centre and prevent colleagues from overworking and mitigate the potential safety risks at work.



人性化的系統令同事能夠輕鬆識別要揀選的物品，從而提高整體效率和準確性。

The user-friendly system layout enabled colleagues to easily identify items to be picked and hence enhanced the overall efficiency and accuracy.