



RFID

Enabling Engine

無線射頻識別 (RFID) 應用引擎

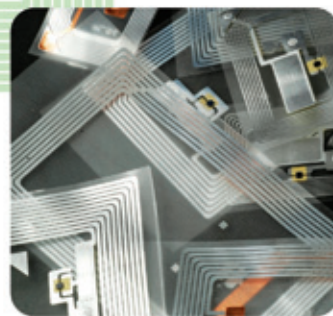
掌握RFID技術 提升物流業競爭力

Enhancing the competitiveness of
logistics industry with RFID technology

RFID



CASE SHARING
個案分享



主辦機構
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「中小企業發展支援基金」撥款資助
Funded by SME Development Fund



工業貿易署
Trade and Industry Department

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This project is organized by The Chamber of Hong Kong Logistics Industry Limited, co-organized by GS1 Hong Kong and funded by the SME Development Fund of the Trade and Industry Department, HKSAR Government. Any opinions, findings, conclusions or recommendations expressed in this material/event (or by members of the Project team) do not reflect the views of the Government of the Hong Kong Special Administrative Region, Trade and Industry Department or the Vetting Committee for the SME Development Fund.

此項目由香港物流商會有限公司和香港貨品編碼協會聯合主辦，並由香港特別行政區政府工業貿易署中小企業發展支援基金撥款資助。在此刊物上 / 活動內（或項目小組成員）表達的任何意見、研究成果、結論或建議，並不代表香港特別行政區政府、工業貿易署及中小企業發展支援基金評審委員會的觀點。

1 Project Background 項目背景



1.1 Current Industry Environment and Challenges

1.1.1 Global Buyers' Demand for EPC/RFID Deployment

Today, an increasing number of multinational companies (MNCs), such as Wal-Mart, are demanding their suppliers – mostly comprising of Small-to-Medium Enterprises (SMEs) – to employ EPC/RFID tags on their case level. By doing this, it will help facilitate supply chain visibility and traceability in achieving shipment tracking and proof-of-delivery.

1.1.2 International Buyers' Distinct RFID Requirements

Most RFID tools available in the market today are technical development platforms that require users to develop complex codes to capture data or make enquiries on events. However, in order to leverage these tools, logistics technology solution providers have to conduct additional work to study, design, develop and test cycles before these tools are able to read and upload information to EPCIS. The situation further becomes complicated as most of the various global buyers have their own requirements on RFID label formats and information required for different events.

1.1.3 Lack of Technology Knowledge for SME Logistics Service Providers

Multinational logistics service providers have the capability to track shipments and proof of delivery using EPC/RFID technology. However, SME logistics service providers still lack the technological know-how and skills-set to deploy EPC/RFID related services, including tag printing, tag reading, as well as the capability to establish connection with EPCIS.

1.1 當今業界環境與挑戰

1.1.1 配合環球買家要求 EPC/RFID技術日益普及

越來越多像沃爾瑪等的跨國公司，要求供應商（當中以中小企規模為主）為所提供的貨品在其貨箱貼上產品電子代碼/無線射頻識別（EPC/RFID）標籤。此舉令供應鏈的透明度和追溯力得以提升。

1.1.2 基礎RFID技術雖同 國際買家RFID要求各異

今天市面上見到的RFID工具，多數是需要用戶自行開發複雜程式來採集數據或查詢事件的技術開發平台。然而，企業如果想善用這些軟件平台來讀取及上載資料到產品電子代碼資訊服務（EPCIS），則需先聘請物流技術方案供應商來為工具加工，即研究用戶要求，繼而設計、開發和測試軟件。情況更複雜的是，大部份環球買家都各自訂立了自己專用的RFID標籤格式要求，包括資料必須符合不同的產品電子代碼資訊服務（EPCIS）標準。

1.1.3 中小企物流服務供應商 技術知識不足

現時大多數跨國物流服務供應商都能以EPC/RFID技術來追蹤貨運及證明貨物的送達。然而，中小企規模的物流服務供應商的技術知識和技能，往往仍不足以提供印製標籤、讀寫標籤，及連接EPCIS等EPC/RFID相關服務。



1.2 The Chamber of Hong Kong Logistics Industry

The Chamber of Hong Kong Logistics Industry (CHKLI) aims to promote cooperation and market information exchange between logistics operators in Hong Kong and Mainland China, and to explore new business opportunities through strengthening of connection with international logistics service providers. The organization actively participates in government and public activities with a view to enhance business environment for the logistics industry. Besides, CHKLI monitors the development trend of the logistics industry and to assist operators to increase competitiveness by improving management skill and service level.

1.2 香港物流商會

香港物流商會致力於為香港及中國內地物流企業服務，促進兩地物流業相互合作和交流，以及加強與國際物流業的緊密聯系，拓展商務網絡，創造商機。同時亦積極參與政府及公共事務，為物流業爭取最佳的營商環境，維持地區經濟繁榮穩定。我們也將關注物流發展趨勢，協助業界提升物流管理能力和服務水平，增強同業競爭力。



1.3 GS1 Hong Kong

Founded in 1989, GS1 Hong Kong is a not-for-profit industry support organization dedicated to helping Hong Kong companies drive supply chain efficiency and deliver value through the innovative use of GS1 System of Standards.

As GS1's local chapter, GS1 Hong Kong is the only organization that is authorized to issue and administer GS1 identification numbers in Hong Kong. Standards and solutions offered include Barcoding services, B2B e-commerce services, Global Data Synchronization (GDS) and Electronic Product Code™ / Radio Frequency Identification (EPC/RFID). The organization also hosts a wide range of training courses to facilitate knowledge transfer for global supply chain standards implementation, enabling technology and best practices.

The GS1 community has over one million corporate members spanning 155 countries and economies and more than 20 industries worldwide.

1.3 香港貨品編碼協會

香港貨品編碼協會 (GS1 Hong Kong) 於一九八九年成立，是一個非牟利的工商業支援機構。GS1標準的創新應用，協助香港企業提升供應鏈效率和創優增值。

作為GS1國際組織的本地分會，香港貨品編碼協會是唯一獲認可簽發及管理GS1識別碼的機構。協會所提供的標準和解決方案，包括條碼服務、企業對企業 (B2B) 電子商貿服務、全球數據同步 (GDS)，以及產品電子代碼/無線射頻識別 (EPC/RFID)。此外，協會更舉辦一系列培訓課程，促進企業對推行全球供應鏈標準的知識傳授，分享技術和最佳實務。

GS1組織在全球擁有超過100萬個企業會員，遍佈155個國家及經濟體，覆蓋逾20多個行業。



1.4 Government Funding

Funded by the SME Development Fund of Trade and Industry Department, HKSAR Government in the year of 2009/2010, RFID Enabling Engine (RFID EE) is organized by The Chamber of Hong Kong Logistics Industry Limited, co-organized and implemented by GS1 Hong Kong.

1.4 政府資助

「RFID應用引擎」是香港特別行政區政府工業貿易署「中小企業發展支援基金」撥款資助的2009/2010年度開發項目。該項目由香港物流商會主辦，並由香港貨品編碼協會協辦及執行。

Glossary of Technology Terms

API - An application programming interface (API) is a set of functions, procedures, methods or classes that an operating system, library or service provides to support requests made by computer programs.

EPC - The Electronic Product Code (EPC) is a unique number that is used to identify a specific item in the supply chain. It is stored on a radio frequency identification (RFID) tag.

EPCIS - EPC Information Services is also a software that collects and stores event data (e.g. loading on pallet or unloading of container) and provides an interface for user to inquire on the event data collected. EPCIS is an EPCglobal standard designed to enable EPC-related data sharing within and across enterprises. The EPCIS standard defines standard interfaces to enable EPC-related data to be captured and subsequently to be queried using a set of service operations and an associated data model. The standard specifies only the interfaces between applications that capture EPC-related data and those that need access to it. It does not specify how the service operations or databases themselves should be implemented. The interfaces enable interoperability while the implementations allow for competition.

EPC Middleware - For objects with RFID tag, readers can pick up a continual stream of data (EPCs). RFID middleware is a software that collects all the data (EPCs) read by RFID reader and performs validation of data and filters off duplicated data.

Open Source - Open source is a development methodology, which offers practical accessibility to a product's source including the source code and knowledge. Users of open source are usually able to use the product free of charge, however, they may need to maintain the product by themselves or through a collaborative workgroup.

RFID - Radio-frequency identification is an automatic identification method that relies on storing and remotely retrieving data using devices known as RFID tags. Today, RFID is used in enterprise supply chain management to improve the efficiency of inventory tracking and management.

RFID Printer - RFID printers are devices that can print visible information on the label and simultaneously write invisible data on the RFID tag.

RFID Reader - A transmitter/receiver that reads the contents of RFID tags. The maximum distance between the reader's antenna and the tag vary, depending on the application. An RFID reader usually connects to more than one antenna to improve read rate.

RFID Tag - An electronic identification device comprising of a chip and antenna. RFID tags are basically a label with data stored in the chip inside the tag. The data are unique numbers to identify the products or an asset identification number for tracking purposes.

術語一覽

應用程式介面 - 應用程式介面 (API) 由一組電腦函數 (functions)、子程序 (procedures)、方法 (methods) 或類別 (classes) 所組成。這些元素都是操作系統 (operating system)、常式庫 (library) 或服務 (service) 為支援電腦程式發出的要求 (requests) 而提供。

EPC - 產品電子代碼 (EPC) 是一個獨一無二的編碼，用來識別供應鏈上的個別物件。這個編碼儲存於RFID標籤內。

產品電子代碼的資訊服務(EPCIS) - 一套可收集及儲存事件數據 (如裝箱或集裝箱卸貨) 的軟件，並為用戶提供一個查詢收集得來的事件數據介面。EPCIS乃根據EPCglobal的標準設計，令EPC相關數據可在企業內部，甚或跨企業共享。EPCIS標準訂立了一些標準介面，令用戶可以利用一組作業服務和相連的數據模型來採集及查詢EPC相關數據。該標準只著墨於收集和查詢EPC相關數據的應用軟件之間的介面，而不觸及服務作業或數據庫的具體執行安排。該標準介面既可令企業的系統相互運作，又可保持企業間的競爭。

EPC 中間件 - RFID讀寫器可從物件上的RFID標籤上擷取一連串的EPC數據。RFID中間件是一種軟件，收集RFID讀寫器讀得的數據 (EPC)，並執行驗證和過濾重複的數據。

開放源碼 - 是一種開發電腦程序的方法，讓開發人員能存取產品的源碼，包括源始碼和知識。開放源碼軟件的用戶通常都可以免費使用軟件，惟須自行或自組人員來維護產品。

RFID - 無線射頻識別 (RFID) 這種自動識別方法，是依靠如「RFID標籤」的儀器來儲存和遠程讀取數據。今天，RFID技術已應用在企業供應鏈管理方面，從而提升庫存追蹤和管理效率。

RFID打印機 - 是一部既能打印標籤上肉眼可見的資料，又能同時把肉眼看不見的數據寫進RFID標籤的儀器。

RFID讀寫器 - 是一個能讀寫RFID標籤內容的收發儀器。讀寫器與標籤之間的收發距離，視乎所採用的應用軟件而定。RFID讀寫器通常會連接多條天線，以改善讀寫取速度。

RFID標籤 - 是一種內置電子晶片和天線的電子識別儀器。RFID標籤基本上是一張附有儲存數據晶片的標貼，所存的數據都是獨一無二的編碼，作識別及追蹤產品和資產之用。

2.1 Project Objectives

The RFID Enabling Engine (RFID EE) Project is organized by the Chamber of Hong Kong Logistics Industry Limited, co-organized by GS1 Hong Kong and funded by the SME Development Fund of the Trade and Industry Department, HKSAR Government. The Project intended to achieve the following objectives:

- Develop an EPC/RFID Enabling Engine that will help in equipping Logistics Technology Solution Providers with the appropriate tool to facilitating RFID tag printing, RFID tag reading, and establishing connection with EPCIS
- Simplify the development of EPC/RFID enabled logistics applications, such as warehouse management, cargo tracking, proof of delivery, etc.
- Carry out pilot cases in partnership with Logistics Service Providers and Logistics Technology Solution Providers in order to make the RFID applications a reality and implement them in real-life environment

2.2 Project Beneficiaries

2.2.1 Logistics Technology Solution Providers

EPC/RFID standards are well-established industry standards that deal with most of logistics industry's requirements. Today, it is now feasible to develop tools that enable logistics technology solution providers to effectively deploy EPC/RFID technology. With the RFID Enabling Engine, an open source software, local logistics technology solution providers will benefit by developing RFID solutions for their customers, i.e. Logistics Services Providers.

2.2.2 Logistics Service Providers

SME logistics service providers will benefit from the software developed by logistics technology solution providers, based on the RFID EE. With these RFID applications, better services can also be provided to their customers, such as buyers and suppliers. This will allow local SME logistics service providers to sharpen their business acumen and provide value-added up-to-date technology for their customers, hence enhancing their skills to keep pace with intense market competition.



2.1 項目目標

「RFID應用引擎」〔RFID Enabling Engine〕項目由香港物流商會主辦、香港貨品編碼協會協辦，並由香港特別行政區政府工業貿易署「中小企業發展支援基金」撥款資助。該項目擬達成以下目標：

- 開發一套可給物流技術方案供應商作為基礎技術的EPC/RFID應用引擎，用以印製RFID標籤、讀寫RFID標籤、連接EPCIS
- 簡化支援EPC/RFID的物流軟件〔如倉庫管理、貨物追蹤和貨物送達證明等系統〕的開發過程
- 與物流服務供應商及物流技術方案供應商攜手開展試點項目，令開發出來的RFID應用軟件更切合實際需要，並應用於現實生活環境之中

2.2 項目受惠者

2.2.1 物流技術方案供應商

EPC/RFID標準是物流業內行之有效、可處理大部份業界需要的行規。今天，為物流技術方案供應商開發可以有效地推行EPC/RFID技術的工具已非空談。受惠於開放源碼，本地物流技術方案供應商可以RFID應用引擎為基礎，為其物流服務供應商客戶度身訂造RFID軟件方案。

2.2.2 物流服務供應商

受惠於物流技術方案供應商以RFID應用引擎為基礎而度身訂造的軟件，中小企物流服務供應商能為其買家和供應商等生意伙伴提供更佳服務。本地中小企規模的物流服務供應商因此提升了商業觸覺，及為其客戶提供更好的新技術，從而提高他們的技能水平，在競爭激烈的市場中保持一席位。



2.2.3 Logistics Industry

With the availability of RFID EE in the industry, SME logistics service providers will be equipped with RFID applications that will help improve operational efficiency and add values to their businesses. Being one of the four industry pillars of the local economy, it will benefit Hong Kong in strengthening its position as a regional logistics and trading hub. As a result, it will also enhance the competitive advantages of local logistics industry players as a whole.

2.2.3 物流業界

RFID應用引擎的出現，令中小企規模的物流服務供應商得以利用RFID應用軟件來提高其業務的營運效率和增值。作為本地四大行業之一，物流業的成功當然有助於香港強化其區內物流及貿易樞紐的地位。本地整體物流業者亦因而加強了競爭優勢。

2.3 Open Source RFID Enabling Engine

RFID Enabling Engine (RFID EE) is an open source software module that logistics technology solution providers can download for free. They can use the software to develop a wide range of logistics applications, e.g. EPC/RFID-based Warehouse Management System, Proof-of-Delivery System, Cargo Tracking System, etc.

The open source RFID EE will allow logistics technology solution providers to shorten development time and reduce the cost of connecting the Electronic Product Code Information Services (EPCIS). Instead of individual logistics technology solution providers developing their own data capture and query instructions to EPCIS, RFID EE provides them with a data capture interface to collect event data and facilitate them to make queries in obtaining necessary event information.

As an open source module, the engine can be customized to seamlessly integrate with RFID middleware and EPCIS (see graph on next page). This configuration enables logistics applications to use simple API to connect RFID EE where exchange for all data is connected through certified data linkage. To this end, it enables logistics technology solution providers to focus more on business application development rather than consuming arduous time in understanding RFID technology and integrating technology into their applications.

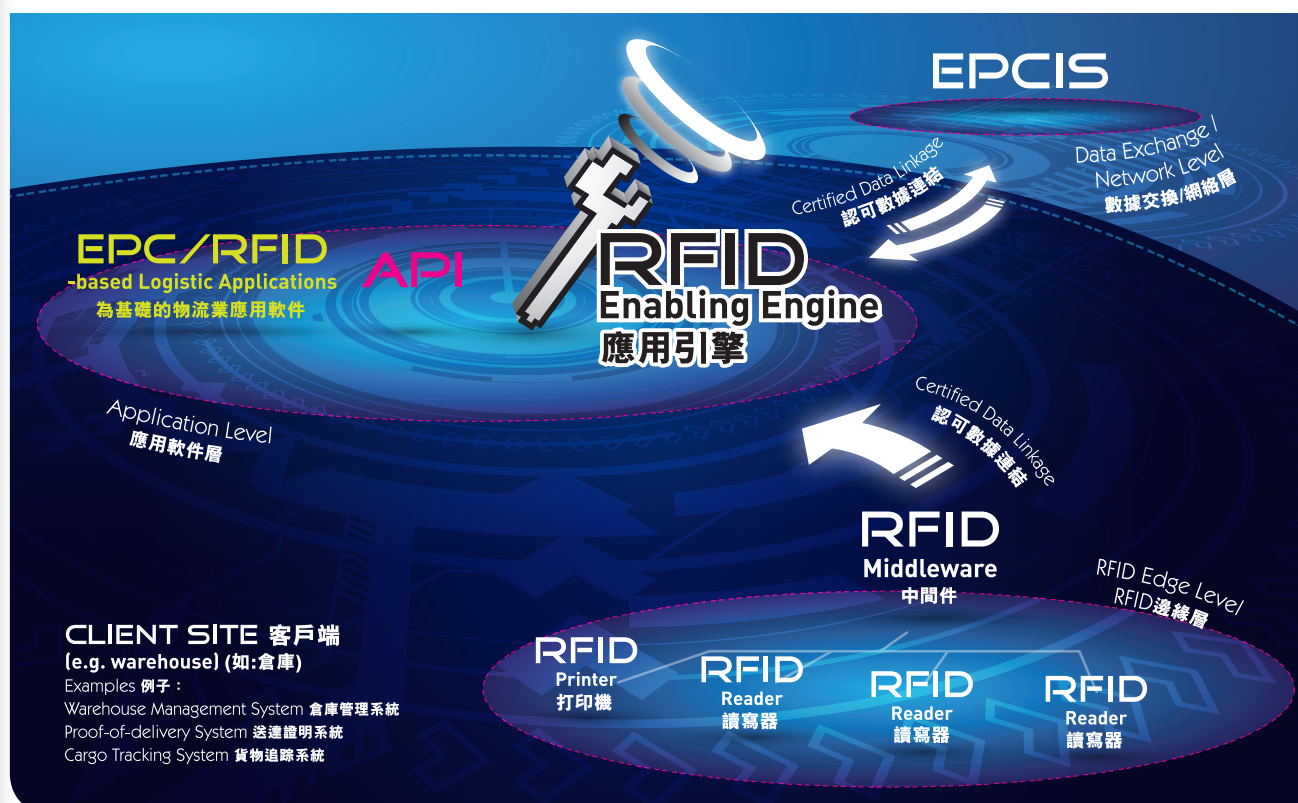
2.3 開放源碼的RFID應用引擎

RFID應用引擎是一個開放源碼軟件模組，可供物流技術方案供應商免費下載。物流技術方案供應商可建基於此，開發其他物流應用軟件，例如以EPC/RFID技術為基礎的倉庫管理系統、貨物送達證明系統及貨物追蹤系統等。

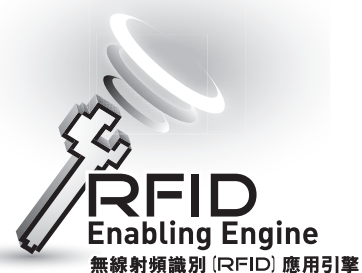
開放源碼的RFID應用引擎有助於物流技術方案供應商縮短軟件的開發時間，並可減低連接EPCIS的成本。物流軟件供應商可以透過RFID應用引擎提供的數據擷取介面來收集事件數據，方便查詢所需事件資訊，而毋須自行開發數據擷取及查詢的EPCIS指令。

因為其源碼模組性質，RFID應用引擎可與RFID中間件和EPCIS無縫整合〔見後圖〕。該配置方法能令物流應用軟件可以利用簡單的應用程式介面〔API〕來連接RFID應用引擎，讓資料經認可數據連結〔Certified Data Linkage〕於RFID應用引擎上進行交換。因此，物流技術方案供應商毋須再為了解和整合RFID技術而張羅，可以專注於開發應用軟件。

RFID ENABLING ENGINE (SOFTWARE MODULE)
RFID 應用引擎 (軟件模組)



Download the RFID Enabling Engine
and user guide for free at
www.gs1hk.org/RFIDEE



請瀏覽 www.gs1hk.org/RFIDEE

免費下載「RFID應用引擎」及用戶手冊。

3

Pilot Company – Earnward Warehouse Limited

試點公司 — 盈滙倉庫有限公司



“

We've come to a conclusion that EPC/RFID warehouse management system is the right solution that can address many key challenges of warehouse management. We also believe that it can further help the logistics industry to evolve business for 3PL.

我們發現採用EPC/RFID倉庫管理系統，確實能解決倉庫管理上的很多主要流弊。我們更相信，有關技術能進一步為物流業界發展第三方物流業務。

”

3.1 Participating Company

Earnward Warehouse Limited (EWL) was founded in Hong Kong in 1991 initially occupying a warehouse space of 10,000 square. Since then the company rapidly grew and now a logistics service provider with 180,000 square feet of warehouse facility in Kwai Chung, Hong Kong. It has also expanded its operations in China and today maintains a 200,000 square feet warehouse in Guangdong province in the Mainland.

3.1 參與公司

盈滙倉庫有限公司〔「盈滙」〕成立於1991，初期的倉庫面積為10,000平方呎。自此盈滙茁壯成長，今天已是業界翹楚，其位於香港葵涌區的倉庫設施，面積達180,000平方呎。此外，盈滙亦已著手拓展中國業務，其廣東省的倉庫面積，更有200,000平方呎。

Participating Logistics Service Provider: 物流服務供應商參與方：	Earnward Warehouse Limited (EWL) 盈滙倉庫有限公司
Application Implemented: 所推行應用軟件：	Mattress Warehouse Management 床墊倉庫管理
Participating Logistics Technology Solution Provider: 物流技術方案供應商參與方：	EPC/RFID-based Warehouse Management System (WMS), provided by Sedna Systems Limited 由思納系統有限公司提供的以EPC/RFID技術為基礎的倉庫管理系統
	RFID handheld application, provided by Vizilog Solutions Company Limited 由維思樂有限公司提供的手提RFID應用軟件
	RFID handheld reader – CS101, provided by Convergence Systems Limited 由Convergence Systems Limited提供的CS101型RFID手提讀寫器
	RFID printer – Toshiba B-SX5T, provided by Sedna Systems Limited 由思納系統有限公司提供的東芝B-SX5T型RFID打印機
	RFID tag, provided by Aeroprint [E&A] Limited 由 Aeroprint [E&A] Limited 提供的RFID標籤



3.2 Current Challenges

EWL provides warehouse facility to store a large number of goods for different manufacturers and suppliers with different delivery lead times. Similar with other SME logistics service providers, EWL was previously managing their warehouse and inventory operations manually without adopting a holistic tracking process. EWL has to record the exact location of each mattress and locate the correct mattress during stock-out process. This led to high human error rate in fulfilling store orders which resulted in incurring high costs due to shipment delays or missing delivery schedules. To improve their supply chain visibility and warehouse management efficiency, EWL participated in a pilot project in implementing an EPC/RFID-based Warehouse Management System (WMS).

Today, EWL has five warehouses in Hong Kong that store variety of products. Its facility in China Aviation Logistics Centre in Kwai Chung stores more than 1,000 mattresses for a leading bedding company. In order to enhance the efficiency of stock-take by location and improve stock-out accuracy of the high valuable mattresses of its clients' assets, EWL decided to search for the right RFID solution in the industry.

3.3 Solution Implementation

"Since we began working with the standard-based RFID tracking system in January this year, we've come to a conclusion that EPC/RFID warehouse management system is the right solution that can address many key challenges of warehouse management. We also believe that it can further help the logistics industry to evolve business for 3PL," said Mr. Thomas Yau, IT Specialist, EWL.

The stock-out process at EWL begins when the products arrive at the facility. All the mattresses are initially labelled with EPC/RFID tags based on the product information. All operations, including stock-in and stock-take of mattress and its associated warehouse location are recorded by the RFID handheld reader. The information collected is synchronized to the EPC/RFID-based WMS via wireless connection. To ensure 100 percent accuracy of stock-out operation, each mattress is verified using an RFID handheld reader before performing stock-out procedure.

3.2 眼前挑戰

盈滙為不同的製造商和供應商提供倉庫設施，儲存大量送遞時間要求不一的貨物。以往，盈滙與其同業一樣都以人手管理倉庫和庫存運作，缺乏全面的貨物追蹤程序。盈滙需要紀錄每張床墊的實際存放位置，以及在安排出倉時準確地找出所需床墊。結果是執行提存指示時出現錯漏，繼而為補救送遞延誤致成本上升。為改善其供應鏈透明度及倉庫管理的效能，盈滙參與了一個推行以EPC/RFID技術為基礎的倉庫管理系統的試點項目。

今天，盈滙在香港擁有五個存放不同貨物的倉庫。其位於葵涌區的中國航空快遞物流中心，為香港一家主要床上用品公司提供可儲存逾千床墊的庫存空間。為了更有效能地為客戶盤點儲存於不同倉庫的貨物，以及改善貴價床墊等客戶資產的出倉準確度，盈滙決定找尋適用於業界的RFID方案。

3.3 推行解決方案

負責盈滙資訊科技項目的邱偉雄先生說：「自今年一月開始使用標準為本的RFID追蹤系統以來，我們發現採用EPC/RFID倉庫管理系統，確實能解決倉庫管理上的很多主要流弊。我們更相信，有關技術能進一步為物流業界發展第三方物流業務。」

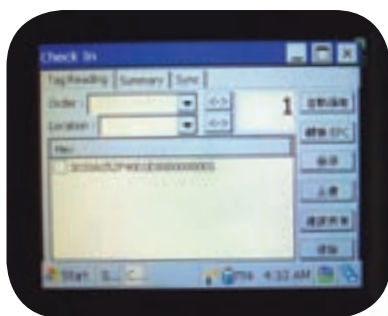
盈滙的出倉工序從貨物抵達其倉庫設施開始。首先，每張床墊都會貼上一張內存產品資料的EPC/RFID標籤。以後，不論是入倉、盤點，還是其他相關的倉庫位置，都由RFID手提讀寫器紀錄下來。收集得來的資料會經無線網絡傳送回以EPC/RFID技術為基礎的倉庫管理系統。為確保出倉百份百準確，每張床墊在出倉前都會先用RFID手提讀寫器來核實。

System configuration

系統配置圖

EWL
盈滙

EPC/RFID-based Mattress Warehouse Management
以EPC/RFID技術的床墊倉庫管理



3.4 Business Benefits

In implementing the solution, EWL is now enjoying real-time traceability of warehouse items, hence achieving logistics visibility in their warehouse facility.

3.4.1 Increasing Efficiency in Stock-take by Location

With the use of RFID handheld reader, EWL now handles stock-take with a flick of a finger. “Compared with our previous warehouse management practice, it took us 48 hours to complete the stock checking process. With EPC/RFID-based WMS application, this process is now accomplished within half a day. We now also only need two personnel to handle this task whereas in the past four staff had to manually complete the process. As a result, we have enhanced our warehouse management efficiency by effectively allocating resources and saving the time spent on monitoring and identifying stock,” Mr. Yau said.

3.4.2 Improving Accuracy in Stock-out

Mr. Yau said “EWL opted for the EPC/RFID-based Warehouse Management System in order to effectively handle and provide clients such as the bedding company accurate delivery information. The mattresses are of high value and not easy to manually identify, and must reach their destination on time”. “The use of standard-based RFID technology for warehouse management system is proving to be most helpful to our warehouse operation by eliminating human errors. We have successfully achieved 100 percent accuracy in shipments,” he added. With this, the cost of return is eliminated while the customer satisfaction was enhanced.

EWL’s EPC/RFID warehouse management system is indeed a pioneering project – it has significantly resulted in quicker, accurate and efficient mattress handling. As a whole, the pilot program has made a significant positive business impact on the company.

3.4 商業成果

有了這個解決方案，盈滙的倉庫設施現已具備實時倉品追溯能力和物流透明度。

3.4.1 提升個別盤點倉庫的效能

手提RFID讀寫器令盈滙的盤點工作成為不過彈指之間的事。邱先生說：「以往未有系統時，我們往往要花48小時來完成一次盤點工作。有了以EPC/RFID技術為基礎的倉庫管理系統，這項工作現時只需半天。而人手方面，同樣的工作可以從往日的四名員工減至兩名。我們的倉庫管理效能得以提升，實有賴於資源的有效分配，和在監管及識別貨物方面所用時間的減省。」

3.4.2 改善出倉準確度

邱先生表示，盈滙採用以EPC為基礎的RFID倉庫管理系統，是為了有效地管理倉庫，為床上用品公司等客戶提供準確的送貨資料。他說：「床墊乃貴重貨物，又難於識別，送貨則必須準時。」邱先生補充：「事實證明，採用標準為本RFID技術的倉庫管理系統，可避免人為錯誤，令我們的倉庫運作更暢順。打從這項工序自動化起，我們的送貨準確度達到100%。」退貨的成本因而減低，客戶的滿意度則得以提升。

盈滙的RFID倉庫管理系統無疑是一個先機早著的項目，它為盈滙帶來了又快又準確的高效能處理床墊工序。總括而言，這項試點項目為盈滙帶來了豐碩的商業成果。





中昇國際投資有限公司

“ Through the EPC/RFID-based Cargo Tracking System, we are able to effectively monitor goods movement along the supply chain from the stock-out at our warehouse to the stock-in at retailer's warehouse. The system provides us with an item-level tracking capability, hence ensuring product visibility.

以EPC/RFID為基礎的貨物追蹤系統令我們可以有效地監察，從我們出倉到零售商入倉整條供應鏈上，貨物是如何送運。有了這套系統，我們可以逐件貨物追蹤，確保貨物的透明度。

”

4.1 Participating Company

China Rise International Investments Limited (China Rise), a food manufacturing company founded in 2000 that produces high-quality ready-to-eat food adopts a centralized manufacturing management approach. It has a factory in Mainland China that manufactures high-value ready-to-eat dried abalone and ready-to-eat sharks fin soup which the company ships to Hong Kong through the help of a third-party logistics service provider. In this pilot case, China Rise pioneers the adoption of EPC/RFID-based Cargo Tracking System for its ready-to-eat dried abalone products.

4.1 參與公司

中昇國際投資有限公司〔中昇國際〕成立於2000年，是一家以中央廚房管理模式生產優質即食食品的食品加工製造商。中昇國際在中國內地設有廠房，生產貴價的即食乾鮑和即食魚翅湯，並經外判的物流服務供應商運往香港。在這個試點項目中，中昇國際率先採用以EPC/RFID為基礎的貨物追蹤系統來管理即食乾鮑之運送。

Participating Manufacture Company: 生產商參與方：	China Rise International Investments Limited 中昇國際投資有限公司
Application Implemented: 所推行應用軟件：	Ready-to-eat Dried Abalone's anti-counterfeit system using EPC/RFID-based Cargo Tracking from Manufacturer to Retailer 即食乾鮑防偽系統 - 以EPC/RFID技術追蹤貨物從生產商運往零售商的整個過程
Participating Logistics Technology Solution Provider: 物流技術方案供應商參與方：	EPC/RFID-based Cargo Tracking System, provided by Vizilog Solutions Company Limited 由維思樂有限公司提供的以EPC/RFID為基礎的貨物追蹤系統
 	RFID handheld application, provided by Vizilog Solutions Company Limited 由維思樂有限公司提供的手提RFID應用軟件
	RFID handheld reader – CS101, provided by Convergence Systems Limited 由Convergence Systems Limited提供的CS101型RFID手提讀寫器
	RFID printer – Zebra-R110Xi, provided by Zebra Technologies Asia Pacific LLC 由Zebra Technologies Asia Pacific LLC提供的Zebra-R110Xi型RFID打印機
	RFID tag, provided by Matizon Consulting Limited 由馬特信有限公司提供的RFID標籤

4.2 Current Challenges

“We manufacture ready-to-eat dried abalone in Mainland China, which are of high value and quality compared with other packaged food in the market today. In order to protect our products from being counterfeited along the supply chain, we need to find a way to effectively authenticate our goods,” said Mr. Anthony Cheung, CEO of China Rise. To achieve this business goal, it is critical to have a high transparency of goods movement and inventory records of its dried abalone products in its distribution locations, particularly from its warehouse to the retailer’s storage facility. To address customers’ health concern, China Rise is exerting all efforts to protect its brand and business in line with its strategy to fight against counterfeiting, hence ensuring that their customers enjoy high-quality products. China Rise wants to ensure that the market gets the real goods, hence gaining solid customer confidence.

4.3 Solution Implementation

With the implementation of EPC/RFID-based Cargo Tracking System, China Rise is able to improve product visibility and goods movement from its warehouse to its customer’s premises (e.g. warehouse). In adopting the system, China Rise attaches a secure label with unique serial identification number to each can of ready-to-eat dried abalone. Then, multiple cans are packed into a carton box with a corresponding EPC/RFID tag attached on the carton box. The associated product information is electronically routed via the EPC/RFID-based Cargo Tracking System to EPCIS services for recording.

In order to protect the product while in the warehouse, the secured labels’ status is set to ‘Not Available for Sale’. Prior to performing stock-out at the warehouse, the EPC/RFID tag on the carton box is read using an RFID handheld reader. The information is then synchronized with the EPCIS Services’ database validating that the cans of abalone have strictly followed the proper stock-out process. The stock-out items are then marked as authenticated goods and ready for public consumption, hence ensuring that the products will not be distributed in the market illegally. When the carton of abalone boxes arrive at the retailer’s warehouse, the EPC/RFID tags on the boxes will be read and the information is synchronized to the EPCIS Services’ database for tracking, hence enhancing the visibility of information along the supply chain.

4.2 眼前挑戰

「我們在中國內地生產即食乾鮑。即食乾鮑是云云包裝食品中價高而質優的一種。為免在供應鏈上被魚目混珠，我們需要有效地認證貨物。」中昇國際行政總裁張華英先生表示。此之所以，整個貨物送運過程必須高度透明，而乾鮑的各個貨運點都務必存庫紀錄，尤其是從中昇國際的倉庫到零售商的儲存設施一段。為了保障顧客健康，讓顧客放心享用優質產品，中昇國際銳意打擊魚目混珠的勾當，捍衛其品牌及生意。中昇國際希望能確保市面上掛有中昇國際品牌的產品都是正貨，贏取顧客信心。

4.3 推行解決方案

推行以EPC/RFID為基礎的貨物追蹤系統令中昇國際改善了貨物透明度，及從中昇國際倉庫到客戶倉庫等地方的貨物送運過程。因應系統的推行，中昇國際會為每罐即食乾鮑貼上一個防偽標貼，標貼上載有一個該罐獨有的序列識別號碼，並會為每個可容納數罐即食乾鮑的包裝紙箱貼上一個相應的EPC/RFID標籤。有關產品資料會經以EPC/RFID為基礎的貨物追蹤系統，傳返電子產品碼資訊服務作紀錄。

基於保安需要，倉庫內貨物的防偽標貼狀況會先設定為「非供發售」。在貨物出倉前，員工會以RFID手提讀寫器來讀取紙箱上的EPC/RFID標籤資料。有關資料隨即傳返電子產品碼資訊服務的數據庫核實，確保每罐鮑魚都是循正常程序出倉。然後，系統會把每件出倉貨物的狀況更新為「可供發售」，以免貨物經不法渠道流入市場。當一箱箱鮑魚運抵零售商的倉庫後，該倉庫的員工又會讀取紙箱上的EPC/RFID標籤，並將資料傳返電子產品碼資訊服務的數據庫作貨物追蹤，提升整條供應鏈的資料透明度。

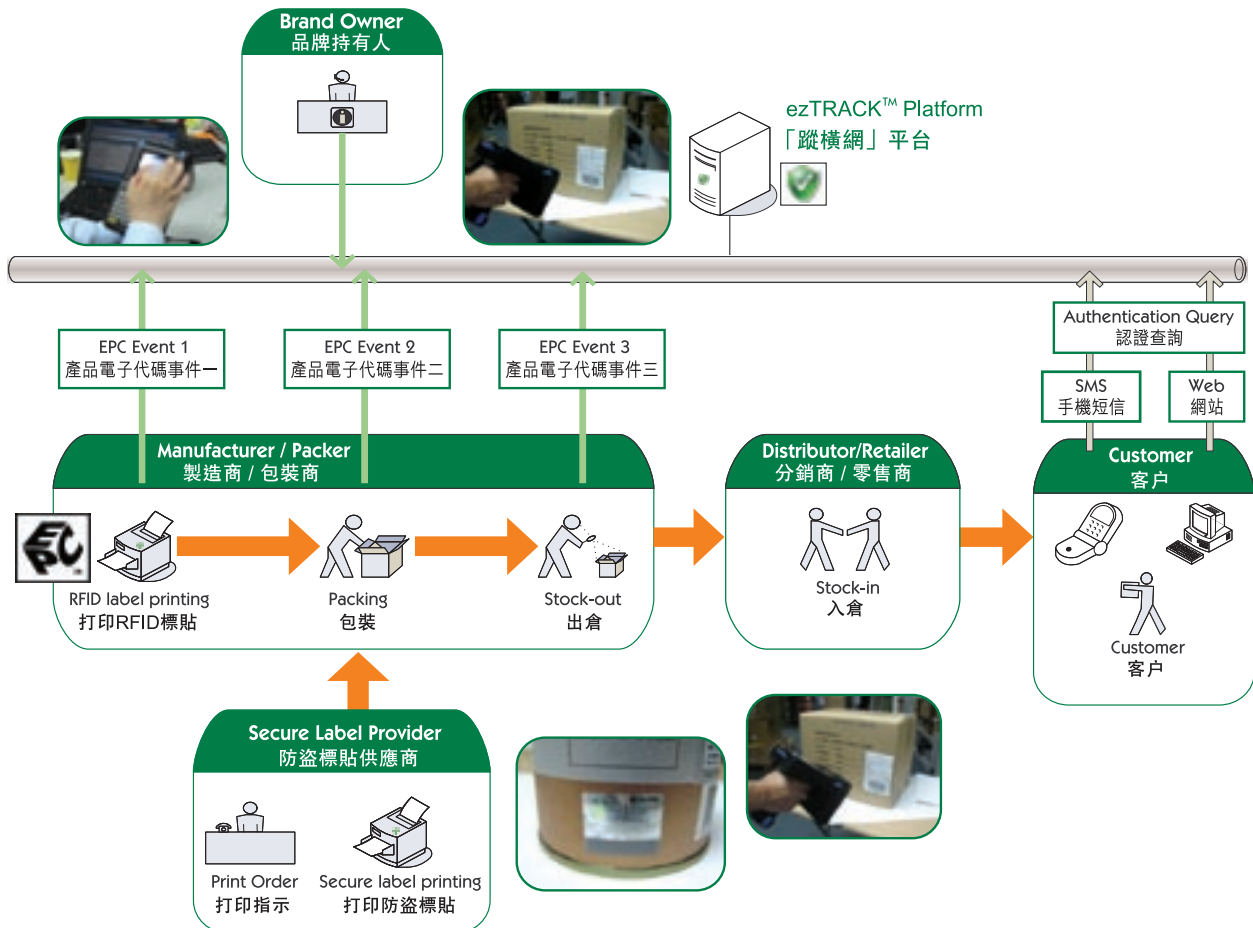


System configuration

系統配置圖

China Rise
中昇國際

Dried Abalone's anti-counterfeit system using EPC/RFID-based Cargo Tracking from Manufacturer to Retailer
乾鮑防偽系統，以EPC/RFID技術追蹤貨物從生產商運往零售商的整個過程



4.4 Business Benefits

4.4.1 Enabling Anti-counterfeit Protection through Supply Chain Visibility

“Through the EPC/RFID-based Cargo Tracking System, we are able to effectively monitor goods movement along the supply chain from the stock-out at our warehouse to the stock-in at retailer’s warehouse. The system provides us with an item-level tracking capability, hence ensuring product visibility,” Mr. Cheung said. With the use of EPC/RFID application, the event history of goods movement are captured and stored in the system for possible or future queries. The event history data which includes the date and time the stock-out was performed is associated at the item-level, and are unique and not easy for any third party organization to duplicate.

4.4.2 Adding Value in Providing Additional Product Track-and-Trace Information

Traditionally, key to achieving business success for a logistics service provider is to provide the fastest delivery service at a competitive cost. Today, the situation is no longer the case. Companies are demanding for more information of their goods movement along the supply chain. By obtaining accurate track-and-trace information, it facilitates product visibility, enabling efficient supply chain management, including product authentication to combat counterfeit, channel management to monitor distribution and avoid parallel goods, and cold chain management to maintain goods’ quality and product, among a few. Indeed, it is important for a company to have product visibility capability in order to achieve the above business scenario.

4.4.3 Driving Consumer Satisfaction along the Supply Chain

“As one of the pilot users in the project and a pioneer in adopting EPC/RFID-based Cargo Tracking System for ready-to-eat dried abalone in the market, we would like to demonstrate the best practice in product authentication along the supply chain using the EPC/RFID application to enhance customer satisfaction,” Mr. Cheung emphasized. In a nutshell, it shows that the use of EPC/RFID based Cargo Tracking System not only offers companies business benefits in achieving visibility of goods movement, but also benefits the consumers by enabling them to distinguish counterfeit goods through product authentication.

4.4 商業成果

4.4.1 提升供應鏈透明度 打擊魚目混珠

「以EPC/RFID為基礎的貨物追蹤系統令我們可以有效地監察，從我們出倉到零售商入倉整條供應鏈上，貨物是如何送運。有了這套系統，我們可以逐件貨物追蹤，確保貨物的透明度。」張先生表示。EPC/RFID應用軟件保存了每件貨物的出倉日期時間等貨物送運紀錄，既方便用戶查閱，外人又難以複製。

4.4.2 貨物追蹤及追溯資料 為物流服務供應商增值

傳統上物流服務供應商的「送貨快、貨格低」市場競爭策略，今天已不再適用。現今的物流客戶都要求更多有關貨物在供應鏈上送運的資料。準確的追蹤及追溯資料有助提升貨物透明度，令物流客戶更有效管理供應鏈，如認證貨物真偽以打擊冒牌貨；亦可更有效管理貨物分銷渠道，監察分銷情況及避免水貨流入；還可以更有效管理冷凍鏈，保持貨物的品質。簡言之，物流客戶必須具備貨物透明度，方可嚐到上述效益。

4.4.3 真偽可辨 客戶稱心

「身為項目試點用戶一員，及採用以EPC/RFID為基礎的貨物追蹤系統來管理即食乾鮑的市場先驅，我們希望能以身作則，展示如何善用EPC/RFID應用軟件來做到供應鏈上的貨物認證，提升客戶的滿意程度。」張先生強調。一言以蔽之，不但物流客戶可受惠於以EPC/RFID為基礎的貨物追蹤系統所帶來的貨物送運透明度，廣大消費者憑藉貨物認證來辨別貨物真偽，亦同樣得益。





“

With the use of EPC/RFID application, we have enhanced the flexibility and efficiency of our warehouse management process. More importantly, we now have an accurate and efficient delivery process that allows us to gain better customer satisfaction.

使用EPC/RFID軟件提升了我們的倉庫管理過程彈性和效能。更重要的是，我們現在有一個既準確又具效率的送遞程序，令我們的客戶更滿意。

”

5.1 Participating Company

From a beginning in 1999, Sun Rise Management Limited (Sun Rise) is now among the growing number of small-to-medium size logistics service providers in Hong Kong. The company provides warehouse, cargo transportation and haulage services to its valuable customers in the apparel, food, home appliance and raw materials industries. Today, Sun Rise maintains a 30,000 square feet warehouse in Yuen Long, New Territories.

5.1 參與公司

旭景管理有限公司〔「旭景」〕始創於1999，現時是香港眾多中小企規模物流服務供應商的一員。該公司為成衣、食品、家電和原材料業的客戶，提供倉庫、貨物運輸和拖運等服務。今天，旭景在新界元朗的倉庫，面積達30,000平方呎。

Participating Logistics Service Provider:

物流服務供應商參與方：

Sun Rise Management Limited

旭景管理有限公司

Application Implemented:

所推行應用軟件：

Plastic Particle and Backpack Warehouse Management

膠粒和背包的倉庫管理

Participating Logistics Technology Solution Provider:

物流技術方案供應商參與方：

EPC/RFID-based Warehouse Management System (WMS), provided by Sedna Systems Limited

由思納系統有限公司提供的以EPC/RFID技術為基礎的倉庫管理系統

RFID handheld application,

provided by Vizilog Solutions Company Limited

由維思樂有限公司提供的手提RFID應用軟件

RFID handheld reader – CS101,

provided by Convergence Systems Limited

由Convergence Systems Limited提供的CS101型RFID手提讀寫器

RFID printer – Zebra-R110Xi,

provided by Zebra Technologies Asia Pacific LLC

由Zebra Technologies Asia Pacific LLC提供的Zebra牌R110Xi型RFID打印機

RFID tag,

provided by Matizon Consulting Limited

由馬特信有限公司提供的RFID標籤



5.2 Current Challenges

“Our main operational objective is to enhance warehouse efficiency by effectively minimizing human errors. We can achieve this by improving our warehouse processes using the latest information technology solution,” said Mr. Kwok Fai, the Founder of Sun Rise. Sun Rise’s clients require the company to manage inventory by their manufacturer’s lot numbers. All stock-in, stock-take and stock-out operations must not only be based on the product codes, but also the manufacturer’s lot numbers. Different customers have different requirements in managing their inventory. Besides, some customers require Sun Rise to manage their inventory by both case and item levels. This means that manual operation will be involved, hence Sun Rise must effectively manage and avoid human error in managing stock-out process.

5.3 Solution Implementation

With a clear idea on the challenges they need to address, Sun Rise implemented an EPC/RFID based Warehouse Management System (WMS), with the assistance of Sedna Systems Ltd. This makes the company one of the pilot users in using the open source RFID Enabling Engine.

Now that the solution has been implemented, all warehouse operations (including stock-in and stock-out) are operated using an RFID handheld reader. The data collected during stock-in and stock-out is synchronized with the EPC/RFID-based WMS to produce an accurate inventory report. In this pilot, Sun Rise is able to manage inventory by manufacturer’s lot numbers and handle stock-out by case and item levels. In addition, a Proof-of-Delivery (PoD) module is available to record the actual date and time the goods were received at the customer side by using the RFID handheld reader.

5.2 眼前挑戰

「我們的運作宗旨是，盡量減少人為錯誤，從而提升倉庫的效能。為了達到這個目標，我們採用最新的資訊科技方案來改善倉庫的運作。」旭景的創辦人郭輝先生說。旭景的客戶要求旭景以製造商的貨物批號來管理庫存。所有入倉、盤點和出倉的工序都必須以產品編號，以及貨物批號來進行。不同客戶對管理庫存的要求亦有所不同。此外，部份客戶會要求旭景管理貨物時，以箱和件為單位。如斯複雜的要求，自然需要人手參與。旭景因此務必有效處理，避免管理出倉過程中的人為錯誤。

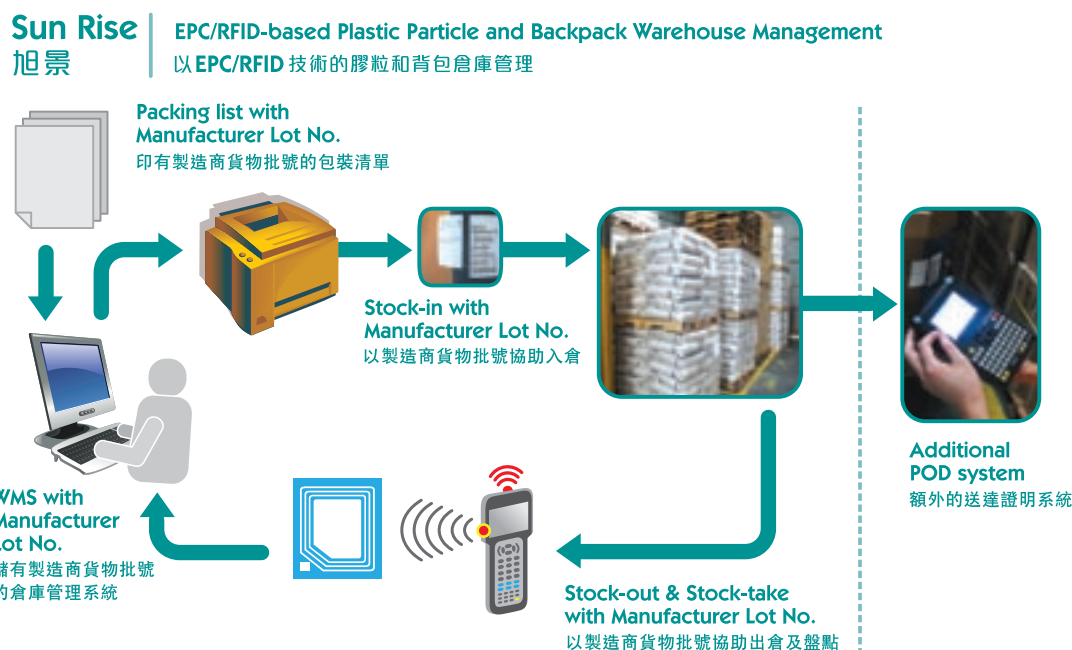
5.3 推行解決方案

既然明確知道要針對的挑戰，旭景遂在思納系統有限公司〔「思納」〕的協助下，推行了一套以EPC/RFID技術為基礎的倉庫管理系統。旭景因為採用了它而成為RFID應用引擎的首批試點用戶。

有了這個解決方案，所有倉庫運作〔包括入倉及出倉〕都由RFID手提讀寫器包辦。在入倉及出倉期間收集得來的數據，會回傳到以EPC/RFID技術為基礎的倉庫管理系統，以編製準確的庫存報表。在這個試點項目中，旭景既可以用貨物批號來管理庫存，又可以用箱和件為單位來處理出倉的工序。再者，該系統亦提供貨物送達證明模組，用戶可以利用RFID手提讀寫器，紀錄貨物抵達客戶時的實際日期及時間。

System configuration

系統配置圖

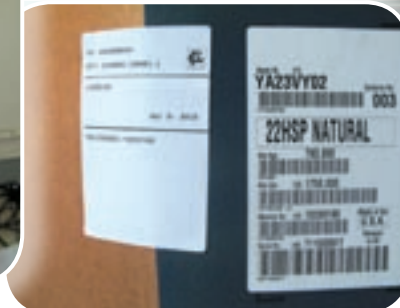


5.4 Business Benefits

As a logistics service provider, it is vital to fulfill customer's requirements for stock management. In order to keep its competitive advantage, Sun Rise has successfully implemented the EPC/RFID-based Warehouse Management System to simplify the task of managing inventory based on manufacturer's lot numbers and handing inventory on case and item levels.

5.4.1 Improving Accuracy to Eliminate Cost of Returns

"With the use of EPC/RFID application, we have enhanced the flexibility and efficiency of our warehouse management process. More importantly, we now have an accurate and efficient delivery process that allows us to gain better customer satisfaction," Mr. Kwok added. With the implementation of EPC/RFID-enabled WMS, Sun Rise is further aiming to achieve 100 percent accuracy of its stock-out process, which in turn will eventually help in reducing or eliminating the cost of returns. The bottom line is that an accurate and on-time delivery will result in better customer loyalty and satisfaction.



5.4.2 Facilitating Case and Item-level Stock-out

With the EPC/RFID application, WMS can now effectively locate and identify the products, not only on case-level, but also on item-level. Previously, the stock-out of backpack was on per case (e.g. 10 pieces of backpack per box case). Today, with the item-level tagging, warehouse staff can tag the individual backpack, hence facilitating the item-level stock-out requested by the customers.

5.4.3 Accelerating RFID Learning Curve

Today, EPC/RFID technology is being widely adopted by various sectors. Sun Rise is keen on acquiring in-depth knowledge in deploying EPC/RFID technology into their business and daily operations and keep pace with the increasing adoption of RFID in the industry. "We want our employees to keep abreast of the latest RFID technology trends to better understand its benefits to our operations. This will help the company in moving forward and stay highly competitive in the market," Mr. Kwok concluded.

5.4 商業成果

對物流服務供應商而言，滿足客戶對庫存管理的要求可謂責無旁貸。為了保持競爭優勢，旭景成功採用了以EPC/RFID技術為基礎的倉庫管理系統，簡化了以製造商貨物批號來管理庫存，和以箱和件為單位處理庫存的工作。

5.4.1 改善準確度 省卻誤送費

「使用EPC/RFID軟件提升了我們的倉庫管理過程彈性和效能。更重要的是，我們現在有一個既準確又具效率的送遞程序，令我們的客戶更滿意。」郭先生補充說。隨著推行支援EPC/RFID的倉庫管理系統，旭景進一步以100%的出倉準確度為目標，冀能減少因誤送而造成的退貨，省卻無謂成本。無論如何，快而準的送遞服務是令客戶長期惠顧和滿意的基石。



5.4.2 逐箱逐件 適隨尊便

EPC/RFID軟件令倉庫管理系統可以尋找及識別貨箱，甚至單件貨物。以前，背包是以貨箱為單位出倉，每十件為一箱。今天，因為每件貨物都可以附以標籤，倉庫的工作人員就可以因應客戶的要求來逐件出貨了。

5.4.3 多加認識RFID

今天，EPC/RFID技術已廣為多種行業所用。旭景一直銳意深入認識EPC/RFID技術，把技術融入日常運作之中，與時並進。「我們希望員工能知道RFID技術的發展趨勢，好使我們更了解RFID技術可為我們的運作帶來什麼好處。此舉有助於旭景不斷向前，在市場上保持高度競爭力。」郭先生總結而言。

6 Conclusion 結語

By presenting the pilot case implementation, it has proven that RFID Enabling Engine is indeed an effective tool to enable SME logistics technology solution providers build EPC/RFID based applications that they can deploy in logistics service providers' daily and sophisticated warehouse and logistics operations involving management and tracking of different products with different stock-in/take/out requirements targeted for different customers.

The Chamber of Hong Kong Logistics Industry and GS1 Hong Kong extend their gratitude for the exceptional support provided by the Trade and Industry Department of the HKSAR Government and the participating companies, including Earnward Warehouse Limited, China Rise International Investments Limited, and Sun Rise Management Limited, in helping to put together this informative casebook.

試點個案的成功證明，RFID應用引擎確能幫助中小企規模的物流技術方案供應商開發以EPC/RFID為基礎的應用軟件，協助物流服務供應商處理日常繁複的倉庫及物流運作，為不同客戶管理及追蹤不同貨物，配合不同的入倉、盤點和出倉要求。

本項目有賴香港特別行政區政府工業貿易署，及盈滙倉庫有限公司、中昇國際投資有限公司和旭景管理有限公司等參與公司的鼎力支持，香港物流商會和香港貨品編碼協會得以順利編製成這本個案手冊。

Download the RFID Enabling Engine
and user guide for free at
www.gs1hk.org/RFIDEE

請瀏覽 www.gs1hk.org/RFIDEE

免費下載「RFID應用引擎」及用戶手冊。





RFID



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