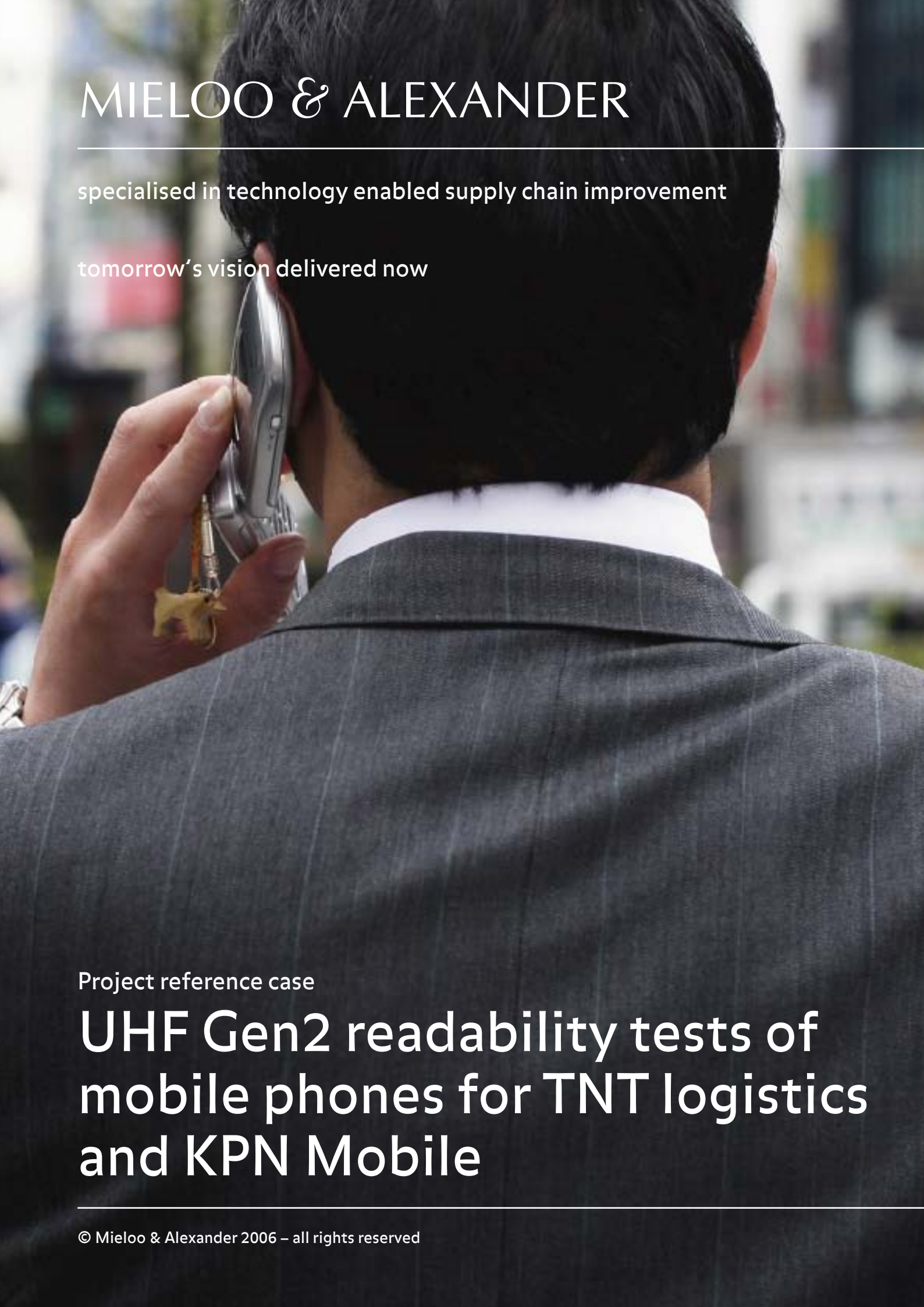


MIELOO & ALEXANDER

specialised in technology enabled supply chain improvement

tomorrow's vision delivered now

Project reference case

UHF Gen2 readability tests of mobile phones for TNT logistics and KPN Mobile

UHF Gen2 readability tests of mobile phones for TNT logistics and KPN Mobile

The performance of the UHF RFID technology has significantly improved since the advent of Generation 2 technology, as the results of our extensive testing show. For a wide variety of products, processes and businesses, UHF RFID technology is now sufficiently robust for operational deployment; first (pilot) projects are emerging.

Nevertheless, 100% readability performance is not yet a guarantee in all instances, as performance still depends on a number of factors. Dominant ones are the physical and packaging characteristics of products, the physical environment, the business processes and physical operations/handlings in which RFID is deployed, and as a resultant of the previous, the suitability of the RFID technology for your operation.

Mieloo & Alexander has bundled its extensive expertise in process redesign, system design and RFID technology to help clients assess and maximize the performance of UHF RFID technology for their operation.

The RFID services of Mieloo & Alexander include

- Objective performance assessment of RFID UHF tags and readers of the leading vendors (ongoing 'fundamental' research for which the lab cooperates with the TU Delft)
- Selection of the best performing RFID technology for the specific business processes, products and physical environment of the client
- Onsite readability tests and analysis of the logistics processes and physical operation/handlings to maximize readability performance
- RFID Business Case, Blueprint and Implementation strategy planning

Box including multiple mobile phones

Introduction Tellitrace project

The Tellitrace project is an initiative of TNT, KPN, Symbol & Zebra to track & trace mobile phones from the TNT warehouse in Leidschendam to two outlets of KPN. The mobile phones are identified, using UHF Gen 2 RFID tags on the outside of the package.

Since a demand for tracking & tracing the mobile phones is to have 100% readability results, there is a need to test the readability performance of the RFID tags when placed on the mobile phones. This feasibility study must be performed prior to the trial period. Mieloo & Alexander were selected to perform this feasibility study.

Objective readability test:
"Perform RFID readability tests in order to identify the best position of the tag on the item, the item in the box and the box on the pallet, trying to minimize the impact on current business process".

RFID enabled process: pick, pack & despatch from TNT Logistics to KPN

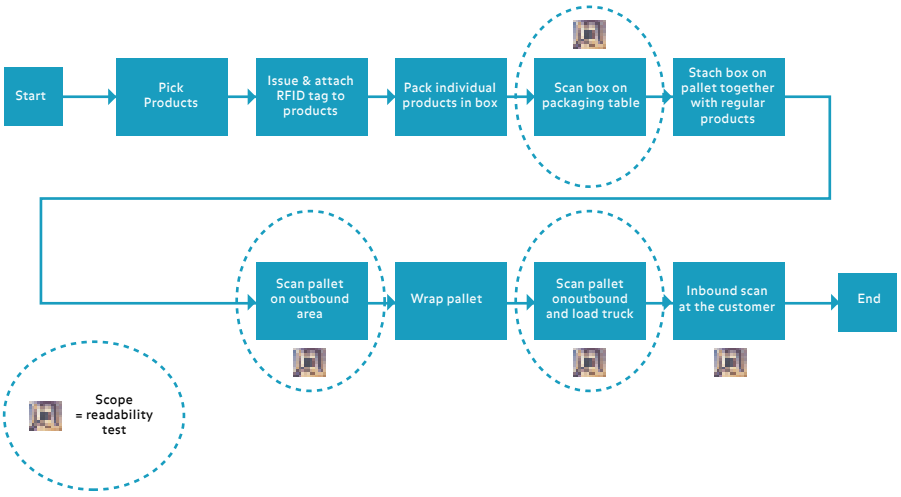
Mobile phones are picked from stock using barcode technology for identification. This registration triggers the issue of a RFID label that is issued and attached to the package of individual mobile phones. The individual mobile phones are packed into a box and another RFID label is attached to the outside of the box. This outside box label will be used to identify which mobile phones are in what box. The individual products and the box are read at the packaging table, before it's stacked on a pallet. Multiple boxes are stacked on a pallet, together with non tagged products and the mixed pallet is read at the dock door, before it is issued to one of the KPN outlets.

Mieloo & Alexander's approach and role

A small team of experienced project & change managers and supply chain consultants supported Sony with:

- Overall program & change management (excluding design, build and implementation of the EDC, as this was run as a separate program),
- Business process, system and organization (re-)design
- Roll-out project management
- Overall test & migration management
- Program management of the EDC Quality improvement program
- Risk mitigation management
- SAP consultancy and support

The same team was then assigned to the program & change management of the business transfer of Sony Europe to Sony United Kingdom Limited, the integration of AIWA Marketing of Europe (a 100% subsidiary of Sony) into Sony Marketing Europe and the redesign and implementation of the Quota/Allocation solution.



RFID enabled pick, pack & despatch process

The objective of the readability tests is to reach 100% readability of individual items and boxes at the packaging table. Secondly 100% readability at outbound when the goods leave the TNT warehouse towards the outlets of KPN is preferable.

Technology used for performing the readability tests

Readability tests are performed with the Symbol readers and antennas and Zebra labels (Rafsec inlays) and with the requirement to minimize process redesigns. Some more details on the technology are:

- Symbol XR480 UHF RFID Reader for the European Market (ETSI EN 302 208, ISO 18000-6 type C).
- Symbol High Performance Area Antennas
- Symbol Tagvis v1.0.6 Software
- Rafsec Class 1, Gen 2 Short Dipole Tags with Impinj IC.

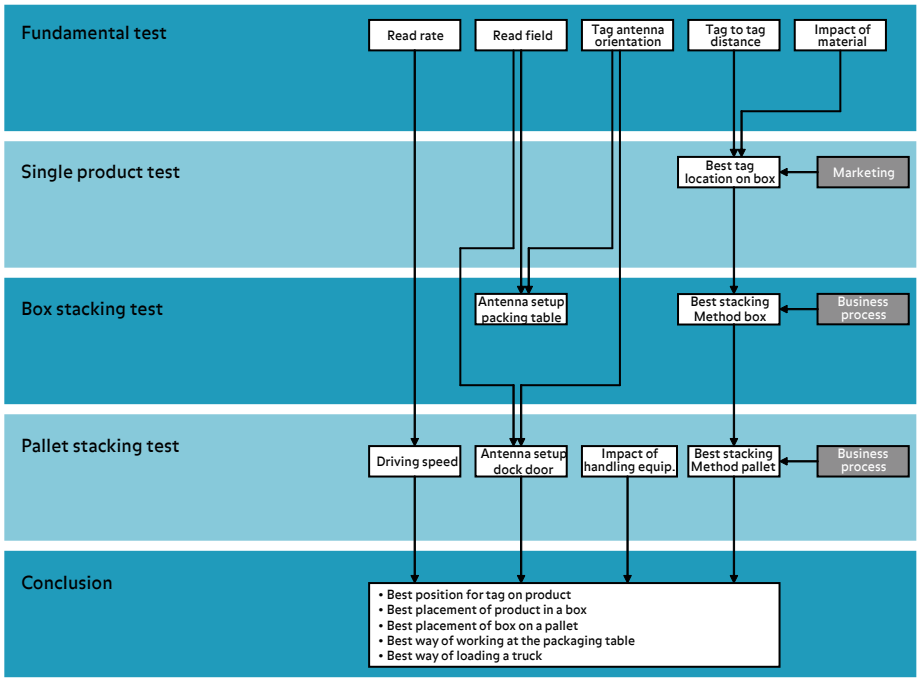
M&A's thorough test approach: key to success!

Since Radio Frequency Identification makes use of radio wave technology, a number of influences determine the readability performance of every individual RFID tag and therefore overall readability performance of, for instance, a full pallet with tagged products. In order to be able to predict readability performance or to draw any conclusions from readability results, it is necessary to find every individual parameter which applies to radio wave technology and has impact on readability performance. After identifying every parameter that has influence on readability performance, one needs to determine how great this influence is on the total readability performance of the full pallet.

Mieloo & Alexander have developed a methodology in identifying all parameters and finding their individual influence on readability performance. This method is called the bottom-up readability optimization method. First in a

laboratory environment (free from outside influences) all parameters are identified and tested one by one. Then the outcome of these tests is used to find the best place for a tag to stick on a single product, after which the best way of stacking the product in a box is found. Then the best way of placing the box on a pallet is determined and finally the influence of the handling equipment and operational influences are measured. These tests also determine the best reader and antenna setup for use in operation.

The method developed by Mieloo & Alexander reviews the given technology (both reader and tag vendor) and identifies the technology status and shortcomings on this technology. The method will not give advice in performing fundamental research on the technology side, but gives recommendations in changing business processes in order to increase the readability performance. The overview above shows the bottom-up approach for increasing this readability performance by making minor changes in the business processes. The bottom-up approach is divided into four phases of tests. First the fundamental test is performed, then the single product test which is followed by the box stacking test and finally the pallet stacking test.



Approach readability tests: four test phases

Results readability tests:

Due to readability tests performed by Mieloo & Alexander of individual items on a pallet (ca. 20 products in a box and ca. 4 boxes on a pallet), the readability performance increased from 74% to 99,6%. 100% readability was still difficult to obtain due to certain product characteristics like CD's in boxes or due to interference of the number of products on a pallet.

Steel warehouse with a humidity controlled environment

About Mieloo & Alexander

Mieloo & Alexander Business Integrators is a consulting firm that specializes in technology enabled supply chain improvement, with a focus on supply chain management and visibility through the use of innovative information technology (RFID). The highly trained consultants design, plan and implement advanced supply chain solutions that focus on RFID Electronic Product Code (EPC) and real-time locating solutions (RTLS). Mieloo & Alexander has customers throughout Western Europe that include multinationals such as: Sony, Akzo Nobel, KPN, ASML, TNT and Hitachi. Mieloo & Alexander is headquartered in Hoofddorp in the Netherlands.

Our office

De Zuidtoren
Taurusavenue 13
2132 LS Hoofddorp
The Netherlands

T: + 31 (0) 23 565 6000
F: + 31 (0) 23 565 6009

For more information see:
www.mielooandalexander.com

Office Mieloo & Alexander

Mieloo & Alexander

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Contact details:

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The Netherlands

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F: + 31 (0) 23 565 6009

For more information visit our website:
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