Beyond X-Ray

Product Introduction

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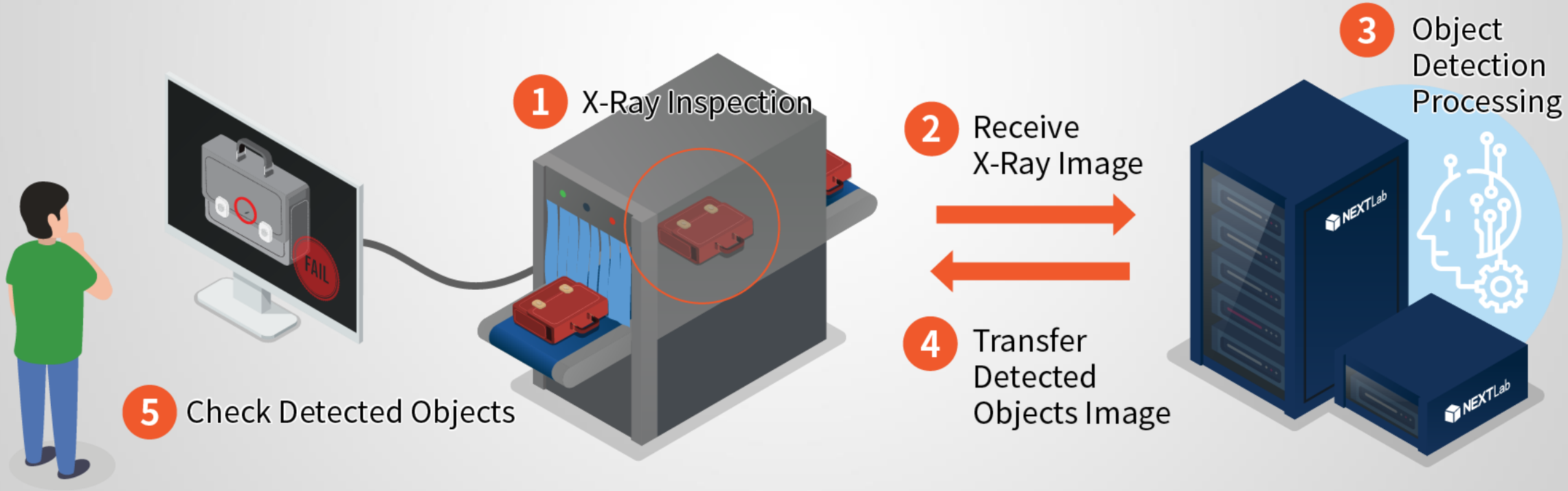
Click or Shot this to see the Introduction Video!

What is Beyond X-Ray

- ✓ Automated Foreign Objects(Defects) Detection System
- ✓ Applicable Products : Garment Products (Bags, Handbags, Shoes and Apparels)
- ✓ Based on Deep Learning Technology (for detecting various objects)



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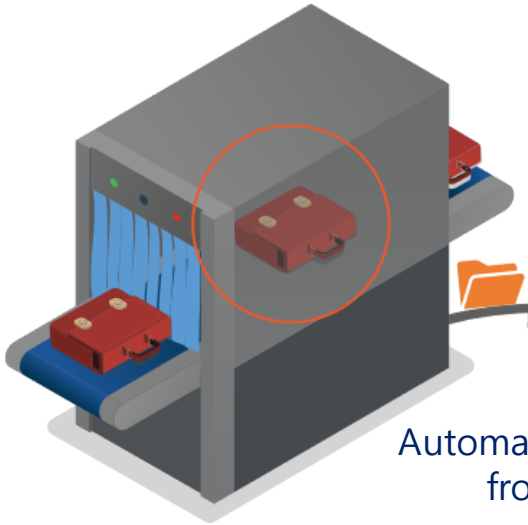
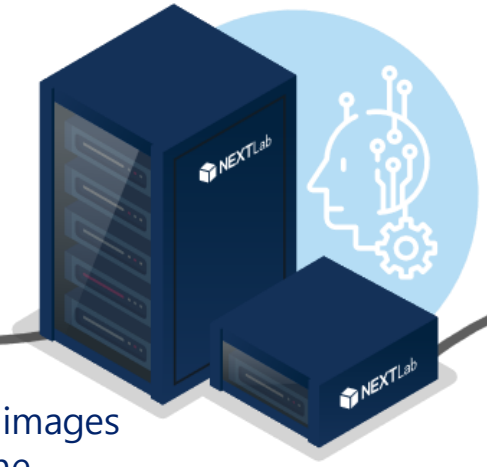
How it works

X-Ray Machine



Generating X-Ray Images

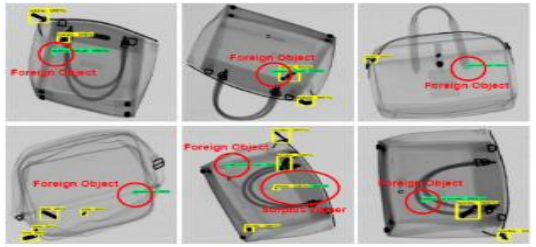
Beyond X-Ray



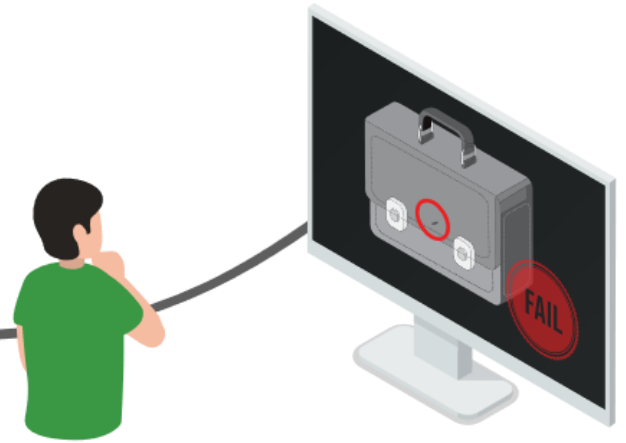
Automatically taking X-Ray images
from the X-Ray machine

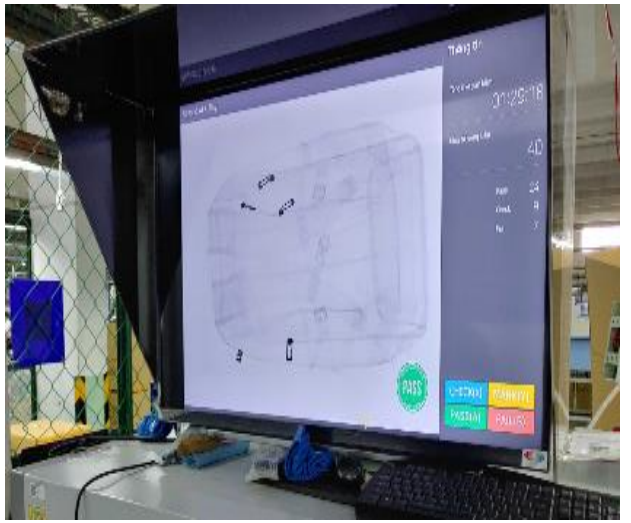
Deep Learning based Detection engine

Finds "Foreign Objects"
by analyzing the X-Ray Image



Outputs the Detection Results





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Specifications (Achieving ISO/IEC 25023:2016 Certification, June 2020)

Analysis Speed

< 0.9 seconds

After getting X-Ray image from the X-Ray machine

Accuracy

99.9%

From the running results of backpack production

Metal Complaint

0

After using Beyond X-Ray

Detection Performance

More than 2 X 2 pixel sized foreign objects†

†Actual Size vary with the X-Ray machine's resolutions
(For Techik's TXR-6080XH, 1 Pixel = 0.43mm at Width Direction, 1 Pixel = 0.2mm at Length Direction)

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Advantages

- ✓ From needle piece to scissors, the Beyond X-Ray can detect wide-range of foreign objects.
- ✓ Thanks to the deep-learning technology, the detection accuracy can be continuously increasing.

As-Is

Metal Detector

Cannot apply to metal accessories attached products

X-Ray Machine

『**Human Error**』
Detection accuracy vary with the inspector's eyesight and concentration

『 **Lack of Automation** 』
- Factory's MES cannot be linked
- No Reporting features

With Beyond X-Ray

(1) Automated Detection
- Various types of objects can be detected
- Using Deep-Learning based algorithm

(2) Customer Optimization
- Can be linked with customer's MES
- Can be applied to the automated lines

(3) Managed Service
- Provides remote S/W monitoring & upgrading

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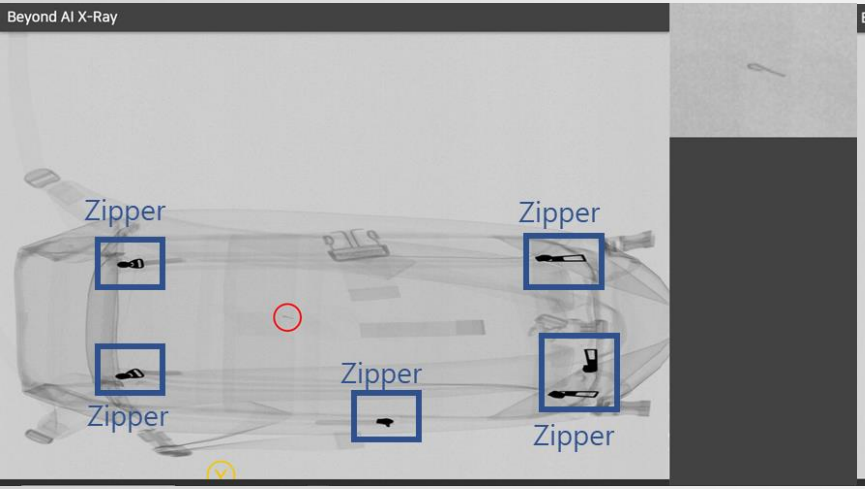
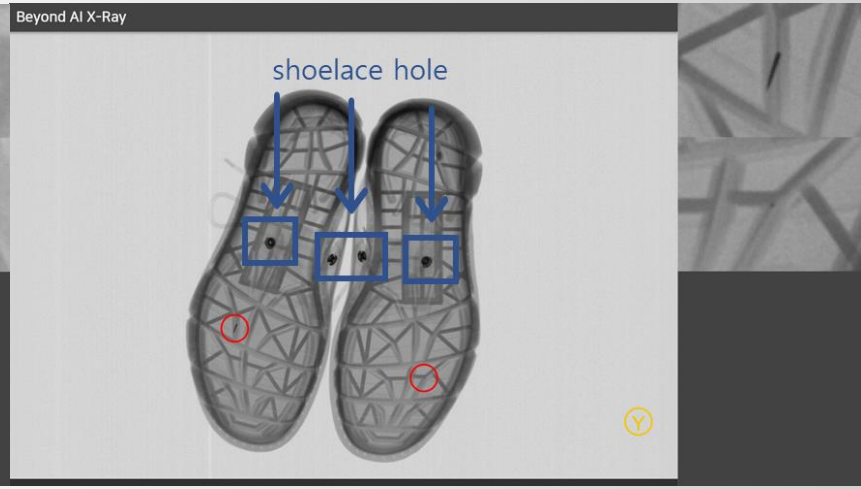
Advantages

- ✓ Beyond X-Ray can only detects foreign objects.
- ✓ The algorithm can classify materials into accessories and abnormal ones.





Square box means zipper, shoelace hole and shoestring

Circle means foreign objects

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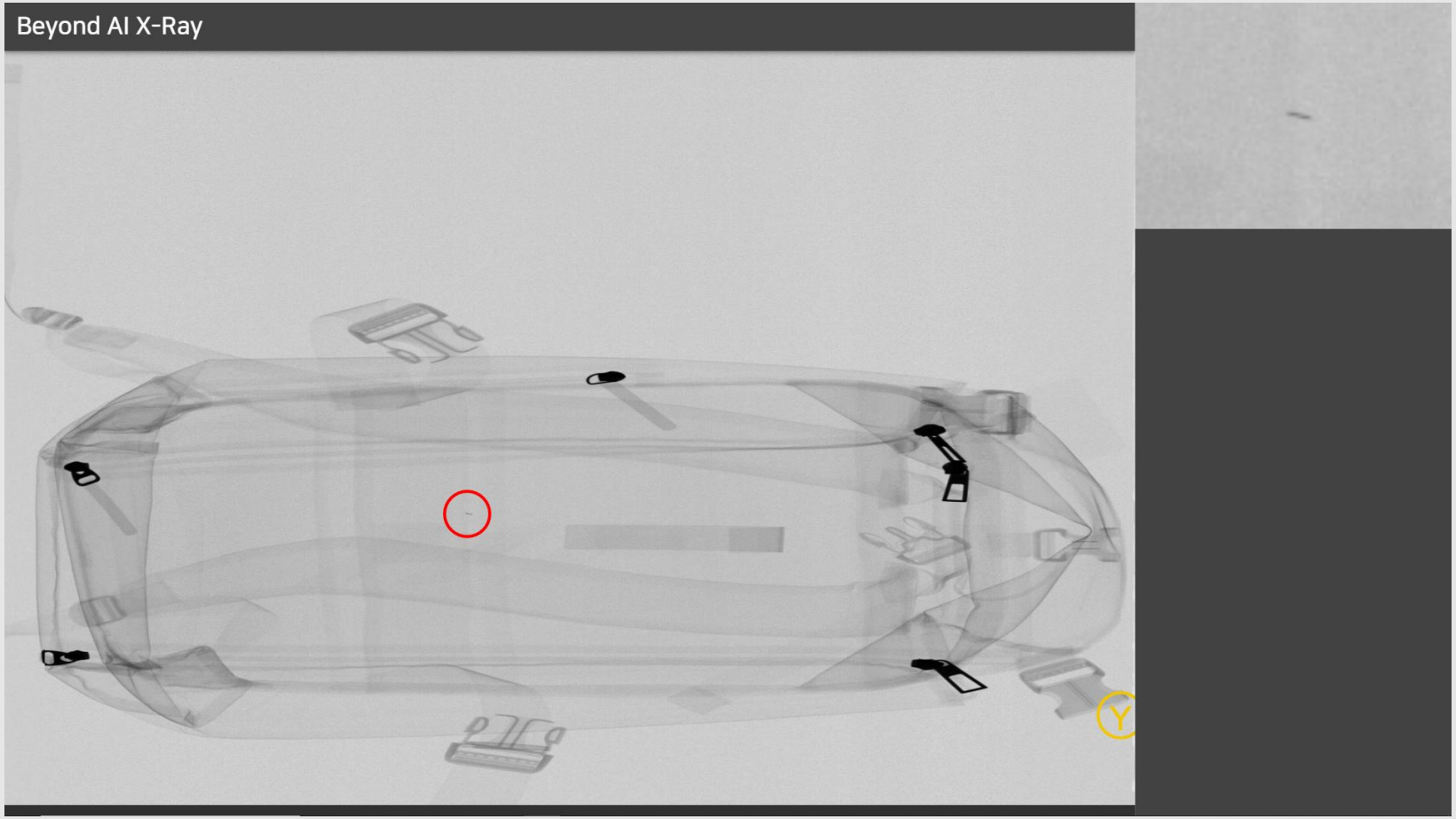
Inspection Sample - Backpack

Sample Backpack

Detection Results



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Inspection Sample - Shoes

Sample Shoes

Detection Results

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Inspection Sample - Apparel

Sample Apparel

Detection Results

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How to use – 1.Inspector Confirm Mode

- ✓ An Inspector reviews and confirms the detailed detection results.
- ✓ The worker in the output section checks the confirmed results and separates the “NG” products.

(1) Input

Worker inputs a bag following the sub-monitor’s command

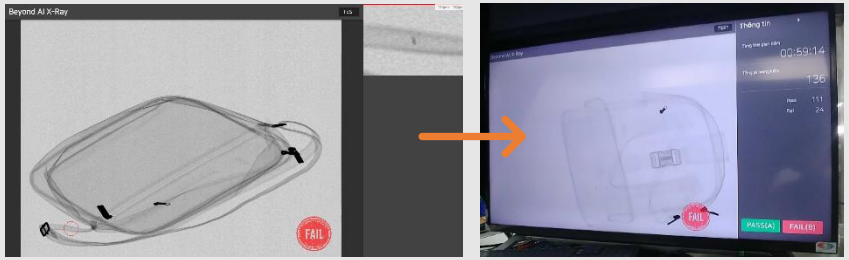
(2) Detect & Confirm

Case 1 : Detected as “OK”

Review results and Confirm

Case 2 : Detected as “NG”

Review results with Zoom & Panning shot and Confirm



(3) Separation

Worker classifies output bag by the sub-monitor’s results

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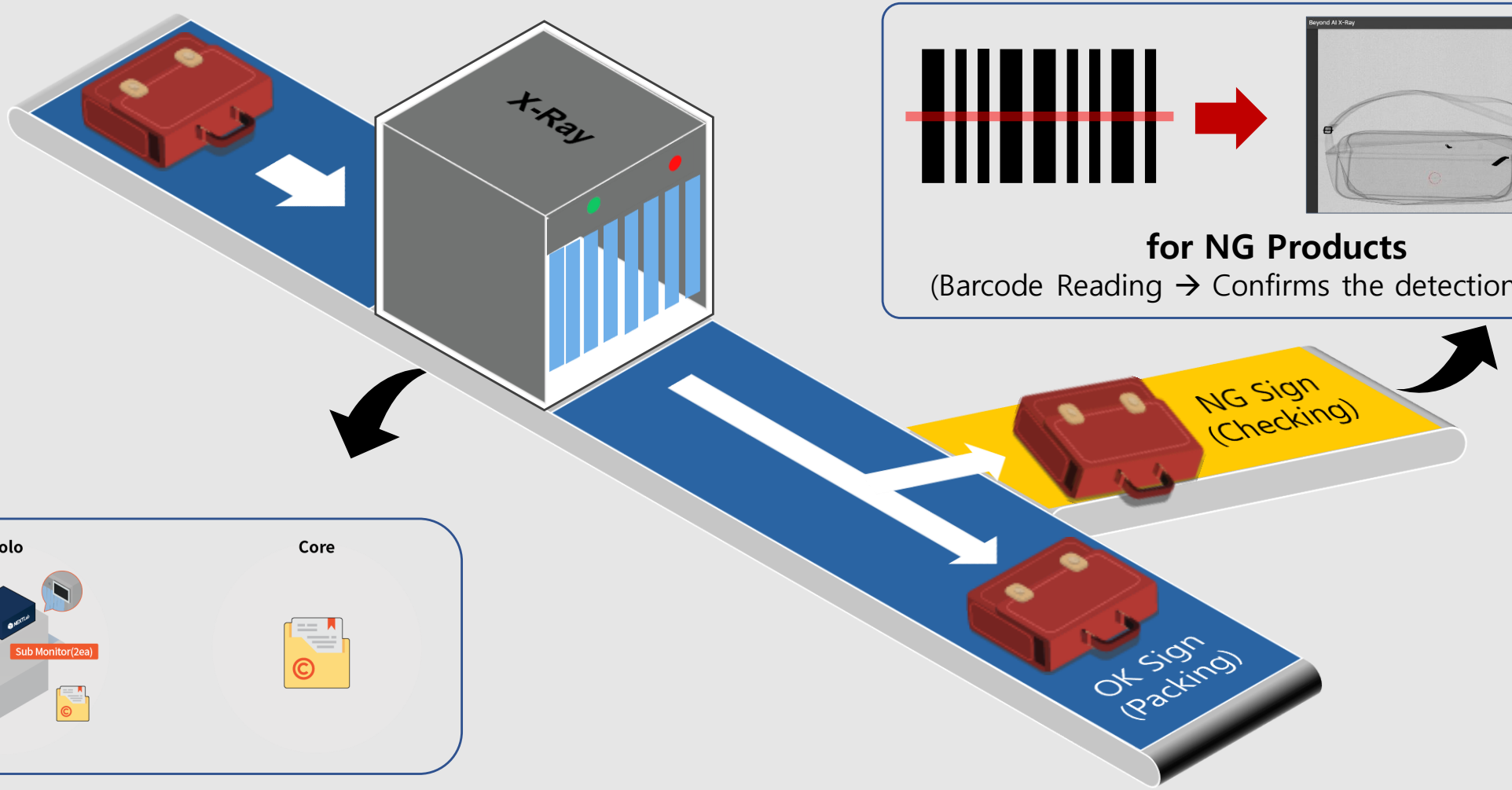
How to use – 2.Automated Separation Mode

- ✓ Beyond X-Ray also can send signal with its own I/O terminal.
- ✓ A separable conveyor can separate "NG" products and inspectors can check the detailed detection results afterward.



for NG Products

(Barcode Reading → Confirms the detection results)

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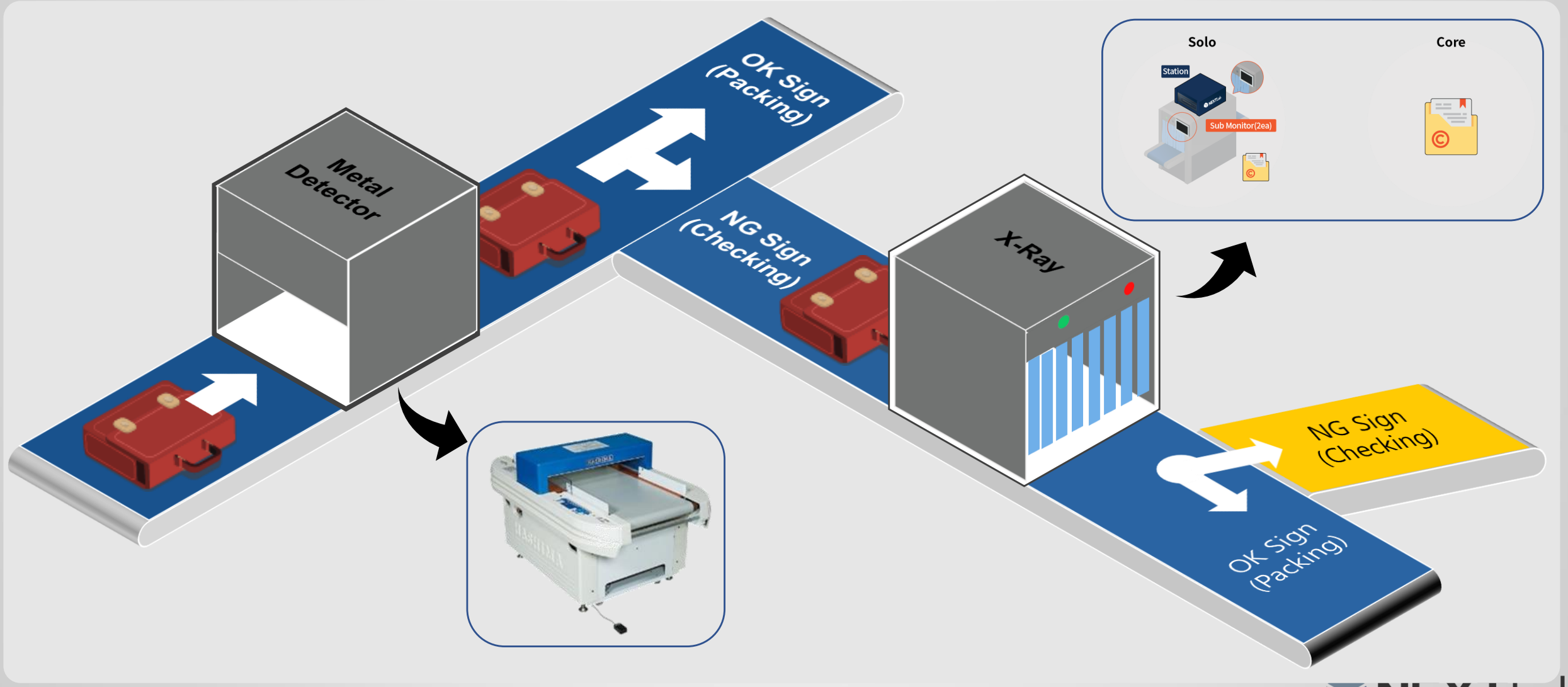
How to use – 2.Automated Separation Mode

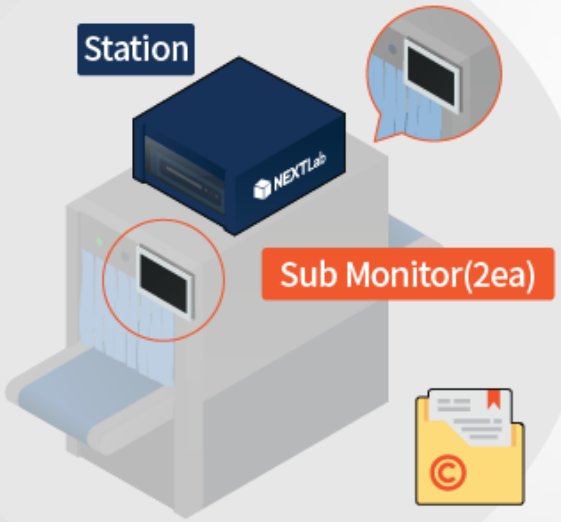
- ✓ Working with metal detectors can also be an option.
- ✓ Effective for products with metallic ornaments.



Lineups

- ✓ Customers who already have X-Ray machine can also use “Beyond X-Ray Solo”.
- ✓ Beyond X-Ray Solo can be worked with most of X-Ray machines[1].
- ✓ Beyond X-Ray Core is software license that can be installed on pc[2].

Solo



Core

1) X-Ray machine requirements
   - Running with Microsoft Windows XP or higher versions
   - Has 1 100Mbps or higher ethernet port
2) PC requirements
   - Window 10 Pro, I5-9600K, GeForce RTX 2060(NVIDIA), 16G RAM

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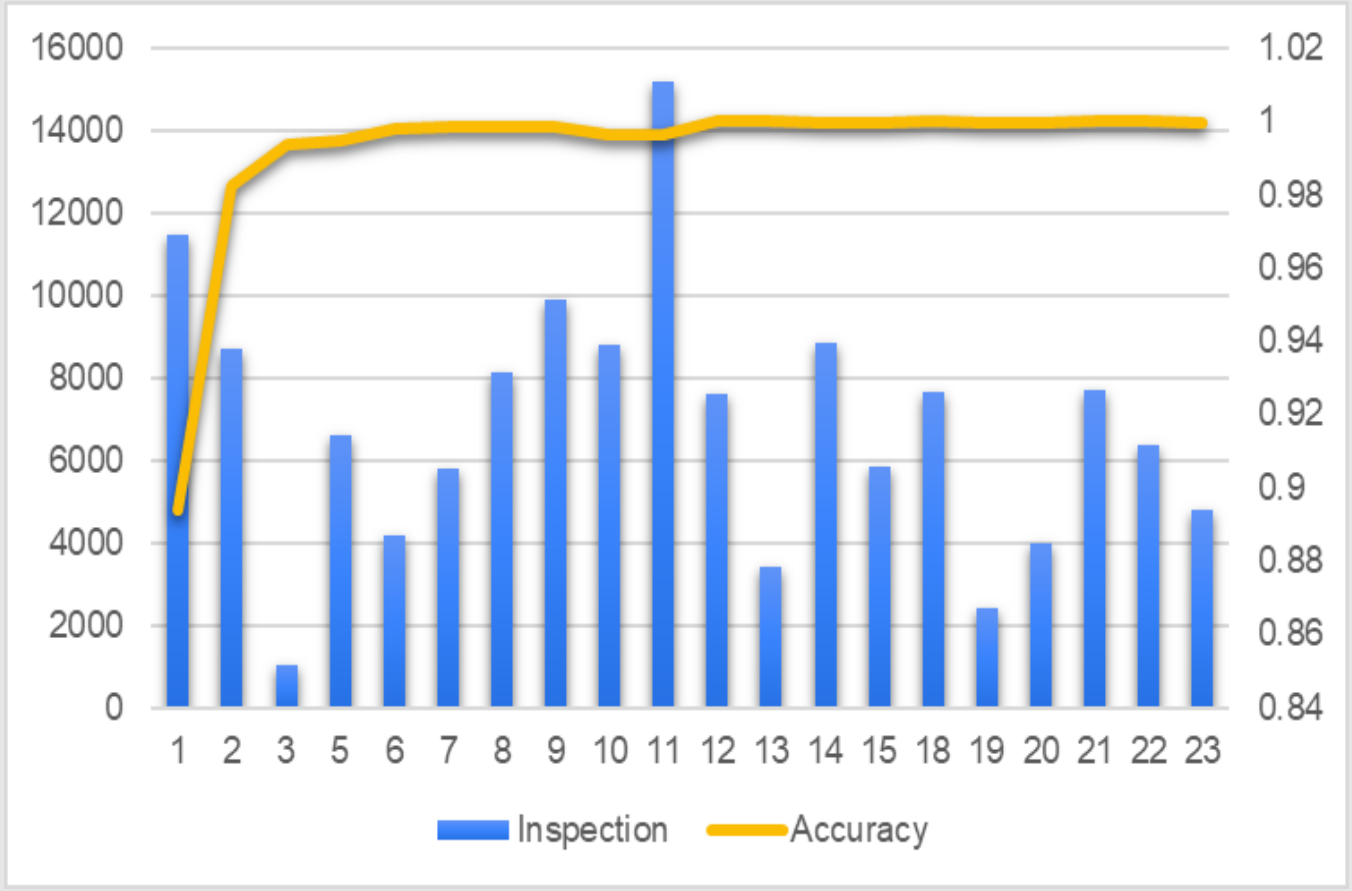
Case Study – Pungkook Saigon III

- ✓ Pungkook Corporation is one of leading OEM in Handbags, backpacks and other baggage manufacturing.
- ✓ Pungkook has used Beyond X-Ray for the final inspection from September 2019.

Inspector Confirm Mode

Operation Results : Average accuracy is 99.9%



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Company Overview – Business Fields

✓ NEXTLab provides automated test and monitoring products based on image processing and deep learning technology.

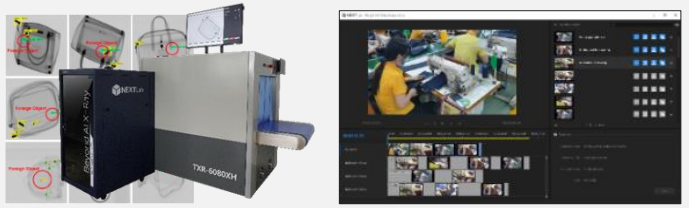
Business Field and Major Clients

Smart Testing |

AI based Smart Devices' Quality Testing
(IPTV, Set-Top box, Smartphone)

SK broadband SK telecom LG U+ LG전자

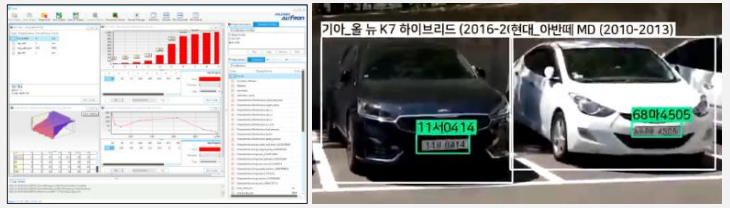
Smart Factory |



AI based metal/nonmetal foreign object detection
Camera-based production monitoring

PUNGKOOK CORPORATION
SINCE 1966 · LUGGAGE, PACK AND LEATHER GOODS

Automotive Engineering|



ECU Tuning, CAN Optimization
AI based Vehicle Recognition
(Vehicle type, damage, License plate)

HYUNDAI AUTRON AJ셀카

NEXTLab's Technology

Image Processing & Deep Learning

- NEXTLab has many patents for image processing and deep learning-based inspection/test
- NEXTLab has a platform for quality inspection and evaluation based on deep learning.

Automation

- Automated control of NEXT-Generation Devices through Voice, IR and Articulated Robot
- Synchronized processing of video and other data (e.g., sensor or network packet)

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Company Overview – Engineering Experts

- ✓ 80% of staffs are R&D personnel.
- ✓ Core people are leading to develop Beyond X-Ray.

CG Lee

Master's Degree in Mech. Engineering

CEO of NEXTLab (2012~)
Naver Corporation (2008~2012)
SK Communications (2003~2007)

YS Park

Lead of R&D Team

Ph.D in Control Engineering

NEXTLab (2019~)
NeilLab (2017~2019)
LG Electronics (2012~2017)

JW Lee

System Development

Master's Degree in Mech. Engineering

NEXTLab (2018~)
Hyundai Engineering (2017~2018)

SM Kim

Product Development, Technical Sales

Master's Degree in Mech. Engineering

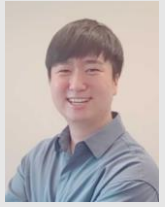
NEXTLab (2014~)
LG Electronics (2013~2014)

SY Lee

Image Processing Algorithm

Bachelor's Degree in Computer Engineering

NEXTLab (2012~)



HJ Son

Deep Learning Algorithm

Master's Degree in Mech. Engineering

NEXTLab (2019~)

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