HKIE THE HONG KONG INSTITUTION OF ENGINEERS 香港工程師學會

Building Division 建造分部

Technical Seminar on New Technology for Concrete Inspection

創新石矢檢查技術分享會

Organised by the HKIE Building Division

香港工程師學會-建造分部主辦

16 · 8 · 2023

近期石屎剝落新聞

旺角道寶安大廈

高齡舊樓淪為計時炸彈

近月舊樓冧石屎事件	
7月2日	旺角道寶安大廈有僭建結構物石屎剝落，貨車司機因扭軚避開而扭傷送院。
7月5日	旺角道寶安大廈外牆再有大量石屎剝落。
7月10日	旺角塘尾道福強工業大廈外牆簷篷一幅約2呎乘2吋的石屎剝落，擊中一輛私家車。
7月19日	西灣河筲箕灣道麗灣大廈簷篷一幅約3.3呎乘20吋的石屎剝落，男子被擊中受傷送院。
7月29日	油麻地廟街一幢大廈有簷篷石屎墮下，砸毀一輛七人車擋風玻璃。
7月29日	旺角砵蘭街新興大廈低層簷篷有石屎剝落，石屎碎飛墮巴士站。
7月31日	長沙灣青山道有唐樓劏房單位內天花塌石屎，兩名租客睡夢中被擊傷。

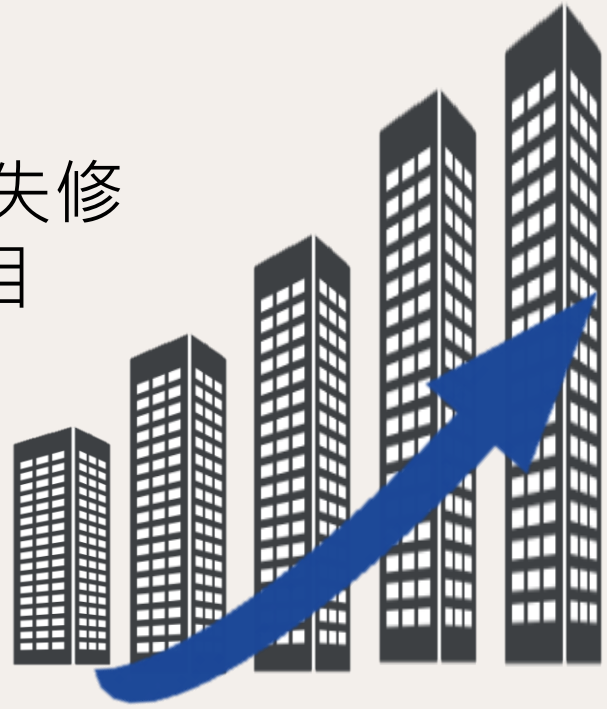
香港舊樓現況

- 根據發展局提供的數字，截至2021年底，全港有超過27,000幢樓宇的樓齡達30年或以上，而50年至59年及 60年或以上分別錄有5,617和3,545幢
- 過去十年間，樓齡達**50年以上**私樓數目由3,900幢**急增至8,600**幢，顯示樓宇老化速度驚人

香港舊樓現況

- 若此類失修樓宇再不進行復修或維修保養，預計至2030年，將會有超過20,000幢樓宇瀕臨「失修」或「明顯失修」

失修/明顯失修
樓宇數目



5,200+
@2022年

20,000+
@2030年


THE HONG KONG INSTITUTION OF ENGINEERS
香港工程師學會
樓宇生病了：
石屎剝落怎麼辦？
成因
石灰/ 飾面
天然老化
滲水/ 有水氣
高溫天氣/ 溫差
僭建/ 樓宇
荷載增加
天花/
牆身隆起
批盪/
瓷磚剝落
外牆有
明顯裂紋
漏水/
出現水痕
敲打牆身
有空鼓聲音
鋼筋石屎剝落
令生銹
鋼筋外露
徵狀
如有關結構問題，
應聘請有工程師背景之
註冊檢驗人員RI(E)進行檢驗
處理方法
· 定期維修保養
· 如有上述徵狀應盡快處理
業主應
(1) 先聘請註冊檢驗人員(RI)勘測
(2) 由註冊承建商進行復修
註冊檢驗人員名冊
樓宇復修
註冊承建商名單
歡迎下載學會《公眾安全系列指南》了解更多資訊


香港工程師學會
公眾安全系列指南：
樓宇保養維修
THE HONG KONG INSTITUTION OF ENGINEERS
香港工程師學會

Presenter

Harris SUN
CEO & Founder

Set business strategy, investment strategy, business operating model; Control critical success factors/metric for the company; Accountable for overall business performance

Harris is a serial entrepreneur with 18+ years of startup experience and global corporate experience. He was recognized for his startup and entrepreneurship in multiple regional and international awards including Deloitte, KPMG, Forbes Asia 100 and World Summit Awards.

Prof. Matthew YUEN
Chief Technology Advisor

Professor Emeritus, former Acting Vice President (R&D); Director Technology Transfer Center, and Head, Department of Mechanical & Aerospace Engineering of HKUST. Chairman, HKMA Quality Award Board of Examiners.

Product & Operations
Dr. Dhanada K MISHRA
Managing Director

Drive long-term product vision and ecosystem partners development; Champion brand impact in the engineering, construction and IT professions; Accountable for product R&D investment effectiveness

Dhanada K Mishra is a PhD in Civil Engineering from the University of Michigan, USA. He has over 25 years of diverse work experience in the areas of structures, non-destructive testing, structural health monitoring.

Research & Development
Andy YEUNG
Managing Director & Cofounder

Define software engineering architecture for entire product suites; Accountable for product software development and implementation; Champion design and software engineering excellence and competency development

Andy YEUNG is Managing Director with a passion for developing cutting-edge AI solutions. With over decades of experience in the field, Andy has established himself as a leader in driving AI initiatives and delivering innovative software products.

Andy holds the Master degree of computer science in the University of Hong Kong.

Business & Strategy
Yolanda AU
Director & Cofounder

Accountable for sales operations execution and sales productivity; Drive achievement of business targets including sales, revenue and customer satisfaction

Yolanda AU is a seasoned Business Leader. With her strategic acumen in business development, Yolanda possesses a keen eye for identifying market opportunities and developing winning strategies. She has a proven track record of successfully positioning AI solutions to meet customer needs and drive revenue growth. She obtained her Bachelor degree in business from Northumbria University, UK.

AI Façade Inspection

Customer Demands

Misses Critical Defects

" Human inspectors may inadvertently overlook subtle or hard to detect defects in building facades, posing potential safety hazards leading to significant repair costs. "

Property Owner

Costly Operations

" We would like to inform (buyer) owners that we offer long-term quality assurance service, but the traditional approach can't meet my demand. "

Real Estate Developer

Inefficient Building Lifecycle Management

" Inaccurate or incomplete inspection data can lead to suboptimal maintenance planning and management, missing opportunities for preventive measures and ultimately resulting in increased maintenance expense for property owners. "

Facility Manager

Limited Accessibility

" Some building's facades present difficult-to-reach areas, especially in high-rise or complex structures. The limitation of Manual access may hinder the effectiveness of inspections and compromise the thoroughness of data. "

Registered Engineer & Building Surveyor

Time Consuming Inspections

" It's difficulty in meeting urgent scenarios. Because Limited scalability for handling multiple projects simultaneously and time-consuming which can take months to complete."

Government

WHO?				
Property Owners and Investors		High maintenance cost for buildings (especially skyscrapers)		**Machine integrity and safety monitoring**
Facility Managers		No prediction on possible failure of working components		**Preventive Maintenance** **Temporal Comparison to assess risks**
Registered Engineers and Surveyors		Prone to incur accidents and injuries by manual inspection work		**Automated Workflow**
Government		Involves intensive manual process for built infrastructure condition by Government and industry		**Data Security & Privacy Compliance**

Protect their investment	
Cost Effectiveness	
Better resources management	
Standardization and Reliability	

Value Proposition

Smart

- AI-based Defect Detection & Analysis
- High Accuracy of Data Localization
- 3D Navigation with BIM and GIS Integration
- AI Defect Dimensioning

Efficient

- 67% More Efficient Workflow & Team-Work Using Cloud Platform
- 100% Digitized Building Data and Inspection Report on Cloud
- AI Face Blurring and Privacy Filter
- Automated Report Generation

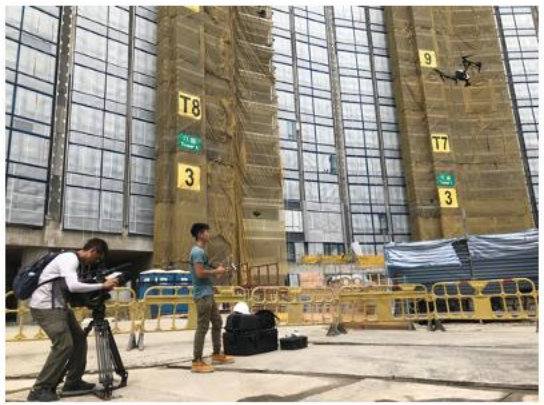
Cost Effective

- 60% Faster Data Capture
- 70% Faster Report Generation
- Worker Risk Free
- 50% off Project Cost

AI Solution: Improve Inspection Efficiency by 67%

1 → 2 → 3 → 4

Autonomous Data Capture

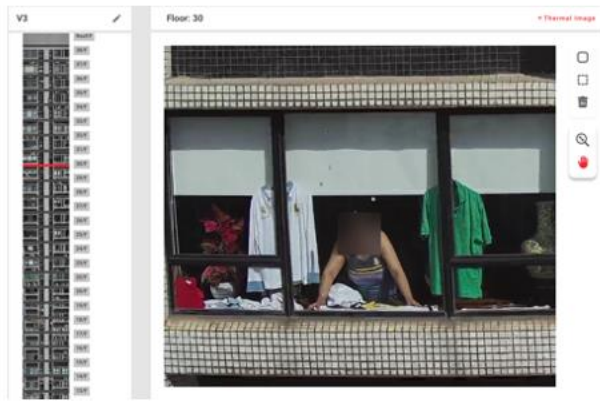


1 day vs. 3 days

RaSpect Traditional

+60%

Data Upload, AI Data Positioning

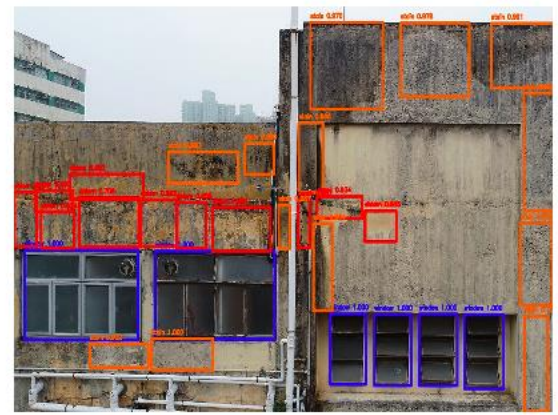


2 days vs. 5 days

RaSpect Traditional

+60%

AI Preliminary Analysis

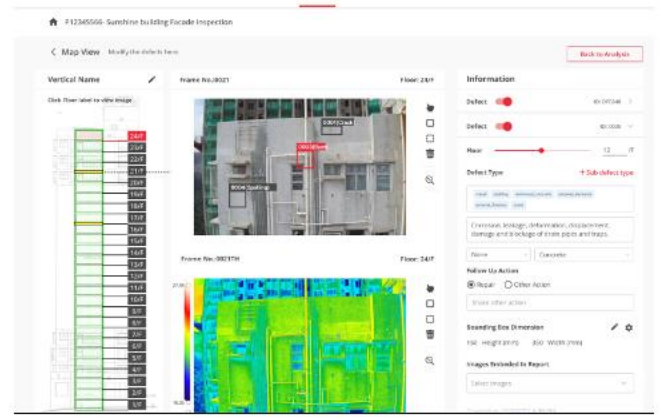


7 days vs. 20 days

RaSpect Traditional

+70%

Professional Endorsement & Reporting



Step 1 | Step 2 | Step 3 | Step 4

Autonomous Data Capture

Curtain Wall Building

▲ Close Up Inspection

▲ General Inspection

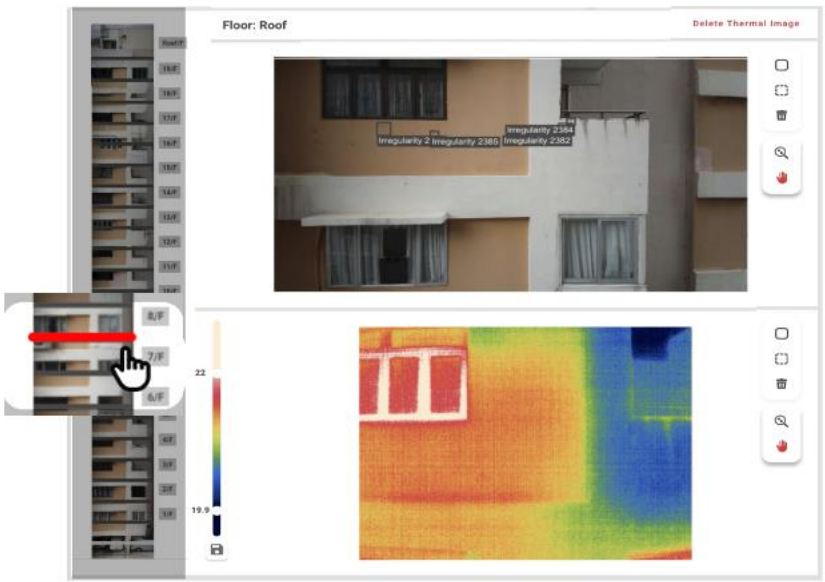
Reinforced Concrete Building

▲ General Inspection

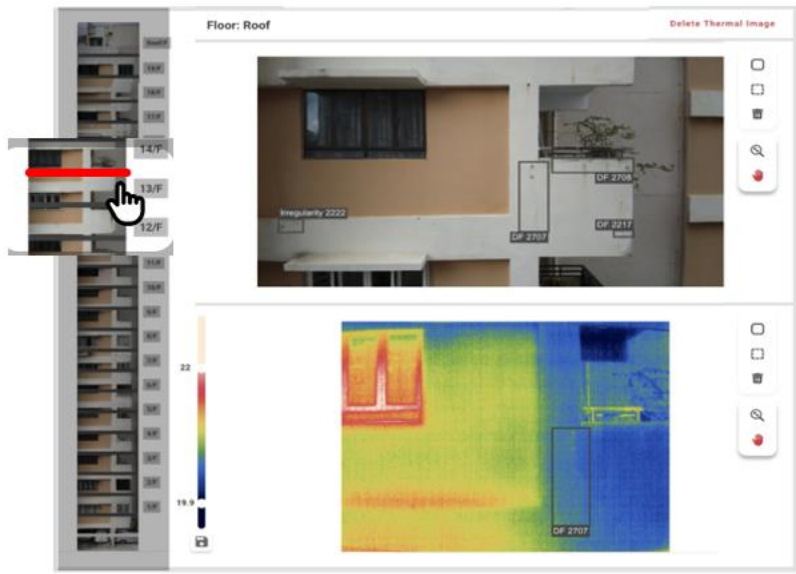
▲ Preliminary Inspection

Step 1 | Step 2 | Step 3 | Step 4

Data Upload & AI Data Localization



▲ Lower Floor

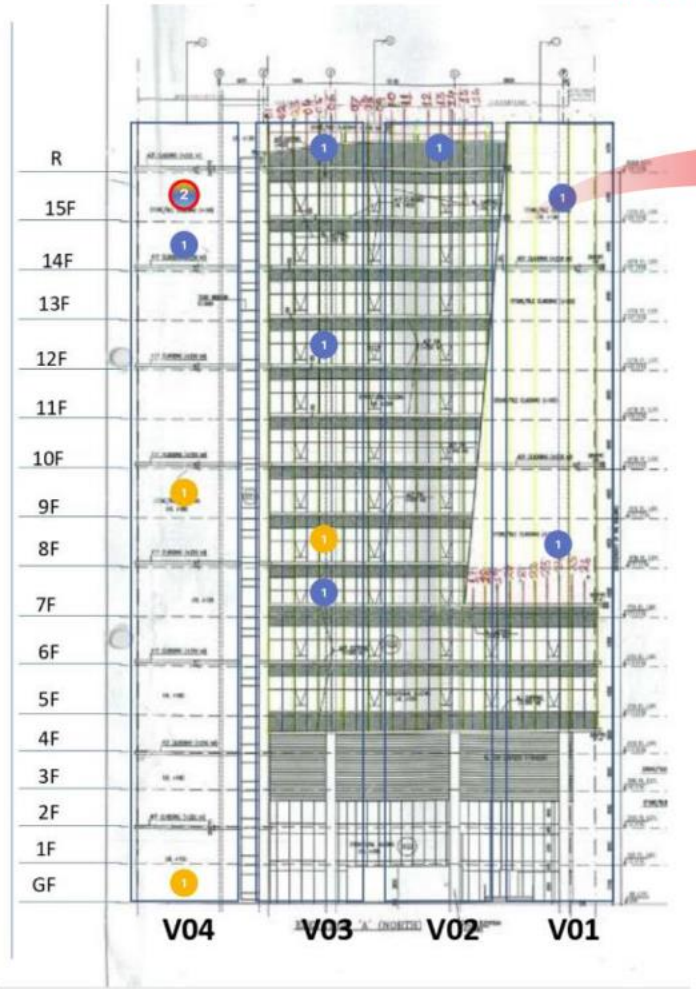


▲ Middle Floor

▲ Upper Floor

Step 1 | Step 2 | **Step 3** | Step 4

AI Preliminary Analysis



Defect Severity

- Critical
- Major
- Moderate
- Minor
- Cosmetic
- Major + lower severity

▲ Auto-suggested Defect Tagging

▲ AI Defect Analysis

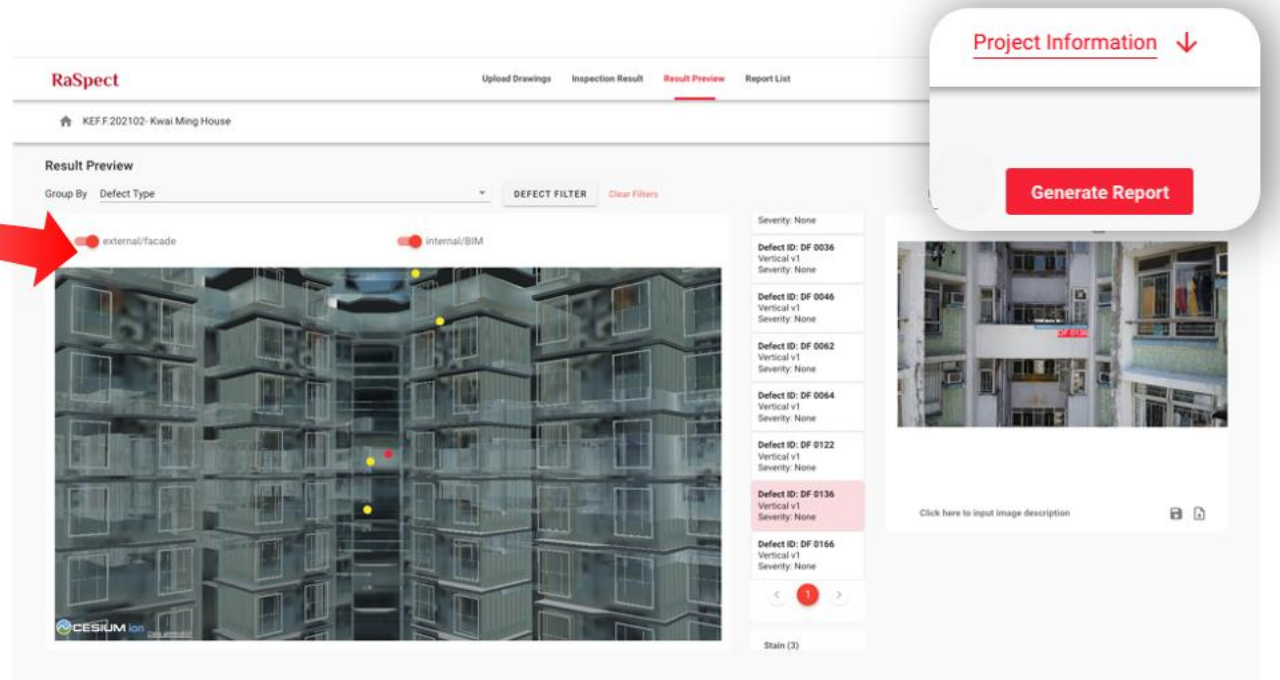
▲ Automatic Privacy Filter

Step 1 | Step 2 | Step 3 | **Step 4**

Professional Endorsement & Reporting

Severity Level	Action
Critical Defect	Take action immediately
Major Defect	Take action as soon as possible
Moderate Defect	Take action when possible
Minor Defect	Monitor regularly
Cosmetic Issue	Keep under watch

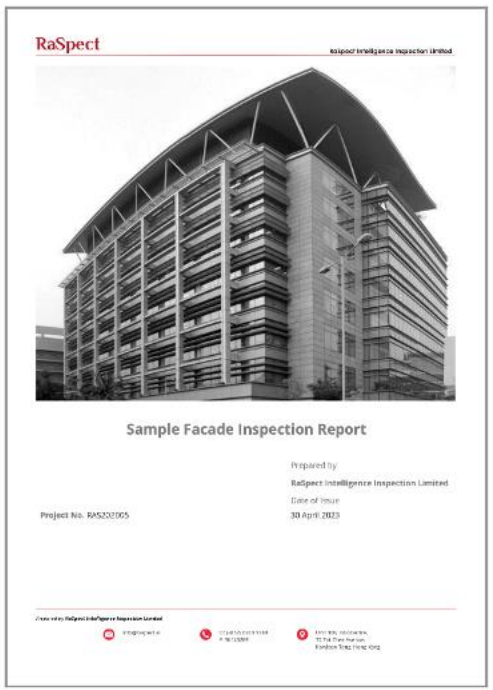
▲ Severity Level Assessment Guidelines



▲ Result Preview (3D/2D)

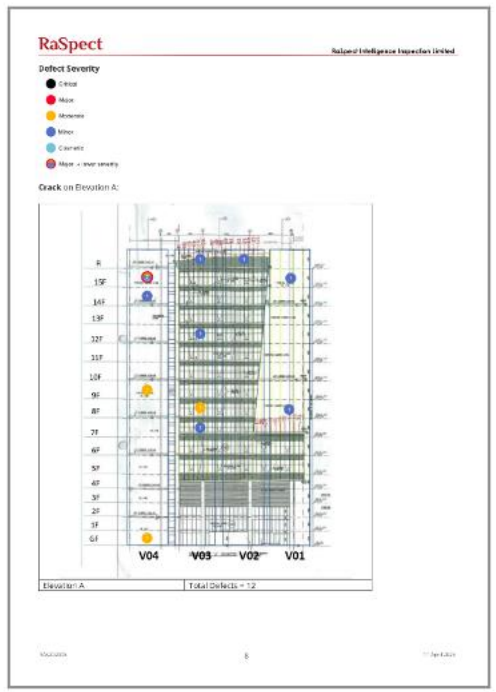
Scope of Service - Report Format

Results and Findings


RaSpect

Sample Facade Inspection Report

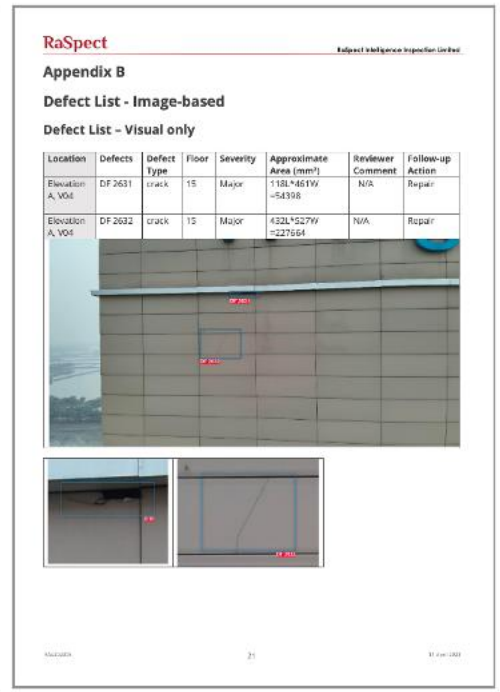
Prepared by:
RaSpect Intelligence Inspection Limited
Date of Issue:
30 April 2023
Project No. RAS202005


RaSpect

Defect Severity

Crack on Elevation A:

Elevation A	Total Defects = 12

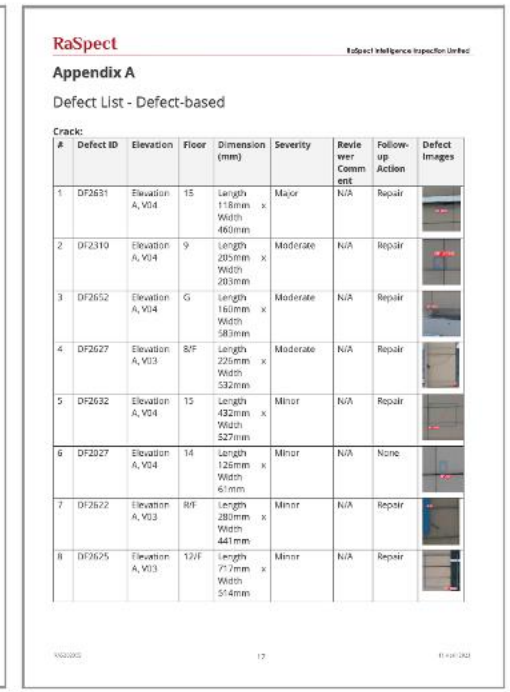

RaSpect

Appendix B

Defect List - Image-based

Defect List – Visual only

Location	Defects	Defect Type	Floor	Severity	Approximate Area (mm²)	Reviewer Comment	Follow-up Action
Elevation A, V04	DF 2631	crack	15	Major	118L*461W =54398	N/A	Repair
Elevation A, V04	DF 2632	crack	15	Major	432L*527W =227664	N/A	Repair

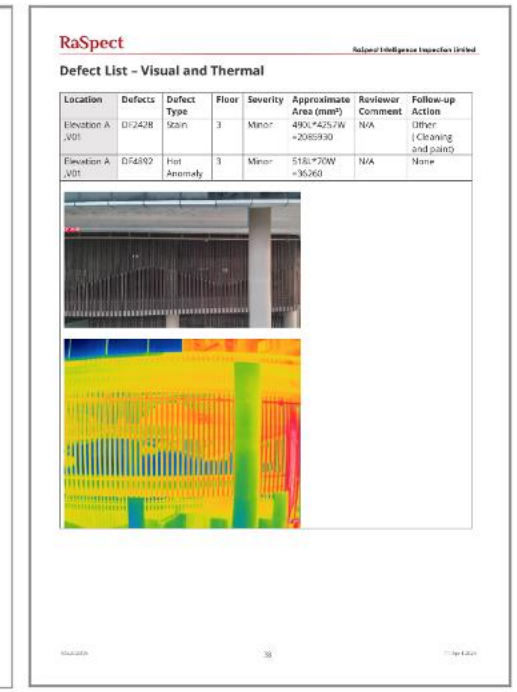

RaSpect

Appendix A

Defect List - Defect-based

Crack:

#	Defect ID	Elevation	Floor	Dimension (mm)	Severity	Reviewer Comment	Follow-up Action	Defect Images
1	DF2631	Elevation A, V04	15	Length 118mm x Width 460mm	Major	N/A	Repair	
2	DF2310	Elevation A, V04	9	Length 205mm x Width 203mm	Moderate	N/A	Repair	
3	DF2652	Elevation A, V04	G	Length 160mm x Width 583mm	Moderate	N/A	Repair	
4	DF2627	Elevation A, V03	8/F	Length 226mm x Width 532mm	Moderate	N/A	Repair	
5	DF2632	Elevation A, V04	15	Length 432mm x Width 527mm	Minor	N/A	Repair	
6	DF2027	Elevation A, V04	14	Length 126mm x Width 61mm	Minor	N/A	None	
7	DF2622	Elevation A, V03	8/F	Length 280mm x Width 441mm	Minor	N/A	Repair	
8	DF2625	Elevation A, V03	12/F	Length 717mm x Width 514mm	Minor	N/A	Repair	


RaSpect

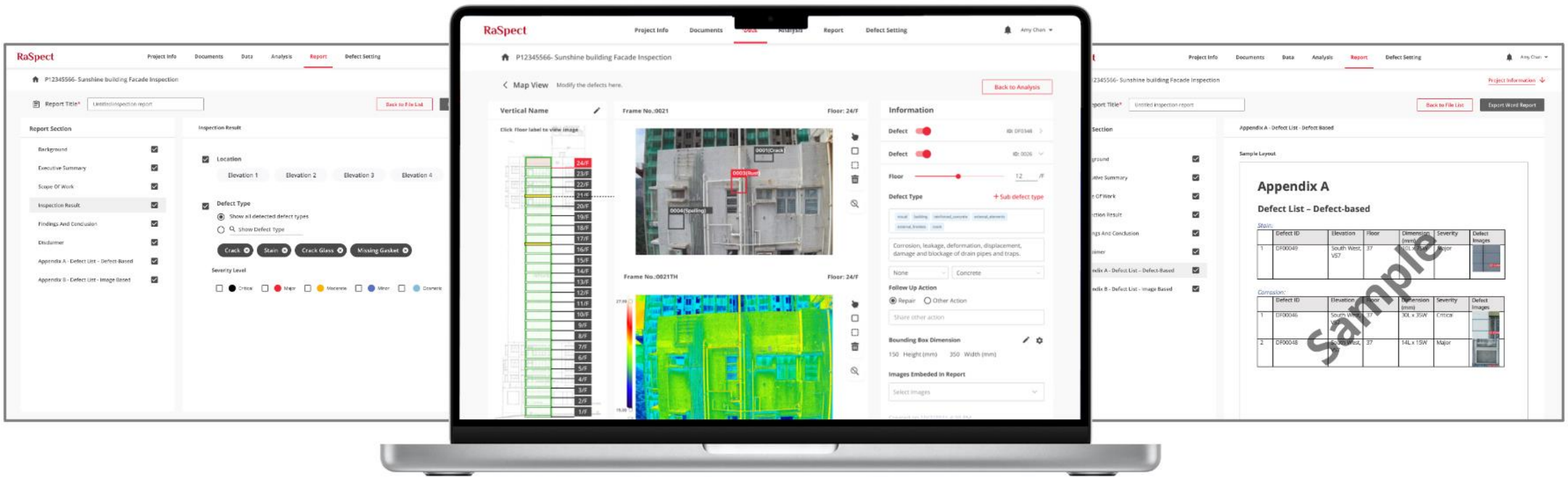
Defect List – Visual and Thermal

Location	Defects	Defect Type	Floor	Severity	Approximate Area (mm²)	Reviewer Comment	Follow-up Action
Elevation A ,V01	DF2428	Stain	3	Minor	490L*425W =208930	N/A	Other (Cleaning and paint)
Elevation A ,V01	DF4892	Hot Anomaly	3	Minor	518L*70W =36260	N/A	None

▲ *(Ref. Case) Sample* Report Format

Scope of Service - Report Visualisation

Presents all inspection analysis on Inspectica™ platform

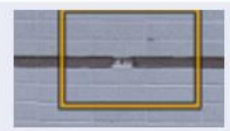


▲ *(Ref. Case) Sample* Screenshots in Inspectica™ Platform

Scope of Service - Sample Defects

Concrete Related	Sample Image	Consequence/Impact	Metal /Grill Related	Sample Image	Consequence/Impact
Crack		Safety / Functionality / Cosmetic	Rust / Corrosion / Stained grill		Functionality / Cosmetic
Spalling		Safety / Functionality / Cosmetic	Blistering / Wrinkling		Functionality / Cosmetic
Delamination		Safety / Functionality / Cosmetic	Peeling		Functionality / Cosmetic
Reinf corrosion		Safety / Functionality / Cosmetic	Stain		Cosmetic
Dent		Safety / Functionality / Cosmetic	Rust Stain		Cosmetic
Efflorescence		Functionality / Cosmetic			
Algal growth		Cosmetic			

Scope of Service - Sample Defects

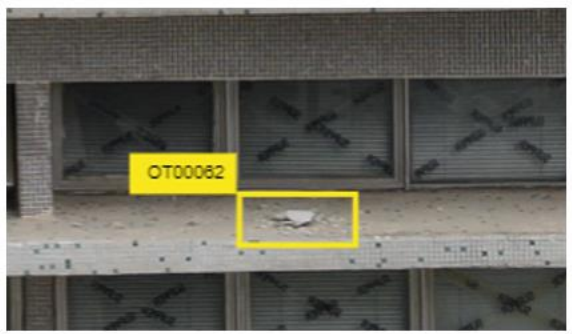
Tiles related	Sample Image	Consequence/Impact	Cladding Related	Sample Image	Consequence/Impact
Chipped tiles		Safety / Functionality / Cosmetic	Abnormal cladding		Cosmetic
Stained tiles		Safety / Functionality / Cosmetic	Misaligned cladding		Safety / Functionality / Cosmetic
Cracked tile		Safety / Functionality / Cosmetic	Cracked cladding		Safety / Functionality / Cosmetic
Missing tiles		Safety / Functionality / Cosmetic	Sealant/Grout Related		Safety / Functionality / Cosmetic
Misaligned tiles		Safety / Functionality / Cosmetic	Missing sealant		Safety / Functionality / Cosmetic
Buckled tiles		Functionality / Cosmetic	Deteriorated sealant		Safety / Functionality / Cosmetic
Scratched tile		Cosmetic	Abnormal sealant		Safety / Functionality / Cosmetic

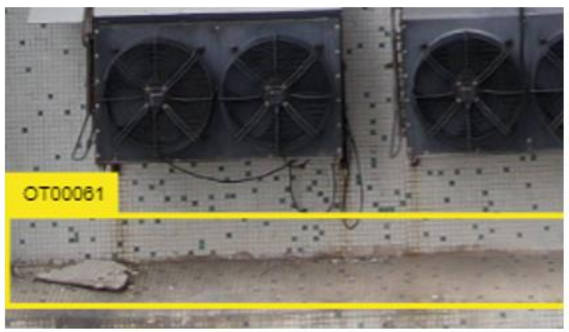
Severity Level Assessment Guidelines - Building Performance

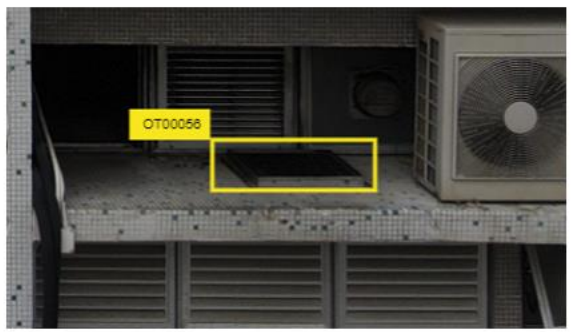
Severity Level	Description	Action
Critical Defect	Represents immediate danger of falling objects. The owner has to be notified immediately to cordon off the area below to prevent any person from coming in. The owner has to engage a registered professional Surveyor/Inspector to carry out a thorough Inspection and to determine further appropriate repair works following MBIS guidelines.	Take action immediately
Major Defect	Affects safety of building user or public. Mainly concerns external elements with the risk of falling objects in some areas. May not immediately endanger the users or people nearby. Timely remedial action as per MBIS guidelines is highly recommended. Recommendation will be given in individual defect section.	Take action as soon as possible
Moderate Defect	Affects usage of the building element and may pose a medium risk to the occupants and/or members of the public. Regular monitoring is recommended (as per MBIS). Perform repair whenever possible. Remedial measures are recommended in individual defect section.	Take action when possible
Minor Defect	Defects that may affect safety and/or functionality in the future. Periodic monitoring(as per MBIS) is recommended since the defect may develop into a more severe class.	Monitor regularly
Cosmetic Issue	Issue that affects only appearance or Aesthetics of the building without posing any safety or functionality risk. Corrective action is discretionary.	Keep under watch

Severity - Critical Defects

Spalling, Delamination, Loose objects, Falling object Risk







Cause	Description	Consequence/Impact
The critical defects on building façade occur due to long neglected repair and maintenance that leads to objects such as spalled concrete, broken tiles, delaminated claddings or corroded metal components etc. becoming loose presenting an imminent danger of falling objects.	The critical defects are the ones that are caused by any object such as a loose piece of concrete, broken piece of tile or any components attached to the building façade which may be in imminent danger of falling off causing risk of injury to occupants or members of public.	• Can cause severe injury or even death to persons by falling objects from building façade. • Represents a building in poor condition or disrepair • Should be attended to immediately

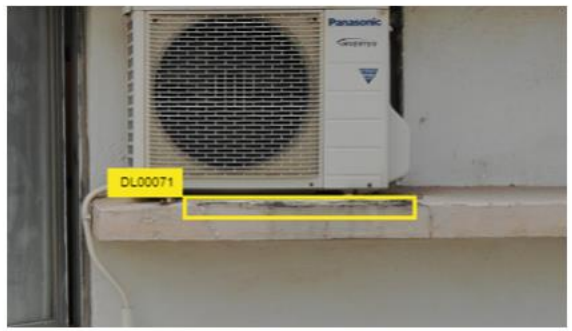
Severity - Major Defects

Cracks, Spalling, Delamination, Corrosion, Falling object Risk

Cause	Description	Consequence/Impact
The major defects on building façade occur due to long neglected repair and maintenance that leads defects such as cracks, spalling, delamination of large size representing danger to the safety of the building and sometime falling object risks. These defects may also develop due to overloading, ad hoc alterations, UBW, foundation movement etc.	The major defects are the ones represent safety risk to the building and in some cases falling object risk although not immediately. Large cracks, spalling, delamination, corrosion of steel, missing tiles, cracked glass or claddings would fall in this category. Typical dimension would be 0.1 sq m area affected per defect or crack width of 1 mm or above.	• Can result in collapse of part or all of the building. • Could lead to falling object incidents if unchecked. • Can be expensive to repair

Severity - Moderate Defects

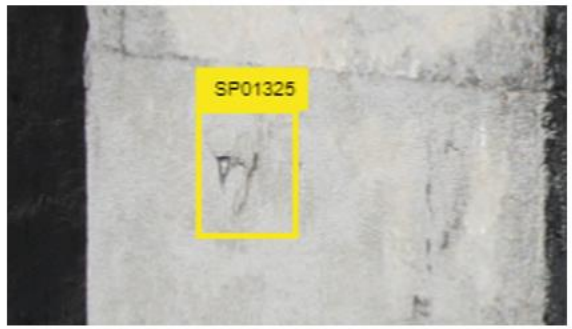
Cracks, Spalling, Damp, Missing Tiles, Chipped Tiles, Rust

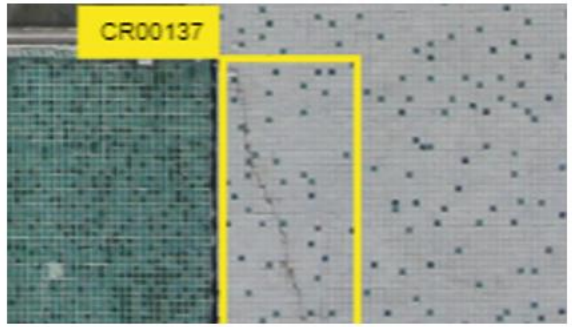


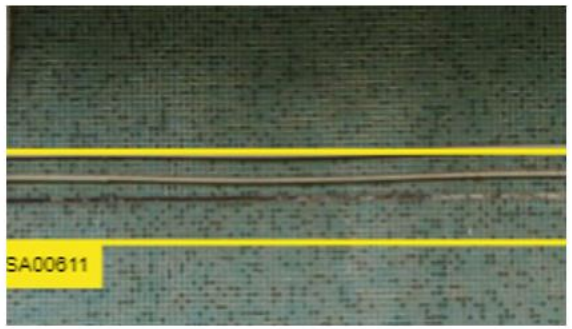
Cause	Description	Consequence/Impact
The moderate defects on building façade occur due to neglected repair and maintenance that leads defects such as cracks, spalling, delamination, dampness of large that may affect the functionality of the building. These defects may also develop due to overloading, ad hoc addition and alterations (A&A), UBW, foundation movement etc.	These defects affect usage of the asset and may pose a medium risk to the members of the public. Regular monitoring is recommended. Perform repair whenever possible. Remedial measures are recommended in individual defect section.	• Can affect functionality and durability of the building. • Could lead to higher category of severity if unrepaired. • Can be difficult to repair – especially moisture issues

Severity - Minor Defects

Cracks, Spalling, Damp, Missing Tiles, Chipped Tiles, Rust







Cause	Description	Consequence/Impact
The minor defects on building façade occur due to neglected repair and maintenance or defective workmanship that leads defects such as cracks, spalling, delamination, dampness of relatively small size that may affect the safety and functionality of the building in future left neglected.	Defects that may affect safety and/or functionality in the future. Periodic monitoring is recommended since the defect may develop into a more severe class.	• Unpleasant look for the building. • Can affect functionality and durability of the building in future. • Could lead to higher category of severity if unrepaired. • Should be monitored

Severity - Cosmetic Defects

Stains, Rust, Efflorescence, Discolouration, Fading, Mismatched

Cause	Description	Consequence/Impact
The cosmetic issues on building façade occur due to maintenance and natural wear and tear due to the exposure to the weathering elements. It leads to stains, discoloration, fading etc. of the building façade.	Issue that affects only appearance or aesthetics without posing any safety or functionality risks. Corrective action is discretionary.	• Affect look of the building • Can decrease market value

AI x Engineer Collaboration

Win-Win Partnership: Elevating AI Built Infrastructure Inspections

Shared Vision: Setting new industry benchmarks, optimizing processes, and fostering a more sustainable tomorrow.

Sustainability Stewardship: Reducing the ecological footprint of real estate activities through advanced, responsible practices.

Industry Transformation: Uniting industry expertise with cutting-edge technology for a revolutionary approach to real estate operations.

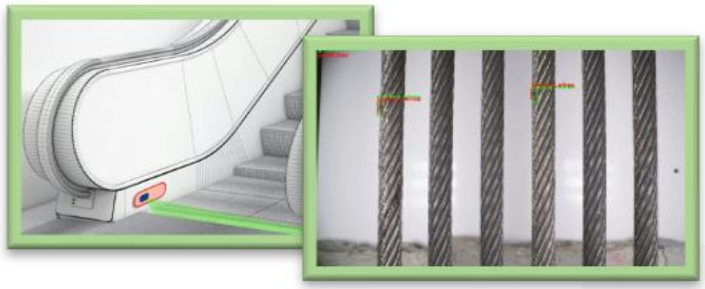
Our Commitment: Together, we innovate, elevate, and create a positive legacy for the real estate sector and the world.

Positioning

We are dedicated to establishing a strategic alliance with professional engineers, capitalizing on our pioneering **AI Big Data and robotics technology** to drive innovation in built infrastructure inspection.

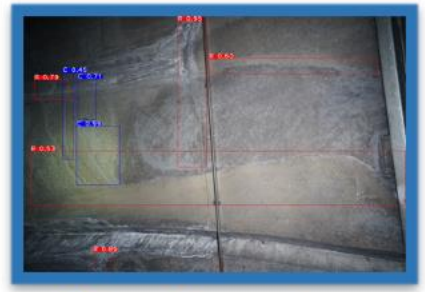
Through seamless digitalization integration, our goal is to augment engineers' scope of work and **empower engineers with a distinct competitive edge**.

AI Inspection Technology



Elevator / Escalator Functional Safety Monitoring

Smart Building Platform

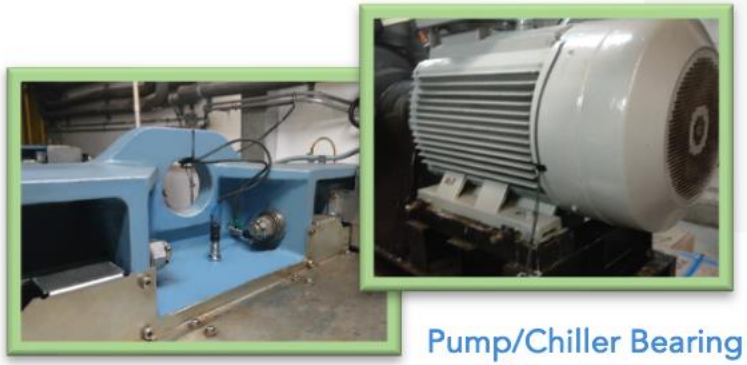


Tunnel Inspection

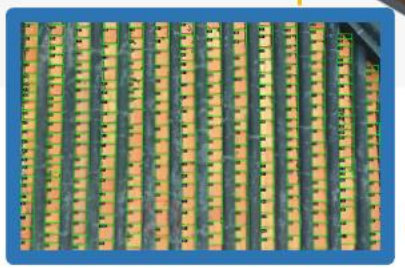
Pylon Tower / Radio Station Inspection

AI Façade & Piping Inspection

AI-Signboard Defect Detection



Pump/Chiller Bearing Monitoring



Heritage Inspection

Road Image Capturing

Key Activities

- **Part 1. Onsite Inspection (Service Operator)**
  - 1A. Drone based – Aerial Data Collection
  - 1B. Mobile App based – Handy Data Collection
  - 1C. Robot based - Lightwell Data Collection
  - 1D. Vehicle based – City level Data Collection

- **Part 2. AI Preliminary Analysis (RaSpect)**
  - 2A. Data Localization of all Captured Visual and Thermal Photos
  - 2B. RaSpect-Inspectica™ Platform for Data Post-processing and Data Visualization
  - 2C. Irregularities Finding Summary

- **Part 3. Professional Endorsement & Reporting (Engineer)**
  - Verified by Chartered Engineers

1. On-site Inspection

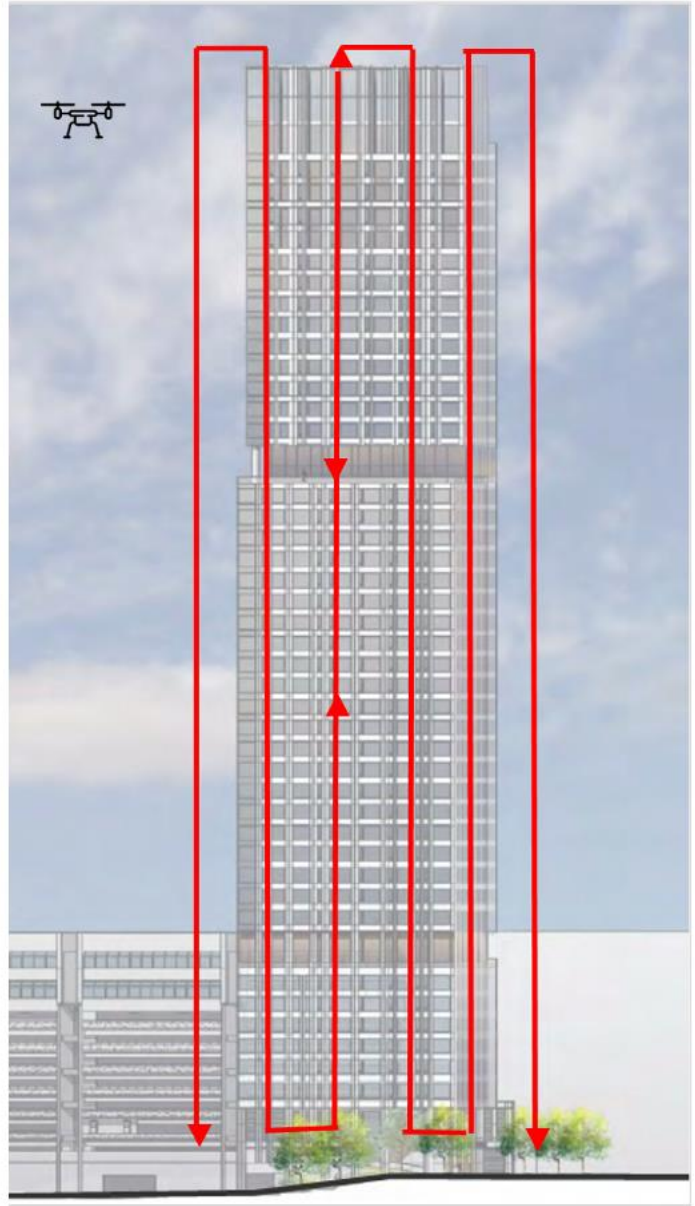
On-Site Flight Prep, Setup and Final Checks

I. Arrival on site at designated time (crew of one Pilot-in Command, and one Observer/Spotter)
II. Set up and cordoning of landing / take-off zone
III. On-site assessment to note any changes / hazards / issues that may have arisen since pre-site survey
IV. Setup and preparation of drone and ancillary equipment (batteries, etc.) for required flight(s)
V. Final weather / frequency spectrum / GPS / and other avionics checks prior to flight

Legend: Red envelope – Sample Flight Path

- Pre-set the flight path in a grid pattern for autonomous Unmanned Aerial Vehicle inspection
- Unmanned Aerial Vehicle shall photograph by scanning vertically and/or horizontally for optimal coverage
- Unmanned Aerial Vehicle captures images via 4 different directions (E>S>W>N)
- All images would be geo-tagged with GPS information.
- Co-Pilot records the operation details in a time-log for reference check, to reassure the location of the captured data.
- Unmanned Aerial Vehicle will fly closer to building for defects closeup.

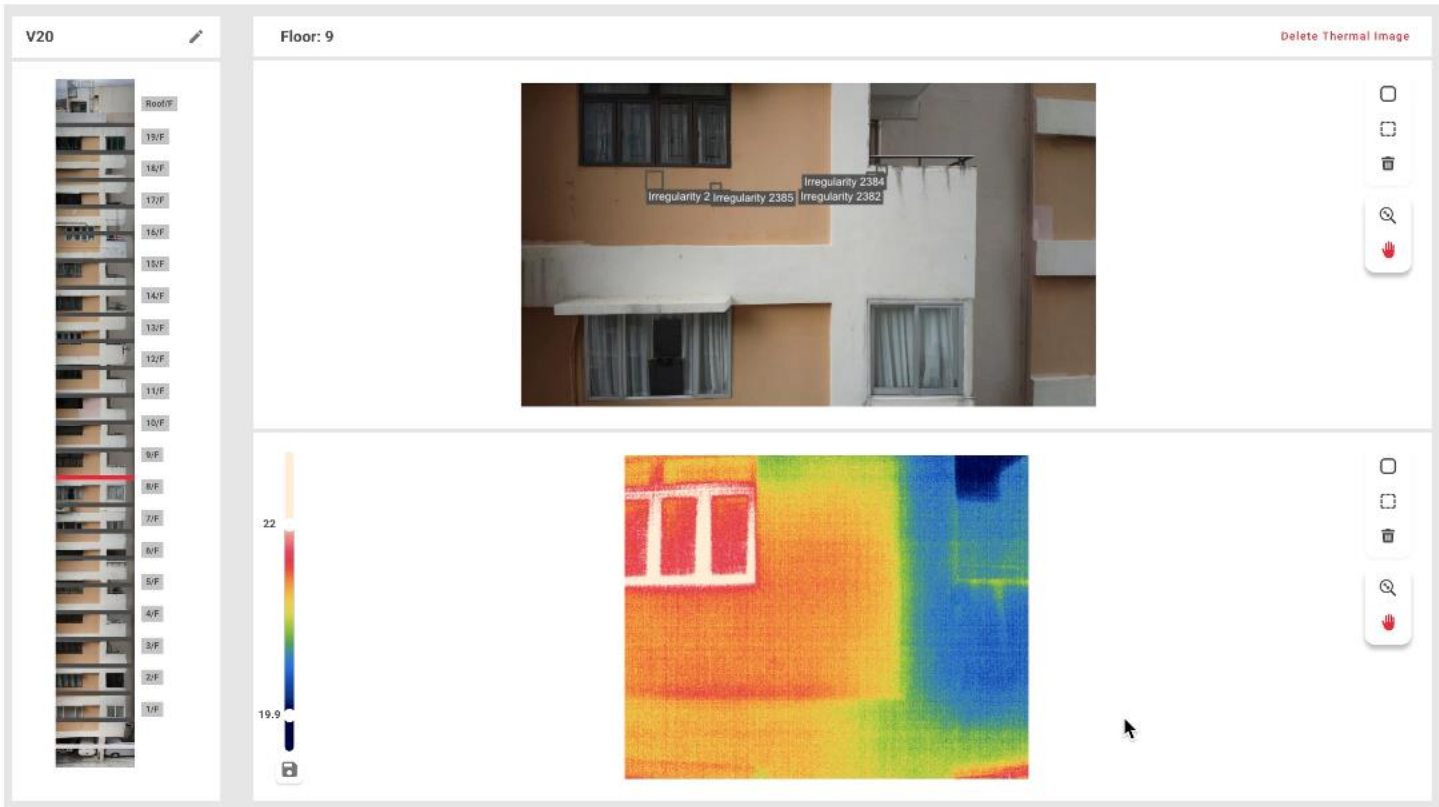
Limitation: Constrained facade regions, like light well and inner corners of the buildings, may not be favorable for aerial data capturing. The operation team will try to capture data at an angle to compensate as much as possible.



▲ *(Ref. Case)Sample illustration of drone flight path*

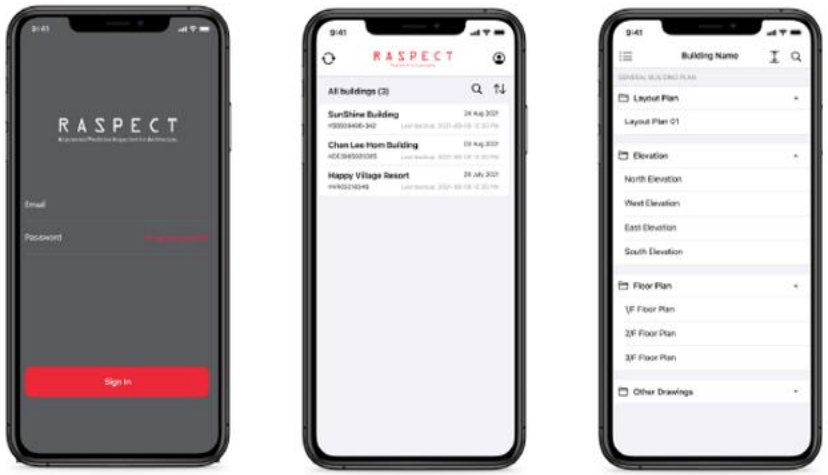
1A. Drone based – Aerial Data Collection (Visual & Thermal)

Systematic high definition visual and thermal survey of designated roof, cladding, curtain wall and high ceiling area supplemented with high resolution still photos for identified problem areas. Includes careful flight path documentation of all areas scanned for clear identification when post processing.

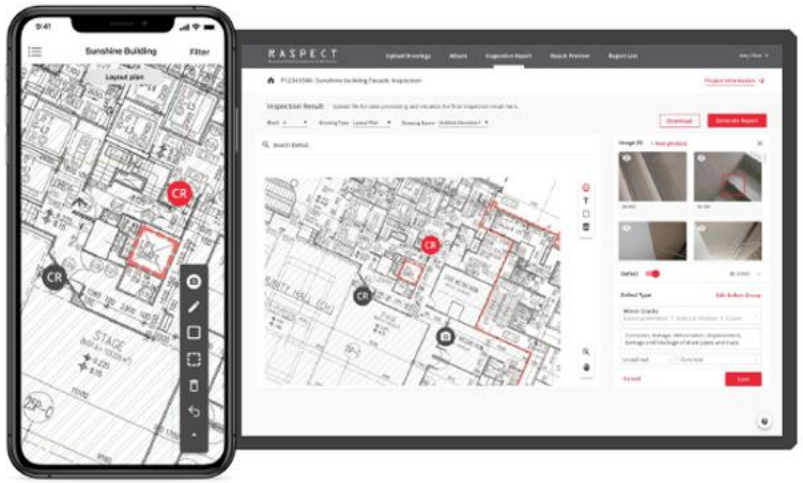


▲ *(Ref. Case) Data collection, localisation and defects finding by using AI-Powered Analysis Algorithm*

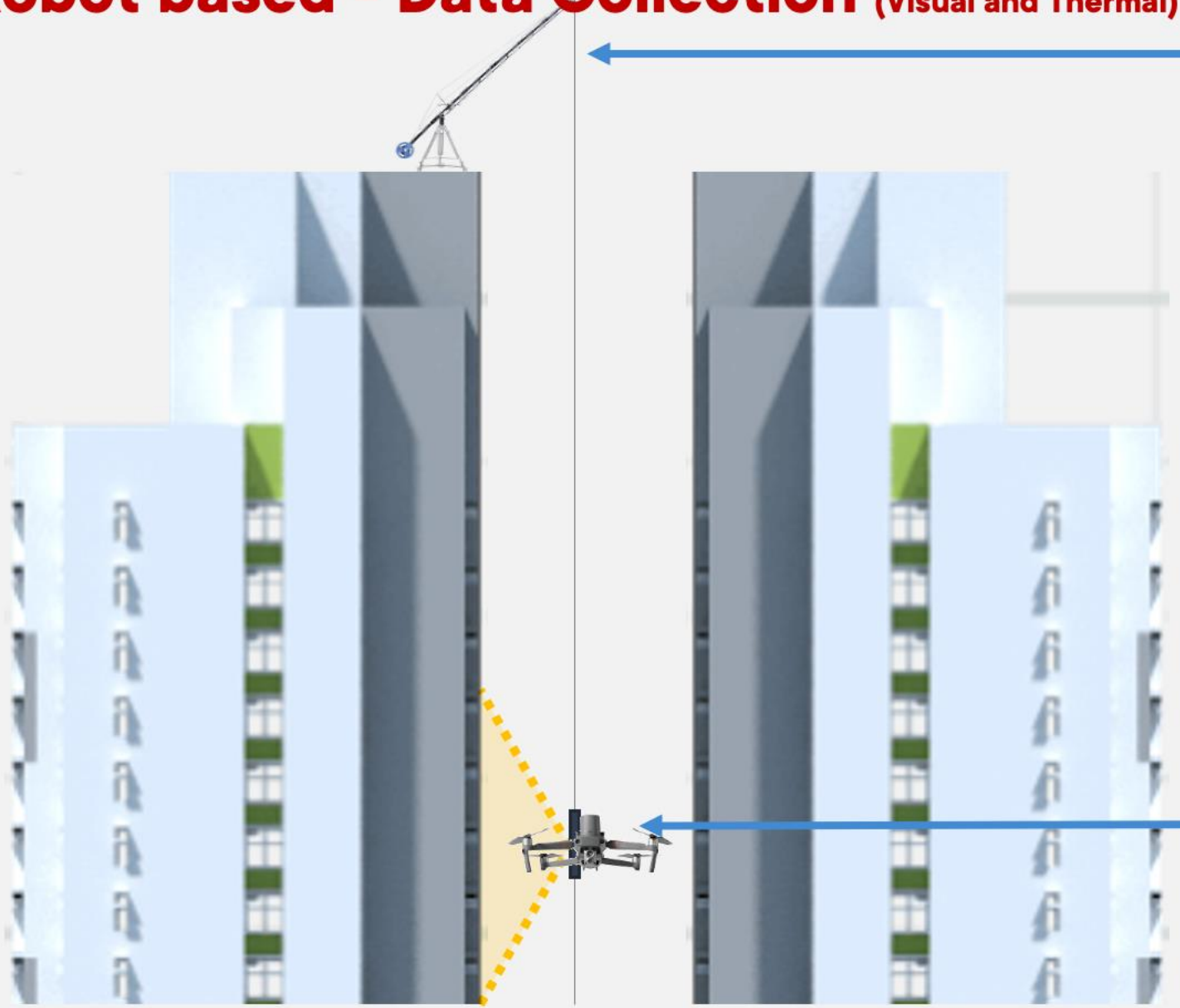
1B. Mobile App based - Handy Data Collection (Visual only)



Login | Project list | Select Drawing



1C. Robot based - Data Collection (Visual and Thermal)



Hardware Technology

Guiding System

- Cable jib system
- Suspend wire-rope towards the ground
- Secured on the roof for additional safety

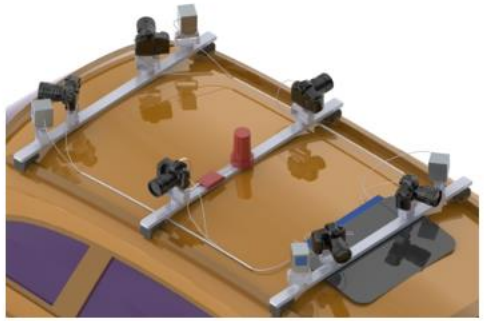
UAS (Drone)

- Equipped with infrared and visual camera
- Protected by propeller guard
- Can equip lighting for illumination

1D. Vehicle based – City level Data Collection (Visual and LiDAR)

City Survey

Visual and Lidar data capture With GPS

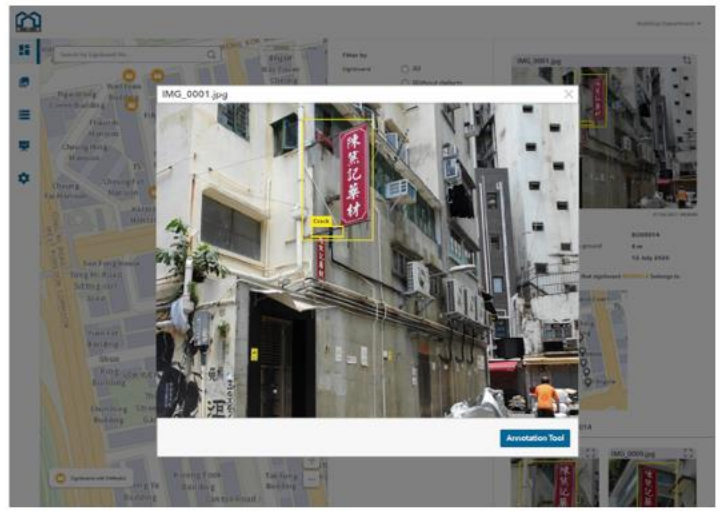


Data livestream

5G data streaming to the cloud server for processing and visualisation

AI Defective Detection

AI-powered defective detection displayed on cloud platform



Part 2. Inspection Deliverables

2A. Data Localization of All Video, Visual and Thermal Images

All video, image and thermal image assets are sorted into folders by facade area and floor level. All data referenced and recorded are provided as a PDF catalogue of reference documents.

2B. **Inspectica™** for Data Analysis and Visualization

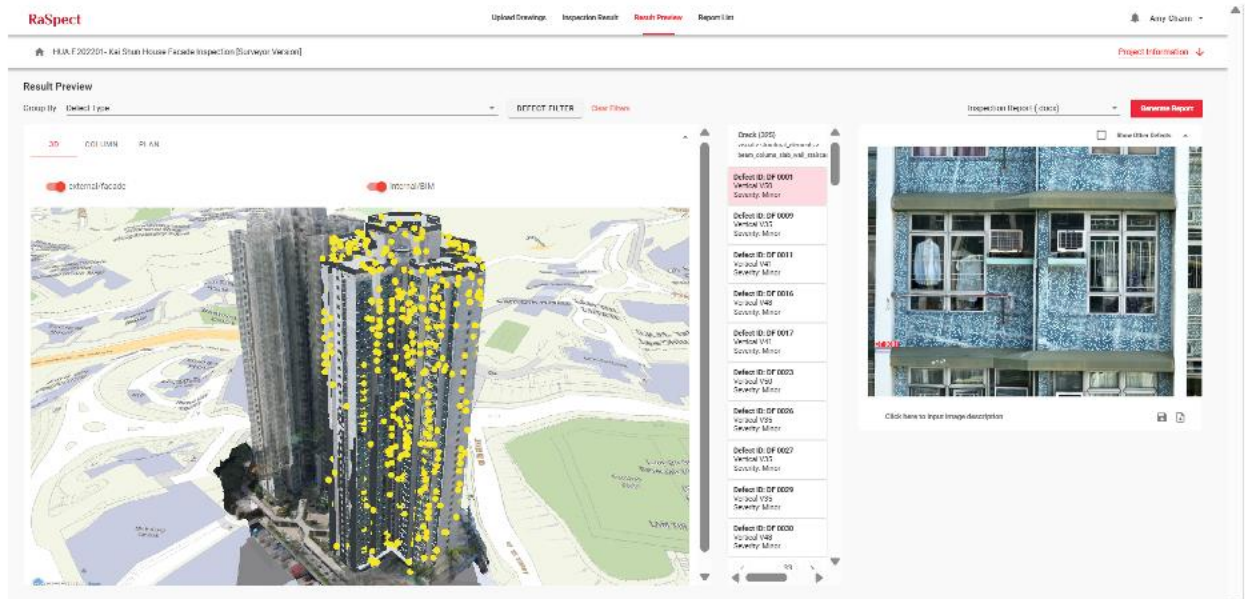
All video, image assets posted and uploaded to our custom-configured, **Inspectica™** cloud-based platform.

2C. Irregularities Finding Summary

Inspectica™ as a platform for client to review all project details, including assorted raw data, comment from surveyor/engineer partner:

I. Image record of the data captured area

II. Identify and localize the irregularities to corresponding area on the elevation



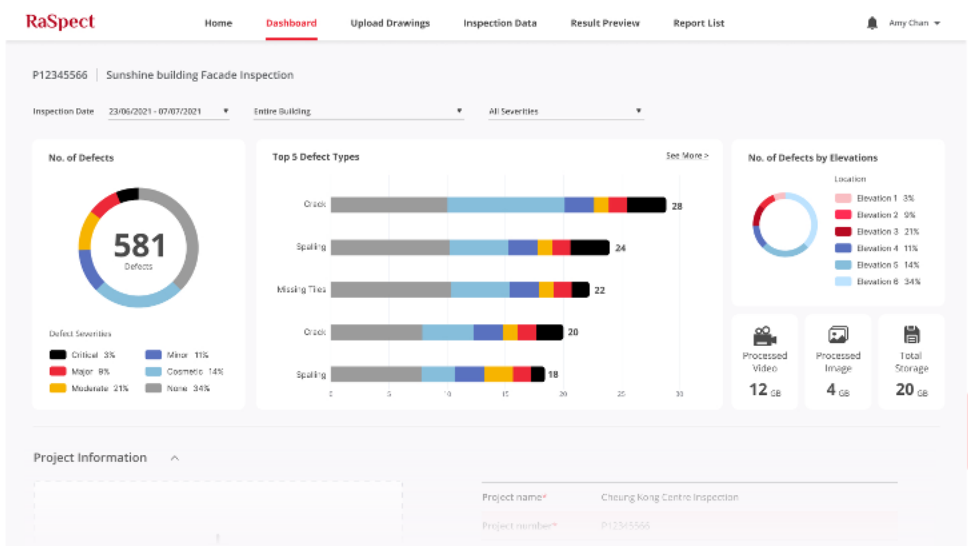
▲ (Ref. Case) Sample dashboard of Inspectica™ platform

Regional Building Building Analytics

Part 3. Report Endorsement by Chartered Building Engineers

Chartered building engineer examine the result including the following:

I. Visual and thermal image record
II. Analysis and evaluation of the collected data
III. Comment on the overall building condition



Background

Address	Tsim Tsa Tsui, Hong Kong
Job Nature	Raspect
Project No.	P12345566
Operation Date	15 May 2023
Date of Issue	31 May 2023

Revision Log

Revision	Version 1.0
Remarks	All defects are correctly identified and report is complete
Issue Date	10 May 2023

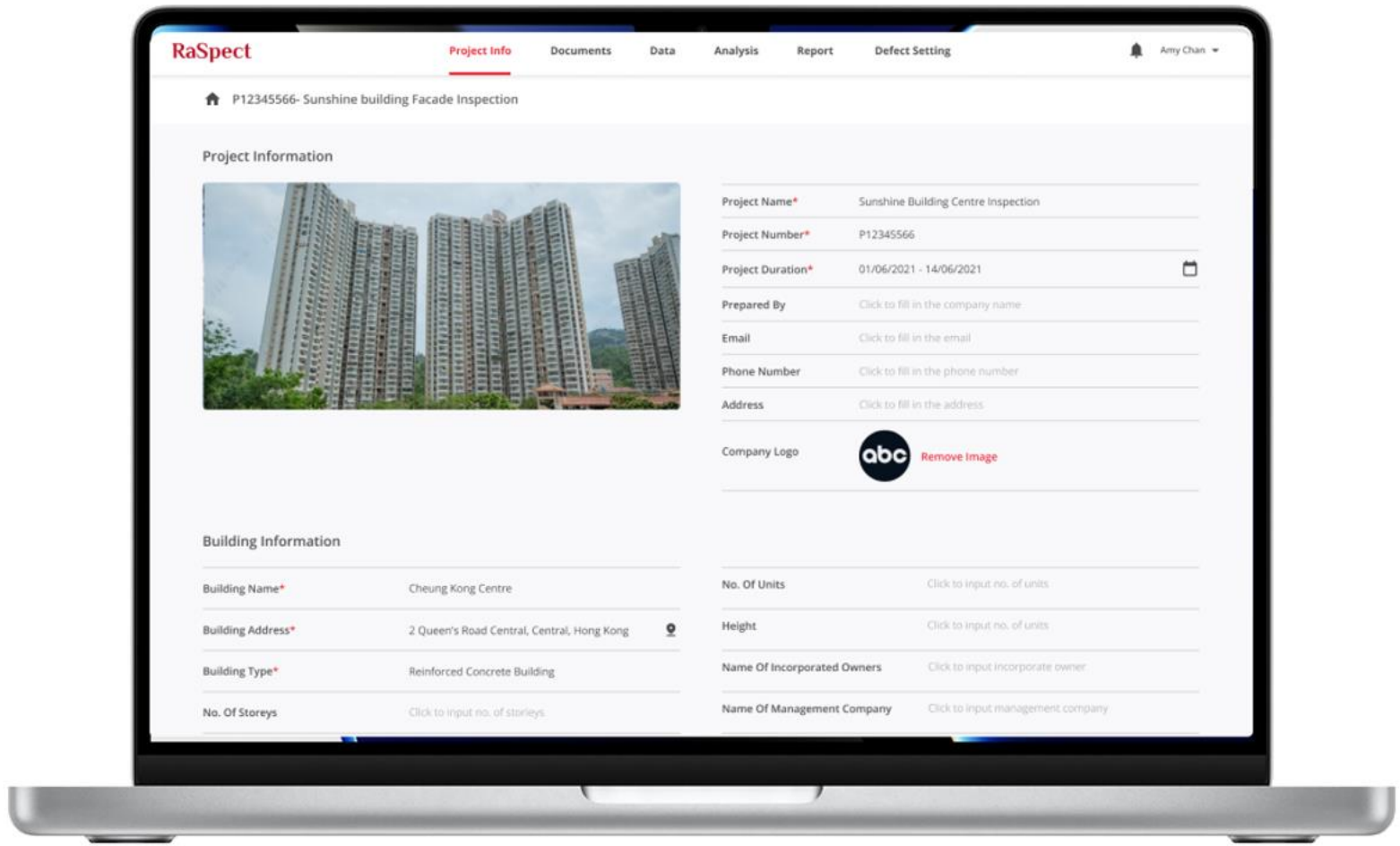
Endorsor Information

Endorsor Name	Mr. Ronan XYZ
Remarks	**Building condition is satisfactory**
Date of Expiry of Registration	10 May 2023
Review Date	10 May 2023
Endorsor Signature	Upload Signautre

Inspectica™ Demo

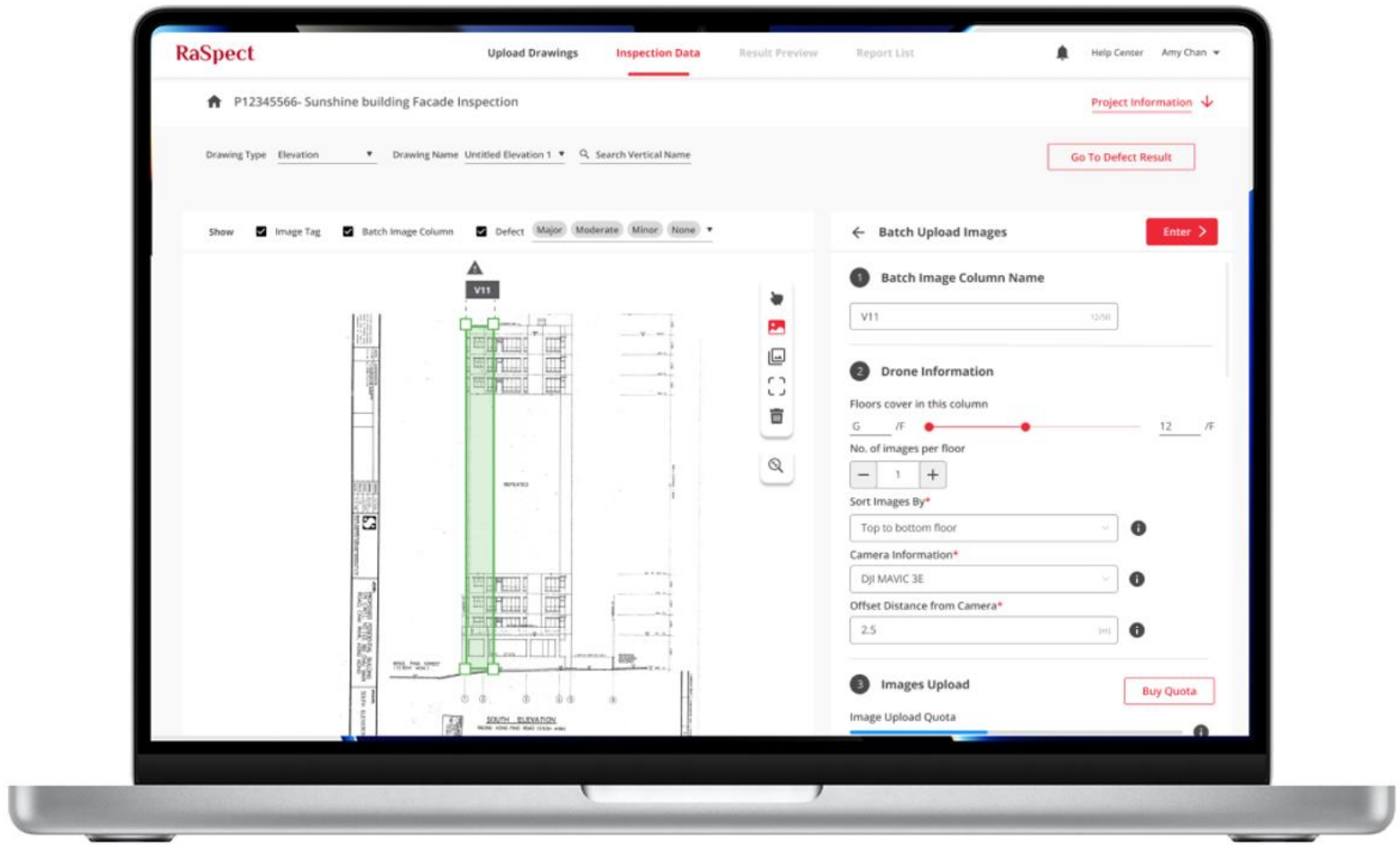
Step 1 | Step 2 | Step 3 | Step 4 | Step 5

Configure Project Info



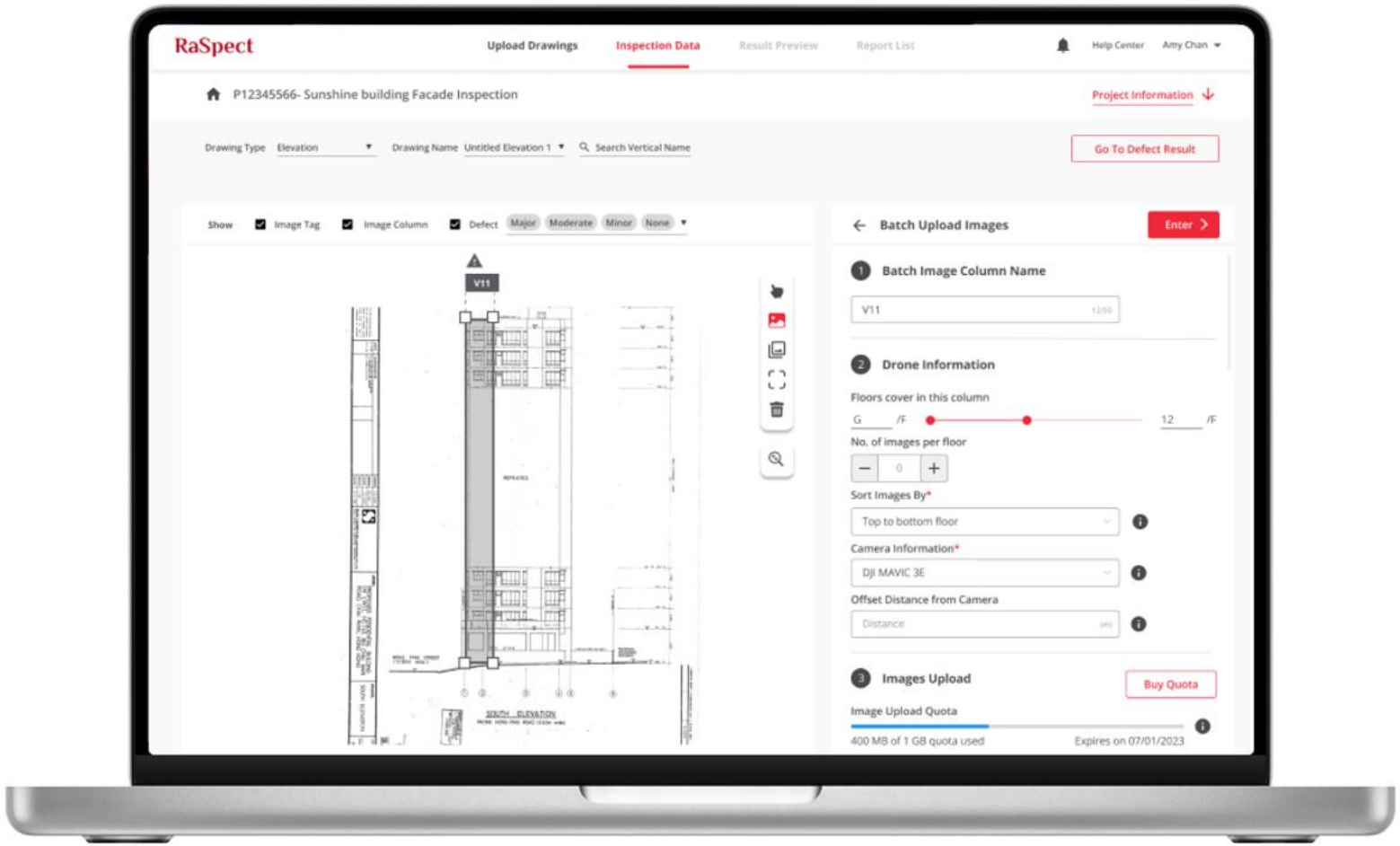
Step 1 | **Step 2** | Step 3 | Step 4 | Step 5

Upload Data



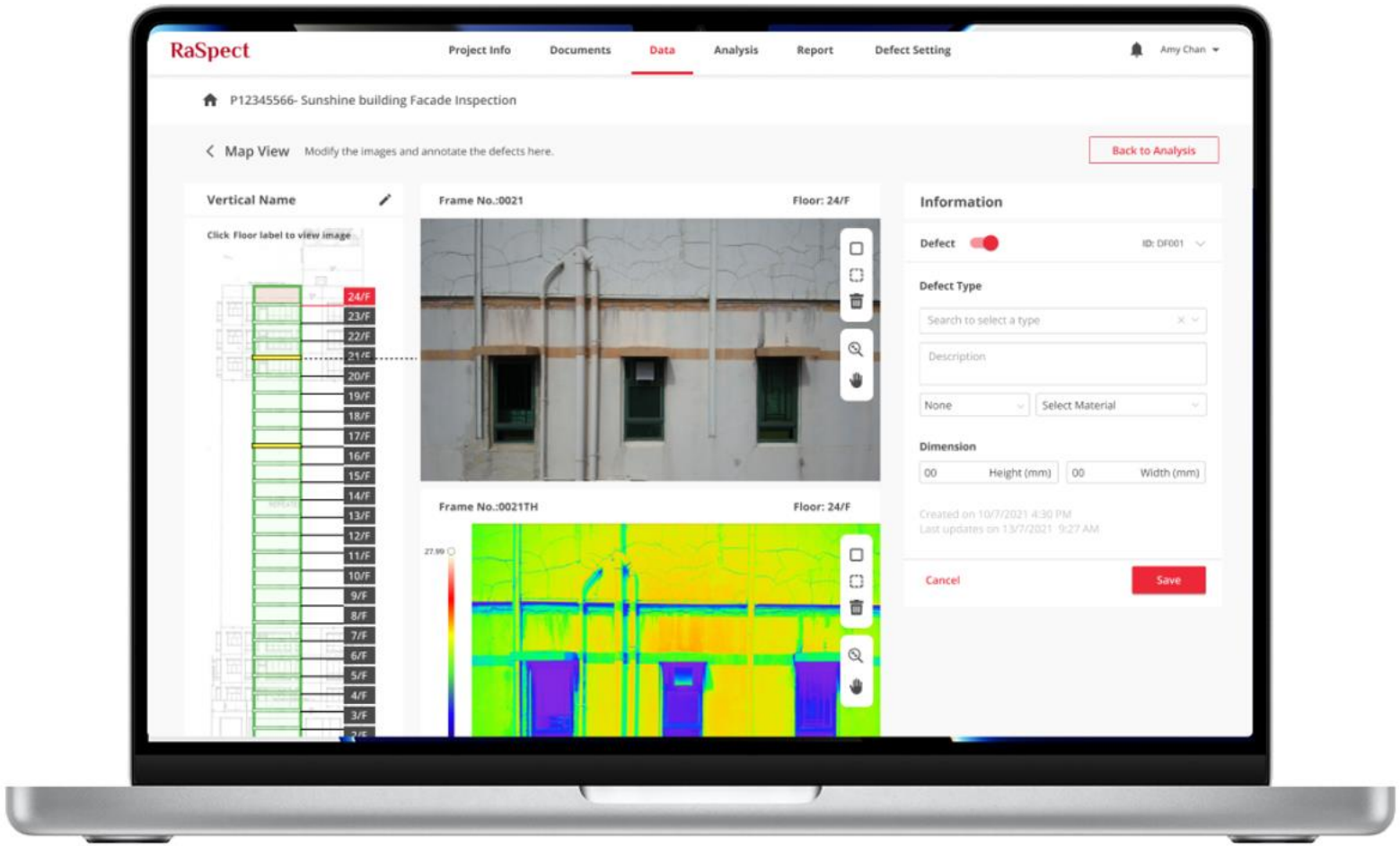
Step 1 | Step 2 | **Step 3** | Step 4 | Step 5

Data localization & AI Analysis



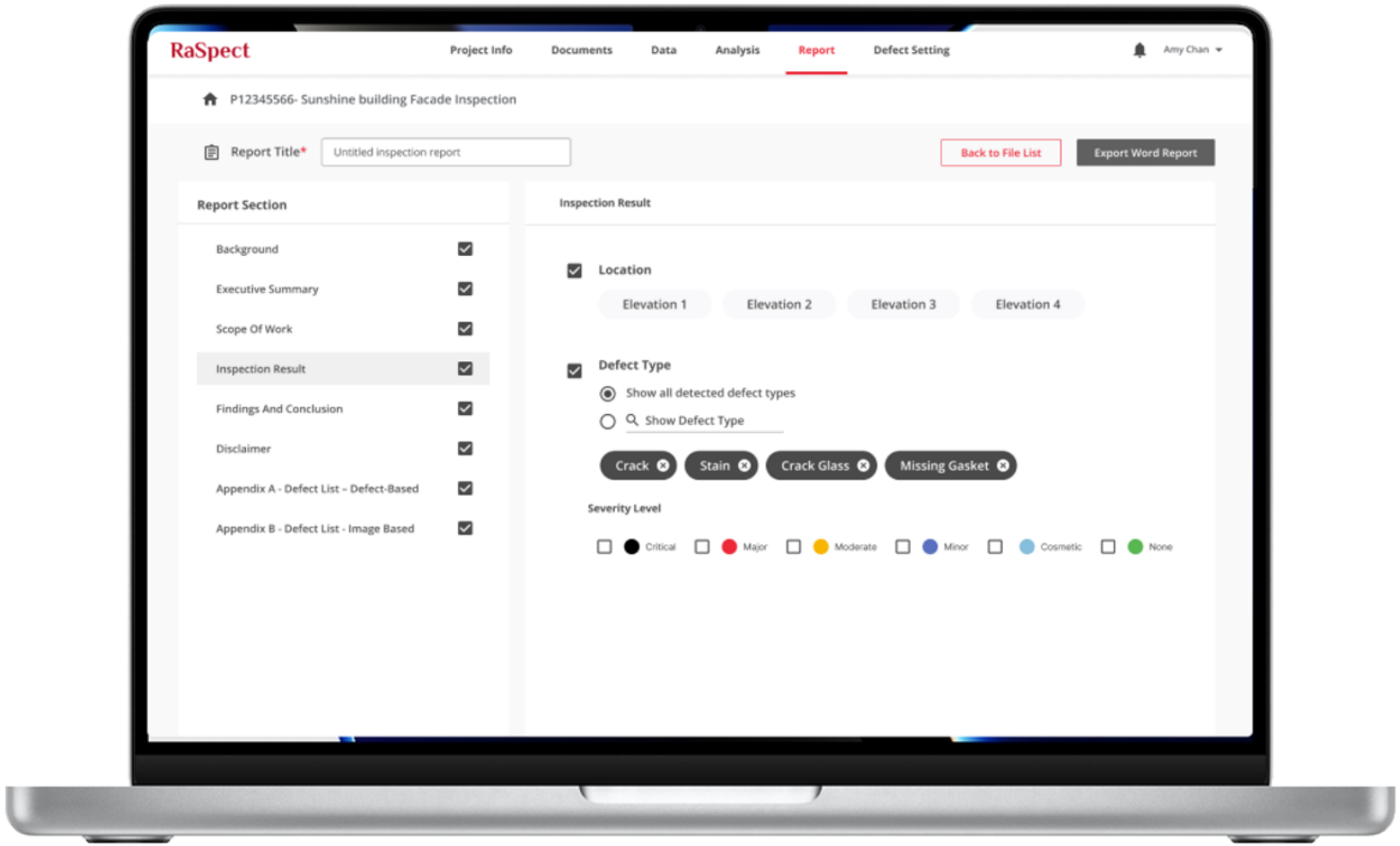
Step 1 | Step 2 | Step 3 | **Step 4** | Step 5

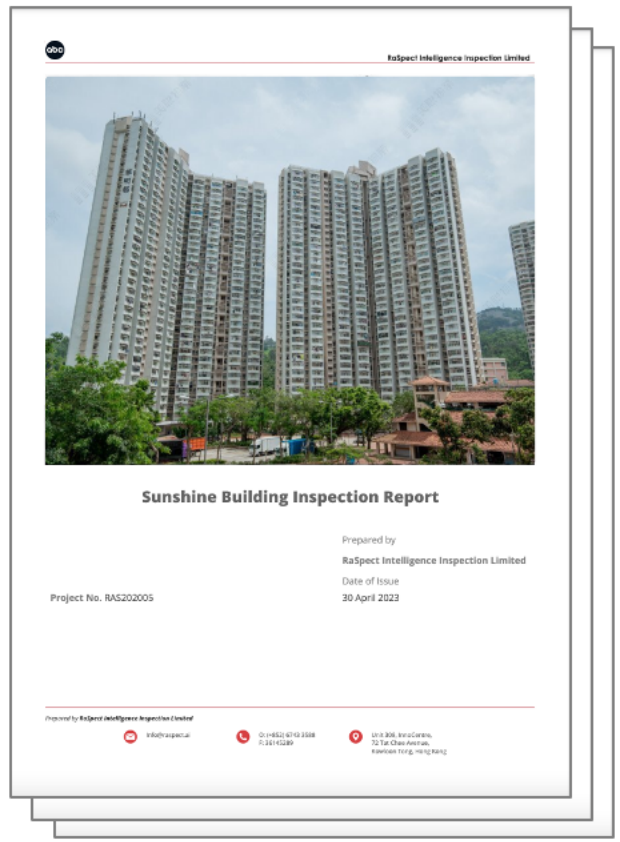
Professional Review Endorsement



Step 1 | Step 2 | Step 3 | Step 4 | **Step 5**

Reporting





RaSpect

Upload Drawings | Inspection Result | Result Preview | Report List

Help Center | Amy Chan

KEF.F.202308–Sunshine Building

Project Information

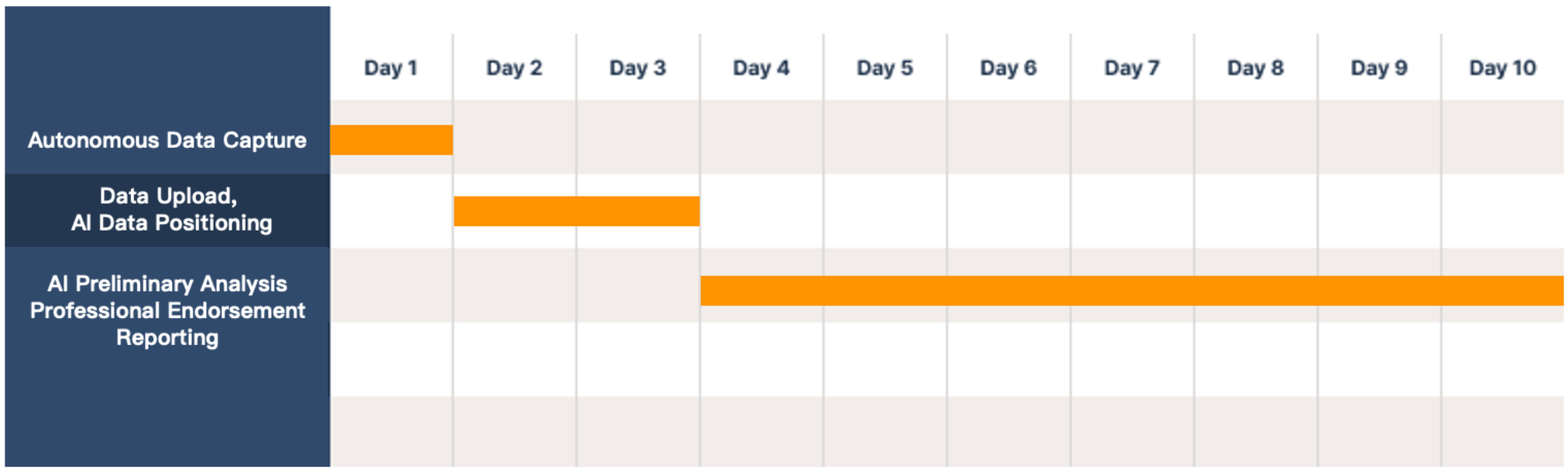
Layout Plan | Floor Plan | Elevation | Other Drawings | Other Documents

f4019ad6-4278-4fc4-8890-17535c4fec0a
13 Jun 2022 at 3:08 PM

Add new file

Project Delivery Timeline

Committed to Timely Deliverables: Our well-defined schedules ensure project success. Actual timelines vary based on location, complexity, size, and regulatory approvals. We provide project visibility before commencement.
*Below Mentioned Gantt Charts Depicts different step timelines of project delivery for any midsized building facade inspection project in Hong Kong.



100+ Customers

Property Owners & Real Estate Developers

SWIRE

MTR

鷹君集團有限公司
Great Eagle Holdings Limited

HKSTP

SINO GROUP
信和集團

KERRY PROPERTIES

hongkong electric 港燈
HK Electric

Facility Managers

Goodman

JLL

昇捷
SYNERGIS

Hactl

Knight Frank

CBRE

GOODWELL 高衛物業管理有限公司
GOODWELL PROPERTY MANAGEMENT LTD
長江實業(集團)有限公司全資附屬機構
A wholly-owned subsidiary of CHEUNG KONG (HOLDINGS) LIMITED

CSX World Terminals HONG KONG

環球貿易廣場
INTERNATIONAL COMMERCE CENTRE

啟勝管理服務有限公司
KAI SHING MANAGEMENT SERVICES LIMITED

雅居物業管理有限公司
Modern Living Property Management Ltd

Consultants/Registered Engineers/Building Surveyors

KS 金城 1963 KUM SHING

Paul Y 保華建業
Paul Y. Engineering

ARUP

intertek
Total Quality. Assured.

G&M Holdings Limited

CSCEC 中國建築國際集團有限公司
CHINA STATE CONSTRUCTION INTERNATIONAL HOLDINGS LIMITED
(於開曼群島註冊成立之有限公司)
(Incorporated in the Cayman Islands with limited liability)

BD 香港工程質量檢測中心有限公司
Building Diagnostic Consultants Limited

AECOM

PRUDEN 普緹

協興建築
HIP HING CONSTRUCTION
新創建集團成員 Member of NWS Holdings

陳旭明測計師行

Governments

建築署
Architectural Services Department

HONG KONG HOUSING SOCIETY
香港房屋協會

機電工程署
EMSD

香港房屋委員會
Hong Kong Housing Authority

屋宇署
BUILDINGS DEPARTMENT

路政署
HIGHWAYS DEPARTMENT

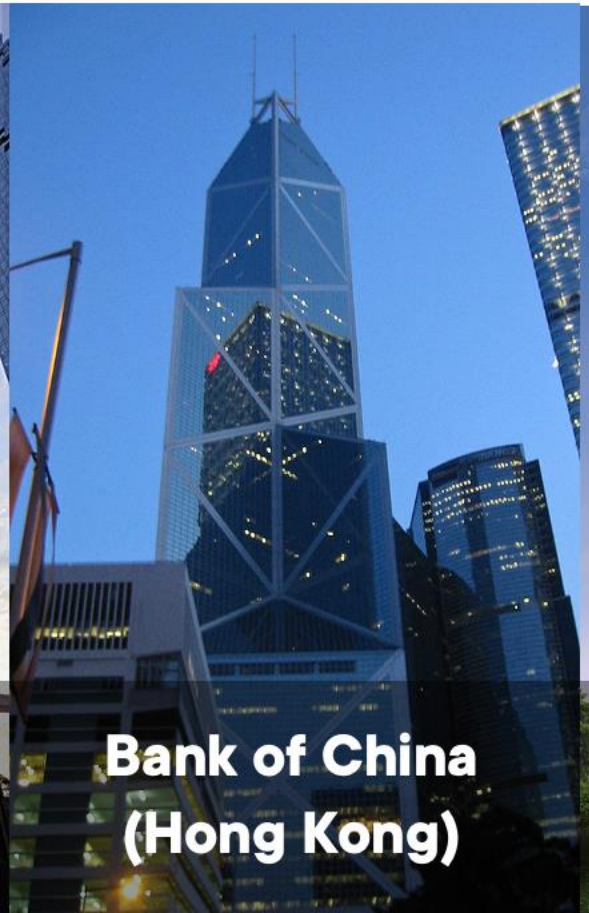
Signature Works

200+
Buildings Inspected

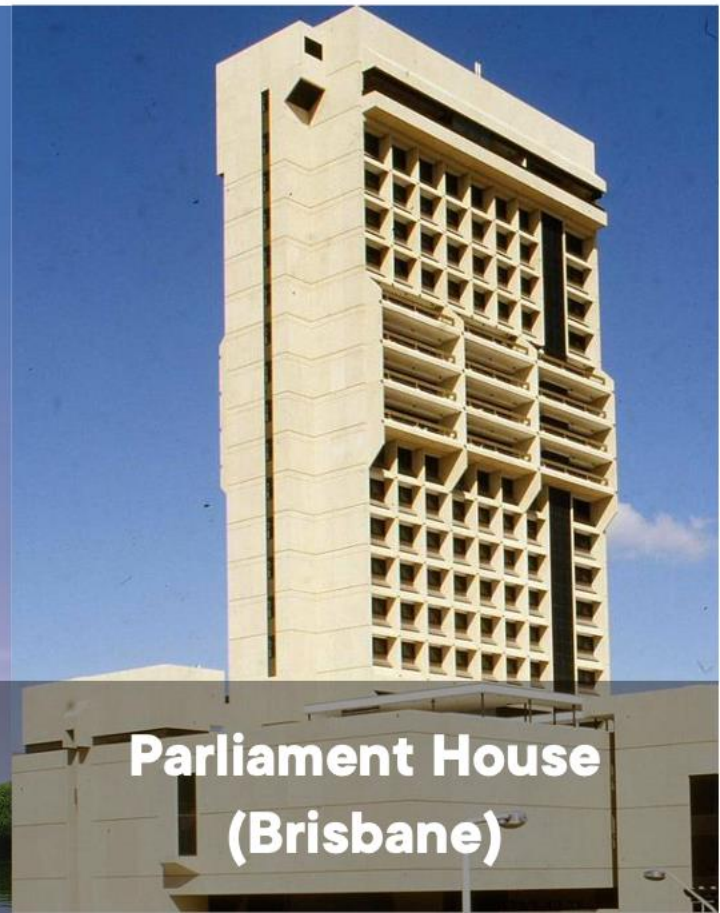
10,000+
Flight Trips

3+ Million
Images


ICC
(Hong Kong)


Bank of China
(Hong Kong)


IT Lagoon Building
(India)


Parliament House
(Brisbane)

Customer Testimonials

"...I use RaSpect Inspectica™, an all-in-one platform that I find highly convenient and user-friendly. "

Dominic Chau

Core Vision Surveyors Limited
Registered Professional Surveyor

" ...defects can be addressed early on, facilitating prompt maintenance arrangements and reducing the risk of potential hazards. "

Jeff Ng

Kai Shing Management Services Limited
Senior Technical Services Manage

" ...we minimize greatly our interference to residents and tenants. In addition, we can utilize drone technology to inspect the structural integrity of our buildings."

Simon Baxter

Great Eagle Holdings Limited
Managing Director, Development & Project Management

"...the system also automates paperwork processes and streamlines regulatory workflows. "

WONG Yue Ka, Edgar

Buildings Department Structural
Engineer (Signboard Control 8)

Awards and Certifications

> “I truly believe this is where Hong Kong can play a unique, value-adding role on the global stage. In addition to green finance, our manufacturers and start-ups are exporting solutions that enable actual implementation of ESG strategies.
>
> Hong Kong has incubated start-ups that, for example, ...monitor wear and tear of skyscrapers (e.g. RaSpect Intelligence Inspection Limited) ... all collecting useful data for performance monitoring and evaluation.”

Elizabeth Fung
Former Political Assistant to Secretary for Commerce and Economic Development at Hong Kong SAR Government

Forbes Asia 100 to Watch (2021)

Tech Top 50 Industrial Engineering Award by Valuer AI (2022)

Silver Award of Global AI Challenge Competition for Building Cooling Load Prediction (2022)

The Most Inspiring AI CEOs to Watch (2020)

KPMG China Leading PropTech 50 (2022)

Winner of Hong Kong ICT Startup Gold Awards (2020)

Winner of World Summit Awards Smart Settlements & Urbanization (2019)

Red Herring Winner Asia Top 100 (2019)

Winner of Hong Kong Rising Star Deloitte China Rising Star Program (2019)

Gold Medal Award Winner of 2nd Asia Exhibition of Inventions Hong Kong (2019)

Publications and Patents

proceedings

MDPI

Proceedings

Concept of Computer Vision Based Algorithm for Detecting Thermal Anomalies in Reinforced Concrete Structures †

Michele De Filippo [1,*,‡], Sasan Asadiabadi [1,‡], Nigel Ko [2] and Harris Sun [1]

1 RaSpect Intelligence Inspection Ltd., 16F, 700 Nathan Road, Mong Kok, Kowloon, Hong Kong, China; sasan.asadiabadi@raspect.co (S.A.); harris.sun@raspect.co (H.S.)
2 Infrared Engineering & Consultants Ltd., Suite 1603, 16/F, Chinachem Johnston Plaza, 178-186 Johnston Road, Wanchai, Hong Kong, China; nigel@infrared.hk
* Correspondence: michele.defilippo@raspect.co; Tel.: +852-3960-7100
† Presented at the 15th International Workshop on Advanced Infrared Technology and Applications (AITA 2019), Florence, Italy, 17–19 September 2019.
‡ These authors contributed equally to this work.

Published: 21 September 2019

check for updates

PATENT COOPERATION TREATY

From the RECEIVING OFFICE

PCT

NOTIFICATION OF THE INTERNATIONAL APPLICATION NUMBER AND OF THE INTERNATIONAL FILING DATE

(PCT Rule 20.2(c))

To:

YUAN, Arthur, T.
Loeb & Loeb LLP
2206-19 Jardine House, 1 Connaught Place
Hong Kong
HONG KONG, CHINE

Date of mailing *(day/month/year)* **12 May 2021 (12.05.2021)**		
Applicant's or agent's file reference **235032-40001**	**IMPORTANT NOTIFICATION**	
International application No. **PCT/IB2021/053937**	International filing date *(day/month/year)* **10 May 2021 (10.05.2021)**	Priority date *(day/month/year)* **08 May 2020 (08.05.2020)**
Applicant **SUN, Chi Chun**		
Title of the invention **SYSTEMS AND METHODS FOR ARTIFICIAL INTELLIGENCE POWERED INSPECTIONS AND PREDICTIVE ANALYSES**		

1. The applicant is hereby notified that the international application has been accorded the international application number and the

HKIE Transactions

AI-powered inspections of facades in reinforced concrete buildings

Michele De Filippo[a*], Sasan Asadiabadi[a], Edward Chan[a], J S Kuang[c], Harris Sun[a]

[a] *RaSpect Intelligence Inspection Limited, Hong Kong*
[b] *Department of Civil and Environmental Engineering, Hong Kong University of Science and Technology, Hong Kong*

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE RECD	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
63/021,894	05/08/2020		140	235032-30001		

CONFIRMATION NO. 3948

SYSTEMS AND METHODS FOR ARTIFICIAL INTELLIGENCE POWERED INSPECTIONS AND PREDICTIVE ANALYSES

CITF Subsidy, Privacy & Data

CITF 建造業創科基金

Inspection software (PA21-018) is on the Pre-approved Lists of the CITF

The CITF is established to encourage wider adoption of innovative construction methods and new technologies in the construction industry with a view to promoting productivity, uplifting built quality, improving site safety and enhancing environmental performance.

70% reimbursement up to HK$ 10M per project!

Privacy protection ensured through auto face-blurring.

Data Security is ensured by

ISO 27001: 2013, ISO 27701: 2019, ISO 9001: 2015 Certified

Call for Action

- We shall leverage cutting edge technology to help address the challenge of building safety from risk of falling objects.
- We want to work with our city's professional building engineers to make inspection safer, easier, faster, accurate and lower cost.
- Instead of traditional manual approach to building façade inspection, drone inspection combined with AI can facilitate safer, faster and more efficient inspection.
- Widespread deployment of AI drone inspection will result in timely data on critical defects that can be repaired before falling object incidents end of causing damage to property or injury to life.
- Hong Kong with its progressive MBIS regulation has an opportunity to lead the global effort in this field to ensure smart city safety.

HKIE THE HONG KONG INSTITUTION OF ENGINEERS 香港工程師學會

MBIS (2012) Vs PFI (2022)

Metrics	Hong Kong	Singapore	
Title of building inspection scheme / measure	Mandatory Building Inspection Scheme (MBIS)	Periodic Structural Inspection (PSI)	Periodic Facade Inspection (PFI)
Year of promulgation	2012	1999	1 Jan 2022
Relevant Ordinance	Buildings Ordinance (BO) & Buildings (Amendment) Ordinance 2011	Building Control Act (Inspection Of Buildings) Regulations	
Target buildings	Any buildings aged 30 years old or above	Non-residential buildings: inspection starting at the 5th year; residential buildings: inspection starting at the 10th year	All buildings that are more than 20 years of age & more than 13 meters in height.
Inspection cycle	Every 10 years	Non-residential buildings: every 5 years; residential buildings: every 10 years	Buildings that are more than 20 years of age are to be inspected every 7 years
Scope of inspection items	Only building elements essential to public safety: External elements and other physical elements; structural elements; fire safety elements; drainage systems; and unauthorized building works (UBW)	Structural elements - initial visual inspection followed by full structural investigation	See FAQ in the adjacent column.
Exemption(s)	Buildings of 3 storeys or less and buildings accredited under the Voluntary Building Assessment Scheme (VBAS)	Detached houses, semi-detached houses, terraced or linked houses and temporary buildings	Detached houses, semi-detached houses, terraced or linked houses and temporary buildings, Temporary buildings as defined under the Building Control (Temporary Buildings) Regulations 2018, Buildings where the highest point (including its roof, if applicable) is 13 metres or lower when measured from the ground.