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SPECIAL FOCUS: SUSTAINABLE ENGINEERING

COVER STORY:

Harnessing AI and drones for façade inspection

Harnessing AI and drones for facade inspection

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Ensuring safety and compliance with BCA regulations.

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INTRODUCTION

Singapore's urban landscape is a testament to its status as a modern city. At the same time, with numerous high-rise buildings and complex infrastructure, ensuring the safety and integrity of these structures has become a top priority.

One critical aspect of building maintenance is facade inspection which involves examining the exterior of buildings for defects, damage or deterioration. Traditional methods of facade inspection can be time-consuming and costly, and can pose safety risks to inspectors.

However, with the advent of Artificial Intelligence (AI) and drone technology, building owners and maintenance teams can now harness these innovative solutions to ensure compliance of the facade inspection with Building and Construction Authority (BCA) regulations.

BCA requires periodic façade inspections for buildings to ensure their safety and structural integrity. The following is a summary of the requirements which are also shown in Figure 1:

- Implementation of Mandatory Periodic Inspection Scheme: All buildings, except certain exempted buildings like landed properties and certain private dormitories, are required to undergo periodic façade inspections, every 10 years, if a building less than 10 years old, and every seven years, if a building is 10 years old or older.
- Appointment of Competent Person: The inspection must be conducted by a Competent Person (CP) registered with BCA.
- Inspection Scope: The inspection

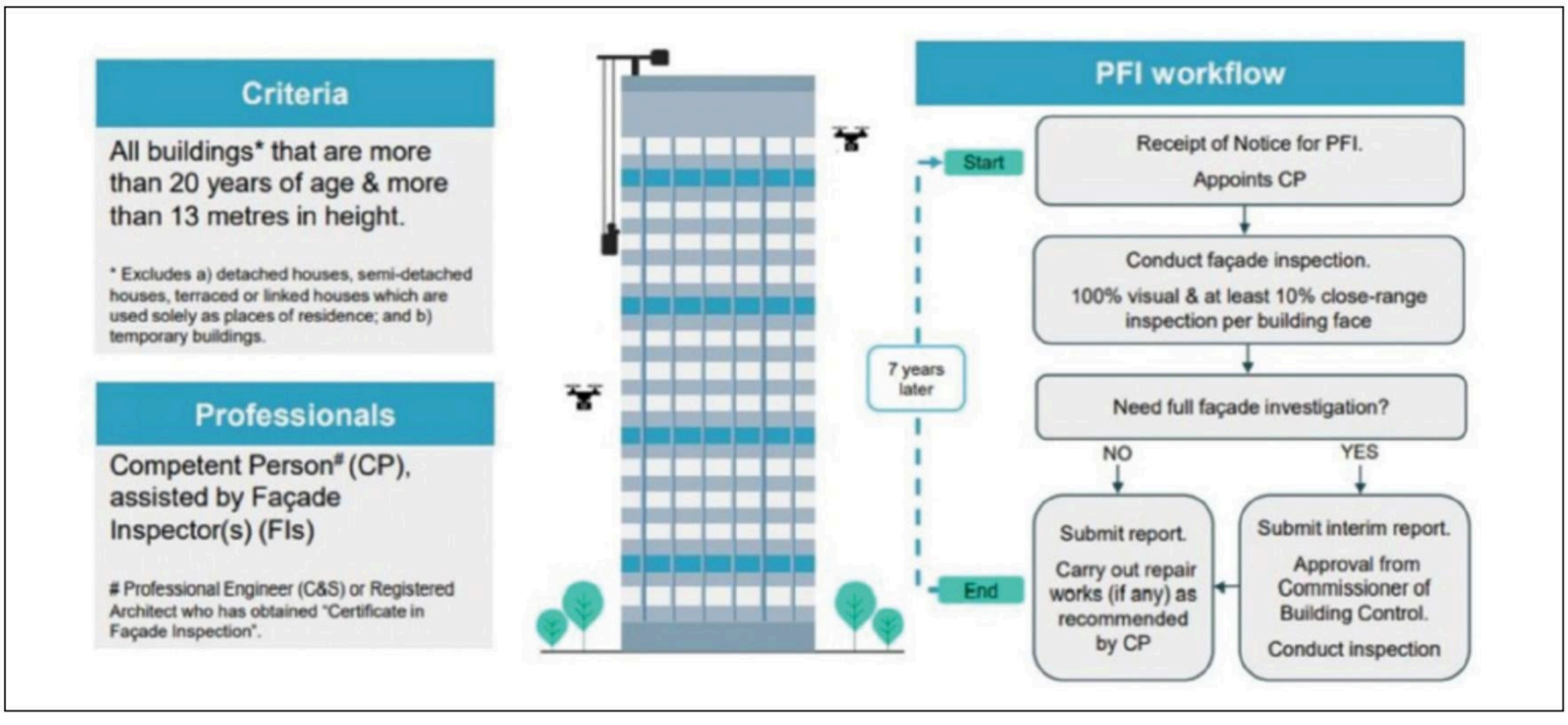

Figure 1: Summary of BCA requirements for periodic facade inspection on buildings. Image: One Smart Engineering Pte Ltd.

incidents of falling façade elements. On average, around 30 cases are reported annually, with some property owners and managing agents being fined or issued warnings for lapses in façade maintenance. These developments reinforce the fact that compliance with Technical Reference 78 is not merely procedural but essential for public safety.

AI-powered drone inspections support CPs in meeting these regulatory requirements with precision. The technology also complements the professional judgement of engineers and architects, providing them with comprehensive data that strengthens the validity of inspection findings and enhances accountability.

A CASE STUDY

A leading property management firm in Singapore recently implemented AI-powered drone inspection across several residential and commercial buildings. By deploying drones for full façade coverage and using AI algorithms to detect and classify defects, the firm achieved a more than 50% reduction in inspection time and a reduction in cost, compared to manual methods.

In this workflow, data collected by drones was processed through NovaPeak's LiveInspect.AI platform which supports multi-user collaboration, defect tagging and compliance reporting, under TR 78.

This example demonstrates how digital collaboration between inspection technology and engineering management systems can deliver measurable efficiency gains, without compromising regulatory compliance.

THE ROAD AHEAD

Harnessing AI and drone technology for façade inspection represents a decisive advancement for Singapore's building maintenance sector. It aligns national safety regulations with the Smart Nation vision, by transforming inspection practices into data-driven, verifiable and predictive processes. Through AI analytics and automated documentation, façade inspections can now deliver not only compliance but also continuous assurance of building health and safety.

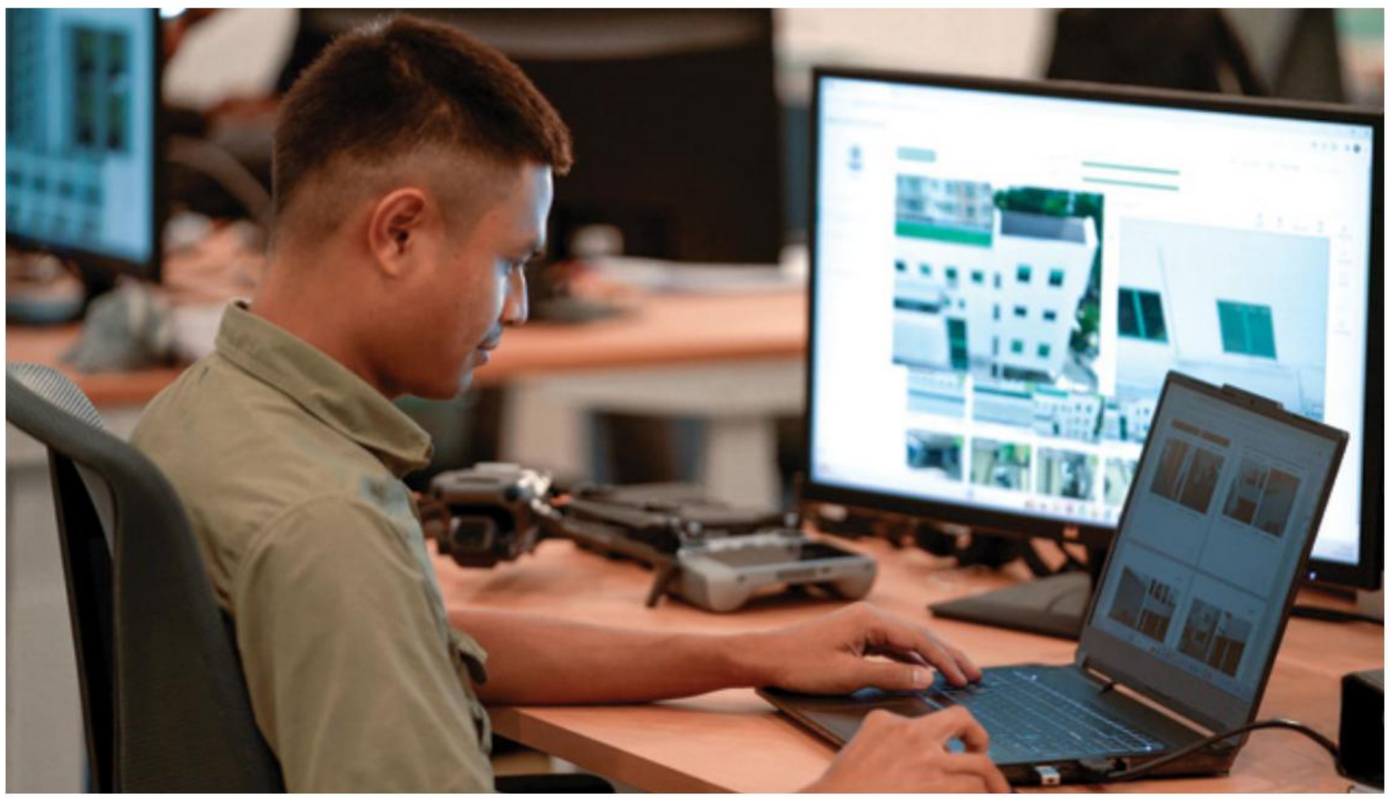

Figure 4: Utilising LiveInspect.AI for defects detection and generation of reports. Image: NovaPeak Pte Ltd.

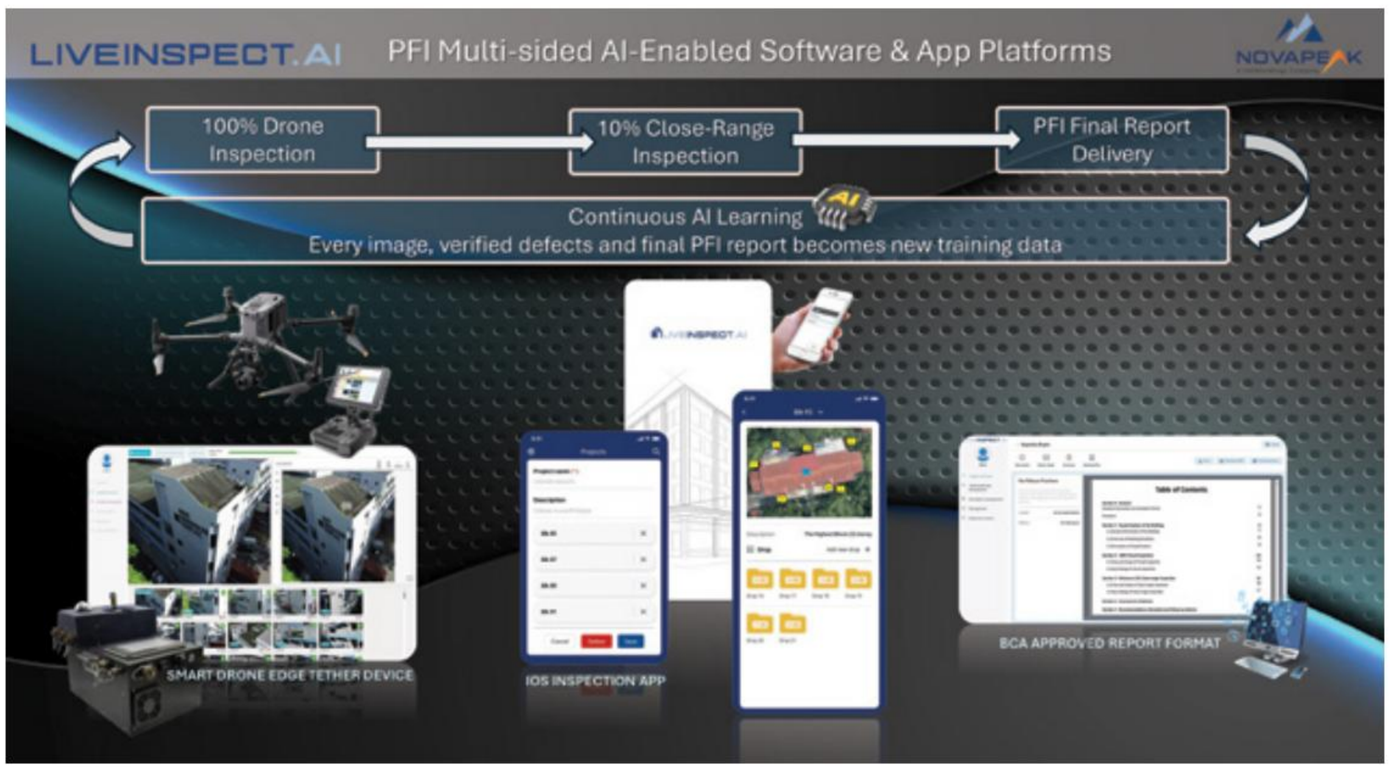

Figure 5: Continuous AI learning via Liveinspect.AI unified smart periodic façade inspection platforms. Image: NovaPeak Pte Ltd.

As more engineering consultancies adopt AI solutions, the reliability of these systems will continue to improve, through ongoing data learning and validation. This synergy between human expertise and intelligent automation will redefine how structural integrity is managed – setting new benchmarks for efficiency, transparency and accountability, in the built environment.

RECOMMENDATIONS FOR BUILDING OWNERS

Our recommendations and conclusions are, as follows:

- **Adopt AI-Powered Drone Inspection:** Consider harnessing AI-powered drone inspection for your façade inspection needs.
- **Ensure Compliance:** Ensure compliance with BCA regulations, by conducting regular façade inspections with accredited Drone Service Providers.
- **Invest in Training:** Invest in training your maintenance team to work with AI-powered drone inspection technology.

By embracing AI-powered drone inspection of building facades, building owners and maintenance teams can ensure the safety and integrity of their buildings, while also reducing costs and improving efficiency.