

RESORTS WORLD™ SENTOSA

Drone Application In Universal Studio Singapore

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Captions if any

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Process Of Implementing Drone Inspection

- **Vendor**
- **Surveying of Flight Area (Battlestar Galactica) -**
GPS Signal/ No Fly Zone/ Indoor/ Outdoor
- **Pilots** – Unmanned Aircraft Pilot License (UAPL)
- **Drone** – DJI, Parrot, Autel Robotic, Garuda
- **Operator & Activity Permit - CAAS**



Drone Inspection In RWS

- Two Drones: **Garuda M400** & **DJI Mavic 3**
- Deploy to supplement our visual Inspection for the Track & Columns with Boom lift; More cost effective and higher productivity



Garuda M400

- ClearCam Z30 Camera with **3-Axis Gimbal** for stabilization & **30x Optical Zoom**
- **Wind Resistance up to 12m/s**



DJI Mavic 3

- Hasselblad Camera with **3-Axis Gimbal** for stabilization, **20MP & 28x Digital Zoom**
- **Wind Resistance up to 12m/s**
- Hovering Accuracy: **+/- 0.1m vertical/ 0.3m horizontal** with vision positioning

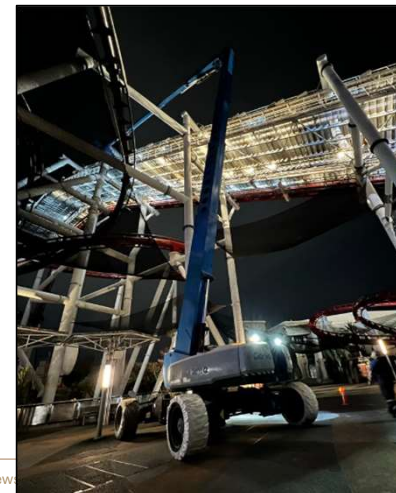


Track Structural Inspection – Battlestar Galactica

- **Maintenance Manual Regime** - 10% of location to be examined annually and all locations in ten years

Conventional Method for Visual Inspection: Using boom lift for inspection

- **Low visibility** - Mostly carried out in the night
- **Time Consuming** – Movement of boom lift from location to location is slow due to tight access
- **Work at height hazards** – up to 43 meters on boom lift



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in list.

Track Structural Inspection - BSG

Improved Method for Visual Inspection: Drone Inspection to Supplement current practice

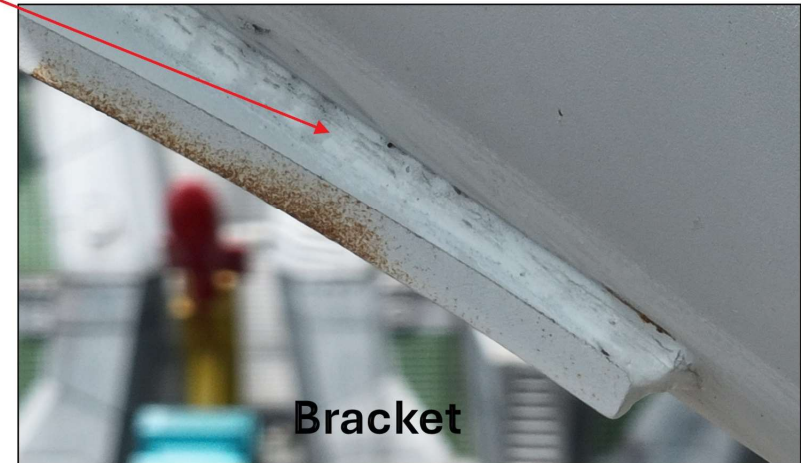
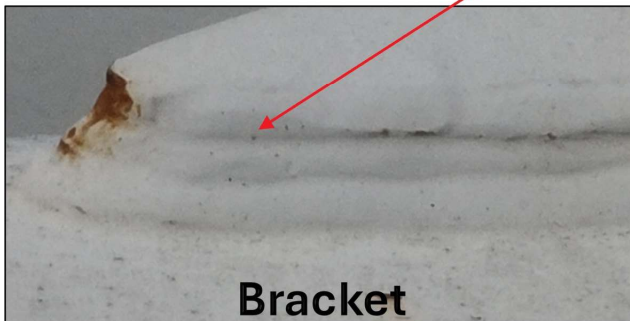
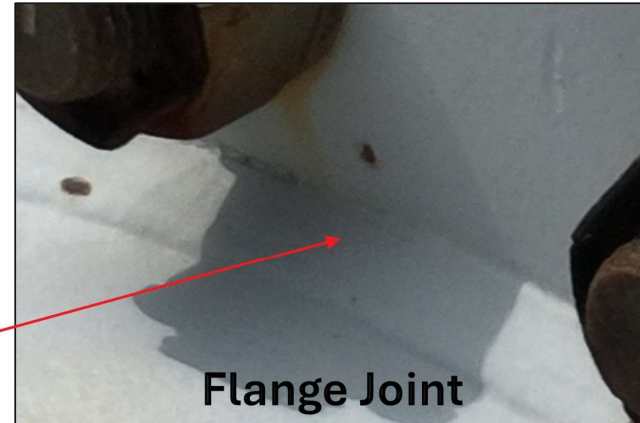
- **Better Visibility** – Carry out in the day
- **Higher Productivity**– Setup is easy, movement of drone from point to point is easy due to smaller size. Cover more points of inspection in the same time frame

Year	2024	2025	2026	2027	2028	2029
Visual inspection						
Drone inspection	2022			2023		

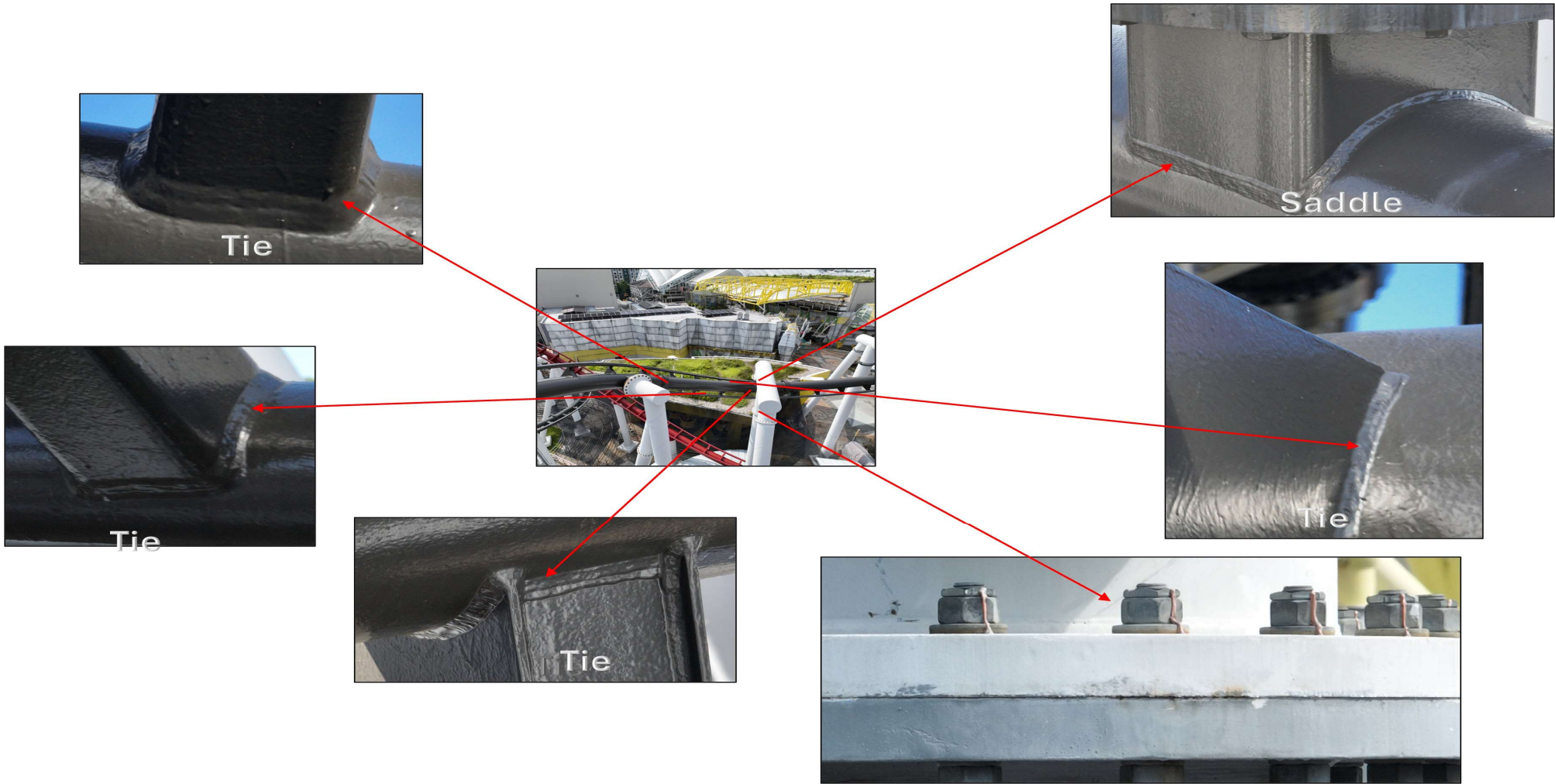
- **Improved Safety** – Eliminated work at height hazard
- **Improved documentation** – Pictures and Video capture can be stored in company server
- **Better Reliability** - Camera Vs Human Eye



Inspection Photos For Column 1011 at 100 ft Height



Inspection Photos For Column 1042 at 65 ft Height



Future Application for Drone – AI (Artificial Intelligence)

Incorporating AI into drone inspection in RWS

Autonomous Flight

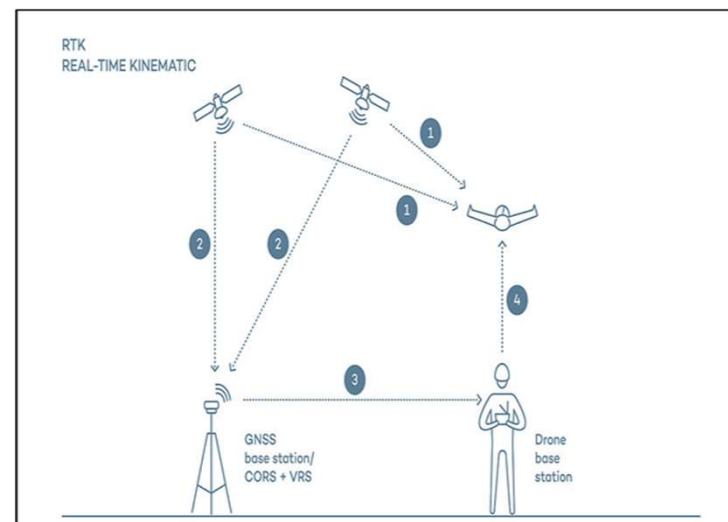
- Operate Drone without a human pilot
- With a programmed flight path

Data Analytics

- Implementing machine learning into drone inspection
- Using AI to analyze pictures & Video collected to provide an insight

Challenges

- Magnetic interference
- Outdoor (Exposure to Sun; Camera settings)
- Façade Inspection (2D) Vs Track Columns inspection (3D)



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The End

