



ROBOTICS & AUTOMATION

INNOVATION THROUGH AUTOMATION

Downer
Relationships creating success

FMS Digital Powered by **TrainDNA**



Rail Facility Drone

The future of Automated Railway Inspections

Rail Facility Drone (RFD) is an autonomous inspection robot for rail assets, facilities and infrastructure using the latest Drones, Autonomous Docking Systems, Infrared and Optical technology to identify Facility & Rollingstock condition and defects.

RFD collects high resolution imagery using a Beyond Visual Line of Sight (BVLOS) **autonomous** Unmanned Aerial Vehicle (UAV) and Docking System.

The autonomous system is configurable for precise and accurate rail asset inspections. With the latest in **Machine Learning and Artificial Intelligence**, RFD data is used to create a digital twin to classify asset condition and identify defects.

RFD is **integration ready** – asset data is used to derive insights and generate maintenance alerts in *your* maintenance management information system.

Business benefits

Increased safety



Reduces personnel exposure to danger during inspections by automating industrial tasks.

Systems Assurance



Ensures high accuracy and repeatability through automating inspections.

Operations Optimisation



Minimises downtime and maintenance costs by detecting faults before failures, automating repetitive labour-intensive inspection tasks, and optimising key-subsystem management.



Artificial Intelligence



Autonomous



Integration Ready



Configurable Inspections



Multi-Robot Ready



Digital Twin

Rail Facility Drone

Autonomous Drone



Autonomous Dock



Autonomous Management



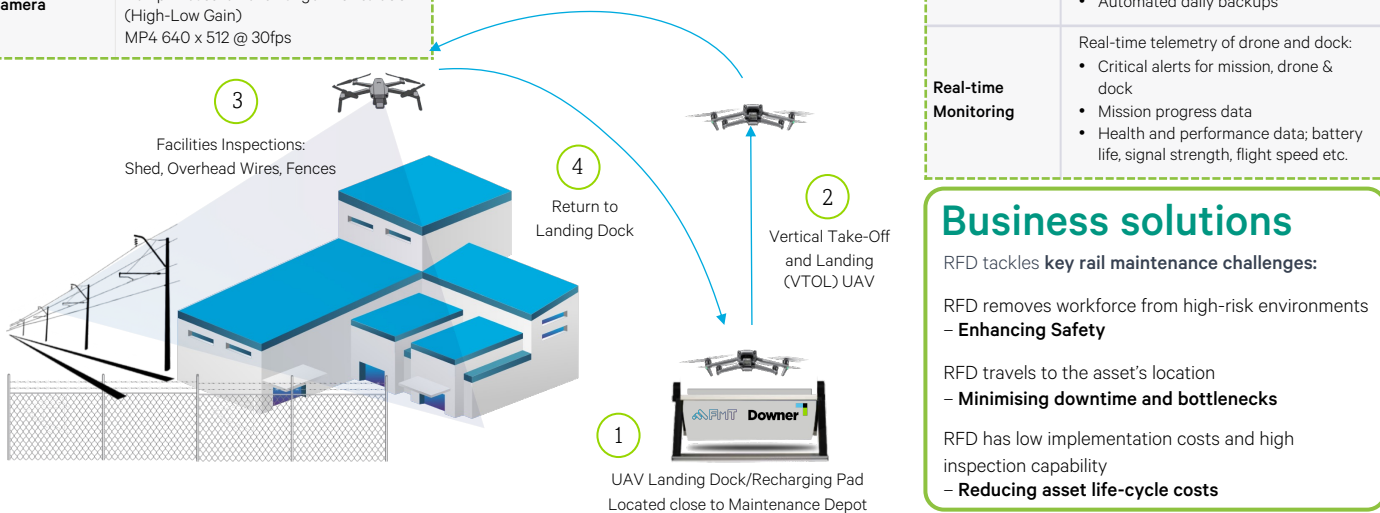
Autonomous quadcopter with advanced sensors	
Autonomy	Autonomous Way-Point Navigation
Weight	< 950g
Flight Speed	Up-to 15 m/s at sea-level, no-wind Up-to 6 m/s ascent and decent speed
Flight Time	45 mins with no wind
Communication Range	1.5-3 km (obstructed, dense building, strong interference) 9-15 km (unobstructed, open space, free of interference)
GNSS	GPS, Galileo, BeiDou, GLONASS with RTK
Hovering Accuracy	Vertical: ±0.02 m using RTK Horizontal: ±0.02 m using RTK
Environment	Operating Temperature: -10° to 40° Max Wind Speed Resistance: 12 m/s Collision Avoidance: Lux > 15
Camera 1	4/3 CMOS Wide Lens 20MP Camera FOV: 84°, Aperture: f/2.8-f/11 H.264 4K: 3840 x 2160 @ 30fps
Optional Camera	1/2-inch CMOS Telephoto Lens 12MP Camera FOV: 15°, Aperture: f/4.4 H.264 4K: 3840 x 2160 @ 30fps
Optional Camera	Thermal Camera - Uncooled Vox Microbolometer Temp. Measurement Range: -20° to 500° (High-Low Gain) MP4 640 x 512 @ 30fps

Autonomous Drone Dock for Charging & Comms with Integrated Weather Station

Autonomy	Autonomous control through Robot Management App to launch, securely docking, charge & transfer data
Dimensions	Length 1000 x Width 870 x Height 900 mm
Weight	85 kg
Environment	Embedded Air-Conditioning for Intelligent Temperature Control Cooling Capacity: 490W Heating Capacity: 400W
Communication	Ethernet, Wi-Fi, 5G
Docking Mechanism	Mechanical alignment for automated charging and data transfer
Integrated Weather Station	Multi-Sensor Array & Alerts: <ul style="list-style-type: none"> Monitors temperature, humidity, wind speed and rainfall in real-time Issues alerts and ensures safe drone operations

Autonomous management through mission control and monitoring

User Interface	User focused interface includes: <ul style="list-style-type: none"> Mission selection and details Mission status and drone telemetry Remote triggering to start or stop a mission Live video feeds
Regulatory Approvals	CASA approved operation (Australia)
Remote Site Configuration*	Set up of missions and inspection flight paths * Site configuration is managed through engineering change processes to ensure site safety and system integrity
Autonomous Analysis	Customised Machine Learning algorithms used to identify Assets for mapping and inspection. Artificial Intelligence used to conduct analysis: <ul style="list-style-type: none"> Asset Condition reporting of inspected components with photographic evidence Long-term trending for Condition-Based Maintenance (CBM)
Data Management	Railway systems compliant data management: <ul style="list-style-type: none"> On-premise or cloud-based options Secure API & authentication for data transfer Automated daily backups
Real-time Monitoring	Real-time telemetry of drone and dock: <ul style="list-style-type: none"> Critical alerts for mission, drone & dock Mission progress data Health and performance data; battery life, signal strength, flight speed etc.



Business solutions

- RFD tackles **key rail maintenance challenges**:
- RFD removes workforce from high-risk environments – **Enhancing Safety**
 - RFD travels to the asset's location – **Minimising downtime and bottlenecks**
 - RFD has low implementation costs and high inspection capability – **Reducing asset life-cycle costs**