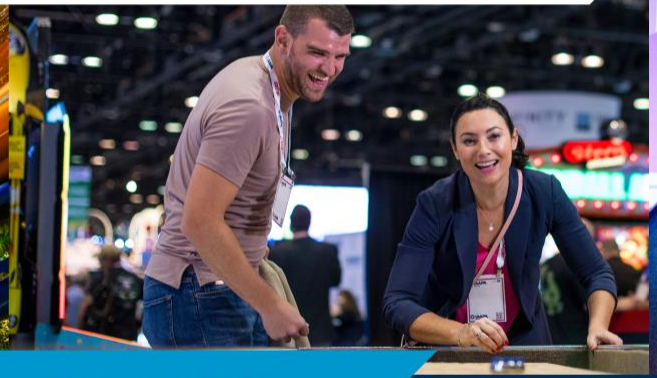
IAAPA® EXPO



CONFERENCE: Nov. 15–18, 2021
TRADE SHOW: Nov. 16–19, 2021

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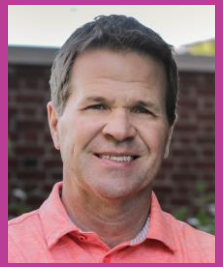
Increasing Uptime with CMMS: Predictive and Preventive Maintenance

Steve Minard, AMS
David Bromilow, Mobaro
Melvin Sandell, Finch Consulting
Darin Porter FMX

– Steve Minard, President, AMS, assists amusement industry in development, financing, construction and operations

– David Bromilow, Mechanical Engineer with 43 years of global experience in leisure safety, maintenance and operations

– Melvin Sandell, Assessment and audit of safety and management systems. Safe use and management of leisure and theme park equipment



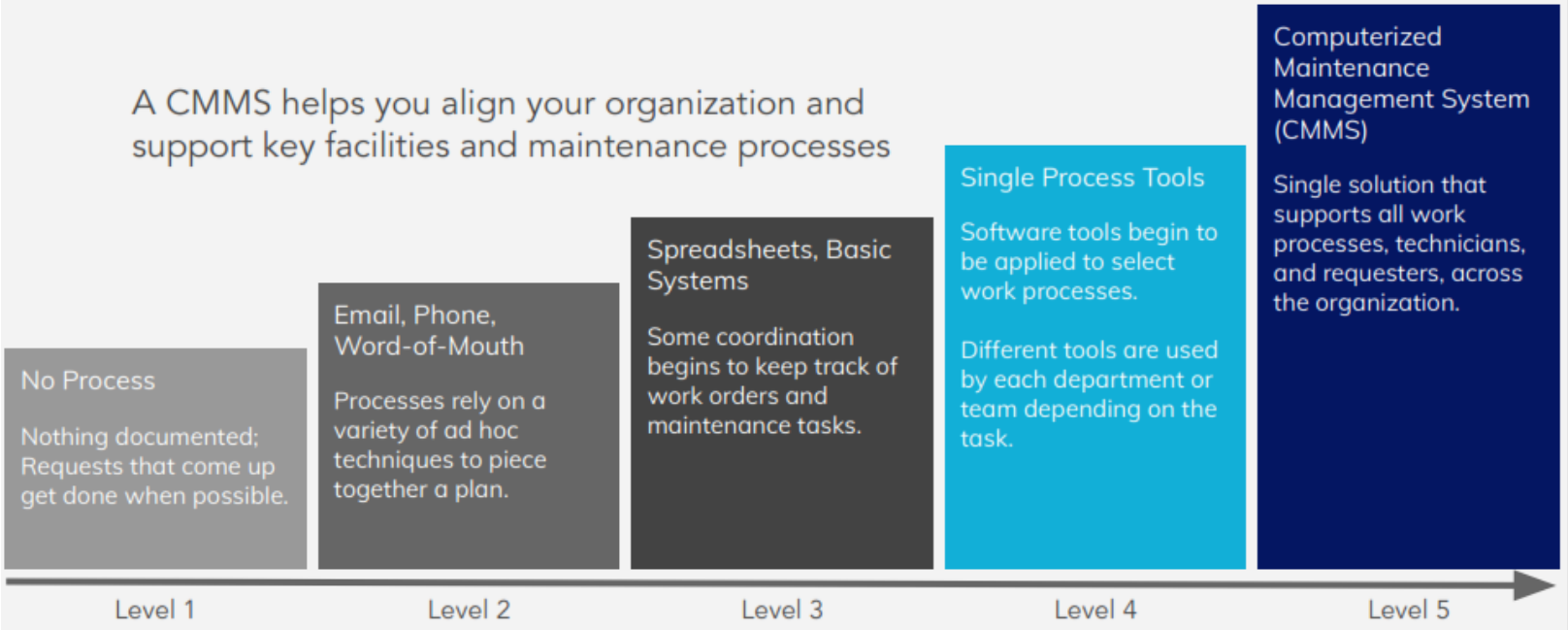
– Darin Porter, Extensive background and experience in building construction and facility management, keenly adept at troubleshooting complex issues.

Why use a CMMS?

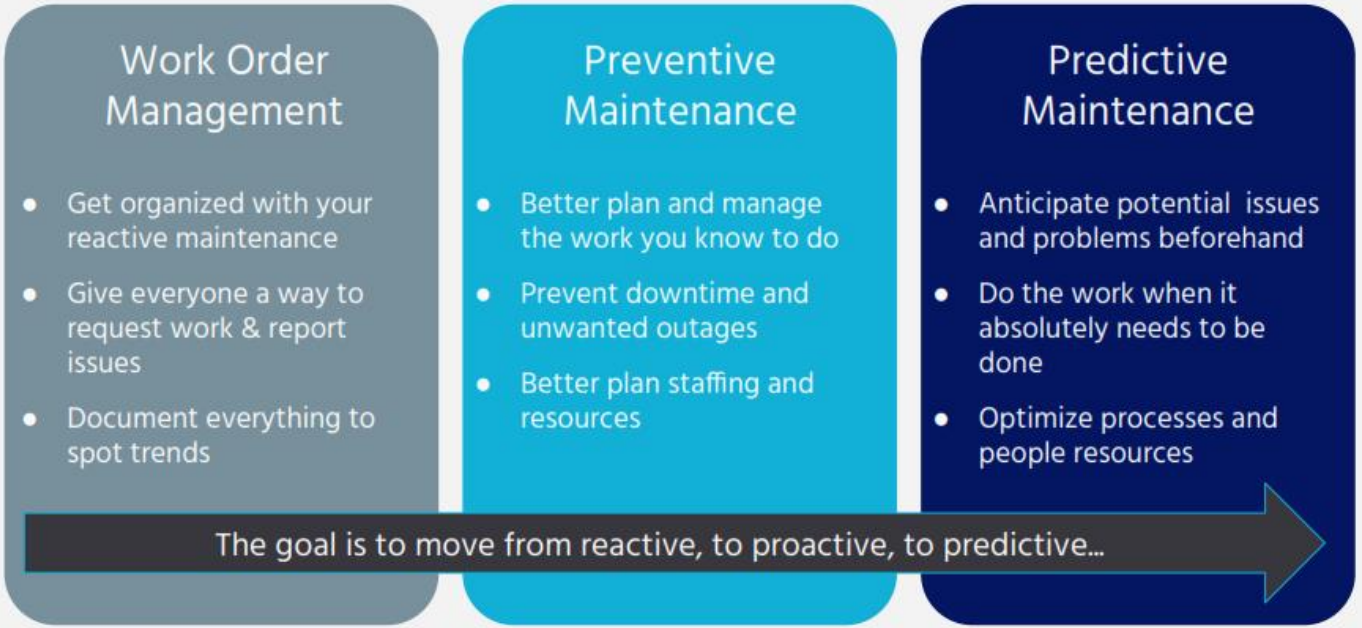
Extend the life of your equipment & assets and significantly increase uptime.

A Typical Customer Journey

A CMMS helps you align your organization and support key facilities and maintenance processes



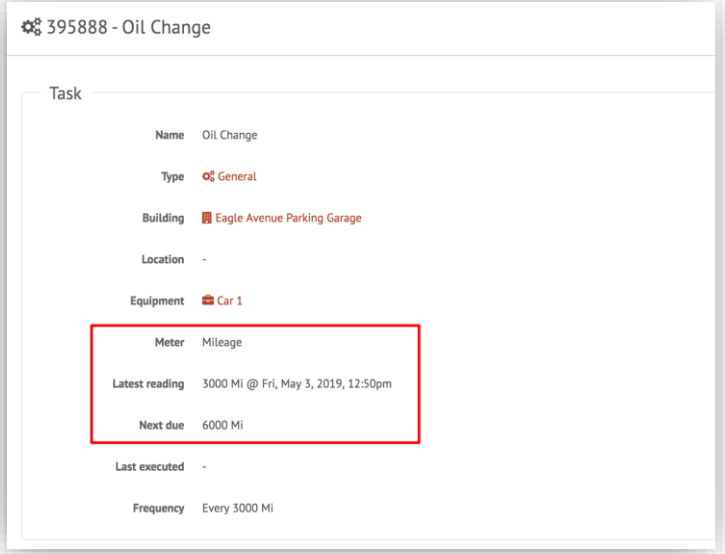
A Typical CMMS Continuum



See Fewer Work Orders

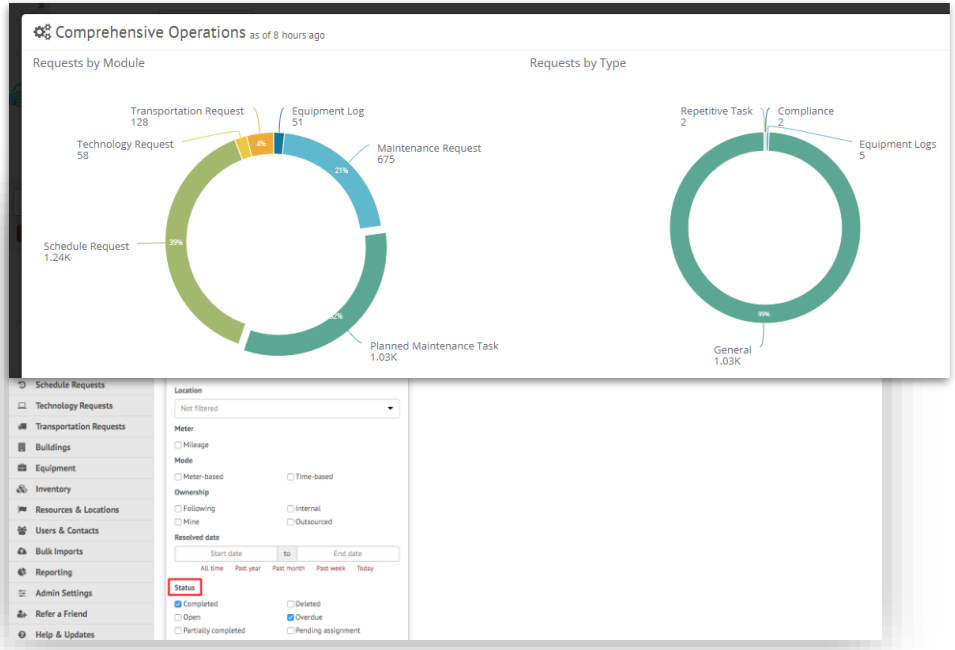
Reactive Maintenance can cost you **3-6 times more** than preventive maintenance

50% average reduction in equipment failures



Report on Maintenance

Review reports for tasks performed for **different users, pieces of equipment, buildings, and more.** This information is useful for **measuring KPIs** and can come in handy for legal issues, audits, and inspections.



Preventive Maintenance

Create checklists and preventive maintenance plans for your unique attractions and rides.

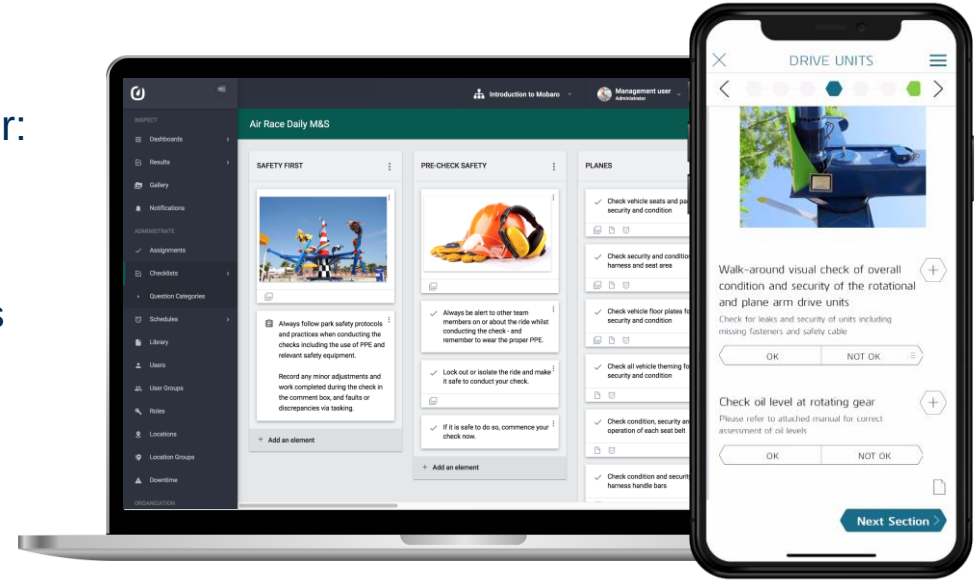
RETHINKING MAINTENANCE

RIDE AND ATTRACTION INSPECTIONS & MAINTENANCE PROCESSES

WEB APP

Create/Edit/Monitor:

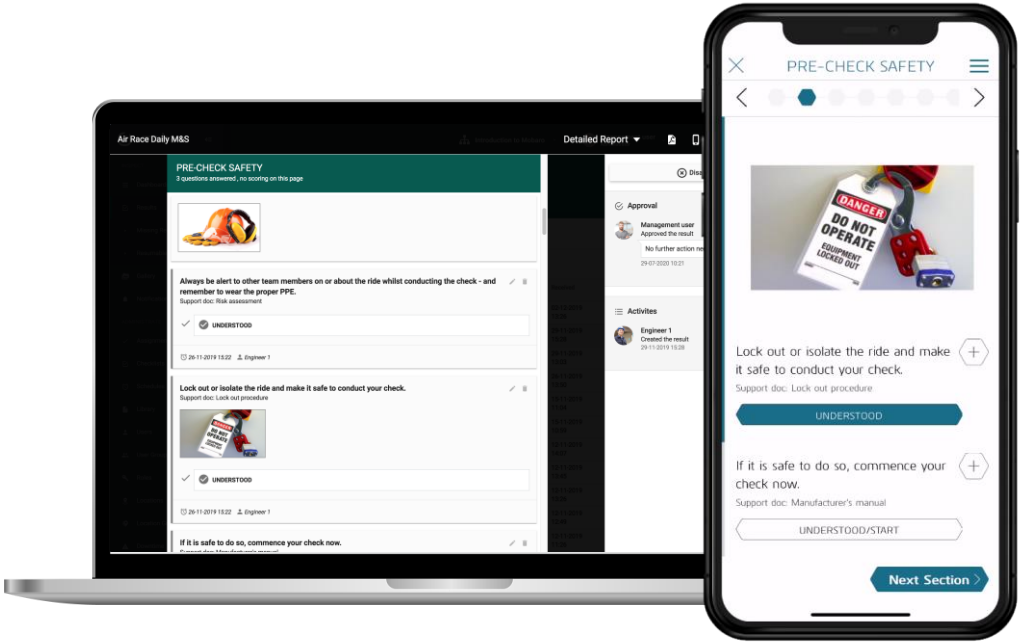
- Checklists
- Automation
- Inspection reports
- Tasks
- Teams
- Rides
- Support docs



MOBILE APP

- Conduct checks
- Perform tasks
- Get prompted
- Create tasks
- View rides
- View reports
- View support docs
- Confirm location

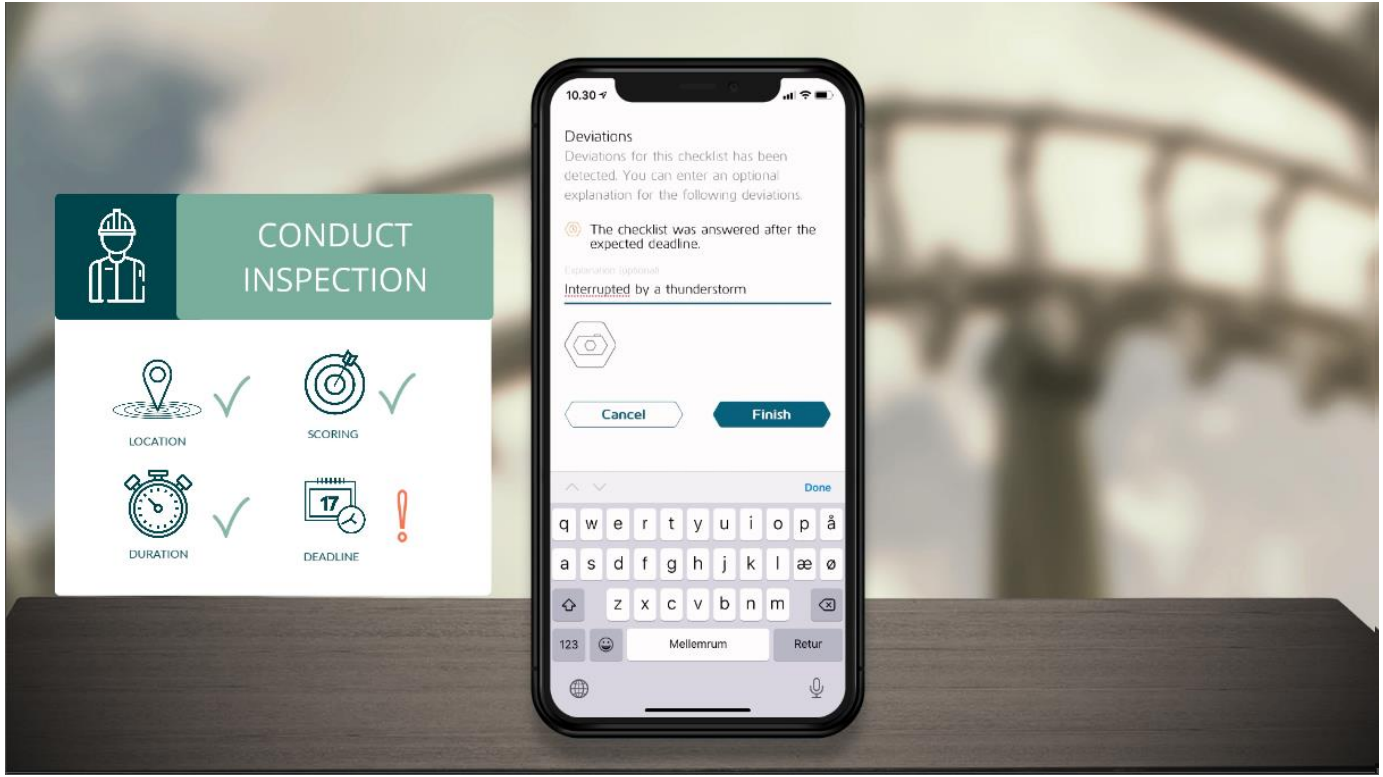
COMPLIANCE MANAGEMENT



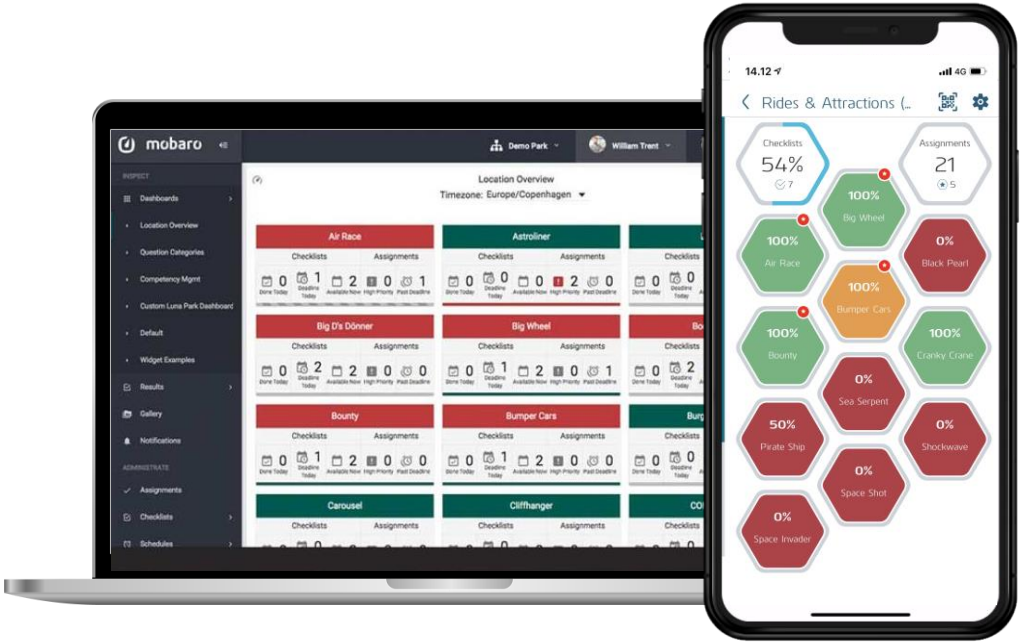
Local and national regulatory compliance facilitated:

- Detailed activity log
- Lock out / tag out compliance
- Working at height
- Confined space
- Lone working
- Chemical management
- PPE requirements

COMPLIANCE MANAGEMENT

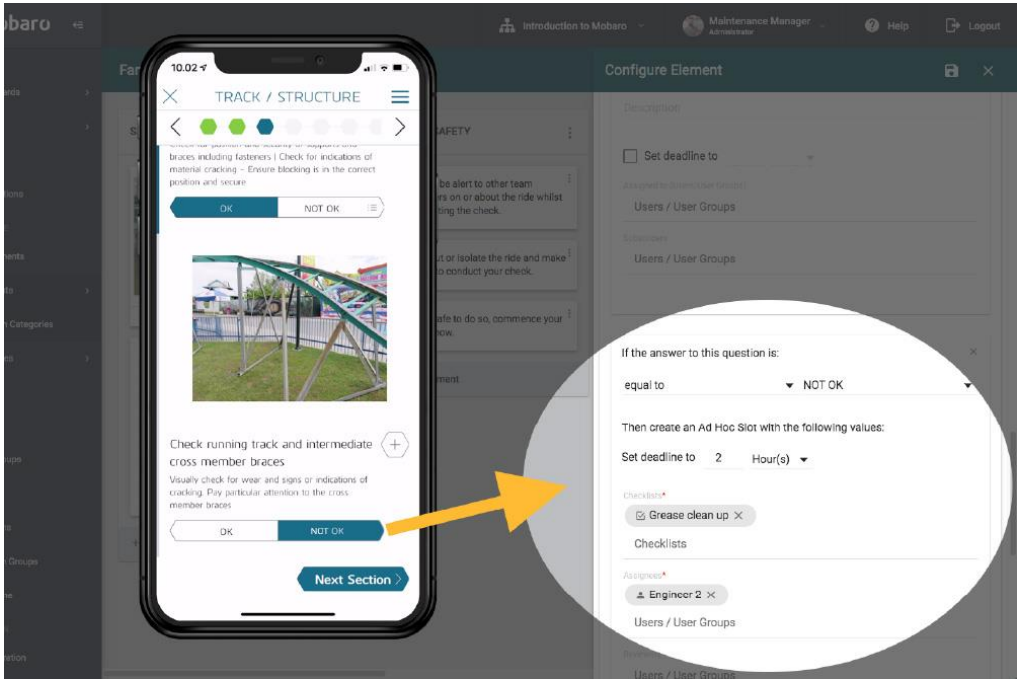


REAL-TIME RIDE STATUS

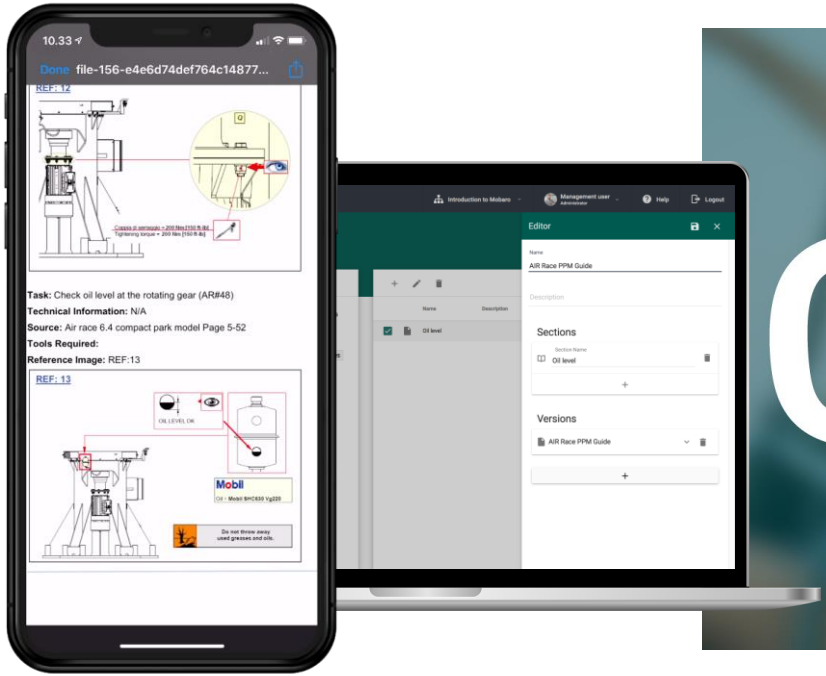


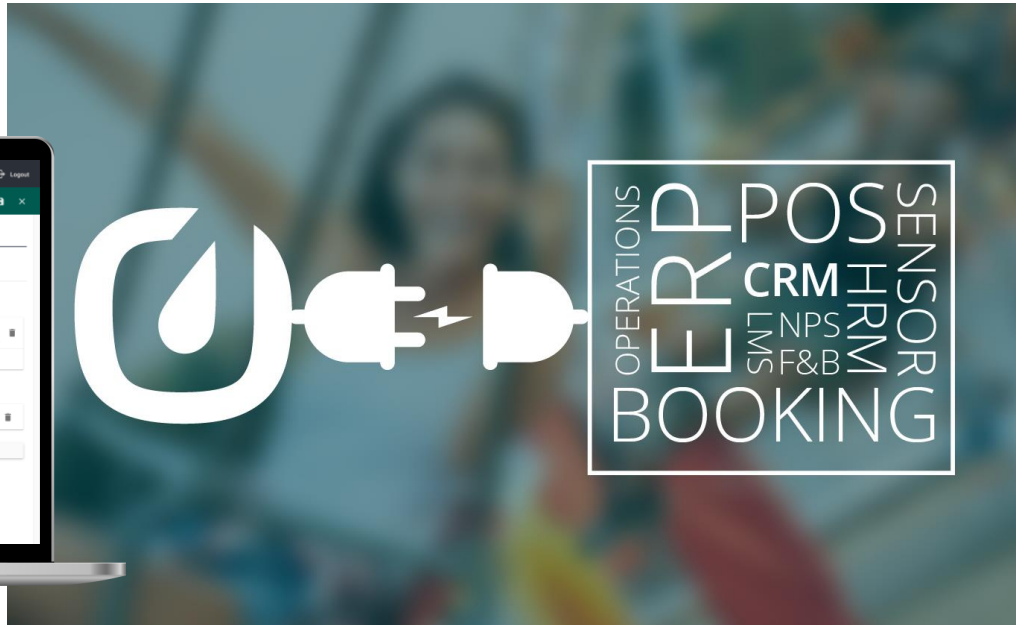
AUTOMATE INSPECTIONS FROM WITHIN OTHER INSPECTIONS

- During an inspection you discover comprehensive grease spill. There is a separate inspection for that, which is triggered from your reply.
- Another team member is prompted to take action.

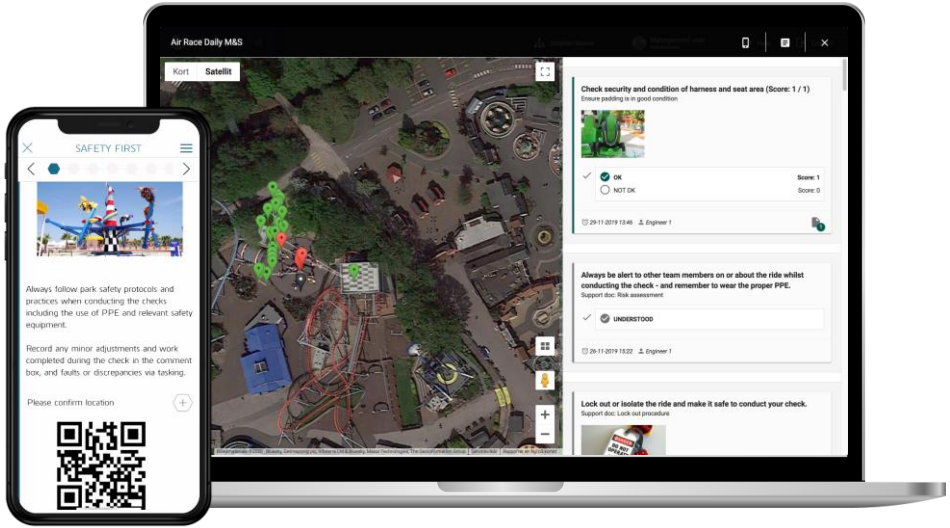


INTEGRATION





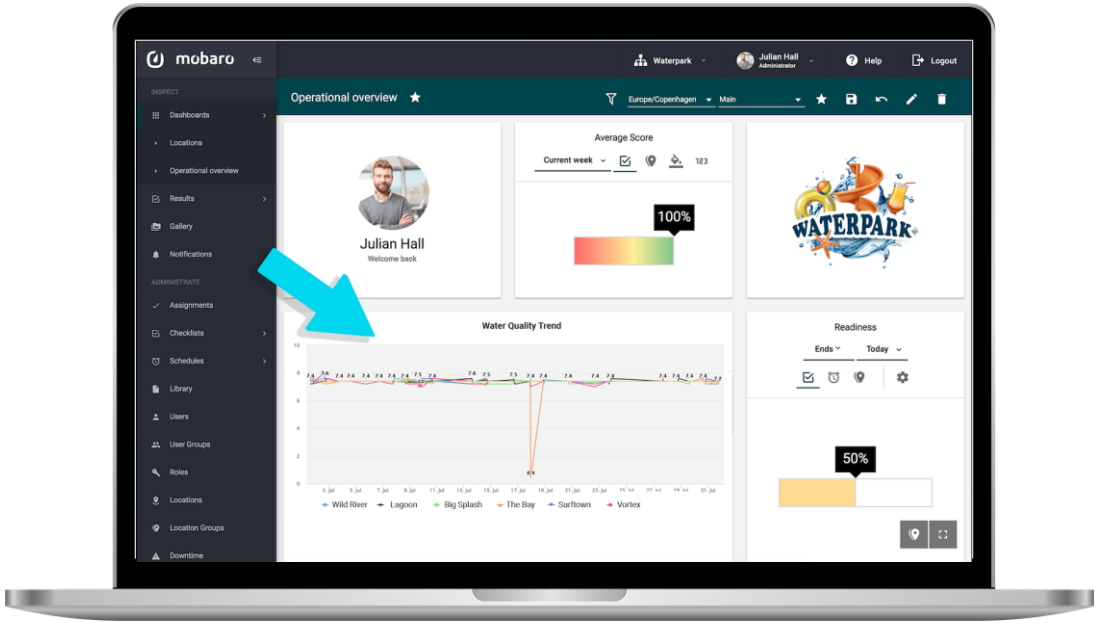
INDIVIDUAL ACCOUNTABILITY



- Personalized login and access level
- Controlled access
- View geo-location from each check item
- Require compliance within predefined radius
- Confirm location using ride-specific QR codes

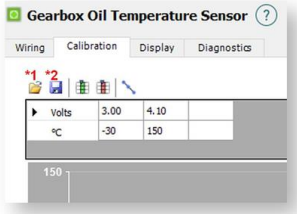
PREDICTIVE MAINTENANCE

- Value development
- Analysis
- Trends and correlations
- Data visualisation



Sensors

The electro-mechanical interface between the machine and the CMMS. Can provide as much or as little information/functionality as you can afford/wish for/your staff are competent for:



- early fault detection
- failure detection
- and CMMS integration

Early Fault Detection

Industrial grade sensors automatically pick up faults within milliseconds often preventing more extensive damage allowing early, less intrusive, less time consuming and cheaper interventions.

Sensors can be in places employees do not have easy or regular access to:

- Inside motors, bearings and gearboxes.
- High sections of supports/tracks.

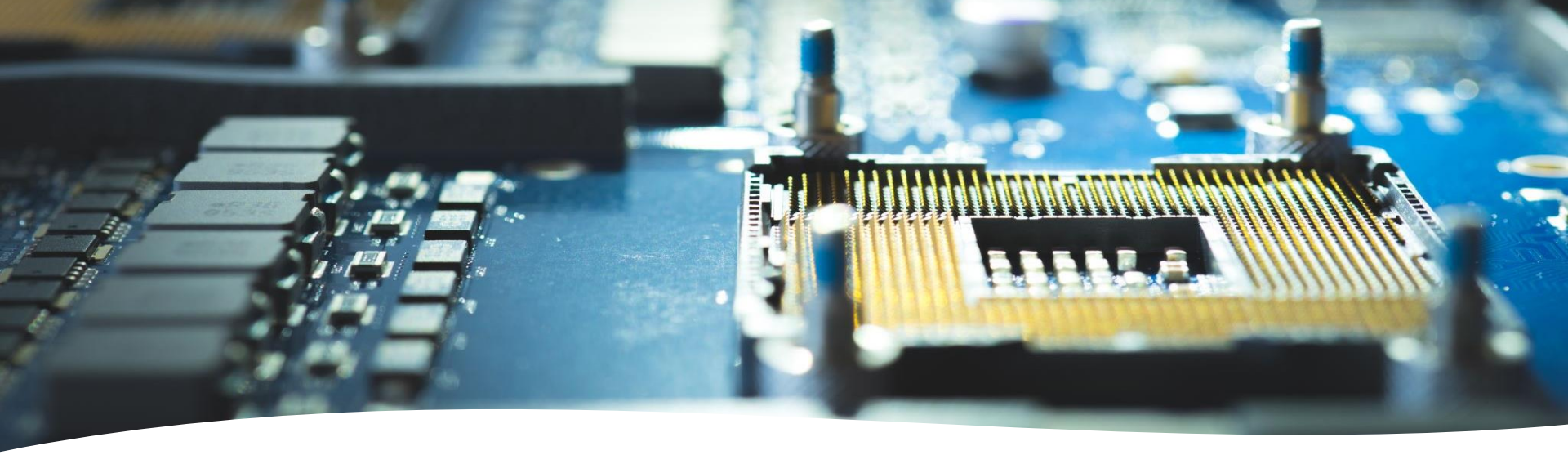
Failure Detection

If a failure is detected or predicted, sensors can alert and, if sanctioned, retroactively disable machines. In many cases, this can happen before the failure actively starts or progresses to a serious failure, preventing or at least reducing equipment downtime, cost of repair, potential for injury and bad publicity.

Power Torque Speed

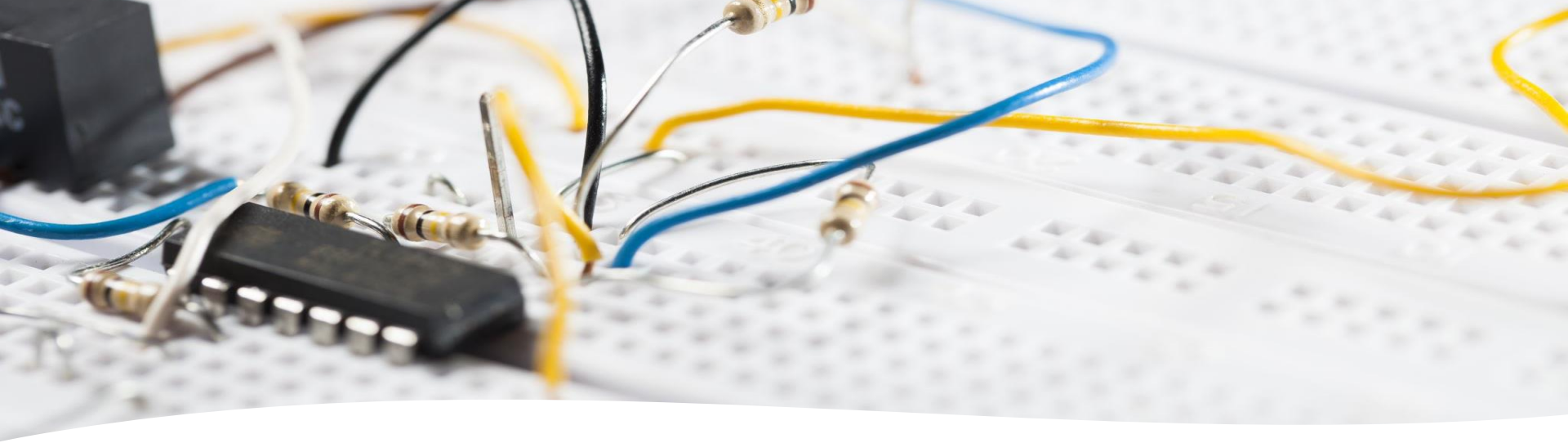
Unexpected increased motor power draw or torque indicates increased, unexpected loading; Motor lubrication? Bearing failing? Downstream car brakes not releasing?

Out of spec speed could indicate deeper system issues. Low speeds could indicate unexpected loadings; sticking brakes, failing bearing or lubrication. High speeds could indicate defective braking, operator misuse, motor overspeed reference failure. Out of spec speeds can mean coasters beaching or excessive equipment wear.



Vibration

Vibration sensors are chiefly found on rotating equipment. They can detect nascent misalignment issues on motors, bearings and axles, uneven wear and damage on wheel and track impact areas and likely areas of high stress on the track as well as any wear on pulleys, wheels etc.



Temperature sensors

Temperature sensors simply detect out of spec temperature changes which can indicate faults. On mechanical equipment they can indicate high friction (lubrication, failing component), low temperature (failed component) and on electrical equipment it can indicate high temperature due to unexpectedly high power draw, possibly due to the issues previously described.

Oil Quality Particle Monitoring

The correct oil in good, clean condition is a critical component. Oil monitoring measures viscosity, particles, and contamination. Viscosity must be maintained to ensure the oil can get to and lubricate where it is needed, particle count must be kept within specification to ensure oxides etc. are removed and remain suspended in the oil, and contamination must be monitored to ensure any debris from damage is picked up early.

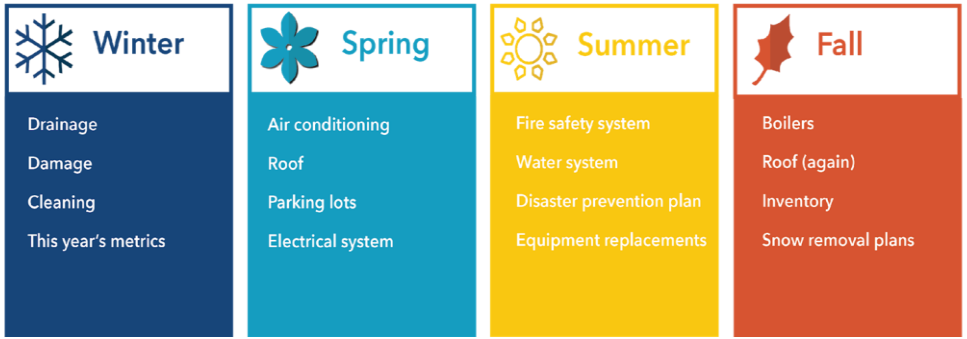
Facilities Maintenance and Monitoring

Computerized Maintenance Management is not just for rides and equipment, they can help you monitor environmental systems in facilities and help ensure the comfort of your patrons.

Plan in advance

Preventive maintenance, though time-consuming, can help you to:

- Extend the life of your equipment and building
- Make fewer large scale repairs
- Improve safety conditions
- Receive fewer work orders



Schedule key preventive maintenance tasks seasonally as they are needed.

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