# Freight & Motive Systems

## Solutions to drive a sustainable future

**Downer**

# Downer has a proud history and an exciting future in the rail freight market

Downer has a long history of designing and manufacturing locomotives across Australia for every major operator and in every state.

At our Maryborough site, we began building locomotives over 100 years ago and continued through Maryborough through to the most recent diesel-electric GT42 class, (4000 and 4100 class locomotives).

In total, we have manufactured almost 1,000 locomotives including diesel electric, diesel hydraulic, electric and steam locomotives from Maryborough alone.

Downer is excited about our future in the rail freight market with where we are offering a robust service offering in line with customer needs.

Downer is a trusted partner for the rail freight market who is offering customers the full spectrum of design, manufacture and maintenance, as well as decarbonisation and digital solutions.

As we look to a net zero future, Downer is proud to bring a sustainability focus to provide engineering support, decarbonisation solutions and advanced rail technologies including our TrainDNA platform.

# Australia's leading rollingstock provider

Downer has 150 years' rail experience providing end-to-end, innovative transport solutions.

We are a leading provider of rollingstock services in Australia, with expertise in delivering whole-of-life asset management support to our customers.
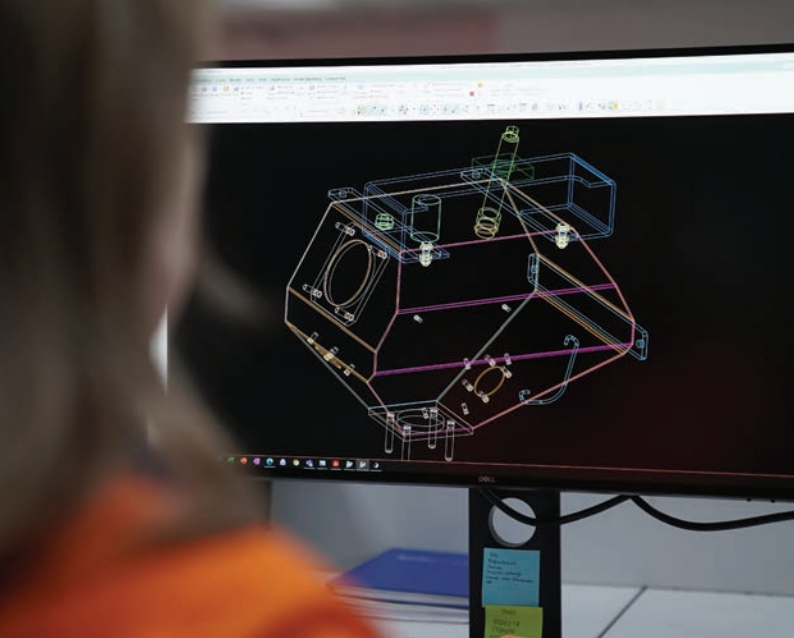
At Downer we have a long history of designing and manufacturing locomotives and we are the largest provider of through-life-support asset management services for passenger rollingstock in Australia.

We build and maintain passenger trains across all major cities in Australia with some of our key rollingstock projects including:

- Manufacture and maintain 65 new six-car trains as part of Queensland Train Manufacturing Program, supporting Cross River Rail and the 2032 Brisbane Olympic and Paralympic Games.

- Manufacture and maintain 119 Waratah trains in NSW – Australia's largest passenger fleet on Australia's largest passenger network.

- Manufacture and maintain 70 High Capacity Metro Trains in Victoria – a step change in public transport offering 20 per cent more capacity than the current fleet and designed with a customer-centered stakeholder engagement piece.

- Manufacture over 1,000 rail cars and nearly 1,000 locomotives from our Maryborough, Queensland site including most recently manufacturing GT42 locomotives.

# Our rollingstock footprint



Unique breadth of capabilities across Downer – no other organisation has all these capabilities in-house

- Rollingstock design and, manufacturing

- Infrastructure delivery and maintenance capability

- Operational and maintenance capability

## Downer's Rail Capability

Our national footprint includes proven rollingstock manufacture and Service Delivery Centres across the east coast of Australia which have access to all gauges of the rail freight network in Australia.

As Australia's leading rollingstock provider, we offer our freight customers:

- Rolling stock design and manufacture with engineering integration expertise to manage complex projects.

- Rolling stock modernisation, overhaul, and repair.

- Decarbonisation solutions.

- Engineering fleet support with specialised freight engineering capability

- Advanced asset management services as Downer is accredited to ISO55001.

- Quality wheel and bearing services.

- Rolling stock maintenance.

- Advanced rail technologies, including data acquisition and asset protection equipment.

## Downer's Engineering Capability

Downer's Rail & Transit Systems employs over 200 Engineers and Designers covering the core competencies while offering a diverse skill set. Our Engineering & Technology Team includes members of our graduate engineering program, up to engineers with over 40 years' experience. As a business, we understand the importance of providing the highest level of engineering solutions, staff and customer safety and client confidence, and as such are working with Engineers Australia to credential our entire technical workforce.

Our engineering team is not only experienced in the traditional engineering fields, but is also experienced in the complete rolling stock engineering system and safety assurance packages, including:

- Integration of complex systems across multiple suppliers.

- Mechanical, electrical and information communication technology engineering.

- Systems engineering.

- Human factors.

- Safety assurance.

- Cyber security.

- Verification management.

- Stakeholder engagement.

- Performance modelling.

- RAMS engineering / Reliability Centred Maintenance.

# Downer and sustainable transport solutions

At Downer, sustainability means sustainable and profitable growth, providing value to our customers, delivering our services in a safe and environmentally responsible manner, helping our people to be better and advancing the communities in which we operate.

As Australia's leading provider of rollingstock , we are investing in technologies and practices to drive efficiencies and help our customers create a more sustainable transportation network.

We know that almost all western jurisdictions have committed to being some form of net zero by 2050, which incentivises us to invest in technology and provision of new services focused on driving efficiency and long-term value. It is not just something we want to focus on, **sustainability is critical to our success**.

## Technology Partners

As a leading rolling stock integrator, Downer has a strong network of technology partners which we have flexibility to work with to get the best outcome for a particular project's requirements.

We have technical relationships with industry leaders for traction systems, control systems and energy storage suppliers. Specifically of note are strategic partnership agreements with ABB for traction equipment and traction control and EKE for train control systems.

ZTR is known for designing innovative products that extend the life of aging locomotives. They focus on reliability, availability, maintainability, and connectivity of locomotives. ZTR have been in development of hybrid locomotive technology as this is a key area for their market expansion. Downer is working closely with ZTR technologies and will be an option that Downer considers for providing technology to assist development of any hybrid locomotive projects.

# Downer's hybrid technology: diesel, electric and battery providing a more sustainable rail network

With the commitment to reduce emissions by 2030 and net zero emissions by 2050, we know that rail transport will need to decarbonise.

The need to reduce emissions and lower transport costs is driving change throughout the transport industry. Downer and ABB are proud to be a part of the sustainable solution.

## Hybrid technology: the power to drive change

Hybrid technology combining traditional fuels and electric battery power is already mainstream in the automotive industry. Downer has signed a strategic partnership agreement with ABB, who are a world leading in traction technology, on-board Energy Storage System (ESS), and electrical energy management.

Together we have developed hybrid technology which combines threes modes of energy that provides operational flexibility to get the freight task done now, and into the zero-carbon emissions future.

Our hybrid technology can seamlessly switch between using onboard energy storage, to overhead catenary line energy (25kVa or 1500 VDC) or to a small diesel backup generator (or a combination of all three sources) which provides significant cost savings and carbon reduction across the rail network.

This gives it the power to climb, maintain speed on flat sections, the ability to recover energy through regenerative braking down hills, and the capability to recharge en route.

## Hybrid locomotive features

Our hybrid's three energy sources are specifically configured to successfully operate freight services, without the need for extensive new electrification or infrastructure. This allows retirement of diesel only locomotive and replacement of agency electric locomotives.

Hybrid locomotive co-configuration:

- Narrow gauge bogies and bodies.
- Six axles with six AC traction motors.
- 25 kV overhead pantograph equipment.
- 1400 kWh of energy storage.
- 1200 kW diesel generator.
- Overall Mass of 120 tonnes (132 tonne version is also available).
- Operate as independent unit or multiple units.
- Length 22,000 mm over couplers faces.
- Continuous tractive effort rating of 410 kN and starting tractive effort of 600kN. Power at the rail of 2300 kW in all modes of operation including overhead connection and with energy storage / diesel mode.
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- Full locomotive electric regenerative braking capability.
- Fully appointed vibration isolated Driver's Cab with AAR crashworthiness.

# RTS Digital

**Powered by TrainDNA**

RTS Digital is Downer Rail & Transit Systems digital consulting, software, and services business, leveraging our experience in digital innovation.
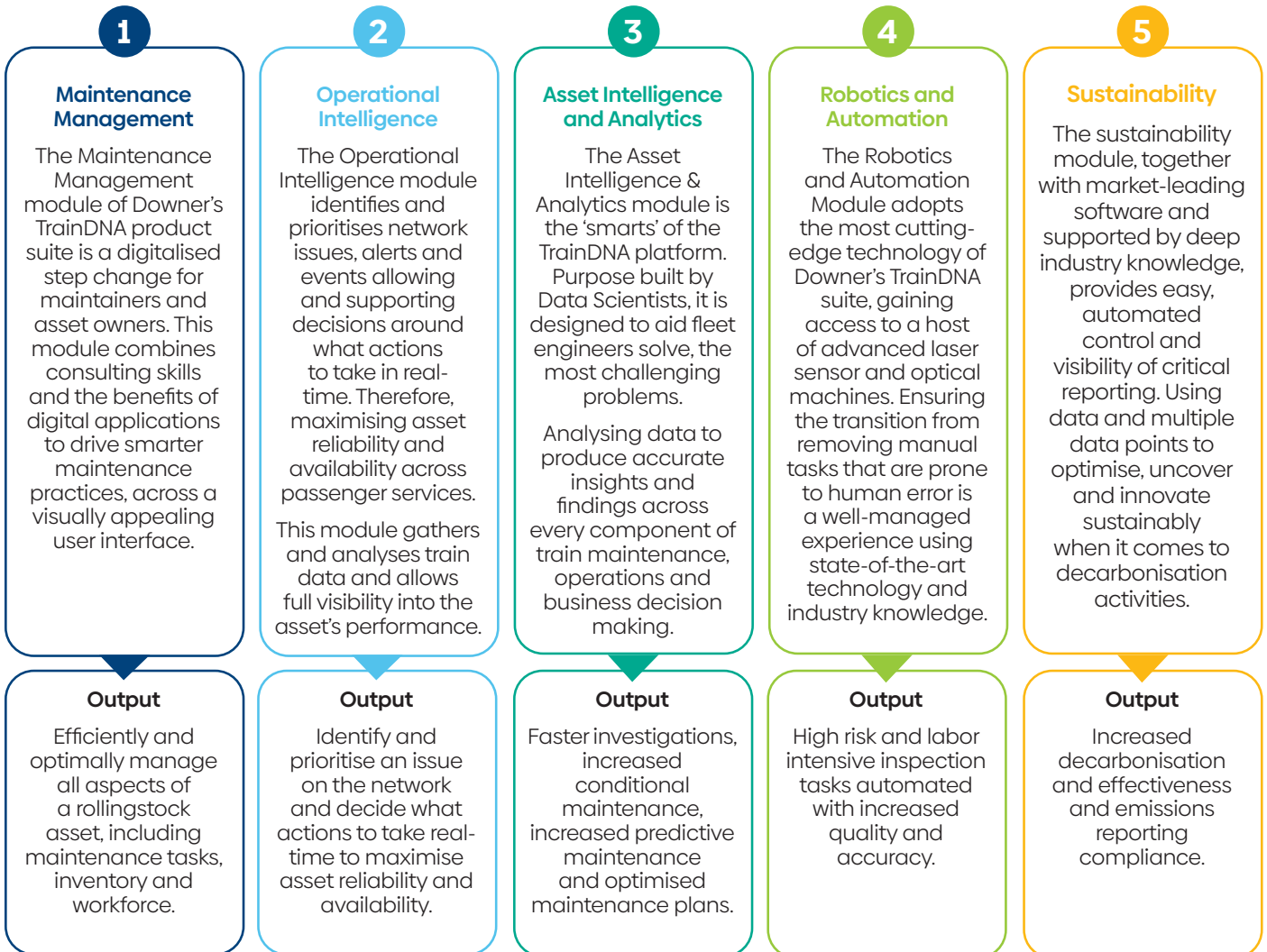
Powered by TrainDNA, we deliver a full-service approach for improved passenger experience through next generation asset management.

Having developed this innovation for over 15 years, we have taken a base industry standard asset management tool, and in conjunction with deep industry experience have developed an industry leading digital platform to provide a wide range of operational, life cycle cost and safety benefits.

## Our Modular Approach

The need to change and improve maintenance work practices is increasing at pace. TrainDNA's modular product approach allows us to meet different customer needs and operational maturity, with the ability to expand in the future to provide a complete digital solution underpinning all maintenance activities.

## Business intelligence to Asset Intelligence & Analytics

### 1 Maintenance Management

The Maintenance Management module of Downer's TrainDNA product suite is a digitalised step change for maintainers and asset owners. This module combines consulting skills and the benefits of digital applications to drive smarter maintenance practices, across a visually appealing user interface.

**Output**

Efficiently and optimally manage all aspects of a rollingstock asset, including maintenance tasks, inventory and workforce.

### 2 Operational Intelligence

The Operational Intelligence module identifies and prioritises network issues, alerts and events allowing and supporting decisions around what actions to take in real-time. Therefore, maximising asset reliability and availability across passenger services.

This module gathers and analyses train data and allows full visibility into the asset's performance.

**Output**

Identify and prioritise an issue on the network and decide what actions to take real-time to maximise asset reliability and availability.

### 3 Asset Intelligence and Analytics

The Asset Intelligence & Analytics module is the 'smarts' of the TrainDNA platform. Purpose built by Data Scientists, it is designed to aid fleet engineers solve, the most challenging problems.

Analysing data to produce accurate insights and findings across every component of train maintenance, operations and business decision making.

**Output**

Faster investigations, increased conditional maintenance, increased predictive maintenance and optimised maintenance plans.

### 4 Robotics and Automation

The Robotics and Automation Module adopts the most cutting-edge technology of Downer's TrainDNA suite, gaining access to a host of advanced laser sensor and optical machines. Ensuring the transition from removing manual tasks that are prone to human error is a well-managed experience using state-of-the-art technology and industry knowledge.

**Output**

High risk and labor intensive inspection tasks automated with increased quality and accuracy.

### 5 Sustainability

The sustainability module, together with market-leading software and supported by deep industry knowledge, provides easy, automated control and visibility of critical reporting. Using data and multiple data points to optimise, uncover and innovate sustainably when it comes to decarbonisation activities.

**Output**

Increased decarbonisation and effectiveness and emissions reporting compliance.

# Downer

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