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Welcome to Airways New Zealand

Airways provides air navigation services in New Zealand and around the world. Our goal is to be at the leading edge of our industry and be widely recognised by our peers as being one of the world’s most innovative providers of air navigation services.

Airways’ Engineering and Maintenance division is a team of highly capable people committed to providing our customers with the highest levels of service. Our expertise covers all disciplines within the air navigation services environment – engineering design, software design and development, asset installation and maintenance, technical training, workload planning, maintenance program development and logistics support.

We offer our clients a safe, reliable, customer focused service, drawing on our extensive knowledge as one of the world’s leading providers of air navigation services. Airways’ goal is to be a highly respected provider of systems and solutions and we continually strive to offer the most cost effective solutions to our clients’ needs.

Read on to find out about how our experienced maintenance and engineering staff can help you.

Peter O’Regan
Head of Engineering & Maintenance
- 30 million km of airspace
- over 1 million aircraft movements annually
- over 60,000 oceanic movements annually
- 50 peak hour aerodrome movements
- 2 flight information regions
- 2 area control centres
- 750 staff
- 7 international airports
- 9 technical centres
- 18 control towers
The Systems Engineering unit has over 30 highly capable and qualified engineers with a strong customer focus dedicated to designing fit for purpose, ICAO compliant systems.

Our design focus is on the delivery of highly reliable, low maintenance solutions that ensure minimum operating costs over the asset life cycle.

Our experience both nationally and internationally provides our customers with access to the latest communication/navigation/surveillance/air traffic management technologies as well as essential infrastructure around telecommunication networks and power systems.

Michael Stewart
Manager Systems Engineering
Communications

Design

Communications engineering is responsible for the design of systems that support ATC operations in New Zealand and to support Airways overseas activities. These activities are often as part of a wider multidisciplinary team as projects often cover a range of engineering expertise.

Some of the specific systems covered by communications engineering include:

- Aeronautical VHF/HF communications radios
- Microwave radio links for core network and last mile communications
- Fibre optic communication systems
- Voice switch to support VHF and telephone communications.

Project engineering

Communications engineering rarely acts merely as a source of design. Airways, like many organisations, has a process of requirements capture, initial design, assessment, final design and implementation. Engineers are involved in every stage of the process ensuring that the solution fits the problem and is implemented correctly.

Airways has been heavily involved in the deployment of a Next Generation communication network at Auckland Airport to support Airfield-based ATC systems.

Escalated support

From time to time, communications engineering provides escalated support to technicians involved in maintaining communications systems. This often involves analysis of complex issues to ascertain likely fault scenarios and diagnosis of the cure.

There are instances where faults can be difficult to trace as they can be temporal or intermittent. Establishing that there is a fault and pinpointing the cause takes the cooperation of a number of Airways teams to resolve the issue.
Navigational aids

Airways navigation engineering comprises tertiary qualified engineers that provide services relating to system design, implementation, life cycle management and systems support for New Zealand’s navigation aids network.

This comprises Non-Directional Beacons (NDB), Distance Measuring Equipment (DME), VHF Omni-directional range finding (VOR), Instrument Landing Systems (ILS) and related infrastructure support including remote control and monitoring systems.

Our experience includes:

• Navigation system design around ICAO compliant criteria
• Navigation system design around equipment specific citing criteria such as Obstruction Service Limitation (ICAO Annex 14) around airports and new sites for navigation
• Navigation systems feasibility study
• Navigation system specification development, tender evaluation, procurement and installation through to system commissioning
• Establishment of Global Navigation Satellite Systems (GNSS) needs development including GNSS Receiver Autonomous Integrity Monitoring (RAIM)
• International consultancy for navigation systems
• Navigation systems support and installation around the world.

Project engineering

Navigation engineering is involved in every stage of navigation systems design process through to commissioning of new systems into operational service. Both local and international standards are adopted to ensure full compliance of navigation systems throughout the implementation process.

Our engineers adopt innovative approaches where necessary to adapt to environmental conditions in keeping with local resource consents.

Post installation support

We work closely with leading equipment manufacturers of systems to ensure any post installation support needs with regard to warranties and associated repairs or maintenance contracts are honoured. This ensures that the integrity and availability of installed systems meets the needs of the customer.
Surveillance

Airways deploy a variety of surveillance facilities including primary radar (PSR), mode S mono-pulse secondary radar (MSSR), wide area (WAM) and surface surveillance multilateration, automatic dependent surveillance – broadcast (ADS-B), ADS – contract (ADS-C) and very high frequency direction finding (VDF).

Our engineers provide consultancy services overseas including in Asia-Pacific and the Middle East and have worked with most of the world’s leading surveillance equipment vendors.

What we offer

- Consultancy and design regarding new surveillance installations
- Selection of surveillance sensor sites using theoretical radio coverage tools, including simulation that determines parameters such as multilateration dilution of precision (DOP)
- Surveillance life cycle planning and drafting of upgrade requirements documents, including an appreciation of air traffic control surveillance operations
- Production of surveillance request for information (RFI) and request for proposal (RFP) documents
- Evaluation of equipment tenders and proposals
- Customer support and attendance at design reviews, factory acceptance tests (FAT) and site acceptance tests (SAT)
- Customer support and analysis of surveillance equipment performance issues with respect to both ground facilities and aircraft avionics

- Recommendation of solutions to identified surveillance problems
- Evaluation of maintenance practices.

Our team

Airways engineers have many years’ experience assessing surveillance equipment performance to international standards, including those of ICAO Annex 10, European Organisation for Civil Aviation Equipment (Eurocae) and Radio Technical Commission for Aeronautics (RTCA).

We take these international standards and evaluate surveillance performance issues, using a variety of diagnostic tools developed from both in-house and vendor supplied resources.

We also have a mature understanding of the practices of the reliability centred maintenance steering group 3 (MSG3) practices and use them to specify more cost effective maintenance practices.
Airfield lighting and power engineering

Airfield lighting engineering supports air navigation by facilitating aircraft operations in daylight and non-daylight, in good conditions and low visibility.

Power engineering provides design services for backup generators, UPS and electrical reticulation to support communication and surveillance equipment at airfields and other communication and surveillance sites.

Our airfield lighting engineering team has been involved in projects from concept development through detailed design, installation supervision and commissioning. These include:

- Visual Approach Path Indicators (PAPI)
- Runway and approach lighting systems from small, regional airports to CAT III runway systems
- Taxiway lighting
- Control systems including for stop bars
- Power distribution systems
- Alternate power supply systems.

Recent experience

Airways designed and implemented the Auckland CAT III/low visibility operations project, where systems are provided to allow landing, take-off, and aircraft ground operations to continue in conditions of heavy fog where normal ground movements would be suspended.

Current projects:

- Airfield lighting control and monitoring of a number of regional airports from Christchurch
- Design of an airfield light control panel for Rarotonga
- Provision of a relocatable power centre that can provide power to up to 25 existing airfield lighting circuits.

Our team

The team comprises eight engineers, some with over 20 years’ experience in airfield lighting and power systems. They handle design project management, functional specifications, factory and site testing, and on-site commissioning of new systems to the standard set by the aviation industry.
Airways is among an elite group of ANSPs providing full software maintenance development of its ATM systems. We have complete access to the full source code of our systems, and have been updating these systems for more than 25 years. These systems include the full range of ATM software:

- Sophisticated flight data processors
- Surveillance data processors with full fusion of sensors of radar, multilateration, and ADS-B
- Controller workstations and system monitoring and control
- Flow/AMAN/CDM/ACDM
- Electronic flight strips
- Full oceanic systems including ADS-C/CPDLC, end-to-end conflict probes, and complex coordination
- System health processors emailing collations of system events and anomalies directly to the engineers desks
- AIS/ AIM/ AFTN/ AMHS.

We work in close collaboration with major international manufacturers such as Lockheed Martin, Thales, Frequentis, and Barco; both in New Zealand and in support of specific work on foreign ATM systems including the USA (FAA), Australia, China, Kazakhstan and others.

We can provide ATM requirements derivation and system acceptance testing services, software engineering and system integration services, software consultancy and support services to international customers.

Recent experience

- Operationally fusing multilateration and ADS-B within an existing radar-based ATM system, to allow a previously procedural sector to become a surveillance sector.
- Integrating an AMAN system providing automated STAR and RTA allocation for controllers, with the ATM Flight Data Processor, and with a CDM flow system allowing airline access to slot manipulation via a browser
- Integrating a tower electronic flight strip system with an existing ATM system’s Flight Data Processing
- System re-hosting for new hardware and operating system architectures, replacing expensive third-party software libraries and delivering box-for-box replacement with no operational interruption
- ICAO FPL 2012 and GRIB 2 implemented on-time and cost effectively.
Airways offers ICAO compliant, independent Flight Inspection services to calibrate radio and visual navigation aids, radar systems, and validation of instrument flight procedures.

Our flight inspection engineers are also experienced navigation aid specialists, and can add considerable value beyond our contracted services role.

What we offer

- A full range of flight inspection services
- Immediate, simple to understand certification results and a Flight Inspection certificate
- On-the-spot interpretation of any errors found during flight inspection facilitating immediate restoration of the facility into service
- A reduced flight inspection time and aerodrome disruption through use of an automated system
- A methodology to reduce the regularity of flight inspection based on past outcomes, reducing the overall cost of certification
- The ability to fit out and calibrate a local aircraft for FI operation, in situations where use of Airways’ prime aircraft is not economically viable
- Our Flight Inspection team work internationally with customers from around the world.

As an ANSP, we understand the needs of the ANSP customer and tailor our services with these needs in mind.

Our team

During inspections, Airways deploys a skilled specialist Flight Inspection engineer with the flight crew, to capture and analyse data, and report findings. The engineer can also provide on site advice in relation to measures that could optimise performance of the navigation facilities being inspected.

In addition to the experienced Flight Inspection engineers, Airways provides qualified navigation procedures flight validators, many of whom are trained pilots.

Airways experts can provide Flight Inspection related consulting, including helping to develop a customer’s own flight inspection capability. This includes assistance with customer aircraft selection and supply if required, aircraft equipage, and Flight Inspection engineer and aircrew training. We also provide independent problem solving of issues concerning navigation aid and aircraft instrument operation or accuracy.
The Maintenance unit has over 80 highly capable and qualified Systems Maintenance experts with a strong customer focus dedicated to maintaining ANSP systems. Our goal is to maximise system availability to ensure safe and efficient aircraft operations.

Our unique understanding of both our customers’ business needs and aviation standards is what qualifies us to manage risk and organise effective maintenance.

Our performance is measured and focused on what is relevant and valued by our customers.

Alan Beuzenberg
Manager Maintenance
24/7 Global technical co-ordination

It is important that an organisation’s maintenance teams have a clear and timely picture on the health of all the components, so they can respond to faults and outages.

To do this, Airways runs a 24 hour technical coordinator (TC) service that is responsible for monitoring the state of Airways’ operational systems around New Zealand, including:

- Being first point-of-contact for any operational issues
- Internal co-ordination of fault rectification activities
- Liaison with customers
- Liaison with external suppliers.

The TC roster is staffed by very experienced technicians who have a sound background in maintaining the systems we operate, and who take responsibility for managing the systems and their availability. This includes monitoring the vast array of remote status indication systems in real time, and pre-empting system failures by being vigilant and pro-active in identifying degraded system components.

They also provide equipment restoration through electronic control or by deploying Airways remote technicians. The TC takes ownership of system faults, and co-ordinates with specialist teams and outside agencies to resolve them.

The Christchurch TC acts as the point of contact for external contractors, technicians, installers and lodgers at Airways sites. Particularly outside office hours, the TC manages the many long-term relationships Airways has with the likes of BCL, Kordia, Chorus, SITA/ARINC, Coastguard and Police.

Whether repairing faults, answering queries or directing calls, the TC needs to be focused on customer needs.
Centralised Workshop

The Centralised Workshop (CWS) is Airways’ repair and innovation centre, predominantly servicing our national infrastructure, and also aviation infrastructure in our neighbouring Pacific Island nations.

Our capability
The workshop is staffed by highly skilled technicians with a range of technical, radio, mechanical and software skills, carrying out component level repairs for Airways and customer equipment. The workshop has a range of calibrated test equipment and specialised tools to enable an efficient turnaround time.

Innovation
We develop and manufacture one-off, low volume and non-commercially available hardware and software solutions, obsolete equipment component replacement, and equipment reliability improvements. Examples are as diverse as developing a radar analyser, a window blind controller, upgrading a master controller for a REIL, meteorological display for remotely supplied data.

Standards
The workshop repairs and innovations are performed in accordance with manufacturer’s specifications and standards or to an appropriate international standard.

Calibration laboratory
We maintain our specialist test equipment through regular testing and calibration cycles in our Wellington based calibration laboratory.

Calibration is maintained to the original equipment manufacturer (OEM) standards and to meet the standards required in the exacting field of aviation.

Regional technical bases
Airways maintains systems throughout New Zealand via a network of regional technical bases.

North Island
• Auckland
• Hamilton
• Tauranga
• Rotorua
• Palmerston North
• Wellington

South Island
• Nelson
• Christchurch
• Dunedin
• Queenstown
Maintenance
Aerodrome lighting and electrical maintenance

Aerodrome lighting

Central to any airport is airfield lighting above ground-level (AGL). Airways owns and operates many AGL systems at airports within New Zealand, from complex CAT III systems to simple lighting systems for smaller, regional airports.

Supported by our own electrical AGL technicians, and in smaller airports by Airways trained, electrical contractors, we are able to provide a range of tailored services. There are also a number of airports where we provide maintenance support for lighting owned by the airfield owner.

Traditionally Airways has installed and maintained many varied types of airfield lighting:

- Runway (edge, centreline, threshold, REILS, strobes)
- CAT III (hi intensity approach, TDZ, SAL)
- LVO (controlled switchable taxiway lighting for Low Visibility conditions)
- PAPI
- Windsocks
- Movement Area Guidance Signs (MAGS)
- Lead in lights (SALS)
- Obstruction or hazard lighting.

Airways staff are well acquainted with installation of all required cabling and ancillary equipment to make your installation as maintenance free and failure tolerant as possible.

Electrical services

Electrical design is at the heart of any system. Robust design to ensure no total system failure should occur is essential in any air traffic installation, be that an ATC centre, ILS installation, CAT III system, or an airfield lighting power centre.

In larger installations, ensuring electrical installations and generators are in separate fire cells is all part of the design - risk management is the key.

Airways maintains a network of generators, UPS’s, 11KV reticulation and solar/battery systems to keep our services running in critical areas. We have our own dedicated electrical staff, supported by technical instructors to ensure all staff are adequately trained to maintain and operate our equipment.

Airways electrical staff have provided assistance and carried out installations in a number of Pacific Island countries - Solomon Islands, Nauru, Niue, Cook Islands and Tonga.
Engineering and maintenance training

Our engineering and maintenance courses are designed to ensure technical staff have the knowledge and skills to keep systems and equipment operating when they are needed. Airways offers specialised theory and equipment maintenance courses for air traffic safety personnel working for either an ANSP or airport authority, which comply with ICAO standards.

Our training division operates a trainee programme which addresses the gap between tertiary qualification and the core skills required for technical roles in an ANSP. Graduates of the programme are able to work skilfully, independently and safely.

The division produces ICAO complaint maintenance documentation for ANSP systems installed in New Zealand and the Pacific Islands.

ME 01 Radio Principles
Duration: Three weeks
This course is based on the radio theory topics from the communications strand of ICAO Doc 7192-AN/857 Part E-2.

ME 02 Navigational Aid Principles
Duration: One week
The Navigational Aid Principles course covers the theory of operation for NDB, ILS, VOR and DME; and is based on the Radio Navigation Aid strand of ICAO Doc 7192-AN/857 Part E-2.

ME 03 Surveillance Principles
Duration: One week
The Surveillance Principles course covers the theory of operation for PSR, MSSR, ADS-B, ADS-C and Multilateration systems and is based on the surveillance strand of ICAO Doc 7192-AN/857 Part E-2.

ME 04 Data Network Principles
Duration: One week
The Data Network Principles course covers the theory of operation for national, international and global data networks, and data protocols, and is based on the communication systems strand of ICAO Doc 7192-AN/857 Part E-2.

Maintenance courses
Duration: One to three days
Supervisory level courses in:
- Quality systems
- Regulations and maintenance practice
- Applied project management
- Human factors for technical people.

Special maintenance courses
Duration: Three days to three weeks
Maintenance courses include:
- Surveillance – Thales, ERA
- Air Traffic Management Systems – Lockheed Martin, Adacel, Comsoft, Frequentis
- Communication equipment – Jotron, Frequentis, Rohde and Schwarz, Marconi, Park Air, Comtech, Prodelin, Cubic, Nokia, 4RF, NET Promina
- Navigational aids – AWA, Interscan, Indra, Butler, Selex, Thales, Wilcox, Nautel, SAC.
- Meteorological systems – Vaisala including RVR
- Power systems – generator, UPS, alternative energy supplies, aerodrome lighting
- Tailored training programmes can be created on demand to ICAO recommendations.
Planning and logistics

The Planning and Logistics team provides support for all of the Engineering and Maintenance teams. The team undertake workload planning, maintenance program development and co-ordination of equipment purchasing and deliveries to ensure efficient and effective maintenance and project work.

Planning

The members of the Planning team focus on maintaining a full understanding of the engineering and maintenance activities being undertaken, including the priorities and interdependencies between work streams. The workload and resources are then planned and co-ordinated to ensure predictable outcomes in terms of both maintenance and project schedules.

In addition, the team activities include:

- Developing planned maintenance programs (using both MSG3 and RCM approaches)
- Maintaining and managing the computerised Maintenance Management System (Trident T64)
- Monitoring of equipment condition, reliability and system availability
- Provision of reporting services.

Logistics

The staff in the Logistics team provide assistance to the Engineering and Maintenance group and to Airways to ensure the right materials are available, at the right place and at the right time.

This includes:

- Advise on, co-ordinate and undertake economic purchasing options
- Provide purchase requisition services
- Ensure equipment inventory is managed and maintained to levels that support equipment maintenance and reliability level requirements
- Provide freight logistics to receive and deliver equipment both in New Zealand and worldwide
- Management of rotables (repairable parts) to ensure they are tracked, maintained, repaired and historical records are kept.

Maintenance Management System

Airways uses the Trident T64 Maintenance Management System developed by Fielden Management Services in Melbourne, Australia; a company with which Airways has had a relationship since the mid 1990’s.

The highly integrated product consists of 12 modules:

- Equipment hierarchy
- Preventative maintenance
- Fault management
- Maintenance planning and scheduling
- Rotable maintenance
- Inventory
- Purchasing
- Engineering orders
- Job cost
- Timesheeting
- Reliability Monitoring
- Reporting.

Designed specifically for the ANSP market, Trident is widely used across our organisation and interfaces with both our financial and project management systems. Designed with the end user in mind, this product provides a very cost effective backbone to our Engineering and Maintenance unit.