Hawkeye 2000 Series
Network Survey Vehicle
Hawkeye 2000 series

• The **Hawkeye 2000 series** is ARRB’s professional range of highly featured and highly specified survey products designed to meet the most demanding of survey applications.

• Typically fitted to a dedicated **Network Survey Vehicle** (NSV), the **modular**, yet integrated design allows for complete scalability.

• Using Hawkeye 2000 systems enables ARRB to satisfy the client’s immediate needs and provide an upgrade for addition of future modules and alternative configurations.
Hawkeye 2000 series - Modularity

DLP
Digital Laser Profiler

Operator

Data Storage

Process

Profiler Report

Database
GIS, PMS

| 23.3 | 46.9 | 124.8 | 56.89 |
| 234.7 | 45.8 | 13.7 | 87.56 |
| 12.2 | 23.6 | 13.4 | 23.7 |
Hawkeye 2000 series - Modularity

Road Geometry Mapping

DLP

GIPSI

Operator

Data Storage

Process

Geometry Report

Profiler Report

Database

GIS, PMS

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Hawkeye 2000 series - Modularity

- DLP
- GIPSI
- DIS

Digital Video

Operator

Data Storage

Process

Images
- Image Analysis Report
- Geometry Report
- Profiler Report

Database
- GIS, PMS

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Hawkeye 2000 series
Network Survey Vehicle (NSV)

- The Hawkeye 2000 series Network Survey Vehicle provides:
  - High accuracy, repeatable pavement monitoring at highway speeds
  - Longitudinal and transverse profiling
  - Pavement and road-side images
  - Centreline and 3-D mapping
  - GPS, DGPS and DMI positioning
  - Advanced processing software
Over 40 Systems Deployed Worldwide
ARRB NSV’s are customised to the client’s requirements

• Multiple vehicle choices
  ➢ Mercedes Vito Van
  ➢ Toyota Landcruiser
  ➢ GMC Savana
  ➢ Iveco Van

• Vehicle preferences
  ➢ LHD / RHD
  ➢ Automatic/Manual Transmission
  ➢ Petrol/Diesel Engine

• Fully modular sub-systems
  ➢ Hawkeye 2000 Professional series.

• Multiple operator positions
  ➢ One, two or three operator consoles
  ➢ Optional front passenger seat and/or rear passenger seat(s) consoles, all interchangeable.
Hawkeye 2000 NSV Packages

• Packages included:
  – Digital Profiler Package
  – Digital Imaging Package
  – DGPS Package
  – Gipsi-Trac Geometry Package
  – Acquisition Package
  – Software Packages

• Output parameters
  – Longitudinal and transverse profiles, roughness, rutting, texture, crack detection, cross-fall, slope, grade, advisory speed, asset and inventory images.
Digital Profiler Package (cont.)

• Profiling Output Compliance:
  – Roughness (IRI) from up to 3 lasers is fully compliant to ASTM E950 Class I, ASSHTO PP37 and World Bank Class I.
  – Rutting across full lane width (typically 3.5m with 13 lasers) is compliant to ASSHTO PP38.
  – Texture can be provided as Mean Profile Depth (MTD) and/or as Sensor Measured Profile Depth (SMTD) and is compliant to ISO 13473 (for MTD) and ASTM E1845 (for SMTD).

• A range of inter-changeable lasers is used (16 kHz, 32 kHz, 64 k Hz or 78 kHz) and configured to meet compliance standards and client requirements.
Digital Profiler Package (cont.)

- Longitudinal profile accuracy +/- 0.5 mm, wavelength 100 mm to 100 m
- Transverse profile accuracy +/- 0.5 mm
- Low and High speed (110 km/h) vehicle operation
- Profile sampling rate: user definable but typically 25mm or less
- Texture sampling rate
  - MPD: 1mm
  - SMTD: 7mm
Digital Profiler Package (cont.)

- An accurate Distance Measuring Instrument (DMI) combined with a keyed database structure is used to precisely lock the data to survey distance (chainage). This data is also linked with a data from the DGPS module.
- Software is available for real-time Roughness and Rutting calculation and display, thus reducing post processing time and increasing user confidence during the survey.
- Office-based processing software produces pre-formatted tables and graphs of results in a range of required units.
- Results are available in printed form or as data files which can be readily imported into commercial databases, spreadsheets and Asset Management Systems.
Digital Profiler Package (cont.)

• Features and Benefits
  – All data linked to both chainage and DGPS
  – Vertical and/or side projection lasers (keeps all equipment within the vehicle profile)
  – Results are independent of vehicle type
  – Large data storage capacity, more than 10,000 km
  – System can be expanded by adding more sensors. No software upgrade required
  – Produces printable reports and graphs with database compatible files
  – Measurements possible on all sealed surfaces in all ambient lighting conditions.
  – On-board real-time data processing confirms data integrity
Principle of Road Profile Measurement

Road Profile = Laser - Accelerometer
Hawkeye 2000- Digital Imaging System (DIS) Packages

- The **Asset View Video Package** is a sophisticated video acquisition system for visually identifying and locating roadside features accurately.

- The **Pavement View Package** is designed for visually identifying and locating pavement deterioration and cracking accurately at highway speeds.
Hawkeye 2000 – DIS Packages

- Forward View
- Pavement View
- L. Side View
- R. Side View

Up to 32 Cameras

Data Storage

Operator

Process

Digital Images

Image Processing Report

Database GIS, PMS

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Hawkeye 2000 – Asset View Video Package

- The Asset View Video Package is a sophisticated video acquisition system for visually identifying and locating roadside features accurately at highway speeds.
- The system utilises the latest in digital camera technology and produces crisp high resolution (1280 x 960) video frames.
- A fully motorised lens enables the real-time adjustment of the optical zoom control, focus and iris for high quality images. Up to 8 cameras can be supported, all controlled through the common Hawkeye 2000 interface.
Hawkeye 2000 – Asset View Video Package (cont.)

• Used in conjunction with other Hawkeye 2000 packages, the Asset View package accurately logs digital images against the other Hawkeye parameters such as distance (chainage), DGPS and profile.

• The camera and lens are mounted in a fully waterproof enclosure on a vehicle roof rack.

• The Hawkeye office-based viewing tools allows the survey database to be reviewed, edited and processed efficiently.

• The data can be exported to most Asset Management Systems.
• Features and Benefits
  – High resolution digital images referenced against chainage, GPS etc
  – Operation at highway speeds
  – Digital Camera (progressive scan) with 6x optical zoom capability
  – Large storage capacity, e.g. 5,000 km storage at 10m intervals, 10x compression per disk. Additional portable storage devices available.
  – AVI storage files (Saved files can be viewed in Windows Media Player and other standard players)
Hawkeye 2000 – Asset View Video Package (cont.)

• Applications
  – Performs cost effective pavement condition and deterioration assessment easily and safely
  – Road surface marking identification
  – Can be used with pavement deterioration models and management systems
  – Typically used with Office Image Analyser or Hawkeye Processing Toolkit
Hawkeye 2000 – Pavement View Video Package

- The Pavement View Video Package is a sophisticated video acquisition system for visually identifying and locating pavement deterioration and cracking accurately.
- The system utilises the latest digital camera technology and produces crisp high resolution video frames. The high frame rate ensures a continuous and accurate digital record of the roadway.
- Used in conjunction with the Hawkeye 2000 Acquisition Package, the video package accurately logs digital images of the pavement against other Hawkeye parameters such as distance (chainage), DGPS and profile for post comparison.
Hawkeye 2000 – Pavement View Video Package (cont.)

- The camera and lens are mounted in a fully waterproof enclosure and are typically mounted on a vehicle roof rack.
- The Hawkeye office-based viewing tools are fully compatible so that the survey database can be reviewed, edited and processed efficiently.
- The data can be directly compared against other Hawkeye parameters and can be exported to most Pavement Management Systems.
Hawkeye 2000 – Pavement View Video Package (cont.)

• Features and Benefits
  – Continuous high resolution digital images linked referenced against chainage, GPS etc
  – Full lane (2.7 to 4 m) coverage - adjustable
  – Operation at highway speeds
  – High resolution B&W Digital Camera (progressive scan)
  – Large storage capacity, e.g. 5,000 km storage at 3 m intervals, 10x compression per disk. Additional portable storage devices available
  – AVI storage files (Movies can be viewed in Windows Media Player and other standard players)
Hawkeye 2000 – Pavement View Video Package (cont.)

• Applications
  – Performs cost effective pavement condition and deterioration assessment easily and safely
  – Road surface marking identification
  – Can be used with pavement deterioration models and management systems
  – Typically used with Office Image Analyser or Hawkeye Processing Toolkit
Hawkeye 2000 – Typical DIS Views

Typical Forward View

Typical Pavement View
Hawkeye 2000 – DIS Screen Layouts