

Monitoring Farmland Activities with the ADS40



case study

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Project:

Acquire farmland imagery for monitoring and management purposes.

Challenge:

Traditional film methods have slow turnaround and require separate processing for color and color infrared photos.

Product:

The ADS40 simultaneously captures color and color infrared digital imagery.

Results:

- 90,000 square miles of agricultural land captured and processed within 90 days
- Statewide project workflow applicable to other regions
- Turnaround time was faster than traditional film methods



ADS40 Captures Statewide Farmland Imagery

Agricultural Crackdown

If you were a farmer and the government provided you with insurance money to help you with your crops, would you be tempted to fib a bit on how many crops you produced or how excellent the quality of the crops was? After all, the more quality crops you produce, the more money you receive. If the answer is yes... don't even try it. The USDA's National Agriculture Imagery Program (NAIP) monitors U.S. farmlands through aerial imagery. NAIP hires contractors to fly over and photograph farmlands within the 26 states it oversees. They then process and map the collected imagery and determine factors including crop locations, size, quality and crop management.

NAIP was looking for two results it wasn't getting from traditional film methods: quicker turnaround time/product delivery and the simultaneous delivery of color and color infrared imagery. In July 2003, NAIP decided to obtain its imagery in a new way- digitally.

NAIP leaders believed digital sensors could deliver the results they were looking for and chose to test the new technology in Nebraska. This was no small task- they needed aerial imagery of approximately 90,000 square miles or 5900 digital ortho quarter quads (DOQQs) of agricultural land. NAIP contracted North West Group, EarthData International and Horizons, Inc. for the task. The companies had a 90-day deadline: 60 days for acquisition, 30 days for processing.

"Timing was critical. We had to obtain the imagery after crops were planted and significantly grown so they were identifiable, but before harvesting, to have proof of types and amounts of crops planted," said John Welter, Vice President of North West.

The magnitude of this project made it the largest digital ortho project ever attempted to date. The digital sensor charged with successfully carrying out the project was the Leica ADS40 Airborne Digital Sensor from Leica Geosystems GIS & Mapping.

On a Tight Schedule

Within three weeks, the contractors obtained imagery of all 90,000 square miles of Nebraska farmlands. The state was split into 120 flight lines and required about 90 hours of flying time. The flight crews mounted two ADS40 sensors into two Cessna 441 Conquest propjets. They lucked out with the weather; good weather conditions allowed them up to nine hours of data collection per day.

The field crews processed their ADS40 data in the field immediately after flight missions, allowing them to verify successful capture and coverage while still in the field. Each contractor used its own data processing infrastructure- North West and Horizons used the Leica GPro software and EarthData used its ISTAR imaging process.

Because the ADS40 captures imagery strips seamlessly, the amount of image mosaicking the teams needed to carry out was drastically reduced when creating their client's radiometrically balanced final product. Furthermore, the ISTAR and GPro processing infrastructures allowed for repetition and automation of steps like rectification and automatic point measurement and the repetitive and independent nature of the steps allowed for parallel processing. Both infrastructures enabled the contractors to carry out distributed computing, meaning they could allocate difficult and lengthy processing steps to different computers, speeding up the overall process time.

And the Results Are...

The contractors acquired and processed all of the aerial imagery within the 90-day timeframe. Despite the size of the project, turnaround time proved to be better than that achieved with most film cameras.

The quality of the imagery was significantly better than that acquired by film cameras in both radiometric consistency and clarity. With digital imagery, the teams were able to invest time in data processing to ensure the high quality of the end product. If they had used a film-based method, they may not have had the time to do this. The lack of time could have resulted in more errors in the final product.

Is the ADS40 capable of competing with traditional film methods in airborne data acquisition? "We definitely showed our clients that the ADS40 is a competent alternative to traditional film methods," said Welter. "Overall, ADS40 advantages over film cameras include better quality production and faster delivery times than film and substantial costs savings for projects that require color and FCIR. Furthermore, digital sensors are more environmentally-friendly than film cameras."

A Bright Future for the ADS40

The success of such a large project opens the door for other states to use digital imagery for their ortho-imagery-related needs including GIS database update, emergency planning, growth planning and more. North West has fielded several requests from other state government organizations interested in using the ADS40 for imagery acquisition.

Nebraska was a pilot project for NAIP to determine if a digital sensor was able to deliver higher-quality results in a shorter period of time. The ADS40 proved it was capable of successfully handling large-scale projects. Moving forward, sensors will compete equally with film cameras for NAIP contracts starting in 2004.

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The Geospatial Imaging Chain

The Geospatial Imaging ChainSM consists of geographic imaging solutions designed to capture, reference, measure, analyze and present data in a format that is useful to geospatial information professionals.

This end-to-end workflow turns data into information and information into knowledge.

Leica Geosystems GIS & Mapping offers the best solutions in the industry across all links in the Geospatial Imaging Chain.



Digital imagery of Nebraska farmlands acquired with the Leica ADS40 by North West, EarthData and Horizons in 2003.



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