



Flight Lt. Julia Lapworth and Flight Lt. Heath Rowe of the Royal Australian Air Force test the mission console aboard Wedgetail aircraft No. 2. Looking on is Boeing mission technician Jim Rogerson. MARIAN LOCKHART PHOTO

Team World

AEW&C program tackles distance, cultural barriers to build partnerships and get the job done

By DEBBY ARKELL

Taking a 737-700 commercial jet and transforming it into a state-of-the-art military intelligence, surveillance and reconnaissance platform is challenging. When your modification and mission systems development partners are located on the other side of the world—and have never before performed work of this scope—getting the work done may seem an impossible task.

Not so for the Seattle-based Boeing Airborne Early Warning & Control team and its teammates around the globe. This year Boeing is simultaneously performing AEW&C modifications and mission systems development in the United States, Australia and Turkey. The challenges of integrating the product line, working together across distance and time, and understanding cultural differences have resulted in lessons learned and a model that is being applied successfully now—and will be

AEW&C: Who, what, where

The 737 Airborne Early Warning & Control aircraft is a state-of-the-art military aircraft used for airborne surveillance, communications and battle management.

The Royal Australian Air Force has purchased six aircraft, dubbed Project Wedgetail. The first two aircraft are being modified and flight tested in Seattle. The remaining four aircraft are being transformed at Boeing Australia Limited in Australia. In addition to Boeing Australia, BAE Systems Australia works on electronic-warfare subsystems and ground support; Boeing subsidiary Hawker de Havilland builds structural subassemblies in Melbourne.

The Republic of Turkey, under a program known as Peace Eagle, has purchased four 737 AEW&C aircraft plus ground support segments for mission crew training, aircraft support and system maintenance support. Modification of the first aircraft is under way in Seattle. The other three aircraft are being modified in Ankara, Turkey.

Boeing also is providing four 737 AEW&C aircraft for the Republic of Korea's EX program. That program began this summer with the Seattle arrival of the Korean on-site team.

—Debby Arkell

used in the near future with new AEW&C customer Korea.

“It is fundamentally important as we begin our third AEW&C contract that we take full advantage of synergies across the program,” said Maureen Dougherty, vice president, AEW&C Program. “Replicating best practices is at the heart of what will ultimately make this product line successful.”

SHARING KNOWLEDGE

The AEW&C program is considered a development program—a single program with multiple, unique contracts. In general, the two AEW&C contracts currently in work—Australia’s Wedgetail and Turkey’s Peace Eagle—are set up similarly, and work has been done nearly concurrently.

Typically Boeing would build one aircraft under a development contract and then build the others under a production contract. But Boeing Peace Eagle Program Manager Mark Ellis said that because these aircraft are so highly desired by customers for military and humanitarian missions, development of all contracted aircraft is essentially occurring concurrently.

“The government of Turkey really wants the assets, and the program is vital to their defense,” Ellis said. “They also see its development as an opportunity to advance Turkish industry.”

Varying degrees of industrial participation have been built into all three AEW&C contracts, something leaders note is very common in programs of this nature.

As a result, Boeing is conducting initial modification work, and then the overseas partners in Ankara, Turkey; Amberley, Australia; and other locations take over mod work on the remaining aircraft.

Ensuring a smooth transition from Seattle to Ankara—nine hours ahead on the clock—and to Amberley—17 hours ahead—required lots of coordination, knowledge-sharing and working together.

Rich Lukezic, AEW&C Operations and Production manager, told of several ways the Seattle team is working together with its international partners—the most notable being an international presence in Seattle and a U.S. presence in customer countries. Boeing also created a program-specific modification support team on-site to assist with training and knowledge-sharing.

As such, Turkish information and services provider HAVELSAN has more than 20 people in Seattle and more than 200 in Ankara currently working on software and ground systems; and more than 50 Australians are on-site in Seattle in support of Wedgetail. The first members

Lean+ built in

Lean+, one of Boeing’s four companywide growth and productivity initiatives, is an important part of daily work on the AEW&C program. For example, program leaders have kicked off initiatives to improve the processes that flow between Seattle and Ankara-based Turkish Aerospace Industries.

“Because it’s a development contract, naturally there is a lot of change,” said Mark Ellis, Peace Eagle Program manager. “We’re using Lean+ techniques to reduce the time it takes for changes identified to get into TAI’s system. We’re using process flows and value stream mapping to identify areas for improvement. Days and weeks matter, so it’s very important that we improve in this regard.”

Boeing also is using Lean with production material processes. If a supplier has a parts shortage, Ellis said, it can take weeks for a part to get shipside from Seattle. The group therefore is working hard to lean out—and speed up—this process.

—Debby Arkell

of the Korean EX team arrive in Seattle in August, and the program will get under way in earnest shortly after.

Also, Boeing has a team of TUSAS Aerospace Industries employees in Seattle working on the first Peace Eagle, learning separate sections of the aircraft in work packages called control codes. The TAI team learned how to perform the work by control code and then went back to TAI to apply the same skills in Ankara.

“This process has been working very well,” Ellis said. “As a matter of fact, TAI is the first partner of ours to go through the learning process pertaining to two full control codes with no quality defects—a tremendous accomplishment.”

Indeed, David Withers, president of Boeing Australia Limited, noted that from the outset, Wedgetail has been a great example of the benefits to be achieved by

taking a truly global approach to cutting-edge developmental projects. “Australian engineers have worked alongside their U.S. colleagues from the very beginning,” he said. “The collaborative approach ensures we continue to find more robust and innovative solutions to schedule challenges.”

Once progress on the first aircraft reaches a certain point, the work packages transfer to the supplier to take the lead. The Boeing support team leader then transitions to on-site support overseas to assist in ongoing training and education, building a team of five or six people to facilitate—such as manufacturing planning, engineering and team leaders.

“We have approximately 15 people now in Turkey, and although there are limits to what we can do and share, having a Boeing presence with our supplier partners is a tremendous benefit,” Ellis said.



Anthony Brown, aircraft technician for Boeing Australia Ltd., works on one of four Wedgetail aircraft being modified at a Boeing Australia facility at Royal Australian Air Force Base Amberley.

JASON WEEDING PHOTO

■ INTEGRATED DEFENSE SYSTEMS

That leads to the very important consideration of export control. Boeing Wedgetail Program Manager Ross Dessert said working-together challenges presented by U.S. export control are of critical importance when working with multiple suppliers in locations around the world. “It is vitally important that we stay compliant with the rules all the time as we share data.”

The U.S. government considers information-sharing issues relative to each customer on a case-by-case basis and recently granted Boeing a license to collaborate with HAVELSAN. This license has led to valuable collocated codevelopment areas in Kent, Wash., and Ankara.

“Our ‘virtual’ codevelopment area in Ankara allows us to pass work back and forth as if we’re side by side, letting us collaborate across thousands of miles,” Ellis said. “We’re able to produce much better work, and we’re seeing the opportunity for tremendous productivity improvements.”

CULTURAL CONSIDERATIONS

To be sure, the ability to improve productivity across vast distances and time isn’t the only opportunity for the AEW&C program and its partners. In addition to the mechanics of working through a development program with geographically dispersed partners, there’s been cultural learning. Dessert said cultural understanding is at the heart of the AEW&C program’s success.

“Our success is contingent on how well we manage our international relationships,” he said. “We view this education as extremely important for our U.S. team, our customers and our supplier partners.”

Indeed, Dessert credits the recovery from initial delays on the Wedgetail program to the trust, commitment and respect that are at the foundation of their business interactions, resulting from learning and respecting each other’s cultural values. “If you don’t understand each others’ cultures, you won’t be successful,” Dessert said.

These differences and others can make the job challenging as all parties work to adapt to the needs, motivating factors and expectations of others. However, the knowledge gained, economic benefits obtained and relationships established will prove to be valuable to the AEW&C program and its international partners.

“The significance of this program to Australia and Boeing cannot be overestimated,” Withers said. “We are now a regional leader in aircraft modifications and have increased our in-country technical expertise for future large-scale proj-



Rick Merryman (right), a Boeing manager for the Peace Eagle program, discusses modification plans with TAI’s Aydin Karabulut. TAI is modifying three AEW&C aircraft at its facility in Ankara, Turkey.
YUNUS OZKAZANC PHOTO

ects. We can now proudly boast a capability previously unavailable in this country. And while we sometimes struggle with time zone differences, we have overcome the barrier of distance by remaining committed to delivering what will become the centerpiece of Australia’s air defense capability and a critical asset in protecting our frontline servicemen and women.”

Long-term plans for the program include mission systems support, technological upgrades and other lifecycle support throughout the life of the aircraft—

which will last approximately 30 years.

“One of the most valuable things we can do is to try to know the people and get the right people in the right place,” Lukezic said. “It is challenging to deal with that and to stay on contract—but this is, after all, a development program. That means we have new discoveries every day. Ultimately we’re on plan—a very aggressive plan—and our success is due to the valuable contributions of our worldwide team.” ■

debra.j.arkell@boeing.com

Status check

Here’s a quick look at the progress of the Airborne Early Warning & Control team with its international customers.

Customer or program	Status
Korea	<ul style="list-style-type: none"> The Korean EX team arrives in Seattle in August. Korea’s first airplane modification starts in March 2009.
Wedgetail	<ul style="list-style-type: none"> Wedgetail No. 1 has finished all installations, and now is in FAA category No. 2—addressing the balance of safety of flight issues and certification tests. Wedgetail No. 2 is in radar/mission-systems testing, which should run through mid-September. Delivery is targeted for the end of 2008. Aircraft Nos. 3 to 6 are undergoing modification at Boeing Australia Limited.
Peace Eagle	<ul style="list-style-type: none"> Peace Eagle No. 1 is in the final stages of mission-system installation. Peace Eagle Nos. 2 to 4 are undergoing modifications by TAI in Ankara, Turkey.