

Technology Transfer

Implementing a privatization strategy, the Republic of China's AIDC relies on DIT-MCO to deliver consistent quality

The sophisticated fly-by-wire Indigenous Defense Fighter (IDF) aircraft readily shifts missions from fighter to interceptor. Its designer and manufacturer, the Republic of China's Aero Industry Development Center (AIDC), is mounting strategic shifts in its business. In reinventing itself, AIDC is transforming a military product line into an expanded offering that meets the needs of the civilian marketplace.

In addition to R&D, design, and manufacturing of various aircraft, engines, and avionic equipment, AIDC provides diverse services to aerospace industries, including system planning, integration, product development, and management services.

“As the company undergoes privatization, technical competence becomes vital,” says a top AIDC official. “Thanks to 30 years of avionics and harness manufacturing and testing experience as a secure military facility, AIDC has established a team of world class professionals. AIDC is rapidly and successfully expanding into civilian areas.” The company is in the final stages of privatization, and by the end of 2002, the Taiwan aerospace industry will be a 100 percent private enterprise.

AIDC acquired its first DIT-MCO wire tester – a Model 200 – in the 1970s to support a joint development program with Bell Helicopter for Army UH-1H helicopters. Over time, DIT-MCO test equipment has evolved into an integral part of AIDC's operations. Procedures and standards are developed around DIT-MCO systems, according to David Chang, Director of the Maintenance and Repair Operation of the Defense System and Technology Division. “This helps us assure the highest quality and meet project schedules without cost overruns.”

AIDC recently completed successful testing of a complicated wiring harness (more than 9,000 test points) for a remote sensing satellite. This is just one illustration of how AIDC utilizes its experience and equipment to gain advantage and financial opportunity in diverse markets. From a paper-based routing list, AIDC's team needed only 60 man-days to extract the part list, build the test program, and complete the actual test with a single DIT-MCO S2000.

“In addition to the test system hardware, we also trust DIT-MCO and Trinity Technologies, Inc. for outstanding service,” says Chang. For example, representatives from Trinity Technologies, DIT-MCO's Taiwan agent, usually conduct monthly site visits to identify issues before they escalate. The high-tech firm maintains full spares of DIT-MCO systems to support customers. Trinity Technologies' Ining Fan has been closely involved with the AIDC operations for many years.

“If there's a problem, we can usually be on-site within two hours to correct it immediately,” says Fan.

Technical Strength

In 1969, the Republic of China (ROC) Air Force established AIDC in Taiwan, primarily to develop trainer and fighter aircraft. AIDC also had joint development programs with foreign airframe manufacturers that produced aircraft such as Bell Helicopter's UH-1H "Huey II" and Northrop Grumman's F-5 fighter and T-38 trainer. Currently, AIDC subcontracts to several foreign programs: Boeing's 717 commercial airliner, the Bombardier BD100 business jet, and United Technologies Sikorsky S92, a medium-lift utility and executive helicopter.

Its own state-of-the-art IDF project with advanced fly-by-wire electronics designed for the Taiwan Air Force showcases AIDC's technical capabilities. AIDC relied on DIT-MCO test equipment for all individual and integrated component testing of the \$20 million aircraft. As with other products, technicians perform tests during initial fabrication of harnesses and avionics boxes, as well as during final aircraft integration.

"Many tests require external energization to confirm functional integrity, as well as wiring accuracy," says Chang.

- ♦ Wire harnesses – Electrical integrity tests include (but are not limited to) continuity test, insulation test, Hipot test, and AC and DC voltage measurement. There are about 400 harnesses per IDF with up to 2,000 test points per harness.
- ♦ Relay panels and control boxes – Opens, shorts, and leakage are identified, along with diodes and resistors measurement. The test facilities use multiple external energization or latching matrix (EE or LM) modules to energize relays with delay circuit, power panels, lights, transformers, and similar components. There are about 500 boxes per IDF with up to 1,300 points each.
- ♦ Functional tests of electronic circuitry with active and passive components – These tests combine standard Series 12B switching, LM, multiple external power sources, and oscilloscopes. "We use a DIT-MCO 9500 to perform functional tests which traditionally could only be done by using much more expensive in-circuit or function testers," says Chang.
- ♦ Final integration test – After all harnesses, control/relay boxes and panels (except for LRUs) and circuit breakers are installed in the aircraft, it undergoes final integration tests to verify the integrity of the entire aircraft circuitry – more than 40,000 test points at this stage.

At the beginning of the IDF project, AIDC decided to develop an automatic test program generator based on the aircraft's "from-to" wire list data to improve a specific problem area. According to Chang, individual parts that have been tested and verified as absolutely correct after manufacturing may actually fail once installed on the aircraft. There were many "human errors" such as damage to wire insulation or misplaced wires or connectors deep inside the aircraft structure. "These problems, which can occur even

with experienced workers, would go unnoticed until later in the manufacturing process during the functional test stage, when it is very difficult and costly to isolate the problem.”

AIDC procedures include testing all components again after they have been integrated inside the aircraft “This allows us to identify any assembly-related problems prior to the functional test, which includes the addition of any line removable units, or LRUs,” says Chang.

For several years, Senior Test Engineer Wong Sheng-Fong (Seiko) has used DIT-MCO 9500s to explore new testing opportunities at AIDC Avionics Division. For example, Seiko recently integrated additional multiple power sources, digital oscilloscopes, function generators and DMM into a 9500 with LM, in order to perform functional tests on devices with active and/or passive digital or analog components.

With the 9500 configured this way, Seiko has reduced both the cost and time to perform these tests.

Gary Mullins, DIT-MCO Director of Sales and Marketing, visited AIDC in October 2001. “AIDC’s electrical test program is a great example of maximizing an investment in DIT-MCO systems,” he observes. ”This is a company utilizing DIT-MCO equipment to complement its technical strength and leverage its international relationships.”

Combining its technical excellence with the power of DIT-MCO Test Systems, AIDC is making a smooth transition into the civilian marketplace, focusing on the needs of firms that manufacture small power co-generation systems, aircraft cabin entertainment systems, medical care equipment, and the railway industry