



president Randy Brinkley: 20 satellites per year with over 38 in backlog. "For the last five years the commercial sector has outgrown the military. Now it's two-thirds commercial/one-third government, the reverse of five to seven years ago," he says.

Today the commercial market is coming to the aid of the government sector. Earlier this year, a Boeing-led team was awarded the \$1.3 billion contract to build the US Department of Defense's Wideband Gapfiller Satellite system of up to six spacecraft, based on the Boeing 702 large commercial satellite bus. "Our strategy is to offer a standardised bus and customised payload. This shortens cycle time and provides flexibility," says Brinkley.

The number of satellites launched over the next five to 10 years will stay relatively constant, but their capability will increase, says Dean. An example is the three Spaceway broadband communication satellites BSS is building for Hughes Network Systems. The largest 702-series spacecraft yet produced, the Spaceway satellites will feature onboard processing and phased-array antennas. "Customers are demanding more transponders and more flexibility," says Dean.

This is impacting the launch services market, driving demand for heavier-payload boosters. While Boeing's family of 11 Delta vehicles "covers the whole range of payloads we see in the future", says Delta Launch Services vice-president Dave Schweikle, he admits the 4t-class Delta III, first launched in 1995, has been overtaken by events. "Most payloads are now bigger than the Delta III was designed for," he says. Boeing has built 20 Delta IIIs, but launched only three of them.

Until the Delta IV enters service next year, the Sea Launch is Boeing's heaviest lifter. This joint venture with Russian, Ukrainian and Norwegian companies to launch satellites from a floating platform at the equator was formed before Boeing

acquired McDonnell Douglas and its Delta line. Now Sea Launch promises to be a valuable adjunct to the Delta IV. Mutual backup agreements have been signed and joint marketing will follow, says Sea Launch chief executive Will Trafton.

Boeing's other launch vehicle, the Space Shuttle, poses its own set of issues. NASA plans to retire the Shuttle in 2012, replacing it with a commercially developed second-generation reusable launch vehicle (RLV). Boeing participates in the agency's \$4.8 billion Space Launch Initiative to develop technology for a next-generation RLV, but believes a human-rated vehicle will be too expensive to develop commercially, putting the price at \$15-20 billion. Instead, the company is drawing up a plan to keep the Shuttle in service to 2030, its lifetime at current launch rates.

When it merged with McDonnell Douglas in 1997, Boeing became the leading producer of military aircraft and a niche player in missile systems. Last year, St Louis-based A&M saw revenues climb to \$12.2 billion and operating earnings to \$1.3 billion, making it Boeing's most profitable business unit. With US defence spending on the rise, revenue is expected to grow steadily at 8% a year through 2005, according to president and chief executive Jerry Daniels.

Over this decade, Boeing expects to secure 25% of the tactical aircraft market, 48% of bomber/airlift, 21% of military rotorcraft and 14% of the strike weapons market. The company has 25 international sales campaigns worth \$20-30 billion under way, says A&M vice-president business development George Roman: four for fighters, six for tanker/transports, 11 for rotorcraft and four for weapons.

The current impressive production line-up includes F-15E and F/A-18E/F fighters, C-17 transport, AH-64 and CH-47 helicopters, T-45 trainer, Harpoon and SLAM-ER missiles and Joint Direct Attack Munition

Airliner production will play a lesser role in Boeing's future plans

guided bomb. Boeing is also a partner with Lockheed Martin on the F-22, Bell on the V-22 and Sikorsky on the RAH-66. It is competing against Lockheed Martin for the Joint Strike Fighter programme, scheduled to be awarded later this year.

The military business is not without its challenges. F-15 production is likely to end if Boeing does not win the \$4 billion 40-fighter competition now under way in South Korea. This will leave the F/A-18E/F as the company's sole export offering, but the Super Hornet will not be competitive until the avionics have been upgraded and its cost significantly reduced. While the US Navy is underwriting the upgrade, Boeing has undertaken to reduce the aircraft's price to around \$40 million. Changes will include a new forward fuselage, moving final-assembly line and cost-saving partnerships with suppliers.

In line with Boeing's strategy, A&M is leveraging its strengths into adjacent markets. This involves growing its aerospace support business and finding both commercial applications for military aircraft and military applications for commercial aircraft. The latter includes C-32s (757s) for the US Air Force, C-40s (737NGs) for the US Navy and the KC-767 tanker, transport now being offered to a number of countries. Although the 737 Airborne Early Warning and Control system is an S&C product, the same airframe is the basis of A&M's offering for the US Navy's Multi-Mission Maritime Aircraft requirement to replace the Lockheed Martin P-3 Orion.

Finding a commercial customer for the C-17 military transport is proving more difficult. Although the company sees a heavy, outside cargo market for around 30 commercial BC-17Xs, it has yet to secure an order. The aircraft will cost \$300-400 million to certificate to civil standards. On the military side, Boeing has renewed an offer of 60 additional C-17s to the US Air Force and is pursuing leasing deals with international customers similar to the seven-year, four-aircraft agreement signed with the UK.

Aerospace support, meanwhile, is A&M's fastest growing segment, with its \$3 billion in sales expected to triple within 10 years, says director international business development Tim Moreland. There is plenty of opportunity for growth. Worldwide Boeing military aircraft support is worth \$4 billion annually, the company calculates, while the total domestic and international military aircraft support market is \$70 billion.

Although the corporate strategy and headquarters relocation are intended to emphasise that Boeing is more than a commercial aircraft manufacturer, the building and supporting of airliners remain central