



Q&A: DENNIS JEWELL

Rotary joint technical director, CIS Business Area,
Cobham Advanced Electronic Solutions

The world's leading manufacturer of rotary joints describes how the latest designs improve the accuracy of azimuth position indicators in radar systems

Can you tell me about the Cobham group and where Air Traffic Control fits in?

Cobham is a leading global technology and services innovator, respected for providing solutions to the most challenging problems, from deep space to the depths of the ocean. Cobham Advanced Electronic Solutions, is the US subsidiary of Cobham operating under a Special Security Agreement with the US Department of Defense. It offers a

number of products for communications, navigation, identification and RF interconnect solutions for air traffic control, many of which are developed and manufactured by our CIS Business Area in Exeter, New Hampshire.

The CIS Business Area was formed through a series of acquisitions of microwave companies and skillsets, technology and embedded ATC products from industry leaders such as Kevlin Corporation; M/A-

COM; MAST Microwave; Premier Microwave; Atlantic Microwave; Litton/ Airtron Microwave; Continental Microwave and Tool; Adams Russell Cable Company; Microwave Development Company; Gamma Microwave and Varian Microwave.

Cobham's CIS Business Area is housed in two modern manufacturing facilities of 186,000 and 80,000 square feet in Exeter, New Hampshire, where its engineers develop a broad range of components and services for

domestic and international Air Traffic Control Radar Systems.

What products and services does Cobham supply to ATC?

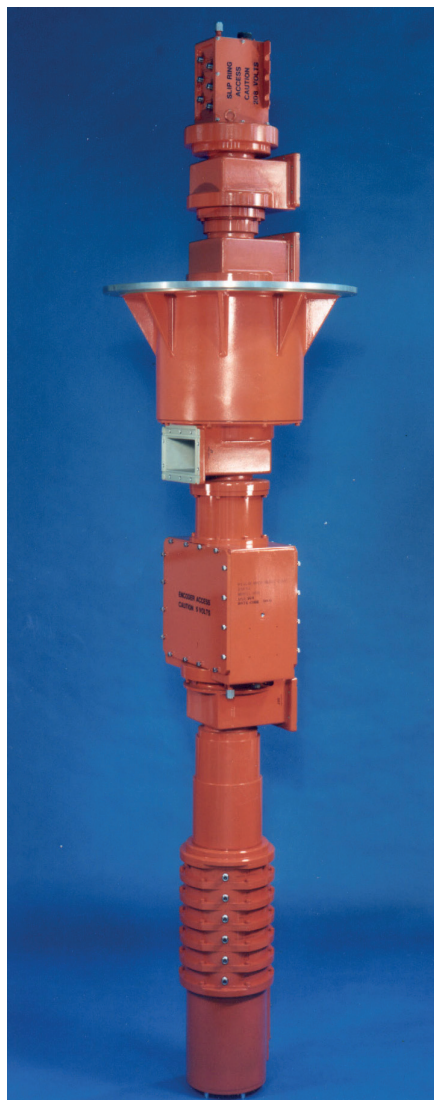
Cobham Advanced Electronic Solutions supplies a wide variety of components to the ATC business, including: waveguide and waveguide products, rotary joints, rotating sub-systems, pedestals, flat-plate waveguide antennas, high power microwave cable assemblies, filters, couplers and a full suite of ferrite control components such as circulators, isolators, phase shifters and switches. Domestically, Cobham is the sole supplier of multi-channel rotary joints to the FAA for all Airport Surveillance Radars (ASR) and Air Route Surveillance Radars (ARSR) and is the only authorized Depot Repair facility for rotary joints outside of the FAA's own facility in Oklahoma City, Oklahoma. Cobham is also highly regarded for its experienced rotary joint engineering and manufacturing staff and as such, manufacturers look to us for regular system improvements, Service Life Extension Programs (SLEP), and site services for their customers.

Who exactly are you supplying to?

Cobham Exeter provides ATC products and services primarily to the Federal Aviation Authority (FAA) as well as foreign radar manufacturers and integrators. While the majority of our ATC business is with aviation authorities or civilian companies, a good portion of our business is supplying rotary joints and other components for military ATC radars through prime contractors such as Northrop Grumman Corporation, Boeing, Raytheon and L-3. Most rotary joint and other components used in ATC radar systems are predominantly dual-use items subject to the US Bureau of Industry and Security regulatory jurisdiction.

Can you describe the company's latest products / services?

One recent advance for Cobham's ATC rotary joints is in the area of improved azimuth position indication. In any rotational radar system, angular position information is matched to the radar returns to accurately determine the azimuth position



Above: Cobham is the sole supplier of rotary joints to the FAA for all of its ASR and ARSR radars

of the targets. In older radar systems, azimuth position generators (APGs) were integrated directly to the pedestal for this purpose.

During operation, APGs exhibit a level of pulse jitter associated with minute variations in the angular velocity of the APG shaft caused by the pedestal. As a result, the jitter directly degrades the accuracy of the azimuth data and the error increases with increasing range. Historically, to solve this problem,

APGs have moved from the pedestal to a point closer to the rotational center of the radar system, inside the rotary joint for a more stable environment. Typically, dual optical encoders are used as APGs inside the rotary joint with 12- or 14-bit resolution. The dual APGs are gear driven off the center shaft of the rotary joint. Even at 14-bit resolution, accuracy errors between the encoders persist at maximum range.

To solve this problem, Cobham redesigned a rotary joint to replace the gear-driven optical encoders with a shaft-mounted Dual Inductosyn Assembly (DIA, 16- or 20-bit resolution). Through this approach, elimination of the gear-drive on the APGs restores coherence of the azimuth position data at maximum range.

What are the main benefits to users of your product offering?

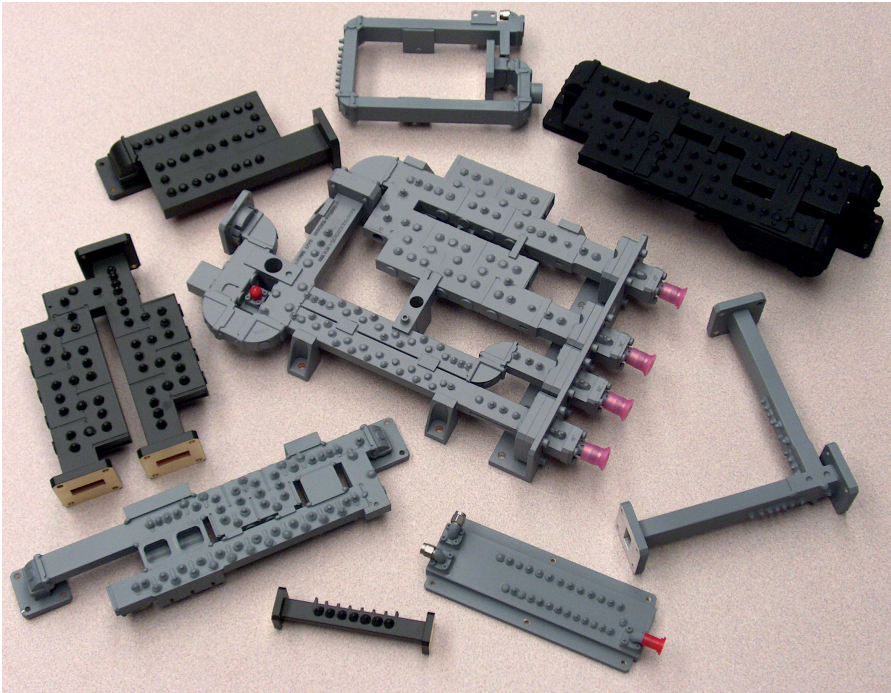
What separates Cobham Advanced Electronic Solutions from other rotary joint manufacturers is our experience, product diversity and design database. Cobham has been supplying rotary joints to the ATC market for more than 37 years. In this capacity, we have designed, developed, fielded and refurbished more ATC rotary joints than any other manufacturer. As mentioned, Cobham is the sole supplier of multi-channel rotary joints to the FAA for all ASR and ARSR radars.

Focusing on this sector of the business, Cobham has developed the manufacturing capability and capacity to repair and refurbish multiple ATC rotary joints simultaneously as well as the technical capability of repairing other manufacturers' rotary joints. Since Cobham has the largest rotary joint design database of any manufacturer, we can easily achieve design changes, upgrades and retrofit operations.

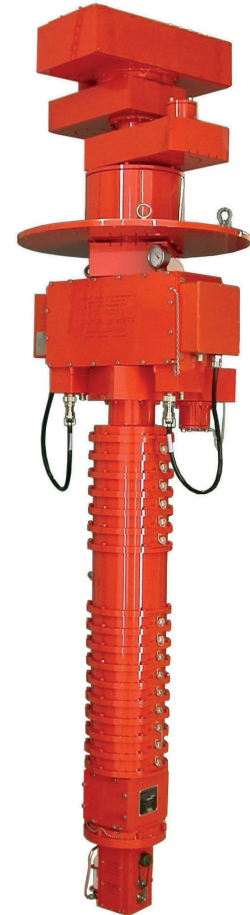
Could you describe a recent application or case study?

Technological advances in the air traffic industry are slowly transforming data-gathering technology from radar-based to satellite-based. The obvious advantage of this change is to gradually reduce and eventually eliminate the dependence on ground-based, high power radar channels. These are the most expensive sections of the radar to

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Above: Cobham Advanced Electronic Solutions has an extensive database for components within its business
Right: Recent advances in rotary joint technology has improved azimuth position indication
Below: High power cable assemblies and integrated assemblies



maintain and the least reliable. However, it is not expected that rotational systems will disappear altogether, unless the substitute systems can supply full 360° coverage.

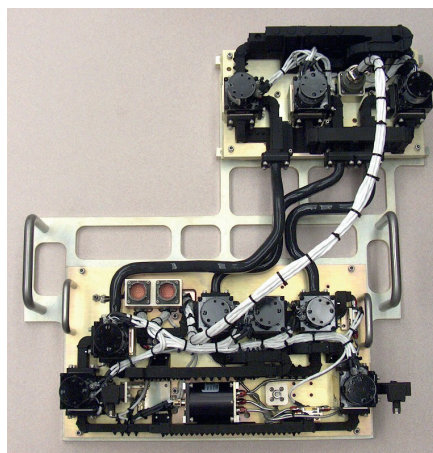
To meet this trend and also meet our customers' needs, Cobham is making improvements to existing hardware for increased frequency bandwidth, power handling or mechanical improvements.

Are there any current trends or new technologies that are important to Cobham and the sector?

The expansion of drone technology has been good business for Cobham's rotary joint, pedestal and waveguide products since many drones use rotational radar and communication systems and Cobham offers a wide range of solutions for this technology. This includes multi-functional pedestal assemblies, including waveguide and coaxial rotary joints, slip rings and media joints.

How do you think the ATC sector will change in the future?

Based on the rate of expansion in satellite technology, I expect ADS-B to slowly replace traditional ground-based radar and eventually transform the air traffic control system into a versatile, user-based network resulting in more efficient air routes,



scheduling and capacity. However, current ATC systems will still remain viable well into the future, albeit in a repair and maintenance mode as ADS-B becomes more widely adopted.

Is there any best practice or standards-related information you would like to communicate?

Cobham's focus is people-oriented and mission driven and we work closely with customers to address customer requirements. We are well-suited to meet ATC manufacturers' needs due to our vast experience, technical excellence, component database and manufacturing infrastructure. Especially within the rotary joint business, we have the most experienced manufacturing and engineering staff in the rotary joint business coupled with the largest design database in the Industry.

What are the plans for the future?

It is not anticipated that transformation of the ATC infrastructure will involve an upgrade or expansion of the current rotary joint technology. Cobham remains focused on providing timely support for the ATC industry in the repair and refurbishment of not just rotary joints, but all of the microwave components we supply to the industry. ❖