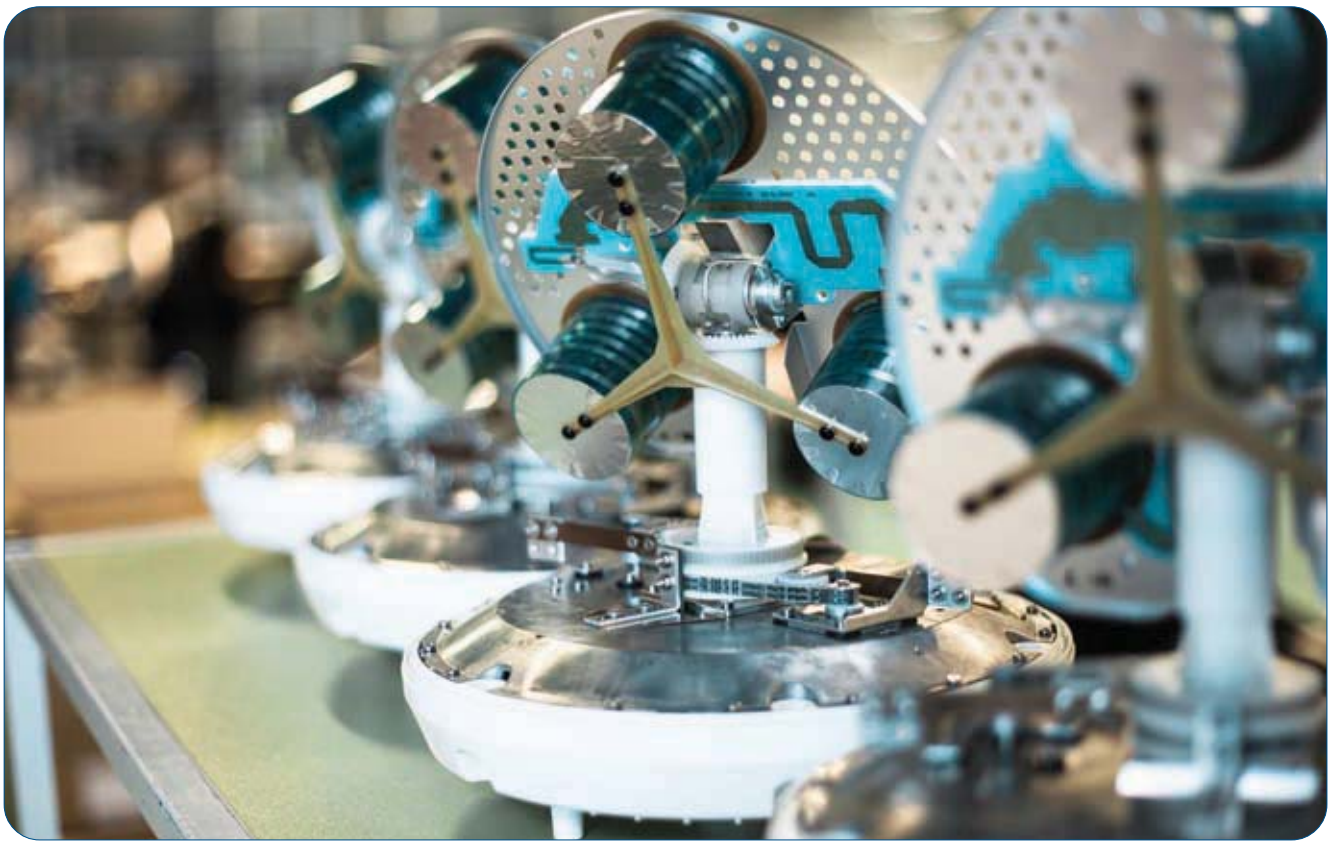

Cobham-burning test facilities

Rigorous analysis conquers tough environments

A meticulously scientific approach to product development complemented by rigorous live testing has been demanded to ensure that SAILOR communication systems provide the Internet speeds and availability of service that today's shipping industry needs – and deserves. Jens Ewerling, Director, Maritime Broadband, Cobham SATCOM, spoke to Satellite Evolution Asia on the extent of these tests.

Imagine taking a brisk evening walk along a beach trying to look at a specific star through a 6mm diameter 48cm long tube. Now imagine doing the same but from the deck of a cargo ship during raging storm in heavy swell. This is essentially what a maritime VSAT antenna must do on a 24/7 basis to ensure connectivity between ship and shore. Whereas a conventional L-band antenna can be pointed within two degrees of its target satellite, Ku- or Ka-band systems must maintain an accuracy of 0.2 degrees regardless of weather conditions.

When hardware is deployed in some of the toughest environments on the globe, a manufacturer's reputation for reliability tends to be hard earned. Cobham SATCOM spends almost US$40 million annually on R&D. However, what distinguishes Cobham SATCOM is not so much the money, but its meticulously scientific approach to product development, backed up by rigorous and unique testing in the field: Approximately one-third of its workforce are involved in research activities.

"People tend to underestimate the stress placed on electronic and mechanical systems at sea, which are expected to run at 100 percent peak performance day in day out," notes Jens Ewerling, Director, Maritime Broadband, Cobham SATCOM.

Gather data

Typical of its approach has been the development its now well-proven and best-selling SAILOR 900 VSAT, where the company's starting point was to gather data on the conditions an antenna needs to tolerate from vessels sailing in different sea areas. Yellow watertight protective cases packed with an assortment of sensors were fitted on several vessels operating in the rough North Sea.

Jens Ewerling, Director, Maritime Broadband, Cobham SATCOM

Several months later, Cobham researchers returned to collect their instrumentation, together with the valuable empirical data on vessel motion, which would later be analysed in the lab. The findings provided a rich addition to a dataset held by the company for the team tasked with creating a high performance; robust antenna system capable of withstanding whatever the natural elements could throw at it.

The ship motion data collected at sea was eventually fed into Cobham SATCOM's Advanced Dynamics Simulator (ADS) testing and development facility in Lyngby, Denmark. Like a flight simulator for pilots, the ADS is a computer-controlled platform that can be moved in any axes thanks to six electro-hydraulic pistons. "What the ADS gives us is the ability to run tests for extended periods, which for practical reasons just wouldn't be possible on a ship. It is not unusual to subject a new antenna design to several thousand hours of physical testing," says Ewerling.

Stress-testing

In addition to the motion tests, antennas are assessed for their resilience to vibration, extreme temperatures, salt corrosion, and dampness. "SAILOR antennas are designed to function in ambient temperatures from -25 to +55°C. However, inside the dome it can be 20°C higher, so we stress-test the mechanical and electronic systems up to +75°C," Ewerling reveals.

"Satellite links have shifted in status from nice-to-have luxury items to vital components for cost efficient and safe operation, which increases the responsibility on us to deliver solutions that can be depended upon. Artificially inducing the various extreme environmental impacts an antenna will encounter during its operational life ensures that our products can withstand the test of time without any degradation in performance or reliability."

However, simulated testing will only take you so far. To make certain antennas perform as they should, pre-production prototypes are once again taken out for sea-trials. For the SAILOR 900 VSAT, this involved installation on two ships in the North Sea and another sailing between Asia and Europe. "We chose different routes to build a full picture of operating conditions," adds Ewerling. "It means we can be confident a ship will retain a communication link to shore whether it's sailing through the Malacca Strait or around Cape Horn."

The testing does not end after antennas enter production. SAILOR antennas are spot-checked throughout the manufacturing process, including out-of-box and on-air tests on a live satellite. "This type of testing makes sure that the quality is maintained through the lifetime of the products," explains Ewerling. "The time we spend testing our products in the lab and in manufacturing quality control reduces the time spent on antenna installation. Moreover, it means our end-users spend less time troubleshooting or finding workarounds to unnecessary failures."

He adds that many antennas produced by Cobham SATCOM have a recorded Mean Time Between Failure (MTBF) of >300,000 hours - equivalent to more than three decades continuous operation, which comfortably exceeds the lifetime of most contemporary commercial ships.

Customer benefits

Cobham SATCOM's testing regime also delivers more immediate benefits for customers, Ewerling explains. A satellite uses less power to transmit data to an accurately pointed antenna. Power is a determining factor in a satellite operator's calculations of wholesale costs to the airtime provider, who in turn charges the end-user. In effect, a high-quality antenna contributes to keeping down the costs of remote connectivity for everyone.

The differential is not just theoretical. In an upgrade project for a European ferry operator, a 1m SAILOR VSAT antenna significantly outperformed a bigger and much heavier, much more complex 1.15m diameter antenna it was replacing from another manufacturer.

The same rigorously scientific approach was taken during the development of the SAILOR 600 VSAT Ku launched earlier this year. Here the challenge facing Cobham SATCOM engineers was to balance performance when operating on High Throughput Satellite services, such as Intelsat's Epic^{NG}, and the smaller 60cm antenna form factor.

Weighing only 35kg, the resulting antenna can be carried on board, making it especially relevant for installations where no cranes or forklifts are available. The combination of a small superlight antenna, quasi-global HTS satellites would open VSAT to ships who were reluctant to put larger antennas on their vessels.

Dynamic Motor Brakes mean the radome remains safely in place during shipping and no-power situations. Further innovations include only a single cable between the antenna and below deck unit. It also features automatic azimuth calibration, so it can find the ship's centreline automatically, saving time during installation and reducing errors. "The attention given during the development process has culminated in a compact solution that makes global high-throughput VSAT viable for more vessels," says Ewerling.

Located at 60° east, providing seamless spot beam coverage between Asia and Europe, IS-33e is the third of seven new High Throughput Satellites that power Intelsat's next generation Epic^{NG} network, a new platform designed to deliver very high-speed broadband.

Cobham SATCOM's innovative scientific approach to antenna design was reflected in the high performance recorded during Marlink's testing, states Ewerling. "The tests show that Cobham antennas can deliver the full potential of new HTS services, helping vessels and fleets to digitalise operations for more safety and efficiency."

SAILOR communication systems often exceed end-user requirements and, Ewerling says, set new industry benchmarks for performance and reliability that are a testament to Cobham SATCOM's analytical product development philosophy. Perhaps, he says, this is something else to think about the next time you take an evening stroll and look up at the night-sky. ■