

## HELPING TO PROTECT SUBMARINE CREWS

**BAE Systems uses Wessex Resins products to clad submarines with acoustic tiles, helping to protect crew members' lives in war situations**

**BAE Systems uses MOD-approved epoxy primer and adhesive from Wessex Resins to clad its submarines with state-of-the-art acoustic tiles, making them extremely difficult to locate and attack. The Wessex Resins products create stronger and more durable bonds than their competitors, keeping the critical tiles in place for up to 25 years – the entire lifecycle of the submarine. In addition, Wessex Resins tests products thoroughly before they leave the factory, ensuring that they meet BAE Systems' requirements in terms of quality and consistency.**

### Challenge

In a war situation, submarines rely on stealth technologies to remain hidden from the enemy and to keep crew members safe.

Over the years, the MOD has developed 'acoustic cladding' solutions that make submarines extremely hard to locate and, therefore, to attack. For these kinds of solutions, state-of-the-art acoustic tiles are attached to the hulls of submarines to absorb and deflect enemies' sonar signals.

To protect submarines and their crews effectively, the adhesive used to hold acoustic tiles in position must be very strong and durable. Specifically, it must be able to resist extremely harsh marine conditions and cope with massive changes in pressure as submarines move up and down in the water.

John Hargreaves, Project Lead at BAE Systems, says, "As submarines dive, acoustic tiles compress, straining the bond to the steel hull underneath. To ensure that tiles stay in position and protect crew members' lives, we need to attach them using adhesives that can take that strain day in day out for the entire lifetime of a submarine – typically up to 25 years."

### Solution

BAE Systems uses Wessex Resins epoxy to attach acoustic tiles to the hulls of its submarines. "First, we prepare the hull with a Wessex Resins epoxy primer, which has excellent wetting out capabilities, which means that it flows easily over the steel surface," says Hargreaves. "Once this primer has cured, we use a specially formulated Wessex Resins epoxy adhesive to create a strong, durable bond between the tiles and the hull itself."

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**John Hargreaves, Project Lead at BAE Systems**

To ensure that tiles are never dropped at sea, BAE Systems always uses the same, tried-and-tested application process. "There's no machine to tell us if tiles are stuck properly, so the consistency of the adhesion process is a critical success factor for us," says Hargreaves. "By repeating the process in exactly the same way every time, we can be sure that the tiles will stay in place for as long as we need them to."

Wessex Resins thoroughly tests all batches of the primer and adhesive before they leave the factory, ensuring the highest levels of quality and consistency for BAE Systems. "We need suppliers whose products mirror the consistency of our tiling process," says Hargreaves. "That's exactly what we get with Wessex Resins."

## Benefits

### The best protection for submarine crews

With Wessex Resins epoxy, BAE Systems can minimise the risk that a tile will be dropped at sea, potentially jeopardising the safety of crew members. "We've looked at lots of other epoxies and we still haven't found anything that can create stronger bonds between the acoustic tiles and the hull than Wessex Resins epoxy can," says Hargreaves. "It is the only product that we would trust to ensure that tiles will stay in place for the entire lifetime of a submarine."

### Excellent technical support

Wessex Resins is always on hand to help BAE Systems overcome its fabrication challenges. "When we were having issues with the epoxy primer being too runny, we got on the phone to Wessex and they quickly thickened it up for us," says Hargreaves. "Wessex Resins has also provided a wealth of technical advice over the years on everything from the shelf-life of the primer to whether epoxy can be used to fill gaps in particular components."

### A close, trust-based relationship

Wessex Resins has built a close, trust-based partnership with BAE systems based on an in-depth understanding of submarine construction and a commitment to excellent customer service. "Submarines operate in some of the most hostile environments known to man, requiring a unique approach to fabrication," says Hargreaves. "The fact that Wessex Resins understands our business means they can answer our questions and support us effectively throughout the acoustic cladding process."

### Improved health and safety

Since 2011, BAE systems has been using a new formulation developed by Wessex Resins. "In response to an EU directive on the Restriction of Hazardous Substances, Wessex Resins developed a new formulation for us that is non-carcinogenic," says Hargreaves. "The new epoxy is safer, which is great news for our technicians."

### Still leading the industry

While many epoxy manufacturers have made contact with BAE Systems over the years, no competing product can rival the Wessex Resins epoxy primer and adhesive in terms of quality and bond strength. "Lots of companies would like to work with us, but none is even half way to improving on the Wessex Resins MOD-approved formulation," says Hargreaves. "It's no secret that other European navies are now developing acoustic tiles for their submarines and many will be looking at the Wessex Resins products to keep their tiles in place and protect their crew members."

## Challenge

- Protect submarine crews in war situations with state-of-the-art acoustic tiles
- Ensure that tiles stay in place for the lifetime of a submarine
- Create bonds that withstand harsh marine conditions, rapid changes in pressure and tile compression

## Solution

- BAE Systems uses epoxy primer and adhesive from Wessex Resins for tile adhesion
- MOD-approved formulations provide the high levels of quality and consistency required
- Consistent tile application process used to ensure success

## Benefits

- Best possible protection for submarine crews in war situations
- Stronger, longer-lasting bonds than competing epoxies
- Excellent technical support helps BAE Systems overcome fabrication challenges
- Improved health and safety based on a re-worked, non-carcinogenic epoxy formulation
- Continuing leadership for submarine applications

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