The hydrodynamic duo
Today’s best hull forms are so well optimized that it is impossible to make major energy efficiency gains. But significant improvements are still possible – for both cruise ship and Azipod® hulls alike.

Royal Caribbean’s new, still unseen class of ships, known as Project Sunshine, has created quite a buzz in cruise. Ship design and engineering experts Foreship and electric propulsion providers ABB have been privileged insiders to the design and construction process at Germany’s Meyer shipyard. Although the two companies have partnered up on many cruise ship projects, Project Sunshine is their closest cooperation to date. Hydrodynamically optimized hull design is their common passion.

It was the hydrodynamically optimized hull design of its new Azipod XO that secured ABB the propulsion contract for Project Sunshine. Building on its successful “Rethink the Azipod” program, ABB modified its Azipod propulsion unit frame design in early 2011 to improve hydrodynamic efficiency. The modifications include new strut and fin structures and the addition of X-tails to the pod cap, all designed to deliver the same thrust with lower energy usage.
Freedom for shipyards
Royal Caribbean’s Radiance of the Seas was the first cruise ship to utilize the new Azipod modifications, which were completed during her drydock in May 2011. Her sailings from May to September demonstrated a hydrodynamic efficiency improvement of more than 2 percent, compared with a sister vessel and her previous operational portfolio.

As Janne Niittymäki, Foreship’s head of hydrodynamics, explains, one of the major advantages of Azipod propulsion is the freedom it allows in hull form design compared with conventional shaft lines. Shipyards benefit not only from flexibility in integrating the Azipod into the ship hull, but also from easier installation due to modular construction and avoidance of high-pressure hydraulics in the steering system.

“The full potential of this has only just been utilized on the very latest cruise ship projects projects,” says Niittymäki. “ABB and Foreship have encouraged shipyards to design pod-optimized hull forms, even designing a cruise ship hull form for podded propulsion, carrying out propulsion model tests and giving the results to the shipyards.”

It is here that one of Foreship’s specialties comes in. Computational fluid dynamics (CFD) calculations, especially in full-scale simulations, hold the secret to small but significant hydrodynamic improvements that can generate significant fuel savings.

The potential saving on fuel consumed for propulsion in large cruise ships can easily be a million dollars a year.
Hydrodynamically best
Although Niittymäki says that estimating the energy and cost savings from pod-optimized hull forms is complicated because every ship is different, he maintains that the potential saving on fuel consumed for propulsion in large cruise ships can easily be a million dollars a year.

Commenting on the cruise industry’s level of confidence in Azipod, Niittymäki says that it differs from one cruise line to another, but has certainly improved.

“Some owners still remember the reliability problems of many years ago, and therefore do not want pods. However, most cruise owners agree that, hydrodynamically, pods are the best propulsion option.” And on one topic Niittymäki is unequivocal: “Azipod still has a role to play in improving the energy efficiency of cruise ships.”