



Photo: Carnival Cruises

HVAC systems of the *Carnival Victory* will be upgraded

State-of-the-art HVAC for cruise liners

KNUD E. HANSEN | The Danish naval design and marine consultancy Knud E. Hansen AS said that it and Novenco Marine & Offshore AS had been contracted by Carnival Cruise Lines to install state-of-the-art heating, ventilation and air conditioning (HVAC) upgrades on the Victory-, Triumph-, Conquest- and Spirit-class cruise liners to improve the overall operational efficiency of the British-American company's fleet. The work will be carried out through 2014 and finalised in early 2015.

Shipowners' newbuilding requirements, Knud E. Hansen noted, often specify excessive capacity for HVAC systems to ensure passenger comfort during tropical cruises. This means there is significant potential for operational optimisation when the vessels are in cooler climates or during transitional periods with fewer passengers on board. The consultancy said its upgrades would take into account both the number of passengers and variety of heat sources, such as entertainment equipment, so that cooling capacity was transferred to areas where needed.

The technology is based on monitoring the passenger flow and occupancy of each area us-

ing CO₂ sensors in addition to a "time schedule". To save electrical power and chilled water, ventilation is reduced to a minimum in unoccupied areas.

HVAC system efficiency gains of up to 25% can be expected by upgrading equipment on board, changing system operational parameters and installing customised software to better manage the operation of HVAC machinery, Knud E. Hansen said. As a consequence, it added, the payback period is likely to be less than six months. An "energy-saving calculation" program can give daily reports to the operators and technical staff ashore.

The new generation of the time schedule and energy-saving calculation program can be interfaced with most existing HVAC HMI control systems, according to Knud E. Hansen. It said further energy efficiency enhancements to the HVAC system could now be implemented, including chilled water flow control, "free cooling" of chilled water for ships sailing in low outside temperatures, unoccupied cabin control, improvement of return air and enthalpy wheels as well as demand air flow in galleys.

Knud E. Hansen said that it and Denmark's Novenco Ma-

rine & Offshore would manage the Carnival Cruise Lines upgrades in cooperation with the Knud E. Hansen office in Fort Lauderdale, Florida. Technical support, regulatory compli-

ance, refit design and energy optimisation including CFD analyses are among the services provided to cruise ship owners since the Florida office opened in late 2010.