



Accelerating  
the future  
of aerospace

AEROSPACE VEHICLES DIVISION

HELICOPTERS & AEROACOUSTICS

# Helicopter-ship qualification

PRODUCTS & SERVICES



The Dutch helicopter-ship qualification method increases safety and reduces testing time and cost.

NLR can assist with testing activities to develop Ship-Helicopter Operational Limitations (SHOL). The NLR developed Dutch helicopter-ship qualification method is a very cost effective and safe approach to obtain SHOLs, based on a thorough understanding of helicopter characteristics and the ship's aerodynamic environment. This method saves helicopter flying hours and ship sailing time, compared to the traditional approach of determining SHOLs by flight testing on board the ship only.



### WHAT YOU NEED

Determination of Ship-Helicopter Operational Limitations (SHOL), while:

- Achieving optimum operational capabilities of the helicopter on board the ship
- Minimizing the testing period in which helicopter and ship will be required
- Ensuring helicopter and ship safety
- Saving cost

### WHAT WE DELIVER

The Dutch helicopter-ship qualification method was developed by NLR and refined together with Dutch firm Aeromath. NLR together with Aeromath delivers efficient support, ranging from consultation, instrumentation and test facilities to full test management and execution services.

### OUR CAPABILITIES

The Dutch helicopter ship qualification method is an optimized four-step method to establish Ship Helicopter Operational Limitations (SHOLs).

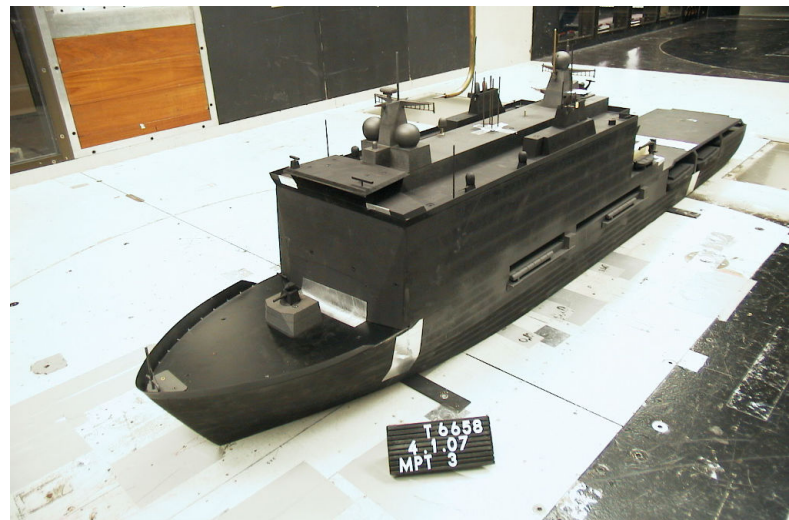
The first step involves determination of the main characteristics of the aerodynamic ship environment in which the helicopter will operate. A short wind tunnel campaign of two days is conducted because in our view CFD is not yet considered cost effective for this application. The relevant characteristics of the airflow around the ship are measured. The wind tunnel test results make full scale validation unnecessary. However, a check of the wind measuring system installed on the ship will always be required at the start of on board helicopter flight trials.

In the second step detailed low-speed helicopter characteristics are determined. A shore-based flight test campaign of up to a week is conducted. Determined are at least variations in engine performance, control margins and handling qualities in hover with cross-wind conditions.

### OUR CAPABILITIES

In the third step, combination of the measured characteristics of the helicopter and the airflow around the ship results in so called Candidate Flight Envelopes (CFEs). The CFEs are an initial determination of the operational limitations of the helicopter/ship combination. However, effects of ship motion, air wake turbulence behind the ship and pilot workload at sea are not included, requiring an evaluation in flight test at sea.

In the fourth and final step a short ship-based flight test campaign of several days is conducted. The length of the campaign depends on the number of flight procedures to be tested. The flight test campaign validates the Candidate Flight Envelopes and includes the effects on the pilot's workload of reduced visibility, ship motion and turbulence. The results are qualified SHOLs in a range of weather conditions by day and by night.



### PRODUCTS & FEATURES

The Dutch helicopter-ship qualification method is extremely efficient. The corresponding savings for the sea trials, compared with other current test methodologies, in time required and flight hours consumed for it are roughly 25-40% whilst at least the same operational capability can be achieved.