Introduction
From 1 January 2015, more stringent regulations regarding sulphur emissions inside ECAs will enter into force. Thereafter, a ship operating inside an ECA area may only use fuel oil onboard whose sulphur content does not exceed 0.1% by mass. Taking into account the present bunker prices, shipowners may profit significantly from an optimised calculation for the duration of the changeover process. A prolonged changeover process leads to unnecessary costs for the ultra-low sulphur fuel, while at the same time a shortened changeover holds the risk of substantial fines.

The challenge
The changeover procedure to MGO appears to be easier and faster compared to the previous changeover to LSHFO. But what looks easier at first glance turns out to pose various challenges caused by the significant differences of the respective fuels, MGO and HFO, all leading to a possible loss of propulsion. The temperature gradient of the fuels is about 80°C, and a rapid temperature reduction throughout the changeover holds the significant risk of a thermal shock to engine components. Common sense is a maximum temperature decrease of 2°C per minute, which can be hard to achieve since the volume to be exchanged is comparatively small. Moreover, the temperature is of significant importance to meet the minimum viscosity limit of 2 cSt in order to avoid loss of pump capacity. In addition, the exact content of sulphur has a major impact on the related calculation: the closer the sulphur content of MGO is at the limit of 0.1%, the longer the necessary time to successfully change over to MGO. A sulphur content of exactly 0.1% involves the risk of non-compliance due to a fuel contamination with deposits of HFO.
THE DNV GL FCO CALCULATOR

Our solution
DNV GL provides a ship-specific DNV GL Fuel Change Over (FCO) Calculator application, which is based on Microsoft Windows®. It refers to a complex numerical simulation of the fuel changeover process, promising a very accurate calculation and additional cost savings in comparison to a linear model.

The DNV GL FCO Calculator takes into account:
- Specific fuel system layout
- Constraints on temperature
- Continuously variable sulphur content of fuels
- Continuously variable temperature of fuels
- Continuously variable fuel oil consumption
- Return flow from service system to service tank
- Price of respective fuels

The DNV GL FCO Calculator delivers:
- The optimised lead time for the changeover process
- Indication if the temperature limit is exceeded
- Maximum allowed hourly consumption to meet constraints
- Amount of MGO used for the changeover process
- Costs of the changeover process

The DNV GL FCO Calculator is provided with the suitable documentation as a redundant format containing further information and the calculations for the most common operational profiles.

YOUR BENEFIT

DNV GL offers a ready-to-use solution for onboard operation and intends to reduce the risk of human error during preparation of the changeover process. Moreover, our comprehensive solution leads to a cost-efficient and reliable changeover process and, on top of this, provides supportive documentation for the respective authorities to demonstrate compliance.