Engine room fires Fuel leaks and hot spots

Every year, fires on ships lead to loss of life and serious damage to the ships themselves. Fires start in the vast majority (according to studies, about 80%) in places where there is a high temperature combined with the presence of fuel. Finally, the oxygen in the atmosphere completes the fire triangle and the result can be bad to catastrophic for the ship, depending on the volume of available fuel (fuel, lubricants) and the reaction time of the crew. Such places on the ship are undoubtedly the engine room in the first place and the ship's galley in the second place. As far as engine room fires are concerned, despite the different places and the different way of manifestation, there are many similarities in the basic principle of the coexistence of high temperature and combustible material. Fire safety is not only about detecting and fighting a fire, but also about preventing its occurrence.

Research into claims directly related to fires and explosions on ships shows that almost 70% of all such fires originated in the engine room and accommodation spaces (primarily galley). Almost 80% of them concern the engine room, with the highest frequency of these fires being observed in the main engines in their individual systems, such as superchargers (turbo chargers) and auxiliary machines (electric engines, pumps, etc.). Most of these incidents were caused by fuel or lubricant with a low flash point (below 200°C) leaking onto very high temperature areas (eg the turbocharger with a temperature of 400°C).

In fires of this type there are two main points that contributed to the occurrence of the fire and must be analyzed:

The reason for the fuel or lubricating oil leakage.
Because there was no protection mechanism for the leaked fuel/lubricant to prevent it from coming into contact with the ignition source.
The main causes for which a leak may initially occur are:

Piping, piping connections and other related components, such as sealing rings, are not genuine spare parts or even of the type recommended by the manufacturer.

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In some cases, modifications are made as part of maintenance by the crew under existing management, without records being kept of the materials used, with the result that subsequent management is unaware of them.
At the connection points of the piping, the locking procedure was not followed, resulting in loosening due to the vibrations of the trip and eventually leakage.
Flange bolts that crack due to fatigue caused by over-tightening.
Pipe fatigue fracture. The phenomenon is seen in pipes that are not well supported along their entire length, which causes excessive stress due to vibrations. This lack of support is usually seen in the negligence of repositioning the supports after maintenance work
The failure of the effectiveness of systems that prevent fuel or oil from contacting very hot surfaces (insulation, spray shields) can be due to the following reasons:

Quality varies from shipyard to shipyard.
Decrease in insulating capacity with age.
Failure or negligence in reinstallation after maintenance.
Fuel/lubricant soaking due to small leaks for some time without detection.
One of the factors to be considered when assessing engine room fire risks is the age of the ship. The risk of leaks from machinery can increase as ships get bigger. Older ships may also face cuts to maintenance and safety budgets as they approach the end of their lives. A ship may have changed ownership and management several times during its lifetime, and this can have a direct impact on the maintenance culture in the engine room.

Finally, in prevention measures, ship managers must incorporate applications of technology such as thermography to detect very hot surfaces in the engine room in order to pinpoint the points where a spontaneous fire may occur. The use of thermographic examination (thermographic examination) of the engine room must be done during the sea trials stage before the delivery of the ship, so that the crew knows all the surfaces where very high temperatures develop with the risk of spontaneous combustion.