



A breath of fresh air

Many ships at berth discharges exhaust emissions which have a negative impact on the performance and health of crane drivers. Protecting the driver from harmful emissions, whilst at the same time ensuring that the cabin is supplied with clean air is quite a challenge. Daan Potters, Manager Ergocab, Merford Cabins, the Netherlands, explains.

Although many Governments have restricted pollution from exhaust emissions, these restrictions don't apply in international waters. It is therefore no surprise that many seagoing vessels use cheap and more polluted heavy fuel oil to run their engines. But when these ships dock at a quay in the port or terminal and their engines are turned off, the onboard generators continue to run to supply electricity to the ship thus continuing to create polluted exhaust emissions. There is a large risk that this polluted air enters the operators' cabin of, for example a ship-to-shore container crane, whilst unloading or loading such a ship. After several research studies about exhaust emissions from ships at berth, it became clear which gases are determined in exhaust emissions. Those emissions contain a lot of nitrogen oxides (NOX), sulphur dioxide (SO₂), carbon monoxide (CO), and carbon dioxide (CO₂) and in lesser fractions hydrocarbons (HC), particulate matter (PM) and poly-aromatic hydrocarbons (PAH). Many of those gases may cause negative impact on the performance and health of the workers. One of the dangers involves the restraint of oxygen by carbon monoxide, carbon dioxide and hydrocarbons. Because of this the crane

operator won't breathe in enough oxygen and may become unconscious or even pass away. Also nitrogen oxides and sulphur dioxide may cause direct impact on the health of the cabin drivers because those gases inflict irritation to the respiratory tract. The poly-aromatic hydrocarbons and particulate matter may have negative effects in the long term and may cause cancer. So it is clear, the air quality inside the driver's cabin is a very important issue to guarantee the performances, but more importantly the health of the workers, even when the outside air quality is highly polluted.

Clean airing

It is important to make sure there is a minimum airing of 30m³/h/person in the cabin. To be sure this incoming air is free of pollution, it will be necessary the air is filtered from injurious gases or the air intake has to take place at a "clean spot". This latest option is quite complex because of the required hoses in combination with the long distance to the driver's cabin. More likely the air inlet takes place directly in the cabin by using a filter package including active carbon filters and zeolite adsorption filters. The best solution is a carbon chemical filter adsorbing a large range of pollution. The gases that will be adsorbed by the carbon chemical filter are sulphur dioxide (SO₂), nitrogen oxides (NOX), hydrocarbons (HC), poly-aromatic hydrocarbons (PAH) and volatile organic compounds. Specific dust filters also help to keep the air quality clean within the cabin. Both kinds of filters have to be exchanged when their life span expires. By using different kinds of sensors the life span of the filters can be indicated.

Avoiding harmful leakage

Normally there will be some leakage of polluted outside air entering the cabin. This can be avoided by creating an overpressure in the cabin, using the above mentioned airing system. From an energy saving point of view (taking the above mentioned minimum airing in mind), but also to save the lifetime of the filters, it is important to keep the airflow into the cabin as low as possible, for example, 100 m³/h, at an outside temperature of -20 degrees Centigrade requires 1000W extra heating capacity. The same issue applies in high temperature environments, the capacity of the AC units sometimes being critical. It's a challenge to find the optimum combination of a minimum airflow and a guaranteed overpressure, taking in mind the leakage of cabins in combination with clean filters, but also in combination with polluted filters. Because of this, the type of fan and the control system of the fan are critical. Dutch cabin manufacturer Merford supplies both integrated and separated filter and overpressure systems for crane cabins to the vital provide fresh air which is free of pollution. The separated units are developed to install on new, and on existing cabins. By using a carbon chemical filter and dust filters and measuring the life span of the filters and concentration of dangerous gases, the air quality will be guaranteed. Beside separated units, Merford has also developed filter and overpressure systems as an integrated version for new cabins by using the same technique. With their system there is total control on the air quality in driver cabins. The filters are easy to replace and the unit are developed to consume less energy. ■