Energy Efficient Engine Room Ventilation

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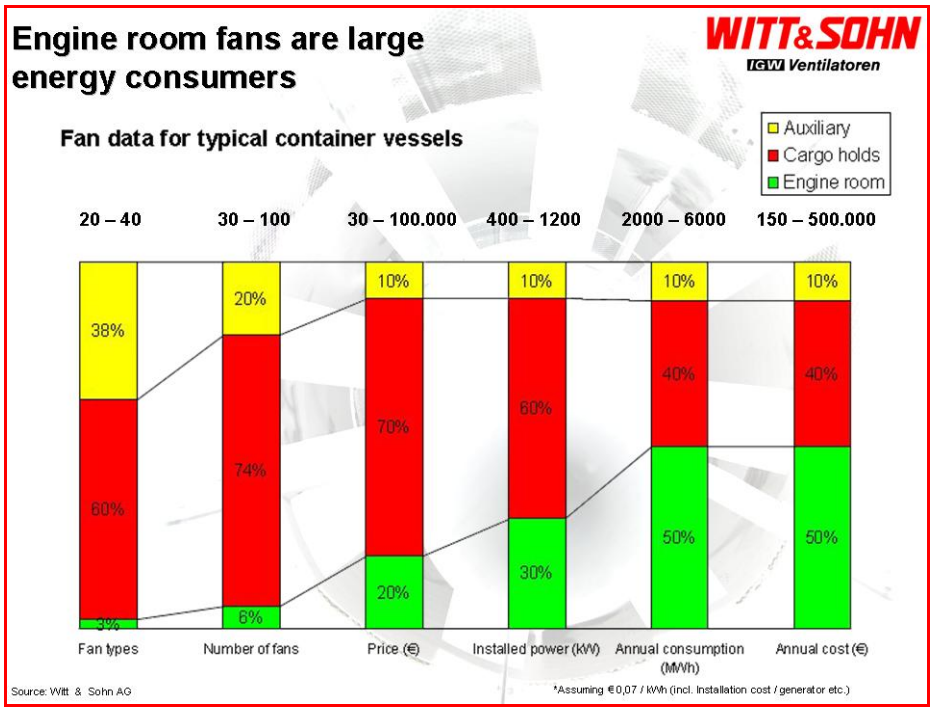
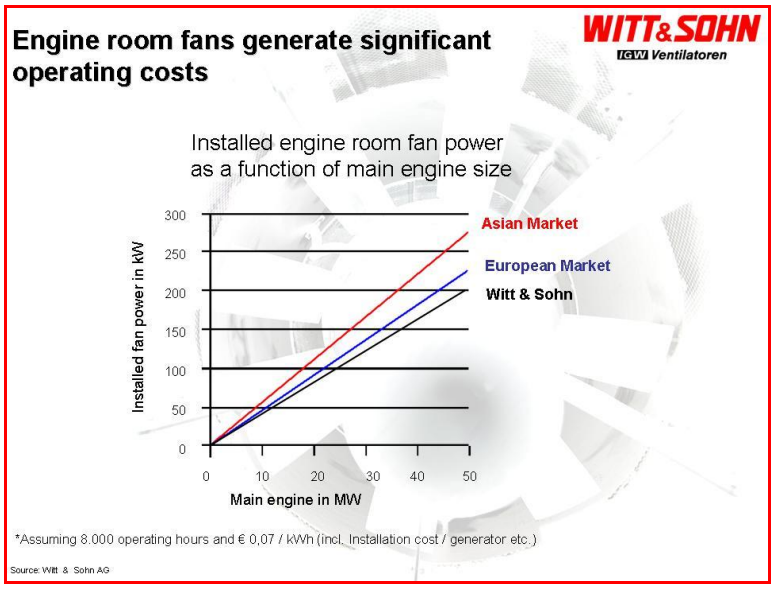
Summary. The energy consumption of engine room fans is normally neglected when the overall efficiency of the main engine is evaluated. By specifying that engine room fans must have an efficiency of more than 80% (and this needs to be attested and certified ideally by a classification society), major cost savings can be achieved while doing something for the environment at the same time. Worldwide shipping traffic is responsible for ca. 2.5% of the CO_2 output. On satellite photos one can clearly see the traces of worldwide shipping traffic based on the brown lines in the Mediterranean Sea, the English Channel, the Great Belt, etc. Climate change, CO_2 output and power saving is on everyone's mind even in the shipping industry. But, in practical terms, not much has happened. Yet there are many small measures which could be commercially practical but are not implemented. The operation of engine room fans is just such an example. The engine room fans support the main engine with fresh air. Due to the very high operating performance – virtually 24 hours a day, 7 days a week – the engine room fans (e.g. on container ships) account for nearly 50% of the complete energy cost for air conditioning.



Aside from the main engine, the engine room fans are the most costly machinery, in energy terms, on board a ship.
For Witt & Sohn as a producer, it is perplexing that the engine room fan specifications are of such low importance for the engineers, the ship owners and the classification societies. Except for a few general guidelines, e.g. pressure, frequency and engine speed, there are not usually any particular instructions to be observed.

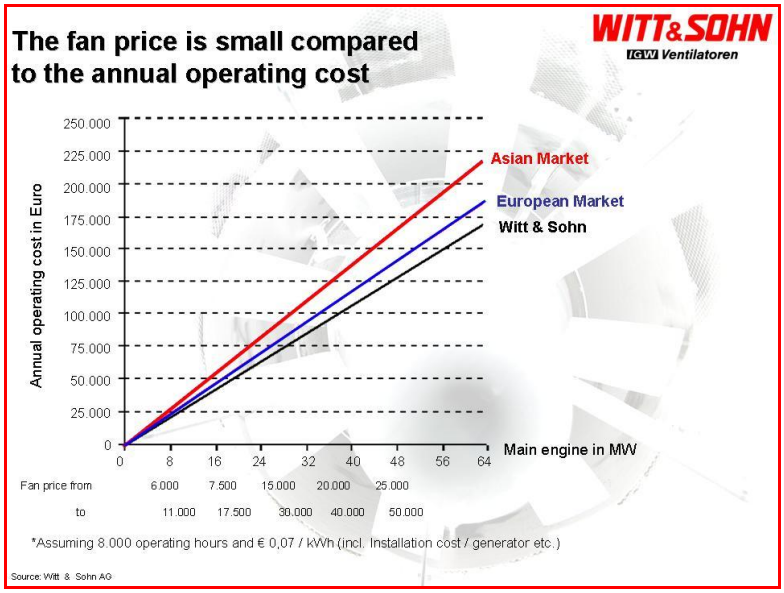
The required volume flow is generated from the main engine and the required pressure is calculated from the construction of the supply and exhaust air system. Specifications of the degree of efficiency for the engine fans are completely overlooked. This is even more inexplicable because the engine room fans are added to the main

engine whereby the resulting calculation of efficiency is then an important part of the negotiations between the ship owner and the shipyard.
The difference in efficiency factor between the European and Asian engine room fans are dramatic. Figure 2 shows the spread between the efforts of engine room fans in addition to the dimension of the main engine depending on which supplier has been chosen.



Differences of 20% in the efficiency factor are normal. Comparing the relatively low efficiency factors of 70-80% for poorly-produced Asian electrical motors to the 90-95% efficiency factors in Europe shows dramatic differences.
Closer inspection of the data raises the question of how the KW/hr cost should be evaluated. Ship owners generally set values between €0.04 and €0.10 (average €0.07) depending on the oil price calculation and whether performance-loss, motor-loss and investment cost, etc., have been considered. It is certain that these values will increase in the future, considering the almost unavoidable rise in the cost of oil.

As shown in the following figure, there can be a 5- figure reduction in Euros per year if West European products are chosen. But even here there are major differences.
In Europe there are also fans are mounted with an efficiency factor of only 70-75% instead of 80-85%. This is partly due to underdeveloped fans as well as poor construction by the shipyard.

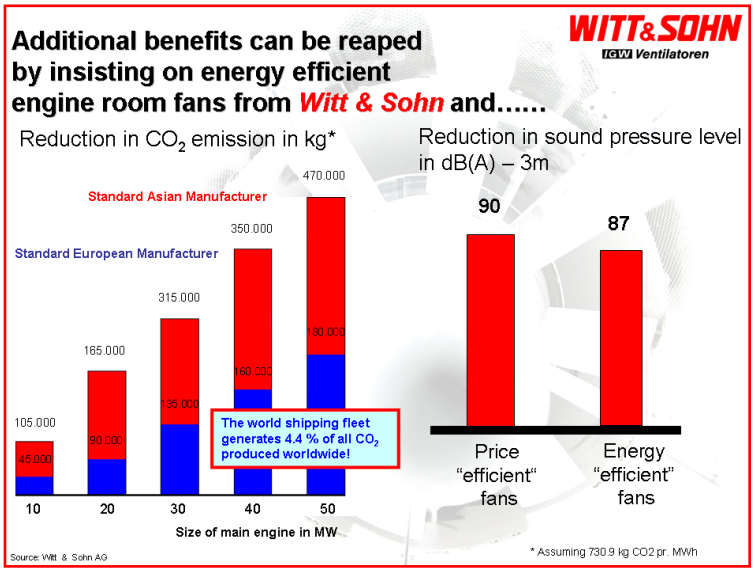


A minimum efficiency factor of 80% is always possible. With some construction effort an even higher level can be reached. To achieve more than 85% is complicated in practice because the basic construction on vessels can

lead to problems in operation. This underlines the importance of the quality of these fans. Engine room fans typically have a gross weight of between 500 and 1500 KG. To ensure operation in all weathers, important details must be considered during construction. Low cost versions have no place in this situation.

As the price differences of the various fan suppliers (even including Asia) are in the 4-figure range, these additional charges can be saved within 1 to 2 months. In many cases – if shipyards would calculate accurately – the additional charges can be saved in cables, smaller generators, etc., even during the test phase.

In addition to the economic benefit, there are environmental benefits for choosing efficient fans. There are large reductions in CO2 emissions based on a lower energy consumption and the noise level will be reduced. Engine room fan noise can be especially disturbing to the crew and the residents near harbours.



The situation can be problematic. Differences can be clearly seen in the variety of offers between the fan suppliers. A shipyard or investor placing an order has little incentive to buy high quality fans because today ships are traded with fixed prices and then go on to be chartered by a third party.

That is where the specification is vital. Every specification should include the following sentence:

"Engine room fans should have a total efficiency of more that 80% according to ISO 5801, attested and certified by a classification society."

It is very important that measurements be made. The cost savings can be reached by having the fans certified to engineering standards preferably by an externally-accredited laboratory. In some countries not all producers have certified test facilities, externally-accredited test facilities are then a necessity. The additional charges for such testing are minor and easily justified in view of the price of the fans. Such additional charges are usually 2-5% of the cost of engine room fans per ship. Usually this can be amortized within a few days. With regard to a series-production of ships, the cost is negligible.

At the same time, one should specify that all motors on board a ship, e.g. for pumps, air conditioners, refrigerators, etc., should have a high efficiency factor. This would be of benefit to the environment and the budget.

As every trip starts with a single step, such a small addition to a specification can be a large step in the right direction for the environment. That this environmental awareness is also cost-efficient is a bonus!

After graduating in mechanical engineering from the Technical University of Denmark in 1976, Karsten C. Witt attained a certificate as Master of Business Administration in 1983 in various Universities. He started his professional carrier with McKinsey & Company Inc. as management consultant in 1983 to 1990. Since 1990 he is member of the executive committee as Management board at Witt & Sohn AG and of the Witt Group of companies.