Howden

Howden Cooling Fans

RETROFIT OF A LARGE COOLING TOWER IN COMBINATION WITH A SIGNIFICANT NOISE REDUCTION

Case Study

Cooling Tower at OMV, Vienna

OMV has a large refinery outside the Austrian capital of Vienna. Typically large cooling towers are a key part of the installations at such a plant. After 18 years of operation, cooling tower number 3 required replacement of the rotating equipment, i.e. the fans and drive trains. In addition, OMV has a strict environmental impact policy that revamps must lead to substantial noise reduction.

These two items, the need to retrofit and the overall policy for noise reduction at this site have been the starting point for the revamping project on cooling tower number 3, which has 24 cells with 22 ft. diameter fans.

At first, a comparative performance and sound test was done between a super quiet fan and a classic straight bladed fan. Measurements by an independent German acoustic consultant were made before and after the revamp. The results from this test showed the difference in noise level of 15 dB(A) between the super quiet fan and the classic straight bladed fan, and proved the potential to reduce noise in the existing cooling towers when using the super quiet fan. For OMV it justified the required investment and the decision to proceed.

The super quiet SX-fans that were used for this revamp are shown in figure 1.

Figure 1

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Cooling Tower

Noise Data (LwA) in dB(A)			
		Before	After
Air inlet, down at the tower	LwA	110	110
Air outlet, fan stack	LwA	115	100
Drive train	LwA	110	94
Total of cooling tower	LwA	117.7	110.9
At the nearest housing areas	SPL	49.1	39.2

table 1: verification test results

Case Study

The SX-fans are quiet for the following two main reasons:

The higher blade coverage in the cross sectional area (solidity) of the SX-fan enables the air flow to be archieved at a lower speed than a conventional fan type.
The special blade shape with swept forward leading and trailing edges generates less noise than a conventional fan type.

As a result SX-fans archieve a given air flow generating 10 to 15 dB(A) less nouse, when compared to classic straight blade fans or, the other way round, the SX-fan can provide substantially more air flow for a given noise level.

When using SX-fans in low noise applications special attention has to be paid to the drive train, to ensure that the gain on aerodynamic noise reduction is not wasted by noise generated by the E-motor and/or gearbox.

It is obvious that when standing beside a counter flow cooling tower the splashing water is the dominant noise source. However, measurements by an acoustic consultant proved that for the environmental noise at the nearby housing area, the fan impeller and drive train were the dominant noise source and that they would benefit from this noise reduction. A summary of the archieved noise reduction is given in table 1.

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