

Case study

# New hub retrofit solution



**Howden**



Transforming Herringværket into a more CO<sub>2</sub> neutral facility, created demands for extra pressure. Howden recommended an upgrade of the forced draught fan to extend lifetime and add 30% extra pressure.

**Howden's solution for Herringværket, was to install a bigger hub and give the fan an extensive modernisation while reducing installation costs and future service expenses.**

## The challenge

From the start in 1982 the Danish power plant Herringværket, owned by DONG Energy, was originally a coal fired power plant. The plant has been retrofitted several times and today it is close to meet the target of being a totally CO<sub>2</sub> neutral power plant using only biomass for the combustion. In fact, it is one of the largest wood-chip fired power plants in Denmark.

In connection with the latest retrofit in 2009, Herringværket contacted Howden for an upgrade of the FD (forced draught) fan. The requirement was to get a fan with a higher pressure performance to match the future operation and at the same time be able to keep the existing motor of 900 kW.

## History

The original FD fan was delivered by Howden in 1981.

It was a single stage fan type ASN1848/1120N, speed of 1490 rpm with medium pressure blade profiles of aluminium and a cast hub. The Test Block volume was 118 m<sup>3</sup>/s and the Test Block pressure was 5825 Pa.

## The solution

Howden recommended replacing the old hub – diameter 1120 mm with a new and bigger hub – diameter 1250 mm and still keeping the existing impeller outer diameter.

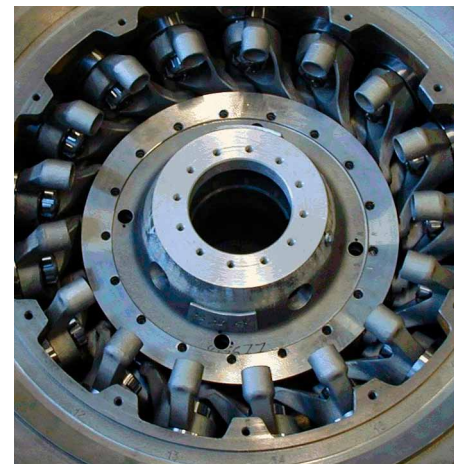
As the Test Block volume was almost unchanged, it was decided to keep the medium pressure blade solution (of course brand new blades were installed). The new hub size made it possible for the Test Block pressure to reach the demanded 7533 Pa.

In order to extend the lifetime of the fan, the new hub was fitted with oil lubricated blade bearings instead of the former grease lubricated ones. At the same time, the old grease lubricated main bearing assembly was upgraded to be oil sump lubricated in a special design, customised to the existing bearing pedestal.

Furthermore, fan regulation was upgraded from mechanical to hydraulic regulation, re-using both the hydraulic cylinder and the hydraulic oil unit from a VARIAX® ID fan replaced earlier.



Oil lubricated blade bearings



New and bigger hub



For further information on axial fan retrofit solutions please contact:

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**The result**

To ensure that all requirements concerning vibration were met while keeping the existing motor, Howden made a calculation check of the existing coupling.

Result: Both existing couplings and the main motor could be kept unchanged.

By reusing some of the existing fan components, the retrofit solution saved the customer \$947,000 when compared to the installation cost of a completely new fan. In addition, the downtime was reduced greatly minimizing the lost production time in excess of \$3 million.

In this case four different Howden retrofit solutions were offered to form a total retrofit package for our customer:

- New hub size
- Upgrade from grease to oil lubricated blade bearings
- Upgrade to oil lubricated main bearing assembly
- Upgrade from mechanical to hydraulic regulation.

Herningvaerket got a modern up-to-date fan and obtained extensive savings, by re-using foundation and casing:

- No demand for establishing a brand new foundation
- No demand for investing in a brand new fan and main motor
- Cut down on total erection time and minimum downtime
- Substantial price savings for the total project and on future service costs.

**Performance data**

Figure 1: Curve showing fan performance before and after retrofit

