

PULSATION STUDIES

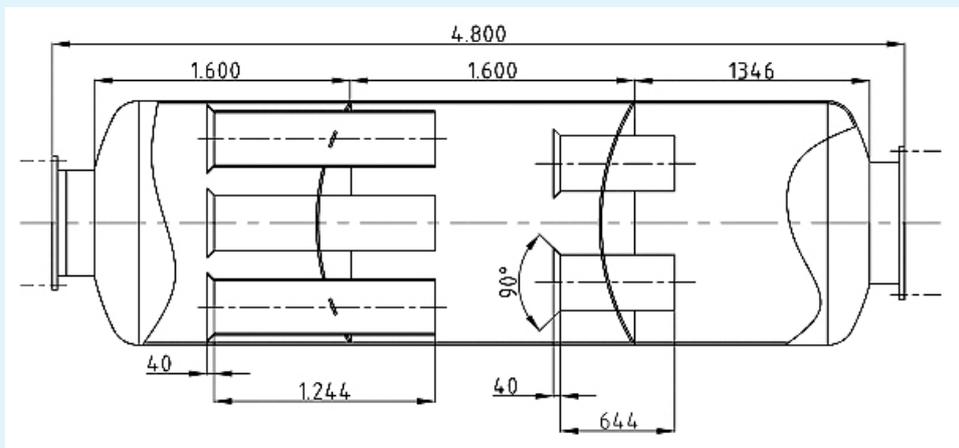
Design of a new pulsation damper for a root blower

In a steel manufacturing company in Southern Germany rotary piston compressors (root blowers) are used in the air separation unit. Increasing problems occurred in one compressor unit at the absorption silencer on discharge side. Repeatedly, it came to a „wash out“ of the absorptive material. The washed out material led to an increased pressure loss within the downstream cooler so that from time to time the plant had to be shut down for cleaning.

Based on a measurement on-site of the current pulsation situation, the installation of an adjusted reflection silencer was recommended to the customer. KÖTTER Consulting Engineers was charged with the design and production of such a pulsation damper. At the same time, the performance data of the absorber had to meet quite high requirements. For an operation flow rate of about 37,000 m³/h the existing transmission loss (Dd) of the absorption silencer up to 500 Hz as well as the geometric dimension of the existing damper should be kept. The maximum pressure loss should not exceed 60 mbar.

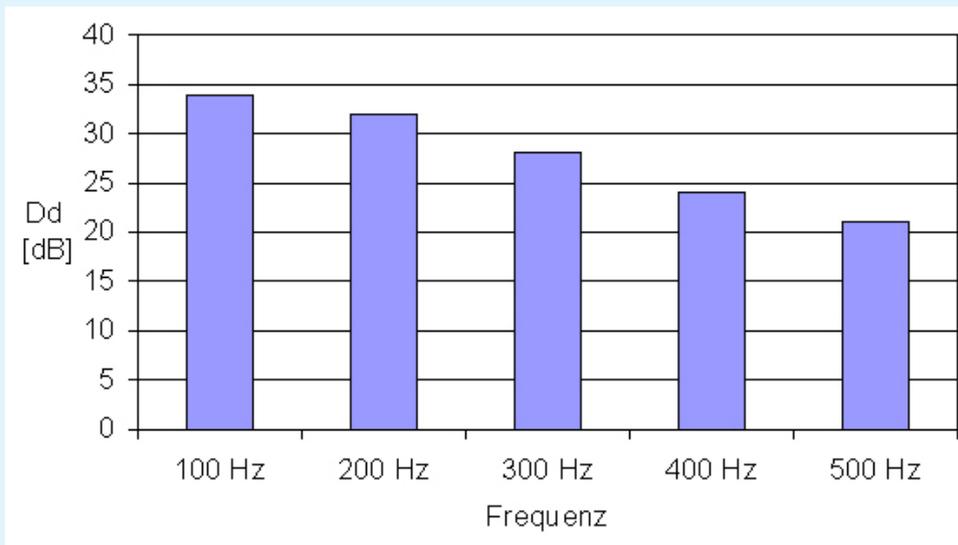
An acoustic model of the silencer was built up. To obtain a high degree of damping at the emission frequencies of the root blower and its multiples (100 Hz, 200 Hz, 300 Hz, 400 Hz), a silencer with three chambers and eight symmetric connecting pipes (choke tubes) was designed by means of numerical simulations (fig. 1).

The damper was manufactured and delivered within eight weeks. After commissioning, measurements were carried out to check the additional acoustic effect of the new silencer. The results confirmed the very good transmission loss (Dd) in the decisive pulsation frequencies (fig. 2). At the same time, the given maximum pressure loss could be kept.



Engineering drawing of the reflection silencer

PULSATION STUDIES



Measured transmission loss of the new reflection silencer



Contact:

Dr.-Ing. Johann Lenz
Telephone: +49 5971 9710-47
j.lenz@koetter-consulting.com