

MACHINE DYNAMICS

## Vibration reduction on cruise liners

On a new cruise liner (figure 1) excessive vibrations occurred at one of the three electric motors/rotary pumps, all identical in construction. The vibrations were noticeable in a large area of the ship and exceeded the guideline values. Goal of the measurement carried out by KCE was to reveal the cause of the vibrations and to detect the mechanism responsible for this effect. Therefore, vibration velocity, rotational speed, and absolute pressure at the suction and discharge side of the pump were measured on two electric motors/rotary pumps. The following effect could be discovered:

- excessive vibrations, mainly on the motor in vertical direction
- a tilting movement in the rotary frequency appeared on the direct axis of the motor
- During the warm-up period the amplitude of the vibrations multiplied by 2.5.

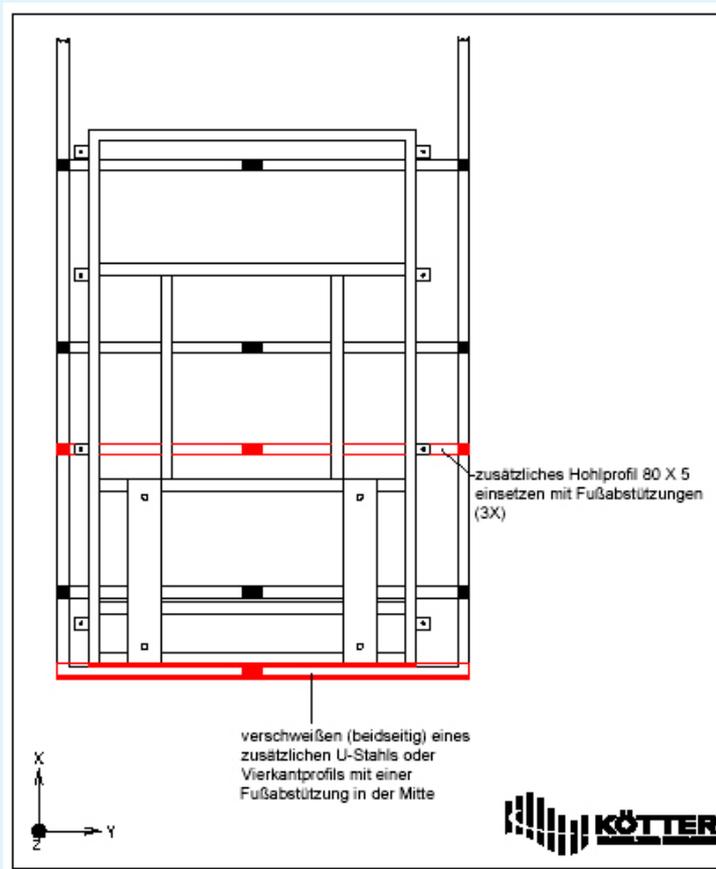
On the one hand, these excessive vibrations were caused by a vibration excitation due to the imbalance of the motor, increased by an additional thermal imbalance. On the other hand, an insufficient stiffness of the steel construction of the motor fastening was detected.

To reduce the vibrations, an additional U-profile and support structure to stiffen the steel construction were implemented. The customer's control measurement approved the success of these actions. Vertical vibrations were reduced by a factor of 4 so that an additional balancing of the motor under load was not necessary.



View of cruise liner "Aurora"

MACHINE DYNAMICS



Solution: Stabilising the skid frame



**Contact:**

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