

Q&A

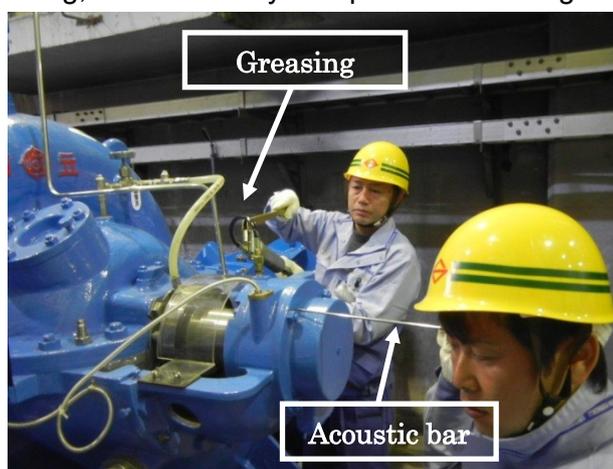
32Q1: Recently a pump has strange noise. Tell me what possibly cause the sound and how we can deal with them. (T.M. Vietnam)

A: Pump is the most used equipment in a water supply system, and malfunction of pump causes water suspension. Therefore, proper maintenance of pumps is important. Strange noise of pump is possible to be caused by various reasons; abnormal noise from a bearing or cavitation occurring.

1. Noise from bearing

[Reasons] First of all, check if the noise comes from a bearing. There are many reasons for the noise such as lack of grease, something stuck inside, and unlevelled-centering at a coupling.

[Measures] The small abnormal noise may be solved by greasing a little. It is advised that grease should be added little by little in several times so that the grease can fit properly, because too much grease can cause heat generation. When greasing, it is recommended to check change of the abnormal noise by using an acoustic bar. A screwdriver can be also used instead of an acoustic bar. If the abnormal noise is big and not solved by greasing, it is necessary to replace the bearing.



Noise check of bearing by an acoustic bar



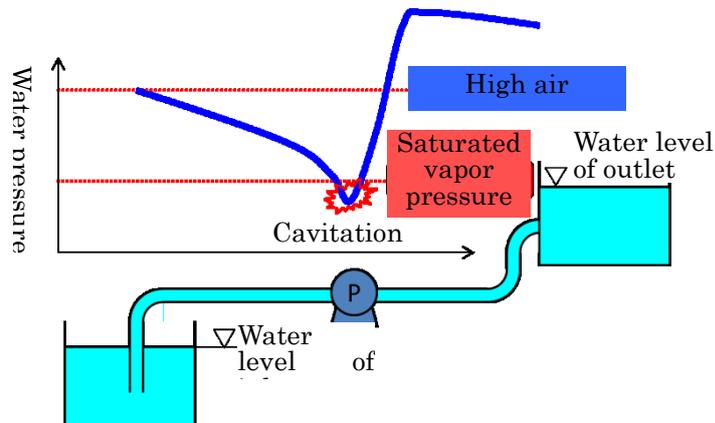
An acoustic bar

Unlevelled-centering at coupling causes abnormal vibration of pump and results in shortening lifetime of the bearing extremely; therefore, it is necessary to adjust centering of coupling surely. In both measures, the staff must work close to a rotating

body, so it is necessary to work carefully to prevent an accident getting working clothes in.

2. Cavitation

[Reasons] "Cavitation" is "a phenomenon that formation of vapor cavities in a liquid which is generated by reduction of pressure in a liquid flowing with high velocity", in other words, a kind of boiling phenomenon occurring locally at the point where pressure of the liquid falls below its saturated vapor pressure; such as surface of an impeller.



Concept: Generation of cavitation

The bubbles are repeatedly generated at the points where liquid flows with high velocity and low pressure such as an inlet port of impeller and crashed (vanished) when reached to the points where liquid flows with higher pressure. And the crashes of bubbles cause a big shock (abnormal noise or vibration). If the crash occurs near a solid surface, it incurs "erosion" on the solid surface that is a phenomenon which destroys a metal. The cavitation is mainly caused by pump operation exceeding flow volume of its capacity, which leads to cavities near impellers and damages and holes on the impellers; consequently, it shortens the lifetime of the pump seriously.

I have an experience of cavitation. The cavitation occurred because the pumps were operated exceeding their capacity, because of increasing the intake volume due to expansion of a water treatment plant.

[Measures] The preventive measures against the cavitation are as follows:

1) Set water level of inlet (suction) of the pump as high as possible so as to reduce negative pressure at the suction point.

e.g.) Dam up a river to raise its water level (for intake pump). Raise a water level of a reservoir (for distribution pump).

2) Set head-loss of the suction pipe as small as possible so as to reduce negative

pressure at the suction point.

e.g.) Set a diameter of a suction pipe as large as possible. Avoid using a bend pipe for a suction pipe. Keep a valve at the suction point open fully.

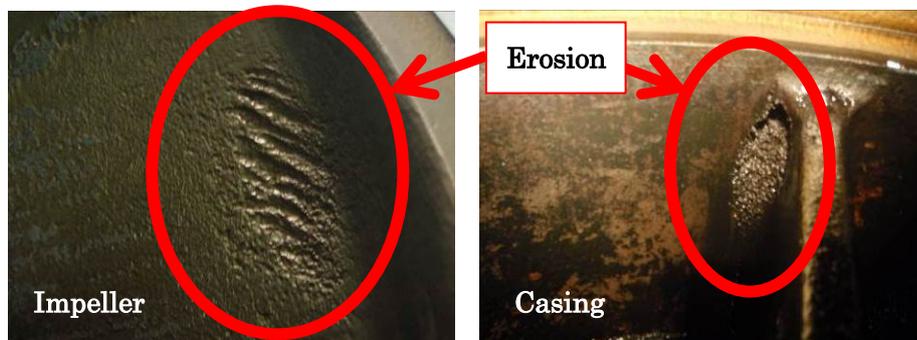
e.g.) Reduce a revolving number of the pump. Control the outlet valve to close.

3) Cavitation occurs when a pump is operated exceeding its minimum or maximum flow capacity, therefore, operating flow range of the pump should be surely confirmed at the time of its design to install.

(Answerer: Mr. ONO Yoshinobu, Yokohama Waterworks Bureau, 2013)



Case 1: Erosion by cavitation (holes on pump casing)



Case 2: Erosion by cavitation