Vibrations and vacuum stability in milking equipment

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Lately, the number of large and complex milking systems installed in practice has increased. Farmers make major investments hoping that the new milking system will reduce labour requirements and improve milk quality. Despite the fact that the installation of such milking systems is carried out according to the ISO norm 5707, problems relating to milking and the health of the mammary glands of the animals have occurred. For this reason, we launched a project with the following aims:

- Work out measuring techniques and determine assessment criteria
- Identify the causes for the malfunction of the milking systems and work out measures to eliminate them
- Verify the impacts of the measures taken
- Work out a diagnostic method suitable for practical application
- Work out recommendations for the practice

Vibrations on the construction of the milking parlour

First investigations have shown that incorrect installation (unintended and unknown) can cause vibrations on different surfaces (construction) of the milking parlour, which may be transferred to the animals.

With regard to human beings, the ISO norm 2631-1 indicates that a vibration intensity varying between 0,8 m/s^2 and 1,6 m/s^2 is considered to be unpleasant.

In our numerous investigations, we measured the following values *inter alia*:

- Outlet of the receiver 9,7 m/s^2
- Neck bar 6,2 m/s^2
- Construction of the milking parlour 3,9 m/s^2
- Dung channel 6,1 m/s^2

We assume that cows are at least as sensitive to vibrations as human beings. Therefore, it is obvious that, given the above mentioned values, the cows do not like to be milked in the milking parlour or that they do not release all their milk.

Figure 1 shows how vibrations can be reduced by modifying the installation.

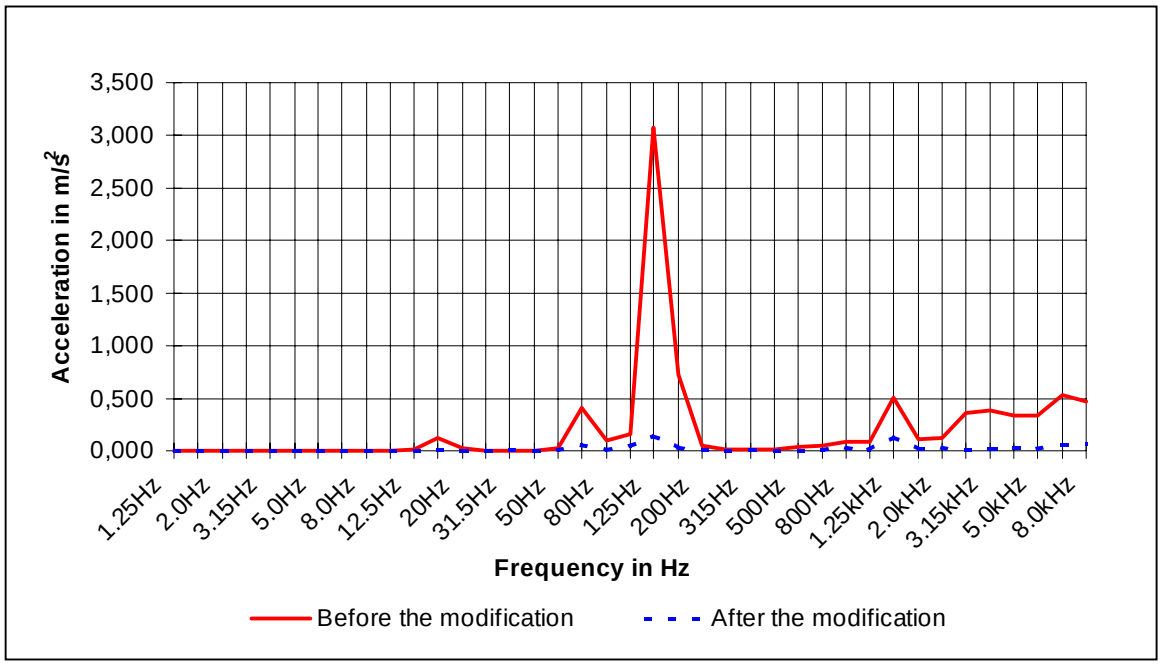


Figure 1. Vibrations measured in the milkline.

Transfer of the vibrations to the vacuum system

The major aim of every milking system is to reach a stable vacuum from the air pipe to the claw and the top of the teat. The vibrations of the construction of the milking parlour are also transferred to the vacuum system and intensified by wrong installation or additional devices (pulsator, regulator valve). Figure 2 and 3 illustrate the impacts of the technical modifications on the vacuum stability in the air pipe and the milk line respectively.

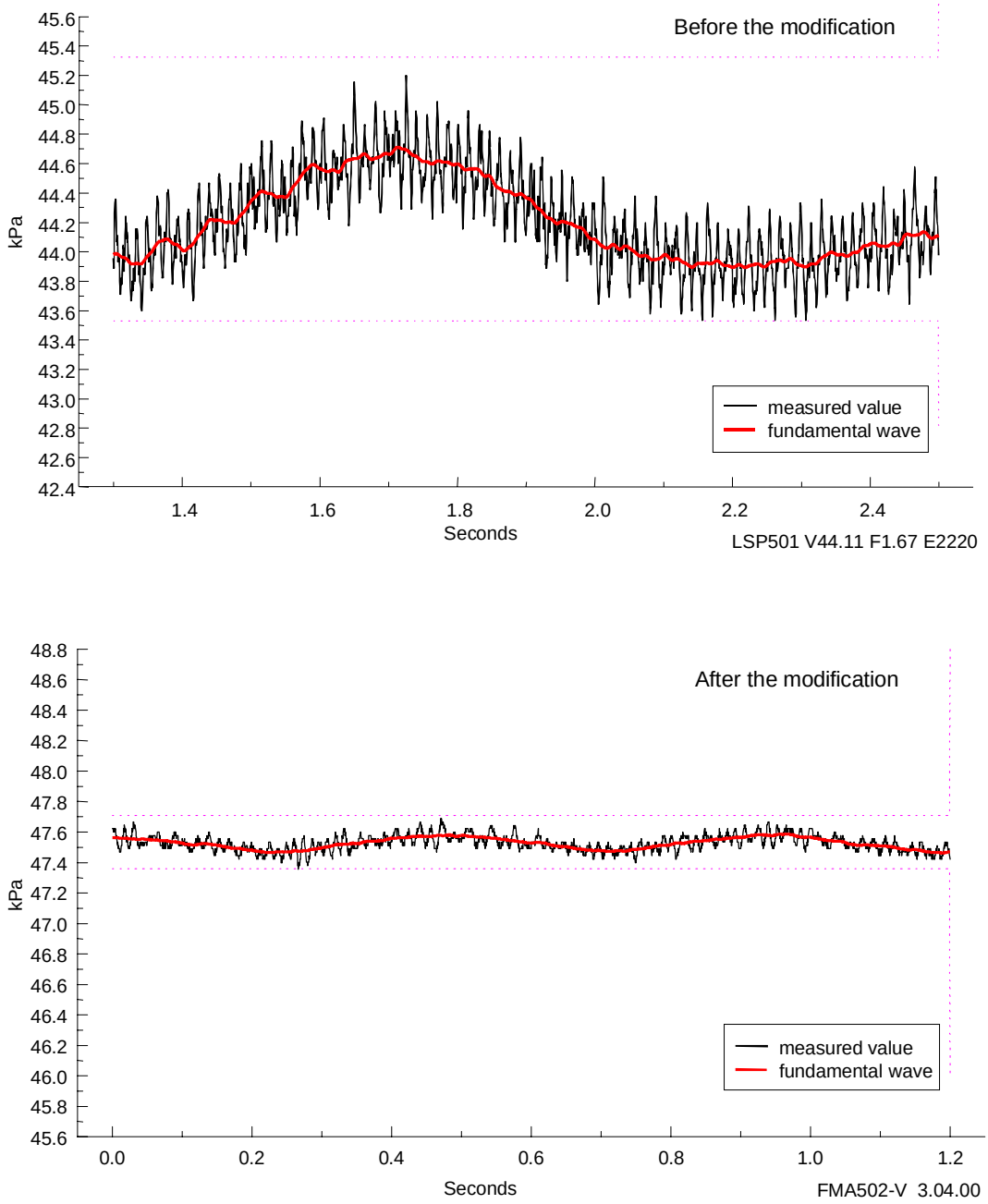
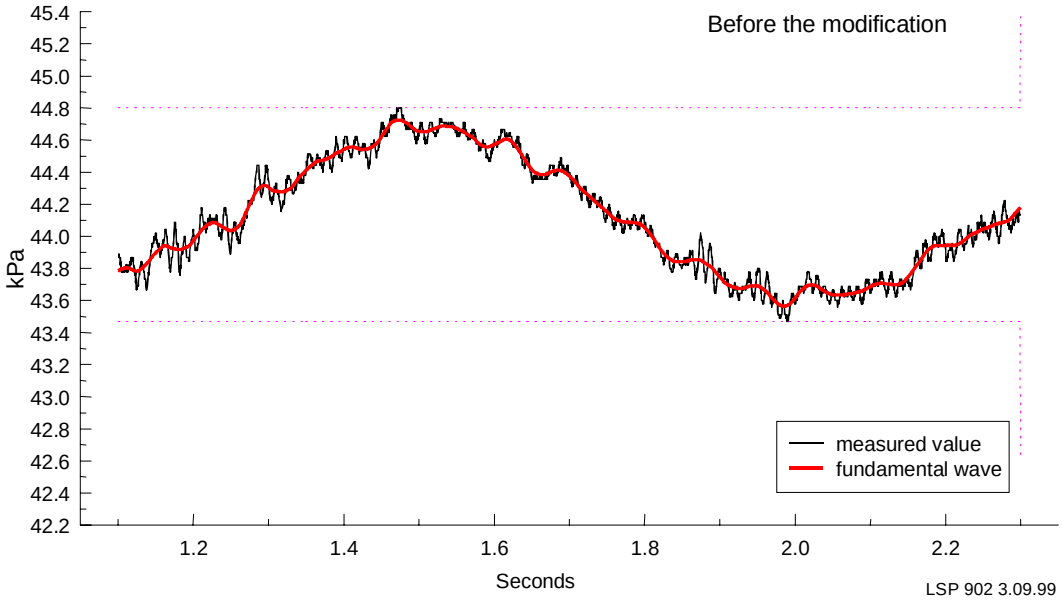


Figure 2. Vacuum stability in the air pipe before and after the modification.



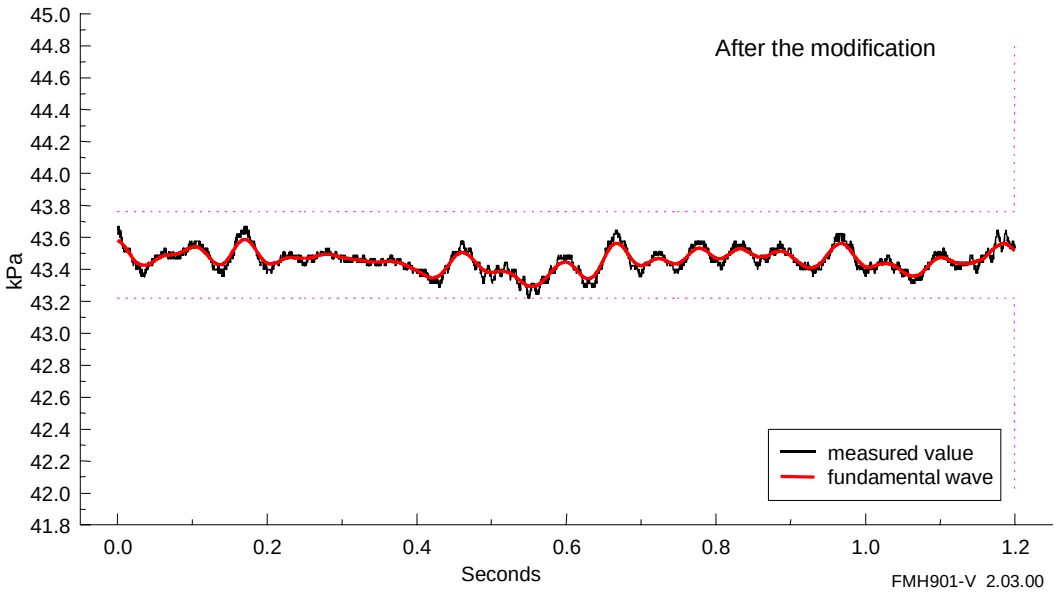


Figure 3. Vacuum stability in the milkline before and after the modification.

Conclusions

In case of problems with milking and the health of the mammary glands, it is particularly important to answer the following questions:

- Do the vibrations transferred to the cows cause discomfort to the animals?
- Are the vibrations also transferred to the vacuum system ?
- Does wrong installation cause problems with regard to the milk flow or fluctuations in the vacuum system ?

On the basis of the answers to these questions, it will be possible to work out measures and to proceed to a stepwise modification of the installation.