

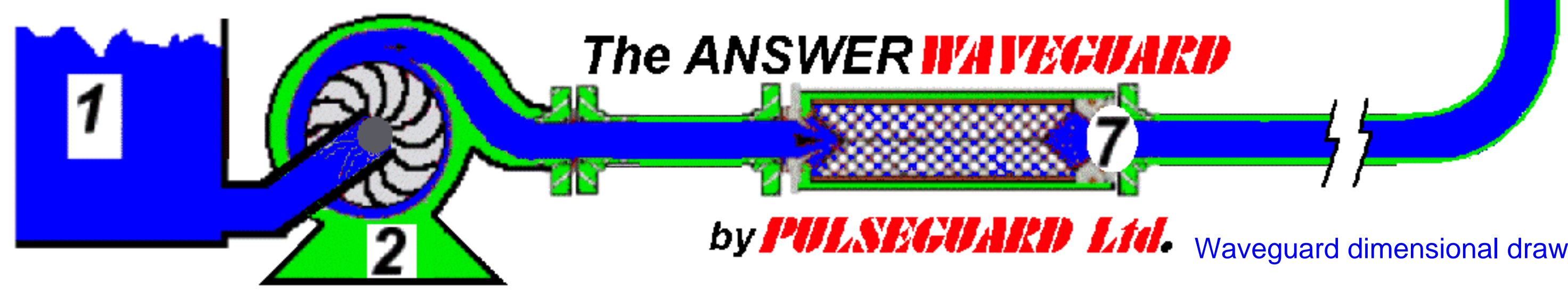
# PREVENT SYSTEM FREQUENCY RESPONSE INDUCED SHAFT VIBRATION Resonant pump shaft deflection PULSATION



This 3.222 Hz major frequency plot is formed by a continuous fluctuation at 29 Hz. which is be seen by magnification

## HOW DOES THIS HAPPEN ?

A common occurrence is, for a natural wave speed frequency of one of the lengths of pipe to reflect or "return", the pressure wave to the pump at a frequency which coincides with the frequency at which the pump shaft will deflect, or bend, or move slightly in its bearings, so that vibration then begins. The small shaft movement, changes the distance from the impellers to the housing, and pressure fluctuations result. The fluctuations are amplified by the returning waves. Very soon the pipe system is suffering from heavy pulsation.



The answer is to decouple the pump from the pipe "acoustically" with a **PULSEGUARD Ltd / Inc. WAVEGUARD**, a no moving parts pulsation dampener.

**LIQUID DYNAMICS International Ltd.** offer analytical and modelling services. They predict these and similar problems, before pipe systems are built. When your pipes already exist, it is less expensive to install a WAVEGUARD than to stand the cost of acoustic diagnostics, analysis and modelling.

## ABOUT FREQUENCIES

Excitational frequencies, from the pressure wave speed or "acoustic velocity", not only depend on the exact lengths of all pipe nodes in the system, but also on the effective compressibility of the system. "Effective", combines pipe wall elasticity and liquid compressibility with entrained & absorbed gasses. All of which change with Temperature.

Many analysis ranges will be needed unless temperature, gas absorbtion, and entrainment remain constant. It is nearly always less expensive to prevent a pressure disturbance with one of our "alleviators", than to make "acoustic" models.

**SHOCKGUARD**<sup>®</sup>  
Shock prevention for pipeline systems.

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