



ENGINEERING

SITE REPORT

“ PAROLA “ PUMPING STATION

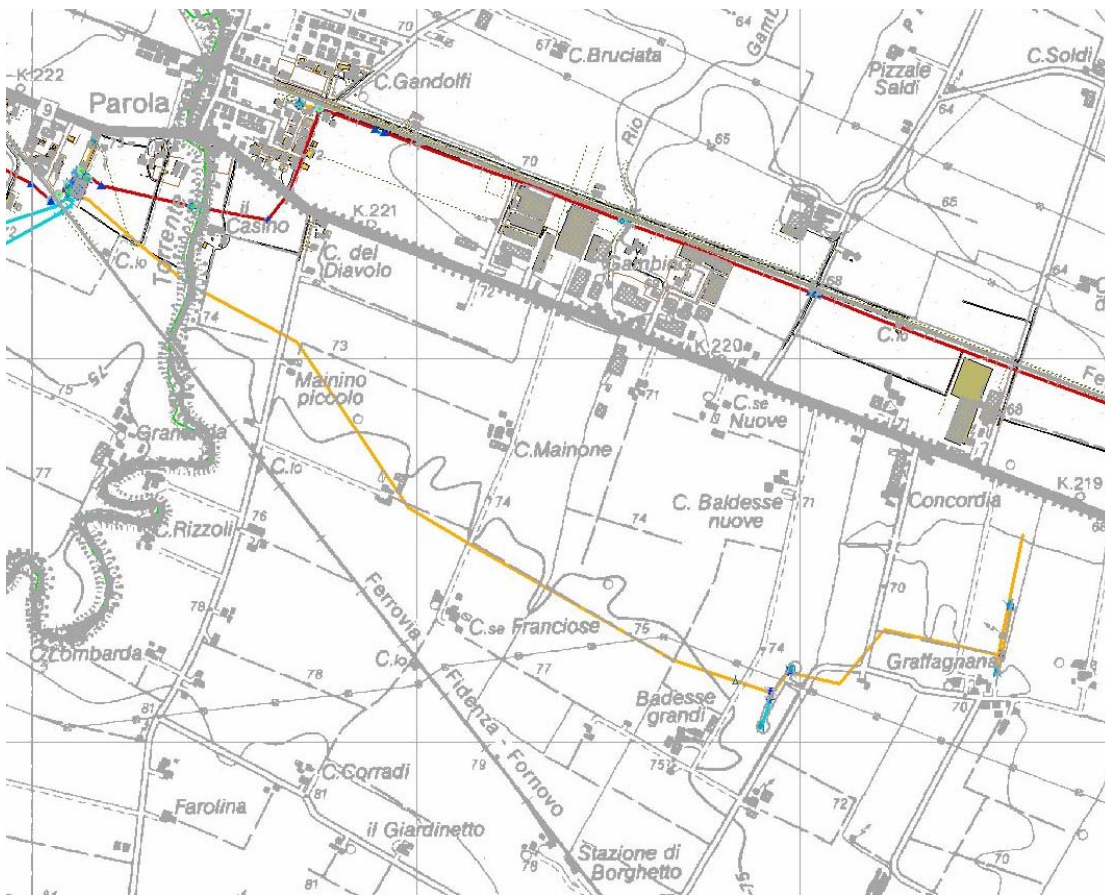
FOX AS performance

This technical paper aims at emphasizing the importance of air valves AS (Anti Shock) in case of abrupt pump failure of a low head pumping station. These valves represent a special application of standard air valves and are provided with a device to control the air discharge avoiding sudden closures.

The system

Parola Pumping station, Fidenza (PR) Italy

One sub pump for clean water , Kw32 , working conditions 45 l/sec with 49 m head, the level of water was pretty deep, according to the latest data the static was -25 m and the dynamic – 36 m
We have a manifold in cement of 450 mm ND, 3000 mt. long, supplied by 4 deep wells bringing water to Parola (the yellow line depicted below)



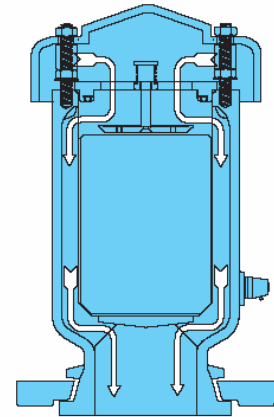
(courtesy of ASCAA, Parma)

The problem

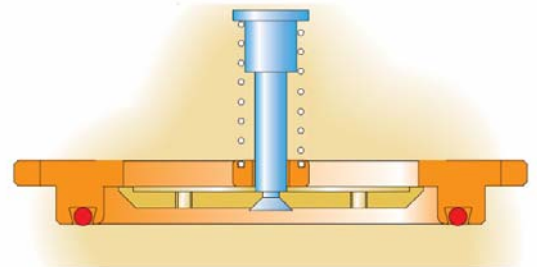
Even though the profile was sort of horizontal towards the downstream boundary condition, due to the low pump's head the pumping station was registering loud vibrations consequent to pump failure or sudden stop, followed by sudden stress and pressure surges.

This event, which occurred frequently, was considered one of the main causes of the system malfunctioning along with the check valve damage (an inspection discovered a leakage through the check valve). Clearly the pump failure was generating negative pressure followed by overpressure, the solution was devised using a special air valve CSA series FOX DN 80 NP 16, provided with an AS mechanism.

Thanks to its design, this equipment allows the entrance of large quantities of air during negative pressure phases to prevent the pressure from dropping below the atmospheric value. The air discharge is then controlled by means of adjustable nozzles, obtained inside the metallic AS flat, and computed carrying out numerical simulations on case studies to optimize the air valve reaction in terms of surges and frequency of waves dampening.



1 Entrance of large amount of air



2 Controlled discharge

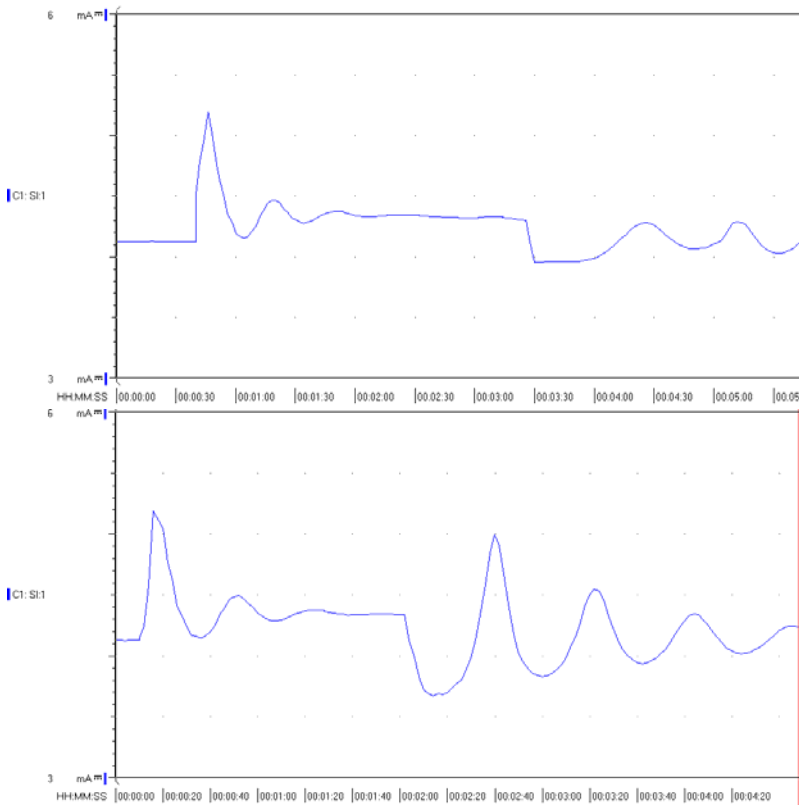
(courtesy of ASCAA, Parma)

Pressure measurements were carried out, before and after installing the air valve, thanks to a high frequency data logger METRAhit 1229S from GOSSEN Metrawatt connected to a pressure transducer.

Everything was recorded on a laptop and converted in pressure and seconds. The data logger output was in mA, respectively with a range o 4-20 mA where 4 corresponds to 0 bar and 20 to 25 bar.



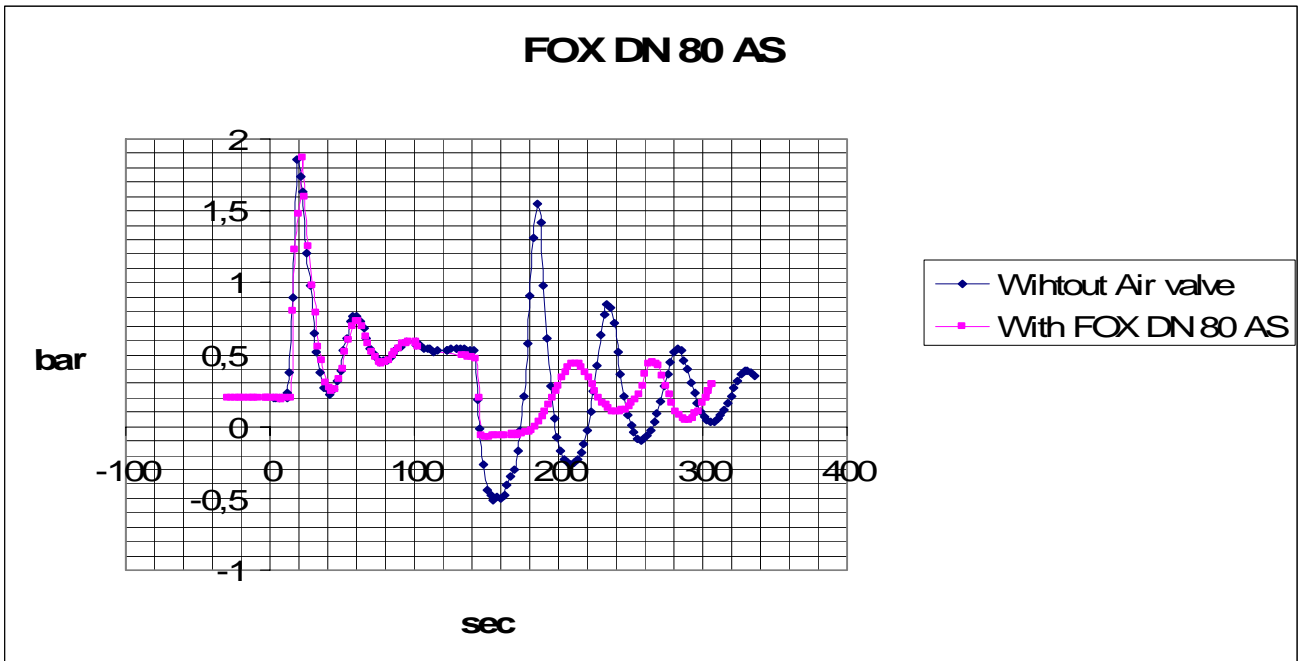
We will attach the plots out of the instrument before being converted



Graph 1) produced by the measurement in presence of FOX DN 80 AS with a scale between 3 and 6 mA

Graph 2) yielded by the measurement without any protection with a scale between 3 and 6 mA

As follows the two plots after being converted and adjusted on a time scale, it is evident how the air valve is protecting the system against negative pressure and surges.



Solution

With FOX DN 80 AS the system reaction to the pump failure was definitely improved, in fact the valve was opening in presence of negative pressure (as shown in the graph below) to control the air discharge with a soft spikes dampening.