

## Flow Computing Easier with less Hardware - Virtual Flow Computing

In 1995 KROHNE Oil & Gas decided to develop a flow computer software platform for fiscal and allocation metering skids for oil and gas applications. The existing flow computers in the market offered insufficient flexibility and calculation power required for this high end market. This computer software platform formed the basis for the flow computer application builder. Over the following 10 years the software was continuously improved, and was used to enhance subsequent hardware generations. While flow computer manufacturers continued to develop hardware, KROHNE focussed on software and making the hardware superfluous. The virtual flow computer was born, but the market at that time was not yet ready for virtual technology. In the mean time, standard pc-based flow computer technology has become an accepted solution in the market for allocation metering and multi-path metering. In some regions, for example in the North Sea, it has also become accepted for fiscal and custody transfer metering.

The development of the virtual flow computer opened the door for a whole new range of applications with respect to online calculations. An example is the exploitation of smaller fields. The verification of wet gas metering systems integrated with reservoir engineering and flash calculation software opens up new opportunities. International regulations in the gas market led to the need for more transparent and traceable field data. In addition there are increased opportunities for diagnostics with liquid and gas ultrasonic and mass flow meters.

The virtual flow computer software can run on any industrial computer and in principle can handle a virtually unlimited number of meter streams (256). It allows instant building of the application by simply adding building blocks from a library. The embedded computer concept enables complex modelling calculations online by fast processor power. Simultaneously, it fulfils the requirement for instant data availability using standard communication protocols and storage methods. Basically all types of field inputs can be connected like 4-20 mA, pulse, serial links, OPC link to DCS, and field bus.

KROHNE initiated the trend away from hardware solutions to interoperable software solutions. Virtual flow computers can be accessed via internet. Upgrading, adding additional streams, networking, creating redundancy, are all possible online. One computer for all streams means no hardware variations, simple universal programming, and minimal spare parts.

Numerous virtual flow computers have been installed in the field. In one of these applications a single virtual flow computer is handling 60 meter streams in a North Sea Offshore environment.

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