

# Sensus Metering Systems

Developing a new  
water meter register



Sensus Metering Systems is the world's leading water meter manufacturer, producing a full range of positive displacement, multi-jet, single-jet, turbine and speciality meters. Sensus has also led the industry in the development of automatic meter reading (AMR) systems that help utilities to improve efficiency when collecting meter data. However, the company was finding it difficult to apply their AMR encoder register to the multi-jet and single-jet meters in their product range, as these meters could not provide the torque required to drive the existing mechanical encoder registers.

Our expertise in sensing technologies allowed us to develop a new encoder register solution for Sensus which was compatible with the full range of meters delivered worldwide. The new register also incorporated twice as many reader wheels for nearly the same cost as the old encoder technology.

When considering our approach to the problem, we appraised various possibilities before deciding on a noncontact magnetic / inductive solution, which used our own patented technology. In this approach, each odometer wheel in the meter contains a tiny inductor and capacitor forming a LC resonator, with each wheel in the register resonating at a different frequency. A transmitter coil and a pair of orthogonal receiver coils are wound around the reader wheel assembly; the transmitter coil then energises each LC resonator in turn, and the receiver coils detect the re-radiated fields. The ratio of the two signals gives the rotational position of the wheel. This process is

repeated for each of the odometer wheels in the register, and the complete odometer reading is passed onto the AMR communications system.

Having demonstrated the technical feasibility of this approach, and shown that it could meet Sensus' cost targets, we then went on to design the complete encoder register. This posed many challenges, including the development of low-cost resonators of appropriate quality, a simplified mechanical design of the register assembly and a custom made, mixed signal low-power CMOS ASIC.

We also worked with Sensus on the manufacturing strategy, before setting up high-volume production in Malaysia. This required a significant investment in special purpose production equipment, to wind the coils and assemble the readers, and specially designed automated test equipment. Following a smooth production launch, the new encoder register is now in mass production (more than 1 million units per year), giving better performance for lower cost and opening up significant new markets for Sensus.

Our expertise in sensor technology, combined with our structured approach to innovation, enabled us to invent and develop a valuable new solution to a complex and difficult sensing problem. Our product design, electronics and engineering skills, together with manufacturing expertise, also meant we could quickly develop the new product and get it into production worldwide.