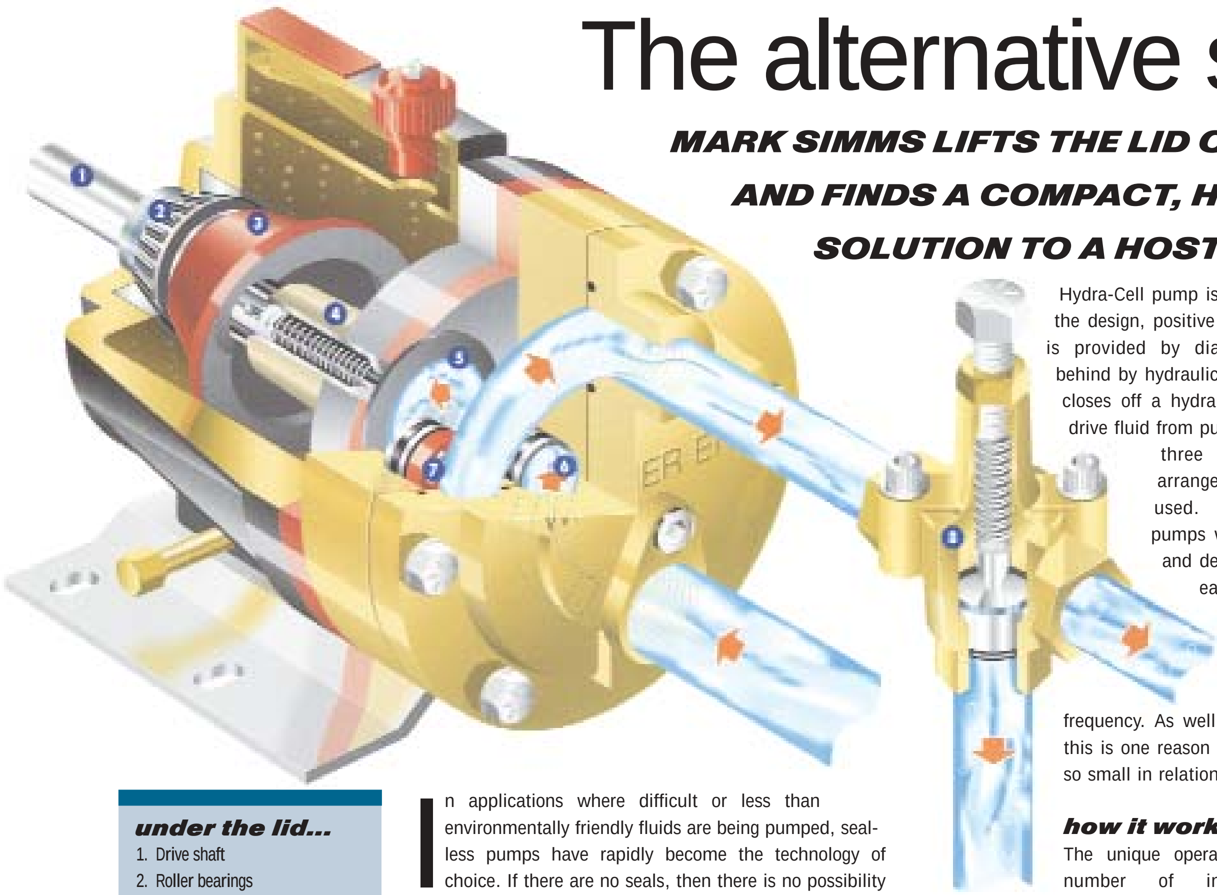
# The alternative seal-less technology

**MARK SIMMS LIFTS THE LID ON WANNER'S HYDRA-CELL SEAL-LESS PUMP AND FINDS A COMPACT, HIGHLY EFFICIENT AND HIGHLY RELIABLE SOLUTION TO A HOST OF APPLICATION PROBLEMS**



### under the lid...

1. Drive shaft
2. Roller bearings
3. Fixed angle cam
4. Oil filled pistons
5. Diaphragm
6. Inlet valve assembly
7. Outlet valve assembly
8. Pressure regulating valve

Hydra-Cell pumps are built to handle the "miserable" fluids that destroy other pumps. These pumps are tough enough to get the job done without the constant worry about pump failure and repairs

In applications where difficult or less than environmentally friendly fluids are being pumped, seal-less pumps have rapidly become the technology of choice. If there are no seals, then there is no possibility of seal wear and the associated concerns over seal replacement costs – perhaps even replacement of the whole pump – and the effects of any possible leakage.

If a seal-less design is what you're after, there are a number of options, but one that is steadily gaining in popularity is the Hydra-Cell pump. Manufactured by Wanner, this design does not readily slot into any of the standard pump categories: it is a unique design, with an equally unique and thoroughly compelling list of advantages. Indeed, where the flow requirement is relatively modest, the Hydra-Cell offers an interesting alternative not only to bigger diaphragm pumps, but to many other types of sealed and seal-less pump. Compared to alternative technologies offering a similar flow, the Hydra-Cell pump is extremely compact. In the design, positive displacement pumping is provided by diaphragms flexed from behind by hydraulic fluid. Each diaphragm closes off a hydraulic cell and separates drive fluid from pumped fluid. Single cell, three cell and five cell arrangements are commonly used. Unlike conventional pumps which are slow moving and deliver a large volume on each stroke, Hydra-Cell pumps work at high speed, delivering a small volume from each cell but at high frequency. As well as reducing pulsation, this is one reason why the pumps can be so small in relation to flow capacity.

### how it works

The unique operating principle offers a number of inherent performance advantages. So how does it work? The drive shaft (1) is rigidly held in the pump housing by a large tapered roller bearing (2) at the rear of the shaft and a smaller bearing at the front of the shaft. Sandwiched between another pair of large bearings is a fixed-angle cam or wobble plate (3). As the drive shaft turns, the wobble plate moves, oscillating forward and back (converting axial motion into linear motion). This complete pumping mechanism is submerged in a lubricating oil bath.

The Hydra-Cell pistons (4) are moved sequentially by the wobble plate. The pistons are filled with oil on their rearward stroke. The oil held in the Hydra-Cell balances the back side of the diaphragms (5) and causes them to flex forward and back as the wobble plate moves, thus providing the pumping action. To provide long, trouble-free diaphragm life, the Hydra-Cell hydraulically balances the diaphragm over the pump's complete pressure range. The diaphragm actually faces only a 2psi pressure differential, no matter what pressure the fluid is being delivered at, even up to 2500psi.

Each diaphragm has its own pumping chamber which contains an inlet and outlet self-aligning check valve assembly (6). As the diaphragms move back, fluid enters the pump through one of the inlet check valves. On the forward stroke, the diaphragm forces this fluid out of the discharge check valve (7), and through the manifold common outlet. The diaphragms, equally spaced from one another, operate sequentially to provide constant, low-pulse flow. A Hydra-Cell pressure regulating valve (8) is typically installed on the outlet side of the pump to regulate the pressure of downstream processes or equipment.

The pumps are very efficient – typical operation is at or above 80% efficiency – and can be driven by electric, air or hydraulic motors. This allows system designers ultimate flexibility in selecting drives. And the high efficiency offers substantial energy savings to users over comparable pumps.

The pumps can also handle a wide range of liquids, whether hot, cold, thick or thin. There is high tolerance to solids in suspension and crystals, as well as tolerance to chemicals. And through the availability of optional materials for the pump head and for the diaphragms, designs can be tailored to match the particular fluid being pumped.

The most recent development of the Hydra-Cell technology is the Kel-Cell innovation which safeguards the diaphragm in the event of abnormal or fault conditions, which would cause the diaphragms to operate out of balance. Such faults may be caused, for example, by an inlet valve shut off, or a blocked inlet filter or inlet pipe, or by operating continually at zero outlet pressure – with the effect that the diaphragm gradually deforms and may eventually rupture. In all such conditions, the Kel-Cell system stabilises the diaphragms to prevent incidental failure – although it has to be said that this is not a substitute for good system design. "Nevertheless," comments Wanner UK managing director Dennis Heath, "it's a significant advance for the extra protection it gives, especially on critical applications."

The patented technology has already been incorporated into all 70bar rated pumps and into slurry-duty pumps. Other Hydra-Cell pumps will benefit in due course. Its introduction is certain to help the company further extend the range of applications for this unique pumping technology.

More information: Write in 265 on the card
or email: it.enquiry@itmagazine.uk.com