PRODUCTS & SERVICES

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Sounds great!

NOISE POLLUTION IS BECOMING AN EVERMORE PRESSING CONCERN – EVEN IN ELECTRIC FORKLIFTS, WHERE THE HYDRAULICS CAN BE A MAJOR SOURCE OF IRRITATION. IN WHICH CASE, THE ELIKA GEAR PUMP WILL BE MUSIC TO YOUR EARS

Noise pollution has become a major concern lately for both mobile and stationary industrial vehicle manufacturers. While noise emanating from off-highway machinery was once seen as a far less pressing concern than that of limiting harmful exhaust emissions, the European Union now has extensive legislation in place designed to reduce NVH (noise, vibration and harshness) and provide a much more comfortable environment for vehicle operators – not to mention anyone within hearing distance.

Low noise emissions from their industrial vehicles is therefore becoming an essential requirement for most operators and customers. There are two main approaches to noise reduction: the first is to take measures to attenuate NVH propagation by applying isolators and dampers to major noise and vibration sources. In addition to adding cost, weight and bulk to the final product, these palliative modifications are rarely 100% efficient as they are only effective under certain conditions, and only for certain frequencies.

The second, more efficient, approach is to tackle the problem at source, designing the machine to be as quiet as possible using low-noise technologies. The application of an alternative technology to lower the level of noise is normally the cheapest solution, giving the greatest acoustic results. This forward-looking approach may also offer substantial savings compared with the cost of fixing a problem after the event.

Gear pump noise has two distinct origins – mechanical and hydraulic. The mechanical noise is what can be expected from any pair of gears, and depends mainly on the level of precision and the surface finish of the gear wheels. The hydraulic noise is primarily generated by the trapping of fluid between the top and the bottom of the tooth. The pressure peaks that arise from entrapment of the fluid between the top and the bottom of the pump are a crucial problem for involute gear pumps. During the delivery phase, the fluid, being compressible, reaches very high pressure spikes causing, high noise, vibration, pressure ripple and mechanical stress.

ABOVE: **Elika low-noise Marzocchi gear pumps series**
RIGHT: **Elika pump helical gear tooth profile**
BELOW: **Tailift ZFBT18 electric forklift truck**

Taiwanese treat

Established in 1973, Tailift, a well-known material handling equipment manufacturer, was awarded the 2011 Taiwan Excellence Award for its leading-edge Z2000 three-wheel electric forklift truck range. The award was given in recognition of the company's outstanding performance in R&D innovation, design uniqueness, quality systems and global marketing.

Tailift's electric forklift trucks offer all the benefits associated with using electric technology, providing top performance levels and long operating times. No harmful emissions are produced, there is greater energy efficiency compared with IC engines, running costs are lower and, now, there are also fewer vibrations and reduced noise.

That is because the OEM has improved its new products using Marzocchi's quiet and efficient Elika gear pump. Tailift's Z Series trucks combine high performance with good environmental credentials, offering the operator excellent comfort and ergonomic safety, and above all, real value. The adoption of full AC technology enables great performance, whether for indoor or outdoor use. The full range includes three- and four-wheel models, in 48V and 80V sizes. Capacities range from 3,000 to 6,000 lb.

Elika pumps can operate efficiently and quietly in a wide speed range, from under 500rpm to over 3,500rpm, making these pumps the ideal solution for designers of many electric vehicles, as well as lifting and material handling equipment and electric aerial work platforms. The use of the Elika gear pump eliminates adverse noise effects on humans and the surrounding environment, reducing the noise level by an average of 15dB(A) compared with a conventional external gear pump.

The study of the Marzocchi tooth profile was conducted in collaboration with the Faculty of Engineering of Bologna University, as a result of the generation of a dedicated design software. The experiments carried out led to the definition of a specific tooth profile capable of obtaining excellent acoustic performances even at high pressures.

However, to be able to engage a pair of toothed wheels without encapsulation requires an enormous concerted effort as any errors in profile would immediately lead to a great deal of noise, interference and poor reliability – but fortunately, the development of tooth-grinding technology makes the economical production of high-precision toothed wheels possible.

The helical toothing ensures the continuity of motion despite the low number of teeth – a feature that greatly reduces the fundamental frequencies of the pump noise, making the sound much more pleasant. In this way it was possible to minimize both the pressure oscillations and their frequency. Without encapsulation, the particular shape of the profile considerably reduces pressure oscillations and vibrations produced by the pump and transmitted to the other components, reducing the noise of the hydraulic system.

Tailift Z2000 electric forklift truck

The pump structure also minimizes the internal leakage, maximizing volumetric efficiency under all conditions. This feature makes the Marzocchi Elika pump suitable for work operations with low speed and high pressure. Internal leakage in hydraulic circuits is a major cause of pump components overheating, but this is virtually eliminated in the Elika pumps. The very low noise level being generated by these pumps makes this product particularly suitable for those applications where screw pumps, vane pumps or internal gear pumps would traditionally be used.

The Elika pumps are available in displacements between 7-200cc/rev, with three main families: ELI2 includes pumps with displacement from 7-35cc/rev; ELI3 series are available with displacement from 20-87cc/rev; and the biggest family, ELI4, with up to 200cc/rev. They also available in configurations with multiple stages. The maximum operating pressures are similar to those of Marzocchi's GHP series and extends up to 300 bar. The simple construction, small size and high performance make the new Elika product extremely competitive. **ALT**

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