

# Marzocchi's Erika Leads a "Silent" Revolution in the Automotive Sector

Marzocchi Pompe has been for the past 50 years a leader supplier of Gear Pumps in the industrial and off-highway mobile applications. Maybe not everybody knows that it is also a key player in the on-highway Automotive Sector.

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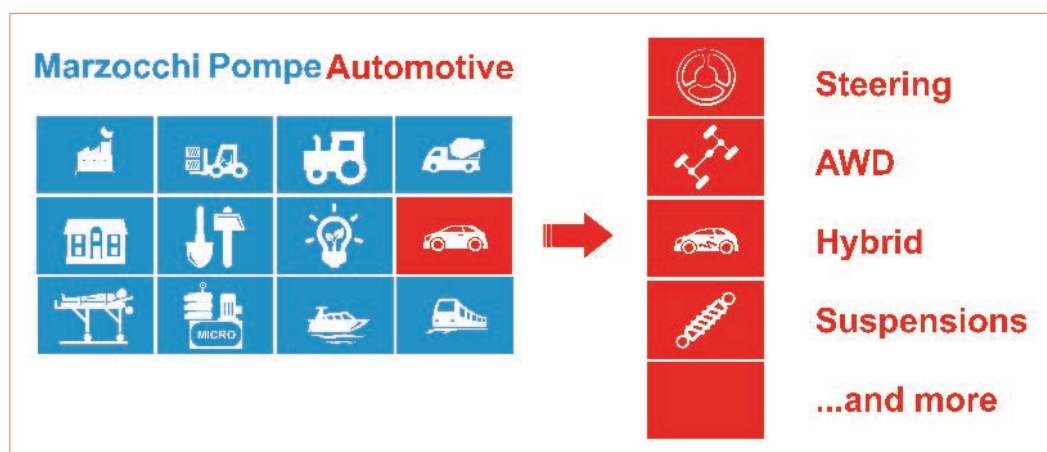


Figure 1  
Applications of E05 Pumps family

Gear pumps are volumetric machines widely used in hydraulic system design since a long time mainly because of their unbeatable cost/efficiencies ratio and for their simple **construction** and **compactness**.

**Marzocchi Pompe** is the manufacturer with the **broadest range of displacement** reaching as low as **0,12 cc/rev** and up to **200 cc/rev**.

The top characteristics of quality, reliability of the **Marzocchi** products allowed the Company to gain an interesting share in the **Automotive Market**, where the most suitable range of displacement goes from **0,12 cc/rev** and up to **8 cc/rev** which is widely appreciated in all those applications where a **mini powerpack** is required.

The pumps are designed specifically to be part of the **electro-hydraulic system** to generate a flow of pressurized oil in a controlled manner to drive the "actuators" required in most of the above-mentioned systems.

Standard application of **Marzocchi Pompe** products are easily requiring up to 300 bars while the limited operating pressure of the automotive application, generally up to 80 - 100 bars, has allowed design and process engineers to introduce several design and process **optimization** with the goal on one side to maintain and even enhance very high performances specifically in terms of **efficiencies and noise and reducing** overall sizes as well, and on the other side decreasing the manufacturing costs also with the adequate level of automatization of the production and assembly of the units.

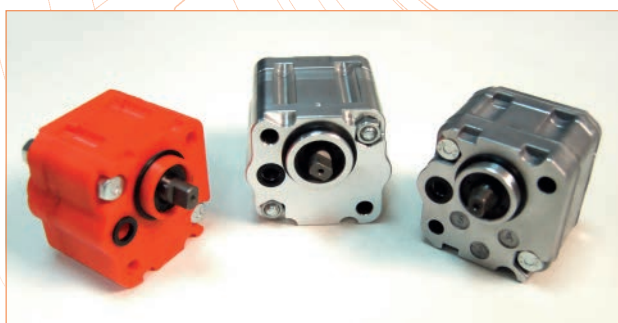


Figure 2 Evolution of E05 Pumps family

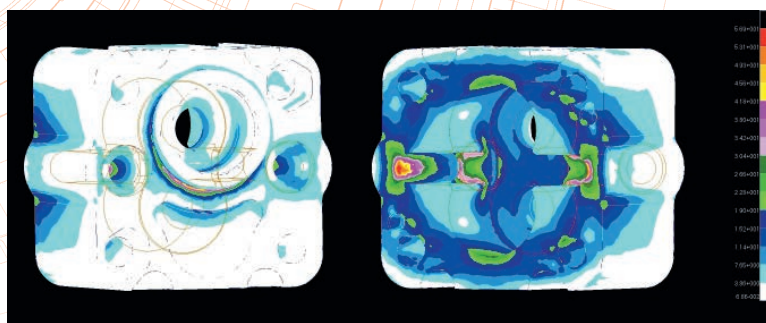


Figure 3 Structural Analysis of E05 body pump

The automotive family of **E05 Pumps** has been specifically designed to be integrated into assemblies of **automatic transmissions, semi-automatic clutches, electro-hydraulic power steering, AWD systems, assistance in hybrid-type of propulsion, suspensions' systems, trucks rear-steering etc.** The main parts of the pump, before being physically built, have been subjected to structural verification through **FEA simulations**, in order to check in advance, the structure of the pump subject to the stresses of work and also to verify the behavior during the most critical stages of the manufacturing process.

Despite their small size, **E05 Pumps**, depending on the application characteristics, can be internally **mono or bi-compensated**, the compensation system must always maintain the compensation plates in contact with the gears ensuring in all operating conditions, a **drastic reduction of internal leakage**, adequate lubrication of the moving parts and excellent volumetric and mechanical efficiency. Synthetic oils used in the automotive industry generally have a low viscosity, as it must maintain adequate fluidity even at low temperatures, down to even  $-40^{\circ}\text{C}$ . The low viscosity of the oil has imposed a fine tuning of the compensation system. The **compensation system** has been designed to **reduce the inevitable friction components increasing the mechanical efficiency of the system**. High mechanical efficiency has a direct effect to lower consumption and enable a reduction of the size of the other components, such as a reduction in the size of the electric motor required to move the micropump.

A reduction of internal friction also entails a reduction of the heat input in the hydraulic circuit. Reducing the volumetric losses is also possible to reduce the size of other components such as the radiators: lower the internal leakage of the pump means lower heat that should be then taken away through oil cooling.

Because of everything said before, **Marzocchi** can definitely provide the right answer to the specification that **TIER1 or TIER2** engineers are looking for:

- High efficiencies to cope with limited current and voltages requirement
- Low noise in order to reduce NVH (noise, vibration, harshness).
- Limited overall dimensions in order to cope with packaging restraints
- Competitive pricing versus standard pump solutions

### A completely new automotive-dedicated Production Plant

Starting from 2016, the automotive pumps had been produced in a new plant completely focused on the Automotive Pumps. In the new factory of more than  $9,000\text{ m}^2$ , located in Zola Predosa, just 5 kilometers from the headquarters of the **Marzocchi Pompe**, 80 people work. The pumps are produced on semi-automatic assembly and testing lines able to guarantee the high quality and contamination standards that the automotive sector requires. The Plant's **ISO IATF 16949 Certificate** has been updated until May of 2021.

### The best for last – The ELIKA Family of Silent Pumps becomes larger

Thanks to the birth of the **ELIKA1P**, the range of available displacements of the **ELIKA** family is once again increasing. This time the development concerns smaller displacements with a standard range **from 2.1 up to 8.1 cm<sup>3</sup>/rev**. This family is particularly suitable for automotive solutions, where the producers are increasingly required to produce silent mini hydraulic power units for **lifting systems, large hydro guides or rear steering systems** for transport vehicles and others. Like all automotive solutions, **Marzocchi** is widely available to collaborate on customized solutions for shapes and sizes.



Figure 4 Helical Gears of ELIKA1P

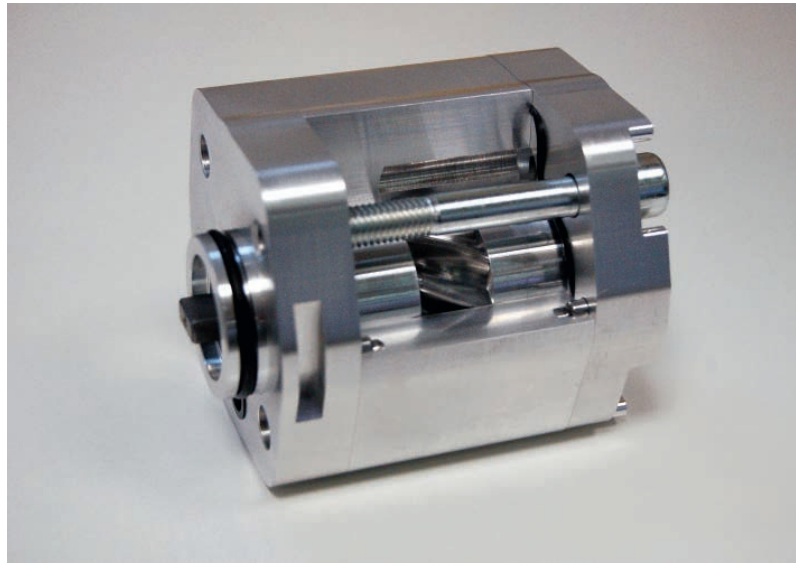


Figure 5 New ELIKA ELIK1P

**ELIKA** itself is a **highly efficient, low-noise and low-ripple Gear Pump**, designed and manufactured by **Marzocchi Pompe**. Its realization is a result of a close cooperation with the Engineering Faculty of the University of Bologna and its development brought to many patents and trademarks registered by Marzocchi.

Just recently (09 November) at **EIMA 2018** in Bologna its Multiple Version was awarded a **Technical Innovation Prize** with the following quote by the commission:

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“Elika is a Solution for external gear pumps that allows the same design of gears previously reserved for individual pumps to be used in modular architectures, to reduce vibrations and noise.”

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**ELIKA's Helical Gear Technology** is the perfect choice for all low-noise level applications. The **ELIKA** gears reduce the **noise level** by an average of **15 dBA** compared with a conventional external gear pump.

The specific design of its helical gears ensures the continuity of the motion despite the low number of teeth. The low number of teeth reduces the fundamental frequencies of the pump noise, producing a **more pleasant sound**. The shape of the **ELIKA Profile**, patented by **Marzocchi Pompe**, eliminates the encapsulation phenomenon typical of standard gear pumps by thus eliminating the main source of noise and vibrations. **ELIKA** tooth profile, without encapsulation, **significantly reduces pressure-oscillations and vibrations** produced by the pump and transmitted to the other components, reducing the noise of the Hydraulic System.

The **particularly low level of noise** produced by the **ELIKA** pump makes it particularly suitable for applications which currently employ much more expensive technologies such as screw pumps, vane pumps, or internal gear pumps. **ELIKA**, with its characteristics, is the **ideal solution** regarding a wide range of specifications such as rotation speed, operating pressure and viscosity. The structure of the **ELIKA** pump minimizes leaks and maximizes volumetric efficiency in all conditions. **ELIKA** is therefore particularly suited for applications, which use **inverters** or variable-speed drives to regulate the speed of the actuators.

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**For further information on Marzocchi Pumps:**  
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