

# Piston ring expertise

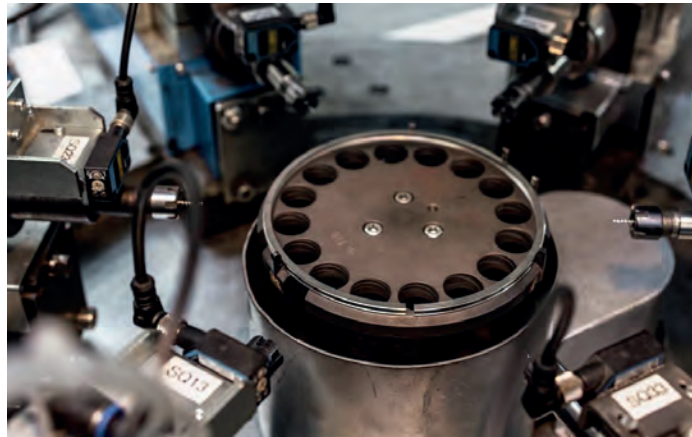
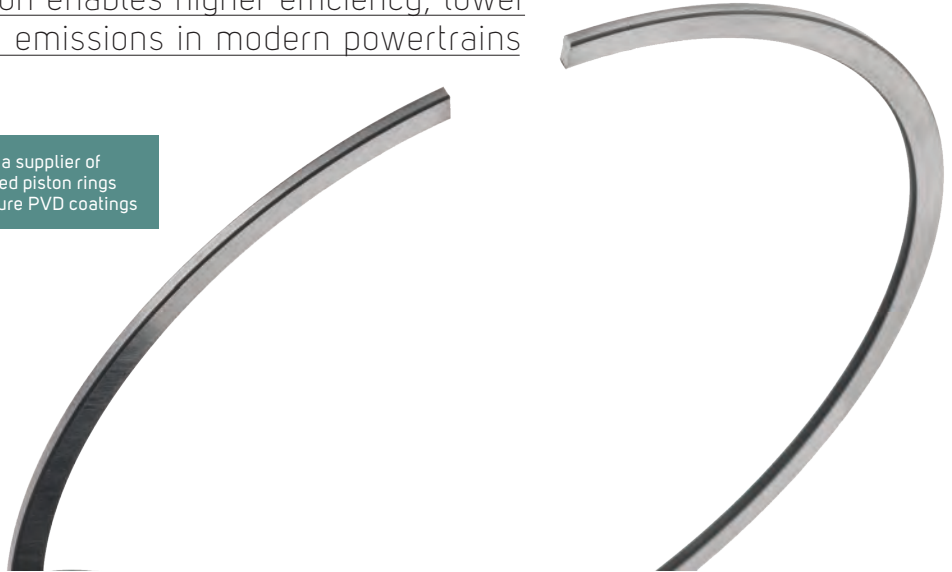
A reduction in piston ring friction enables higher efficiency, lower fuel consumption and reduced emissions in modern powertrains

▶ Buzuluk, a supplier of piston rings and sealing rings, conducts extensive R&D and is able to meet special requirements of niche market customers. It is one of the oldest companies in the Czech Republic, which has a history of over 555 years of iron production in Komarov, 50km west of the capital, Prague. The company's history can also be tracked back to the 15<sup>th</sup> century, when the ironworks were established in the Komarov area. The current portfolio was developed in the 20<sup>th</sup> century with the introduction of piston ring production in 1932 and through the acquisition of rubber processing machinery from Svit Gottwaldov in 1952.

Buzuluk is an engineering and manufacturing expert with a rubber and plastics machinery division. It has in-house development and servicing capabilities. It supplies systems worldwide and is known for the quality of its calendaring and mixing lines. The piston ring and special castings division develops, manufactures and delivers piston and sealing rings to major global customers – and not just in the automotive industry. It provides high quantity series production for these industries and is able to produce about 25 million pieces of piston rings a year.

Meanwhile the plastics machinery division focuses on more sophisticated individual systems for manufacturing in the rubber and plastic industries. Due to its focus on different manufacturing sectors, a few changes to enable both divisions to become more independent are to be implemented in the coming months. This is a logical step in further development of the company as it is concerned with

Buzuluk is a supplier of steel nitrided piston rings which feature PVD coatings



The high-precision production process of drilling the holes to oil control ring

two completely different disciplines and therefore focuses on other areas of the market at this time. More independence of both divisions will result in better customer care and solutions for individual requirements. Thanks to these changes, both divisions will be able to focus on their own market sectors, which will ultimately lead to a higher success in achieving project objectives.

Based on a good reference given by Skoda for piston ring production for the company's auto 1.3-liter engine, Buzuluk's

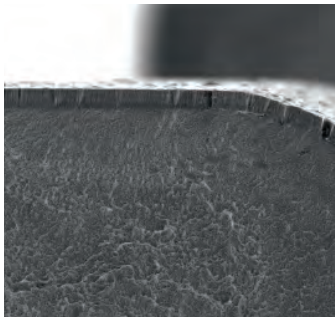
first major customer from Western Europe was Kolbenschmidt, a renowned producer of pistons and other components. Kolbenschmidt is still one of Buzuluk's biggest customers for piston rings.

Thanks to investments in new technology, more resources in R&D, the building of a new testing facility for engines and compressors and implementation of new methods of production and quality management, Buzuluk has been able to supply piston rings to many customers worldwide. Its main customer in the small engine

segment is well-known company Stihl. Audi, ZMZ (Russia) and ZAZ (Ukraine) are its main OE customers in the gasoline engine segment. In the OE segment of diesel engines, Buzuluk supplies Kohler (Lombardini), Czech tractor producer Zetor, truck manufacturer Tatra and others. The winner of the 2017 Dakar race, Kamaz, also used piston rings made by Buzuluk.

Elsewhere Buzuluk saw an opportunity in another niche market in the development of new rings for the hydraulic valve variable timing (VVT) systems of combustion engines. The first rings developed were designed for VW engines, including type VR5 and VR6 and derivatives W8 and W12. That followed with supplies for VVT systems for the Audi R4, V6 and V8, Porsche, Bentley and AMG. The last successful serial application of the VVT ring was in the new Volvo VEP4 engine.

Today, Buzuluk produces piston rings with diameters from 25mm to 140mm, manufactured from more than 10 types of material – including cast iron, nodular cast iron, alloyed cast iron, various steels and more. A chromium



A close-up, detailed image of a steel piston ring, which features Buzuluk's PVD coating

coating is necessary to improve the durability of a ring. Chromium ceramic coating has found various applications in diesel engines in this niche market.

This technology was developed by Buzuluk. To further improve nodular cast rings, the company has developed a high durability coating called BDG (Buzuluk diamond graphite).

To improve the durability, particularly of steel compression rings, Buzuluk has installed nitriding furnace to supply steel and alloyed cast iron nitrided rings.

To decrease friction, Buzuluk offers newly developed PVD and DLC coatings that can be applied to steel nitride rings as well as to cast iron rings. Friction can be further decreased thanks to the super finish of the PVD surface of the rings.

However, coatings are not the only method of achieving low friction; the geometry and tangential force are also important factors to consider. To decrease the top ring friction, low axial rings with an optimized asymmetric working surface profile can be produced. Low oil consumption with a low tangential force can be achieved with oil control rings with extremely narrow lands.

The latest development in oil control rings is a combination of

extremely narrow lands with the PVD coatings, and in the case of cast iron or nodular cast iron, with drilled oil holes. These rings can fulfill all the requirements for low friction, low oil consumption and durability. In addition, the company's rings for piston compressors in automotive applications are also technically very interesting, where the oil consumption requirements are ten times lower than in the combustion engine.

Buzuluk works in close collaboration with Wabco. Together the two have developed a special compressor testing rig, which has greatly enhanced the development of new rings.

Thanks to its extensive experience in the production of rings for VVT systems, Buzuluk can also support the development of the whole assembly, an area in which its capabilities have been widely praised by customers in this market. Buzuluk believes its success is not only due to its supply of high-quality parts but because of its competence in all areas, including technical development and servicing. ©

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