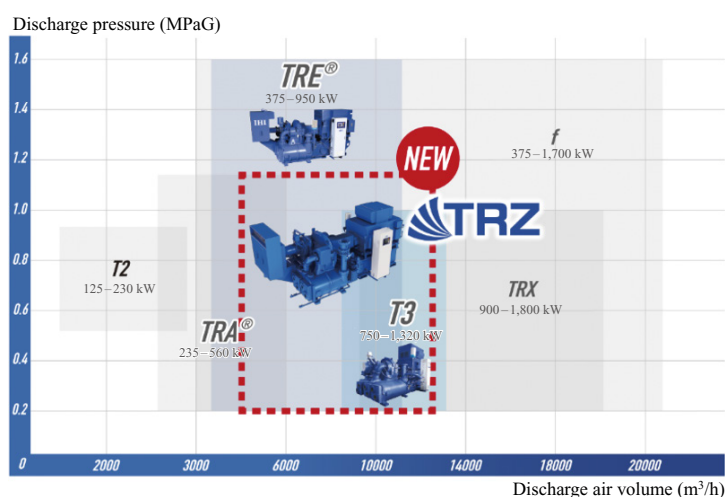


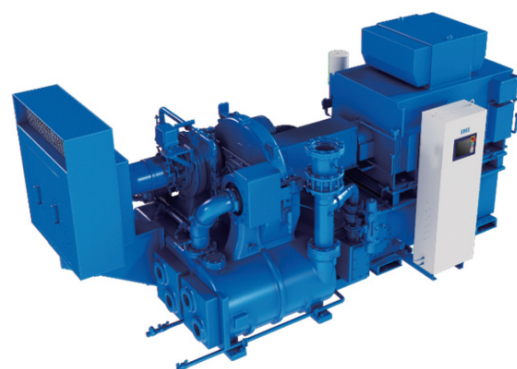
New Turbo Compressor Achieving High Efficiency Through Advanced Technologies

Contributing to reducing plant operating costs and achieving energy-saving targets

IHI Rotating Machinery Engineering Co., Ltd. (IRM) has developed a new product, the “TRZ Series turbo compressor.” By adopting advanced technologies for components such as impellers and bearings, this new model achieves higher flow capacity and improved performance compared to conventional models. This article introduces its development overview and product features.



(a) Range map



(b) External view of the turbo compressor

Overview of the TRZ Series turbo compressor

Introduction

At manufacturing plants, compressors play a critical role in supplying compressed air. Compressed air is widely utilized for various applications, including serving as a power source for equipment such as air cylinders, painting processes, water blow-off and drying after cleaning, and chip removal after machining. Because of its convenience and rapid responsiveness, compressed air has become indispensable in a wide range of industries.

On the other hand, generating compressed air consumes a large amount of electricity. Compressors typically account for 20 to 40% of a plant's total power consumption. Therefore,

improving the energy efficiency of compressors has become an important challenge directly linked to reducing plant operating costs and environmental impact.

Against this background, IRM released the “TRZ Series turbo compressor” in 2025, a new general-purpose turbo compressor featuring higher efficiency and a wider operating range. This article introduces the TRZ Series turbo compressor and the technologies developed for it.

TRZ Series turbo compressor

The TRZ Series achieved a 15% increase in discharge air volume while maintaining the same installation footprint and overall dimensions as the previous model (TRE Series).

Consequently, it enables a reduction in installation space for the same discharge air volume and allows multiple conventional small compressors to be consolidated into a single TRZ model, thereby reducing equipment costs and making more effective use of available space. Furthermore, this downsizing for a given air volume demand contributes to reducing the resource consumption by the compressor itself and mitigating the environmental impact throughout its entire lifecycle from manufacturing to disposal.

In addition, specific energy consumption (defined as discharge air volume per unit power consumption) has also been improved compared to the previous model. This improvement is expected to contribute to reducing plant operating costs and achieving energy-saving targets.

Technical features

Turbo compressors are machines that continuously draw in air using high-speed rotating bladed rotors called impellers, imparting kinetic energy to air through centrifugal and inertial forces thereby increasing its pressure. The TRZ Series achieved a higher flow capacity and improved efficiency through the development of a new impeller. Specifically, the impeller was designed using computational fluid dynamics (CFD), and its intake shape was optimized to improve efficiency without increasing the number of parts. As a result, the TRZ Series outperforms conventional models across a wide operating range, as shown on the range map, which visualizes the operational range of the compressor.

Because the pinion bearing supporting the impeller of the turbo compressor rotates at high speeds, it is required to achieve both low mechanical losses and stable vibration characteristics. The TRZ Series adopts a tilting pad journal bearing that utilizes a directed lubrication method instead of the conventional oil bath method. In the oil bath method, the bearing housing is filled with lubrication oil, which is supplied to the bearing surface by the rotation of the pinion shaft. However, this method had issues with oil churning losses and increased bearing temperature. In the directed lubrication method, lubrication oil is injected directly onto

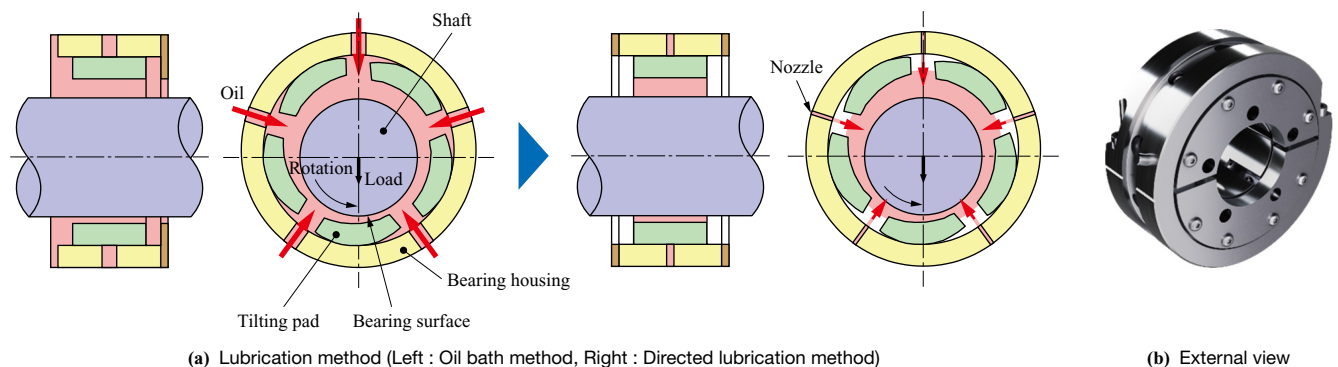
the bearing surface through oil supply nozzles, thereby reducing both churning losses and temperature rise caused by lubricant oil circulation within the bearing. The TRZ Series further advanced bearing design, improving load-carrying capacity and cooling performance, achieving both reduced mechanical losses and a more compact design.

Conclusion

The TRZ Series turbo compressor introduced in this article contributes to reducing plant operating costs and achieving energy-saving targets. Furthermore, the technologies and expertise gained through this development are expected to be applied to other turbo compressor products, leading to performance improvements. We will continue to contribute to the success of our customers and the realization of a sustainable society by developing highly efficient and reliable products.



External view of new impeller



Oil supply method of tilting pad journal bearing and external view