



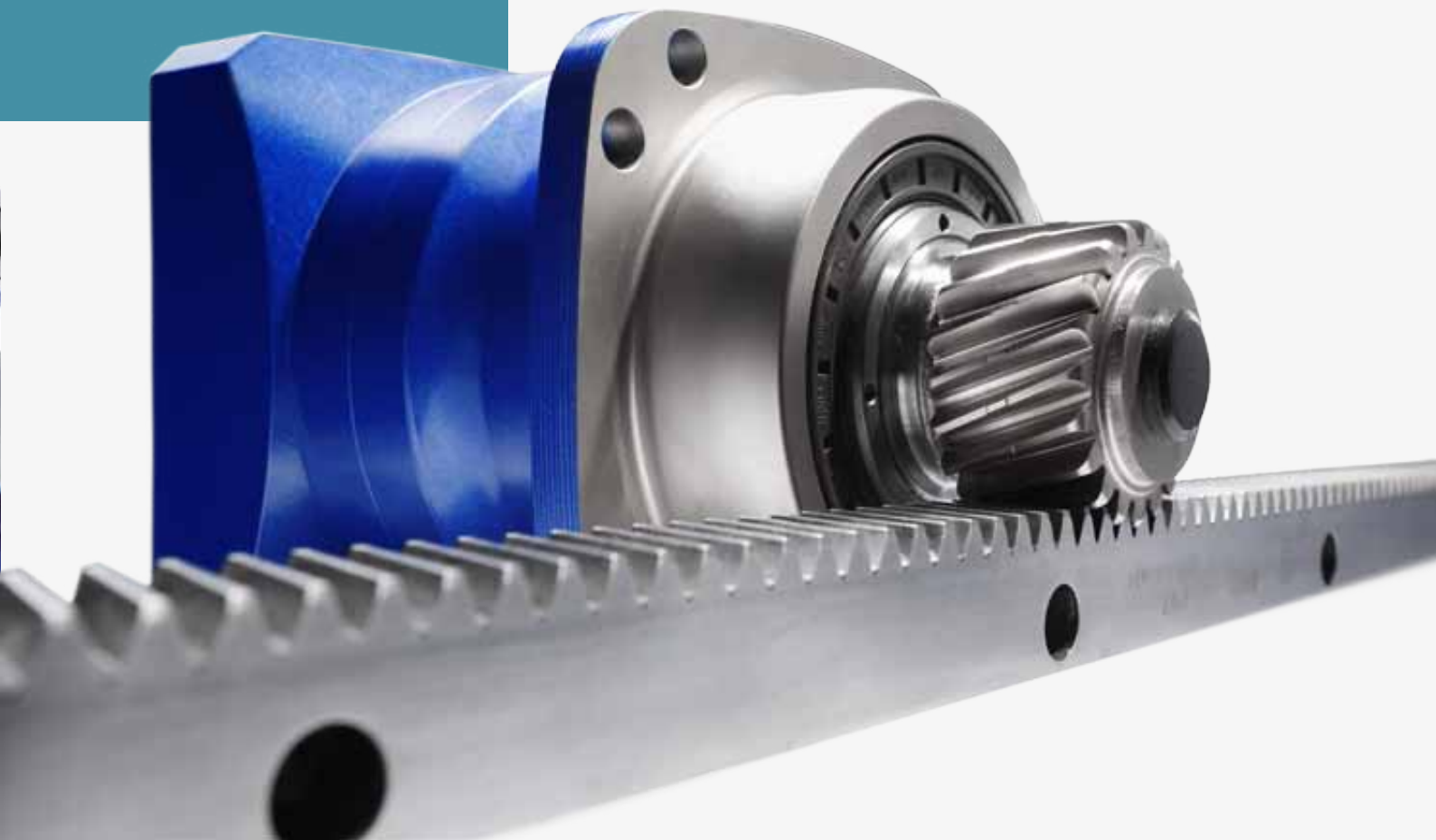
WITTENSTEIN

alpha

# Rack and Pinion Systems

## alpha Performance System

more dynamic  
more precise  
more efficient



# 3 x 1 = one or “The system is more than the sum of its parts!”

## **Performance Rack-and-Pinion Systems from WITTENSTEIN alpha**

The new Performance rack-and-pinion systems from WITTENSTEIN alpha offer new possibilities for machine design.

The Performance system satisfies customer demands for more compact and more efficient solutions providing high quality and performance.

With its high power density, the Performance package also provides an excellent means of improving the performance of existing systems.

As the developer and manufacturer of all system components, WITTENSTEIN alpha possesses the required expertise in the areas of gearing, manufacturing and system design to cope with this challenge.

The performance increase of the overall system could only be achieved by developing a new class of racks. This “genuine” carburised rack forms the Performance package together with the alpheno® low-backlash planetary gearhead.

The unique interface between the output pinion and the gearhead represents a further elementary aspect of the system which WITTENSTEIN alpha has taken to perfection with the welded connection.

The combination of the new rack, alpheno® gearhead and pinion excels with its power density and extremely high positioning accuracy in its performance class.

Individuality does not suffer either. Users can size and optimize the Performance package according to their needs. The new manufacturing facility provides the required flexibility, which is reflected in the choice of available modules, lengths and hole patterns.

As a total system provider, WITTENSTEIN alpha warrants the functionality and performance of the Performance rack systems. Together with the high quality standard of the individual components, this creates a real innovative lead.



# Combinations and solutions

## Customer benefits of the Performance package

### More dynamic

- Highest travel speeds and acceleration with lower inertia as a result of downsizing
- Further improvement in control behaviour due to the even stiffer driveline

### More precise

- Higher linear rigidity in connection with the PC<sup>+</sup> pinion makes the Performance System more precise
- Even higher positioning accuracy owing to optimally matched components

### More efficient

- Easy installation with tailor-made system solutions from WITTENSTEIN alpha
- Further reduced volume and improved power density

## Performance packages

With Premium Class<sup>+</sup> pinion, Performance rack and alphen<sup>®</sup>

Feeding force [N]	Speed [m/min]	Gearhead
8000	200	alphen <sup>®</sup> 30
12000	200	alphen <sup>®</sup> 40
17600	267	alphen <sup>®</sup> 50

### alphen<sup>®</sup> gearhead

The performance of planetary gearheads is taken to an entirely new level with alphen<sup>®</sup>. In combination with the WITTENSTEIN alpha rack-and-pinion portfolio, alphen<sup>®</sup> represents an unbeatable drive solution in the field of linear motion.

### PC<sup>+</sup> pinion

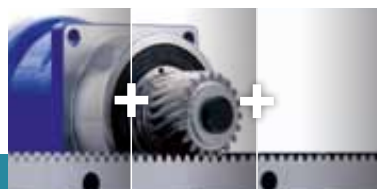
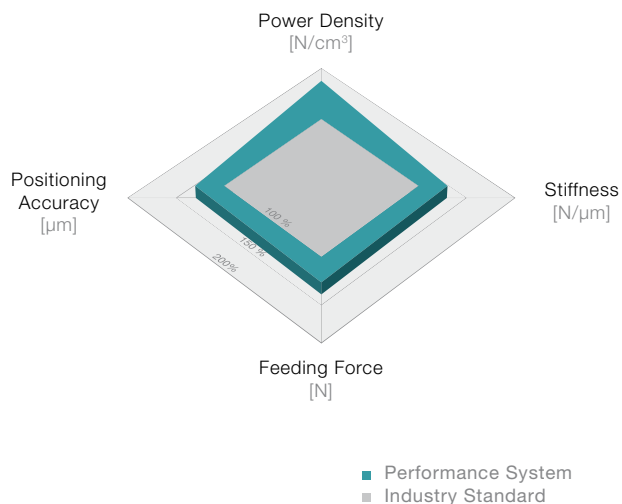
The Premium Class<sup>+</sup> pinion excels with very high linear rigidity and precision. These features are particularly evident in combination with the alphen<sup>®</sup>.

### Performance rack

The Performance rack is characterised by a unique hardening process that sets it apart from all other racks in the market. Case-hardening steel in conjunction with a genuine carburisation process make it a truly muscle-packed machine.

## Comparison of technical data

### Industry Standard vs. alpha Performance System



# One system – five benchmarks

1. **Feeding force: 180 kN**
2. **Acceleration: 4 g**
3. **Speed: 440 m/min**
4. **Maximum acceleration torque: 3800 Nm**
5. **Accuracy: 5  $\mu\text{m}$**

## Feeding force up to 180 kN and acceleration torque up to 3800 Nm

When maximum cutting performance is essential or huge gantries have to be accelerated, our linear drives (with rack and pinion) unleash their full potential. In a gantry master-slave arrangement, up to four drives provide feeding forces up to 180 kN without any loss of precision. Our knowledge of systems and designs gives you complete control over the drive system (even more powerful systems are available on request).

## Speeds up to 440 m/min

Drive systems from WITTENSTEIN alpha can accelerate your application up to a maximum speed of 440 m/min with up to 4 g. Non-productive times are reduced to a minimum and even very large workpieces are machined efficiently.

These extreme performance values can only be achieved if all components interact optimally – starting with the configuration and specification. Our team of experts has access to the largest selection of gearheads, pinions and racks. These can be combined with one out of more than 10,000 servo motors from major global manufacturers.

Our system expertise allows us to configure the ideal drive system for your application.

## Absolute precision

When every “ $\mu$ ” of accuracy counts: to ensure the highest level of precision and quality for machine tools, Wittenstein designs its rack-and-pinion systems in a master-slave arrangement. The potential accuracy of the tensioned drives is less than 5  $\mu\text{m}$  – regardless of the feeding force, travel speed or axial length. This level of precision is only attainable through the optimal interaction of the individual components, which only a system provider like Wittenstein alpha can provide – further proof of our technology leadership in mechatronic motion control.



Maximum speed and more power in less space:  
Planetary gearhead alpheno<sup>®</sup> with welded pinion



Maximum precision and feeding power  
Master-Slave: TP<sup>+</sup> with PC<sup>+</sup>



# Reference and branch solutions

## Machine tools

Portal milling machines are used for machining large workpieces. Travel distances of 45 metres, portal weights of 20 tons and process forces of 50kN when milling steel materials are typical specifications for these applications. Maximum precision and uniformity must be ensured in the drive train in order to achieve optimal workpiece accuracy and surface quality. The absolutely precise systems from WITTENSTEIN alpha are a great advantage here: two master-slave systems in a portal arrangement produce feeding forces of up to 180kN, while the electronic tensioning in the master-slave setup provides accuracies of up to 5 µm.



HSC (high-speed cutting) portal milling machine  
Source: F. Zimmermann GmbH

Laser cutting machines are highly dynamic applications in the machine tool industry. Travel speeds of up to 300m/min are typical specified.

WITTENSTEIN alpha's rack systems meet demands for maximum dynamics with their high acceleration forces, low moments of inertia and optimally matched system components.



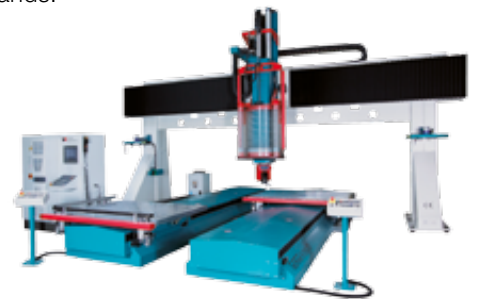
Source: TRUMPF Werkzeugmaschinen GmbH + Co. KG

## Wood, plastics and compound machining centres

Today, wood, plastics and compound machining centres face multiple new challenges. The blades of wind turbines, aircraft parts and boat hulls are just a few examples that can be mentioned here. This trend results in travel distances of 50 m or more with constant accuracy.

The precision and flexibility of these machining centres open up completely new possibilities for part design and diversity.

WITTENSTEIN rack-and-pinion systems facilitate a modular design that allows the machine to be adapted to individual customer demands.



CNC machining centre for wood, plastics and compounds  
Source: Westphal Maschinenbau GmbH, Hameln

## Axes in automation systems

The mounting area around the travel axis is frequently limited in robotic applications. Drives offering high performance in a compact space envelope are called for.

The rack systems from WITTENSTEIN alpha fulfil these requirements ideally with their high diversity and user-specific configuration options. Regardless of whether a part has to be transported to the next machining station in an automated assembly shop at a rate of 300m/min or a welding robot must perform a laser weld with 0.01 mm accuracy, WITTENSTEIN alpha can supply the optimal drive.



Source: MOTOMAN Robotics Europe AB



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