



New additions to IMS Gear's modular system

Planetary gear with oil lubrication now ready for volume production

New products have been added to IMS Gear's modular system for planetary gears. Solution concepts with oil lubrication have now reached volume production readiness, following intensive research and development work. "This extends the

application and performance range of our planetary gears significantly, and also opens up new fields for their use, such as in the E-mobility sector", says Heinz Gert Hagedorn, Vice President Sales & Engineering Planetary Gears.

Customers can make use of these benefits in their own individual ways. For the same performance rating and the same overall dimensions, the service life of oil-lubricated versions lasts five times longer than that of grease-lubricated gears, and in some cases even longer. Low-viscosity oil is fundamentally more suitable as a gear lubricant than grease, and IMS Gear further improves on that with another ingenious innovation of its own. The bearing pins in the planetary wheels were flattened in a radial direction on two sides. This enabled IMS Gear to achieve a decisive improvement in lubricant access to critical bearing points.

Downsizing or Increased Performance

When the choice of a suitable gear is restricted by the available space, oil lubrication offers a good solution approach, helping to reduce the overall dimensions of the unit without shortening the service life of the gear. It is however advisable when opting for this reduction in size to ensure that gear teeth and bearing pins remain able to cope with the levels of operating stress.

Wherever more performance is required for a given space, without any restriction in terms of service life, the new „Oil lubrication“ module in IMS Gear’s modular system also offers an interesting alternative. All of this, as Hagedorn emphasizes, is possible within the attractive pricing structure of IMS Gear’s modular system.

Until now, improvements in the parameter triad of service life, space and performance could only be made in favor of one parameter, and at the cost of another. Thus, planetary wheels mounted on needle bearings, to cite one example, often had longer service

lives than those with standard bearings. However, at the same time, this was obtained at the expense of a reduction in transmissible power because the load-bearing capacities of the pin bearings are limited. This compromise can be resolved by using IMS Gear’s new oil lubrication technology. Oil lubrication guarantees significantly longer service lives without limiting the load-bearing capacities.

High Power Density and Service Life

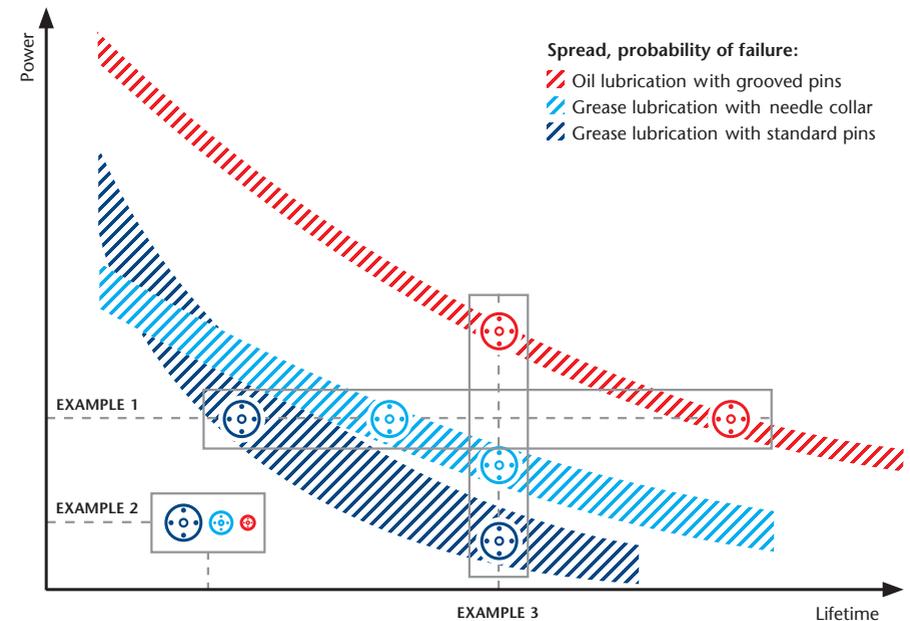
Furthermore, the attractive price-performance ratio of oil-lubricated gears from this modular system is not impaired by the more stringent requirements for seal integrity associated with their use. IMS Gear offers various solutions to suit different mounting positions (see additional information on the back). However, to take another example, as a result of friction losses, when a shaft seal is used at the input (motor) side, the degree of efficiency may be lower than in grease-lubricated gears without a seal. This may require a more powerful motor. On the other hand, comparison tests between synthetic and mineral oils have not shown any significant differences in terms of performance and service life. Having said that, attention must be paid to choosing the appropriate viscosity for the range of temperatures and field of application.

In future applications for planetary gears, the requirements for power density and service life are going to become more demanding. “IMS Gear’s modular system extended by oil lubrication is now ideally suited to meet that challenge”, affirms Hagedorn. Hagedorn views electric mobility or intralogistics as appropriate fields of application for IMS Gear’s solutions. These are fields where demand is rising for sustainable solutions combined with high levels of availability. “With oil lubrication in our modular system, we can meet demands for extended service life and higher power density combined

with reductions in weight, and we can do so cost-effectively.”

Grease-lubricated planetary gears, including those containing planetary wheels mounted on needle bearings, will continue to have their justified place in many applications. The main benefit of the oil lubrication option is the way it extends the breadth of potential applications. With applications where grease-lubricated gears encounter their limits of viability, the new „Oil lubrication for planetary gears“ modular system from IMS Gear now provides a timely and a cost-effective answer.

Operating range and correlation of lubrication- and bearing options for planetary gearboxes (schematic)



EXAMPLE 1
Enhanced **lifetime** with the same power and the same size

EXAMPLE 2
Reduced **size** with the same life and the same power

EXAMPLE 3
Enhanced **power** with the same lifetime and the same size

Tightness, mounting position and oil volume

Because oil is less viscous than conventional grease lubricants, oil lubrication requires more effective seals - depending on the mounting position.

The horizontal configuration of motor and gear is the best option for oil-lubricated planetary gears. Firstly, a relatively low oil level is sufficient because the lower half of the housing acts as an oil sump. The planetary wheels pass through this sump and, because the bearing pins are flattened, the oil is able to continuously reach all areas subjected to operating stress. In most cases, simple labyrinth seals or felt rings is the only sealing mode required on the motor (input) and output sides.

In cases where the motor is installed vertically above the gear, labyrinth gaskets or felt ring seals on the motor side are sufficient to protect the motor from oil spray. An appropriate oil level must be chosen to ensure that the first transmission stage is supplied with a sufficient amount of oil at all times, because at low load levels, this is where the highest rotational speed occurs. In contrast to this, at the output side, radial shaft seals are sufficient at low rotational speeds.

The vertical configuration with the motor located beneath the gear is the most critical mounting position because most motors have to be protected at all times from oil entry. For this scenario, IMS Gear can, for example, offer a motor pinion with ground bush, used in conjunction with a shaft seal. To keep the frictional diameter of the shaft seal, which is prone to abrasive wear, to a minimum, it is possible to opt for a direct installation between motor bearing plate and motor shaft. Usually, a felt ring seal or a labyrinth gasket at the output side is sufficient protection against oil spray.

Depending on sector and intended purpose, it may also be possible to implement sealing modes of higher quality. "Across the board, our tests have demonstrated that the additional cost of sealing oil-lubricated planetary gears is negligible - given that grease-lubricated gears already need suitable sealing modes", emphasizes Hagedorn.