

Multi-property igus tribo-polymers increase machine service life and efficiency

Tribo-polymers showcase their advantages in maintenance-free and lubrication-free iglidur bearing technology

Assessing the service life of a machine must take account of the costs of purchase, procurement and installation, as well as all the costs incurred in the long term operation, maintenance and repair of the machine. Using wear-resistant materials and low-maintenance components reduces not only running costs but also the risk of unscheduled shutdowns and extensive maintenance work.

Motion plastics specialist igus has many years of experience and knowledge in developing and producing of wear-resistant solutions made of tribo-polymers, and it keeps a large database of these products in its own test laboratory. Many machines today are well engineered and work hard, often running constantly. With high physical demands on machines, searching for the most tribologically optimised component is time well spent for every mechanical engineer.

Design engineers are trained to select the best material for the product or component, and often seek tribologically-optimised components – tribology is the study of friction and wear on moving parts. igus is often chosen as the preferred supplier because of their development of polymers specifically for dry, lubrication-free operation. Base polymers, solid lubricants and fibre reinforcing are combined to develop even better materials for increasingly challenging applications and to achieve better wear results.

Continuous development based on decades of experience

While some of these materials are developed for individual customers with special requirements, others become part of the catalogue portfolio. In more than 12,000 wear tests per year carried out on over 450 test stands, igus engineers in Cologne systematically analyse how materials wear. Here, more than 135 trillion test movements take place annually over a range of conditions and variables, including temperature, humidity, the type of movement and the contact materials. All these factors effect the wear patterns in individual

scenarios and have to be taken into account by machine operators. The analysis is used to both evaluate the materials' performance and to calculate the service life of components in any application, a unique service in the motion polymer industry.

The test laboratory as a reflection of industrial reality

The many parameters that affect wear shows how much work goes into research involved in the successful development of high-strength polymer components, which is why plastics specialist igus operates a 3,800 square metre test laboratory (bigger than half a standard football pitch). Here, the tribological quality of the polymers is tested with linear, rotating and flexing types of motion, in combination with other materials.

But it is not just mechanical properties that are important for the continuous improvement of customer solutions; igus components are used in different industry sectors and must be able to withstand different external influences. For example, classical manufacturing equipment and methods involving a normal degree of dirt as well as extremely dirty environments, or the presence of aggressive chemicals, such as when tribo-polymer components are used in agriculture, construction or offshore installations. Other fields of industry present different challenges, making the tests in the igus laboratory so important.

Test laboratory: diverse environments effect the polymer products

Agricultural work is exposed to a lot of dirt, the building materials industry is an aggressive environment due to chemicals, and the offshore industry is also corrosive due to salt water. Components that are used in pharmaceutical industry cleanrooms or where they come into contact with food have to cope with other conditions, where hygienic design is of the utmost importance. igus laboratory engineers are trained to prepare and test for all the challenges their components may encounter, from tests underwater to the simulation of very dirty environments, and testing in different temperatures and in a cold chamber. This thorough research has resulted in products such as iglidur plain bearings, drylin linear bearings, xiros ball bearings, energy chains and cables whose polymers have the best tribological properties for almost any application.

Growing database calculates service life

Every year, the laboratory's test databases are supplemented with more research data from which new materials are created, whose technical performance today is at the level of what customers will need tomorrow. Analysing this huge amount of recorded test data means the service life of a product can be calculated in an [expert system](#) specially developed for this purpose. The accuracy of these results from the expert system are a unique service in the plastics industry. Accurate service life benefits the customer, especially for bearing technology products that are central to the operational performance of machines and installations. Also, the consequences of the wrong choice of material can be problematic.

Tribologically optimised polymers ensuring the smooth operation of bearings

If you are planning to run a safe and reliable production process on a large scale you should first think of the small things, namely the bearings. Bearings should be as wear-resistant as possible so that everything operates smoothly and for a long time. There are many types of bearing, such as rolling bearings, linear bearings and plain bearings, where the latter are supplied by igus as lubrication-free polymer bearings. A product range with over 8,500 catalogue dimensions and specialist parts made of more than 60 different tribologically optimised materials gives the user a huge range of choices.

The fact that zero lubrication is needed reduces customers' costs and maintenance. igus polymers are corrosion-free, they can withstand high loads and in addition to the classical plain bearings, igus supplies a wide range of polymer slewing ring bearings, called iglidur PRT. Last but not least, the tribologically optimised xiros polymer ball bearings are the product of intensive research and are the first choice of many mechanical engineers for whom classic metal ball bearings unsuitable. For customers who are looking for more freedom in the design of lubrication-free spherical bearings, it is worthwhile looking at the igubal series of bearings. This complete system of self-aligning bearing elements has the best tribological properties and covers a range of swivel heads, clevis joints, flange bearings, spherical bearings and pillow block bearings.

Tribo-polymers: a great option for do-it-yourselfers as well

Hobbyists and microbusinesses who love creating and making can obtain iglidur bar stock sold by the metre, which offers many design possibilities. iglidur bar stock is a good choice for the creation of test samples, small to medium production batches and also complicated prototypes, which often involve searching for the right material.

Where durability is a bigger factor than design, the tribological properties of lead screw systems, trapezoidal threads and high helix threads from igus become more important, because the functioning of such products and therefore process reliability depends on an abrasion-resistant surface structure. The drylin product series provides mechanical engineers with polymer solutions that perform this higher durability job reliably and without fault, even under very stressful conditions. igus can promise these elite properties for each of its products because of the extensive laboratory testing it carries out; today, tomorrow, the day after tomorrow and into the future.

Image captions:



Caption: Tribologically produced parts



Caption: Test Laboratory



Caption: Variety of bar stock materials

The user has the choice of milling a wear-resistant part made of tribo-polymers in the form of a plain bearing or bar stock, or asking igus to make it. (Source: igus GmbH)



Caption: Iglidur expert system

The [iglidur expert](#) uses the data from the test laboratory to find the right material and calculate the service life of the respective bearing. (Source: igus GmbH)

