

A life full of **FRICTION**

Lars Pleth Nielsen believes that the world can save trillions of dollars by reducing the costs associated with the unwanted effects of friction that arises when two surfaces rub against each other.

TEXT: MARTIN NEANDER PHOTOS: LARS SUNDSHØJ

When it comes to friction, Lars Pleth Nielsen is a man of many words.

"Friction depends on the characteristics of the surfaces – how flat, round or rough they are," says Pleth Nielsen, manager of the Tribology Center at the Danish Technological Institute. "Friction is also dependent on what kind of medium the surfaces are in, if it is wet or dry, or what particles there are in the medium. It is a multidisciplinary field, because it involves different areas, such as mechanics, chemistry and fluid dynamics. You have to go all the way to the atomic level to more fully realize in detail what is going on in terms of friction."

The Tribology Center works with the development of surface coatings to lower friction, corrosion and wear in different applications. It even runs a coating facility seven days a week, mainly supporting the Danish industry with solutions.

Pleth Nielsen himself has spent

most of his working life dealing with surfaces.

"I have a Ph.D. in surface physics, where I specialized in the actions and motions of individual atoms on surfaces," he says. "Today, apart from my work at the Danish Technological Institute, I am also the president of ENIWEP – the European Network for Industrial Wear Prevention."

ENIWEP is a EUREKA (the pan-European research and development intergovernmental initiative) umbrella action dedicated to industrial wear prevention. This project →

THE NECESSITY OF FRICTION

Friction is a force that appears whenever two objects rub against each other. It is the opposite of motion. No matter which direction something moves in, friction pulls it the other way. Yet we need friction. Without it, we would not be able to walk, sit in a chair or climb stairs. Everything would just keep slipping around.





“ Between 2 and 4 percent of an industrialized country’s GDP is lost through friction.

LOWERING FRICTION

● Reducing friction is an objective in many of Trelleborg’s solutions. The main example is in sealing solutions where the sealing function needs to be achieved without friction affecting system performance too much. Whether it is to speed up movement on an escape slide or optimize how tires travel over different surfaces, management of friction is equally important.

In the industrial environment, where the reduction of friction can have real impact on GDP, engineering of sealing solutions and hoses concentrates on getting the best friction characteristics from product designs and material formulations.

Specifically, Trelleborg has developed Turcon PTFE-based (Poly-Tetra-Fluoro-Ethylene) sealing materials that improve efficiency in dynamic hydraulic applications, while the friction technology used in the Scirocco II hose is proven to reduce costs when processing solids.

PERSONAL:

Name: Lars Pleth Nielsen

Profession: Manager of the Tribology Center at the Danish Technological Institute

Age: 40

Nationality: Danish

Education: Ph.D. in physics supplemented with a master's in innovation, management and organization.

Background: Six years as a research scientist at Haldor Topsee in the field of catalysis. Four years as a research scientist at NKT Research and Innovation A/S working on the development of optical components.

Favorite scientists: Niels Bohr and Albert Einstein



This Sinox CemeCon setup allows Lars Pleth Nielsen and his team to deposit coating materials that give substrates required properties such as hardness, conductivity and friction. It is also being used for research on self-cleaning surfaces and surfaces for solid oxide fuel cells.



→ aims to improve interaction between industry and tribology research and to facilitate the transfer of science to technology in industry.

"One example is a project funded by the governments in Spain, Germany and Belgium," Pleth Nielsen says. "In this project, we are developing low-friction, diamond-like carbon coatings for vacuum and space applications."

According to Pleth Nielsen, estimates show that between 2 and 4 percent of an industrialized country's gross domestic product (GDP) is lost through friction and to mechanical parts wearing out.

"You can see wear, tear and friction issues in major business arenas, such as in the food and automotive

industries," he says. "Friction is one of the main reasons why things work only for a limited time. Of course, it is an extra cost for companies to put low-friction coatings on surfaces, so that is a barrier to overcome. But these additional expenses will certainly lead to long-term benefits. At first, some of our customers are not really aware of the huge costs involved due just to friction. But when they see that they can produce higher quality for an extended period, then they realize that the cost of coatings and tailored surfaces is more than counter-balanced by the gains."

Pleth Nielsen points to one Danish company that makes tin cans used for food applications.



PHOTO: ISTOCKPHOTO

"If they run their machines for folding and stamping tin cans without coatings, the tools are worn out after just 30 minutes in the production process," he says. "With our coatings, they can run for several months without any lubrication and without having to wash the produced cans in order to remove lubricants. It is a substantial saving moneywise. In environmental terms, it means that they do not need to use the unhealthy chemical lubricants, while saving both electricity and water for cleaning the produced cans." ■

When a bow is drawn across the strings of a violin it is friction that causes them to vibrate and create sound.