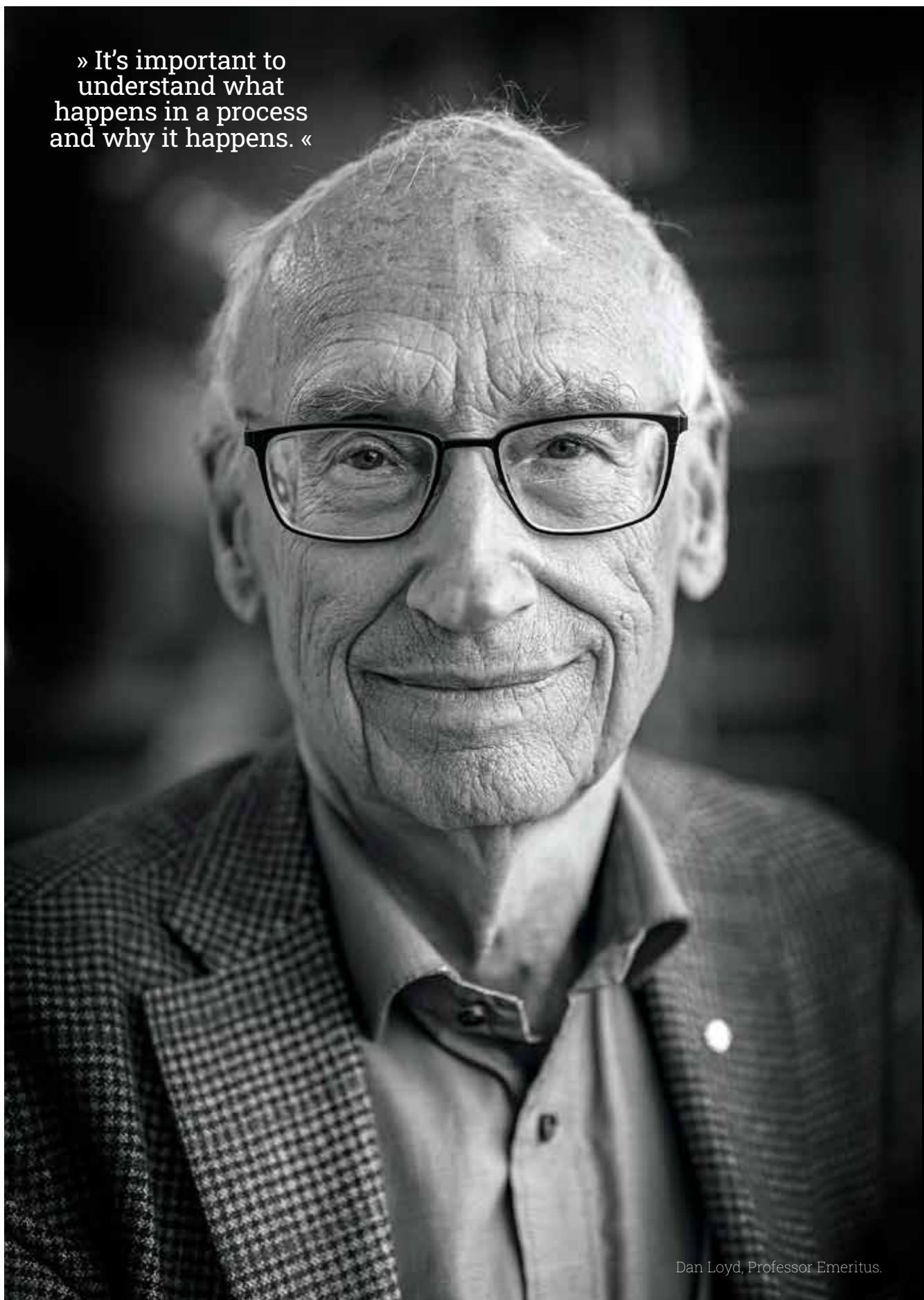


» It's important to understand what happens in a process and why it happens. «



Dan Loyd, Professor Emeritus.

DAN LOYD, PROFESSOR EMERITUS

“My curiosity is the **driving force** behind my devotion to **research** and **education**”

Partnerships between industry and universities are very important.

“Knowledge transfer is a give-and-take situation that works best when both parties benefit,” says Dan Loyd, Professor Emeritus at Linköping University and one of Sweden’s leading experts in heat transfer and temperature measurement.

PENTRONIC AND DAN first crossed paths back in the early 1990s. Since then their contact has developed into a valuable exchange of knowledge, which benefits both Pentronic and students at Linköping University. Dan has also visited Pentronic with student groups to gain insight into the company’s operations.

Why do you think Pentronic is such a successful company in its sector?

“Above all, Pentronic’s strength lies in its great knowledge and experience in temperature measurement. The company doesn’t just sell measuring instruments and sensors, it sells a function. Pentronic offers standard products but also solves problems that demand special solutions – something that requires great knowledge and interest,” Dan says.

Our world is changing

Dan Loyd’s own journey began with mechanical engineering studies at Chalmers University of Technology in Gothenburg. He then worked on chemical engineering in Lund before coming to Linköping to focus on research and education in fluid dynamics, heat transfer and thermodynamics.

“My curiosity is the reason why I do research and train students. I want to share my knowledge with both students and industry professionals,” he explains.

“Educating engineers who are actively working requires a completely different approach and skill set than training

students. It involves a lot of discussion with people who have a different experience, who have seen problems and made observations and know why things happen.

“It’s important to understand what happens in a process and why it happens. In our division, Applied Thermodynamics and Fluid Mechanics (MVS), I also have in-house courses for our faculty and I address concrete problems in industry and theorise about them. It’s important to continuously develop your skills, as the world around us is changing all the time.”

Mutual exchange of knowledge

Some time ago, Per Bäckström, Björn Tunek and Camilla Gustafsson from Pentronic visited Linköping University and met Dan Loyd on his home turf. Together with Roland Gårdhagen, Senior Lecturer and Head of Division, Dan presented the training they are working on.

The subject of applied thermodynamics and fluid mechanics includes heat transfer, aerodynamics, fluid mechanics, bio-fluids and thermodynamics.

“We focus on applications and calculations and we work with education and research in close cooperation with actors in society and industry,” Dan and Roland explain. “We have direct contacts with them in our degree projects, course projects and research projects. For knowledge exchange to work, it’s important that all parties benefit from it. Companies benefit, we get better skills and educational opportunities, and students

experience the reality they will later encounter.”

Refrigerators help to increase understanding

The educational programme combines theory and practical applications. In the basic thermodynamics course, students first make measurements involving refrigerators in order to understand the process.

“The aim is to create a better understanding of heat and temperature in a process,” Roland explains.

Students often use simulations to find sustainable and efficient solutions to various flow- and thermal problems.

“One of our projects is to build a solar collector and make measurements and calculations. The upper-year students are given projects with more of an industrial focus, such as measuring and calculating the temperature in the preheating and rolling of aluminium. By addressing real-life problems, students are better prepared when they finish their studies.”

Exciting research projects

The research projects cover a wide range of areas. These could be studying flows in blood vessels, increasing process understanding about biogas digestion, or doing practical experiments to evaluate thermal comfort in aircraft cabins. Roland also mentions a project that aims to investigate indoor climate in livestock buildings and to monitor animal movement patterns.

“Temperature measurements are

» Knowledge transfer is a give-and-take situation that works best when both parties benefit. «

important when simulating indoor climates. The studies are linked to animal welfare, productivity and whether the operation is energy efficient.”

It’s important to have good and developing relationships with companies and organisations.

“This helps to make our students highly sought after, and the research can be used for increased competitiveness and sustainability. For the university, it is a strength that we also have access to Dan’s vast knowledge,” Roland points out.

How the collaboration developed

Dan, what was it like when Pentronic and you first met?

“Somewhat by chance, we met via a course and found that we had synergetic interests. I was the lecturer of a course in industrial measurement technology run by one of Sweden’s leading association of

engineers and architects, Svenska Teknologföreningen. The course was aimed at engineers throughout Sweden.”

Dan then began writing articles about heat transfer aimed at measurement engineers, which Pentronic published in its customer magazine.

“I raised various problems and supplied an explanation and a solution to the problem. These were not only measurement problems but also heat transfer problems. It was especially good that some readers also sent in questions, which we then answered.”

This flow of knowledge had a great impact on both Pentronic and the curriculum.

“It has been interesting and instructive to be able to use real problems from industry in our training for students and in continuing education for teachers,” says Dan.

“This is often how our industrial partnerships work. Knowledge transfer is a give-and-take situation that works best if all parties benefit from it.”
What do you think made Pentronic see great value in this?

“Pentronic didn’t just want a solution to a problem, it perceived greater value in being able to educate its customer base as well,” Dan concludes. ■

Dan Loyd, Professor Emeritus and Roland Gårdhagen, Senior Lecturer.



FACTS

The Division of Applied Thermodynamics and Fluid Mechanics is part of the Department of Management and Engineering (IEI). With more than 500 employees and 20 divisions, IEI is the largest department at Linköping University. Courses and programmes are offered to more than 9,000 students each year. The department strengthens and develops tomorrow’s industries, business sector and society through its pioneering research, educational programmes and new innovations.



Björn Tunek, Per Bäckström and Camilla Gustafsson of Pentronic together with Professor Dan Loyd and Roland Gårdhagen in front of one of Linköping University's buildings.

Collaboration with medical researchers

THE DIVISION of Applied Thermodynamics and Fluid Mechanics has a long tradition of also collaborating with the University Hospital in Linköping. With regard to research on flow in the heart and the major blood vessels, Dan was one of the pioneers.

“As is often the case, a research project started by chance,” says Dan.

Bengt Wranne, a physician, had read an article in a journal to which he reacted. Based on his own experience, he thought that

the information about blood flow in the heart was not correct. He then contacted a researcher at the Centre for Medical Technology Assessment, Per Ask, who knew that Dan was working on fluid mechanics.

“We concluded that the article contained an error in fluid mechanics. This was in the early 1980s when ultrasound had begun being used more often in medicine. I’ve been working with the University Hospital ever since,” says Dan. ■