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# Pipework monitor spin-out sold for over £30 million

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Permasense Ltd, a company formed in 2009 to commercialise industrial process monitoring technology for use in harsh conditions, pioneered by Dr Frederic Cegla while an EPSRC (Engineering and Physical Sciences Research Council)-supported doctoral student at Imperial College London, has been sold to Fortune 500 company Emerson for over £30 million.

- Over 18,000 corrosion sensors sold globally; enhancing safety and increasing profitability
- Key clients include Shell, BP (British Petroleum) and Total
- Technology employed in over 30 countries, and in 180 plants worldwide
- Company named in Sunday Times 'One to Watch' Tech Track Top 10

With a roster of multinational customers such as Shell, Total and BP (British Petroleum) (which supported the underpinning research), the company pioneered technology capable of monitoring industrial systems operating under extremely harsh conditions, without the need for costly closures and inspections.

Permasense's proprietary sensor technology continuously monitors metal loss from corrosion or erosion, and transmits the data it acquires wirelessly – providing high integrity information, particularly in difficult environments at high temperatures.

Many industrial processes, such as power generation and crude oil refining, operate at very high temperatures – exceeding several hundred degrees Celsius. These harsh environments cause corrosion and erosion of components and pipework, which need to be routinely inspected to avoid potentially fatal failures. Usually this means plants have to be shut down during the inspection period, which can cost millions of pounds per day as the plant cannot produce products when it is not operating.

The components that need monitoring are often difficult to access. Preparation work – such as building scaffolding and removing insulation – is required before inspections are carried out.

To address this challenge, the Permasense team developed a sensor system which uses permanently installed wireless ultrasonic sensors that can withstand high temperatures. They have been engineered to work in temperatures of up to 600 degrees Celsius. By contrast, conventional sensors can only withstand temperatures of around 100 degrees Celsius.

The system only needs to be installed once, incurring a one-off cost. It can then monitor components continuously, without the need for costly routine inspections.

Permasense was formed in 2009 by Dr Frederic Cegla, Dr Jon Allin and Professor Peter Cawley from the Department of Mechanical Engineering at Imperial College London, with the help of Imperial Innovations. Since coming to market, the company has achieved global success, and its technology has become the market leader and a global standard. In 2015, Permasense featured as one of the 10 'Ones to Watch' in the Sunday Times Tech Track 100 list.

Permasense systems are now used in over 180 plants worldwide, and more than 18,000 sensors have been sold, with more than 20 million measurements taken. The company's main customers are from the oil and gas industry, but it has also sold to power generation companies and materials processing companies.

Dr Cegla describes balancing his role as both academic and entrepreneur as both challenging and rewarding. He says: "I have learned an awful lot. Such as how businesses operate; how we can create technology that delivers value to industry; how to sell stuff; how to manufacture and

produce products; how to create reliability in engineering processes, and the importance of academic findings for industry.



“In hindsight, the constant learning process was one of the best things about being involved in the company.”

## Find out more

Essentially, Permasense’s technology emits high-frequency sound waves to monitor the daily wear and tear occurring to components. The information received when these sound waves bounce off the component is transmitted down a special type of robust metal strip called a

‘waveguide’. The waveguide acts as an acoustic cable that conducts sound waves to a safe environment for digital storage and for processing by temperature-sensitive electronic equipment. Wireless technology transmits the data to computers, which use algorithms to interpret the information. To monitor an industrial process and how it is holding up under extreme pressures, all that engineers need to do is access the information from their computers – from anywhere in the world.

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