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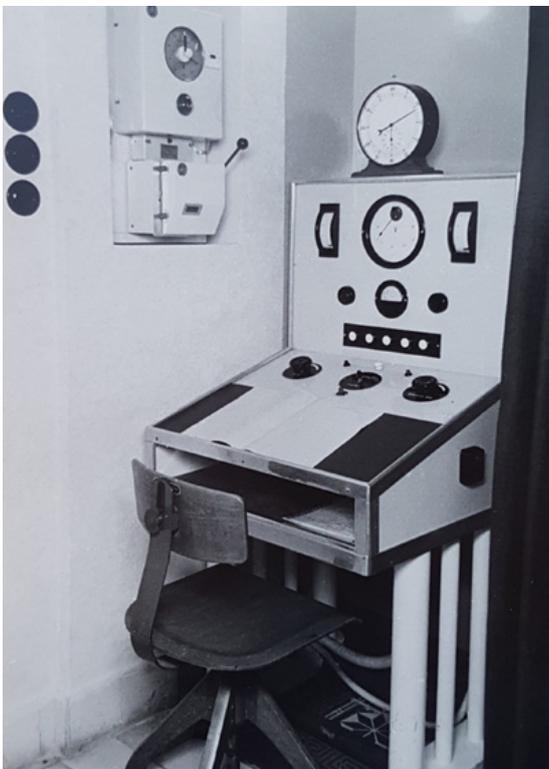
This photo was captured by Esa Tienhaara from [Divicon Oy](https://www.divicon.fi) during one of the meeting's coffee breaks.

The Finnish Medical Physics Days, Which Were Held on 13-14 May 2022 at Hotel Nuuksio in Espoo, Finland



100 Years of Inventive Spirit at PTW: From Hammer Dosemeter to Today and Beyond

PTW Freiburg can look back on 100 years of advances in dosimetry technology and positive business development. Thanks to the innovative spirit of its employees, the company has been able to stay successful on the global market over the decades.



PTW: The Hammer Dosemeter control room in 1922



PTW: Today and beyond 2022



PTW: The Hammer Dosemeter in 1922



UNIDOS Tango: Newest dosimeter generation by PTW and in clinical use since 2021

The technical know-how and application knowledge developed over a century is also based on an open-minded management style at PTW. Ideas can be considered, tried out and sometimes controversially discussed, and not every idea must necessarily result in a product. The management of the

family-run company has always trusted its developers' intuition and allowed them a great deal of freedom – even if this may result in delays. After all, the decision-makers are sure that the quality of their devices speaks for itself as soon as the PTW developers have given the green light for it.

Always with a finger on the pulse of the market

When developing innovative dosimetry solutions, the company has always kept the practical needs of users, e.g., medical physicists, in mind. The automatic tank leveling feature of the latest water phantom generation is a good example: The PTW R&D team has developed a unique function that automatically levels the heavy water tank for a time-saving, quick and, above all, simple and precise measurement setup. This is a huge improvement for users in clinical medical physics, since it eliminates the laborious and error-prone manual adjustment of the water phantom.

From Germany to the whole world

PTW set its sights on the world market at an early stage, and its products were already in great demand internationally shortly after the company had started operation. As early as 1935, the first brochure was printed in Portuguese – for Brazil. While the export share of sales in the early 1980s was still 15 percent, today it is 85 percent. The internationalization of the company gained momentum in the mid-1990s when it became clear that cooperation with foreign representatives alone was no longer sufficient for long-term growth. In 1995, the first subsidiary was founded in New York. Today, PTW has ten subsidiaries and affiliates worldwide.

From invention to industry standard

It is less well known that PTW also invented an important measurement parameter for quality assurance in diagnostic imaging and developed the first measuring instrument for it. The "Diamentor", which was launched on the market in 1959, made it possible for the first time to determine the dose-area product. The radiation exposure of patients in radiology is monitored worldwide based on the standard introduced for this purpose. With the development of the first DAP measuring instrument, PTW set an industry standard that has

helped to protect countless patients worldwide from skin damage and other health effects.

The first dosimeter – and its further developments

The Hammer dosimeter was one of the first reliable measuring instruments for determining the dose in radiation therapy. It was based on the electrostatic relay invented by Professor Wilhelm Hammer and bears the name of its inventor, who founded the Physikalisch-Technische Werkstätten (PTW) in 1922 to market it. Over the years, this absolute dosimeter has experienced numerous technological advances. With the beginning of tube electronics, a new generation of devices replaced the first absolute dosimeter. While its predecessor had an electric counting function, the new model had a preamplifier located close to the detector.

With the introduction of integrated circuits, the dosimeter was provided with an interface to be connected to a computer. Always keeping pace with technological progress, the company continued to develop its dosimeter: The first model of the

modern generation was controlled by a microprocessor. Its resolution of one femtoampere, already achieved in the early 1990s, made PTW clearly stand out from the competition. The current dosimeter generation can be operated via WiFi using a smartphone. With its integrated camera, it can automatically detect the data matrix code printed on the label of the measurement detector in use. In addition, the resolution of the latest generation has again been increased by a factor of 10.

Water phantom with a vision

PTW has also continuously adapted the water phantom to the requirements in medical physics: The original device, which could only be controlled manually, was later replaced by a product with a process computer. When the first personal PCs were launched, the company decided to continue working with clearly defined interfaces so that it could always participate in the latest computer technology. The water phantom of today's generation is a smart measuring device that can be operated and set up automatically via WiFi.

The successes of the past continue to inspire PTW to develop the technologies of the future. PTW is the world's first dosimetry company to launch an artificial intelligence (AI) product. Thanks to the AI algorithm used in the latest water phantom software, measuring time and quality can be significantly improved. The challenges of new technologies in radiation therapy, such as flash dosimetry or image-based techniques, e.g., MRgRT, are accepted by the PTW engineers. In the future, the further development of web-based software and integrated, automated solutions will likewise play a central role in paving the way for true innovations and new technological standards in dosimetry and quality assurance.



The engineer Dr. Christian Pychlau is a managing partner and one of the leading minds of PTW. He is the third generation in the leadership of the globally successful dosimetry company, which was built up by his grandfather Herbert Pychlau in the 1920s.



Jürgen Kiehne is a graduate engineer and can look back on many years of service at PTW. He was long-time head of research and development until he moved to product management in 2012.

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