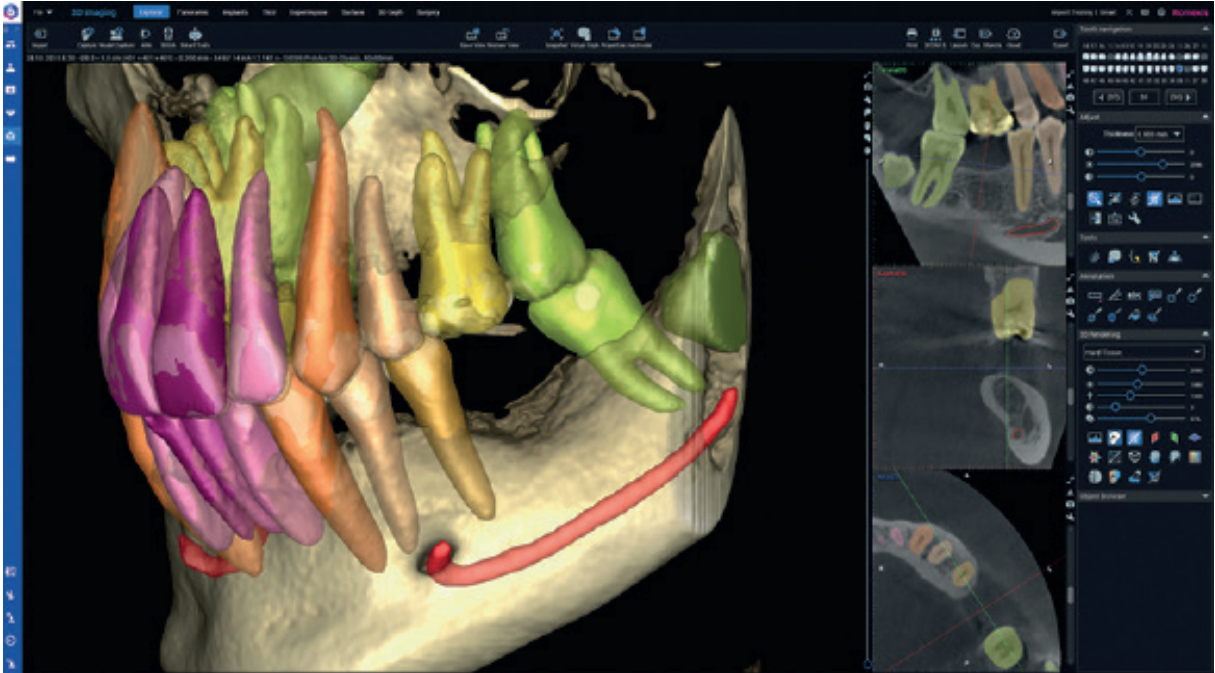


# Dentistry **innovations** through **research** collaboration



Many of Planmeca's innovations have been born through joint research and close collaboration with research institutions and universities. Research collaboration also allows Planmeca to observe the development of emerging technologies and gain in-depth understanding of their potential applications.

The company has always strived to explore forward-thinking ideas and bring them into practice. This culture of discovery has allowed it to continue to evolve and to always stay one step ahead. Planmeca has been the first in the field of dentistry to introduce several groundbreaking innovations that have been tested with scientific rigour and proven to make a difference.

Of course, development is a never-ending process. Products are never truly finished and there is also an infinite need for new solutions. A strong dedication to research allows the company to push the limits of technology and to open entirely new doors to improvement. After all, much of what is routine today was once considered impossible.

As the largest family-owned company in dentistry, Planmeca is in a fortunate position that has allowed it to adopt

a long-term perspective characterised by an enduring and unusually strong commitment to research and development.

This R&D commitment has helped to create an open-minded environment that is very stimulating for those with a deep passion for innovation. The culture of discovery encourages in-house researchers to think beyond current limitations and to explore the potential of emerging technologies and future trends.

## Game-changing innovations drive dentistry forward

New technologies and treatment concepts drive the field forward and improve the standard of care. Many of the most influential ideas have been formed as a collaborative effort.

Planmeca's close cooperation with leading dental universities, research organisations and other companies has indeed paved the way for several game-changing dental innovations. While technological breakthroughs are often impressive on their own, their value is ultimately derived from the real-world benefits they offer.

The company has an extensive history of working together with academic and clinical experts to make sure that research ideas are transformed into tangible products and solutions that make a difference. One of the best known examples is the proprietary Planmeca Ultra Low Dose™ algorithm, the leading and scientifically proven method for acquiring CBCT images at low effective patient doses without compromising the image quality.

Of course, its research efforts have not ended there. In fact, Planmeca is involved in numerous ongoing scientific research projects. Through scientific projects, it even has the opportunity to collaborate with other technology companies, such as different sensor manufacturers.

"In the world of research, it is relatively common for companies and even competitors within the same industry to participate in the same projects. This also applies to big players like Philips or Siemens, which have long been involved in joint projects. This is because few companies can control the entire value chain or achieve significant results on their own in today's interconnected world. Collaboration, however, allows achieving beneficial outcomes to everyone involved," explains Jukka Kanerva, Senior Vice President of Planmeca.

The power of research collaboration lies precisely in sharing knowledge and creating synergies among different stakeholders. Consequently, research collaboration not only advances Planmeca's technological development but also lays the foundation for a sustainable future and broad expertise.

## Promising results in ongoing AI research projects

Several ongoing research projects, in which Planmeca has been actively involved in the past few years, have already advanced to the stage of applying for official approvals for the developed solutions. One of them is the AI Head Analysis project, in which Planmeca, CGI, and HUS Helsinki University Hospital are collaborating to develop a diagnostic tool for detecting cerebral haemorrhage from X-ray images with the help of artificial intelligence. The project is part of the CleverHealth Network research ecosystem, which has been formed to facilitate the development of new digital solutions for healthcare.

"AI Head Analysis is an excellent example of how joint research projects can support the development of innovative solutions, which help improve people's health and well-being. While we continue to develop the AI algorithm within the project, our own product development teams are already exploring future options for utilising the algorithm in maxillofacial images captured with Planmeca devices," tells Jukka Kanerva.

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Another example of Planmeca's ongoing research collaboration projects also involves leveraging artificial intelligence—this time for locating the nerve canal in the lower jaw. Taking place within the Finnish Center for Artificial Intelligence (FCAI), the collaboration involving Aalto University, Tampere University Hospital and Planmeca has produced a deep learning model to locate the mandibular canal in CBCT images rapidly and accurately. The model has been trained with anonymised hospital data, which is remarkably diverse, including annotated CBCT data from various devices, ethnicities, and surgery cases.

The ultimate goal of the project is to provide a tool for Planmeca Romexis® software, which automatically segments the nerve canal to help dental professionals in implant planning and wisdom tooth extraction. The project has already produced four scientific papers with conclusive results, for example proving the accuracy of the segmentation against the golden standard provided by four specialist radiologists. Thanks to Planmeca's active involvement in steering the research, the AI solution has been designed to work on any Romexis workstation. The work now continues to secure the necessary regulatory approvals for customer use.

Romexis has already been complemented with new tools for 2D and 3D imaging that harness the potential of artificial intelligence, which have also been developed together with academic and clinical experts. For example, Romexis Smart utilises scientifically proven Relu AI engine, which has been developed together with KU Leuven.

### Exploring diverse routes of discovery

Besides AI, Planmeca is currently involved in several other research projects. One of them is TOMOHEAD, which aims to develop edge cloud computing algorithms to enhance the calculation efficiency and clinical performance of CBCT imaging. The project revolves around the edge cloud computing technology developed by Nokia and also involves Helsinki University, Oulu University

Hospital and sensor technology company Detection Technologies. The three-year project is coordinated by the University of Oulu and has secured a funding of over five million euros from Business Finland.

In the realm of 3D printing, Planmeca plays an active role within the research consortium cerAM. This consortium consists of five industrial companies dedicated to studying the 3D printing of ceramics for diverse applications, including developing 3D printable ceramic crown materials. Tampere University leads this project, which receives funding from Business Finland.

Engaging in various research projects, either as an active participant or through steering groups, enables Planmeca to keep updated on entirely new, emerging technologies. These projects can even extend beyond the realms of dentistry and medical imaging to areas like optics, photonics, and spectral imaging. For instance, Planmeca is tracking ongoing research analysing the spectral data of intra-oral tissues through steering group involvement. Planmeca also provides equipment and product support for various research projects.

Planmeca also collaborates with individual researchers, including doctoral candidates. Dr Juha Koivisto, Planmeca's Chief Physicist, has conducted several studies on lowering the effective patient doses. Dr Koivisto is also involved in numerous scientific articles based on clinical studies conducted by customers, assessing the usability of technology developed by Planmeca.

Currently, Planmeca also has an employee through the national Postdoc for Companies (PoDoCo) programme, led by the University of Eastern Finland, working on inverse mathematics to develop iterative CBCT reconstruction. Finnish Research Impact Foundation recently granted EUR170,000 in funding for the project's continuation.

"We have not limited our approach to scientific research and research collaboration. By utilising different channels, we believe we can foster innovation and breakthroughs and also expand our network of expertise and resources. You never know where the next big idea will come from. In the end, their results will benefit the users of Planmeca solutions," Jukka Kanerva says.

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