



DENTISTRY + AI

LEVERAGING ARTIFICIAL
INTELLIGENCE TO IMPROVE
CLINICAL SUCCESS

Unlocking the Potential of AI at Glidewell

Artificial intelligence is becoming increasingly sophisticated, giving us unprecedented potential for efficiency and growth. As we see AI play a more prominent role across a variety of industries, many wonder how this technology can benefit the dental practice. To help us understand the growing significance of this cutting-edge development, we sat down with three of our leading experts at Glidewell: Sergei Azernikov, vice president of CAD/CAM development, Mike Selberis, chief technology officer, and Ben Vu, director of machine learning and data analytics.



Thanks to a proprietary algorithm developed at Glidewell, AI can be used to detect tooth morphology.

Glidewell: What were some developments that led to our interest in AI?

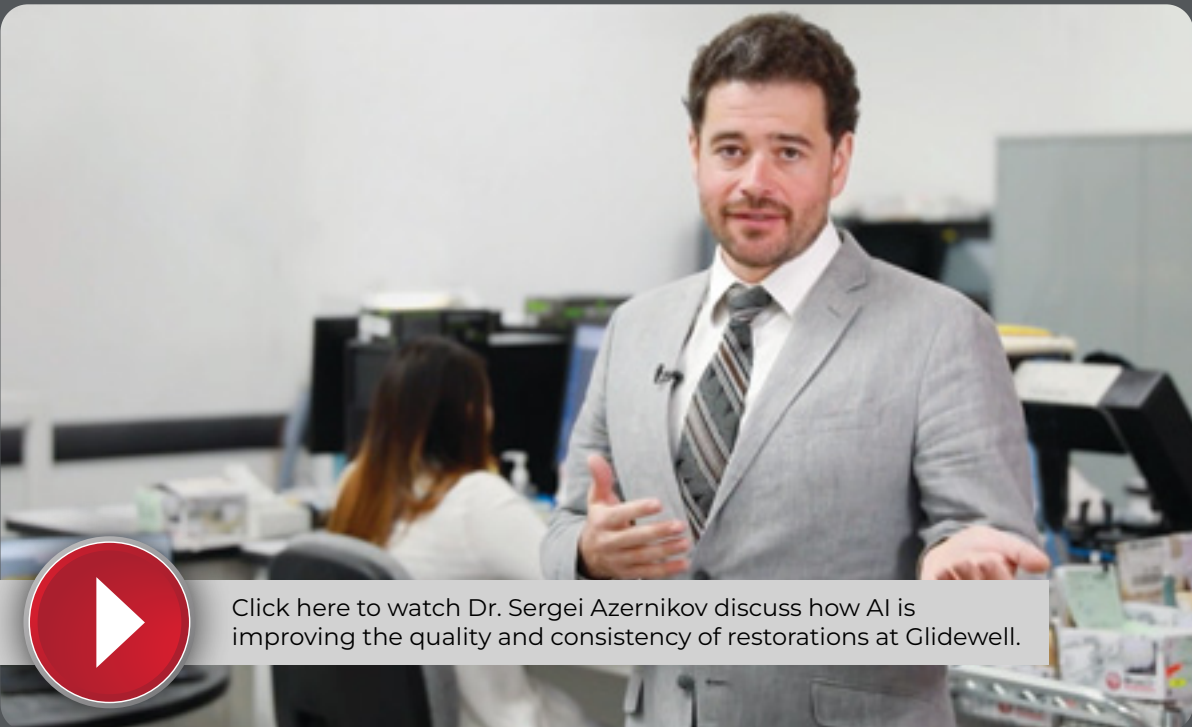
Mike: When I started working on automation in 2012, my goal was to improve the quality of design proposals. We were trying to make it so that clinicians can use our software to generate a crown design with the highest level possible of accuracy. I never imagined the extent that we would become involved with AI at Glidewell. As we started testing with deep learning, generative AI, and computer visioning data, we got to the point where our software could generate crown proposals with a 98% acceptance rate. With every scan, our algorithm becomes more precise, and I saw that we were able to produce consistent results with this technology in our own lab manufacturing. That technology is what developed into the [CrownAI™](#) and [MarginAI™](#) components of the glidewell.io™ In-Office Solution, which we launched in 2018. Really, our involvement in AI has been going on for a lot longer than most people are aware of.

Sergei: When I first joined Glidewell ten years ago, our CAD/CAM development team had already been testing the capabilities of automation. At that point we were focused on improving the design process as well as our

own manufacturing. On the back end of the software we developed for those tools, we had a mature proprietary CAD cloud package where we stored information from our crown designs. Having that [database with millions](#) of individual crowns sets gave us the ability to start collecting precise geometric data.

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Mike Selberis
CTO, Glidewell



Click here to watch Dr. Sergei Azernikov discuss how AI is improving the quality and consistency of restorations at Glidewell.

At the same time, we started seeing other industries implementing AI in very promising ways. It achieved outcomes that were close to human performance in terms of image recognition and other fields. Algorithms had become so advanced that they could use data to improve their own performance on a given task. That's when we felt it was time to start addressing AI for our needs. So, we asked ourselves a simple question: can a machine-learning algorithm recognize teeth? Tooth morphology has a very complex shape with a high degree of variability, so it takes a very sophisticated program to be able to distinguish those tiny details. Our cloud data is what gave us the ability to start building that algorithm for our lab.

Glidewell: Was there a turning point when you realized that AI had big capabilities for dentistry?

Sergei: We put together a competition between our top technician and the machine-based algorithm, and guess what? The AI won every time. Even the best technicians can make the occasional error, but the machine was error-proof. That's when we realized that AI technology has far-reaching capabilities for the dental industry.

That was really the launching point for us. We gathered renowned engineers from around the world, and six years later, we now have a system that can reliably design without any human assistance. It's remarkable that we were able to develop this technology in-house. We had to build it all from the ground up ourselves, and now most of our single-unit and bridge restorations go through that system.

Ben: In my experience, that realization came gradually as I noticed a shift in how dentists perceive this technology. I remember going to a conference and hearing several dentists talk about machine learning, AI, and deep learning. These are exciting topics for those of us who work on the engineering side of the lab, people who have their finger on that pulse. It was eye-opening for me to see that dentists are pursuing this topic and openly discussing the potentials of AI in dentistry. One attendee I spoke to was even taking a course at UC Berkeley about machine learning, simply because she wanted to learn more. That was a defining moment to me that proved that this industry is ready for what AI can do.



Any adjustments a technician needs to make to a crown gets added to the stored data and uploaded to a cloud database.

“By choosing a lab like Glidewell that uses AI, doctors can count on more precise, functional, and esthetic crowns with minimal risk of a remake. Automation makes our lab more efficient, which extends to other benefits to doctors, such as faster turnaround times on cases.”

Sergei Azernikov

Vice president of CAD/CAM development,
Glidewell

Glidewell: How would you explain the practical benefits of AI to doctors who are unfamiliar with this technology?

Mike: The biggest way AI technology helps is through enhanced diagnostics. By using AI to get precise, accurate data from a patient, a doctor can create

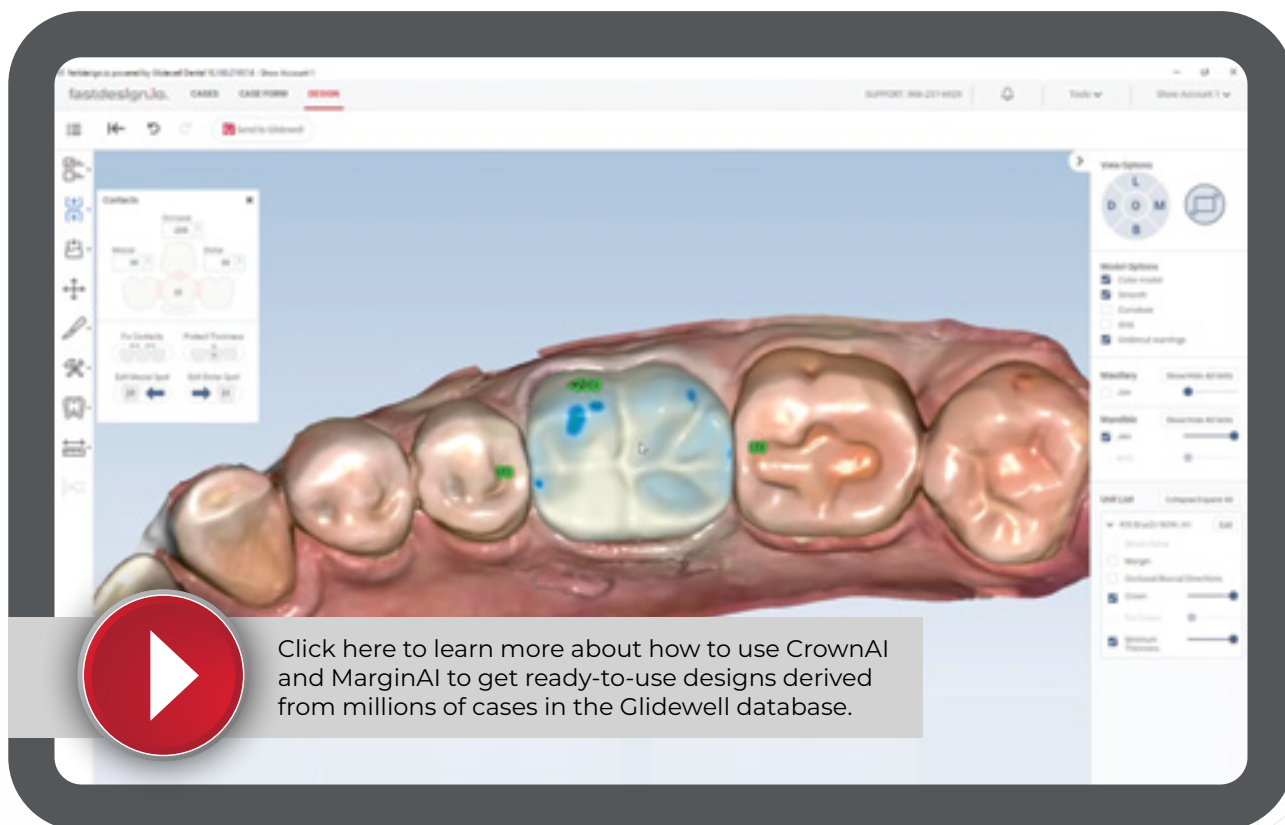
an even better treatment plan with greater long-term success. Eventually doctors will be able to use AI-enhanced guided treatment for an even more personalized level of care.

Sergei: It boils down to providing better patient care while also saving time and money. By choosing a lab like Glidewell that uses AI, doctors can count on more precise, functional, and esthetic crowns with minimal risk of a remake. [Automation](#) makes our lab more efficient, which extends to other benefits to doctors, such as faster turnaround times on cases.

Ben: AI is an integral part of digital dentistry, which we see more clinics using every year. Instead of creating a physical impression, doctors can use an [intraoral scanner](#). Instead of relying on a lab technician, doctors can use design software and an [in-office mill](#) to fabricate a crown. A lot of these tasks, like preparing impression materials or using design software, are done by a staff member in the clinic — so AI makes their job easier too. It's a benefit to everyone in the clinic.

Glidewell: Why was it so important for us to establish ourselves as pioneers of AI technology in dentistry?

Mike: It's important for us to scale up without compromising quality. Considering the number of technicians we have and the sheer volume of cases



Click here to learn more about how to use CrownAI and MarginAI to get ready-to-use designs derived from millions of cases in the Glidewell database.

we handle, it's necessary for a lab of our size to invest in automation, robotics, cloud storage, and AI if we want to keep growing. Our lab has some of the best technicians in the world, but there's a small degree of variability that is simply inevitable due to human error. AI technology is what fills in that small amount of variability so we can continue to provide the consistency that our customers expect, albeit at a much larger scale.

Glidewell: What is the biggest misconception that doctors have about AI?

Ben: From a broad perspective, a lot of people think that AI is replacing humans. That's simply not true. What we're trying to do is leverage AI to eliminate mundane tasks that people don't want to do.

Sergei: On the other hand, some doctors also have unrealistically high expectations for AI technology. It's not magic, it still requires humans to function correctly.

Mike: To echo what Ben was saying, we don't intend or expect AI to automate everything. Any doctor, staff member, or RDA should see it as a tool to help inform and make better quality decisions. By freeing

up the tasks that are easier to do, we can enable the technicians to work on the more complex tasks. AI is like having one more technician in your practice, or one more staff member in the office. It's not about replacing; it's about complementing and supporting you.

Sergei: Exactly. AI won't make decisions for you. That's a tremendous misconception. AI gives one more perspective, or one more piece of insight. But the decision-making process is still up to the individual person.

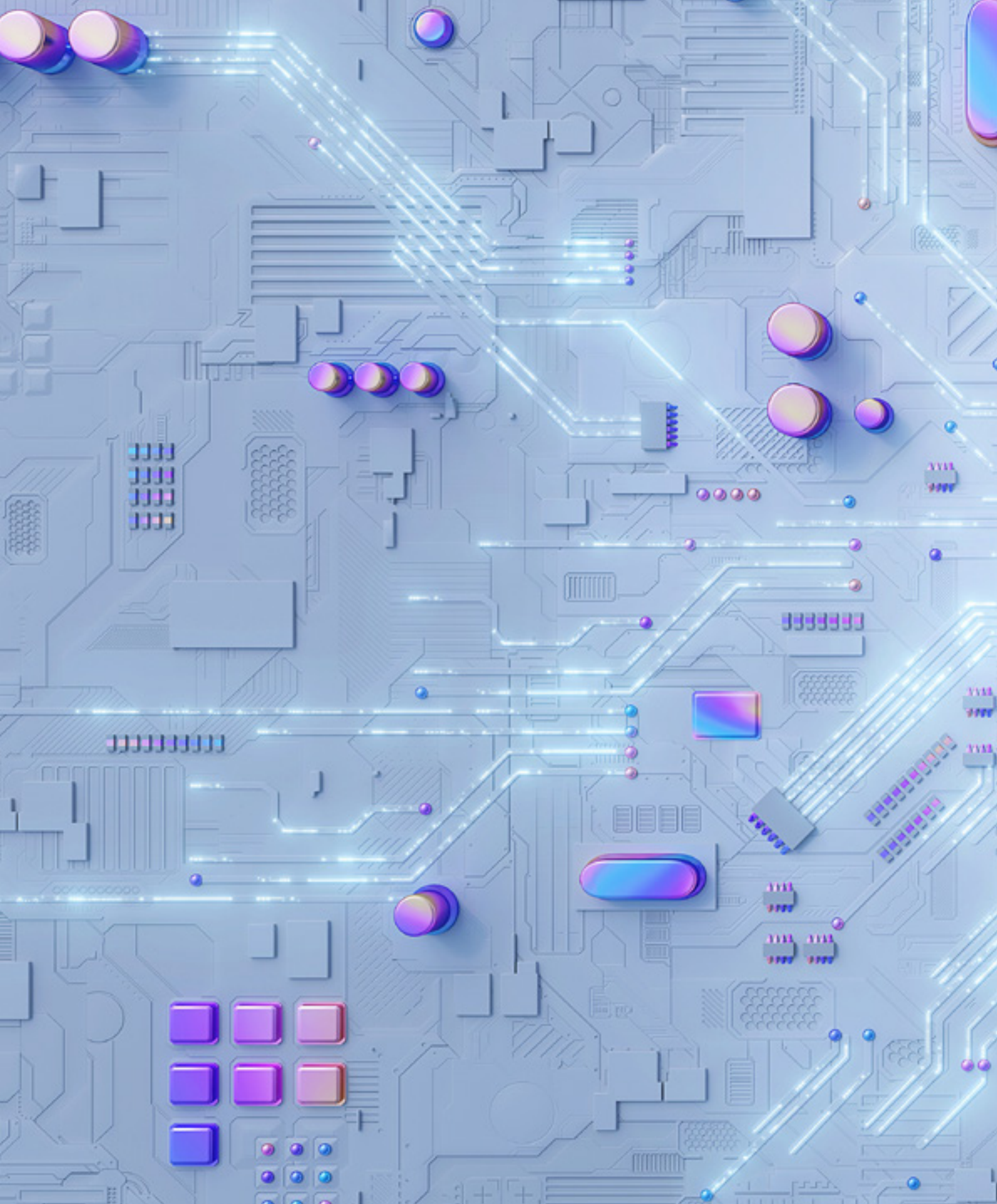
Glidewell: What's next for AI and machine learning at Glidewell?

Mike: A lot of our success has been with tools that are implemented reactively. The next phase with machine learning at Glidewell is to leverage AI into something that can help the doctor proactively. The positive reaction to glidewell.io shows me that we need to keep moving digital innovations upstream, into the doctor's hands. I believe I speak for everyone when I say that we're excited to be working on guided treatment planning, and ways to provide real-time insight and feedback to help them produce the most optimal prep.

For more information about Glidewell's digital products and services, visit glidewell.com/digital-dentistry



Implementing AI and machine learning is a crucial part of maintaining consistency and quality at scale.



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