

SoftSmile's Innovative Tech Will Produce Optimal Ortho Outcomes

Advanced digital treatment planning software features machine-learning algorithms set up to help clinicians model the best treatment for patients, dramatically reduce costs, and improve results.

If you're a clinician looking to offer orthodontic aligners to your patients, quite a few options are available today. However, some may be a better fit than others. Obstacles such as high costs, unreliable results, and long treatments have left many patients unwilling to give orthodontics a try or unhappy with the results.

That's where SoftSmile and its advanced digital treatment planning software can serve as an industry game changer. The company's machine-learning algorithms are set up to help clinicians model the most optimal treatment for patients—and improve patient outcomes.

SoftSmile's software was designed to ensure precision and efficiency without sacrificing a doctor's control over treatment planning. The technology allows doctors to easily modify the setup at any stage in the treatment process as long as their adjustments comply with biomechanical principles. There is no need to involve third parties.

Sticking to these biomechanical principles eliminates the guesswork and adds to the system's precision.

All treatment steps and calculations are based strictly on actual patient data and scientifically proven algorithms. Additionally, SoftSmile's Infrastructure allows all patient data to be accessed by a doctor from any device.

"You absolutely need to be careful and take into account things like biomechanics, the material properties. All those varieties need to be taken into account," explains Damian Gerikhanov, chief technology officer at SoftSmile. "One of the aspects of our R&D work was designed to specifically come up with the best software for in-house production."

Because producing a lot of high-quality technology can be difficult, especially in-house if you don't have large-scale production capabilities, you want to minimize the amount of manufacturing required.

"One way you can address that issue," Gerikhanov says, "is by making sure that the amount of technology you use is optimal in the sense that it is as efficient as possible—so you have as few possible aligners while also delivering the desired result."

That is a part of the thinking behind the SoftSmile solution.

The company's Vision software is equipped with a powerful setting system that helps a doctor achieve absolute precision in treatment planning and the ability to position teeth in accordance with their own expertise. In addition, Vision's algorithms act as an autopilot that help protect the doctor and the patient from any potential mistakes.

Gerikhanov adds that SoftSmile has invested a lot of time and resources into developing a system that he believes can provide affordable, results-driven orthodontic care to more patients.

“What we've done is actually partnered up with producers, the manufacturers of the plastics for the aligners,” he says. “We've partnered with them and acquired all the technical specifications of the material properties, and what we've done is build a model that tries to simulate accurately how this plastic will behave and how it's going to affect the patient.”

The process is extremely successful, and it's just one of many powerful components of the software,

which features an incremental process and what the company calls “live learning.” As SoftSmile moves along, it collects more and more data, and the workflow improves along the way. Vision software's powerful integrated algorithm analyzes all steps prescribed by an orthodontist while simultaneously calculating how many aligners should be used to achieve the final result: an ideal smile for the patient.

A lot of effort went into making sure that it takes as little time as possible to produce a treatment plan. So the ultimate goal of the software is to give the doctor—the end-user—an accurate clinically applicable treatment plan.

Dr Claudia Cruz, an orthodontist specialist and private clinician in New York and Northern Virginia and a clinical advisor for SoftSmile, says SoftSmile's software protects both the provider and the patient.

“Technology adoption must fit into the characteristics of the different adopter categories,” says Cruz, whose orthodontic experience includes being a former faculty member at New York University and Columbia University. “It protects the professional and the patient. These intuitive and user-friendly interfaces

decrease any clinical risk. We must understand that if we do not have a well-experienced ortho-trained professional providing



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treatment, errors during the learning curve in adopting technologies have a higher chance of occurring. That’s a reality that demands attention.

“At the end of the day, what we want to have is a safe practice for all patients. And understanding the complexity of cases and knowing realistic limits according to the level of experience for the different professionals are important aspects of SoftSmile’s innovative features.”

The first process of building the treatment plan is preprocessing. This includes taking the rules of the patient’s mouth case, processing the segmentation, and separating from the gingiva gum. This is required before you can move the teeth, and it is usually a tedious manual process for the technicians and doctors or whoever is using the software. It’s a time-consuming process that consists of clicking on the teeth around the tool, drawing the line, and producing segmentation code.

SoftSmile’s software, however, dramatically cuts down this labor time.

“We’ve automated this to such a degree that end users are reporting the time required for the segmentation process has been reduced by 10 to 14 times based on the feedback we’ve collected,” Gerikhanov says. “It’s not the main selling point, but it’s one of the most evident advantages of our software.”

He adds that the developers put a lot of effort into reducing the time required for this precise treatment planning.

“As we go along, this will be getting even better because some of our algorithms are ‘learning.’ So there’s a bit of machine learning involved,” he explains. “The main benefit of machine learning is that you can improve over time with what you have. That’s essentially...the main paradigm of our usage of machine learning....”

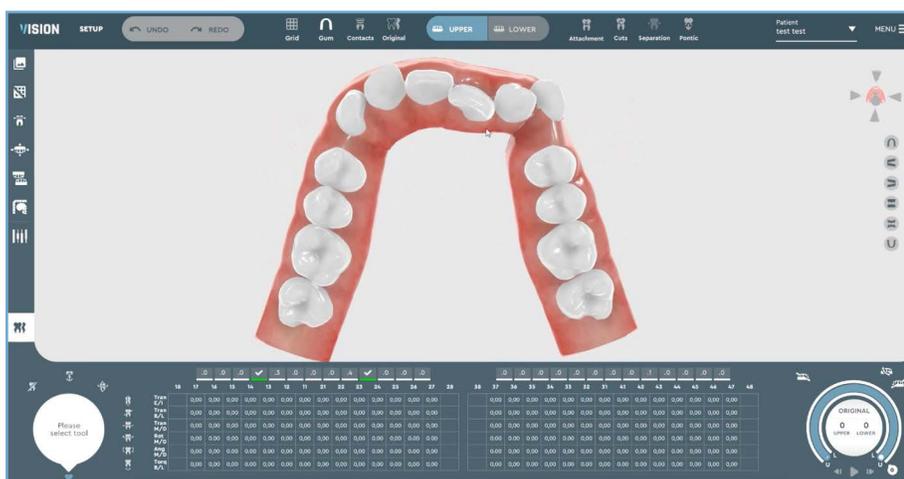
With the SoftSmile workflow, users put in a basic model, which produces targeted results. As users make corrections to the results, these corrections are fed back into the model—so over time, some of these corrections will become automated.

Dr Cruz agrees that incorporating clinician feedback is what makes the SoftSmile solution so effective.

“Biomechanical principles are quintessential for tooth movement efficiency. They are a must in the most perfectly designed orthodontic treatment plan,” she says.

“Cutting out the middleman in the aligner production process also improves workflow and reduces costs” –Dr Cruz

Dr Cruz says early and even many current aligner options on the market have lacked in precision and require refinements, not to mention their sometimes-scary price tags. SoftSmile software considers data like the mechanical properties of the plastic or the cephalometric data that are also important when building more realistic biomechanical principles.



*Our VISION interface
in action*

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As for clinicians working closely with the developers, she says that it was absolutely necessary and that the results being produced back up the efforts.

“No doubt engineers are key in this endeavor,” Dr Cruz says. “They understand a lot of what we’re doing, but there is also the integration of the biological elements that need to synchronize most accurately. There has been a lot of doctor input, which translates into good outcomes for patients. SoftSmile incorporates all the essentials in the treatment planning with aligners effectively.”

The Vision platform is thorough, taking into account many components including the interplay of tooth anatomy, tissue biology, biomechanics, and the mechanical properties of the plastic, not only including maximum accuracy but also visualization of the anatomy and the interaction of the different structures in the patient’s mouth. Dr Cruz says that, overall, the analysis is more robust and precise, so SoftSmile provides a great-value market solution for doctors and patients.

Accessibility and Affordability

With lower costs made possible by improved workflows, fewer aligners needed for treatment, the elimination of third parties, and more accurate and efficient workflows, SoftSmile hopes to make orthodontic care

more easily available to more people. In addition, the expanding use of teledentistry today will only improve accessibility by eliminating or at least reducing the number of trips to the clinician’s office.

“Patients now are demanding far less time spent in the offices,” explains Dr Cruz. “We need to provide them with safety first because excluding a doctor is really dangerous for a patient who often doesn’t fully understand their needs. With teledentistry, the service is virtual and ensures doctor’s supervision.”

With teledentistry and the SoftSmile software, Dr Cruz can show patients accurate tooth movements and explain possible anatomy restrictions. “If they don’t have enough bone or periodontal tissue, the software is going to tell me the limitations of my tooth movement in the most accurate manner,” she says. “Of course, clinicians have experience and can evaluate these through an x-ray or additional clinical tests. For patients to interpret an x-ray or a clinical test is difficult. With this kind of tool, we have a complete way to provide clear vision and communication of a given problem to the patient.”

Cutting out the middleman in the aligner production process also improves workflow and reduces costs, says Dr Cruz.

“Cost and effectiveness are part of the many challenges we’ve been discovering for doctors and patients.

We just started opening the doors really into what it means for the profession,” says Dr Cruz. “Day by day, we’re just learning more about the implications of this technology in a more demanding consumer society.”

In the past, many orthodontic solutions made it difficult for doctors to make the best treatment workflow decisions. Concerns with pricing and working with a third party also presented obstacles. The last thing patients or clinicians want is expensive orthodontics with less-than-desired results.

“We require orthodontic treatments that are time and cost effective for both doctors and patients,” says Dr Cruz, who notes that plenty of published studies indicate that adult populations put a high value on oral health and straight teeth. However, patients who don’t regularly visit the dentist note that cost is the main reason. “For us, it is essential to make it affordable and accessible for the patient. There is no way that we can offer it differently. Having straight teeth impact patients’ physical, social, and emotional well-being.”

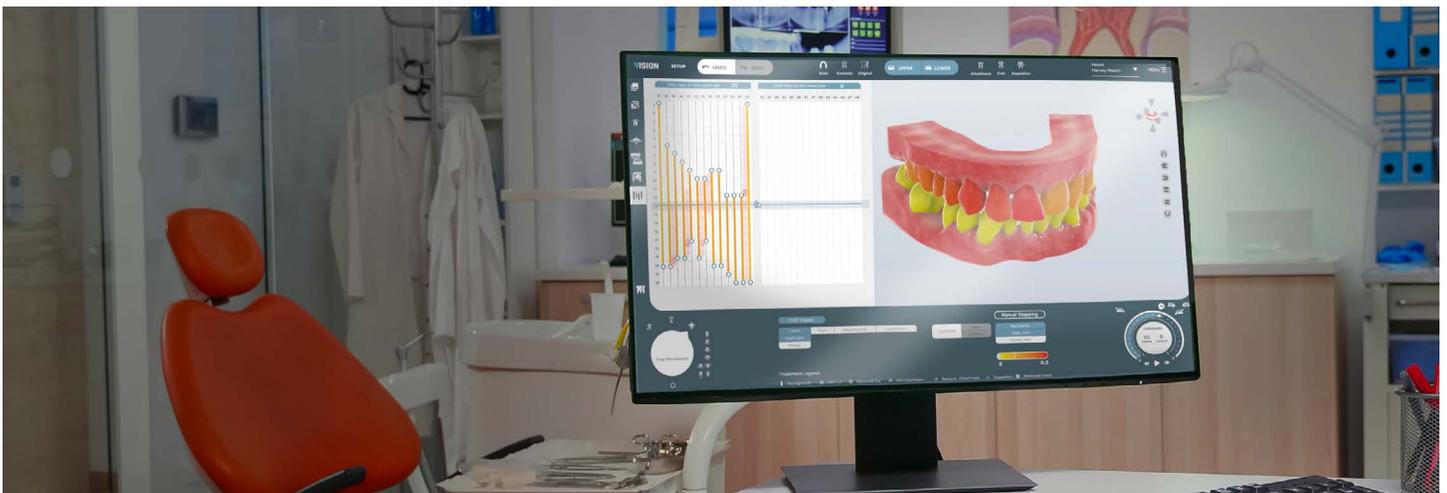
Teledentistry is helping to make dental care more accessible for the patient, and its impact is more evident in orthodontics now that it is not just a tool for a quick consultation. We can reach out to a broader

range of patients. This practice allows more thorough consultations and follow-ups, and the number of in-person visits can be reduced to benefit patients’ lifestyle demands.

“Providing a thorough consultation to a patient is providing the patient with the right tools and accurate information so that they can understand their case’s complexities and treatment options,” Dr Cruz says. “Being able to make a well-informed decision is what makes a difference for a patient deciding whether to take or not to take a treatment....SoftSmile’s software Vision is that perfect tool to use to illustrate a case during a virtual consultation. It gives the ability to provide a patient or another doctor with access to an actual comprehensive visualization of a treatment plan at any stage. You can also collect and store the various versions of the treatment plan, and that’s of a significant value.”

Setup Stage

Preparations are needed before you actually test any of the teeth and start the actual alignment process. This is called setup or staging; this is when the data are moved around so that they are aligned, and then



you generate something called staging, which is essentially the sequence of motions designed in such a way that they are all clinically applicable. Although a clinician might align teeth one way or another, it doesn't guarantee the desired results—it doesn't tell the system how to achieve this final stage. You would again have to do this manually, by specifying for every single tooth the movements needed and, in some cases, waiting for certain teeth to collide before determining the movements of other teeth.

With SoftSmile's software, you don't need to do any of that manually. You just click a button, and it looks at all the collisions that occur and then arranges the speed and the starting points of all these motions in such a way that it's optimal without collisions. Of course, a doctor will always have the final say and will always be able to alter the suggested strategy. A doctor is ultimately responsible for the treatment result.

SoftSmile Aligners/3D Printing

The aligners themselves are genuinely invisible, slim, comfortable, and thanks to a unique Force Control feature within the software, work strictly in the way prescribed by a doctor. These features are designed to ensure that the treatment will be gentle, careful, and successful. Another plus is that Vision makes 3-dimensional (3D) printing easier than ever by integrating with any sophisticated dental printer.

"We are primarily trying to target the global market, but we also try to target in-house production for the benefits of in-house production," Gerikhanov says. "These benefits primarily have to do with not needing to wait for things and not relying on transportation and logistics. Handling this in-house also means not necessarily relying on big external companies and being dependent on them."

One challenge, according to Gerikhanov, is making sure that all the 3D printers being used are capable of producing clinically applicable and clinically correct

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appliances. This challenge is something SoftSmile tackled when designing the software.

Dr Cruz says the software's highly detailed graphics are a great help and its easy integration with 3D printers opens up a world of possibilities for delivering affordable, precise aligners.

"The most important aspect right now is the possibility of 3D printing," she says. "It gives us limitless possibilities with appliance production, not only to produce aligners in-house but also because there is a deep learning curve in setting up the good printer for a given office. SoftSmile can offer everything simultaneously when practices don't have or are on the way to set up their offices. It's going to assist doctors in scaling up to the pace and capacity of each particular doctor's office demands."

For example, suppose the doctor wants to start with a simple process of delivering retainers. In that case, they can do that, and little by little, the practice can grow its capabilities up to print and then, ultimately, produce the aligners in their own offices.

SoftSmile's features include an automated positioning for the 3D model, segmentation respecting the precise anatomy, and automatic detection of tooth axis, which

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is essential to easy manipulation, tooth orientation, design of different tooth movements, and visualization of where the tooth axis can place the tooth right forces.

“It provides a very realistic, accurate image, and that’s huge,” Dr Cruz says. “I cannot describe just how accurate it is. Staging is key. We need to determine the sequence of movements accurately and in the minimal time possible. You get that with this software.”

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Game-changing Innovation

Gerikhanov and SoftSmile’s developers spent countless hours perfecting the SoftSmile software and the company’s process to easily deliver affordable orthodontic treatments to more patients.

“To achieve this, we had to grow our team and involve a lot of people who are not necessarily software developers but rather, mechanics people and doctors and clinicians. And a lot of people from the industry

itself were involved with the development because as a software developer, software engineer, you might know how to do things—and yet you’re not really sure what to do,” Gerikhanov says. “So yes, we worked a lot with actual clinicians and practitioners.”

By eliminating the middleman in the aligner production process and developing a process in which fewer aligners are required to deliver optimal outcomes, SoftSmile looks to pass those savings to the patient and deliver great smiles at economical rates.

“If you cut out the middleman, you typically end up with less costs, but that’s only one part of it,” Gerikhanov says. “The second part is you can end up with the same treatment or the same result with a different number of aligners, a different number of appliances....The more you have, the more it costs to produce. If you minimize the total number of things you need to manufacture for the overall treatment, the price reduces. This is something the software itself tries to address. The idea is to require less and to be more efficient.”

Dr Cruz expects that precise treatment outcomes combined with lower costs will open up orthodontic treatments to patients who may not have been able to pay for or willing to accept these treatments in the past.

“This brings significant cost savings to the patient,” she says. “And now we need more doctors to offer patients these flexibilities. Some cases demand a hybrid approach, needing braces and aligners simultaneously; in the past, we couldn’t offer that because both were very expensive. So right now, this is offering the flexibility of all kinds. I can incorporate whatever I need to meet the complexities of all my patients.”

Best-in-class technology designed to deliver optimal results to more patients at an affordable rate. Who could ask for anything more? More for less.

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