

Minnesota Edition

DOCTOR *of* DENTISTRY

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A middle-aged man with glasses, wearing a blue button-down shirt and a striped tie, is smiling and sitting at a desk. His arms are crossed. Behind him is a computer monitor displaying a 3D dental model of a jaw with blue and white teeth. The background shows grey cabinets and a framed picture on the wall.

**Snyder
Orthodontics**
The Changing Face of Orthodontics

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By Carolyn Will

After listening to Ron Snyder, D.D.S., board certified by the American Board of Orthodontics, talk about the advantages of SureSmile technology for orthodontic treatment, a person may be reminded of the lesson learned from the classic fable of the tortoise and the hare.

The tortoise wins through his steady but sure steps toward the finish line. With SureSmile technology, computer software maps out the shortest distance teeth need to be moved and shape-memory alloy wires apply constant, steady pressure to move teeth into the finishing position without any missteps. Just like the classic fable, this approach is yielding winning smiles.

MAKING THE SWITCH FROM CONVENTIONAL ORTHODONTICS TO SURESMILE

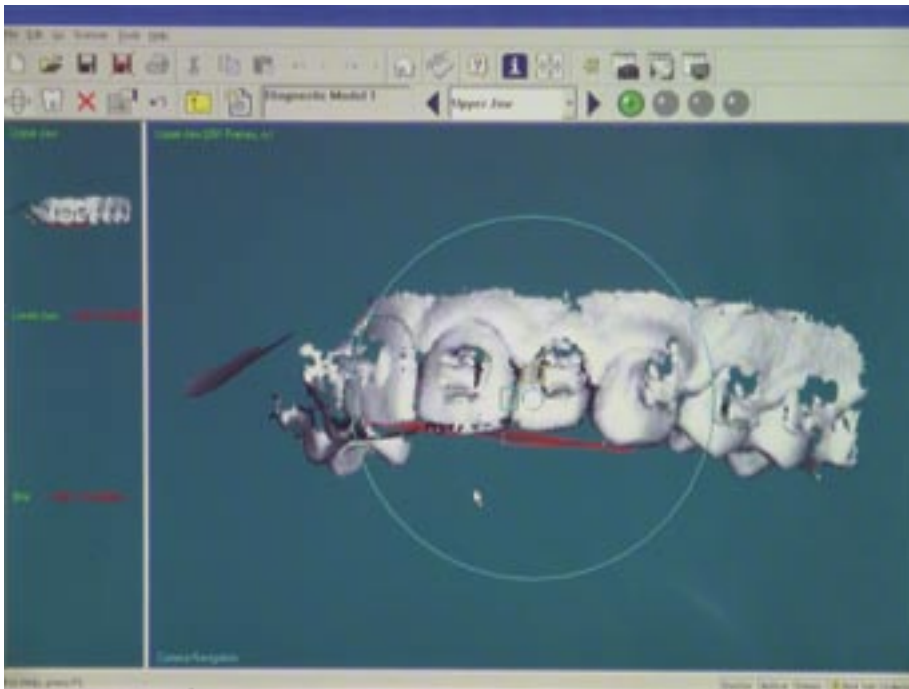
Dr. Snyder has been practicing orthodontics in central Dakota

County since 1987. Snyder Orthodontics, located at 14065 Essex Avenue, Apple Valley, treats both children and adult patients. Up until five years ago, Dr. Snyder practiced conventional braces orthodontics. His average braces treatment time was 23 months, compared with the national average of 26 months. “We had a good record, but I recognized the limits of conventional chairside wire bending,” said Dr. Snyder. “Then, in 2003, SureSmile by OraMetrix asked me to be a beta test site for a system using a new customized wire.” In the following five years, Dr. Snyder has become a proponent of the new technology as he reduced his patients’ treatment times by almost half. “We are finding,” added Dr. Snyder, “that similar to other industries, this increase in efficiency offsets the cost for technology.”

Holding one of the SureSmile archwires in his hand, Dr. Snyder twists it into a looped pretzel shape and releases it. The wire moves

Orthodontic assistant capturing virtual images with a 3-D camera (no radiation).





A precise 3-D image captured during a 30 minute scanning appointment.

back into its customized shape within seconds. The difference is the metal used for the wires. The shape-memory alloy is primarily titanium. “Just as titanium changed golf, it’s changed orthodontics. This is the latest and greatest in accuracy and efficiency,” added Dr. Snyder.

When Dr. Snyder made the decision to use SureSmile for his practice over the other digital-oriented clinical systems available, he identified three major reasons, which he published in *Digital Radiography and Three-Dimensional Imaging* (Dept. of Orthodontics and Pediatric Dentistry, Univ. of Michigan, Vol. 43: 181, 2005).

- He wanted to improve the quality of patient care, increase efficiency and maximize the use of technological advances in 3-D diagnosis, treatment planning and biomechanics.
- SureSmile provides the technology to scan both *in vivo* and *in vitro* at the practice, and uniquely integrates 3-D diagnosis and treatment planning with the manufacture of customized prescription archwires.
- SureSmile provides comprehensive support services that include training, practice marketing, financial analysis, customer care, digital lab and field support.

SURESMILE: ACCURATE AND EFFICIENT

When broken down into steps, the SureSmile technology has three key components:

- OraScanner/image processing
- Treatment planning software
- Computer-aided manufacture of archwires using robot technology

“It’s sophisticated,” said Dr. Snyder, who has now finished 400 patients using SureSmile technology. “Teeth need constant, light force to move. It’s much better than the rigid-move, rigid-move,

conventional method. We have all seen cases where force levels were overdone; the root gets damaged and root resorption occurs. Now, it’s taken to a higher level where it’s more accurate and gentler with essentially no root resorption. Since root resorption is nearly eliminated, a more important biologic benefit is the shorter treatment times. With shorter treatment times, we are seeing less decalcification of teeth which creates unattractive permanent white marks and caries. Importantly, less tooth movement is always better for efficiency. If a patient’s jaw size differences are properly diagnosed and corrected prior to braces then efficiency with sophisticated technology improves.”

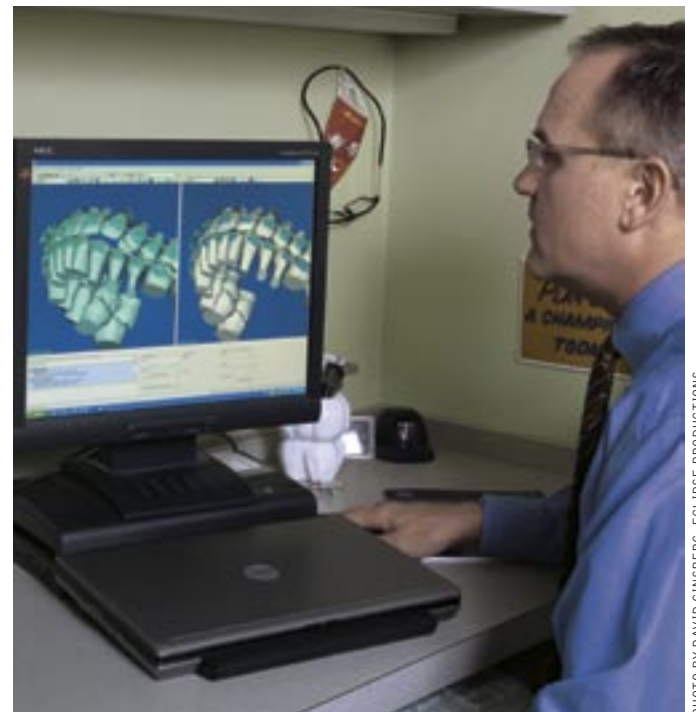
THREE-D IMAGING

The first step is capturing an initial scan taken from the patient’s plaster model that includes the upper arch, lower arch and bite registration. Using the handheld OraScanner, made up of a projector and a video camera, the structure of the patient’s mouth is scanned and sent to the OraMetrix digital lab. What’s returned to Dr. Snyder, via the Internet, is a 3-D model of his patient’s dentition.

COMPUTER-AIDED TREATMENT PLANNING

“I will look at the 3-D image and create a customized treatment

Dr. Snyder using SureSmile software to virtually design tooth movements and order robotic bent titanium wires.





Lateral head film being taken with a Kodak 8000C digital cephalometric and panoramic system. Soon this will be outdated technology, as cone beam radiology will one day integrate SureSmile technology.

plan,” said Dr. Snyder, as he points to an image on his computer screen. Using his treatment plan as a guide, the braces are put on the patient and another scan is taken. From the scan, Dr. Snyder will develop a custom archwire prescription. “Based on the panorex X-ray finding, for example, a tooth may be a little too close to another tooth. I can move the tooth by moving the virtual tooth—in tenths of a millimeter. Applying sound biologic tooth movement principles, I can map out all required tooth movements very early in treatment and then initiate movement in a healthy way.”

ROBOTIC CUSTOMIZATION OF SHAPE-MEMORY ALLOY WIRES

At the OraMetrix lab, robotic hands will follow Dr. Snyder’s prescription to create the patient’s customized shape-memory alloy archwire. First, the lab will send a targeted setup of the patient for evaluation. Dr. Snyder can review and make any necessary adjustments or manipulations to the final design using the computer software. Once the final adjustments are made, the robot bends the wire. “Creating a setup on the computer is exciting,” said Dr. Snyder. “Here, I apply all my knowledge on orchestrated tooth movement, which can be extremely sophisticated. The system is only as good as the programmer.”

The technology to create shape-memory archwires was originally introduced by NASA and the University of Iowa. SureSmile expanded on this technology by making use of hot-cold memory technology. The material is heated to 400° centigrade and the robotic arms then bend the orthodontic wires in all three planes of space. The accuracy of the SureSmile archwire bends is 1/10 of a millimeter for linear bends and 1° for angular bends, as reported in Dr. Snyder’s published article. (Dept. of Orthodontics and Pediatric Dentistry, Univ. of Michigan, Vol. 43: 187, 2005). “Shape-memory alloys were introduced 20 years ago,” said Dr. Snyder. “These wires are used routinely by orthodontists throughout the world. Since the wire cannot be bent by the conventional orthodontist, he or she is forced to use bendable wire technology to customize patient care. SureSmile technology circumvents this problem by accurately bending the alloy wire to specific patient needs.”

The metal alloy properties work by applying constant pressure to allow for a wide range of tooth movement. “An in-depth look at the stress-strain behavior of the alloy reveals some very interesting behavior of clinical relevance. Initially, when the archwire is deflected to engage severe malocclusions, the material transforms into stress-induced martensite, which has near zero stiffness. As

the archwire recovers towards its final position and brings the tooth with it, it becomes stiffer, because the martensite begins to transform into austenite. In the last millimeter of recovery, the archwire generally has transformed completely into austenite (Ormco's Product Offerings, 2003; SureSmile User Manual, 2004, Sachdeva, 2005).

For patient comfort, Dr. Snyder's informational patient CD instructs SureSmile wearers to drink cold beverages to soften the metal. When the metal is warmed by the human body, or even more so by drinking hot beverages, the heat will stiffen the metal wire.

Patient Lori Hoganson, 45, had SureSmile orthodontics two years ago and remembers feeling very little discomfort. "When I compare my experience with what two of my sons said they felt with the traditional braces, it was nothing. And I had some crooked teeth," she said. Mrs. Hoganson's two front teeth overlapped and the entire left side of her mouth collapsed, creating crowding of both upper and lower jaws.

"I am just so grateful. It went so quick, I was amazed," said Mrs. Hoganson, who had her braces on for just under a year. "We live in Stillwater," said Mrs. Hoganson. "Distance was not a problem due to the shorter treatment time and fewer visits." She will continue to have supporting wires inside the upper and lower front teeth for several years and she wears a retainer at night. The patient added that another benefit to having her malocclusion fixed has been the positive effect it's had on her receding gums, which have plagued most of her family. Now her youngest son is in SureSmile braces.

Because the archwire is designed to "remember" the doctor's prescription, the teeth move more directly to their target positions, reducing total treatment time. "I'm getting into finishing wires at the beginning. It's revolutionized the way we do braces. It's a totally different way to look at tooth movement. Orthodontists traditionally treat the patient retrospectively. The patient comes in, we review what we did last month, evaluate those changes and then put some bends in the wire and send them on their way until they come back to do it all over again," said Dr. Snyder. "This is actually setting up all the teeth for their end positions at the beginning." Dr. Snyder has his SureSmile patients come in for check-ups every eight weeks, rather than the typical four to six weeks with conventional braces.

The finishing wire is slid into the brackets and the orthodontist watches the teeth move slowly into position, with far less discomfort for patients. "The wire is very flexible so it's not painful. It's more efficient, more constant, more biological," said Dr. Snyder.

CLAIMING ONLY WHAT'S TRUE AND SUBSTANTIATED

With tremendous recent advances in technology come claims that technology creates excellence. As stated earlier, Dr. Snyder and his clinical team at Snyder Orthodontics have treated 400



Robotic wire bending of fully customized copper nickel titanium orthodontic wire — a revolutionary merger of high-speed Internet technology, metallurgy and robotics

PHOTO PROVIDED BY SURESMILE

patients with SureSmile since 2003. The average treatment time has been impressively reduced from an average of 23 months with conventional orthodontic treatment to an average of 14 months with SureSmile. However, Dr. Snyder is careful not to make claims to the general public until his results have been studied and substantiated by a third party.

"The recent technological changes have been significant in orthodontics. Our profession relies upon practices that assist the development of clinical efficiency and quality care. Here at Snyder Orthodontics, we have seen tremendous improvements in treatment efficiency and treatment outcomes due in large part to the advancements in technology. We have also witnessed in our profession a blind association of technology with quality," said Dr. Snyder. "Although I have seen improvements in quality as technology has improved, I cannot ethically claim that my clinical systems are better than another due to advanced technology.

"The faculty at the University of Indiana Department of Orthodontics is currently studying my outcome changes when applying SureSmile technology. After five years using this technology, I am comfortable to claim that my outcomes and efficiency is



Snyder Orthodontics, established 1987, Apple Valley, MN



Arch collapse and space gained with nonsurgical palatal expansion followed by 11 months of braces with SureSmile.



significantly improved. However, I can only say that empirically until this important study is completed.

“Although we strive to treat all patients to the standards of the American Board of Orthodontics, I most certainly can’t claim that my practice has better outcomes or is more efficient than any other orthodontic practice. When practitioners claim to provide superior treatment without having scientifically reliable evidence to support their claim, it erodes the integrity of our profession and the trust of our patients,” added Dr. Snyder.

PERSONAL HISTORY

After graduating from the University of Notre Dame in 1980, Dr. Snyder returned to his birthplace of Denver to attend the University of Colorado School of Dentistry. He completed his general practice residency at the University of Chicago Hospitals and his orthodontic training at the University of Illinois. He is board certified by the American Board of Orthodontics and is a member of the prestigious Edward H. Angle Society of Orthodontists, as well as several other orthodontic professional organizations. He is the orthodontic advisor to the Dakota/Northfield chapter of the Seattle Study Club for adult treatment. Dr. Snyder lectures extensively. He is an adjunct faculty member at Marquette University Department of Orthodontics.

When not involved in his professional pursuits, Dr. Snyder enjoys family life with his wife and three children. He also enjoys running, golf and cheering for his alma mater’s football team and the Minnesota Twins. ■