

ALIGN TECHNOLOGY INC.,

Plaintiff,

v.

CLEARCORRECT OPERATING LLC,
CLEARCORRECT HOLDINGS, INC. &
INSTITUT STRAUMANN AG,

Defendants

CLEARCORRECT OPERATING LLC,
CLEARCORRECT HOLDINGS, INC. &
STRAUMANN USA, LLC,

Counterclaim-Plaintiffs

v.

ALIGN TECHNOLOGY INC.,

Counterclaim-Defendant

Case No. 6:24-CV-00187-ADA-DTG

Pursuant to the Court’s Standing Order Governing Proceedings (“OGP”) Version 4.4, Align Technology Inc. serves its preliminary infringement contention charts and identification of priority dates on ClearCorrect,¹ Institut Straumann AG, and Straumann USA, LLC.

Align's preliminary infringement contention charts are attached as Exhibits A-I to these disclosures. As set forth on those charts, and based on Align's current knowledge, understanding,

ClearCorrect Exhibit 1014, Page 1 of 156

and belief as to Defendants’ products and practices, the following products (“Accused Products”) practice and/or their use practices at least the following claims (“Asserted Claims”):

Asserted Patent	Asserted Claims	Accused Products
U.S. Patent No. 10,973,613	1, 3, 4, 6-10, 12-15, 17, 18, 20, 22	Aligners made by Defendants from ClearQuartz
U.S. Patent No. 11,154,384	1, 2, 4, 6-8, 10-12, 14, 16-18, 20-22, 24, 26-28, 30	
U.S. Patent No. 11,648,090	1-3, 5, 9-10	
U.S. Patent No. 11,648,091	1, 4-7, 9-11, 13, 17-19, 21, 25, 26	
U.S. Patent No. 8,038,444	1-42	Defendants’ treatment planning software, likely named “Cut & Stage,” “ClearPilot,” or both; digital models of treatment plans produced by that software
U.S. Patent No. 10,456,217	1-20	
U.S. Patent No. 10,524,879	1-24	
U.S. Patent No. 11,369,456	1-19	
U.S. Patent No. 10,791,936	1-20	Virtuo Vivo intraoral scanner system

Defendants have yet to produce documents or other information regarding the Accused Products. Align’s preliminary infringement contention charts are therefore based on publicly available information about Defendants’ products and practices and reflect Aligns’ reasonable efforts to investigate the same. Align reserves the right to amend these disclosures based on Defendants’ productions of “technical documents” pursuant to the OGP, discovery, the Court’s claim construction rulings, Align’s ongoing investigation, and other events including, but not limited to, changes to Defendants’ products, product offerings, and business practices.

II. PRELIMINARY IDENTIFICATION OF THE PRIORITY DATE FOR EACH CLAIM OF THE ASSERTED PATENTS

The Asserted Claims are entitled to priority dates at least as early as shown below:

Asserted Patent	Asserted Claims	Priority Date
U.S. Patent No. 10,973,613	1, 3, 4, 6-10, 12-15, 17, 18, 20, 22	May 12, 2011
U.S. Patent No. 11,154,384	1, 2, 4, 6-8, 10-12, 14, 16-18, 20-22, 24,	May 12, 2011

	26-28, 30	
U.S. Patent No. 11,648,090	1-3, 5, 9-10	May 12, 2011
U.S. Patent No. 11,648,091	1, 4-7, 9-11, 13, 17-19, 21, 25, 26	May 12, 2011
U.S. Patent No. 8,038,444	1-42	Aug. 30, 2006
U.S. Patent No. 10,456,217	1-20	Aug. 30, 2006
U.S. Patent No. 10,524,879	1-24	Aug. 30, 2006
U.S. Patent No. 11,369,456	1-19	Aug. 30, 2006
U.S. Patent No. 10,791,936	1-20	July 19, 2010

As the Court has not yet entered a claim construction order and Align's investigation remains ongoing, Align reserves the right to amend its preliminary identification of priority dates.

III. DOCUMENT PRODUCTION ACCOMPANYING PRELIMINARY INFRINGEMENT CONTENTIONS

A. Documents Evidencing Conception and Reduction to Practice

Align has produced copies of the following documents that may be relevant to conception, diligence, or reduction to practice for one or more of the claimed inventions of the Asserted Patents: ALGN00000001-ALGN00014839.

As the Court has not yet entered a claim construction order and Align's investigation remains ongoing, Align reserves the right to supplement its production.

B. File Histories for Asserted Patents

Align has produced certified copies of the file histories for each Asserted Patent:

Asserted Patent	Patent Application No.	Begin Production Bates No.
U.S. Patent No. 10,973,613	15/476,655	ALGN00006176
U.S. Patent No. 11,154,384	17/214,487	ALGN00007203
U.S. Patent No. 11,648,090	17/858,825	ALGN00010914
U.S. Patent No. 11,648,091	17/902,445	ALGN00011251
U.S. Patent No. 8,038,444	11/848,172	ALGN00011450
U.S. Patent No. 10,456,217	15/834,608	ALGN00001020
U.S. Patent No. 10,524,879	15/834,649	ALGN00001411
U.S. Patent No. 11,369,456	16/723,706	ALGN00007541
U.S. Patent No. 10,791,936	16/586,528	ALGN00001823

Dated: July 18, 2024

Respectfully submitted,

/s/ Brian C. Nash

Brian C. Nash (TX Bar No. 24051103)
Austin M. Schnell (TX Bar No. 24095985)
MORRISON & FOERSTER LLP
300 Colorado Street, Suite 1800
Austin, TX 78701
Tel: (512) 617-0650
Fax: (737) 910-0730
BNash@mofo.com
ASchnell@mofo.com

Richard S.J. Hung (*pro hac vice*)
Daralyn J. Durie (*pro hac vice*)
Forrest M. McClellen (*pro hac vice*)
Ian A. Bennett (*pro hac vice*)
MORRISON & FOERSTER LLP
425 Market Street
San Francisco, CA 94105
Tel: (415) 268-7000
Fax: (415) 268-7522
rhung@mofo.com
ddurie@mofo.com
fmccllellen@mofo.com
ibennett@mofo.com

Counsel for Plaintiff
ALIGN TECHNOLOGY, INC.

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and correct copy of this document has been served on all counsel of record via electronic mail on July 18, 2024.

/s/ Brian C. Nash
Brian C. Nash

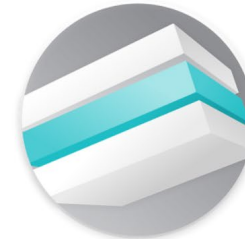
EXHIBIT A

U.S. Patent No. 10,973,613	
1[Pre]: A method making a dental appliance for positioning a patient's teeth, the method comprising:	If limiting, ClearCorrect makes aligners, which are dental appliances for positioning a patients' teeth. 8. Summary of Usage A dental health care professional (e.g. orthodontists or dentists), prescribes the ClearCorrect system based on an assessment of the patient's teeth, determines a course of treatment with the system, takes molds of the patient's teeth and completes a prescription form. The molds and prescription are sent to ClearCorrect. Utilizing standard dental software used for tooth alignment, ClearCorrect designs a series of plastic trays intended to gradually realign the patient's teeth in accordance with the physician's prescription. The prescribing physician reviews and approves the model scheme before the molds are produced. Once approved, ClearCorrect produces the trays, which are formed of clear, thin thermoformed polyeurathaneplastic. The trays are sent back to the dental health care professional, who then provides them to the patient, confirming fit and design. Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position. The dental care professional monitors treatment from the moment the first aligner is delivered to when treatment is completed. The trays are held in place by pressure and can be removed by the patient at any time. This technology is essentially identical to that used by a number of sequential alignment systems, including the predicates referenced below. Doc. 1-11 at 3.
1[A]: providing a sheet comprising three or more polymer layers, the three or more polymer layers comprising:	ClearCorrect makes its aligners by providing a sheet comprising three or more polymer layers. ClearCorrect makes its aligners from Zendura FLX, which is also known as ClearQuartz, a polymer sheet with three layers:

U.S. Patent No. 10,973,613

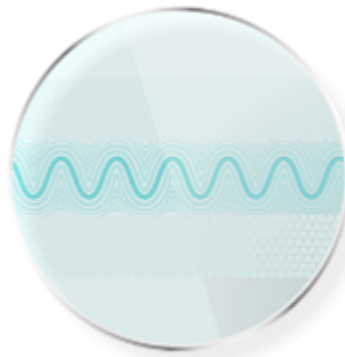
ClearQuartz™ tri-layer material.

ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*



- **Low-porosity material**
For toughness and stain resistance
- **Elastomeric layer**
Applies gentle, consistent, and continuous force

About the Aligners, Straumann (2024),
<https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html>.



Low-porosity material

For durability and stain-resistance

Elastomeric layer

Applies gentle, consistent, and continuous force

ClearCorrect Aligners, ClearCorrect (Mar. 12, 2024),
<https://support.clearcorrect.com/hc/en-us/articles/4410091639063-ClearCorrect-Aligners>.

U.S. Patent No. 10,973,613

1[B]: a hard polymer layer comprising a co-polyester and having a flexural modulus greater than about 150,000 psi; and

On information and belief, ClearCorrect's aligners include a hard polymer layer made from either Tritan MX-710 or MX-711, both of which are co-polyesters. Each of those plastics has a flexural modulus of about 225,000 psi:

Mechanical Properties		
Tensile Stress @ Yield	D 638	43 MPa (6200 psi)
Tensile Stress @ Break	D 638	53 MPa (7700 psi)
Elongation @ Yield	D 638	6 %
Elongation @ Break	D 638	210 %
Tensile Modulus	D 638	1550 MPa (2.25×10^5 psi)
Flexural Modulus	D 790	1550 MPa (2.25×10^5 psi)
Flexural Yield Strength	D 790	62 MPa (9000 psi)

Technical Data Sheet: Eastman Tritan Copolyester MX0710, Eastman (Sept. 12, 2019), <https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710>; *Technical Data Sheet: Eastman Tritan Copolyester MX0711*, Eastman (Sept. 12, 2019), <https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711> (same).

1[C]: a soft polymer layer comprising a thermoplastic polyurethane elastomer and having an elongation at break of greater than about 200%, and a hardness from about 60A to about 85D;

On information and belief, ClearCorrect's aligners include a soft polymer layer made from Tecothane TPU-Clear TT 1065-D, which is a thermoplastic polyurethane elastomer. On information and belief, Tecothane TPU-Clear TT 1065-D has an elongation at break of 300% and a hardness of 64D:

U.S. Patent No. 10,973,613

Tecothane® TPU - Clear

Type: Medical Grade Aromatic Polyether-based Thermoplastic Polyurethanes (TPUs)

Features: Variety of hardnesses, good mechanical properties, good chemical resistance, and can be color-matched

Process: Extrusion and Injection Molding

Products & Properties	ASTM Test	TT-1074A	TT-1085A	TT-1095A	TT-1055D	TT-1065D	TT-1069D	TT-1072D	TT-1075D-M
Durometer (Shore Hardness)	D2240	75A	85A	94A	54D	64D	69D	74D	75D
Specific Gravity	D792	1.10	1.12	1.15	1.16	1.18	1.18	1.18	1.19
Flexural Modulus (psi)	D790	1,300	3,000	8,000	18,000	26,000	44,000	73,000	180,000
Ultimate Tensile (psi)	D412	6,000	7,000	9,000	9,600	10,000	8,800	9,000	8,300
Ultimate Elongation (%)	D412	550	450	400	350	300	310	275	150
Tensile Modulus (psi)	D412								
at 100% Elongation		500	800	1300	2500	2800	3200	3700	3600
at 200% Elongation		700	1000	2100	3800	4600	4200	3900	NA
at 300% Elongation		1100	1600	4300	6500	7800	NA	NA	NA
Mold Shrinkage (in/in)	D955	.008-.012	.008-.012	.006-.010	.004-.008	.004-.008	.004-.008	.004-.006	.004-.006

Tecothane TPU – Clear Datasheet, Lubrizol LifeSciences (July 8, 2019),
<https://www.lubrizol.com/-/media/Lubrizol/Health/TDS/Tecothane-TPU-Clear.pdf>.

1[D]: providing a positive model of the patient's teeth in a target position; and

ClearCorrect fabricates its aligners by providing a positive model of the patient's teeth in a target position:

U.S. Patent No. 10,973,613



Clearcorrect expands production capacity for orthodontic aligners by 30 percent, stratsys (Aug. 19, 2020), <https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/>; see also Doc. 1-11 at 3.

1[E]: fabricating an appliance as a negative of the positive model comprising thermoforming the sheet over the positive model.

ClearCorrect fabricates its aligners as a negative of the positive model by thermoforming the sheet over the positive model:



U.S. Patent No. 10,973,613	
	<i>Clearcorrect expands production capacity for orthodontic aligners by 30 percent</i>, stratsys (Aug. 19, 2020), https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/; see also Doc. 1-11 at 3.
3: The method of claim 1, wherein the hard polymer layer comprises at least two layers and the at least two layers each independently comprise a polyester, a co-polyester, a polycarbonate, a thermoplastic polyurethane, a polypropylene, a polyethylene, a polypropylene and polyethylene copolymer, an acrylic, a cyclic block copolymer, a polyetheretherketone, a polyamide, a polyethylene terephthalate, a polybutylene terephthalate, a polyetherimide, a polyethersulfone, or a polytrimethylene terephthalate.	ClearQuartz includes two hard outer layers: ClearQuartz™ tri-layer material. ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*  • Low-porosity material For toughness and stain resistance • Elastomeric layer Applies gentle, consistent, and continuous force <i>About the Aligners</i>, Straumann (2024), https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html. On information and belief, the hard material used in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711, both of which are co-polyesters.
4: The method of claim 1, wherein the soft polymer layer further comprises a styrenic block copolymer, a silicone rubber, an elastomeric alloy, a thermoplastic elastomer, a thermoplastic vulcanizate elastomer, a block copolymer elastomer, a polyolefin blend elastomer, a thermoplastic co-polyester elastomer,	On information and belief, ClearCorrect's aligners include a soft polymer layer made from Tecothane TPU-Clear TT 1065-D, which is a thermoplastic elastomer.

U.S. Patent No. 10,973,613																																			
a thermoplastic polyamide elastomer, or a combination thereof.																																			
6: The method of claim 1, wherein the hard polymer layer comprises at least one of a tensile strength at yield of between about 4000 psi and 6500 psi, an elongation at yield of greater than about 4%, an elongation at break of greater than about 70%, a tensile modulus of greater than about 150,000 psi, a stress relaxation greater than about 10% at 24 hours testing in a wet environment, and a light transmission between 400 nm and 800 nm of greater than about 75%.	On information and belief, the hard material used in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711. Eastman Tritan MX-710 and MX-711 each have a tensile strength at yield of 6200 psi, an elongation at break of 210%, a tensile modulus of 225,000 psi: <table><tr><th colspan="3">Mechanical Properties</th></tr><tr><td>Tensile Stress @ Yield</td><td>D 638</td><td>43 MPa (6200 psi)</td></tr><tr><td>Tensile Stress @ Break</td><td>D 638</td><td>53 MPa (7700 psi)</td></tr><tr><td>Elongation @ Yield</td><td>D 638</td><td>6 %</td></tr><tr><td>Elongation @ Break</td><td>D 638</td><td>210 %</td></tr><tr><td>Tensile Modulus</td><td>D 638</td><td>1550 MPa (2.25 x 10⁵ psi)</td></tr><tr><td>Flexural Modulus</td><td>D 790</td><td>1550 MPa (2.25 x 10⁵ psi)</td></tr><tr><td>Flexural Yield Strength</td><td>D 790</td><td>62 MPa (9000 psi)</td></tr></table> <i>Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710; <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 (same). On information and belief, both the Tritan MX-710 and the MX-711 plastics also have a light transmission between 400 nm and 800 nm of greater than about 75%. According to the manufacturer of the Tritan plastics, both polymers have a “total transmittance” of “90%.” <table><tr><th colspan="3">Optical Properties</th></tr><tr><td>Total Transmittance</td><td>D 1003</td><td>90 %</td></tr><tr><td>Haze</td><td>D 1003</td><td><1 %</td></tr></table>		Mechanical Properties			Tensile Stress @ Yield	D 638	43 MPa (6200 psi)	Tensile Stress @ Break	D 638	53 MPa (7700 psi)	Elongation @ Yield	D 638	6 %	Elongation @ Break	D 638	210 %	Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)	Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)	Flexural Yield Strength	D 790	62 MPa (9000 psi)	Optical Properties			Total Transmittance	D 1003	90 %	Haze	D 1003	<1 %
Mechanical Properties																																			
Tensile Stress @ Yield	D 638	43 MPa (6200 psi)																																	
Tensile Stress @ Break	D 638	53 MPa (7700 psi)																																	
Elongation @ Yield	D 638	6 %																																	
Elongation @ Break	D 638	210 %																																	
Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)																																	
Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)																																	
Flexural Yield Strength	D 790	62 MPa (9000 psi)																																	
Optical Properties																																			
Total Transmittance	D 1003	90 %																																	
Haze	D 1003	<1 %																																	

U.S. Patent No. 10,973,613

Id.

On information and belief, the stress relaxation at 24 hours in a wet environment of between 90-100% humidity of at least Eastman Tritan MX-711 is greater than 10%.

7: The method of claim 1, wherein the soft polymer layer comprises at least one of an ultimate tensile strength of greater than about 5000 psi, a compression set at about 70° C. of greater than 40% after 24 hours, a flexural modulus of greater than about 35,000 psi, and a light transmission between 400 nm and 800 nm of greater than about 75%.

On information and belief, the soft material used in the ClearQuartz blanks is Tecothane TPU-Clear TT-1065D. Tecothane TPU-Clear TT-1065D has an ultimate tensile strength of 10,000 psi:

Tecothane® TPU - Clear

Type: Medical Grade Aromatic Polyether-based Thermoplastic Polyurethanes (TPUs)

Features: Variety of hardnesses, good mechanical properties, good chemical resistance, and can be color-matched

Process: Extrusion and Injection Molding

Products & Properties	ASTM Test	TT-1074A	TT-1085A	TT-1095A	TT-1055D	TT-1065D	TT-1069D	TT-1072D	TT-1075D-M
Durometer (Shore Hardness)	D2240	75A	85A	94A	54D	64D	69D	74D	75D
Specific Gravity	D792	1.10	1.12	1.15	1.16	1.18	1.18	1.18	1.19
Flexural Modulus (psi)	D790	1,300	3,000	8,000	18,000	26,000	44,000	73,000	180,000
Ultimate Tensile (psi)	D412	6,000	7,000	9,000	9,600	10,000	8,800	9,000	8,300
Ultimate Elongation (%)	D412	550	450	400	350	300	310	275	150
Tensile Modulus (psi)	D412								
at 100% Elongation		500	800	1300	2500	2800	3200	3700	3600
at 200% Elongation		700	1000	2100	3800	4600	4200	3900	NA
at 300% Elongation		1100	1600	4300	6500	7800	NA	NA	NA
Mold Shrinkage (in/in)	D955	.008-.012	.008-.012	.006-.010	.004-.008	.004-.008	.004-.008	.004-.006	.004-.006

Tecothane TPU – Clear Datasheet, Lubrizol LifeSciences (July 8, 2019),
<https://www.lubrizol.com/-/media/Lubrizol/Health/TDS/Tecothane-TPU-Clear.pdf>.

U.S. Patent No. 10,973,613	
8: The method of claim 1, further comprising fabricating a plurality of appliances corresponding to different arrangements of the patient's teeth.	ClearCorrect makes its aligners by performing the method of claim 1, further comprising fabricating a plurality of appliances: Retainers Retainers can either be based on a previous step or on new impressions or scans. • During UNLIMITED Treatment, you may order up to two sets of retainers every six months at no additional cost. • During ONE Treatment, you may order up to one set of retainers at the end of treatment, within one year from date the first Appliance is shipped. • During TWO treatment, you may order up to two sets of retainers at the end of treatment, within 24 months from date the first Appliance is shipped. • During THREE treatment, you may order up to three sets of retainers at the end of treatment, within 36 months from date the first Appliance is shipped. • All other retainers are available at standard FLEX prices. <i>ClearCorrect's Treatment and Pricing Options</i>, ClearCorrect (2023), https://support.clearcorrect.com/hc/en-us/articles/4402074198807-ClearCorrect-s-Treatment-Pricing-Options. The aligners have various shapes corresponding to different arrangements of teeth:

U.S. Patent No. 10,973,613	
	8. Summary of Usage A dental health care professional (e.g. orthodontists or dentists), prescribes the ClearCorrect system based on an assessment of the patient's teeth, determines a course of treatment with the system, takes molds of the patient's teeth and completes a prescription form. The molds and prescription are sent to ClearCorrect. Utilizing standard dental software used for tooth alignment, ClearCorrect designs a series of plastic trays intended to gradually realign the patient's teeth in accordance with the physician's prescription. The prescribing physician reviews and approves the model scheme before the molds are produced. Once approved, ClearCorrect produces the trays, which are formed of clear, thin thermoformed polyurethaneplastic. The trays are sent back to the dental health care professional, who then provides them to the patient, confirming fit and design. Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position. The dental care professional monitors treatment from the moment the first aligner is delivered to when treatment is completed. The trays are held in place by pressure and can be removed by the patient at any time. This technology is essentially identical to that used by a number of sequential alignment systems, including the predicates referenced below. Doc. 1-11 at 3; <i>see also</i> Doc. 1-12 at 8.
9: The method of claim 8, wherein fabricating the plurality of appliances comprises digitally staging a plurality of digital models of the patient's teeth and generating a plurality of physical models from the digital models.	ClearCorrect makes its aligners using the method of claim 8, wherein fabricating the plurality of appliances comprises digitally staging a plurality of digital models of the patient's teeth and generating a plurality of physical models from the digital models. As ClearCorrect has explained in FDA submissions, ClearCorrect uses software to digitally stage models of dental patients' teeth. <i>See, e.g.,</i> Doc. 1-11 at 3; Doc. 1-12 at 8. ClearCorrect has published images of those digital models in YouTube videos. <i>See, e.g., ClearPilot features: The Control is in Your Hands</i>, ClearCorrect, https://www.youtube.com/watch?v=DYVS21zqH0c (annotated). After a dentist reviews and approves the digital models, ClearCorrect generates physical models from the digital models via 3-D printing. <i>See</i> Doc. 1-11 at 3; Doc. 1-12 at 8; <i>Clearcorrect expands production capacity for orthodontic aligners by 30 percent</i>, stratsys (Aug. 19, 2020), https://www.stratasys.com/en/resources/blog/clearcorrect-3d-printing/.

U.S. Patent No. 10,973,613	
10: The method of claim 8, wherein two or more of the plurality of appliances comprise a sheet comprising the hard polymer layer and the soft polymer layer.	ClearCorrect makes its aligners from ClearQuartz, a polymer sheet with two hard layers and one soft layer. <i>See</i> Limitations 1[A]-1[C].
12: The method of claim 1, wherein the three or more polymer layers each comprise: co-polyester material having a flexural modulus greater than about 150,000 psi; or thermoplastic polyurethane elastomer material having an elongation at break of greater than about 200% and a hardness from about 60 A to about 85 D.	The polymer layers of ClearCorrect's aligners either a copolyester material with a flexural modulus of about 225,000 psi or a thermoplastic polyurethane elastomer material with an elongation at break of 300% and a hardness of 64D. <i>See</i> Limitations 1[B], 1[C].
13: The method of claim 12, wherein the three or more polymer layers alternate between soft and hard polymer layers.	The three polymer layers in ClearCorrect's aligners alternate between soft and hard polymer layers: ClearQuartz™ tri-layer material. ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*  • Low-porosity material For toughness and stain resistance • Elastomeric layer Applies gentle, consistent, and continuous force

U.S. Patent No. 10,973,613	
	<i>About the Aligners</i>, Straumann (2024), https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html.
14: The method of claim 13, wherein the sheet has three polymer layers.	ClearCorrect's aligners include three polymer layers: ClearQuartz™ tri-layer material. ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*  • Low-porosity material For toughness and stain resistance • Elastomeric layer Applies gentle, consistent, and continuous force <i>About the Aligners</i>, Straumann (2024), https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html.
15. The method of claim 12, wherein the hard polymer layer is positioned adjacent to one or more soft polymer layers, the one or more soft polymer layers comprising the soft polymer layer.	ClearCorrect's aligners include the two hard polymer layers positioned adjacent to the inner soft polymer layer: ClearQuartz™ tri-layer material. ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*  • Low-porosity material For toughness and stain resistance • Elastomeric layer Applies gentle, consistent, and continuous force <i>About the Aligners</i>, Straumann (2024), https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html.

U.S. Patent No. 10,973,613	
17: The method of claim 1, wherein the appliance comprises a co-extruded material.	On information and belief, ClearQuartz is a co-extruded material.
18: The method of claim 1, wherein the appliance comprises a thickness of between 500 µm and 1200 µm.	ClearCorrect aligners have a thickness of 750 µm. <i>See</i> Yashodhan M. Bichu et al., <i>Advances in orthodontic clear aligner materials</i> , Bioactive Materials, 22, 384-403, Table 1 (2023).
20[Pre]: A method of making a plurality of dental appliances for positioning a patient's teeth, the method comprising:	If limiting, ClearCorrect makes aligners, which are plurality of dental appliances for positioning a patient's teeth. <i>See, e.g., ClearCorrect's Treatment and Pricing Options</i> , ClearCorrect (2023), https://support.clearcorrect.com/hc/en-us/articles/4402074198807-ClearCorrect-s-Treatment-Pricing-Options ; Doc. 1-11 at 3.
20[A]: providing a sheet comprising three or more polymer layers, the three or more polymer layers comprising:	<i>See</i> Limitation 1[A].
20[B]: a hard polymer layer comprising a co-polyester and having a flexural modulus greater than about 150,000 psi: and	<i>See</i> Limitation 1[B].
20[C]: a soft polymer layer comprising a thermoplastic polyurethane elastomer and having an elongation at break of greater than	<i>See</i> Limitation 1[C].

U.S. Patent No. 10,973,613	
about 200%, and a hardness from about 60A to about 85D;	
20[D]: Providing a plurality of positive models of the patient's teeth, each in a target position; and	<i>See</i> Limitation 1[D].
20[E]: fabricating the plurality of dental appliances, each as a negative of at least one of the plurality of positive models comprising thermoforming the sheet over the at least one positive model.	<i>See</i> Limitation 1[E].
22: The method of claim 20, wherein the soft polymer layer further comprises a styrenic block copolymer, a silicone rubber, an elastomeric alloy, a thermoplastic elastomer, a thermoplastic vulcanizate elastomer, a block copolymer elastomer, a polyolefin blend elastomer, a thermoplastic co-polyester elastomer, a thermoplastic polyamide elastomer, or a combination thereof.	<i>See</i> Claim 4.

EXHIBIT B

U.S. Patent No. 11,154,384	
1[Pre]: A dental appliance for positioning a patient's teeth from a first arrangement toward a second arrangement, the dental appliance comprising:	If limiting, ClearCorrect's aligners are dental appliances for positioning a patients' teeth. 8. Summary of Usage A dental health care professional (e.g. orthodontists or dentists), prescribes the ClearCorrect system based on an assessment of the patient's teeth, determines a course of treatment with the system, takes molds of the patient's teeth and completes a prescription form. The molds and prescription are sent to ClearCorrect. Utilizing standard dental software used for tooth alignment, ClearCorrect designs a series of plastic trays intended to gradually realign the patient's teeth in accordance with the physician's prescription. The prescribing physician reviews and approves the model scheme before the molds are produced. Once approved, ClearCorrect produces the trays, which are formed of clear, thin thermoformed polyeurathaneplastic. The trays are sent back to the dental health care professional, who then provides them to the patient, confirming fit and design. Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position. The dental care professional monitors treatment from the moment the first aligner is delivered to when treatment is completed. The trays are held in place by pressure and can be removed by the patient at any time. This technology is essentially identical to that used by a number of sequential alignment systems, including the predicates referenced below. Doc. 1-11 at 3.
1[A]: a plurality of tooth-receiving cavities shaped to receive and resiliently reposition the patient's teeth from the first arrangement toward the second arrangement;	ClearCorrect aligners have a plurality of tooth-receiving cavities to receive the tooth and resiliently reposition the patient's teeth from the first arrangement toward the second arrangement.

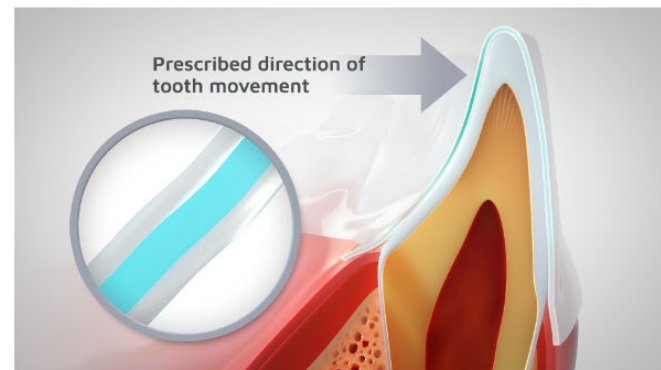
U.S. Patent No. 11,154,384



Clearcorrect expands production capacity for orthodontic aligners by 30 percent, stratsys (Aug. 19, 2020), <https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/>.

Below is a graphic from ClearCorrect's website showing how one such cavity receives and resiliently repositions one tooth:

ClearQuartz was designed to provide efficient and accurate movements due to the elasticity and adaptation while remaining comfortable for the patient.



U.S. Patent No. 11,154,384	
	<i>ClearCorrect® Aligners</i>, ClearCorrect (March 12, 2024), https://support.clearcorrect.com/hc/en-us/articles/4410091639063-ClearCorrect-Aligners; <i>see also</i> Doc. 1-11 at 3 (ClearCorrect: “Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position.”).
1[B]: three or more polymer layers, the three or more polymer layers comprising:	ClearCorrect makes its aligners from Zendura FLX, which is also known as ClearQuartz, a polymer sheet with three layers: ClearQuartz™ tri-layer material. ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*  • Low-porosity material For toughness and stain resistance • Elastomeric layer Applies gentle, consistent, and continuous force <i>About the Aligners</i>, Straumann (2024), https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html.

U.S. Patent No. 11,154,384



Low-porosity material

For durability and stain-resistance

Elastomeric layer

Applies gentle, consistent, and continuous force

ClearCorrect Aligners, ClearCorrect (Mar. 12, 2024),
<https://support.clearcorrect.com/hc/en-us/articles/4410091639063-ClearCorrect-Aligners>.

1[C]: a hard polymer layer comprising a co-polyester and having a flexural modulus greater than about 150,000 psi: and

On information and belief, ClearCorrect's aligners include a hard polymer layer made from either Tritan MX-710 or MX-711, both of which are co-polyesters. Each of those plastics has a flexural modulus of about 225,000 psi:

Mechanical Properties		
Tensile Stress @ Yield	D 638	43 MPa (6200 psi)
Tensile Stress @ Break	D 638	53 MPa (7700 psi)
Elongation @ Yield	D 638	6 %
Elongation @ Break	D 638	210 %
Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)
Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)
Flexural Yield Strength	D 790	62 MPa (9000 psi)

U.S. Patent No. 11,154,384																																																																																																															
	<i>Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710; <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 (same).																																																																																																														
1[D]: a soft polymer layer comprising a thermoplastic polyurethane elastomer and having an elongation at break of greater than about 200%, and a hardness from about 60A to about 85D	On information and belief, ClearCorrect’s aligners include a soft polymer layer made from Tecothane TPU-Clear TT 1065-D, which is a thermoplastic polyurethane elastomer. On information and belief, Tecothane TPU-Clear TT 1065-D has an elongation at break of 300% and a hardness of 64D: Tecothane® TPU - Clear Type: Medical Grade Aromatic Polyether-based Thermoplastic Polyurethanes (TPUs) Features: Variety of hardnesses, good mechanical properties, good chemical resistance, and can be color-matched Process: Extrusion and Injection Molding <table><tr><th>Products & Properties</th><th>ASTM Test</th><th>TT-1074A</th><th>TT-1085A</th><th>TT-1095A</th><th>TT-1055D</th><th>TT-1065D</th><th>TT-1069D</th><th>TT-1072D</th><th>TT-1075D-M</th></tr><tr><td>Durometer (Shore Hardness)</td><td>D2240</td><td>75A</td><td>85A</td><td>94A</td><td>54D</td><td>64D</td><td>69D</td><td>74D</td><td>75D</td></tr><tr><td>Specific Gravity</td><td>D792</td><td>1.10</td><td>1.12</td><td>1.15</td><td>1.16</td><td>1.18</td><td>1.18</td><td>1.18</td><td>1.19</td></tr><tr><td>Flexural Modulus (psi)</td><td>D790</td><td>1,300</td><td>3,000</td><td>8,000</td><td>18,000</td><td>26,000</td><td>44,000</td><td>73,000</td><td>180,000</td></tr><tr><td>Ultimate Tensile (psi)</td><td>D412</td><td>6,000</td><td>7,000</td><td>9,000</td><td>9,600</td><td>10,000</td><td>8,800</td><td>9,000</td><td>8,300</td></tr><tr><td>Ultimate Elongation (%)</td><td>D412</td><td>550</td><td>450</td><td>400</td><td>350</td><td>300</td><td>310</td><td>275</td><td>150</td></tr><tr><td>Tensile Modulus (psi)</td><td>D412</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>at 100% Elongation</td><td></td><td>500</td><td>800</td><td>1300</td><td>2500</td><td>2800</td><td>3200</td><td>3700</td><td>3600</td></tr><tr><td>at 200% Elongation</td><td></td><td>700</td><td>1000</td><td>2100</td><td>3800</td><td>4600</td><td>4200</td><td>3900</td><td>NA</td></tr><tr><td>at 300% Elongation</td><td></td><td>1100</td><td>1600</td><td>4300</td><td>6500</td><td>7800</td><td>NA</td><td>NA</td><td>NA</td></tr><tr><td>Mold Shrinkage (in/in)</td><td>D955</td><td>.008-.012</td><td>.008-.012</td><td>.006-.010</td><td>.004-.008</td><td>.004-.008</td><td>.004-.008</td><td>.004-.006</td><td>.004-.006</td></tr></table> <i>Tecothane TPU – Clear Datasheet</i>, Lubrizol LifeSciences (July 8, 2019), https://www.lubrizol.com/-/media/Lubrizol/Health/TDS/Tecothane-TPU-Clear.pdf.	Products & Properties	ASTM Test	TT-1074A	TT-1085A	TT-1095A	TT-1055D	TT-1065D	TT-1069D	TT-1072D	TT-1075D-M	Durometer (Shore Hardness)	D2240	75A	85A	94A	54D	64D	69D	74D	75D	Specific Gravity	D792	1.10	1.12	1.15	1.16	1.18	1.18	1.18	1.19	Flexural Modulus (psi)	D790	1,300	3,000	8,000	18,000	26,000	44,000	73,000	180,000	Ultimate Tensile (psi)	D412	6,000	7,000	9,000	9,600	10,000	8,800	9,000	8,300	Ultimate Elongation (%)	D412	550	450	400	350	300	310	275	150	Tensile Modulus (psi)	D412									at 100% Elongation		500	800	1300	2500	2800	3200	3700	3600	at 200% Elongation		700	1000	2100	3800	4600	4200	3900	NA	at 300% Elongation		1100	1600	4300	6500	7800	NA	NA	NA	Mold Shrinkage (in/in)	D955	.008-.012	.008-.012	.006-.010	.004-.008	.004-.008	.004-.008	.004-.006	.004-.006
Products & Properties	ASTM Test	TT-1074A	TT-1085A	TT-1095A	TT-1055D	TT-1065D	TT-1069D	TT-1072D	TT-1075D-M																																																																																																						
Durometer (Shore Hardness)	D2240	75A	85A	94A	54D	64D	69D	74D	75D																																																																																																						
Specific Gravity	D792	1.10	1.12	1.15	1.16	1.18	1.18	1.18	1.19																																																																																																						
Flexural Modulus (psi)	D790	1,300	3,000	8,000	18,000	26,000	44,000	73,000	180,000																																																																																																						
Ultimate Tensile (psi)	D412	6,000	7,000	9,000	9,600	10,000	8,800	9,000	8,300																																																																																																						
Ultimate Elongation (%)	D412	550	450	400	350	300	310	275	150																																																																																																						
Tensile Modulus (psi)	D412																																																																																																														
at 100% Elongation		500	800	1300	2500	2800	3200	3700	3600																																																																																																						
at 200% Elongation		700	1000	2100	3800	4600	4200	3900	NA																																																																																																						
at 300% Elongation		1100	1600	4300	6500	7800	NA	NA	NA																																																																																																						
Mold Shrinkage (in/in)	D955	.008-.012	.008-.012	.006-.010	.004-.008	.004-.008	.004-.008	.004-.006	.004-.006																																																																																																						

U.S. Patent No. 11,154,384

2: The dental appliance of claim 1, wherein the soft polymer layer has an ultimate tensile strength of greater than about 5000 psi.

On information and belief, the soft material used in the ClearQuartz blanks is Tecothane TPU-Clear TT-1065D. Tecothane TPU-Clear TT-1065D has an ultimate tensile strength of 10,000 psi:

Tecothane® TPU - Clear

Type: Medical Grade Aromatic Polyether-based Thermoplastic Polyurethanes (TPUs)

Features: Variety of hardnesses, good mechanical properties, good chemical resistance, and can be color-matched

Process: Extrusion and Injection Molding

Products & Properties	ASTM Test	TT-1074A	TT-1085A	TT-1095A	TT-1055D	TT-1065D	TT-1069D	TT-1072D	TT-1075D-M
Durometer (Shore Hardness)	D2240	75A	85A	94A	54D	64D	69D	74D	75D
Specific Gravity	D792	1.10	1.12	1.15	1.16	1.18	1.18	1.18	1.19
Flexural Modulus (psi)	D790	1,300	3,000	8,000	18,000	26,000	44,000	73,000	180,000
Ultimate Tensile (psi)	D412	6,000	7,000	9,000	9,600	10,000	8,800	9,000	8,300
Ultimate Elongation (%)	D412	550	450	400	350	300	310	275	150
Tensile Modulus (psi)	D412								
at 100% Elongation		500	800	1300	2500	2800	3200	3700	3600
at 200% Elongation		700	1000	2100	3800	4600	4200	3900	NA
at 300% Elongation		1100	1600	4300	6500	7800	NA	NA	NA
Mold Shrinkage (in/in)	D955	.008-.012	.008-.012	.006-.010	.004-.008	.004-.008	.004-.008	.004-.006	.004-.006

Tecothane TPU – Clear Datasheet, Lubrizol LifeSciences (July 8, 2019), <https://www.lubrizol.com/-/media/Lubrizol/Health/TDS/Tecothane-TPU-Clear.pdf>.

4: The dental appliance of claim 1, wherein the hard polymer layer has a tensile modulus greater than 150,000 psi.

On information and belief, the hard material used in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711. Eastman Tritan MX-710 and MX-711 each have a tensile modulus of 225,000 psi:

U.S. Patent No. 11,154,384

Mechanical Properties		
Tensile Stress @ Yield	D 638	43 MPa (6200 psi)
Tensile Stress @ Break	D 638	53 MPa (7700 psi)
Elongation @ Yield	D 638	6 %
Elongation @ Break	D 638	210 %
Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)
Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)
Flexural Yield Strength	D 790	62 MPa (9000 psi)

Technical Data Sheet: Eastman Tritan Copolyester MX0710, Eastman (Sept. 12, 2019), <https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710>; *Technical Data Sheet: Eastman Tritan Copolyester MX0711*, Eastman (Sept. 12, 2019), <https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711> (same).

6: The dental appliance of claim 1, wherein the hard polymer layer has a tensile strength at yield between 4000 psi and 6500 psi.

On information and belief, the hard material used in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711. Eastman Tritan MX-710 and MX-711 each have a tensile strength at yield of 6200 psi:

Mechanical Properties		
Tensile Stress @ Yield	D 638	43 MPa (6200 psi)
Tensile Stress @ Break	D 638	53 MPa (7700 psi)
Elongation @ Yield	D 638	6 %
Elongation @ Break	D 638	210 %
Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)
Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)
Flexural Yield Strength	D 790	62 MPa (9000 psi)

Technical Data Sheet: Eastman Tritan Copolyester MX0710, Eastman (Sept. 12, 2019), <https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710>; *Technical Data Sheet: Eastman Tritan Copolyester MX0711*, Eastman (Sept. 12, 2019), <https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711> (same).

U.S. Patent No. 11,154,384																										
7: The dental appliance of claim 1, wherein the hard polymer layer has an elongation at break of greater than about 70%.	On information and belief, the hard material used in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711. Eastman Tritan MX-710 and MX-711 each have an elongation at break of 210%: <table border="1"> <thead> <tr> <th colspan="3">Mechanical Properties</th></tr> </thead> <tbody> <tr> <td>Tensile Stress @ Yield</td><td>D 638</td><td>43 MPa (6200 psi)</td></tr> <tr> <td>Tensile Stress @ Break</td><td>D 638</td><td>53 MPa (7700 psi)</td></tr> <tr> <td>Elongation @ Yield</td><td>D 638</td><td>6 %</td></tr> <tr> <td>Elongation @ Break</td><td>D 638</td><td>210 %</td></tr> <tr> <td>Tensile Modulus</td><td>D 638</td><td>1550 MPa (2.25 x 10⁵ psi)</td></tr> <tr> <td>Flexural Modulus</td><td>D 790</td><td>1550 MPa (2.25 x 10⁵ psi)</td></tr> <tr> <td>Flexural Yield Strength</td><td>D 790</td><td>62 MPa (9000 psi)</td></tr> </tbody> </table> <i>Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710; <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 (same).	Mechanical Properties			Tensile Stress @ Yield	D 638	43 MPa (6200 psi)	Tensile Stress @ Break	D 638	53 MPa (7700 psi)	Elongation @ Yield	D 638	6 %	Elongation @ Break	D 638	210 %	Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)	Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)	Flexural Yield Strength	D 790	62 MPa (9000 psi)	
Mechanical Properties																										
Tensile Stress @ Yield	D 638	43 MPa (6200 psi)																								
Tensile Stress @ Break	D 638	53 MPa (7700 psi)																								
Elongation @ Yield	D 638	6 %																								
Elongation @ Break	D 638	210 %																								
Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)																								
Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)																								
Flexural Yield Strength	D 790	62 MPa (9000 psi)																								
8: The dental appliance of claim 1, wherein the hard polymer layer has a hard polymer layer elastic modulus and the soft polymer layer has a soft polymer layer elastic modulus less than the hard polymer layer elastic modulus.	On information and belief, the hard material used in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711 and the soft material is Lubrizol Tecothane TPU-Clear TT 1065-D. Eastman Tritan MX-710 and MX-711 each have a tensile (elastic) modulus of 225,000 psi, which is greater than Tecothane TPU-Clear TT-1065D's tensile (elastic) modulus of 7,800 psi. <i>Compare Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710 and <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 with Lubrizol LifeSciences, <i>Tecothane TPU – Clear Datasheet</i>,																									

U.S. Patent No. 11,154,384	
	available at https://www.lubrizol.com/-/media/Lubrizol/Health/TDS/Tecothane-TPU-Clear.pdf .
10: The dental appliance of claim 1, wherein the dental appliance has a thickness of between 500 µm and 1200 µm.	ClearCorrect aligners have a thickness of 750 µm. <i>See</i> Yashodhan M. Bichu et al., <i>Advances in orthodontic clear aligner materials</i> , Bioactive Materials, 22, 384-403, Table 1 (2023).
11[Pre]: A plurality of dental appliances for positioning a patient's teeth, having a plurality of tooth-receiving activities shaped to directly receive at least some of the patient's teeth and apply a resilient positioning force to the patient's teeth, wherein the plurality of dental appliances are shaped to move teeth from one arrangement to a successive arrangement, and wherein at least one of the plurality of dental appliances comprises:	If limiting, ClearCorrect aligners are a plurality of dental appliances for positioning a patient's teeth, having a plurality of tooth-receiving activities shaped to directly receive at least some of the patient's teeth and apply a resilient positioning force to the patient's teeth, wherein the plurality of dental appliances are shaped to move teeth from one arrangement to a successive arrangement. <i>See</i> Limitations 1[Pre], 1[A]; Doc. 1-11 at 3; <i>ClearCorrect's Treatment and Pricing Options</i> , ClearCorrect (2023), https://support.clearcorrect.com/hc/en-us/articles/4402074198807-ClearCorrect-s-Treatment-Pricing-Options .
11[A]: three or more polymer layers, the three or more polymer layers comprising:	<i>See</i> Limitation 1[B].
11[B]: a hard polymer layer comprising a co-polyester and having a flexural	<i>See</i> Limitation 1[C].

U.S. Patent No. 11,154,384	
modulus greater than about 150,000 psi: and	
11[C]: a soft polymer layer comprising a thermoplastic polyurethane elastomer and having an elongation at break of greater than about 200%, and a hardness from about 60A to about 85D.	<i>See Limitation 1[D].</i>
12: The plurality of dental appliances of claim 11, wherein the soft polymer layer has an ultimate tensile strength of greater than about 5000 psi.	<i>See Claim 2.</i>
14: The plurality of dental appliances of claim 11, wherein the hard polymer layer has a tensile modulus greater than 150,000 psi.	<i>See Claim 4.</i>
16: The plurality of dental appliances of claim 11, wherein the hard polymer layer has a tensile strength at yield between 4000 psi and 6500 psi.	<i>See Claim 6.</i>
17: The plurality of dental appliances of claim 11, wherein the hard polymer layer has an elongation at break of greater than about 70%.	<i>See Claim 7.</i>

U.S. Patent No. 11,154,384	
18: The plurality of dental appliances of claim 11, wherein the hard polymer layer has a hard polymer layer elastic modulus and the soft polymer layer has a soft polymer layer elastic modulus less than the hard polymer layer elastic modulus.	See Claim 8.
20: The plurality of dental appliances of claim 11, wherein at least one of the dental appliances has a thickness of between 500 μm and 1200 μm .	See Claim 10.
21[Pre]: A plurality of dental appliances for positioning a patient's teeth, the plurality of dental appliances comprising:	If limiting, ClearCorrect aligners are a plurality of dental appliances for positioning a patients' teeth. See, e.g., Doc. 1-11 at 3; <i>ClearCorrect's Treatment and Pricing Options</i> , ClearCorrect (2023), https://support.clearcorrect.com/hc/en-us/articles/4402074198807-ClearCorrect-s-Treatment-Pricing-Options .
21[A][i]: a first dental appliance comprising:	ClearCorrect aligner treatments include a first aligner. See, e.g., Doc. 1-11 at 3; <i>ClearCorrect's Treatment and Pricing Options</i> , ClearCorrect (2023), https://support.clearcorrect.com/hc/en-us/articles/4402074198807-ClearCorrect-s-Treatment-Pricing-Options .
21[A][ii]: a first plurality of tooth-receiving cavities shaped to receive and resiliently reposition the patient's teeth from a first arrangement toward a second arrangement;	See Limitation 1[A].

U.S. Patent No. 11,154,384	
21[A][iii]: first three or more polymer layers, the three or more polymer layers comprising:	<i>See</i> Limitation 1[B].
21[A][iv]: a first hard polymer layer comprising a co-polyester and having a flexural modulus greater than about 150,000 psi; and	<i>See</i> Limitation 1[C].
21[A][v]: a first soft polymer layer comprising a thermoplastic polyurethane elastomer and having an elongation at break of greater than about 200%, and a hardness from about 60A to about 85D; and	<i>See</i> Limitation 1[D].
21[B][i]: a second dental appliance comprising:	ClearCorrect aligner treatments include a plurality of aligners and thus include a second aligner. <i>See, e.g.,</i> Doc. 1-11 at 3; <i>ClearCorrect's Treatment and Pricing Options</i> , ClearCorrect (2023), https://support.clearcorrect.com/hc/en-us/articles/4402074198807-ClearCorrect-s-Treatment-Pricing-Options .
21[B][ii]: a second plurality of tooth-receiving cavities shaped to receive and resiliently reposition the patient's teeth from a first arrangement toward a second arrangement;	<i>See</i> Limitation 1[A].

U.S. Patent No. 11,154,384	
21[B][iii]: a second three or more polymer layers, the three or more polymer layers comprising:	<i>See</i> Limitation 1[B].
21[B][iv]: a second hard polymer layer comprising a co-polyester and having a flexural modulus greater than about 150,000 psi: and	<i>See</i> Limitation 1[C].
21[B][v]: a second soft polymer layer comprising a thermoplastic polyurethane elastomer and having an elongation at break of greater than about 200%, and a hardness from about 60A to about 85D.	<i>See</i> Limitation 1[D].
22: The plurality of dental appliances of claim 21, wherein the first soft polymer layer and the second soft polymer layer has an ultimate tensile strength of greater than about 5000 psi.	<i>See</i> Claim 8.
24: The plurality of dental appliances of claim 21, wherein the first hard polymer layer and the second hard polymer layer has a tensile modulus greater than 150,000 psi.	On information and belief, both of ClearQuartz's hard layers are made from Eastman Tritan MX-710 or MX-711. Both polymers have a tensile modulus of 225,000 psi. <i>See</i> Claim 4.
26: The plurality of dental appliances of claim 21, wherein the first hard polymer layer and the second hard polymer layer	On information and belief, both of ClearQuartz's hard layers are made from Eastman Tritan MX-710 or MX-711. Both polymers have a tensile strength at yield of 6200 psi. <i>See</i> Claim 6.

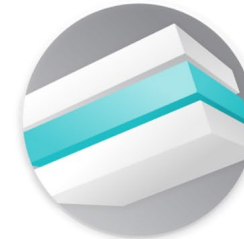
U.S. Patent No. 11,154,384	
has a tensile strength at yield between 4000 psi and 6500 psi.	
27: The plurality of dental appliances of claim 21, wherein the first hard polymer layer and the second hard polymer layer has an elongation at break of greater than about 70%.	On information and belief, both of ClearQuartz's hard layers are made from Eastman Tritan MX-710 or MX-711. Both polymers have an elongation at break of 210%. <i>See</i> Claim 7.
28: The plurality of dental appliances of claim 21, wherein: the first hard polymer layer and the second hard polymer layer has a hard polymer layer elastic modulus; and the first soft polymer layer and the second soft polymer layer has a soft polymer layer elastic modulus, wherein the soft polymer layer elastic modulus is less than the hard polymer layer elastic modulus.	On information and belief, both of ClearQuartz's hard layers are made from Eastman Tritan MX-710 or MX-711. Both polymers have an elastic modulus greater than that of the soft polymer layer. <i>See</i> Claim 8.
30: The plurality of dental appliances of claim 21, wherein at least one of the first dental appliance or second dental appliance dental appliance has a thickness of between 500 μm and 1200 μm .	ClearCorrect aligners have a thickness of 750 μm . <i>See</i> Yashodhan M. Bichu et al., <i>Advances in orthodontic clear aligner materials</i> , Bioactive Materials, 22, 384-403, Table 1 (2023).

EXHIBIT C

U.S. Patent No. 11,648,090	
1[Pre]: A method of making a multilayer dental aligner for repositioning a patient's teeth from a first arrangement toward a second arrangement, the method comprising:	If limiting, ClearCorrect makes aligners, which are multilayer dental appliances for repositioning patients' teeth from a first arrangement toward a second arrangement. 8. Summary of Usage A dental health care professional (e.g. orthodontists or dentists), prescribes the ClearCorrect system based on an assessment of the patient's teeth, determines a course of treatment with the system, takes molds of the patient's teeth and completes a prescription form. The molds and prescription are sent to ClearCorrect. Utilizing standard dental software used for tooth alignment, ClearCorrect designs a series of plastic trays intended to gradually realign the patient's teeth in accordance with the physician's prescription. The prescribing physician reviews and approves the model scheme before the molds are produced. Once approved, ClearCorrect produces the trays, which are formed of clear, thin thermoformed polyurethaneplastic. The trays are sent back to the dental health care professional, who then provides them to the patient, confirming fit and design. Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position. The dental care professional monitors treatment from the moment the first aligner is delivered to when treatment is completed. The trays are held in place by pressure and can be removed by the patient at any time. This technology is essentially identical to that used by a number of sequential alignment systems, including the predicates referenced below. Doc. 1-11 at 3.
1[A]: providing a multilayer sheet comprising three polymer layers, the three polymer layers comprising:	ClearCorrect makes its aligners by providing a sheet comprising three or more polymer layers. Specifically, ClearCorrect makes its aligners from Zendura FLX, which is also known as ClearQuartz, a polymer sheet with three layers:

ClearQuartz™ tri-layer material.

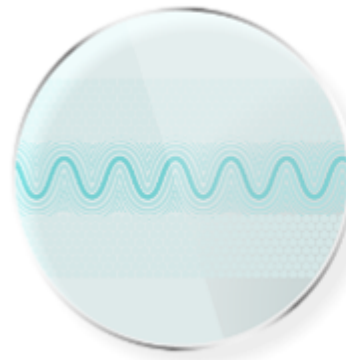
ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*



- **Low-porosity material**
For toughness and stain resistance
- **Elastomeric layer**
Applies gentle, consistent, and continuous force

About the Aligners, Straumann (2024),

<https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html>.



Low-porosity material

For durability and stain-resistance

Elastomeric layer

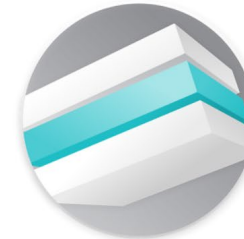
Applies gentle, consistent, and continuous force

ClearCorrect Aligners, ClearCorrect (Mar. 12, 2024), <https://support.clearcorrect.com/hc/en-us/articles/4410091639063-ClearCorrect-Aligners>.

U.S. Patent No. 11,648,090																									
1[B]: A first layer consisting of a co-polyester, the co-polyester having a flexural modulus greater than 150,000 psi, an elongation at yield of greater than 4%, a tensile modulus greater than 150,000 psi, a tensile strength at yield of 4000-6500 psi, and an elongation at break of greater than 70%; and	On information and belief, ClearCorrect’s aligners include a hard polymer layer made from either Tritan MX-710 or MX-711. Both Tritan MX-710 and MX-711 have a flexural modulus of 225,000 psi, an elongation at yield of 6%, a tensile modulus of 225,000 psi, a tensile strength at yield of 6200 psi, and an elongation at break of 210%:																								
	<table><tr><th colspan="3">Mechanical Properties</th></tr><tr><td>Tensile Stress @ Yield</td><td>D 638</td><td>43 MPa (6200 psi)</td></tr><tr><td>Tensile Stress @ Break</td><td>D 638</td><td>53 MPa (7700 psi)</td></tr><tr><td>Elongation @ Yield</td><td>D 638</td><td>6 %</td></tr><tr><td>Elongation @ Break</td><td>D 638</td><td>210 %</td></tr><tr><td>Tensile Modulus</td><td>D 638</td><td>1550 MPa (2.25 x 10⁵ psi)</td></tr><tr><td>Flexural Modulus</td><td>D 790</td><td>1550 MPa (2.25 x 10⁵ psi)</td></tr><tr><td>Flexural Yield Strength</td><td>D 790</td><td>62 MPa (9000 psi)</td></tr></table> <i>Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710; <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 (same).		Mechanical Properties			Tensile Stress @ Yield	D 638	43 MPa (6200 psi)	Tensile Stress @ Break	D 638	53 MPa (7700 psi)	Elongation @ Yield	D 638	6 %	Elongation @ Break	D 638	210 %	Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)	Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)	Flexural Yield Strength	D 790
Mechanical Properties																									
Tensile Stress @ Yield	D 638	43 MPa (6200 psi)																							
Tensile Stress @ Break	D 638	53 MPa (7700 psi)																							
Elongation @ Yield	D 638	6 %																							
Elongation @ Break	D 638	210 %																							
Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)																							
Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)																							
Flexural Yield Strength	D 790	62 MPa (9000 psi)																							
1[C]: A second layer consisting of a thermoplastic polyurethane elastomer, the thermoplastic polyurethane elastomer having an ultimate tensile strength of greater than 5000 psi, an elongation at break of greater than 200%, and a hardness of 60A to 85D; and	On information and belief, ClearCorrect makes its aligners using a second polymer layer of Tecothane TPU-Clear TT-1065D. On information and belief, Tecothane TPU-Clear TT-1065D is thermoplastic polyurethane elastomer with an ultimate tensile strength of 10,000 psi, an elongation at break of 300%, and a hardness of 64D.																								

ClearQuartz™ tri-layer material.

ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*



- **Low-porosity material**
For toughness and stain resistance
- **Elastomeric layer**
Applies gentle, consistent, and continuous force

About the Aligners, Straumann (2024),
<https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html>.

Tecothane® TPU - Clear

Type: Medical Grade Aromatic Polyether-based Thermoplastic Polyurethanes (TPUs)

Features: Variety of hardnesses, good mechanical properties, good chemical resistance, and can be color-matched

Process: Extrusion and Injection Molding

Products & Properties	ASTM Test	TT-1074A	TT-1085A	TT-1095A	TT-1055D	TT-1065D	TT-1069D	TT-1072D	TT-1075D-M
Durometer (Shore Hardness)	D2240	75A	85A	94A	54D	64D	69D	74D	75D
Specific Gravity	D792	1.10	1.12	1.15	1.16	1.18	1.18	1.18	1.19
Flexural Modulus (psi)	D790	1,300	3,000	8,000	18,000	26,000	44,000	73,000	180,000
Ultimate Tensile (psi)	D412	6,000	7,000	9,000	9,600	10,000	8,800	9,000	8,300
Ultimate Elongation (%)	D412	550	450	400	350	300	310	275	150
Tensile Modulus (psi)	D412								
at 100% Elongation		500	800	1300	2500	2800	3200	3700	3600
at 200% Elongation		700	1000	2100	3800	4600	4200	3900	NA
at 300% Elongation		1100	1600	4300	6500	7800	NA	NA	NA
Mold Shrinkage (in/in)	D955	.008-.012	.008-.012	.006-.010	.004-.008	.004-.008	.004-.008	.004-.006	.004-.006

See Tecothane TPU – Clear Datasheet, Lubrizol LifeSciences (July 8, 2019),
<https://www.lubrizol.com/-/media/Lubrizol/Health/TDS/Tecothane-TPU-Clear.pdf>.

U.S. Patent No. 11,648,090	
1[D]: A third layer;	ClearCorrect aligners have a third layer. ClearQuartz™ tri-layer material. ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*  • Low-porosity material For toughness and stain resistance • Elastomeric layer Applies gentle, consistent, and continuous force <i>About the Aligners</i>, Straumann (2024), https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html.
1[E]: wherein the co-polyester has an elastic modulus greater than the thermoplastic polyurethane elastomer;	ClearCorrect aligners are made from ClearQuartz. On information and belief, the co-polyester layer in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711 and the thermoplastic polyurethane elastomer layer is Tecothane TPU-Clear TT-1065D. Eastman Tritan MX-710 and MX-711 each have an elastic modulus of 225,000 psi, which is greater than Tecothane TPU-Clear TT-1065D's tensile (elastic) modulus of 7800 psi. <i>Compare Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710 and <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 with Lubrizol LifeSciences, <i>Tecothane TPU – Clear Datasheet</i>, available at https://www.lubrizol.com/-/media/Lubrizol/Health/TDS/Tecothane-TPU-Clear.pdf.
1[F]: providing a mold;	ClearCorrect fabricates its aligners by providing a mold of the patient's teeth in a target position:

U.S. Patent No. 11,648,090



Clearcorrect expands production capacity for orthodontic aligners by 30 percent, stratsys (Aug. 19, 2020), <https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/>; see also Doc. 1-11 at 3.

1[G]: thermoforming the multilayer sheet over the mold to form a plurality of tooth-receiving cavities configured to receive and reposition the patient's teeth from the first arrangement toward the second arrangement; and

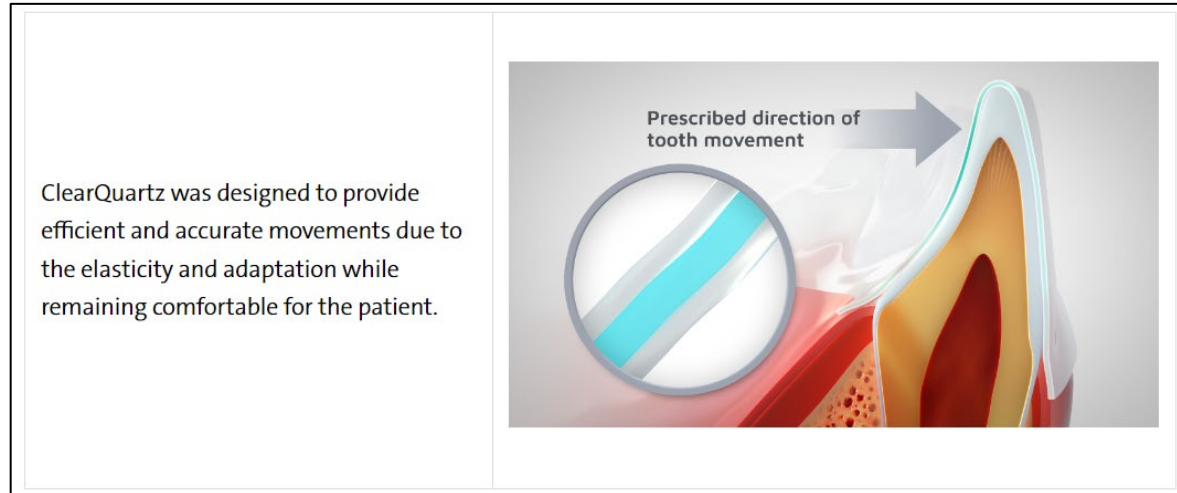
ClearCorrect aligners are made by thermoforming the multilayer sheet over the mold to form a plurality of tooth-receiving cavities configured to receive and reposition the patient's teeth from the first arrangement toward the second arrangement.



Clearcorrect expands production capacity for orthodontic aligners by 30 percent, stratsys (Aug. 19, 2020), <https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/>; see also Doc. 1-11 at 3.

U.S. Patent No. 11,648,090

Below is a graphic from ClearCorrect's website showing how one such cavity receives and repositions one tooth:



ClearCorrect® Aligners, ClearCorrect (March 12, 2024), <https://support.clearcorrect.com/hc/en-us/articles/4410091639063-ClearCorrect-Aligners>; *see also* Doc. 1-11 at 3 (ClearCorrect: “Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position.”).

1[H]: trimming excess material from the thermoformed multilayer sheet to form the multilayer dental aligner.

ClearCorrect makes its aligners by trimming excess material from the thermoformed multilayer sheet to form the multilayer dental material. *See ClearCorrect Aligners*, ClearCorrect (March 12, 2024), <https://support.clearcorrect.com/hc/en-us/articles/4410091639063-ClearCorrect-Aligners>.

2: The method of claim 1, wherein the co-polyester has a light

ClearCorrect aligners are made from ClearQuartz. On information and belief, the co-polyester layer in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711.

U.S. Patent No. 11,648,090										
transmission between 400 nm and 800 nm of greater than about 75%.	On information and belief, both the Tritan MX-710 and the MX-711 plastics have a light transmission between 400 nm and 800 nm of greater than about 75%. According to the manufacturer of the Tritan plastics, both polymers have a “total transmittance” of “90%.” <table><tr><th colspan="3">Optical Properties</th></tr><tr><td>Total Transmittance</td><td>D 1003</td><td>90 %</td></tr><tr><td>Haze</td><td>D 1003</td><td><1 %</td></tr></table> <i>Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710; <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 (same).	Optical Properties			Total Transmittance	D 1003	90 %	Haze	D 1003	<1 %
Optical Properties										
Total Transmittance	D 1003	90 %								
Haze	D 1003	<1 %								
3: The method of claim 1, wherein the third layer comprises a same or different co-polyester.	ClearCorrect’s aligners have three layers. On information and belief, the third layer of ClearQuartz is made from the Eastman Tritan MX-710 or MX-711 co-polyester. ClearQuartz™ tri-layer material. ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*  • Low-porosity material For toughness and stain resistance • Elastomeric layer Applies gentle, consistent, and continuous force <i>About the Aligners</i>, Straumann (2024), https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html.									
5: The method of claim 1, wherein the first layer is coextruded with or laminated to the third layer.	On information and belief, ClearQuartz is a co-extruded material.									

U.S. Patent No. 11,648,090	
9: The method of claim 1, wherein the thermoplastic polyurethane elastomer comprises a light transmission between 400 nm and 800 nm of greater than about 75%.	ClearCorrect's aligners are clear. Thus, on information and belief, their constituent plastics comprise a light transmission between 400 nm and 800 nm, which is the spectrum of light visible to the human eye, of greater than about 75%.
10: The method of claim 1, wherein the co-polyester has a stress relaxation at 24 hours in a wet environment of between 90-100% humidity of greater than 10%.	ClearCorrect aligners are made from ClearQuartz. On information and belief, the co-polyester layer in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711. On information and belief, the stress relaxation at 24 hours in a wet environment of between 90-100% humidity of at least Eastman Tritan MX-711 is greater than 10%.

EXHIBIT D

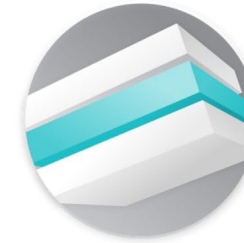
U.S. Patent No. 11,648,091

1[Pre]: A multilayer sheet comprising:

If limiting, ClearCorrect makes its aligners from a multilayer sheet.

ClearQuartz™ tri-layer material.

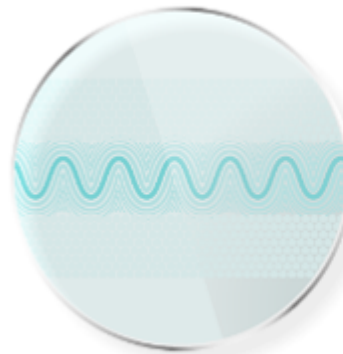
ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*



- **Low-porosity material**
For toughness and stain resistance
- **Elastomeric layer**
Applies gentle, consistent, and continuous force

About the Aligners, Straumann (2024),

<https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html>.



Low-porosity material

For durability and stain-resistance

Elastomeric layer

Applies gentle, consistent, and continuous force

U.S. Patent No. 11,648,091																									
	See <i>ClearCorrect Aligners</i>, ClearCorrect (Mar. 12, 2024), https://support.clearcorrect.com/hc/en-us/articles/4410091639063-ClearCorrect-Aligners.																								
1[A]: a first layer containing a single polymer, wherein the single polymer of the first layer is a co-polyester, and wherein the first layer has a flexural modulus greater than 150,000 psi, an elongation at yield of greater than 4%, a tensile modulus greater than 150,000 psi, a tensile strength at yield of 4000-6500 psi, and an elongation at break of greater than 70%; and	On information and belief, the first layer of ClearCorrect’s aligners is either Tritan MX-710 or MX-711, both of which are co-polyesters. Each of those polymers have a flexural modulus of about 225,000 psi, an elongation at yield of 6%, a tensile modulus of 225,000 psi, a tensile strength at yield of 6200 psi, and an elongation at break of 210%. <table><tr><th colspan="3">Mechanical Properties</th></tr><tr><td>Tensile Stress @ Yield</td><td>D 638</td><td>43 MPa (6200 psi)</td></tr><tr><td>Tensile Stress @ Break</td><td>D 638</td><td>53 MPa (7700 psi)</td></tr><tr><td>Elongation @ Yield</td><td>D 638</td><td>6 %</td></tr><tr><td>Elongation @ Break</td><td>D 638</td><td>210 %</td></tr><tr><td>Tensile Modulus</td><td>D 638</td><td>1550 MPa (2.25 x 10⁵ psi)</td></tr><tr><td>Flexural Modulus</td><td>D 790</td><td>1550 MPa (2.25 x 10⁵ psi)</td></tr><tr><td>Flexural Yield Strength</td><td>D 790</td><td>62 MPa (9000 psi)</td></tr></table> <i>Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710; <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 (same).	Mechanical Properties			Tensile Stress @ Yield	D 638	43 MPa (6200 psi)	Tensile Stress @ Break	D 638	53 MPa (7700 psi)	Elongation @ Yield	D 638	6 %	Elongation @ Break	D 638	210 %	Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)	Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)	Flexural Yield Strength	D 790	62 MPa (9000 psi)
Mechanical Properties																									
Tensile Stress @ Yield	D 638	43 MPa (6200 psi)																							
Tensile Stress @ Break	D 638	53 MPa (7700 psi)																							
Elongation @ Yield	D 638	6 %																							
Elongation @ Break	D 638	210 %																							
Tensile Modulus	D 638	1550 MPa (2.25 x 10 ⁵ psi)																							
Flexural Modulus	D 790	1550 MPa (2.25 x 10 ⁵ psi)																							
Flexural Yield Strength	D 790	62 MPa (9000 psi)																							
1[B]: A second layer containing a single polymer, wherein the single polymer of the second layer is a thermoplastic polyurethane elastomer, and wherein the second	On information and belief, the second layer ClearCorrect’s aligners are is Tecothane TPU-Clear TT-1065D. Tecothane TPU-Clear TT-1065D is a thermoplastic polyurethane elastomer and has an ultimate tensile strength of 10,000 psi, an elongation break of 300%, and a hardness of 64D.																								

U.S. Patent No. 11,648,091

layer has an ultimate tensile strength of greater than 5000 psi, an elongation at break of greater than 200%, and a hardness of 60A to 85D; and

Tecothane® TPU - Clear

Type: Medical Grade Aromatic Polyether-based Thermoplastic Polyurethanes (TPUs)

Features: Variety of hardnesses, good mechanical properties, good chemical resistance, and can be color-matched

Process: Extrusion and Injection Molding

Products & Properties	ASTM Test	TT-1074A	TT-1085A	TT-1095A	TT-1055D	TT-1065D	TT-1069D	TT-1072D	TT-1075D-M
Durometer (Shore Hardness)	D2240	75A	85A	94A	54D	64D	69D	74D	75D
Specific Gravity	D792	1.10	1.12	1.15	1.16	1.18	1.18	1.18	1.19
Flexural Modulus (psi)	D790	1,300	3,000	8,000	18,000	26,000	44,000	73,000	180,000
Ultimate Tensile (psi)	D412	6,000	7,000	9,000	9,600	10,000	8,800	9,000	8,300
Ultimate Elongation (%)	D412	550	450	400	350	300	310	275	150
Tensile Modulus (psi)	D412								
at 100% Elongation		500	800	1300	2500	2800	3200	3700	3600
at 200% Elongation		700	1000	2100	3800	4600	4200	3900	NA
at 300% Elongation		1100	1600	4300	6500	7800	NA	NA	NA
Mold Shrinkage (in/in)	D955	.008-.012	.008-.012	.006-.010	.004-.008	.004-.008	.004-.008	.004-.006	.004-.006

See *Tecothane TPU – Clear Datasheet*, Lubrizol LifeSciences (July 8, 2019), <https://www.lubrizol.com/-/media/Lubrizol/Health/TDS/Tecothane-TPU-Clear.pdf>.

1[C]: a third layer;

ClearCorrect aligners have a third layer.

U.S. Patent No. 11,648,091	
	ClearQuartz™ tri-layer material. ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*  • Low-porosity material For toughness and stain resistance • Elastomeric layer Applies gentle, consistent, and continuous force <i>About the Aligners</i>, Straumann (2024), https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html.
1[D] : wherein the first layer has an elastic modulus greater than the second layer; and	On information and belief, the first layer in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711 and the second layer is Tecothane TPU-Clear TT-1065D. Eastman Tritan MX-710 and MX-711 each have an elastic modulus of 225,000 psi, which is greater than Tecothane TPU-Clear TT-1065D's tensile (elastic) modulus of 7800 psi. <i>Compare Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710 and <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 with Lubrizol LifeSciences, <i>Tecothane TPU – Clear Datasheet</i>, available at https://www.lubrizol.com/-/media/Lubrizol/Health/TDS/Tecothane-TPU-Clear.pdf.
1[E] : wherein the multilayer sheet is incorporated into an orthodontic appliance.	ClearCorrect aligners are made from the multilayer sheet.

U.S. Patent No. 11,648,091										
	8. Summary of Usage A dental health care professional (e.g. orthodontists or dentists), prescribes the ClearCorrect system based on an assessment of the patient's teeth, determines a course of treatment with the system, takes molds of the patient's teeth and completes a prescription form. The molds and prescription are sent to ClearCorrect. Utilizing standard dental software used for tooth alignment, ClearCorrect designs a series of plastic trays intended to gradually realign the patient's teeth in accordance with the physician's prescription. The prescribing physician reviews and approves the model scheme before the molds are produced. Once approved, ClearCorrect produces the trays, which are formed of clear, thin thermoformed polyurethaneplastic. The trays are sent back to the dental health care professional, who then provides them to the patient, confirming fit and design. Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position. The dental care professional monitors treatment from the moment the first aligner is delivered to when treatment is completed. The trays are held in place by pressure and can be removed by the patient at any time. This technology is essentially identical to that used by a number of sequential alignment systems, including the predicates referenced below. Doc. 1-11 at 3.									
4: The multilayer sheet of claim 1, wherein the first layer has a light transmission between 400 nm and 800 nm of greater than about 75%.	ClearCorrect aligners are made from ClearQuartz. On information and belief, the co-polyester layer in the ClearQuartz blanks is either Eastman Tritan MX-710 or MX-711. On information and belief, both the Tritan MX-710 and the MX-711 plastics have a light transmission between 400 nm and 800 nm of greater than about 75%. According to the manufacturer of the Tritan plastics, both polymers have a “total transmittance” of “90%.” <table><tr><th colspan="3">Optical Properties</th></tr><tr><td>Total Transmittance</td><td>D 1003</td><td>90 %</td></tr><tr><td>Haze</td><td>D 1003</td><td><1 %</td></tr></table> <i>Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710; <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019),	Optical Properties			Total Transmittance	D 1003	90 %	Haze	D 1003	<1 %
Optical Properties										
Total Transmittance	D 1003	90 %								
Haze	D 1003	<1 %								

U.S. Patent No. 11,648,091	
	https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 (same).
5: The multilayer sheet of claim 1, wherein the first layer is coextruded with or laminated to the third layer.	On information and belief, ClearQuartz is a co-extruded material.
6[Pre]: A multilayer dental aligner for repositioning a patient's teeth from a first arrangement toward a second arrangement, the multilayer dental aligner comprising:	If limiting, ClearCorrect aligners are a multilayer dental appliance for repositioning patients' teeth from a first arrangement toward a second arrangement. 8. Summary of Usage A dental health care professional (e.g. orthodontists or dentists), prescribes the ClearCorrect system based on an assessment of the patient's teeth, determines a course of treatment with the system, takes molds of the patient's teeth and completes a prescription form. The molds and prescription are sent to ClearCorrect. Utilizing standard dental software used for tooth alignment, ClearCorrect designs a series of plastic trays intended to gradually realign the patient's teeth in accordance with the physician's prescription. The prescribing physician reviews and approves the model scheme before the molds are produced. Once approved, ClearCorrect produces the trays, which are formed of clear, thin thermoformed polyurethaneplastic. The trays are sent back to the dental health care professional, who then provides them to the patient, confirming fit and design. Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position. The dental care professional monitors treatment from the moment the first aligner is delivered to when treatment is completed. The trays are held in place by pressure and can be removed by the patient at any time. This technology is essentially identical to that used by a number of sequential alignment systems, including the predicates referenced below. Doc. 1-11 at 3.
6[A]: a multilayer sheet comprising:	See Limitation 1[Pre].
6[B]: a first layer containing a single polymer, wherein the single polymer of the first layer is a co-polyester, and wherein the first	See Limitation 1[A].

U.S. Patent No. 11,648,091	
layer has a flexural modulus greater than 150,000 psi, an elongation at yield of greater than 4%, a tensile modulus greater than 150,000 psi, a tensile strength at yield of 4000-6500 psi, and an elongation at break of greater than 70%; and	
6[C]: a second layer containing a single polymer, wherein the single polymer of the second layer is a thermoplastic polyurethane elastomer, and wherein the second layer has an ultimate tensile strength of greater than 5000 psi, an elongation at break of greater than 200%, and a hardness of 60A to 85D; and	<i>See Limitation 1[B].</i>
6[D]: wherein the multilayer sheet forms a plurality of tooth receiving cavities configured to receive and reposition the patient's teeth from the first arrangement toward the second arrangement.	ClearCorrect aligners are made by thermoforming the multilayer sheet over the mold to form a plurality of tooth-receiving cavities configured to receive and reposition the patient's teeth from the first arrangement toward the second arrangement.

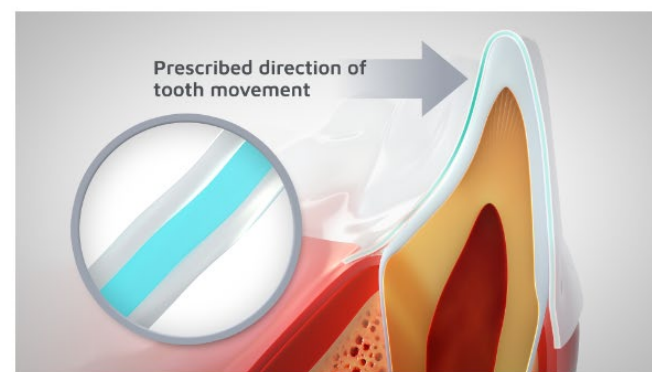
U.S. Patent No. 11,648,091



Clearcorrect expands production capacity for orthodontic aligners by 30 percent, stratsys (Aug. 19, 2020), <https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/>.

Below is a graphic from ClearCorrect's website showing how one such cavity receives and repositions one tooth:

ClearQuartz was designed to provide efficient and accurate movements due to the elasticity and adaptation while remaining comfortable for the patient.



U.S. Patent No. 11,648,091	
	<i>ClearCorrect® Aligners</i>, ClearCorrect (March 12, 2024), https://support.clearcorrect.com/hc/en-us/articles/4410091639063-ClearCorrect-Aligners; <i>see also</i> Doc. 1-11 at 3 (ClearCorrect: “Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position.”).
7: The multilayer dental aligner of claim 6, wherein the multilayer sheet further comprises a third layer containing a single polymer, and wherein the single polymer of the third layer is a same or different co-polyester as the single polymer of the first layer or a same or different thermoplastic polyurethane elastomer as the single polymer of the second layer.	On information and belief, ClearCorrect aligners comprise a third layer of either Eastman Tritan MX-710 or MX-711, which is the same co-polyester as the first layer. <i>See Technical Data Sheet: Eastman Tritan Copolyester MX0710</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070148&pn=Tritan+Copolyester+MX710; <i>Technical Data Sheet: Eastman Tritan Copolyester MX0711</i>, Eastman (Sept. 12, 2019), https://productcatalog.eastman.com/tds/ProdDatasheet.aspx?product=71070154&pn=Tritan+Copolyester+MX711 (same).
9: The multilayer dental aligner of claim 6, wherein the first layer has an elastic modulus greater than the second layer.	<i>See</i> Limitation 1[D].
10[Pre]: A multilayer dental aligner for repositioning a patient’s teeth from a first arrangement toward a second arrangement, the multilayer dental aligner comprising:	If limiting, ClearCorrect aligners are a multilayer dental appliance for repositioning patients’ teeth from a first arrangement toward a second arrangement.

U.S. Patent No. 11,648,091	
	8. Summary of Usage A dental health care professional (e.g. orthodontists or dentists), prescribes the ClearCorrect system based on an assessment of the patient's teeth, determines a course of treatment with the system, takes molds of the patient's teeth and completes a prescription form. The molds and prescription are sent to ClearCorrect. Utilizing standard dental software used for tooth alignment, ClearCorrect designs a series of plastic trays intended to gradually realign the patient's teeth in accordance with the physician's prescription. The prescribing physician reviews and approves the model scheme before the molds are produced. Once approved, ClearCorrect produces the trays, which are formed of clear, thin thermoformed polyurethaneplastic. The trays are sent back to the dental health care professional, who then provides them to the patient, confirming fit and design. Over a period of months, additional trays are provided sequentially to the patient by the dental health care professional to gradually move the target teeth to the desired position. The dental care professional monitors treatment from the moment the first aligner is delivered to when treatment is completed. The trays are held in place by pressure and can be removed by the patient at any time. This technology is essentially identical to that used by a number of sequential alignment systems, including the predicates referenced below. Doc. 1-11 at 3.
10[A]: a multilayer sheet comprising:	<i>See</i> Limitation 1[Pre].
10[B]: a first layer consisting of a co-polyester, the co-polyester having a flexural modulus of greater than 150,000 psi, an elongation at yield of greater than 4%, a tensile modulus greater than 150,000 psi, a tensile strength at yield of 4000-6500 psi, and an elongation at break of greater than 70%;	<i>See</i> Limitation 1[A].

U.S. Patent No. 11,648,091	
10[C]: a second layer consisting of a thermoplastic polyurethane elastomer, the thermoplastic polyurethane elastomer having an ultimate tensile strength of greater than 5000 psi, an elongation at break of greater than 200%, and a hardness of 60A to 85D;	<i>See</i> Limitation 1[B].
10[D]: a third layer; and	<i>See</i> Limitation 1[C].
10[E]: wherein the multilayer sheet forms a plurality of tooth receiving cavities configured to receive and reposition the patient's teeth from the first arrangement toward the second arrangement.	<i>See</i> Limitation 6[D].
11: The multilayer dental aligner of claim 10, wherein the third layer consists of a same or different co-polyester or a same or different thermoplastic polyurethane elastomer.	<i>See</i> Claim 7.
13: The multilayer dental aligner of claim 11, wherein the first layer is co-extruded with or laminated to the third layer.	On information and belief, ClearQuartz is a co-extruded material.
17: The multilayer dental aligner of claim 10, wherein the	<i>See</i> Limitation 1[D].

U.S. Patent No. 11,648,091	
co-polyester has an elastic modulus greater than the thermoplastic polyurethane elastomer.	
18[Pre]: multilayer dental aligner for repositioning a patient's teeth from a first arrangement toward a second arrangement, the multilayer dental aligner comprising:	<i>See</i> Limitation 10[Pre].
18[A]: a multilayer sheet comprising:	<i>See</i> Limitation 1[Pre].
18[B]: a first layer consisting of a co-polyester, the co-polyester having an elongation at break of greater than 70%, a flexural modulus of greater than 150,000 psi, an elongation at yield of greater than 4%, a tensile modulus greater than 150,000 psi, and a tensile strength at yield of 4000-6500 psi; and	<i>See</i> Limitation 1[A].
18[C]: a second layer consisting of a thermoplastic polyurethane elastomer having an elongation at break of greater than 200%, an ultimate tensile strength of greater than 5000 psi, and a hardness of 60A to 85D; and	<i>See</i> Limitation 1[B].
18[D]: wherein the multilayer sheet forms a plurality of tooth receiving	<i>See</i> Limitation 6[D].

U.S. Patent No. 11,648,091	
cavities configured to receive and reposition the patient's teeth from the first arrangement toward the second arrangement.	
19: The multilayer dental aligner of claim 18, wherein the multilayer sheet further comprises a third layer.	See Claim 7.
21: The multilayer dental aligner of claim 19, wherein third layer consists of a same or different co-polyester, and wherein the third layer is co-extruded with or laminated to the first layer.	ClearCorrect's aligners have three layers. On information and belief, the third layer of ClearQuartz is made from the Eastman Tritan MX-710 or MX-711 co-polyester. ClearQuartz™ tri-layer material. ClearCorrect aligners are made from ClearQuartz, an industry-leading tri-layer plastic material that improves comfort and clarity while maintaining durability.*  • Low-porosity material For toughness and stain resistance • Elastomeric layer Applies gentle, consistent, and continuous force <i>About the Aligners</i>, Straumann (2024), https://www.straumann.com/clearcorrect/en/patients/about-the-aligners.html. On information and belief, ClearQuartz is a co-extruded material.
25: The multilayer dental aligner of claim 18, wherein the first layer has a light transmission between 400 nm and 800 nm of greater than about 75%.	See Claim 4.

U.S. Patent No. 11,648,091	
26: The multilayer dental aligner of claim 18, wherein the co-polyester has an elastic modulus greater than the thermoplastic polyurethane elastomer.	<i>See</i> Limitation 1[D].

EXHIBIT E

U.S. Patent No. 8,038,444	
1[Pre]: A computer-implemented method for staging the movement of a plurality of dental objects, the method comprising:	If limiting, ClearCorrect’s treatment planning software performs a computer-implemented method for staging the movement of a plurality of dental objects. In an October 2022, 510(k) submission to the FDA, ClearCorrect stated that its Cut and Stage software uses initial and final positions of patients’ teeth to “interpret[] a series of intermediate states that adhere to [a] defined maximum tooth motions and clinician instructions.” Doc. 1-12 at 9. On information and belief, the phrase “interpret[] a series of intermediate states” refers to staging the movement of a patient’s teeth for each phase of treatment with aligners. <i>Id.</i>
1[A]: receiving, at a host computer, an electronic representation of each dental object of the plurality of dental objects in relation to one another;	On information and belief, a computer running ClearCorrect’s treatment planning software receives an electronic representation of a patient’s teeth. In its October 2022, 510(k) submission to the FDA, ClearCorrect stated, “ClearCorrect technicians using the ClearCorrect Cut and Stage software use a scan of a PVS impression or the output of an intra-oral scanner of the patient’s untreated oral anatomy” Doc. 1-12 at 9. For the technicians to use such a scan, the computer must have received it. ClearCorrect also stated that its “internal” software is “functionally equivalent to” Align’s software, which computes treatment plans based on an electronic representation of a patient’s teeth received at the computer running Align’s treatment planning software. <i>Id.</i> Additionally, ClearCorrect’s website states, “[e]very ClearCorrect case includes a Treatment Setup, and a 3D representation of the patient’s teeth <i>before</i>, during, and after planned treatment.” <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i>, ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot (emphasis added).
1[B]: receiving, by the host computer, an electronic representation of a desired final position for each respective dental object; and	On information and belief, a computer running ClearCorrect’s treatment planning software receives an electronic representation of a desired final state of a patient’s teeth.

U.S. Patent No. 8,038,444	
	In its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its technicians “using the ClearCorrect Cut and Stage software” and “the prescription details” will “derive the desired final patient tooth positions[,]” and that the software then uses “this desired state” to calculate a treatment plan. Doc. 1-12 at 9. To use the desired final state of a patient’s teeth to calculate a treatment plan, the computer must have received it. ClearCorrect also stated that its “internal” software is “functionally equivalent to” Align’s software, which computes treatment plans based on an electronic representation of a desired final position of each of a patient’s teeth received by the computer running that software. <i>Id.</i> Alternatively, ClearCorrect’s treatment planning software receives an electronic representation of a desired final state of a patient’s teeth after a doctor digitally edits the desired final positions via ClearCorrect’s ClearPilot software. A doctor can access the ClearPilot software via both ClearCorrect’s dr.clearcorrect.com portal and via Straumann’s eShop website. <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i>, ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot. According to ClearCorrect’s website, “[a]fter you submit the desired final position and the instructions related to these changes, the technician will adjust the setup to reflect your requested edits.” <i>Id.</i> On information and belief, the technician’s computer running ClearCorrect’s treatment planning software receives an electronic representation of the updated Treatment Setup with desired final positions of teeth. Additionally, ClearCorrect’s website states, “[e]very ClearCorrect case includes a Treatment Setup, and a 3D representation of the patient’s teeth before, during, and <i>after</i> planned treatment.” <i>Id.</i> (emphasis added).
1[C]: determining, by the host computer, an order of movement for each respective dental object such that the dental objects avoid colliding with or obstructing each other on their respective routes from said initial position to said desired final position	On information and belief, a computer running ClearCorrect’s treatment planning software determines an order of movement for each tooth during treatment planning. In its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its Cut and Stage software “interprets a series of intermediate states that adhere to defined maximum tooth motions and clinician instructions.” Doc. 1-12 at 9. Then, only “as

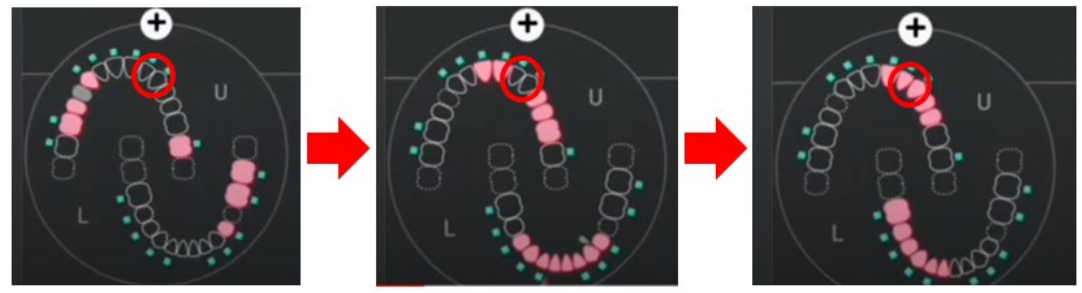
U.S. Patent No. 8,038,444	
through at least one of staggering and round-tripping of at least one dental object.	necessary,” a “technician further refines these intermediate states.” <i>Id.</i> On information and belief, the phrase “interpret[] a series of intermediate states” refers to staging the movement of a patient’s teeth for each phase of treatment with aligners, which would include determining the order in which the teeth moved. ClearCorrect also stated that its “internal” software is “functionally equivalent to” Align’s software, which determines an order of movement for each tooth during treatment planning. <i>Id.</i> On information and belief, ClearCorrect’s treatment planning software determines an order of movement for each of a patient’s teeth that avoids collisions between teeth or one tooth obstructing another en route to each tooth’s final position through at least one of staggering and round-tripping. ClearCorrect advertises that its technicians will, by default, treatment plan for “Moderate-Severe Crowding (Class II)” using “anterior round tripping as needed.” <i>Treatment Preferences</i>, ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences. ClearCorrect also has published a YouTube video showing its ClearPilot software animating a treatment plan with staggering:



ClearPilot features: The Control is in Your Hands, ClearCorrect,
<https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated). The foregoing stills depict staggering by showing the tooth circled in red moving only after the teeth circled in blue and green.

The following images from the ClearCorrect YouTube video also depict staggering. As shown below, and on information and belief, the following images depict a treatment plan using a mid-line shift pattern (here, the teeth move left to right). In this treatment plan, two teeth in the patient's upper jaw (circled red) move only after teeth to their right have moved. The teeth circled in red thus are staggered:

U.S. Patent No. 8,038,444



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated).

ClearCorrect also stated, in its October 2022, 510(k) submission to the FDA, that its “internal” software is “functionally equivalent to” Align’s software, which uses round-tripping and staggering, where necessary, to avoid collisions between teeth and teeth obstructing other teeth en route to their final positions. Doc. 12-1 at 9.

2[Pre]: The computer-implemented method of claim 1, wherein determining the order of movement, comprises:

See Limitation 1[Pre].

2[A]: (a) determining a route each respective dental object will move to achieve its respective final position;

On information and belief, ClearCorrect’s treatment planning software performs this limitation. Determining a route for each tooth is a necessary step in treatment planning.

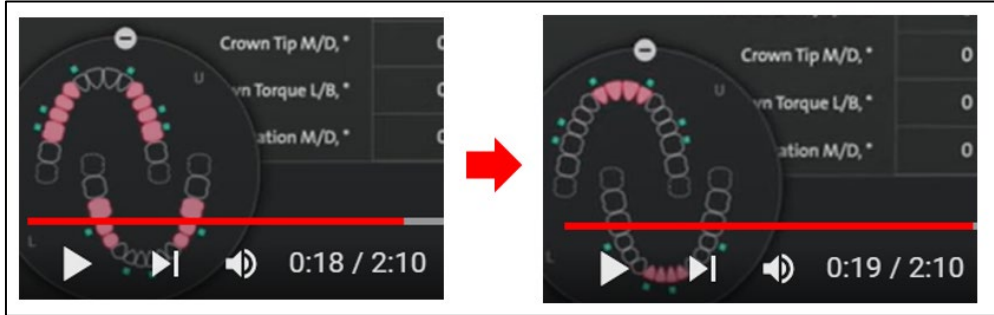
2[B]: (b) determining the distance each respective dental object will move to achieve its respective final position; and

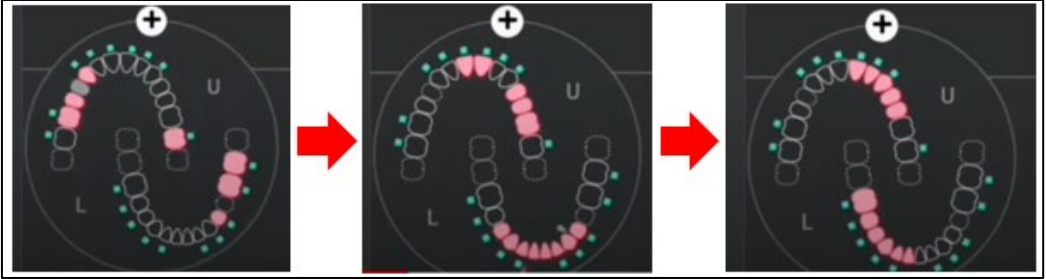
On information and belief, ClearCorrect’s treatment planning software performs this limitation. Determining the distance each tooth will move is a necessary step in treatment planning.

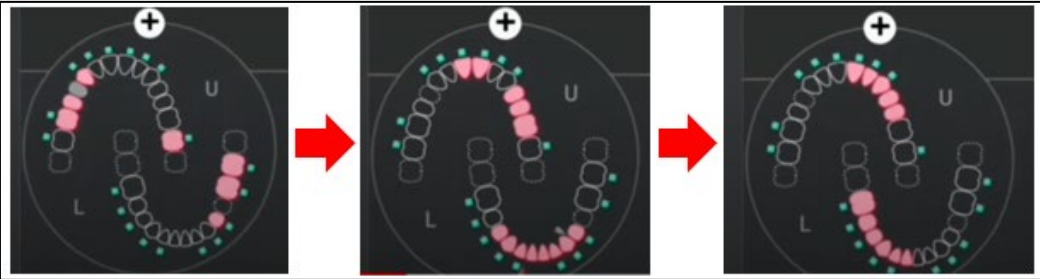
2[C]: (c) determining a rate at which each respective dental object will move along its respective route.

On information and belief, ClearCorrect’s treatment planning software performs this limitation. ClearCorrect’s website explains that “[t]he provider can change the movement velocity ...” *Treatment Preferences*, ClearCorrect (Mar. 25, 2024), <https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences>. Thus, ClearCorrect’s treatment planning process allows for moving teeth at varied rates. On information and belief, its treatment planning software determines the rate at which each tooth moves, including based on direction from providers.

U.S. Patent No. 8,038,444	
3: The computer-implemented method of claim 2, further comprising: determining (a), (b), and (c) in relation to each of the other dental objects.	ClearCorrect advertises that its software performs “collision management.” <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i>, ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot. Therefore, and on information and belief and to avoid collisions, ClearCorrect’s treatment planning software performs each of the steps recited in claim 2 for each tooth in relation to each other tooth.
4: The computer-implemented method of claim 3, wherein determining (a), (b), and (c) in relation to each of the other dental objects step comprises adjusting at least one of the route and the rate of at least one dental object to avoid collision with at least one other dental object.	On information and belief, ClearCorrect’s treatment planning software performs the additional limitation recited by this claim. ClearCorrect advertises that its software performs “collision management.” <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i>, ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot.
5: The computer-implemented method of claim 1, further comprising determining, by the host computer, an optimal number of stages for the order of movement of the dental objects.	On information and belief, ClearCorrect’s treatment planning software determines the optimal number of stags for the order of movement of each of a patient’s teeth. Otherwise, ClearCorrect could not determine the minimum number of aligners needed for each patient’s treatment.
6: The computer-implemented method of claim 5, wherein determining the optimal number of stages step comprises: determining a total distance each respective dental object will move; dividing the total distance for each dental object by its respective maximum speed to determine a number of movement stages for each dental object; determining a number of non-movement stages for each respective dental object; adding the number of movement stages to the number of non-movement stages for each dental object to determine a	On information and belief, ClearCorrect’s treatment planning software performs the additional steps recited in this dependent claim. Without determining the minimum number of stages required for each tooth and further selecting the largest minimum number of stages, i.e., for the tooth that requires the most stages to complete treatment, ClearCorrect could not determine the minimum number of aligners needed for each patient’s treatment.

U.S. Patent No. 8,038,444	
minimum number of stages for each respective dental object; and selecting the largest of the minimum number of stages.	
7: The computer-implemented method of claim 1, wherein the determining the order of movement, comprises, ordering the movement of the dental objects to form an all-equal pattern.	On information and belief, ClearCorrect's treatment planning software uses patterns to order the movement of the dental objects. <i>See</i> Claims 8, 11. On information and belief, ClearCorrect's software uses an "all-equal" pattern to devise treatment plans for patients with simple malocclusion cases.
8: The computer-implemented method of claim 1, wherein the determining the order of movement step comprises ordering the movement of the dental objects to form a V-shaped pattern.	ClearCorrect's treatment planning software performs the additional step of this claim. ClearCorrect has published a YouTube video depicting a ClearCorrect treatment plan in which the order of movement is a V-shaped pattern:  <i>ClearPilot™: powerful digital treatment planning</i>, ClearCorrect, https://www.youtube.com/watch?v=bJglDeZ0ZBs.
9: The computer-implemented method of claim 1, wherein the determining the order of movement comprises: ordering the movement of the dental objects to form an A-shaped pattern.	On information and belief, ClearCorrect's treatment planning software uses patterns to order the movement of the dental objects. <i>See</i> Claims 8, 11. On information and belief, ClearCorrect's software uses an "A-shaped" pattern to devise treatment plans for patients having gapped teeth. <i>See generally About the aligners: Spacing</i> , Straumann, https://www.straumann.com/clearcorrect/us/en/patients/about-the-aligners/Spacing.html .
10: The computer-implemented method of claim 1, wherein determining the order of	On information and belief, ClearCorrect's treatment planning software uses patterns to order the movement of the dental objects. <i>See</i> Claims 8, 11. On information and

U.S. Patent No. 8,038,444	
movement step comprises ordering the movement of the dental objects to form an M-shaped pattern.	belief, ClearCorrect's software uses an "M-shaped" pattern to devise treatment plans for patients having gapped teeth on both sides of their upper or lower jaw. <i>See generally About the aligners: Spacing</i>, Straumann, https://www.straumann.com/clearcorrect/us/en/patients/about-the-aligners/Spacing.html.
11: The computer-implemented method of claim 1, wherein, determining the order of movement step comprises ordering the movement of the dental objects to form a mid-line shift pattern.	ClearCorrect's treatment planning software performs the additional step of this claim. ClearCorrect has published a YouTube video depicting a ClearCorrect treatment plan in which the order of movement is a mid-line shift pattern:  <i>ClearPilot features: The Control is in Your Hands</i>, ClearCorrect, https://www.youtube.com/watch?v=DYVS21zqH0c.
12: The computer-implemented method of claim 1, wherein, determining the order of movement step comprises staggering the movement of at least two dental objects.	See Limitation 1[C].
13: The computer-implemented method of claim 1, wherein determining the order of movement step comprises, round tripping at least one dental object.	See Limitation 1[C].
14: The computer-implemented method of claim 1, wherein determining the order of movement step comprises, slowing the movement of at least one dental object.	On information and belief, ClearCorrect's treatment planning software determines the order of movement including by slowing at least one tooth in some treatment plans. For example, in the following stills from a ClearCorrect YouTube video,

U.S. Patent No. 8,038,444	
	ClearCorrect stops the movement of the teeth on the left side of the patient's mouth as treatment proceeds:  <i>ClearPilot features: The Control is in Your Hands, ClearCorrect, https://www.youtube.com/watch?v=DYVS21zqH0c.</i>
15[Pre]: A system for staging the movement of a plurality of dental objects, the system comprising:	If limiting, the computer hosting ClearCorrect's software satisfies this limitation. <i>See</i> Limitation 1[Pre].
15[A]: means for receiving an electronic representation of each dental object of the plurality of dental objects in relation to one another;	The computer hosting ClearCorrect's software satisfies this limitation. <i>See</i> Limitation 1[A].
15[B]: means for receiving an electronic representation of a desired final position for each respective dental object; and	The computer hosting ClearCorrect's software satisfies this limitation. <i>See</i> Limitation 1[B].
15[C]: means for determining an order of movement for each respective dental object such that the dental objects avoid colliding with each other on their respective routes from said initial position to said desired final position.	ClearCorrect's treatment planning software satisfies this limitation. <i>See</i> Limitation 1[C]. On information and belief, ClearCorrect's software computes its treatment plans by first selecting a pattern of movement (<i>see</i> claims 8, 11), staggers or roundtrips teeth, as needed, to avoid collisions (<i>see</i> Limitation 1[C]), and determines the most efficient path for each respective dental object.

U.S. Patent No. 8,038,444	
16[Pre]: The system of claim 15, wherein the means for determining the order of movement comprises:	<i>See</i> Limitation 2[Pre].
16[A]: (a) means for determining a route each respective dental object will move to achieve its respective final position;	<i>See</i> Limitation 2[A].
16[B]: (b) means for determining the distance each respective dental object will move to achieve its respective final position; and	<i>See</i> Limitation 2[B].
16[C]: (c) means for determining a rate at which each respective dental object will move along its respective route.	<i>See</i> Limitation 2[C].
17: The system of claim 16, further comprising means for determining (a), (b), and (c) in relation to each of the other dental objects.	<i>See</i> Claim 3.
18: The system of claim 17, wherein the means for determining (a), (b), and (c) in relation to each of the other dental objects comprises means for adjusting at least one of the route and the rate of at least one dental object to avoid collision with at least one other dental object.	<i>See</i> Claim 4.
19: The system of claim 15, further comprising means for determining an optimal number of stages for the order of movement of the dental objects.	<i>See</i> Claim 5.
20: The system of claim 19, wherein the means for determining the optimal number of stages step comprises: means for determining a total distance each respective	<i>See</i> Claim 6.

U.S. Patent No. 8,038,444	
dental object will move; means for dividing the total distance for each dental object by its respective maximum speed to determine a number of movement stages for each dental object; means for determining a number of non-movement stages for each respective dental object; means for adding the number of movement stages to the number of non-movement stages for each dental object to determine a minimum number of stages for each respective dental object; and means for selecting the largest of the minimum number of stages.	
21: The system of claim 15, wherein the means for determining the order of movement comprises means for ordering the movement of the dental objects in an all-equal pattern.	On information and belief, ClearCorrect's treatment planning software satisfies this limitation. <i>See</i> Claim 7, Limitation 15[C].
22: The system of claim 15, wherein the means for determining the order of movement comprises means for ordering the movement of the dental objects in a V-shaped pattern.	ClearCorrect's treatment planning software satisfies this limitation. <i>See</i> Claim 8, Limitation 15[C].
23: The system of claim 15, wherein the means for determining the order of movement comprises means for ordering the movement of the dental objects in an A-shaped pattern.	On information and belief, ClearCorrect's treatment planning software satisfies this limitation. <i>See</i> Claim 9, Limitation 15[C].
24: The system of claim 15, wherein the means for determining the order of movement comprises means for ordering	On information and belief, ClearCorrect's treatment planning software satisfies this limitation. <i>See</i> Claim 10, Limitation 15[C].

U.S. Patent No. 8,038,444	
the movement of the dental objects to form an M-shaped pattern.	
25: The system of claim 15, wherein the means for determining the order of movement comprises means for ordering the movement of the dental objects in a mid-line shift pattern.	ClearCorrect's treatment planning software satisfies this limitation. <i>See</i> Claim 11, Limitation 15[C].
26: The system of claim 15, wherein the means for determining the order of movement comprises means for staggering the movement of at least two dental objects.	ClearCorrect's treatment planning software satisfies this limitation. <i>See</i> Claim 12, Limitation 15[C].
27: The system of claim 15, wherein the means for determining the order of movement comprises means for round tripping at least one dental object.	ClearCorrect's treatment planning software satisfies this limitation. <i>See</i> Claim 13, Limitation 15[C].
28: The system of claim 15, wherein the means for determining the order of movement comprises means for slowing the movement of at least one dental object.	<i>See</i> Claim 14.
29[Pre]: A machine-readable medium having stored thereon a plurality of instructions for staging the movement of a plurality of dental objects, the plurality of instructions when executed by a processor, causing the processor to:	If limiting, ClearCorrect's treatment planning software is stored in a machine readable medium, <i>i.e.</i> , computer memory, and executed on a processor.

U.S. Patent No. 8,038,444	
29[A]: receive an electronic representation of each dental object in relation to one another in an initial position;	<i>See</i> Limitation 1[A].
29[B]: receive an electronic representation of a desired final position for each respective dental object; and	<i>See</i> Limitation 1[B].
29[C]: determine an order of movement for each respective dental object such that the dental objects avoid colliding with each other on their respective routes from said initial position to said desired final position.	<i>See</i> Limitation 1[C].
30[Pre]: The machine-readable medium of claim 29, wherein the instructions causing the processor to determine the order of movement instructions further comprise instructions to:	<i>See</i> Limitation 2[Pre].
30[A]: (a) determine a route each respective dental object will move to achieve its respective final position;	<i>See</i> Limitation 2[A].
30[B]: (b) determine the distance each respective dental object will move to achieve its respective final position; and	<i>See</i> Limitation 2[B].
30[C]: (c) determine a rate at which each respective dental object will move along its respective route.	<i>See</i> Limitation 2[C].
31: The machine-readable medium of claim 30, further comprising instructions to: determine (a), (b), and (c) in relation to each of the other dental objects.	<i>See</i> Claim 3.

U.S. Patent No. 8,038,444	
32: The machine-readable medium of claim 31, wherein the instructions to determine (a), (b), and (c) in relation to each of the other dental objects comprises instructions to adjust at least one of the route and the rate of at least one dental object to avoid collision with at least one other dental object.	<i>See Claim 4.</i>
33: The machine-readable medium of claim 29, further comprising instructions to determine an optimal number of stages for the order of movement of the dental objects.	<i>See Claim 5.</i>
34: The machine-readable medium of claim 33, wherein the instructions to determine the optimal number of stages comprise instructions to: determine a total distance each respective dental object will move; divide the total distance for each dental object by its respective maximum speed to determine a number of movement stages for each dental object; determine a number of non-movement stages for each respective dental object; add the number of movement stages to the number of non-movement stages for each dental object to determine a minimum number of stages for each respective dental object; and select the largest of the minimum number of stages.	<i>See Claim 6.</i>
35: The machine-readable medium of claim 29, wherein the instructions to determine the order of movement comprise	<i>See Claim 7.</i>

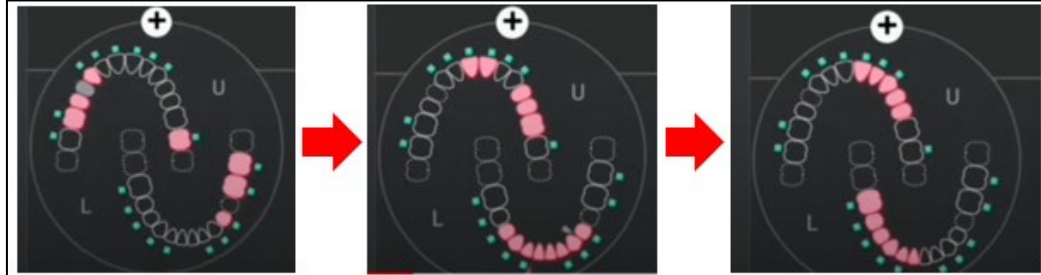
U.S. Patent No. 8,038,444	
instructions to order the movement of the dental objects to form an all-equal pattern.	
36: The machine-readable medium of claim 29, wherein the instructions to determine the order of movement comprise instructions to order the movement of the dental objects to form a V-shaped pattern.	<i>See Claim 8.</i>
37: The machine-readable medium of claim 29, wherein the instructions to determine the order of movement, comprise instructions to order the movement of the dental objects to form an A-shaped pattern.	<i>See Claim 9.</i>
38: The machine-readable medium of claim 29, wherein the instructions to determine the order of movement comprise instructions to order the movement of the dental objects to form an M-shaped pattern.	<i>See Claim 10.</i>
39: The machine-readable medium of claim 29, wherein the instructions to determine the order of movement comprise instructions to order the movement of the dental objects a mid-line shift pattern.	<i>See Claim 11.</i>
40: The machine-readable medium of claim 29, wherein the instructions to determining the order of movement, comprise instructions to stagger the movement of at least two dental objects.	<i>See Claim 12.</i>
41: The machine-readable medium of claim 29, wherein the instructions to determine	<i>See Claim 13.</i>

U.S. Patent No. 8,038,444	
the order of movement comprise instructions to round-trip at least one dental object.	
42: The machine-readable medium of claim 29, wherein the instructions to determine the order of movement comprise instructions to slow the movement of at least one dental object.	<i>See Claim 14.</i>

EXHIBIT F

U.S. Patent No. 10,456,217	
1[Pre]: A method comprising:	If limiting, ClearCorrect performs a method as set forth below.
1[A]: selecting a movement pattern from a plurality of movement patterns for moving dental objects from an initial arrangement toward a final arrangement, the dental objects being based on output of a scanning device, the movement pattern defining a schedule of movement of the dental objects during treatment stages as each of the dental objects moves from a respective initial position toward a respective final position;	On information and belief, during treatment planning, a computer running ClearCorrect's treatment planning software or a human technician selects a movement pattern from a plurality of movement patterns for moving a patient's teeth, <i>i.e.</i>, dental objects, from their initial positions to their final positions. For example, ClearCorrect advertises that, by "[d]efault[,] " ClearCorrect will treatment plan for "Class II Corrections" using "[u]pper molar distalization with <i>sequential</i> movement[,] " <i>i.e.</i>, scheduling some teeth to move before others. <i>Treatment Preferences</i>, ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences (emphasis added). It also offers, alternatively, "[n]o class II correction (no molar changes). <i>Id.</i> Videos published by ClearCorrect on its YouTube channel also indicate that ClearCorrect's treatment planning software selects a movement pattern from a plurality of movement patterns to define a schedule of movement for a patient's teeth. For example, ClearCorrect has published a YouTube video depicting a ClearCorrect treatment plan scheduling movement in a V-shaped pattern: <i>ClearPilot™: powerful digital treatment planning</i>, ClearCorrect, https://www.youtube.com/watch?v=bJglDeZ0ZBs. It also has published a YouTube video depicting a ClearCorrect treatment plan scheduling movement in a mid-line shift pattern:

U.S. Patent No. 10,456,217



ClearPilot features: The Control is in Your Hands, ClearCorrect,
<https://www.youtube.com/watch?v=DYVS21zqH0c>.

Additionally, in its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its “internal” software is “functionally equivalent to” Align’s software, which preselects a movement pattern for moving a patient’s teeth and which also allows a technician to override that preselection and select a different movement pattern. Doc. 1-12 at 9.

On information and belief, ClearCorrect’s treatment planning software calculates treatment plans for patients’ teeth using electronic representations of patients’ teeth based on the output of an intraoral scanner. In its October 2022, 510(k) submission to the FDA, ClearCorrect stated, “ClearCorrect technicians using the ClearCorrect Cut and Stage software use a scan of a PVS impression or the output of an intra-oral scanner of the patient’s untreated oral anatomy” Doc. 1-12 at 9. It also stated that its “internal” software is “functionally equivalent to” Align’s software, which computes treatment plans based on an electronic representation of a patient’s teeth received from, in many cases, an intraoral scanner. *Id.*

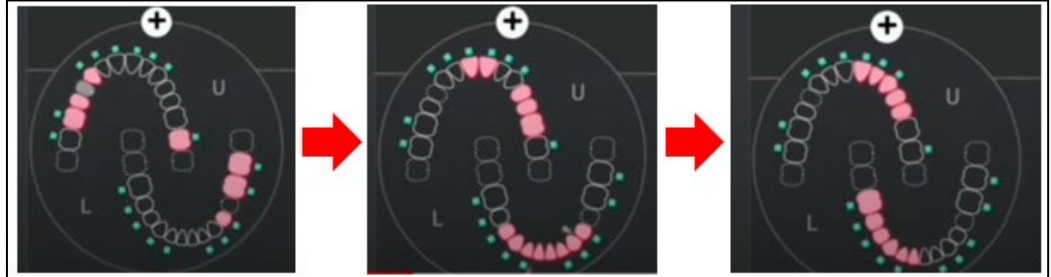
1[B]: calculating, by a computer processor, a respective treatment path for each of the dental objects between its respective initial and final positions;

On information and belief, a computer running ClearCorrect’s treatment planning software calculates a treatment path for each tooth during treatment planning. In its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its Cut and Stage software “interprets a series of intermediate states that adhere to defined maximum tooth motions and clinician instructions.” Doc. 1-12 at 9. Then, only “as

U.S. Patent No. 10,456,217	
	necessary,” a “technician further refines these intermediate states.” <i>Id.</i> On information and belief, the phrase “interpret[] a series of intermediate states” refers to staging the movement of a patient’s teeth for each phase of treatment with aligners, which would include calculating a treatment path for each tooth. ClearCorrect also stated that its “internal” software is “functionally equivalent to” Align’s software, which calculates a treatment path for each tooth during treatment planning, including each intermediate state for each tooth between each tooth’s respective initial and final positions. <i>Id.</i>
1[C]: identifying, by a computer processor, a collision between a first of the dental objects and a second of the dental objects based at least on one of the respective treatment paths; and	On information and belief, a computer running ClearCorrect’s treatment planning software detects collisions between teeth that would occur according to some treatment paths. For example, ClearCorrect advertises that its ClearPilot software can perform “collision management.” <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i> , ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot . ClearCorrect’s treatment planning software also must detect collisions between teeth because, otherwise, it could not plot a treatment plan that avoided collisions and thereby allowed a patient’s teeth to reach their final positions. Finally, in its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its “internal” software is “functionally equivalent to” Align’s software, which detects collisions. Doc. 1-12 at 9.
1[D]: performing, by a computer processor, a first modification of the schedule of movement in response to the identifying, the first modification comprising: round-tripping the first dental object.	On information and belief, a computer running ClearCorrect’s treatment planning software will modify a treatment plan via round-tripping, where necessary, to avoid a collision between teeth. ClearCorrect advertises that its technicians will, by default, treatment plan for “Moderate-Severe Crowding (Class II)” using “anterior round tripping as needed,” <i>i.e.</i> , to avoid a collision. <i>Treatment Preferences</i> , ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences . ClearCorrect also stated in its October 2022 510(k) submission to the FDA that its “internal” software is “functionally equivalent to” Align’s software, which iteratively modifies its treatment plans to avoid collisions, including via round-tripping. Doc. 1-12 at 9.

U.S. Patent No. 10,456,217	
2: The method of claim 1, wherein the movement pattern is selected by a user.	As explained above, either a computer running ClearCorrect's treatment planning software or a human technician selects a movement pattern. <i>See</i> Limitation 1[A]. A human technician is "a user."
3: The method of claim 1, wherein the selecting comprises analyzing, by a computer processor, the dental objects in their respective initial and final positions.	On information and belief, a computer running ClearCorrect's treatment planning software analyzes the patient's teeth in their respective initial and final positions during selection of a movement pattern.
4: The method of claim 3, wherein the analyzing comprises determining, by a computer processor, a respective distance needed to move each of the dental objects from its respective initial position to its respective final position.	On information and belief, a computer running ClearCorrect's treatment planning software that analyzes a patient's teeth in their initial and final positions also determines the distance needed to move each tooth from its initial to its final position.
5: The method of claim 1, further comprising: determining, by a computer processor, that the first modification does not avoid a collision between the first and second dental objects; and performing, by a computer processor after the determining, a second modification of the schedule of movement, the second modification comprising slowing or stopping movement of the first dental object during one or more of the treatment stages following a previous one of the treatment stages in which the first dental object moved.	On information and belief, a computer running ClearCorrect's treatment planning software sometimes will determine that the first modification does not avoid a collision between two dental objects. On information and belief, this is so because treatment planning involves iteratively calculating possible treatment plans and rejecting treatment plans that result in collisions. Indeed, ClearCorrect stated that its "internal" software is "functionally equivalent to" Align's software, which iteratively calculates its treatment plans to avoid collisions. Doc. 1-12 at 9. On information and belief, a computer running ClearCorrect's treatment planning software therefore will sometimes perform a second modification of the schedule of movement, including via slowing or stopping movement. For example, in the following stills from a ClearCorrect YouTube video, ClearCorrect stops the movement of the teeth on the left side of the patient's mouth as treatment proceeds:

U.S. Patent No. 10,456,217



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c>.

6: The method of claim 5, further comprising: determining, by a computer processor, that the second modification does not avoid a collision between the first and second dental objects; and performing, by a computer processor after determining that the second modification does not avoid a collision, a third modification of the schedule of movement, the third modification comprising round-tripping the first dental object.

On information and belief, a computer running ClearCorrect's treatment planning software sometimes will determine that the second modification does not avoid a collision between two dental objects. On information and belief, this is so because treatment planning involves iteratively calculating possible treatment plans and rejecting treatment plans that result in collisions. Indeed, ClearCorrect stated that its "internal" software is "functionally equivalent to" Align's software, which iteratively calculates its treatment plans to avoid collisions. Doc. 1-12 at 9.

On information and belief, a computer running ClearCorrect's treatment planning software will perform a third modification of a treatment plan, including via roundtripping. ClearCorrect advertises that its technicians will, by default, treatment plan for "Moderate-Severe Crowding (Class II)" using "anterior round tripping as needed." *Treatment Preferences*, ClearCorrect (Mar. 25, 2024), <https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences>.

7[Pre]: The method of claim 1, further comprising:

See Limitation 1[Pre].

7[A]: determining, by a computer processor, that the first modification does not avoid a collision between the first and second dental objects; and

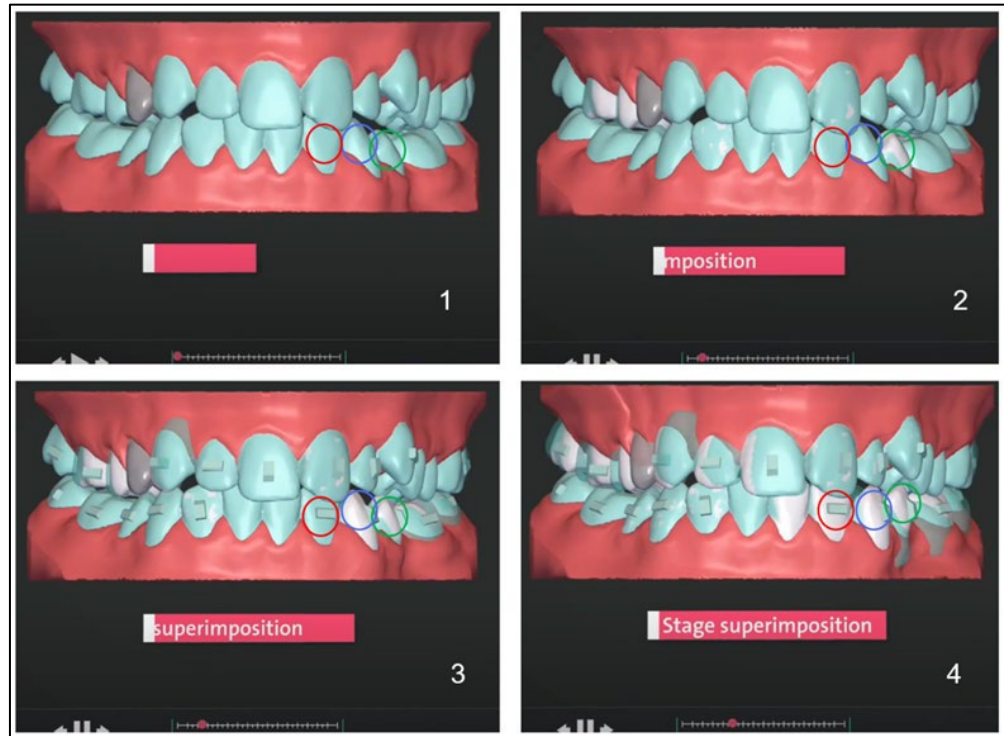
On information and belief, a computer running ClearCorrect's treatment planning software sometimes will determine that the first modification does not avoid a collision between two dental objects. On information and belief, this is so because treatment planning involves iteratively calculating possible treatment plans and rejecting treatment plans that result in collisions. Indeed, ClearCorrect stated that its

U.S. Patent No. 10,456,217	
	“internal” software is “functionally equivalent to” Align’s software, which iteratively calculates its treatment plans to avoid collisions. Doc. 1-12 at 9.
7[B]: performing, by a computer processor after the determining, a second modification of the schedule of movement, the second modification comprising round-tripping the first dental object.	On information and belief, a computer running ClearCorrect’s treatment planning software will perform a second modification of a treatment plan, including via round-tripping. ClearCorrect advertises that its technicians will, by default, treatment plan for “Moderate-Severe Crowding (Class II)” using “anterior round tripping as needed.” <i>Treatment Preferences</i> , ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences .
8: The method of claim 1, further comprising producing a series of orthodontic appliances based at least on the modified schedule of movement, wherein each of the orthodontic appliances corresponds to a respective one of the treatment stages.	ClearCorrect uses its treatment plans to produce aligners where each aligner corresponds to a treatment stage. ClearCorrect told the FDA in its October 2022 510(k): The dental practitioner then reviews these images [of each intermediate state in the treatment plan] and has the option to reject or request modifications to the set-up prior to approving it for aligner fabrication. Once the dental practitioner approves the treatment plan, the software converts the files <i>to produce the series of custom-made aligners.</i> Doc. 1-12 at 9 (emphasis added).
9: The method of claim 8, wherein the producing comprises: fabricating a respective positive mold of the dental objects for at least two of the treatment stages; and thermoforming a respective one of the orthodontic appliances over each of the respective positive molds.	ClearCorrect manufactures its aligners by fabricating a positive mold corresponding to the desired positions of a patient’s teeth in each stage of a treatment plan and then thermoforming the aligners over those molds. <i>See, e.g., Clearcorrect expands production capacity for orthodontic aligners by 30 percent</i> , stratsys (Aug. 19, 2020), https://www.stratasys.com/en/resources/blog/clearcorrect-3d-printing/ .
10: The method of claim 1, further comprising: performing, by a computer processor, a second modification of the schedule of movement in response to the	<i>See Claim 5.</i> On information and belief, a computer running ClearCorrect’s treatment planning software also will, in response to the identifying, perform a second modification

U.S. Patent No. 10,456,217

identifying, the second modification comprising one or more of: delaying initial movement of the first dental object; and slowing or stopping movement of the first dental object during one or more of the treatment stages following a previous one of the treatment stages during which the first dental object moved.

comprising delaying the initial movement of the first dental object. For example, ClearCorrect has published a YouTube video showing its ClearPilot software animating a treatment plan with staggering:

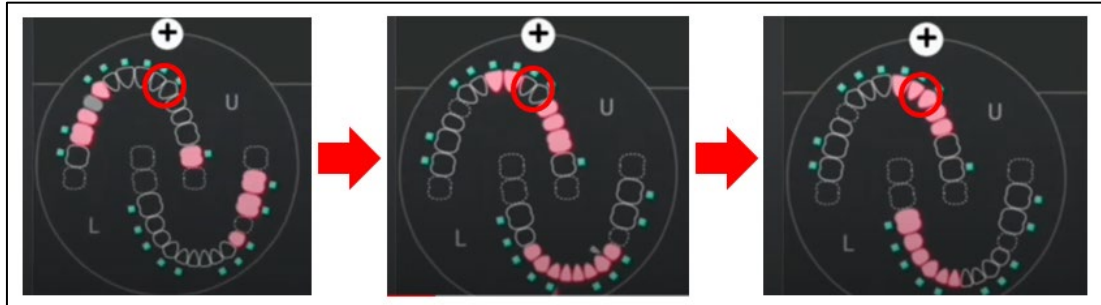


ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated). The foregoing stills depict staggering by showing the tooth circled in red moving only after the teeth circled in blue and green.

The following images from the ClearCorrect YouTube video also depict staggering. As shown below, and on information and belief, the following images depict a

U.S. Patent No. 10,456,217

treatment plan using a mid-line shift pattern (here, the teeth move left to right). In this treatment plan, two teeth in the patient's upper jaw (circled red) move only after teeth to their right have moved. The teeth circled in red thus are staggered:



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated).

11[Pre]: A non-transitory computer-readable medium comprising instructions that, when executed by one or more computer processors, cause at least one of the one or more processors to:

If limiting, ClearCorrect's treatment planning software is stored in a machine readable medium, *i.e.*, computer memory, and executed on one or more processors.

11[A]: select a movement pattern from a plurality of movement patterns for moving dental objects from an initial arrangement toward a final arrangement, the dental objects being based on output of a scanning device, the movement pattern defining a schedule of movement that of the dental objects during treatment stages as each of the dental objects moves from a respective

See Limitation 1[A].

U.S. Patent No. 10,456,217	
initial position toward a respective final position;	
11[B]: calculate a respective treatment path for each of the dental objects between its respective initial and final positions;	<i>See</i> Limitation 1[B].
11[C]: identify a collision between a first of the dental objects and a second of the dental objects based at least on one of the respective treatment paths; and	<i>See</i> Limitation 1[C].
11[D]: perform a first modification of the schedule of movement in response to the identifying, the first modification comprising:	<i>See</i> Limitation 1[D][i].
11[E]: round-tripping the first dental object.	<i>See</i> Limitation 1[D][ii].
12: The medium of claim 11, wherein the movement pattern is selected by a user.	As explained above, either a computer running ClearCorrect's treatment planning software or a human technician selects a movement pattern. <i>See</i> Limitation 1[A]. A human technician is "a user."
13: The medium of claim 11, wherein the selecting comprises analyzing the dental objects in their respective initial and final positions.	<i>See</i> Claim 3.
14: The medium of claim 13, wherein the analyzing comprises determining a respective distance needed to move each of the dental objects from its respective initial position to its respective final position.	<i>See</i> Claim 4.
15: The medium of claim 11, wherein the instructions, when executed by the one or	<i>See</i> Claim 5.

U.S. Patent No. 10,456,217

more processors, further cause at least one of the one or more processors to: determine that the first modification does not avoid a collision between the first and second dental objects; and perform, after the determining, a second modification of the schedule of movement, the second modification comprising slowing or stopping the movement of the first dental object during at least one of the treatment stages following a previous one of the treatment stages during which the first dental object moved.

16: The medium of claim 15, wherein the instructions, when executed by the one or more processors, further cause at least one of the one or more processors to: determine that the second modification does not avoid a collision between the first and second dental objects; and perform, after determining that the second modification does not avoid a collision, a third modification of the schedule of movement, the third modification comprising round-tripping the first dental object moved.

17[Pre]: The medium of claim 11, wherein the instructions, when executed by the one or more processors, further cause at least one of the one or more processors to:

See Claim 6.

See Limitation 11[Pre].

U.S. Patent No. 10,456,217	
17[A]: determine that the first modification does not avoid a collision between the first and second dental objects; and	See Limitation 7[A].
17[B]: perform, after the determining, a second modification of the schedule of movement, the second modification comprising round-tripping the first dental object.	See Limitation 7[B].
18: The medium of claim 11, wherein the instructions, when executed by the one or more processors, further cause at least one of the one or more processors to produce a series of orthodontic appliances based at least on the modified schedule of movement, wherein each of the orthodontic appliances corresponds to a respective one of the treatment stages.	ClearCorrect produces its aligners by 3-D printing positive molds corresponding to each stage of a patient's treatment plan and then thermoforming plastic over those molds. See Doc. 1-11 at 3; Doc. 1-12 at 8; <i>Clearcorrect expands production capacity for orthodontic aligners by 30 percent</i> , stratsys (Aug. 19, 2020), https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/ . On information and belief, the 3-D printers include processors controlled by executable computer code.
19: The medium of claim 18, wherein the producing comprises: fabricating a respective positive mold of the dental objects for at least two of the treatment stages; and thermoforming a respective one of the orthodontic appliances over each of the respective positive molds.	ClearCorrect produces its aligners by 3-D printing positive molds corresponding to each stage of a patient's treatment plan and then thermoforming plastic over those molds. See Doc. 1-11 at 3; Doc. 1-12 at 8; <i>Clearcorrect expands production capacity for orthodontic aligners by 30 percent</i> , stratsys (Aug. 19, 2020), https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/ .
20: The method of 11, further comprising: performing, by a computer processor, a second modification of the schedule of movement in response to the identifying, the second modification comprising one or more of:	See Claims 5, 10.

U.S. Patent No. 10,456,217	
delaying initial movement of the first dental object; and slowing or stopping movement of the first dental object during one or more of the treatment stages following a previous one of the treatment stages during which the first dental object moved.	

EXHIBIT G

U.S. Patent No. 10,524,879	
1[Pre]: A computer-implemented method comprising:	If limiting, ClearCorrect's treatment planning software performs a computer-implemented method.
1[A]: determining, by one or more computer processors, a schedule of movement for dental objects during treatment stages, the dental objects being based from output of a scanning device, wherein the schedule of movement indicates whether each of the dental objects moves during each of the treatment stages;	On information and belief, a computer running ClearCorrect's treatment planning software determines a schedule of movement for each tooth during treatment planning. In its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its Cut and Stage software "interprets a series of intermediate states that adhere to defined maximum tooth motions and clinician instructions." Doc. 1-12 at 9. Then, only "as necessary," a "technician further refines these intermediate states." <i>Id.</i> On information and belief, the phrase "interpret[] a series of intermediate states" refers to staging the movement of a patient's teeth for each phase of treatment with aligners, which would include determining a schedule of movement indicating whether each tooth moves during each phase. ClearCorrect also stated that its "internal" software is "functionally equivalent to" Align's software, which determines a schedule of movement for each tooth during treatment planning, including whether each tooth moves during each treatment stage. <i>Id.</i> On information and belief, ClearCorrect's treatment planning software calculates treatment plans for patients' teeth using electronic representations of patients' teeth based on the output of an intraoral scanner. In its October 2022, 510(k) submission to the FDA, ClearCorrect stated, "ClearCorrect technicians using the ClearCorrect Cut and Stage software use a scan of a PVS impression or the output of an intra-oral scanner of the patient's untreated oral anatomy" Doc. 1-12 at 9. It also stated that its "internal" software is "functionally equivalent to" Align's software, which computes treatment plans based on an electronic representation of a patient's teeth received from, in many cases, an intraoral scanner. <i>Id.</i>
1[B]: calculating, by one or more computer processors, a respective route from an initial position toward a final position for	On information and belief, a computer running ClearCorrect's treatment planning software calculates a route for each tooth during treatment planning. In its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its Cut and Stage software "interprets a series of intermediate states that adhere to defined maximum

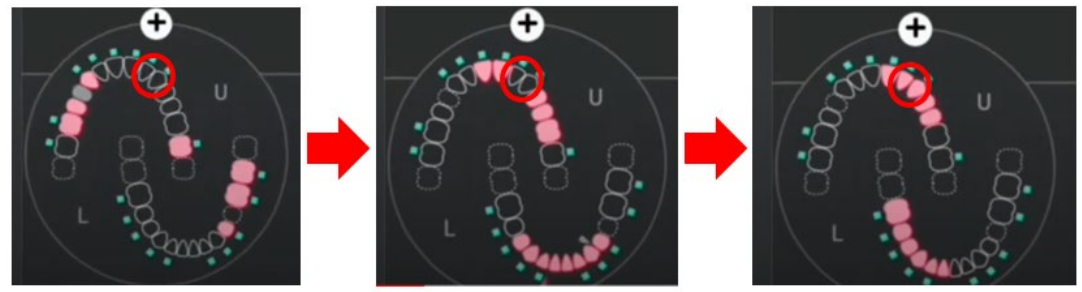
U.S. Patent No. 10,524,879	
each of the dental objects during the treatment stages; and	tooth motions and clinician instructions.” Doc 1-12 at 9. Then, only “as necessary,” a “technician further refines these intermediate states.” <i>Id.</i> On information and belief, the phrase “interpret[] a series of intermediate states” refers to staging the movement of a patient’s teeth for each phase of treatment with aligners, which would include calculating the route for each tooth. ClearCorrect also stated that its “internal” software is “functionally equivalent to” Align’s software, which calculates a route for each tooth during treatment planning from each tooth’s respective initial position to its final position. <i>Id.</i>
1[C]: modifying, by one or more computer processors, the schedule of movement to avoid a collision or obstruction between two of the dental objects on their respective routes, the modifying comprising: delaying initial movement of one of the dental objects; and round-tripping one of the dental objects.	On information and belief, a computer running ClearCorrect’s treatment planning software will modify a treatment plan via delaying an initial movement of one or more teeth (<i>i.e.</i>, staggering) and via round-tripping, where necessary, to avoid collisions between teeth. ClearCorrect advertises that its technicians will, by default, treatment plan for “Moderate-Severe Crowding (Class II)” using “anterior round tripping as needed.” <i>Treatment Preferences</i>, ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences. ClearCorrect also has published a YouTube video showing its ClearPilot software animating a treatment plan with staggering:



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated). The foregoing stills depict staggering by showing the tooth circled in red moving only after the teeth circled in blue and green.

The following images from the ClearCorrect YouTube video also depict staggering. As shown below, and on information and belief, the following images depict a treatment plan using a mid-line shift pattern (here, the teeth move left to right). In this treatment plan, two teeth in the patient's upper jaw (circled red) move only after teeth to their right have moved. The teeth circled in red thus are staggered:

U.S. Patent No. 10,524,879



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated).

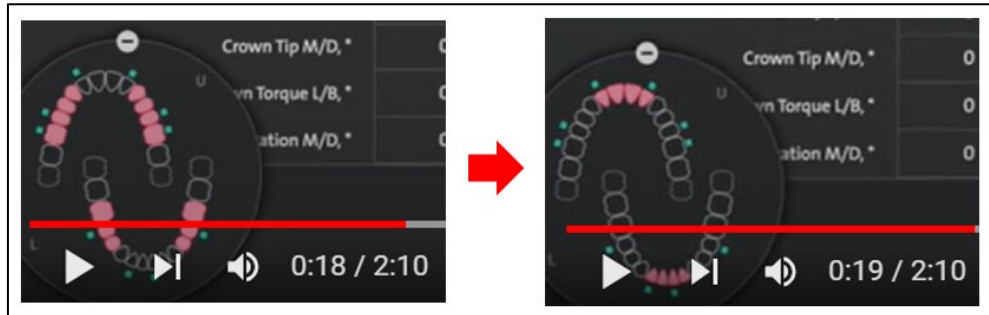
ClearCorrect also stated, in its October 2022, 510(k) submission to the FDA, that its “internal” software is “functionally equivalent to” Align’s software, which uses round-tripping and staggering, where necessary, to avoid collisions between teeth and teeth obstructing other teeth en route to their final positions. Doc. 12-1 at 9.

2: The computer-implemented method of claim 1, wherein determining the schedule of movement comprises selecting a movement pattern from a plurality of predetermined movement patterns.

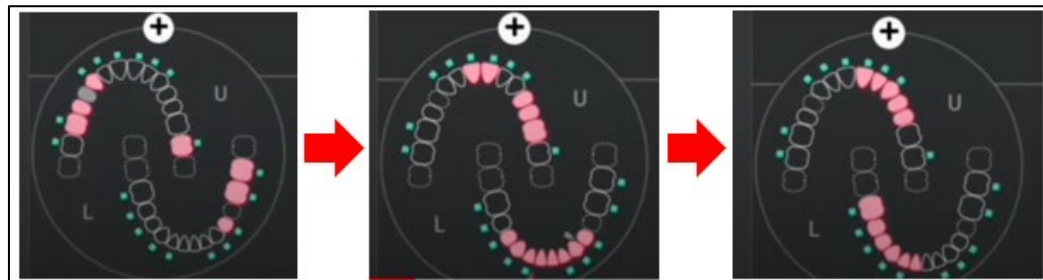
On information and belief, during treatment planning, a computer running ClearCorrect’s treatment planning software or a human technician selects via a computer interface a movement pattern from a plurality of movement patterns.

For example, ClearCorrect advertises that, by “[d]efault[,]” ClearCorrect will treatment plan for “Class II Corrections” using “[u]pper molar distalization with **sequential** movement[,]” *i.e.*, scheduling some teeth to move before others. *Treatment Preferences*, ClearCorrect (Mar. 25, 2024), <https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences> (emphasis added). It also offers, alternatively, “[n]o class II correction (no molar changes). *Id.*

Videos published by ClearCorrect on its YouTube channel also indicate that ClearCorrect’s treatment planning software selects a movement pattern from a plurality of movement patterns to define a schedule of movement for a patient’s teeth. For example, ClearCorrect has published a YouTube video depicting a ClearCorrect treatment plan scheduling movement in a V-shaped pattern:



ClearPilot™: powerful digital treatment planning, ClearCorrect,
<https://www.youtube.com/watch?v=bJglDeZ0ZBs>. It also has published a YouTube
 video depicting a ClearCorrect treatment plan scheduling movement in a mid-line
 shift pattern:



ClearPilot features: The Control is in Your Hands, ClearCorrect,
<https://www.youtube.com/watch?v=DYVS21zqH0c>.

Additionally, in its October 2022, 510(k) submission to the FDA, ClearCorrect stated
 that its “internal” software is “functionally equivalent to” Align’s software, which
 preselects a movement pattern for moving a patient’s teeth and which also allows a
 technician to override that preselection and select a different movement pattern. Doc.
 1-12 at 9.

U.S. Patent No. 10,524,879	
3: The computer-implemented method of claim 1, further comprising recalculating at least one of the respective routes based on the modified schedule of movement.	On information and belief, ClearCorrect's treatment planning software recalculates at least one of the respective routes of a tooth based on each modified schedule of movement. Otherwise, the software could not determine whether the modified schedule of movement avoids collisions, as ClearCorrect advertises. <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i> , ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot .
4: The computer-implemented method of claim 1, further comprising manufacturing at least two orthodontic aligners, each of the orthodontic aligners corresponding to a respective one of the treatment stages.	ClearCorrect uses its treatment plans to produce aligners where each aligner corresponds to a treatment stage. ClearCorrect told the FDA in its October 2022 510(k): The dental practitioner then reviews these images [of each intermediate state in the treatment plan] and has the option to reject or request modifications to the set-up prior to approving it for aligner fabrication. Once the dental practitioner approves the treatment plan, the software converts the files <i>to produce the series of custom-made aligners.</i> Doc. 1-12 at 9 (emphasis added).
5: The computer-implemented method of claim 4, wherein the manufacturing comprises: fabricating a respective positive mold of the dental objects for at least two of the treatment stages; and thermoforming an orthodontic aligner over each respective positive mold.	ClearCorrect manufactures its aligners by fabricating a positive mold corresponding to the desired positions of a patient's teeth in each stage of a treatment plan and then thermoforming the aligners over those molds. <i>See, e.g., Clearcorrect expands production capacity for orthodontic aligners by 30 percent</i> , stratsys (Aug. 19, 2020), https://www.stratasys.com/en/resources/blog/clearcorrect-3d-printing/ .
6: The computer-implemented method of claim 1, wherein the round-tripping comprises: moving a first of the dental objects away from the respective route of a second of the dental objects; and moving the first dental object toward its respective	<i>See</i> Limitation 1[C].

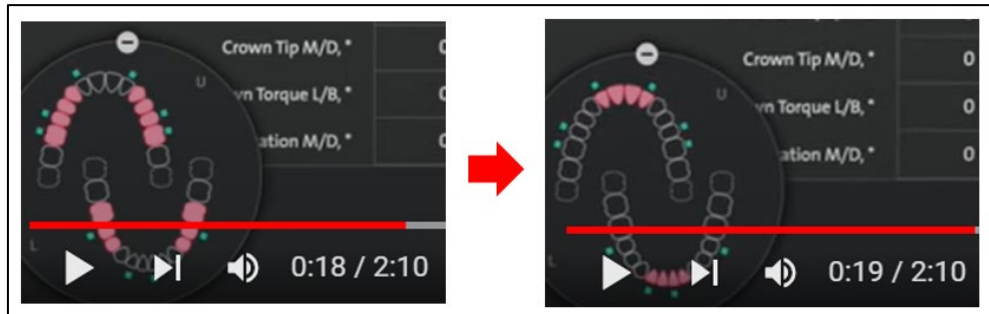
U.S. Patent No. 10,524,879	
final position after the second dental object has sufficiently traversed its respective route to avoid the collision.	
7: The computer-implemented method of claim 1, wherein the round-tripping comprises: moving a first of the dental objects away from the respective route of a second of the dental objects; and moving the first dental object toward its previous position.	<i>See</i> Limitation 1[C].
8[Pre]: The computer-implemented method of claim 1, wherein:	<i>See</i> Claim 1.
8[A]: the determining of the schedule of movement comprises determining, by one or more computer processors, a total number of the treatment stages; and	On information and belief, ClearCorrect's software determines a total number of treatment stages as part of determining the schedule of movement.
8[B]: the determining of the total number of the treatment stages comprises: determining, by one or more computer processors, a respective minimum number of treatment stages for each of the dental objects; and selecting, by one or more computer processors, a largest of the respective minimum numbers of treatment stages as the total number of the treatment stages.	On information and belief, ClearCorrect's software's determining the total number of treatment stages includes determining a minimum number of treatment stages for each tooth and then selecting the largest of those minimums as the total number of treatment stages. Otherwise, ClearCorrect's software could not formulate effective treatment plans.
9[Pre]: A non-transitory computer-readable medium comprising instructions that, when executed by one or more computer	If limiting, ClearCorrect's treatment planning software is stored in a machine readable medium, <i>i.e.</i> , computer memory, and executed on one or more processors.

U.S. Patent No. 10,524,879	
processors, cause at least one of the one or more computer processors to:	
9[A]: determine a schedule of movement for dental objects during treatment stages, the dental objects being based from output from a scanning device, wherein the schedule of movement indicates whether each of the dental objects moves during each of the treatment stages;	<i>See</i> Limitation 1[A].
9[B]: calculate a respective route from an initial position toward a desired final position for each of the dental objects during the treatment stages; and	<i>See</i> Limitation 1[B].
9[C][i]: modify the schedule of movement to avoid a collision or obstruction between two of the dental objects on their respective routes, the modifying comprising:	<i>See</i> Limitation 1[C][i].
9[C][ii]: delaying initial movement of one of the dental objects; and	<i>See</i> Limitation 1[C][ii].
9[C][iii]: round-tripping one of the dental objects.	<i>See</i> Limitation 1[C][iii].
10: The medium of claim 9, wherein determining the schedule of movement comprises selecting a movement pattern from a plurality of predetermined movement patterns.	On information and belief, during treatment planning, a computer running ClearCorrect's treatment planning software or a human technician selects via a computer interface a movement pattern from a plurality of movement patterns. For example, ClearCorrect advertises that, by "[d]efault[.]" ClearCorrect will treatment plan for "Class II Corrections" using "[u]pper molar distalization with

U.S. Patent No. 10,524,879

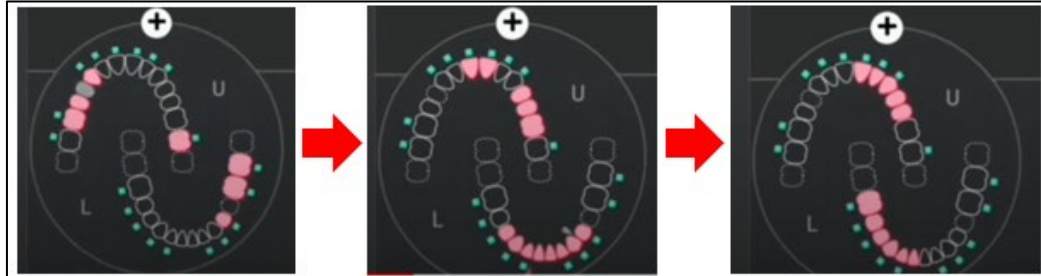
sequential movement[,]” *i.e.*, scheduling some teeth to move before others. *Treatment Preferences*, ClearCorrect (Mar. 25, 2024), <https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences> (emphasis added). It also offers, alternatively, “[n]o class II correction (no molar changes). *Id.*

Videos published by ClearCorrect on its YouTube channel also indicate that ClearCorrect’s treatment planning software selects a movement pattern from a plurality of movement patterns to define a schedule of movement for a patient’s teeth. For example, ClearCorrect has published a YouTube video depicting a ClearCorrect treatment plan scheduling movement in a V-shaped pattern:



ClearCorrect, *ClearPilot™: powerful digital treatment planning*, <https://www.youtube.com/watch?v=bJglDeZ0ZBs>. It also has published a YouTube video depicting a ClearCorrect treatment plan scheduling movement in a mid-line shift pattern:

U.S. Patent No. 10,524,879



ClearPilot features: The Control is in Your Hands, ClearCorrect,
<https://www.youtube.com/watch?v=DYVS21zqH0c>.

Additionally, in its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its “internal” software is “functionally equivalent to” Align’s software, which preselects a movement pattern for moving a patient’s teeth and which also allows a technician to override that preselection and select a different movement pattern. Doc. 1-12 at 9.

11: The medium of claim 9, wherein the instructions, when executed by the one or more computer processors, further cause at least one of the one or more computer processors to recalculate at least one of the respective routes based on the modified schedule of movement.

On information and belief, ClearCorrect’s treatment planning software recalculates at least one of the respective routes of a tooth based on the modified schedule of movement. Otherwise, the software could not determine whether the modified schedule of movement avoids collisions as ClearCorrect advertises. *ClearPilot 8.0 – Introduction and Use of ClearPilot*, ClearCorrect (Apr. 11, 2024), <https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot>.

12: The medium of claim 9, wherein the instructions, when executed by the one or more computer processors, further cause at least one of the one or more computer processors to control manufacture of at least two orthodontic aligners, each of the orthodontic aligners corresponding to a respective one of the treatment stages.

ClearCorrect manufactures its aligners by 3-D printing positive molds corresponding to each stage of a patient’s treatment plan and then thermoforming plastic over those molds. See Doc. 1-11 at 3; Doc. 1-12 at 8; *Clearcorrect expands production capacity for orthodontic aligners by 30 percent*, stratsys (Aug. 19, 2020), <https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/>. On information and belief, the 3-D printers include processors controlled by executable computer code.

U.S. Patent No. 10,524,879	
13: The medium of claim 12, wherein the manufacture comprises: fabricating a respective positive mold of the dental objects for at least two of the treatment stages; and thermoforming an orthodontic aligner over each of the respective positive molds.	ClearCorrect produces its aligners by 3-D printing positive molds corresponding to each stage of a patient's treatment plan and then thermoforming plastic over those molds. See Doc. 1-11 at 3; Doc. 1-12 at 8; <i>Clearcorrect expands production capacity for orthodontic aligners by 30 percent</i> , stratsys (Aug. 19, 2020), https://www.stratsys.com/en/resources/blog/clearcorrect-3d-printing/ .
14[Pre]: The medium of claim 9, wherein	See Claim 9.
14[A]: the determining of the schedule of movement comprises determining a total number of the treatment stages; and	See Limitation 8[A].
14[B]: the determining of the total number of the treatment stages comprises: determining a respective minimum number of treatment stages for each of the dental objects; and selecting a largest of the respective minimum numbers of treatment stages as the total number of the treatment stages.	See Limitation 8[B].
15[A]: determining, by one or more computer processors, a schedule of movement for dental objects during treatment stages, the dental objects being based from output of a scanning device, wherein the schedule of movement indicates whether each of the dental objects moves during each of the treatment stages;	See Limitation 1[A].
15[B]: calculating, by the one or more computer processors, a respective route	See Limitation 1[B].

U.S. Patent No. 10,524,879	
from an initial position toward a final position for each of the dental objects during the treatment stages; and	
15[C][i]: modifying, by the one or more computer processors, the schedule of movement to avoid a collision or obstruction between two of the dental objects on their respective routes, the modifying comprising:	<i>See</i> Limitation 1[C].
15[C][ii]: determining, by the one or more computer processors, that the respective route of a first of the dental objects results in a collision or obstruction with a second of the dental objects;	On information and belief, a computer running ClearCorrect's treatment planning software detects collisions between teeth that would occur according to some routes. For example, ClearCorrect advertises that its ClearPilot software can perform "collision management." <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i> , ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot . ClearCorrect's treatment planning software also must detect collisions between teeth because, otherwise, it could not plot a treatment plan that avoided collisions and thereby allowed a patient's teeth to reach their final positions. Finally, in its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its "internal" software is "functionally equivalent to" Align's software, which detects collisions. Doc. 1-12 at 98.
15[C][iii]: altering, by the one or more computer processors in response to the determining, the schedule of movement by delaying initial movement of the first dental object;	On information and belief, a computer running ClearCorrect's treatment planning software will alter a treatment plan, where necessary, to avoid collisions between teeth. <i>See</i> Limitation 1[C].
15[C][iv]: determining, by the one or more computer processors, that the altered schedule of movement still results in a	On information and belief, a computer running ClearCorrect's treatment planning software sometimes determines that the altered schedule of movement still results in a collision or obstruction involving the first dental object. As noted above,

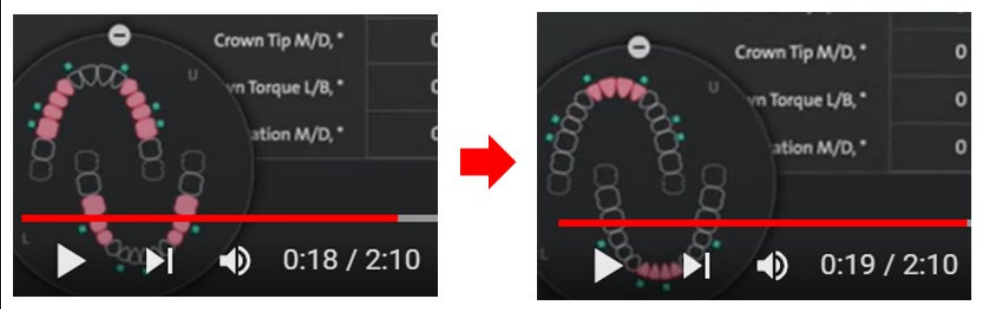
U.S. Patent No. 10,524,879	
collision or obstruction involving the first dental object; and	ClearCorrect advertises that its ClearPilot software can perform “collision management.” <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i> , ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot . Treatment planning is a complex, iterative process, and, on information and belief, ClearCorrect’s software sometimes determines that a proposed modification fails to resolve all possible collisions and obstructions involving the first dental object.
15[C][v] : altering, by the one or more computer processors after the determining that the altered schedule of movement still results in a collision or obstruction, the schedule of movement of the first dental object by moving the first dental object out of the path of the second dental object, and once the second dental object has moved sufficiently, moving the first dental object back to the first dental object previous position before proceeding to a desired final position of the first dental object.	On information a computer running ClearCorrect’s treatment planning software will perform a second modification of a treatment plan’s schedule of movement by modifying when a tooth moves during treatment in response to the failure of the first modification to avoid a collision or obstruction involving that tooth. For example, ClearCorrect advertises that its technicians will, by default, treatment plan for “Moderate-Severe Crowding (Class II)” using “anterior round tripping as needed,” which, on information and belief, can include moving a first dental object out of the path of a second dental object and then back into its previous position before proceeding to its desired final position. <i>Treatment Preferences</i> , ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences .
16 : The computer-implemented method of claim 15, further comprising recalculating at least one of the respective routes based on the modified schedule of movement.	On information and belief, ClearCorrect’s treatment planning software recalculates at least one of the respective routes of a tooth based on each modified schedule of movement. Otherwise, the software could not determine whether the modified schedule of movement avoids collisions, as ClearCorrect advertises. <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i> , ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot .
17 : The computer-implemented method of claim 15, further comprising manufacturing at least two orthodontic aligners, each of the orthodontic aligners	ClearCorrect uses its treatment plans to produce aligners where each aligner corresponds to a treatment stage. ClearCorrect told the FDA in its October 2022 510(k):

U.S. Patent No. 10,524,879	
corresponding to a respective one of the treatment stages.	The dental practitioner then reviews these images [of each intermediate state in the treatment plan] and has the option to reject or request modifications to the set-up prior to approving it for aligner fabrication. Once the dental practitioner approves the treatment plan, the software converts the files <i>to produce the series of custom-made aligners.</i>” Doc. 1-12 at 9 (emphasis added).
18: The computer-implemented method of claim 17, wherein the manufacturing comprises: fabricating a respective positive mold of the dental objects for at least two of the treatment stages; and thermoforming an orthodontic aligner over each of the respective positive molds.	ClearCorrect manufactures its aligners by fabricating a positive mold corresponding to the desired positions of a patient’s teeth in each stage of a treatment plan and then thermoforming the aligners over those molds. <i>See, e.g., Clearcorrect expands production capacity for orthodontic aligners by 30 percent</i>, stratsys (Aug. 19, 2020), https://www.stratasys.com/en/resources/blog/clearcorrect-3d-printing/.
19[Pre]: The computer-implemented method of claim 15, wherein:	<i>See</i> Claim 15.
19[A]: the determining of the schedule of movement comprises determining a total number of the treatment stages; and	<i>See</i> Limitation 8[A].
19[B]: the determining of the total number of the treatment stages comprises: determining, by one or more computer processors, a respective minimum number of treatment stages for each of the dental objects; and selecting, by one or more computer processors, a largest of the respective minimum numbers of treatment stages as the total number of the treatment stages.	<i>See</i> Limitation 8[B].

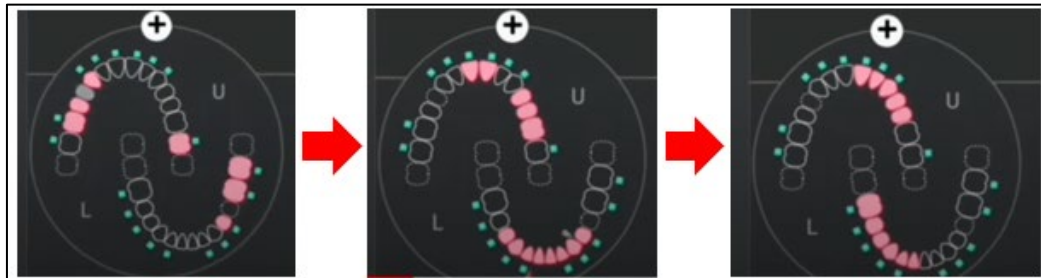
U.S. Patent No. 10,524,879	
20[Pre]: A non-transitory computer-readable medium comprising instructions that, when executed by one or more computer processors, cause at least one of the one or more computer processors to:	If limiting, ClearCorrect's treatment planning software is stored in a machine readable medium, <i>i.e.</i> , computer memory, and executed on one or more processors.
20[A]: determine a schedule of movement for dental objects during treatment stages, the dental objects being based from output from a scanning device, wherein the schedule of movement indicates whether each of the dental objects moves during each of the treatment stages;	<i>See</i> Limitation 1[A]
20[B]: calculate a respective route from an initial position toward a final position for each of the dental objects during the treatment stages; and	<i>See</i> Limitation 1[B]
20[C][i]: modify the schedule of movement to avoid a collision or obstruction between two of the dental objects on their respective routes, the modifying comprising:	<i>See</i> Limitation 1[C]
20[C][ii]: determining that the respective route of a first of the dental objects results in a collision or obstruction with a second of the dental objects;	<i>See</i> Limitation 15[C][ii]
20[C][iii]: altering, in response to the determining, the schedule of movement by	<i>See</i> Limitation 15[C][iii].

U.S. Patent No. 10,524,879	
delaying initial movement of the first dental object;	
20[C][iv]: determining that the altered schedule of movement still results in a collision or obstruction involving the first dental object; and	<i>See</i> Limitation 15[C][iv].
20[C][v]: altering, after the determining that the altered schedule of movement still results in a collision or obstruction, the schedule of movement by round-tripping the first dental object.	<i>See</i> Limitation 15[C][v].
21: The medium of claim 20, wherein determining the schedule of movement comprises selecting a movement pattern from a plurality of predetermined movement patterns.	On information and belief, during treatment planning, a computer running ClearCorrect’s treatment planning software or a human technician selects via a computer interface a movement pattern from a plurality of movement patterns. For example, ClearCorrect advertises that, by “[d]efault[,]” ClearCorrect will treatment plan for “Class II Corrections” using “[u]pper molar distalization with <i>sequential</i> movement[,]” <i>i.e.</i>, scheduling some teeth to move before others. <i>Treatment Preferences</i>, ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences (emphasis added). It also offers, alternatively, “[n]o class II correction (no molar changes). <i>Id.</i> Videos published by ClearCorrect on its YouTube channel also indicate that ClearCorrect’s treatment planning software selects a movement pattern from a plurality of movement patterns to define a schedule of movement for a patient’s teeth. For example, ClearCorrect has published a YouTube video depicting a ClearCorrect treatment plan scheduling movement in a V-shaped pattern:

U.S. Patent No. 10,524,879



ClearPilot™: powerful digital treatment planning, ClearCorrect, <https://www.youtube.com/watch?v=bJglDeZ0ZBs>. It also has published a YouTube video depicting a ClearCorrect treatment plan scheduling movement in a mid-line shift pattern:



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c>.

Additionally, in its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its “internal” software is “functionally equivalent to” Align’s software, which preselects a movement pattern for moving a patient’s teeth and which also allows a technician to override that preselection and select a different movement pattern. Doc. 1-12 at 9.

22: The medium of claim 20, wherein the instructions, when executed by the one or more computer processors, further cause at

See Claim 16.

U.S. Patent No. 10,524,879	
least one of the one or more computer processors to recalculate at least one of the respective routes based on the modified schedule of movement.	
23: The medium of claim 20, wherein the instructions, when executed by the one or more computer processors, further cause at least one of the one or more computer processors to control manufacture of at least two orthodontic aligners, each of the orthodontic aligners corresponding to a respective one of the treatment stages.	<i>See Claim 12.</i>
24. The medium of claim 23, wherein the manufacture comprises: fabricating a respective positive mold of the dental objects for at least two of the treatment stages; and thermoforming a respective one of the orthodontic aligners over each of the respective positive molds.	<i>See Claim 13.</i>

EXHIBIT H

U.S. Patent No. 11,369,456	
1[Pre]: A computer-implemented method comprising:	If limiting, ClearCorrect's treatment planning software performs a computer-implemented method.
1[A]: determining a schedule of movement for dental objects during treatment stages of an orthodontic treatment, wherein the schedule of movement indicates whether or not each of the dental objects moves during each of the treatment stages;	On information and belief, a computer running ClearCorrect's treatment planning software determines a schedule of movement for each tooth during treatment planning. In its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its Cut and Stage software "interprets a series of intermediate states that adhere to defined maximum tooth motions and clinician instructions." Doc. 1-12 at 9. Then, only "as necessary," a "technician further refines these intermediate states." <i>Id.</i> On information and belief, the phrase "interpret[] a series of intermediate states" refers to staging the movement of a patient's teeth for each phase of treatment with aligners, which would include determining a schedule of movement indicating whether each tooth moves during each phase. ClearCorrect also stated that its "internal" software is "functionally equivalent to" Align's software, which determines a schedule of movement for each tooth during treatment planning, including whether each tooth moves during each treatment stage. <i>Id.</i>
1[B]: calculating a respective treatment path for each of the dental objects between their respective initial position and respective final position;	On information and belief, a computer running ClearCorrect's treatment planning software calculates a route for each tooth during treatment planning. In its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its Cut and Stage software "interprets a series of intermediate states that adhere to defined maximum tooth motions and clinician instructions." Doc 1-12 at 9. Then, only "as necessary," a "technician further refines these intermediate states." <i>Id.</i> On information and belief, the phrase "interpret[] a series of intermediate states" refers to staging the movement of a patient's teeth for each phase of treatment with aligners, which would include calculating the route for each tooth. ClearCorrect also stated that its "internal" software is "functionally equivalent to" Align's software, which calculates a treatment path for each tooth during treatment planning, including each intermediate state for each tooth between each tooth's respective initial and final positions. <i>Id.</i>
1[C]: identifying a collision between a first of the dental objects and a second of the dental objects based at least on the schedule	On information and belief, a computer running ClearCorrect's treatment planning software identifies collisions between teeth that would occur based on a treatment plan, which includes the schedule of movement and the treatment paths of each tooth. For example, ClearCorrect advertises that its ClearPilot software can perform

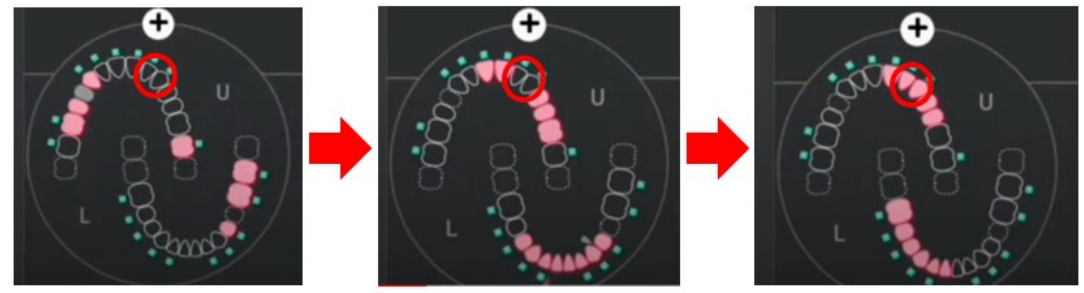
U.S. Patent No. 11,369,456	
of movement of the dental objects and the respective treatment paths;	“collision management.” <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i>, ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot. ClearCorrect’s treatment planning software also must identify collisions between teeth because, otherwise, it could not plot a treatment plan that avoided collisions and thereby allowed a patient’s teeth to reach their final positions. Finally, in its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its “internal” software is “functionally equivalent to” Align’s software, which identifies collisions. Doc. 1-12 at 9.
1[D] : performing a first modification of the schedule of movement in response to the identifying, the first modification of the schedule of movement modifying whether or not at least one of the dental objects move during at least one of the treatment stages;	On information and belief, a computer running ClearCorrect’s treatment planning software will modify a treatment plan by modifying whether at least one tooth moves during treatment in response to identifying a collision. For example, ClearCorrect has published a YouTube video showing its ClearPilot software animating a treatment plan including staggering a tooth to avoid a collision:



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated). The foregoing stills depict staggering by showing the tooth circled in red moving only after the teeth circled in blue and green.

The following images from the ClearCorrect YouTube video also depict staggering. As shown below, and on information and belief, the following images depict a treatment plan using a mid-line shift pattern (here, the teeth move left to right). In this treatment plan, two teeth in the patient's upper jaw (circled red) move only after teeth to their right have moved. The teeth circled in red thus are staggered:

U.S. Patent No. 11,369,456



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated).

ClearCorrect also stated that its “internal” software is “functionally equivalent to” Align’s software, which iteratively modifies its treatment plans—including by staggering—to avoid collisions. Doc. 1-12 at 9.

1[E]: determining that the first modification does not avoid a collision between the first of the dental objects and the second of the dental objects; and

On information and belief, a computer running ClearCorrect’s treatment planning software sometimes will determine that the first modification does not avoid a collision between two dental objects. On information and belief, this is so because treatment planning involves iteratively calculating possible treatment plans and rejecting treatment plans that result in collisions. Indeed, ClearCorrect stated that its “internal” software is “functionally equivalent to” Align’s software, which iteratively calculates its treatment plans to avoid collisions. Doc. 1-12 at 9.

1[F]: performing a second modification of the schedule of movement after the determining that the first modification does not avoid a collision, the second modification of the schedule of movement modifying whether or not at least one of the dental objects move during at least one of the treatment stages.

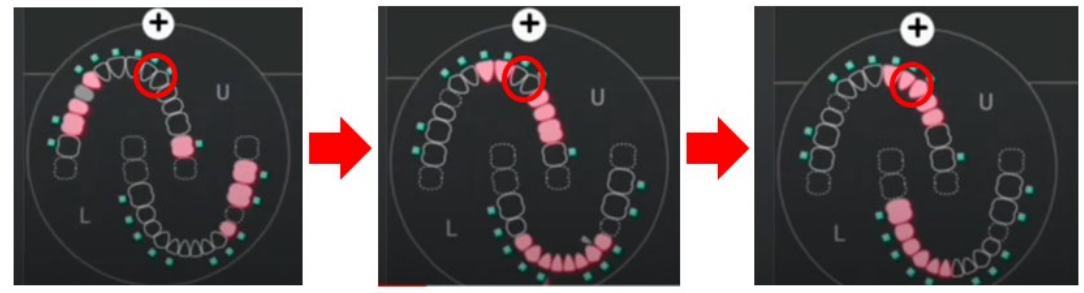
On information and belief, a computer running ClearCorrect’s treatment planning software will perform a second modification of a treatment plan by modifying whether at least one tooth moves during treatment in response to the failure of the first modification to avoid a collision. As explained above, ClearCorrect published a YouTube video showing its ClearPilot software animating a treatment plan including staggering a tooth to avoid a collision. *See* Limitation 1[D]. As shown in the below stills, a tooth circled in green moves first, followed by a tooth circled in blue and then a tooth circled in red:



ClearPilot features: The Control is in Your Hands, ClearCorrect,
<https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated). On information and belief, creating the treatment plan reflected in these stills involved a computer iteratively checking whether the tooth circled in red could move to its final position without colliding with the tooth circled in blue and iteratively delaying movement until after both the blue- and green-circled teeth had moved out of the way.

Additionally, as noted above, the following images from a ClearCorrect treatment plan also depict staggering two teeth on a patient's upper jaw:

U.S. Patent No. 11,369,456



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c> (annotated). On information and belief, creating the treatment plan reflected in these stills involved a computer iteratively checking whether delaying the movement of one of the two circled teeth resolved a collision, determining that delaying the movement of only one tooth did not do so, and therefore delaying the movement of the second circled tooth.

ClearCorrect also stated that its “internal” software is “functionally equivalent to” Align’s software, which iteratively modifies its treatment plans—including by staggering—to avoid collisions. Doc. 1-12 at 9.

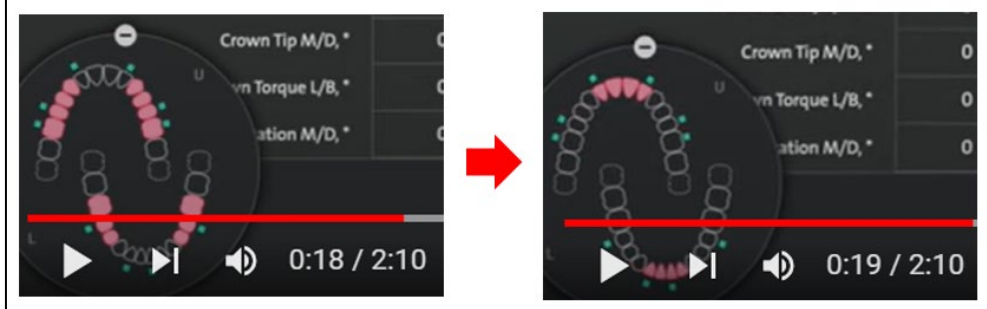
2: The method of claim 1, wherein the schedule of movement is determined by selection by a user.

In its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its Cut and Stage software “interprets a series of intermediate states that adhere to defined maximum tooth motions and clinician instructions.” Doc. 1-12 at 9. Then, only “as necessary,” a “technician further refines these intermediate states.” *Id.* On information and belief, the technician refining the intermediate states includes refining—and thus determining—the schedule of movement. A human technician is “a user.”

3: The method of claim 1, wherein the schedule of movement includes one of an all-equal pattern, an A-shaped pattern, a V-shaped pattern, a mid-line shift pattern, or a M-shaped pattern.

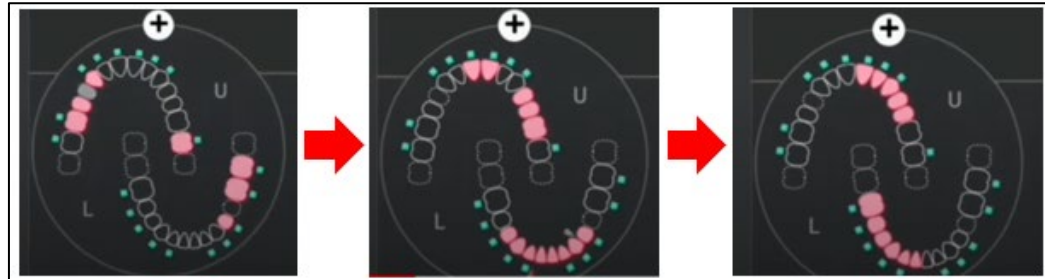
ClearCorrect’s treatment planning software performs the additional step of this claim. For example, ClearCorrect has published a YouTube video depicting a ClearCorrect treatment plan in which the schedule of movement includes a V-shaped pattern:

U.S. Patent No. 11,369,456



ClearPilot™: powerful digital treatment planning, ClearCorrect,
<https://www.youtube.com/watch?v=bJglDeZ0ZBs>.

It also has published a YouTube video depicting a ClearCorrect treatment plan in which the schedule of movement includes a mid-line shift pattern:



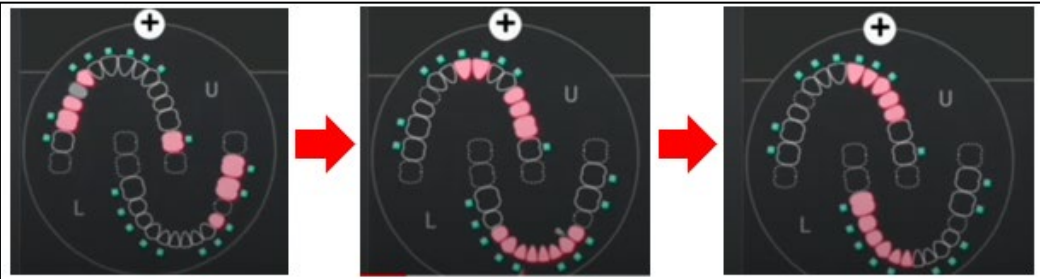
ClearPilot features: The Control is in Your Hands, ClearCorrect,
<https://www.youtube.com/watch?v=DYVS21zqH0c>.

4: The method of claim 1, wherein the determining the schedule of movement comprises analyzing, by a computer processor, the dental objects in their respective initial positions and respective final positions.

On information and belief, a computer running ClearCorrect's treatment planning software analyzes the patient's teeth in their respective initial and final positions when determining a schedule of movement.

U.S. Patent No. 11,369,456	
5: The method of claim 4, wherein the analyzing comprises determining a respective distance needed to move each of the dental objects from their respective initial positions to their respective final positions.	On information and belief, a computer running ClearCorrect's treatment planning software that analyzes a patient's teeth in their initial and final positions also determines the distance needed to move each tooth from its initial to its final position.
6: The method of claim 1, further comprising producing a series of orthodontic appliances based at least on the modified schedule of movement, wherein each of the orthodontic appliances corresponds to a respective one of the treatment stages.	ClearCorrect uses its treatment plans to produce aligners where each aligner corresponds to a treatment stage. ClearCorrect told the FDA in its October 2022 510(k): The dental practitioner then reviews these images [of each intermediate state in the treatment plan] and has the option to reject or request modifications to the set-up prior to approving it for aligner fabrication. Once the dental practitioner approves the treatment plan, the software converts the files <i>to produce the series of custom-made aligners.</i>" Doc. 1-12 at 9 (emphasis added).
7: The method of claim 6, wherein the producing comprises: fabricating a respective positive mold of the dental objects for at least two of the treatment stages; and thermoforming a respective one of the orthodontic appliances over each of the respective positive molds.	ClearCorrect manufactures its aligners by fabricating a positive mold corresponding to the desired positions of a patient's teeth in each stage of a treatment plan and then thermoforming the aligners over those molds. <i>See, e.g., Clearcorrect expands production capacity for orthodontic aligners by 30 percent</i> , stratsys (Aug. 19, 2020), https://www.stratasys.com/en/resources/blog/clearcorrect-3d-printing/ .
8[Pre]: A computer-implemented method comprising:	<i>See</i> Limitation 1[Pre].
8[A]: determining a schedule of movement for dental objects during treatment stages of an orthodontic treatment, wherein the	<i>See</i> Limitation 1[A].

U.S. Patent No. 11,369,456	
schedule of movement indicates whether or not each of the dental objects moves during each of the treatment stages;	
8[B]: calculating a respective treatment path for each of the dental objects between their respective initial position and respective final position;	<i>See</i> Limitation 1[B].
8[C]: identifying a collision between a first of the dental objects and a second of the dental objects based at least on the schedule of movement of the dental objects and the respective treatment paths;	<i>See</i> Limitation 1[C].
8[D]: performing a first modification of the schedule of movement in response to the identifying, wherein the first modification comprises delaying initial movement of the first of the dental objects;	<i>See</i> Limitation 1[D].
8[E]: determining that the first modification does not avoid a collision between the first of the dental objects and the second of the dental objects; and	<i>See</i> Limitation 1[E].
8[F]: performing a second modification of the schedule of movement after the determining that the first modification does not avoid a collision.	<i>See</i> Limitation 1[F].
9: The method of claim 8, wherein the second modification comprises slowing or	On information and belief, for the second modification, ClearCorrect's treatment planning software slows or stops the movement of at least one tooth in some

U.S. Patent No. 11,369,456	
stopping movement of the first of the dental objects during one or more of the treatment stages following a previous one of the treatment stages in which the first dental object moved.	treatment plans. For example, in the following stills from a ClearCorrect YouTube video, ClearCorrect stops the movement of the teeth on the left side of the patient's mouth as treatment proceeds:  <i>ClearPilot features: The Control is in Your Hands</i>, ClearCorrect, https://www.youtube.com/watch?v=DYVS21zqH0c.
10[Pre]: 10. The method of claim 9, further comprising:	See Claim 9.
10[A]: performing, after determining that the second modification does not avoid a collision, a modification of the schedule of movement of the dental objects, the modification comprising:	On information and belief, a computer running ClearCorrect's treatment planning software sometimes will determine that the second modification does not avoid a collision between two dental objects. On information and belief, this is so because treatment planning involves iteratively calculating possible treatment plans and rejecting treatment plans that result in collisions. Indeed, ClearCorrect stated that its "internal" software is "functionally equivalent to" Align's software, which iteratively calculates its treatment plans to avoid collisions. Doc. 1-12 at 9. On information and belief, a computer running ClearCorrect's treatment planning software therefore sometimes performs a third modification of the schedule of movement.
10[B]: moving the first of the dental objects away from the respective route of the second of the dental objects; and moving the first of the dental objects toward its respective final position after the second of the dental objects has sufficiently traversed its respective route to avoid the collision.	On information and belief, the third modification sometimes includes movements described in this limitation. For instance, ClearCorrect advertises that that its technicians will, by default, treatment plan for "Moderate-Severe Crowding (Class II)" using "anterior round tripping as needed." <i>Treatment Preferences</i>, ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences.

U.S. Patent No. 11,369,456	
	ClearCorrect also stated, in its October 2022, 510(k) submission to the FDA, that its “internal” software is “functionally equivalent to” Align’s software, which uses round-tripping, where necessary, to avoid collisions. Doc. 12-1 at 9.
11[Pre]: A computer-implemented method comprising:	<i>See</i> Limitation 1[Pre].
11[A]: determining a schedule of movement for dental objects during treatment stages of an orthodontic treatment, wherein the schedule of movement indicates whether or not each of the dental objects moves during each of the treatment stages;	<i>See</i> Limitation 1[A].
11[B]: calculating a respective treatment path for each of the dental objects between their respective initial position and respective final position;	<i>See</i> Limitation 1[B].
11[C]: identifying a collision between a first of the dental objects and a second of the dental objects based at least on the schedule of movement of the dental objects and the respective treatment paths;	<i>See</i> Limitation 1[C].
11[D]: performing a first modification of the schedule of movement in response to the identifying;	<i>See</i> Limitation 1[D].
11[E]: determining that the first modification does not avoid a collision between the first of the dental objects and the second of the dental objects; and	<i>See</i> Limitation 1[E].
11[F]: performing a second modification of the schedule of movement after the determining that the first modification does	<i>See</i> Limitation 1[F], Claim 9.

U.S. Patent No. 11,369,456	
not avoid a collision, wherein the second modification comprises one or more of: delaying initial movement of the first of the dental objects; and slowing or stopping movement of the first of the dental objects during one or more of the treatment stages following a previous one of the treatment stages during which the first of the dental objects moved.	
12[Pre]: A computer-implemented method comprising:	<i>See</i> Limitation 1[Pre].
12[A]: determining a schedule of movement for dental objects during treatment stages of an orthodontic treatment, wherein the schedule of movement indicates whether or not each of the dental objects moves during each of the treatment stages;	<i>See</i> Limitation 1[A].
12[B]: calculating a respective treatment path for each of the dental objects between their respective initial position and respective final position;	<i>See</i> Limitation 1[B].
12[C]: identifying a collision between a first of the dental objects and a second of the dental objects based at least on the schedule of movement of the dental objects and the respective treatment paths;	<i>See</i> Limitation 1[C].

U.S. Patent No. 11,369,456	
12[D]: performing a first modification of the schedule of movement in response to the identifying;	<i>See</i> Limitation 1[D].
12[E]: determining that the first modification does not avoid a collision between the first of the dental objects and the second of the dental objects; and	<i>See</i> Limitation 11[E].
12[F]: performing a second modification of the schedule of movement after the determining that the first modification does not avoid a collision, wherein the second modification comprises: moving the first of the dental objects away from the respective route of the second of the dental objects; and moving the first of the dental objects toward its respective final position after the second of the dental objects has sufficiently traversed its respective route to avoid the collision.	<i>See</i> Limitation 1[F]. ClearCorrect advertises that its technicians will, by default, treatment plan for “Moderate-Severe Crowding (Class II)” using “anterior round tripping as needed.” <i>Treatment Preferences</i> , ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences .
13[Pre]: A computer-implemented method comprising:	<i>See</i> Limitation 1[Pre].
13[A]: determining a schedule of movement for dental objects during treatment stages, wherein the schedule of movement indicates whether or not each of the dental objects moves during each of the treatment stages;	<i>See</i> Limitation 1[A].

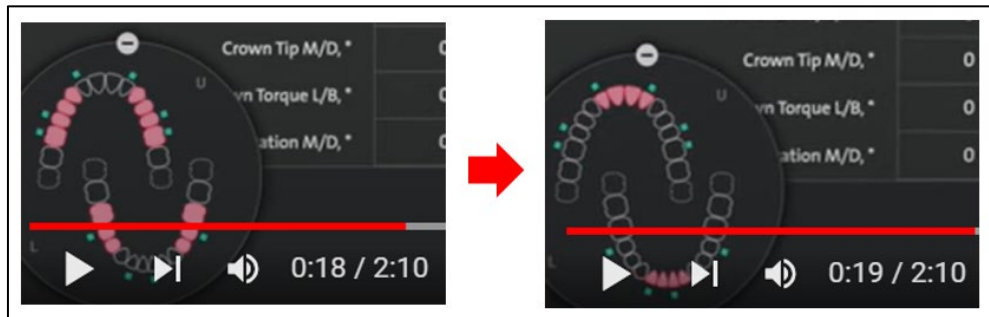
U.S. Patent No. 11,369,456	
13[B]: calculating a respective route from an initial position toward a final position for each of the dental objects during the treatment stages;	<i>See</i> Limitation 1[B].
13[C]: performing a first modification to the schedule of movement to avoid a collision or obstruction between a first dental object and a second dental object of the dental objects on their respective routes, the first modification of the schedule of movement modifying whether or not at least one of the dental objects move during at least one of the treatment stages;	<i>See</i> Limitations 1[C], 1[D].
13[D]: determining that the first modification does not avoid the collision or obstruction between the first dental object and second dental object; and	<i>See</i> Limitation 1[E].
13[E]: performing a second modification of the schedule of movement after determining that the first modification does not avoid the collision or obstruction, the second modification of the schedule of movement modifying whether or not at least one of the dental objects move during at least one of the treatment stages.	<i>See</i> Limitation 1[F].
14: The computer-implemented method of claim 13, wherein determining the schedule of movement comprises selecting	On information and belief, during treatment planning, a computer running ClearCorrect's treatment planning software or a human technician selects via a computer interface a movement pattern from a plurality of movement patterns.

U.S. Patent No. 11,369,456

a movement pattern from a plurality of predetermined movement patterns.

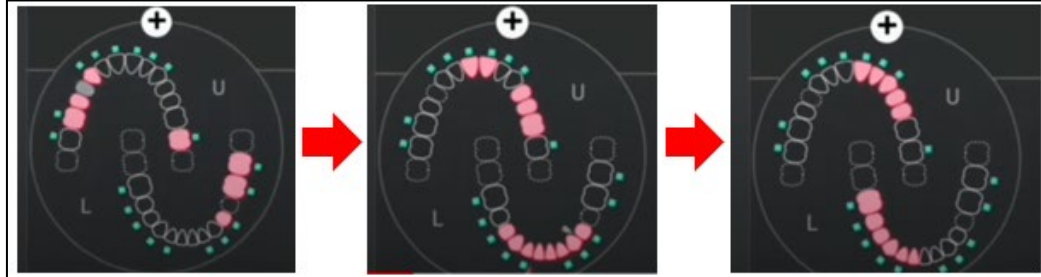
For example, ClearCorrect advertises that, by “[d]efault[,]” ClearCorrect will treatment plan for “Class II Corrections” using “[u]pper molar distalization with **sequential** movement[,]” *i.e.*, scheduling some teeth to move before others. *Treatment Preferences*, ClearCorrect (Mar. 25, 2024), <https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences> (emphasis added). It also offers, alternatively, “[n]o class II correction (no molar changes). *Id.*

Videos published by ClearCorrect on its YouTube channel also indicate that ClearCorrect’s treatment planning software selects a movement pattern from a plurality of movement patterns to define a schedule of movement for a patient’s teeth. For example, ClearCorrect has published a YouTube video depicting a ClearCorrect treatment plan scheduling movement in a V-shaped pattern:



ClearPilot™: powerful digital treatment planning, ClearCorrect, <https://www.youtube.com/watch?v=bJglDeZ0ZBs>. It also has published a YouTube video depicting a ClearCorrect treatment plan scheduling movement in a mid-line shift pattern:

U.S. Patent No. 11,369,456



ClearPilot features: The Control is in Your Hands, ClearCorrect, <https://www.youtube.com/watch?v=DYVS21zqH0c>. Additionally, in its October 2022, 510(k) submission to the FDA, ClearCorrect stated that its “internal” software is “functionally equivalent to” Align’s software, which preselects a movement pattern for moving a patient’s teeth and which also allows a technician to override that preselection and select a different movement pattern. Doc. 1-12 at 9.

15: The computer-implemented method of claim 13, further comprising manufacturing at least two orthodontic aligners, each of the orthodontic aligners corresponding to a respective one of the treatment stages.

See Claim 6.

16: The computer-implemented method of claim 15, wherein the manufacturing comprises:

fabricating a respective positive mold of the dental objects for at least two of the treatment stages; and

thermoforming an orthodontic aligner over each respective positive mold.

See Claim 7.

U.S. Patent No. 11,369,456	
17[Pre]: A computer-implemented method comprising:	<i>See</i> Limitation 1[Pre].
17[A]: determining a schedule of movement for dental objects during treatment stages, wherein the schedule of movement indicates whether or not each of the dental objects moves during each of the treatment stages;	<i>See</i> Limitation 1[A].
17[B]: calculating a respective route from an initial position toward a final position for each of the dental objects during the treatment stages;	<i>See</i> Limitation 1[B].
17[C]: performing a first modification to the schedule of movement to avoid a collision or obstruction between a first dental object and a second dental object of the dental objects on their respective routes;	<i>See</i> Limitations 1[C], 1[D].
17[D]: determining that the first modification does not avoid the collision or obstruction between the first dental object and second dental object; and	<i>See</i> Limitation 1[E].
17[E]: performing a second modification of the schedule of movement after determining that the first modification does not avoid the collision or obstruction; and	<i>See</i> Limitation 1[F].

U.S. Patent No. 11,369,456	
17[F]: recalculating at least one of the respective routes based on the first or second modified schedule of movement.	On information and belief, ClearCorrect's treatment planning software recalculates at least one of the respective routes of a tooth based on each modified schedule of movement. Otherwise, the software could not determine whether the modified schedule of movement avoids collisions as ClearCorrect advertises. <i>ClearPilot 8.0 – Introduction and Use of ClearPilot</i> , ClearCorrect (Apr. 11, 2024), https://support.clearcorrect.com/hc/en-us/articles/4617115008279-ClearPilot-8-0-Introduction-and-Use-of-ClearPilot .
18[Pre]: A computer-implemented method comprising:	<i>See</i> Limitation 1[Pre].
18[A]: determining a schedule of movement for dental objects during treatment stages, wherein the schedule of movement indicates whether or not each of the dental objects moves during each of the treatment stages;	<i>See</i> Limitation 1[A].
18[B]: calculating a respective route from an initial position toward a final position for each of the dental objects during the treatment stages;	<i>See</i> Limitation 1[B].
18[C]: performing a first modification to the schedule of movement to avoid a collision or obstruction between a first dental object and a second dental object of the dental objects on their respective routes;	<i>See</i> Limitations 1[C], 1[D].
18[D]: determining that the first modification does not avoid the collision or obstruction between the first dental object and second dental object; and	<i>See</i> Limitation 1[E].

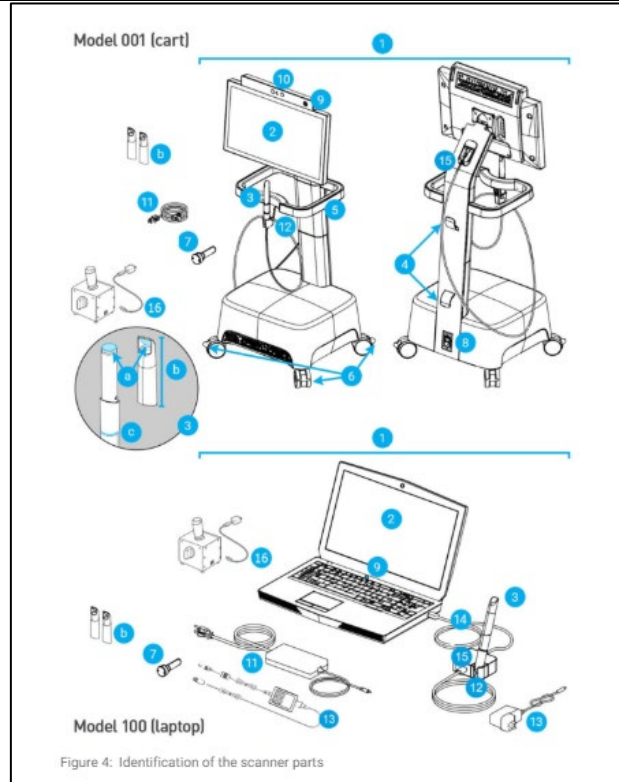
U.S. Patent No. 11,369,456	
18[E]: performing a second modification of the schedule of movement after determining that the first modification does not avoid the collision or obstruction,	<i>See</i> Limitation 1[F].
18[F]: wherein the first modification or second modification comprises: moving the first dental object away from the respective route of the second dental object; stopping movement of the first of the dental objects; and moving the first dental object toward its respective final position after the second dental object has sufficiently traversed its respective route to avoid the collision.	ClearCorrect advertises that its technicians will, by default, treatment plan for “Moderate-Severe Crowding (Class II)” using “anterior round tripping as needed.” <i>Treatment Preferences</i> , ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences .
19[Pre]: A computer-implemented method comprising:	<i>See</i> Limitation 1[Pre].
19[A]: determining a schedule of movement for dental objects during treatment stages, wherein the schedule of movement indicates whether or not each of the dental objects moves during each of the treatment stages;	<i>See</i> Limitation 1[A].
19[B]: calculating a respective route from an initial position toward a final position for each of the dental objects during the treatment stages;	<i>See</i> Limitation 1[B].
19[C]: performing a first modification to the schedule of movement to avoid a	<i>See</i> Limitations 1[C], 1[D].

U.S. Patent No. 11,369,456	
collision or obstruction between a first dental object and a second dental object of the dental objects on their respective routes;	
19[D]: determining that the first modification does not avoid the collision or obstruction between the first dental object and second dental object; and	<i>See</i> Limitation 1[E].
19[E]: performing a second modification of the schedule of movement after determining that the first modification does not avoid the collision or obstruction, wherein the first modification or second modification comprises: moving the first dental object away from the respective route of the second dental object; stopping movement of the first of the dental objects; and moving the first dental object toward its previous position.	ClearCorrect advertises that its technicians will, by default, treatment plan for “Moderate-Severe Crowding (Class II)” using “anterior round tripping as needed.” <i>Treatment Preferences</i> , ClearCorrect (Mar. 25, 2024), https://support.clearcorrect.com/hc/en-us/articles/4416586057495-Treatment-Preferences .

EXHIBIT I

U.S. Patent No. 10,791,936	
1[Pre]: A system for scanning a patient's teeth for a dental procedure, the system comprising:	If limiting, the Virtuo Vivo Intraoral Scanner ("Scanner") and accompanying computer, display, and software is a system scanning a patient's teeth for a dental procedure, as described in cells 1[A]-[B][viii] below.
1[A]: a hand-held intraoral scanner; and	The scanner is a hand-held intraoral scanner: 

U.S. Patent No. 10,791,936	
	<i>Virtuo Vivo, Intraoral Scanner</i> (“Scanner Brochure”) at 4, Straumann (2023), https://www.straumann.com/content/dam/media-center/digital/en/documents/brochure/product-information/490.710-en_low.pdf.  https://www.straumann.com/en/dental-professionals/popups/products-and-solutions/digital/discover-the-virtuo-vivo-fast-scan.html, at 0:05.
1[B][i]: a computer readable medium including instructions that, when executed by a computer system, cause the computer system to:	The scanner is sold with accompanying computer systems. For example, below is a schematic depicting Scanner models and identifying parts including a computer system:

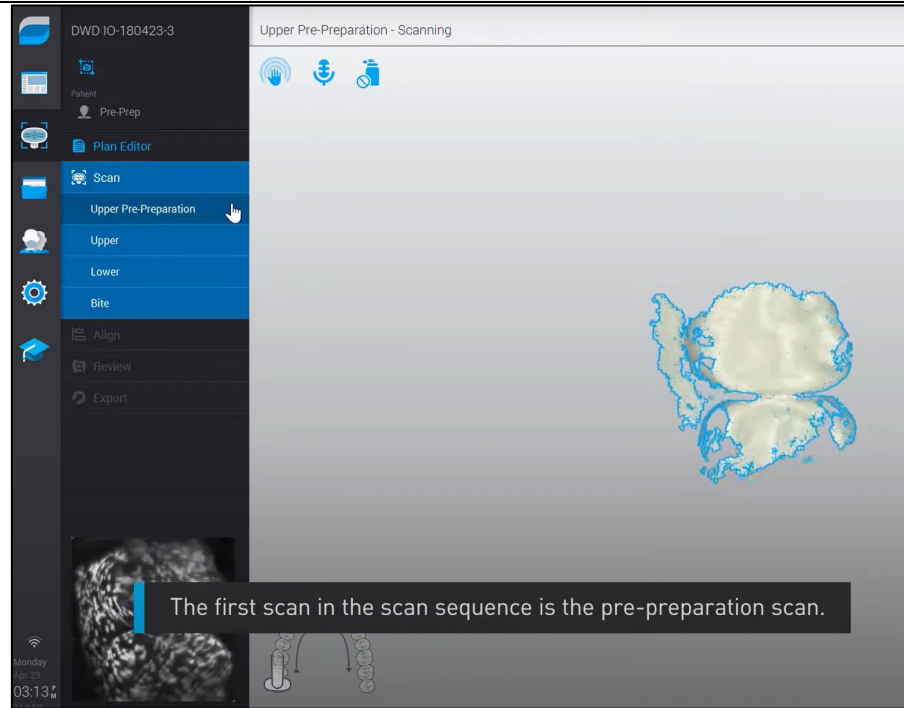


DentalWings, *Intraoral Scanner: Instructions for Use*, at 18, https://ifu.dentalwings.com/ifu/vivo/29-0100_Intraoral%20Scanner_v4.4-EN.pdf (“Dental Wings IFU”).

The computer systems include computer memory, such as an SSD hard disk, which is a computer readable medium.

U.S. Patent No. 10,791,936									
	Computer / operating system	Integrated high-performance computer storage for 8000 cases Dedicated high-end graphic card Windows 10 operating system Integrated gesture and voice recognition modules	Minimum requirements ² Memory: 16 GB DDR4 at 2400 MHz Processor: Intel® Core™ i7-8750H Graphic card: NVIDIA GeForce GTX 1060 with 6 GB GDDR5 Hard disk: 256 GB SSD Webcam						
		21" multi-touch screen	17" screen						
		<i>Id.</i> at 49. The computer systems include software, i.e., executable instructions:							
<table><tr><th>Software applications</th><th>Included</th><th>Optional</th></tr><tr><td>Intraoral Scanner software application</td><td>x</td><td></td></tr></table>				Software applications	Included	Optional	Intraoral Scanner software application	x	
Software applications	Included	Optional							
Intraoral Scanner software application	x								
<i>Id.</i> at 51. The instructions cause the computer system to perform the steps described in cells 1[B][ii]-[viii], below.									
1[B][ii]: receive first scan data of the patient's teeth from the hand-held intraoral scanner;	The system receives first scan data of the patient's teeth from the hand-held intraoral scanner. For example, below is a still from a Dental Wings training video depicting a computer system receiving first scan data of a patient's teeth from a Virtuo-Vivo scanner:								

U.S. Patent No. 10,791,936

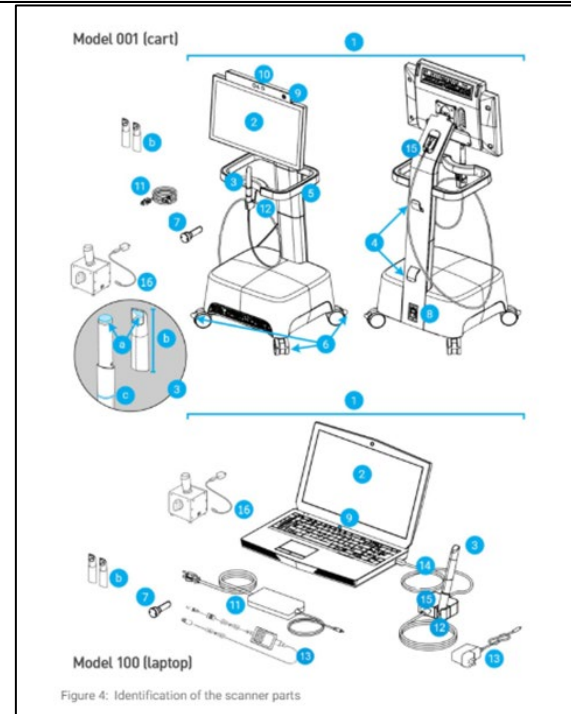


Dental Wings, *Pre Preparation Workflow*, at 0:46,
<https://www.youtube.com/watch?v=TsOMsxjWTUk>.

1[B][iii]: display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

The system displays, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth.

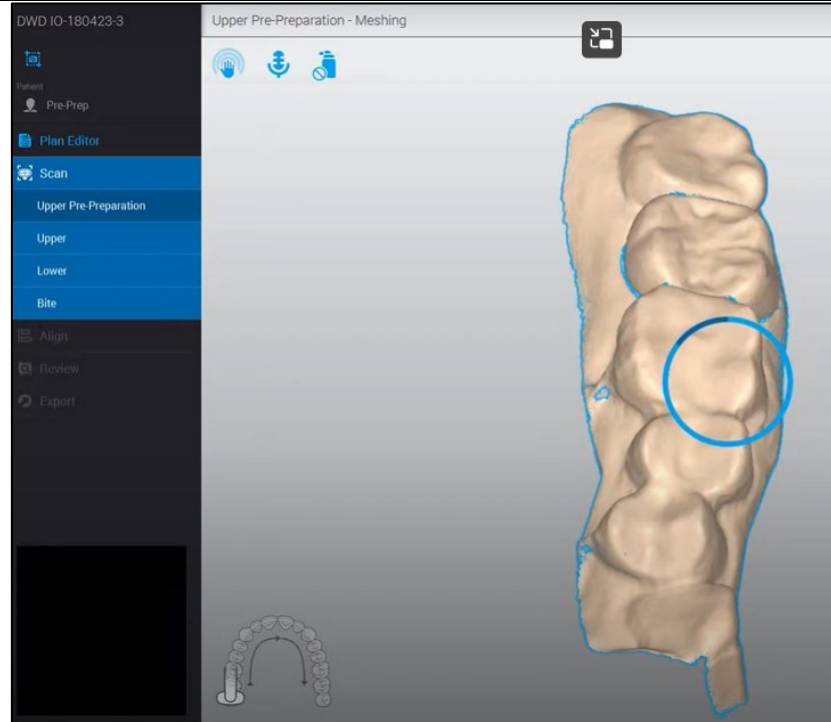
The Scanner's accompanying computer system includes a display:



Dental Wings IFU at 18.

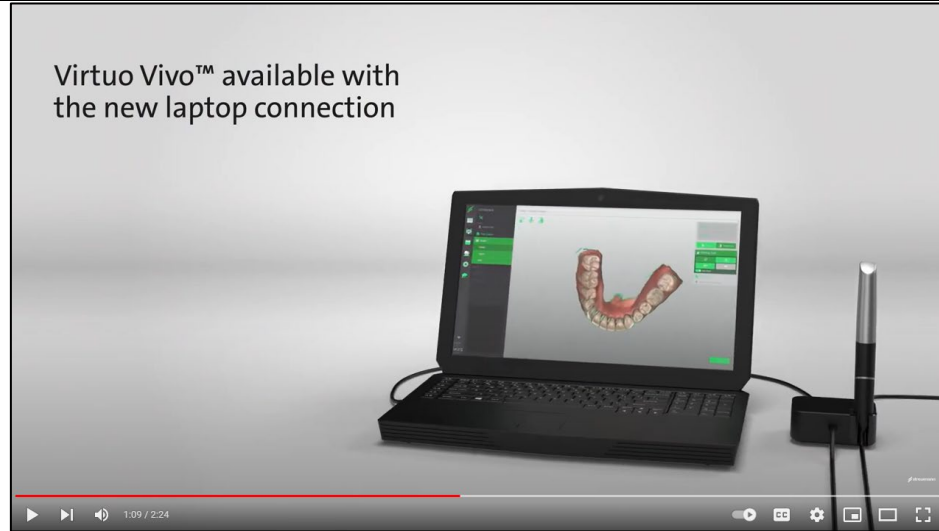
The display displays the virtual model based on the received first scan data of the patient's teeth as shown above in cell 1[B][ii] and below:

U.S. Patent No. 10,791,936



Dental Wings, *Pre Preparation Workflow*, at 1:23,
<https://www.youtube.com/watch?v=TsOMsxjWTUk>.

U.S. Patent No. 10,791,936

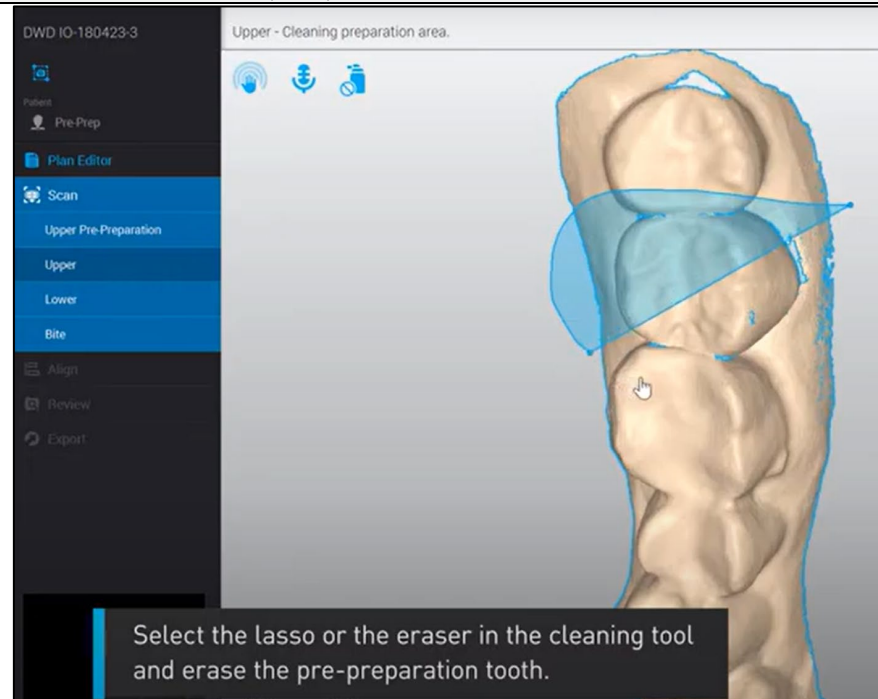


*See Straumann, Straumann® Virtuo Vivo™, at 1:09,
<https://www.youtube.com/watch?v=UMDvQYrJlhE>.*

1[B][iv]: receive user input defining
a portion of the model to be
removed;

The system receives user input defining a portion of the model to be removed:

U.S. Patent No. 10,791,936

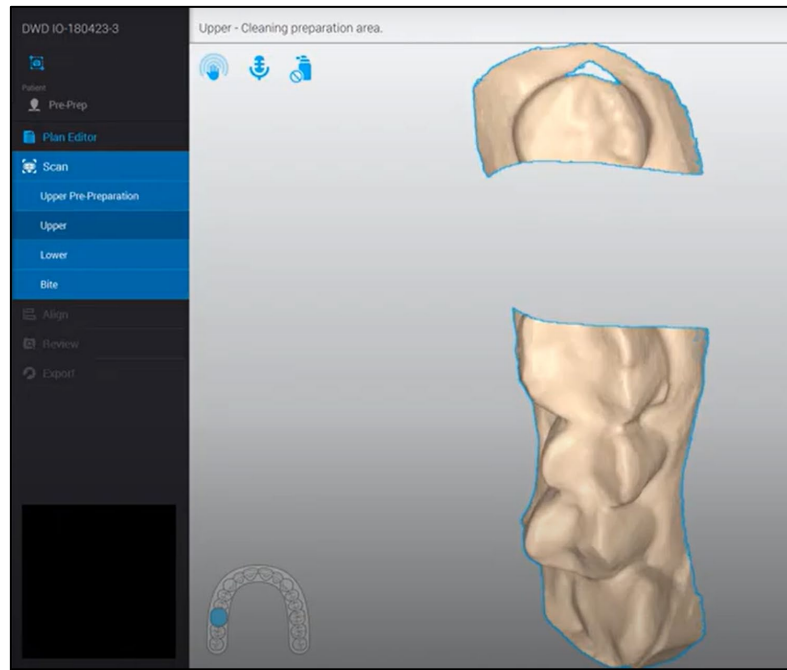


Dental Wings, *Pre Preparation Workflow*, at 1:41,
<https://www.youtube.com/watch?v=TsOMsxjWTUk>.

U.S. Patent No. 10,791,936

1[B][v]: remove, from the displayed model, a removed surface portion of the model to be removed according to the user input;

The system removes, from the displayed model, a removed surface portion of the model to be removed according to the user input:



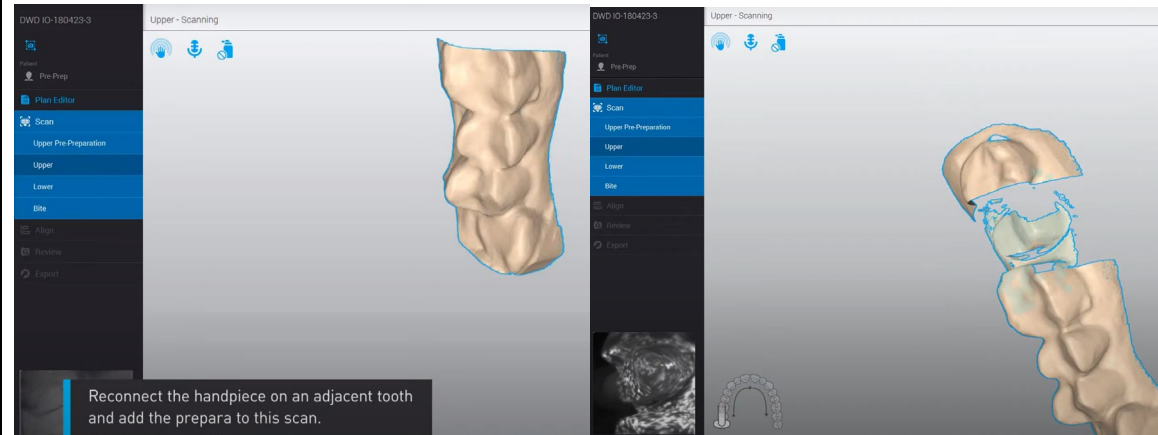
See Dental Wings, *Pre Preparation Workflow*, at 1:47, <https://www.youtube.com/watch?v=TsOMsxjWTUk>.

1[B][vi]: receive second scan data of the patient's teeth from the hand-held intraoral scanner, the scan data including surface data of a physically changed portion of the patient's intraoral cavity; and

The system receives second scan data of the patient's teeth from the hand-held intraoral scanner, where the scan data includes surface data of a physically changed portion of the patient's intraoral cavity. For example, in the workflow of the Dental Wings training video excerpted throughout this claim chart, the identified tooth undergoes a dental procedure that causes the tooth to be physically changed after the first scan and before the second scan. Instructions in the workflow training video indicate that second 3D intraoral scan data includes surface data of the portion that is physically changed into a preparation. Below are

U.S. Patent No. 10,791,936

screenshots from the portion of the training video depicting a user obtaining second scan data of a physically changed tooth:

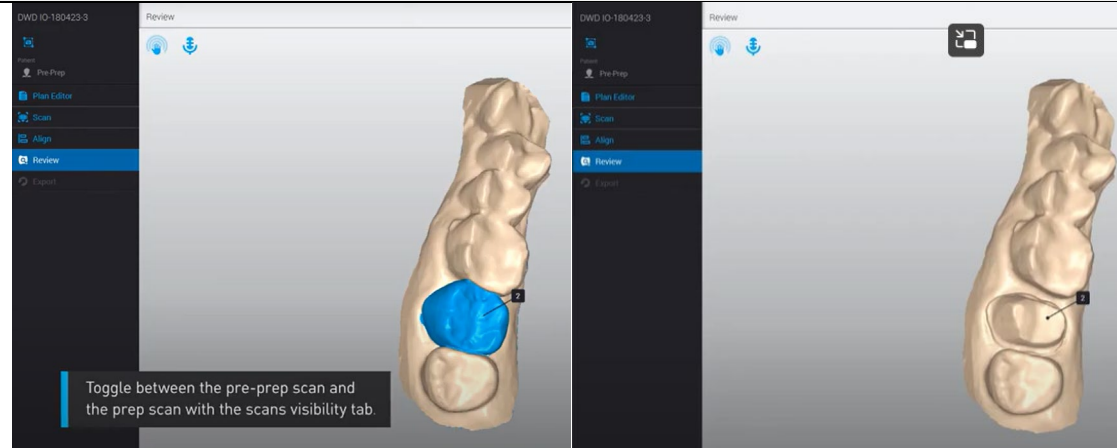


Dental Wings, *Pre Preparation Workflow*, at 1:54-1:59,
<https://www.youtube.com/watch?v=TsOMsxjWTUk>.

1[B][vii]: replace at least a portion of the removed surface portion of the model using the received second scan data of the patient's teeth including surface data of a physically changed portion of the patient's intraoral cavity; and

The system replaces at least a portion of the removed surface portion of the model using the received second scan data of the patient's teeth including surface data of a physically changed portion of the patient's intraoral cavity. For example, the below stills from the Dental Wings training video show a modified virtual model created from first and second scan data. The left-hand still highlights the area before removal of the surface in blue and the right-hand still depicts the virtual model after the system replaces the removed surface portion with the received second scan data:

U.S. Patent No. 10,791,936



Dental Wings, *Pre Preparation Workflow*, at 4:12 (left) and 4:21 (right), <https://www.youtube.com/watch?v=TsOMsxjWTUk>.

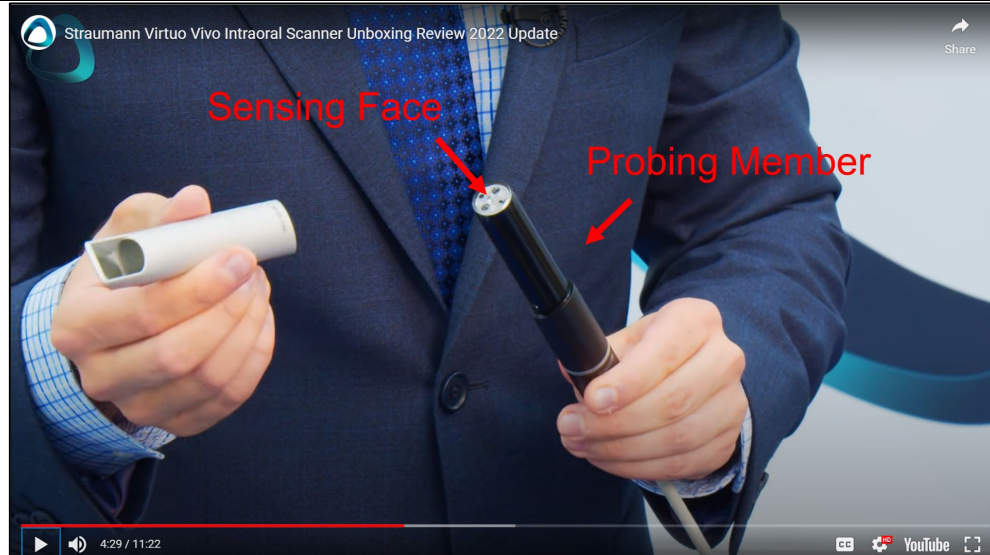
1[B][viii]: output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the second scan data.

The computer system outputs, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the second scan data, as shown in cell 1[B][vii], above.

2: The system of claim 1, wherein the hand-held intraoral scanner comprises a probing member with a sensing face, an illumination unit, a light focusing optics defining one or more focal planes forward the sensing face, and a translation mechanism for displacing the one or more focal planes relative to the sensing face.

The hand-held scanner includes a probing member with a sensing face:

U.S. Patent No. 10,791,936



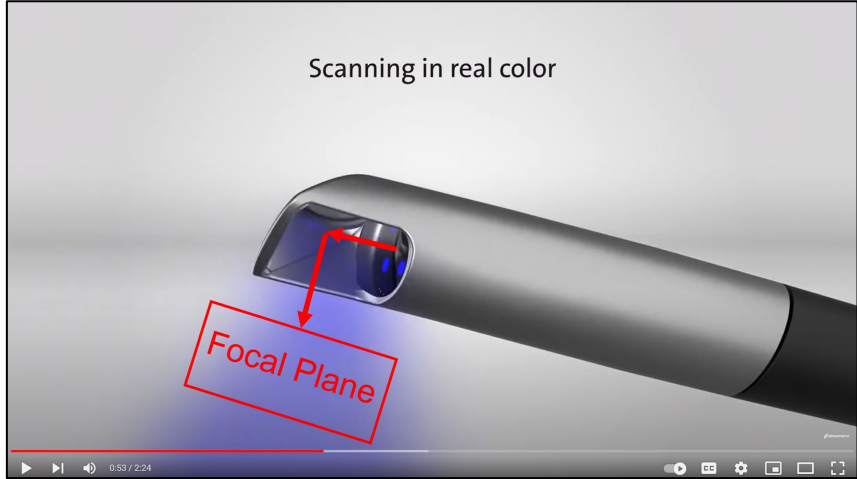
Institute of Digital Dentistry, *Straumann Virtuo Vivo Intraoral Scanner Unboxing Review 2022 Update*, at 4:29, <https://www.youtube.com/watch?v=y7jl4YbId-0> (annotated).

The hand-held scanner includes an illumination unit (an LED light) and light focusing optics defining one or more focal planes forward the sensing face (cameras):

Optical technology	LED light
	High-speed measuring cameras
	Video cameras

Dental Wings IFU at 51.

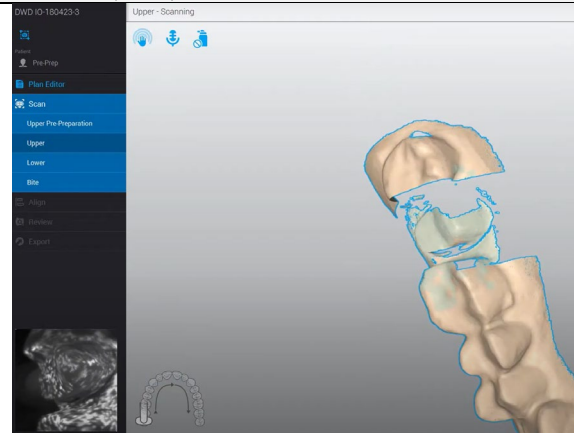
The hand-held scanner includes a translation mechanism for displacing the one or more focal planes relative to the sensing face. For example, it includes a mirror that displaces the focal planes relative to the sensing face:

U.S. Patent No. 10,791,936	
	 Straumann, <i>Straumann® Virtuo Vivo</i>, at 0:53, https://www.youtube.com/watch?v=UMDvQYrJhE (annotated).
3[A]: The system of claim 2, wherein the system further comprises the computer system and the display;	<i>See</i> Limitation 1[B][iii].
3[B]: wherein the system further comprises a mouse or wherein the display comprises a touch screen display; and	The system comprises at least a touch screen display:

U.S. Patent No. 10,791,936

U.S. Patent No. 10,791,936							
	<table><tr><td>Computer / operating system</td><td>Integrated high-performance computer storage for 8000 cases Dedicated high-end graphic card Windows 10 operating system Integrated gesture and voice recognition modules</td><td>Minimum requirements² Memory: 16 GB DDR4 at 2400 MHz Processor: Intel® Core™ i7-8750H Graphic card: NVIDIA GeForce GTX 1060 with 6 GB GDDR5 Hard disk: 256 GB SSD Webcam</td></tr><tr><td></td><td>21" multi-touch screen</td><td>17" screen</td></tr></table>	Computer / operating system	Integrated high-performance computer storage for 8000 cases Dedicated high-end graphic card Windows 10 operating system Integrated gesture and voice recognition modules	Minimum requirements ² Memory: 16 GB DDR4 at 2400 MHz Processor: Intel® Core™ i7-8750H Graphic card: NVIDIA GeForce GTX 1060 with 6 GB GDDR5 Hard disk: 256 GB SSD Webcam		21" multi-touch screen	17" screen
Computer / operating system	Integrated high-performance computer storage for 8000 cases Dedicated high-end graphic card Windows 10 operating system Integrated gesture and voice recognition modules	Minimum requirements ² Memory: 16 GB DDR4 at 2400 MHz Processor: Intel® Core™ i7-8750H Graphic card: NVIDIA GeForce GTX 1060 with 6 GB GDDR5 Hard disk: 256 GB SSD Webcam					
	21" multi-touch screen	17" screen					
	Dental Wings IFU at 49.						
3[C]: wherein the user input defining portion of the model to be removed is received by the mouse or the touch screen display.	See Limitation 1[B][iv].						
4: The system of claim 1, wherein the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to register the received second scan data with the model.	On information and belief, the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to register the received second scan data with the model. For example, as shown below, the Dental Wings training video depicts Virtuo Vivo software aligning the second scan data with the model:						

U.S. Patent No. 10,791,936



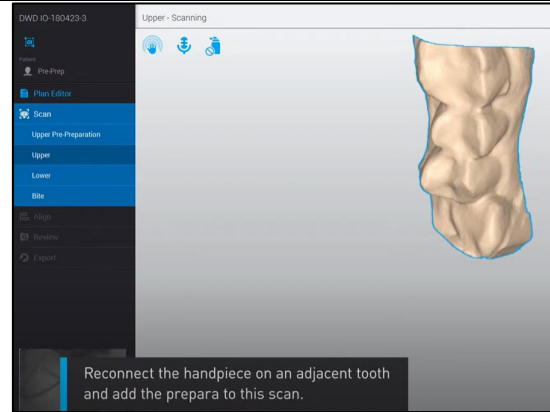
Dental Wings, *Pre Preparation Workflow*, at 1:54-1:59,
<https://www.youtube.com/watch?v=TsOMsxjWTUk>.

5: The system of claim 4, wherein the received second scan data is registered with the model by aligning identifying data of the received second scan data with corresponding parts of the model.

On information and belief, the system registers a received second scan with the model by aligning identifying data of the received second scan data with corresponding parts of the model.

For example, the Dental Wings instructs a user to “[r]econnect the handpiece on an adjacent tooth”:

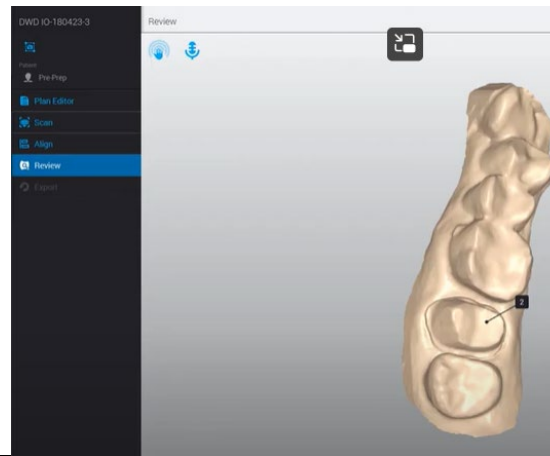
U.S. Patent No. 10,791,936

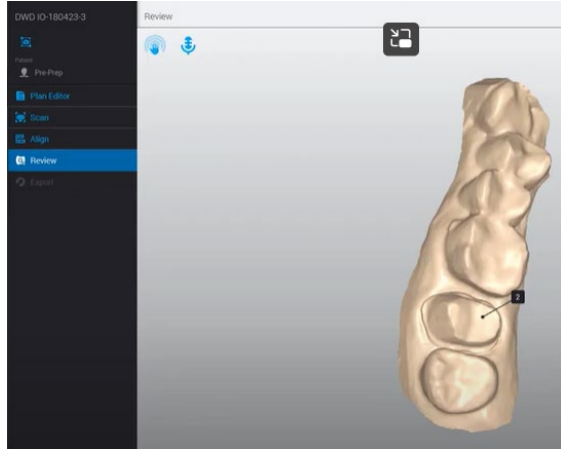


Dental Wings, *Pre Preparation Workflow*, at 1:55, <https://www.youtube.com/watch?v=TsOMsxjWTUk>. On information and belief, the Dental Wings software registers the second scan of the physically modified tooth against the existing model by aligning (*i.e.*, “reconnect[ing]”) the second scan of the “adjacent tooth” against the first scan of that same tooth.

6: The system of claim 5, wherein the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to further stitch a portion of the received second scan data with the model.

The system stitches together the first and second scans to replace at least a portion of the removed surface portion of the model. Below is an example of a stitched model:



U.S. Patent No. 10,791,936	
	Dental Wings, <i>Pre Preparation Workflow</i>, at 4:21, https://www.youtube.com/watch?v=TsOMsxjWTUk.
7: The system of claim 6, wherein the instructions to replace the at least the portion of the removed surface portion of the model using the received second scan data comprise instructions to further discard a remainder of the received second scan data, the remainder including the identifying surface data, after stitching the portion of the received second scan data with the model.	On information and belief, the system further includes instructions to further discard a remainder of the received second scan data after stitching, including the identifying surface data. As shown below, the stitched model includes only the portion of the second scan showing the tooth labeled “2”. It does not include the second scan of the “adjacent tooth” used to align the first and second scans.  The image is a screenshot of the Dental Wings software interface. On the left is a dark sidebar with a menu containing 'Pre Prep', 'Plan Editor', 'Scan', 'Align', 'Review' (highlighted in blue), and 'Export'. The main area shows a 3D dental model of a lower jaw. A specific tooth is highlighted with a black circle and the number '2'. Above the model, there are icons for 'Review' and a download icon. The top left of the interface shows the text 'DWD IO-180423-3'. Dental Wings, <i>Pre Preparation Workflow</i>, at 4:21, https://www.youtube.com/watch?v=TsOMsxjWTUk.
8[Pre]: The system of claim 1, wherein the computer readable medium further includes instructions that when executed by the computer system, cause the computer system to:	See Limitation 1[B].

U.S. Patent No. 10,791,936	
8[A]: mark, on the displayed model, the user input defined portion, after receiving the user input and before removing the removed surface portion of the model.	The system marks, on the displayed model, the user input defined portion, after receiving the user input and before removing the removed surface portion of the model. <i>See</i> Limitation 1[B][iv].
9[Pre]: A method for scanning a patient's teeth for a dental procedure, the method comprising:	If limiting, Defendants or their customers perform a method as recited in claim 9.
9[A]: receiving first scan data of the patient's teeth from a hand-held intraoral scanner;	<i>See</i> Limitation 1[B][ii].
9[B]: displaying, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;	<i>See</i> Limitation 1[B][iii].
9[C]: receiving user input via the displayed model demarcating a portion of the model to be retained and a surface portion of the model to be replaced;	<i>See</i> Limitation 1[B][iv].
9[D]: receiving second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intraoral cavity;	<i>See</i> Limitation 1[B][vi].
9[E]: replacing at least a portion of the surface portion of the model to be replaced according to the user input using at least a portion of the second scan data of the patient's	<i>See</i> Limitation 1[B][vii].

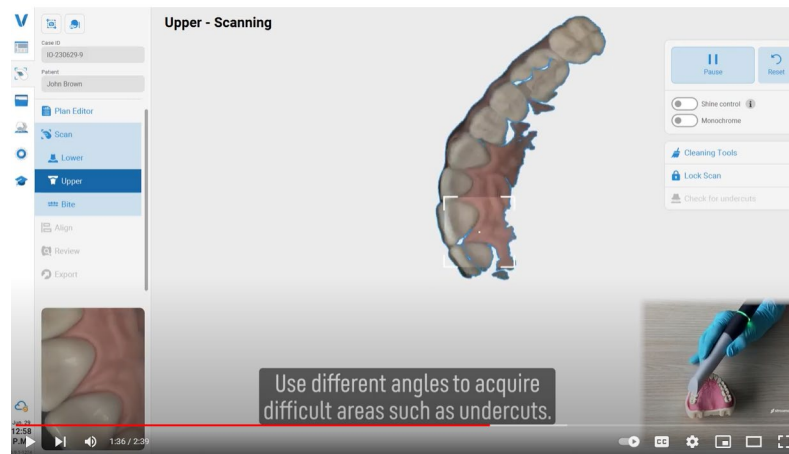
U.S. Patent No. 10,791,936	
teeth including the physically changed portion; and	
9[F]: outputting, to the display, the model of the patient's teeth with the at least the portion of the surface portion replaced using the second scan data.	<i>See</i> Limitation 1[B][viii].
10: The method of claim 9, further comprising marking an area on the displayed model associated with the received user input.	Defendants or their customers perform the additional step of this claim. <i>See</i> Limitation 1[B][iv].
11: The method of claim 9, wherein replacing the at least the portion of the surface portion of the model to be replaced according to the user input using at least the portion of the second scan data comprises registering the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model.	Defendants or their customers perform the additional step of this claim. <i>See</i> Claim 5.
12: The method of claim 11, wherein replacing the at least the portion of the surface portion of the model to be replaced according to the user input using at least the portion of the second scan data further comprises stitching the at least the portion of the second scan data with the model.	Defendants or their customers perform the additional step of this claim. <i>See</i> Claim 6.
13: The method of claim 12, wherein replacing the at least the	<i>See</i> Claim 7.

U.S. Patent No. 10,791,936

portion of the surface portion of the model to be replaced according to the user input using the at least the portion of the second scan data further comprises discarding a remainder of the second scan data, including the identifying surface data, after stitching the at least the portion of the second scan data with the model.

14: The method of claim 9, wherein the model of the patient's teeth comprises a tooth preparation having a finish line, wherein a portion of the finish line is obscured or distorted, and wherein the physical change results in the finish line not being obscured or distorted.

Defendants or their customers perform a method as recited in claim 9 wherein the model of the patient's teeth comprises a tooth preparation having a finish line, wherein a portion of the finish line is obscured or distorted, and wherein the physical change results in the finish line not being obscured or distorted.



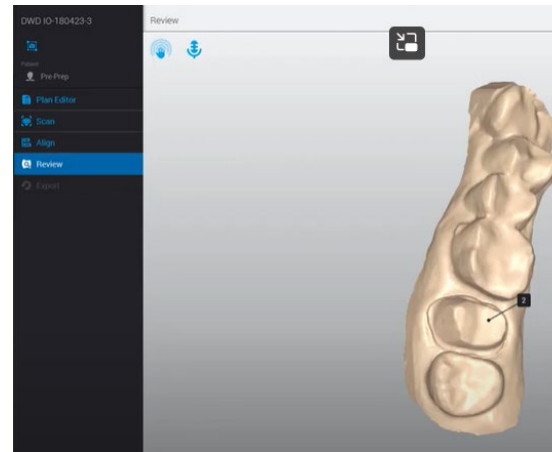
See Straumann, *Virtuo Vivo - Scan Technique*, at 1:36, last accessed May 14, 2024 at <https://www.youtube.com/watch?v=GjOfdAFt4AI> (describing how to capture second scan to ensure finish line is not obscured or distorted).

U.S. Patent No. 10,791,936

15: The method of claim 9, wherein the model of the patient's teeth comprises a tooth preparation that accurately represents a surface of a physical preparation of the patient, and wherein the method further comprises analyzing the tooth preparation of the model to determine whether the surface of the physical preparation is suitable for a dental prosthesis; and wherein the physical change is a physical modification of the surface of the physical preparation of the patient.

Defendants' customers perform a method as recited in claim 9 wherein the model of the patient's teeth comprises a tooth preparation that accurately represents a surface of a physical preparation of the patient. *See* Dental Wings, *Pre Preparation Workflow*, at 4:21, <https://www.youtube.com/watch?v=TsOMsxjWTUk>. The physical change is a physical modification of the surface of the physical preparation of the patient. *See id.* (depicting post-preparation tooth as smaller than pre-preparation tooth).

Defendants' customers further analyze the tooth preparation of the model to determine whether the surface of the patient's modified tooth is suitable for a dental prosthesis. For example, on information and belief, the preparation shown in the following still is suitable for a dental crown, which is a dental prosthesis.



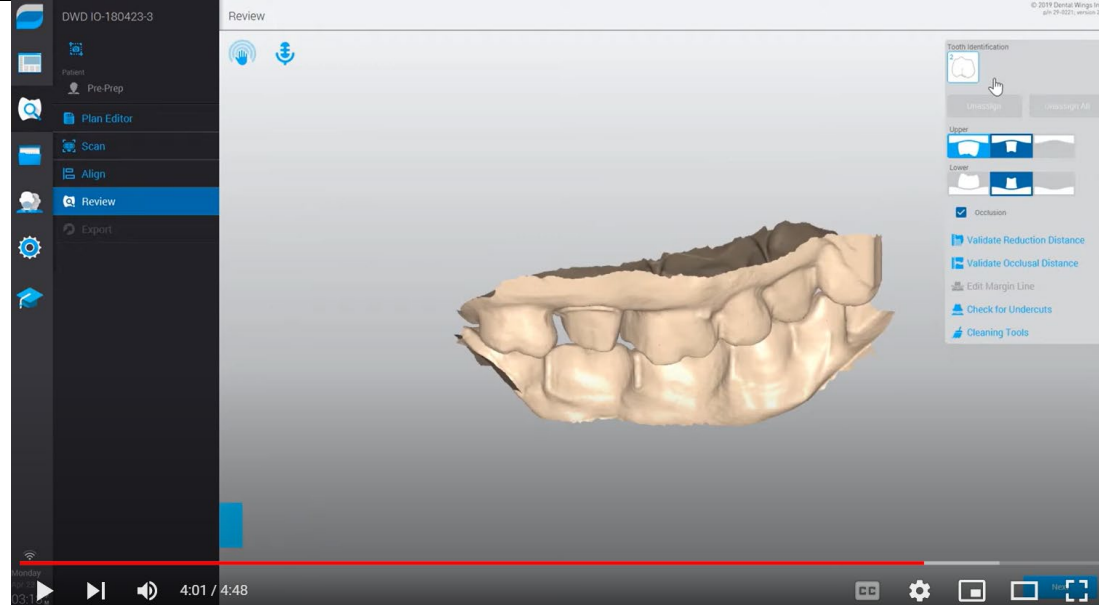
Dental Wings, *Pre Preparation Workflow*, at 4:21, <https://www.youtube.com/watch?v=TsOMsxjWTUk>.

16: The method of claim 15, wherein the dental prosthesis comprises a dental crown and wherein the tooth preparation analysis comprises analysis of the

The dental prosthesis is a dental crown. *See* Claim 15. On information and belief, Defendants' customers further analyze the model with respect to a virtual model of opposing dentition of an opposite jaw to determine whether the tooth preparation would result in an inadequate structure for the dental crown:

U.S. Patent No. 10,791,936

model with respect to a virtual model of an opposing dentition of an opposite jaw to determine whether the tooth preparation would result in an inadequate structure for the dental crown.



Dental Wings, *Pre Preparation Workflow*, at 4:01,
<https://www.youtube.com/watch?v=TsOMsxjWTUk>.

17[Pre]: A system for intraorally scanning a patient's teeth for a dental procedure, the system comprising:

See Limitation 1[Pre].

17[A]: a hand-held intraoral scanner; and

See Limitation 1[A].

17[B][i]: a computer readable medium including instructions that when executed by a computer system, cause the computer system to:

See Limitation 1[B][i].

17[B][ii]: receive first scan data of the patient's teeth from the hand-held intraoral scanner;

See Limitation 1[B][ii].

U.S. Patent No. 10,791,936	
17[B][iii]: display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;	<i>See</i> Limitation 1[B][iii].
17[B][iv]: receive user input defining a portion of the model to be removed;	<i>See</i> Limitation 1[B][iv].
17[B][v]: after receiving the user input, remove, from the displayed model, a removed surface portion of the model to be removed according to the user input;	<i>See</i> Limitation 1[B][v].
17[G]: after removing the portion of the model, receive second scan data of the patient's teeth from the hand-held intraoral scanner;	<i>See</i> Limitation 1[B][vi].
17[H]: register the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model;	<i>See</i> Claim 5.
17[I]: replace at least a portion of the removed surface portion of the model using at least a portion of the received second scan data of the patient's teeth;	<i>See</i> Limitation 1[B][vii].
17[J]: discarding a remainder of the second scan data, including the identifying data, after registering the second scan data with the model; and	<i>See</i> Claim 7.

U.S. Patent No. 10,791,936	
17[K]: output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the received scan data.	<i>See</i> Limitation 1[B][viii].
18: The system of claim 17, wherein the hand-held intraoral scanner comprises a probing member with a sensing face, an illumination unit, a light focusing optics defining one or more focal planes forward the sensing face, and a translation mechanism for displacing the one or more focal planes relative to the sensing face.	<i>See</i> Claim 2.
19: The system of claim 18, wherein the system further comprises the computer system and the display; wherein the system further comprises a mouse or wherein the display comprises a touch screen display; and wherein the user input defining portion of the model to be removed is received by the mouse or the touch screen display.	<i>See</i> Claim 3.
20: The system of claim 17, wherein the portion of the removed surface portion of the model is replaced using at least the portion of the received second scan data by registering the second scan data with the model.	<i>See</i> Claim 4.