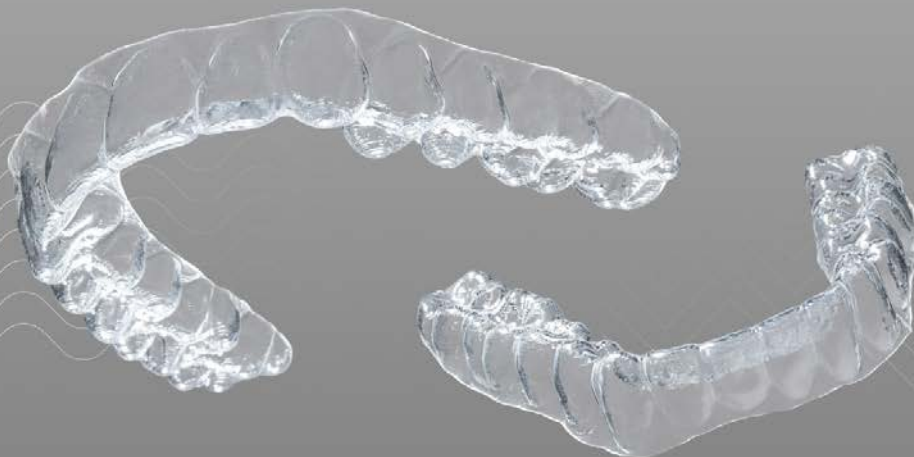




Clarity™

Esthetic Orthodontic Solutions



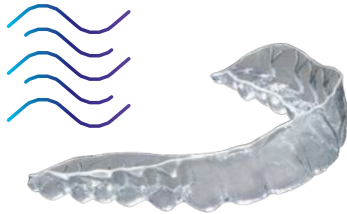
# 3M™ Clarity™ Aligners Flex + Force: More materials, more treatment options

*Lori Gmeinder, Donna J. Stenberg, Shantel Rivard, David K. Cinader*

Aligners revolutionized esthetic treatment in orthodontics. But since their introduction in the late '90s, the options for tray materials within a treatment design have been very limited. That changed recently with the introduction of 3M™ Clarity™ Aligners Flex. Developed by 3M materials scientists, Clarity Aligners Flex features 5-layers of contrasting materials that offer you new flexibility to direct movement. When used in conjunction with 3M™ Clarity™ Aligners Force (the new name for our original tray material) you can develop treatment designs that simply aren't possible when using just one type of aligner tray material.

## Tapping into the fixed appliance paradigm

Orthodontic treatment is all about biologic-based tooth movement. Treatment may start with one type of movement—creating space for example—and then switch to another type of movement such as torque. With fixed appliances, these movements can be achieved by using flexible wires at the start of treatment and stiffer wires near the end. 3M™ Clarity™ Aligners Flex + Force work in a similar manner.



### Flex First

*The 5-layer material designed to be thinner and more pliable.*

Clarity Aligners Force is analogous to a stiffer wire. It is well suited to directing movement in the transverse dimension or when you need to deliver torque and help correct vertical or horizontal discrepancies.

Clarity Aligners Flex is comparable to an initial wire in that it is more flexible and has better force persistence than our original aligner. This compliance may help at the case start when there tends to be more crowding and undercuts. A more flexible material provides the characteristics needed to engage well with teeth that are misaligned. Being comfortable is also a desirable quality when removing and replacing the aligner, which can be challenging for the patient.



### Force First

*Time-tested aligners material that provides rigidity and stability.*

## Two materials more than double your treatment options

While we have preliminarily identified which movements are best suited for Clarity Aligners Flex + Force, we know that orthodontists have their own ideas for how to best use the materials. It may be that in some cases, it could make more sense to start with Clarity Aligners Force to achieve expansion and then move to the Clarity Aligners Flex for rotation and finishing. That's the beauty of this new system—you get to choose.

The two materials system can also address patient behaviors. For example, Clarity Aligners Flex might be a better option for some patients at the beginning of treatment because it is easy to insert and remove the aligner, easing the patient into the process.

We were motivated to develop this two materials system because different movements require different forces. Along with fixed appliance mechanics, you have more options to deliver variable force levels for your desired results. It's a whole new level of customization for treatment—however you want to do it.

## How orthodontists have been using them

Before officially launching Clarity Aligners Flex + Force, we provided a group of orthodontists with the aligners to better understand how they can be used for different movements. Here's what two orthodontists had to say:



“[I] do the heavy lifting (expansion/ deep bite correction) first with Force, then detail/finish (align) with Flex.”

- Dr. Rick O'Neil, South Alabama Orthodontics

“I am looking at the amount of crowding and the anatomy of the teeth. Lots of crowding and/or tall, “curvy” teeth make me want to begin with Flex. If there isn't a lot of crowding, or the teeth don't have as many undercuts - Force would be my preference.”

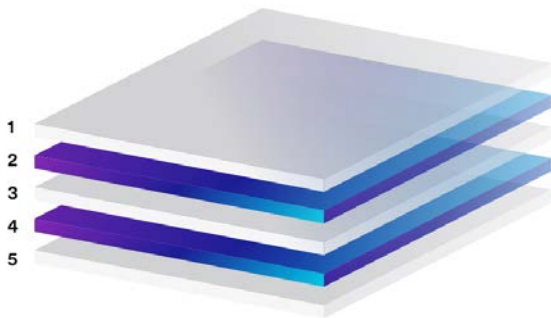
- Dr. Christian Groth, TDR Specialists in Orthodontics

## More materials. More design and treatment options.

3M has a long and successful history in polymer science. So we knew we had the technical expertise to develop a new aligner material that offered these attributes: force persistence, flexibility, durability, clarity and stain resistance. After much research, development, prototyping and testing we succeeded with Clarity Aligners Flex.

It is constructed using 5 layers of polymer materials to achieve somewhat contradictory objectives. For example, the material is flexible, so that it fits well but it also offers excellent force persistence for predictable movement that has shown to retain 75% of its force over a two-week period. The outer layer of Clarity Aligners Flex was developed to resist tearing, staining and scratches.

### 5-Layer Material



*Optimal durability, esthetics and force persistence via proprietary multi-layer materials science.*

Another design feature that has been carried forward into Clarity Aligners Flex is that it can cover the gingival margin. That gives you more choices in placing attachments. This material offers good engagement with attachments and in lab testing has shown it is durable when using hook cut-outs and bite ramps. Overall, the Flex material is highly durable, withstanding more than 450 insertion and removal cycles.

For the past 20 years orthodontists have used ingenuity to work around the limitations presented by having only one aligner material. Now, with the addition of Clarity Aligners Flex, we anticipate a leap in treatment creativity.

## Advanced Tx Design within the 3M™ Oral Care Portal

Updates to the 3M Oral Care portal allow clinicians to customize each patient's treatment using Clarity Aligners Flex + Force in a single treatment design.

Key to the user experience of advanced Tx Design is the ability to work seamlessly with multiple treatment modalities and combination treatments, for example using Clarity Aligners and 3M™ Digital Bonding Trays. There's no more jumping between multiple systems or brands—it's an integrated experience that allows you to explore options and create the best plan regardless of the modality for truly customized treatment.

For more information about Clarity Aligners Flex + Force, please visit [3M.com/ClarityAligners](https://www.3M.com/ClarityAligners).



**Lori Gmeinder, DDS, Clinical Advisor.** Lori has a B.S. in Engineering from the University of Minnesota and a DDS degree from the University of Minnesota. After graduation, Lori completed a General Practice Residency at the VA Medical Center in Denver. She practiced dentistry for 11 years in private practice prior to transitioning to the Oral Care Solutions Division of 3M in 2017. She has been involved in the development of custom orthodontic digital solutions including 3M™ Clarity™ Aligners and 3M™ Digital Bonding.



**Donna J. Stenberg, DDS, MS, Consultant,** graduated from the University of Minnesota School of Dentistry summa cum laude. She continued her education there completing her orthodontic residency and MS. She is a diplomate of the American Board of Orthodontics. Donna owned a private practice in Minnesota for 30+ years, and has supported 3M as a customer, through focus groups and in office clinical trials for 3M™ Smart Clip™ SL3 Self-ligating Brackets. She is active in Spear Education as a Visiting Faculty and speaker on interdisciplinary treatment planning. In 2017, Donna joined 3M as a consultant for 3M™ Clarity™ Aligners.



**Shantel Rivard, 3M Digital Operations Manufacturing Manager.** Shantel has a B.S. and M.S. in Mechanical Engineering from Rochester Institute of Technology. She has been in Quality and Manufacturing engineer roles at Eastman Kodak Company and Corning Inc. Shantel joined 3M Oral Care Solutions Division in 2013 as a Senior Product Assurance engineer and then as a Senior Manufacturing Process engineer supporting the True Definition Scanner. Since 2018 she has supported the launch and scale-up of custom orthodontic digital solutions including 3M™ Clarity™ Aligners and 3M™ Digital Bonding.



**David K. Cinader, PhD, Researcher.** David received a B.S. Degree in Chemical Engineering from Michigan Tech University in 1994 and a PhD in Chemical Engineering in 1999 from Northwestern University. He joined 3M Unitek Research and Development in September 1999 and has been involved in orthodontic bonding development including 3M™ APC™ Flash-Free Adhesive, 3M™ Transbond™ Plus Self-Etching Primer, 3M™ APC™ II, 3M™ APC™ PLUS and 3M™ Transbond™ Supreme Low Viscosity Adhesives.



**3M Oral Care**  
2510 Conway Avenue  
St. Paul, MN 55144-1000 USA  
[3M.com/Ortho](http://3M.com/Ortho)

[3M.com/ClarityAligners](http://3M.com/ClarityAligners)

**For more information contact  
3M Oral Care at 800-423-4588**

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