A World of Proof
Discover the power of fibres

everStick® Family
from GC

Study compilation
Discover everStick®
and the world of fibre reinforcement

everStick glass fibre reinforcements have been developed to provide strong solutions for minimally invasive dentistry. Researchers all around the world are investigating and documenting the clinical and laboratory evidence of their effectiveness.

The volume and extent of supportive independent research on everStick fibre reinforcements, as summarised here, clearly emphasises the global significance of these remarkable products.
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IPN - The heart of everStick® fibres

Proper bonding between the fibres and composite is the key factor for a successful treatment.

Only everStick products have a unique, patented interpenetrating polymer network structure (IPN). The IPN technology is based on the ability of the polymer matrix to partially dissolve in the resin used for bonding.

Clinically this leads to superior bonding, enabling reliable surface retained applications and perfect handling properties. Because of this IPN structure, surfaces can be reactivated even after the final polymerisation. Reactivation is crucial for superior bonding when:

• Laboratory-manufactured restorations are cemented to teeth
• Fibre reinforced composite (FRC) restorations are remodelled or repaired

The IPN structure makes the everStick products fundamentally different from any other fibre or composite materials available on the market.
Minimally invasive and patient-friendly fibre reinforcement solutions for daily dentistry

The advantages of everStick

- Minimally invasive and reversible solutions, leaving all options open for future treatments
- Extensive clinical proof & in vitro research available
- Superior mechanical properties
- Unique patented bonding with IPN (interpenetrating polymer network) technology
- Economical alternative to indirect treatments

Indications

- Fibre-reinforced composite bridges
- Advanced root canal post & core structures
- Splints of mobile and traumatised teeth
- Orthodontic retainers

Creating a direct fibre-reinforced bridge with everStickC&B

Courtesy of Prof. Marleen Peumans, Belgium

Custom-made post with everStickPOST

Courtesy of Dr. Anja Baraba, Croatia

Splinting teeth with everStickPERIO

Courtesy of Dr. Javier Tapia Guadix, Spain

Splinting traumatic teeth with everStickNET

Courtesy of Dr. Rudolf Novotny, Slovakia

Orthodontic retainer with everStickORTHO

Courtesy of Dr. Lucile Dahan, France
Publications on key features

Mechanical properties and load bearing capacity

Based on the literature, glass fibre reinforcements (everStick) have been used to reinforce resin matrices and their strength and reinforcing effect are among the highest to be found. Several authors have reported that everStick fibre reinforcements have excellent mechanical properties with a relatively high modulus of elasticity and load bearing capacity, even after long-term water immersion.


2. Effects of nanofillers on mechanical properties of fiber-reinforced composites polymerized with light-curing and additional postcuring.


4. Effect of water temperature on cyclic fatigue properties of glass-fiber-reinforced hybrid composite resin and its fracture pattern after flexural testing.


7. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure.


11. Load bearing capacity of fibre-reinforced and particulate filler composite resin combination.

12. Effect of cross-sectional design on the modulus of elasticity and toughness of fiber-reinforced composite materials.

13. Damage mechanics and load failure of fiber-reinforced composite fixed partial dentures.


15. Static strength of molar region direct technique glass fibre-reinforced composite fixed partial dentures.

16. The span length and cross-sectional design affect values of strength.
17. Flexural fatigue of denture base polymer with fiber-reinforced composite reinforcement.
   Narva KK et al.

18. The degree of conversion of fiber-reinforced composites polymerized using different light-curing sources.
   Uctasli S et al.

19. The static strength and modulus of fiber reinforced denture base polymer.
   Narva KK et al.

20. Effect of fiber position and orientation on fracture load of fiber-reinforced composite.
   Dyer SR et al.

   Hamza TA et al.

22. Flexural properties of fiber reinforced root canal posts.
   Lassila LV et al.

23. The effect of fiber position and polymerization condition on the flexural properties of fiber-reinforced composite.
   Lassila LV and Vallittu PK.

24. Mechanical properties of preimpregnated glass fiber reinforced composite resins.
   Xie QF et al.

25. Acoustic emission analysis of fiber-reinforced composite in flexural testing.
   Alander P et al.

   Lassila LV et al.
   Biomaterials. 2002 May;23(10):2221-9.
Bonding performance of everStick fibres

everStick fibres are pre-impregnated with a unique light-polymerisable dimethacrylate resin system. It contains linear polymer phases that form a semi-IPN polymer network after being polymerised. That way, it offers a better bonding site for composite resin and tooth structure.

1. Polymer matrix of fiber-reinforced composites: Changes in the semi-interpenetrating polymer network during the shelf life.
   Khan AA et al.

   Frese C et al.

3. Shear bond strength to enamel and flexural strength of different fiber-reinforced composites.
   Juloski J et al.

   Kallio TT et al.

5. Microtensile bond strength of fiber-reinforced composite with semi-interpenetrating polymer matrix to dentin using various bonding systems.
   Tezvergil-Mutluay A et al.

6. The bond strength of particulate-filler composite to differently oriented fiber-reinforced composite substrate.
   Lassila LV et al.
   J Prosthodont. 2007 Jan-Feb;16(1):10-7.

7. The shear bond strength of bidirectional and random-oriented fibre-reinforced composite to tooth structure.
   Tezvergil A et al.

8. Bond strength of glass fiber reinforced composite and base metal frameworks used in resin-bonded fixed partial dentures.
   Sadeghi M.

   Keski-Nikkola MS et al.

    Tezvergil A et al.

    Tezvergil A et al.

12. The semi-interpenetrating polymer network matrix of fiber-reinforced composite and its effect on the surface adhesive properties.
    Lastumäki TM et al.

13. Bond strength of fibre-reinforced composite to the metal surface.
    Vallittu PK and Kurunmäki H.

    Lastumäki TM et al.
Plaque accumulation and bacterial adhesion of everStick fibres

In vivo and in vitro studies showed that glass fibre-reinforced composites (everStick) and conventional particulate filler composite have a similar plaque accumulation and bacterial adhesion properties.

   Lassila LV et al.

2. Early plaque formation on fibre-reinforced composites in vivo.
   Tanner J et al.

3. Adsorption of parotid saliva proteins and adhesion of Streptococcus mutans ATCC 21752 to dental fiber-reinforced composites.
   Tanner J et al.

4. Effect of water storage of E-glass fiber-reinforced composite on adhesion of Streptococcus mutans.
   Tanner J et al.
Extensive clinical studies and reports are available that demonstrate the benefits of using everStickC&B fibres. The findings of these studies indicate that restorations reinforced with everStickC&B are a valid alternative for replacing missing single anterior and posterior teeth. Such restorations appear to offer a reliable, minimally invasive, aesthetic and cost-efficient way to restore missing single teeth with predictable clinical performance and patient-oriented outcomes. Moreover, the versatility in fabrication techniques, whether direct or indirect, varying retention options through surface, inlay or hybrid retainers, and their capacity to be easily repaired in situ, are all considered major advantages and support the use of restorations reinforced with everStickC&B.

15. Pilot study of unidirectional E-glass fibre-reinforced composite resin splints: up to 4.5-year clinical follow-up.
   Kumbuloglu O et al.

16. Five-year survival of 3-unit fiber-reinforced composite fixed partial dentures in the posterior area.
   van Heumen CC et al.

17. Rehabilitation of an extracted anterior tooth space using fiber-reinforced composite and the natural tooth.
   Bagis B et al.

   Garoushi SK et al.

19. Five-year survival of 3-unit fiber-reinforced composite fixed partial dentures in the anterior area.
   van Heumen CC et al.

   Bagis B et al.

   Kurumäki H et al.

   Garoushi S et al.

   Garoushi S et al.

24. Rehabilitation of advanced periodontal problems by using a combination of a glass fiber-reinforced composite resin bridge and splint.
   Kumbuloglu O et al.

25. Intraoral repair of all ceramic fixed partial denture utilizing preimpregnated fiber reinforced composite.
   Turkaslan S, Tezvergil-Mutluay A.

   Garoushi S et al.
   Libyan J Med. 2007 Sep 1;2(3):139-41.

27. Chairside fabricated fiber-reinforced composite fixed partial denture.
   Garoushi S, Vallittu PK.

28. Use of a prefabricated fiber-reinforced composite resin framework to provide a provisional fixed partial denture over an integrating implant: a clinical report.
   Meiers JC, Freilich MA.

29. Design and use of a prefabricated fiber-reinforced composite substructure for the chairside replacement of missing premolars.
   Meiers JC, Freilich MA.

30. Fiber-reinforced composites in fixed partial dentures.
   Garoushi S, Vallittu P.

   Meiers JC, Kazemi RB.

   Aydin MY, Kargül B.

33. Survival rates of resin-bonded, glass fiber-reinforced composite fixed partial dentures with a mean follow-up of 42 months: a pilot study.
   Vallittu PK.

34. Single-tooth replacement with a chairside prefabricated fiber-reinforced resin composite bridge: a case study.
   Arteaga S, Meiers JC.

35. Clinical evaluation of fiber-reinforced fixed bridges.
   Freilich MA et al.

   Vallittu PK.
Fracture resistance of everStickC&B reinforced restorations

Several authors have reported scientific evidences supporting the use of everStickC&B reinforced restorations. They attributed the superior mechanical performance to the fibre structure and good connection with the resin matrix. The optimal adhesion between everStickC&B and resin is a key factor in load transfer and clinical success of all fibre-reinforced applications.

1. Ex vivo fracture resistance of teeth restored with glass and fiber reinforced composite resin.
   Khan SIR et al.

   Cekic-Nagas I et al.

3. Fracture behavior of pontics of fiber-reinforced composite fixed dental prostheses.
   Perea L et al.

4. Fiber-reinforced composite fixed dental prostheses with various pontics.
   Perea L et al.

5. Fracture strength of cusp-replacing fibre-strengthened composite restorations.
   HJ Visser et al.
   SADJ June 2014, Vol 69 no 5 p202 - p207

   Gönçü Başaran E et al.

7. Effects of different cavity designs on fracture load of fiber-reinforced adhesive fixed dental prostheses in the anterior region.
  Aktas G et al.

8. Shear bond strength to enamel and flexural strength of different fiber-reinforced composites.
   Juloski J et al.

9. Analysis of the interdiffusion of resin monomers into pre-polymerized fiber-reinforced composites.
   Wolff D et al.

10. Fiber reinforcement of two temporary composite bridge materials Effect upon flexural properties.
    AL Twal E.Q.H, Chadwick R.G.

    Ozcan M et al.

12. Static and dynamic failure load of fiber-reinforced composite and particulate filler composite cantilever resin-bonded fixed dental prostheses.
    Keulemans F et al.

    Keulemans F et al.

    Keulemans F et al.

15. Fracture strength of direct surface-retained fixed partial dentures: effect of fiber reinforcement versus the use of particulate filler composites only.
    Kumbuloglu O et al.

    Ozcan M, Kumbuloglu O, User A.

17. Comparison of load-bearing capacity of direct resin-bonded fiber-reinforced composite FPDs with four framework designs.
    Xie Q et al.

    Ozcan M et al.
According to the available research, everStickPOST has proved to be successful clinically due to the mono-block effect formed by the luting agent, the post system and the core material and due to the bonding to dentin. everStickPOST provides a novel way of fabricating cost-effective, aesthetic and less time-consuming individually formed posts to restore endodontically treated teeth.
Marginal adaptation and bonding strength of everStickPOST to root canal dentin

Laboratory studies showed that individually formed fibre posts (everStickPOST) have higher dentin bond strength values and less microleakage in comparison to prefabricated fibre posts. Thanks to the IPN technology, everStickPOST bonds efficiently to adhesive cements and direct composite cores/restorations, enabling reliable surface-retained applications. Moreover, with everStickPOST the amount of luting cement can be minimised, thereby reducing the residual shrinkage of the cement and resulting in a better adaptation of the fibre post.

1. The Effect of Self-adhesive and Self-etching Resin Cements on the Bond Strength of Nonmetallic Posts in Different Root Thirds.
da Silva MB et al. 

San T, Ozyesil AG. 

3. Effect of cementation technique of individually formed fiber-reinforced composite post on bond strength and microleakage.
Makarewicz D et al. 

4. Influence of cement thickness on the bond strength of tooth-colored posts to root dentin after thermal cycling.
Egilmez F et al. 

5. One year effect of chlorhexidine on bonding of fibre-reinforced composite root canal post to dentine.
Lindblad RM et al. 

6. Effect of plunger diameter on the push-out bond values of different root filling materials.
Nagas E et al. 

7. Does the surface treatment affect the bond strength of various fibre-post systems to resin-core materials?
Cekic-Nagas I et al. 

8. Effect of chlorhexidine on initial adhesion of fiber-reinforced post to root canal.
Lindblad RM et al. 

Zaitter S et al. 

10. Effects of pretreatment and thermocycling on bond strength of resin core materials to various fiber-reinforced composite posts.
Bitter K et al. 

11. Microtensile bond strength of resin-post interfaces created with interpenetrating polymer network posts or cross-linked posts.
Mannocci F et al. 

Abo El-Ela OA et al. 

13. Is a “flexible” glass fiber-bundle dowel system as retentive as a "rigid" quartz fiber dowel system?
Al-Tayyan MH et al. 

Le Bell-Rönnlöf AM et al. 

15. Effect of silanization on bond strengths of fiber posts to various resin cements.
Bitter K et al. 

Mannocci F et al. 

17. Bonding of fibre-reinforced composite post to root canal dentin.
Le Bell AM et al. 

Le Bell AM et al. 
Loading performance of endodontically treated teeth reinforced by everStickPOST

Many studies showed a significant increase in the fracture resistance of restored teeth when the individually formed fibre posts were adapted closely to the canal walls. When using everStickPOST, it is possible to fill large and irregular root canals more efficiently than with a single, prefabricated centrally positioned post.

1. In vitro fracture resistance of premolar teeth restored with fibre-reinforced composite posts using a single or a multi-post technique.
   Fráter M et al.

   Fráter M et al.

3. Fracture resistance of endodontically restored, weakened incisors.
   Cauwels RG et al.

   Cauwels RG et al.

5. Load-bearing capacity of human incisor restored with various fiber-reinforced composite posts.
   Le Bell-Rönnlöf AM et al.

6. High volume individual fibre post versus low volume fibre post: the fracture load of the restored tooth.
   Hatta M et al.

7. Fracture strength of endodontically-treated teeth restored with post and cores and composite cores only.
   Ozcan M, Valandro LF.

8. Fracture resistance and failure modes of endodontically treated human teeth restored with four different post-core systems.
   Yang Z et al.

   Qiufie Xie et al.

    Abo El-Ela OA et al.

    Garoushi S et al.
    J Dent. 2007 Sep;35(9):731-6.

    Wiskott HW et al.

    Fokkinga WA et al.

14. Flexural properties of fiber reinforced root canal posts.
    Lassila LV et al.
Clinical performance of everStickPERIO

Many clinical studies and reports demonstrate the merits of using everStickPERIO splints in stabilising periodontally affected teeth. Patient’s acceptance of the treatment is high and splints are considered durable, comfortable, aesthetic and easy to maintain. In addition, everStickPERIO splints do not hinder the individual and professional oral hygiene.

1. Evaluation of fiber reinforcement composites in restoring lower dentition defect and fixing loose teeth for chronic periodontitis.
Wu XY, Zhong Q.

2. Evaluation of the fiber-reinforced composite periodontal splint on fixing loose teeth with severe periodontitis.
Xu J et al.

3. The Use of Fibre Reinforced Composites (Frcs) in Periodontal Splinting & the Natural Tooth Pontic (NTP) in the Management of Advanced Periodontal Disease.
Keer I.
Smile Dental Journal 2013;8:32-36.

4. Pilot study of unidirectional E-glass fibre-reinforced composite resin splints: up to 4.5-year clinical follow-up.
Kumbuloglu O et al.

5. Rehabilitation of advanced periodontal problems by using a combination of a glass fiber-reinforced composite resin bridge and splint.
Kumbuloglu O et al.

6. Clinical investigation of the fiber-reinforced composite periodontal splint (FRC) on fixing the aged loosen teeth.
Zhang Yi, FU Zhi-yi-ing
Chinese Journal of Conservative Dentistry,2005-07

7. Effect of occlusal therapy with FRC splint on periodontal parameters in maintenance phase.
Vályi P et al.
Evaluation of two kinds of periodontal stabilization splint on fixing the labial loosen teeth
Zhang Yi, FU Zhi-yi-ing

Sewón LA et al.
Literature findings support the use of bidirectional fibre reinforcement (everStickNET) to increase the load bearing capacity of restorations. everStickNET has a beneficial effect on the failure mode and thereby on the re-restorability in case of fracture. A number of authors stated that everStickNET is also a suitable material to repair veneers.


Marginal adaptation of everStickNET reinforced restorations

Combination of everStickNET with flowable composite helps to reduce microleakage in adhesive composite restorations and shows a better marginal adaptability for veneer restorations.


Bonding performance of everStickNET

Using everStickNET at the adhesive interface significantly improves the shear bond strength of resin composite to dentin or metal substrates.

Color stability of everStickNET restorations

Incorporation of everStickNET fibres did not alter the translucency of the composite resins and everStickNET restorations demonstrated clinically acceptable colour change after ageing.

1. Effect of water storage on the translucency of silorane-based and dimethacrylate-based composite resins with fibres.
   Ozakar Ilday N et al.

2. Effect of fibers on the color changes and stability of resin composites after accelerated aging.
   Tuncdemir A, Aykent F.
   Dent Mater J 2012; 31:872-78.
Clinical performance of everStickORTHO retainers

Clinical studies and reports revealed that the application of everStickORTHO glass fibre reinforcements for orthodontic lingual retention is a practical alternative to conventional retainers used in orthodontic treatment. Authors stated that everStickORTHO is clinically easy to handle and can be precisely adjusted to the dental arch.

1. Clinical Success of Fiber-reinforced Composite Resin as a Space Maintainer.
   Kirzioğlu Z et al.

2. Two-year survival analysis of twisted wire fixed retainer versus spiral wire and fiber-reinforced composite retainers: a preliminary explorative single-blind randomized clinical trial.
   Sobouti F et al.

   Wu HM et al.

   Sfondrini MF et al.

5. Bonded orthodontic retainer and fixed partial denture made with fiber reinforced composite resin.
   Kumbuloglu O et al.

6. Application of fiber-reinforced composite as fixed lingual retainer.
   Liu Y.
   Chinese.

   Subramaniam P, et al.

   Kargul B, et al.

   Aydin MY, Kargül B.
In vitro comparison between everStickORTHO and stainless steel orthodontic retainers

Laboratory findings suggest that fibre-reinforced composite retainers with everStickORTHO may be an effective option for orthodontic retention. Hence, everStickORTHO can be considered a viable aesthetic alternative for full-size stainless steel wires. Furthermore, several authors declared that fibre-reinforced composite space maintainers may be a clinically acceptable and expedient alternative to the conventional band-loop appliances.


everStick®C&B
Anterior Bridge

Measure the length of fibre needed
Cut the fibre inside the silicone
Clean the teeth with pumice and water
Etch the teeth for 45-60 seconds
Bond the etched area and light-cure
Apply a flowable composite; do not light-cure
Position the fibre on top of the flowable

Spread the fibre on the surface of the first tooth
Light-cure while protecting the rest of the fibre
Bend the centre of the fibre labially to support the pontic, and hold it in position. Do not light-cure.
Spread the fibre on the surface of the second tooth, while keeping the labial curvature. Light-cure the complete structure.
Add a transverse fibre occlusally, cover with flowable & light-cure
Layer the pontic with composite
Finish and check the occlusion

everStick®POST

Initial situation
Prepare the space for the post
Measure the length needed
Choose the size, and cut out the post from the silicone
Shorten the post to the desired length
Fit the post inside the root canal
Taper the post if necessary

Place the post inside the root canal
Fill the canal with shorter posts if needed, and condense them laterally
Use a dual-cure composite luting for the cementation
Insert the condensed post into the canal
Light-cure for at least 40 seconds
Continue the build-up with composite & light-cure
Final situation

everStick®PERIO

Initial situation
Measure the length of fibre needed
Cut the fibre bundle inside the silicone
Clean the teeth with pumice and water
Etch the teeth for 45-60 seconds
Bond the etched area and light-cure
Apply a flowable composite; do not light-cure

Position the fibre on top of the flowable
Spread the fibre on the surface of the first tooth
Light-cure while protecting the rest of the fibre
Proceed in the same way for each tooth
Intermediate result after light-curing
Cover the fibre completely with a flowable & light-cure
Final situation
everStick®NET

- Measure the length needed
- Cut the fibre net at the desired length
- Cut out two or three fibre strips of different widths
- Clean the teeth with pumice and water
- Etch the teeth for 45-60 seconds
- Bond the etched area and light-cure
- Apply a flowable composite, do not light-cure!

- Remove the fibre net from its protective paper
- Position one fibre strip at a time
- Light-cure 5-10 seconds per tooth while protecting the rest of the fibre from the light
- Apply a thin layer of light-curing resin on the cured strip.
- Position the second strip on top, and light-cure tooth per tooth.
- Repeat the same procedure for the third fibre strip.
- Cover the cured fibre net with flowable composite and light-cure for 40 seconds per tooth
- Final situation after finishing the fibre splint

everStick®ORTHO

- Initial situation
- Measure the length of fibre needed
- Cut the fibre bundle inside the silicone
- Clean the teeth with pumice and water
- Etch the teeth for 45-60 seconds
- Bond the etched area and light-cure
- Apply a flowable composite, do not light-cure!

- Position the fibre on top of the flowable
- Spread the fibre on the surface of the first tooth
- Light-cure while protecting the rest of the fibre
- Proceed in the same way for each tooth
- Intermediate result after light-curing
- Cover the fibre completely with a flowable & light-cure
- Final situation
Discover more on Youtube!
https://www.youtube.com/user/GCEuropeProducts/search?query=everStick

Check our App!

Restorative Dentistry Guides

In GC’s Restorative Dentistry Guides, you can find more information regarding the use of everStick products as well as other restorative materials, together with step-by-step procedures and technique tips!