

esthetic.line

Pekkton® ivory

High performance polymer for definitive aesthetic restorations on implants.





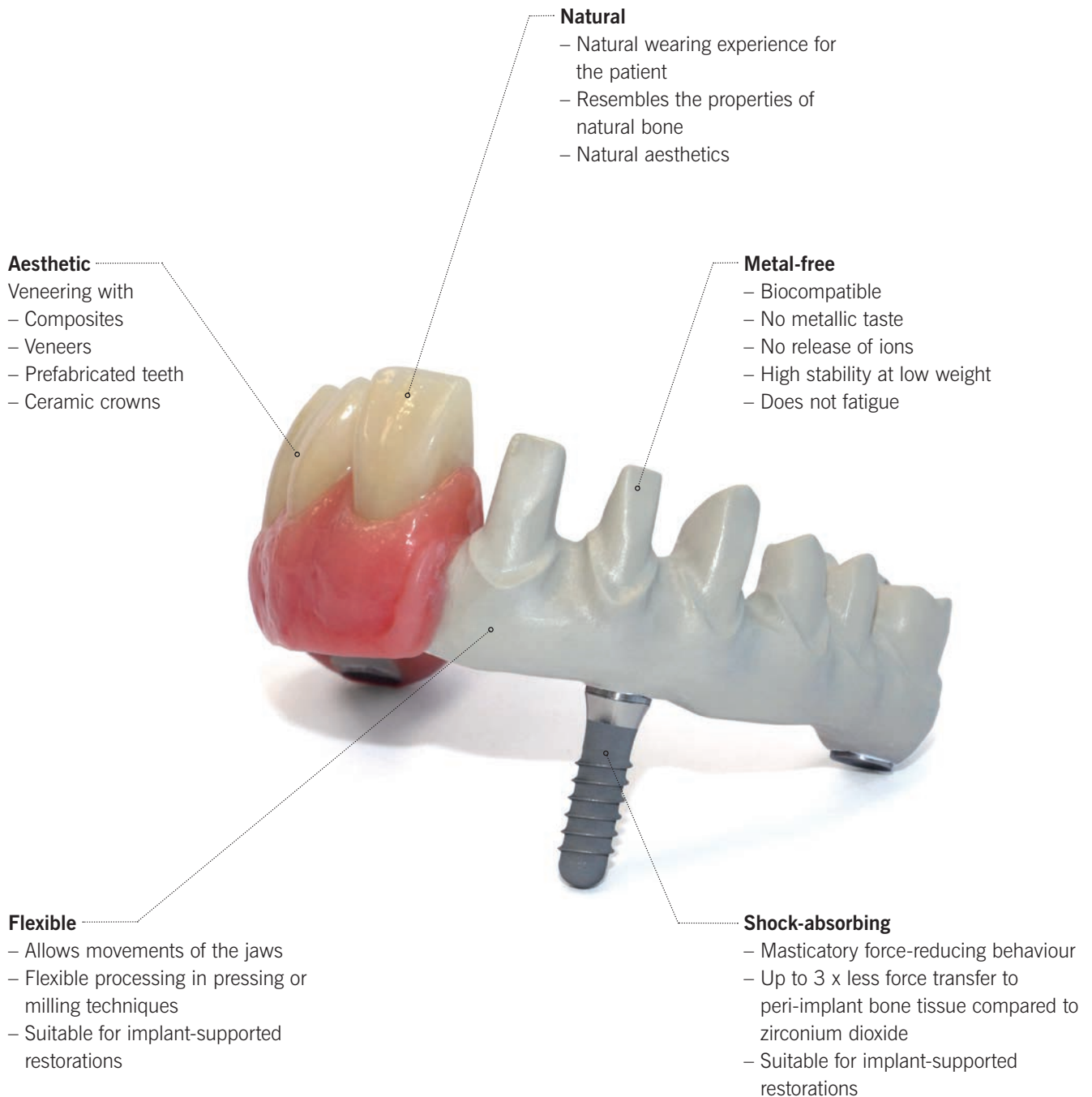


Break new ground with Pekkton® ivory, join the new world of materials.

The material PEKK, the top material among the thermoplastic polyaryletherketones, is available exclusively from Cendres+Métaux under the brand name Pekkton® ivory. The solution for definitive, aesthetic and patient-friendly restorations.

Pekkton[®] ivory.

Five convincing reasons why Pekkton[®] ivory should be your restorative material of choice.



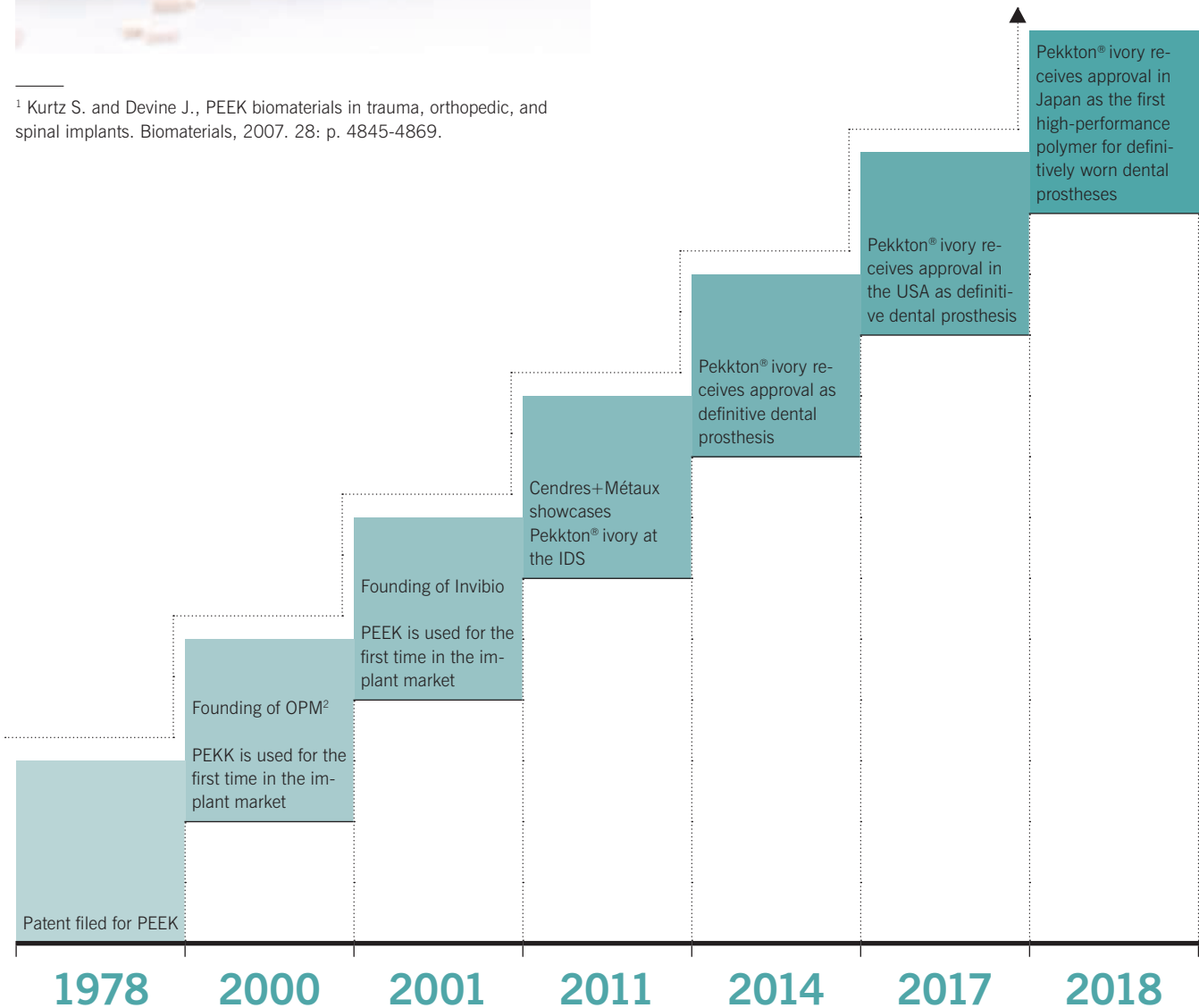
History.

A material well-known in medical engineering finds its way into the world of dentistry.



The PEKK material used for Pekkton® ivory originates from the PAEK (PolyArylEtherKetone) materials family. High-performance polymers have found their way into orthopaedics and traumatology since the 1980s.¹ They are used as knee, spinal or craniomaxillofacial implants due to their bone-like behaviour. Since 2011, PEKK has also been used in the dental market. Based on the semi-crystalline, implantable base material, Cendres+Métaux offers Pekkton® ivory exclusively as a framework material for dental applications.

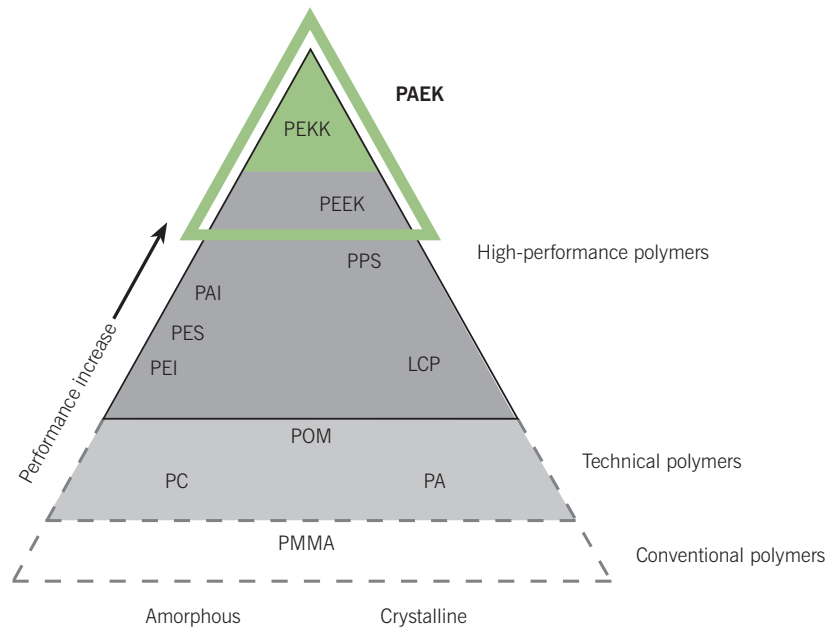
¹ Kurtz S. and Devine J., PEEK biomaterials in trauma, orthopedic, and spinal implants. *Biomaterials*, 2007. 28: p. 4845-4869.



² Oxford Performance Materials, USA

The PAEK family.

From a chemical perspective.

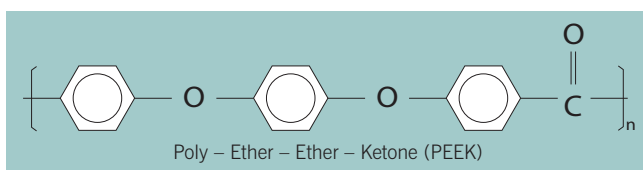
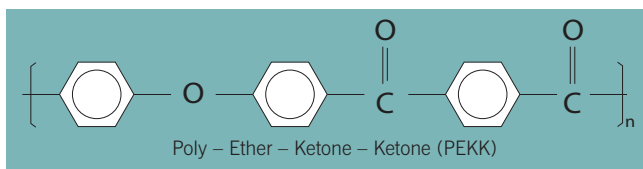


The PAEK family at the top of the performance pyramid

The high-performance polymers PEEK and PEKK both belong to the family of polyaryletherketones, referred to in short as PAEK.

PAEKs are high-performance thermoplastics which demonstrate high strength, stiffness and resistance to hydrolysis over a wide temperature range and are suitable for extreme loads. When processing thermoplastics, only the shape is changed, but not their chemical properties. Furthermore, the material shows no porosity and is free of monomers.

PEKK is positioned at the top of the polymer pyramid and is available as base material in semi-crystalline and amorphous structure. Whereas PEEK, which is based on an amorphous structure, behaves flexibly, PEKK, which is based on a crystalline structure, is distinguished by high strength values. Pekkton® ivory is based on a semi-crystalline structure and therefore exhibits very good mechanical properties and high flexibility.



The chemical structure of PEKK

Owing to the double ketone bond in the chemical structure, the PEKK material offers very good mechanical properties. For example, PEKK has an up to 80% higher compressive strength than PEEK.

Main advantage PAEK: double ketones

Mechanical properties.

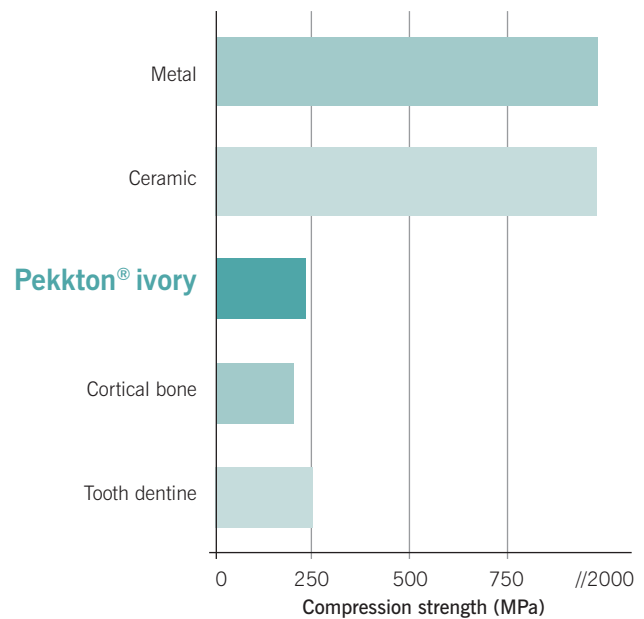
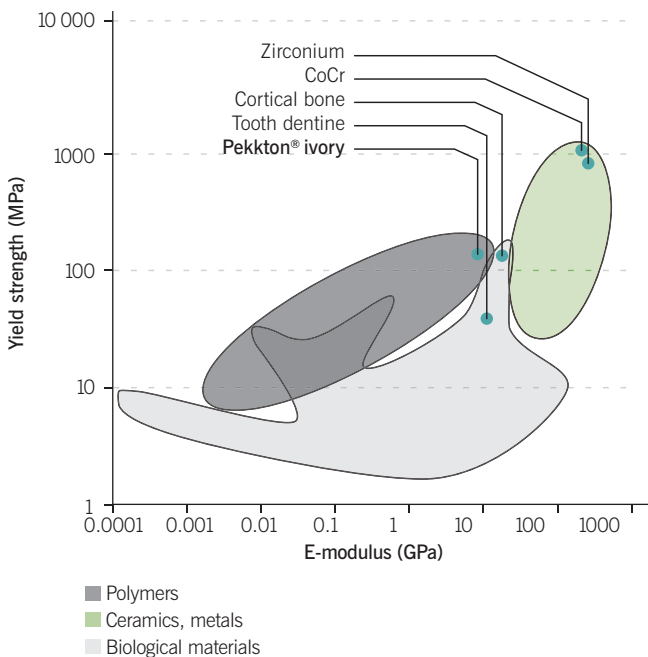
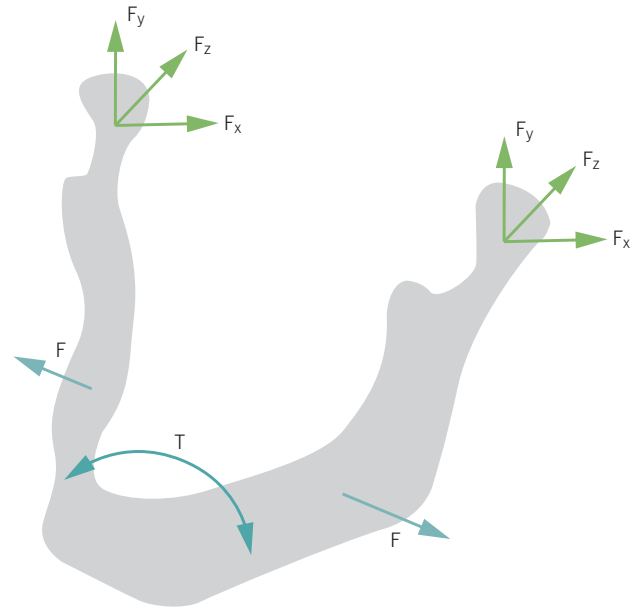
Pekkton[®] ivory – a polymer resembling biological materials.

Masticatory effect on the jaw bone.

The lower jaw bone in particular is exposed to various tensile and compressive forces. Add to this, the natural torsion due to the comminution of food.³

The use of rigid materials for prosthetic solutions such as zirconium ceramics or metals, limits the natural mobility of the jawbone and transfers the forces to the implants, the dentures or even the bone tissue.

This can have a negative effect on the osseointegration of the implants and the physiological movement patterns.



Biomimetics

Pekkton[®] ivory closely resembles the properties of human bone tissue.

Compression strength

In terms of compression strength Pekkton[®] ivory is comparable to tooth dentine and bone substance.

The use of high-performance polymers instead of typical metallic or ceramic materials is intended to support better biomechanical integration.

Mechanical properties.

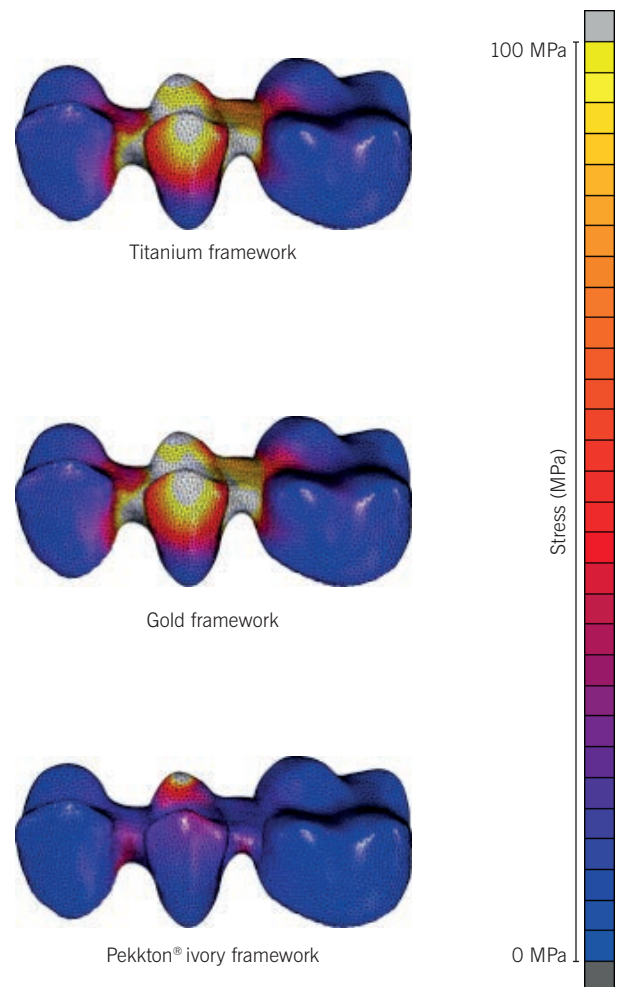
A comparison with conventional materials.

Property	Natural bone tissue	Pekkton® ivory	PEEK non-filled	PEEK filled	PMMA	Titanium (Grade 5)	Zirconium (TZP-A)
Compression strength	280 MPa	246 MPa	118 MPa	n.a.	n.a.	970 MPa	2,000 MPa
Bending strength	n.a.	200 MPa	170 MPa	185 MPa	n.a.	n.a.	1,200 MPa
E-modulus	2-14 GPa	5.1 GPa	4.0 GPa	4.8 GPa	3 GPa	110 GPa	210 GPa
Yield strength	70 MPa	115 MPa	100 MPa	n.a.	n.a.	1,100 MPa	n.a.
Density	n.a.	1.4 g/cm ³	1.3 g/cm ³	1.4 g/cm ³	1.2 g/cm ³	4.5 g/cm ³	6.05 g/cm ³
Water absorption	n.a.	8.7 µg/mm ³	5.0 µg/mm ³	6.5 µg/mm ³	19.0 µg/mm ³	–	n.a.
Solubility	n.a.	0.2 µg/mm ³	0.5 µg/mm ³	0.3 µg/mm ³	1-1.4 µg/mm ³	–	n.a.
Hardness HV	n.a.	33 HV	20 HV	30 HV	18 HV	300-400 HV	1200 HV
Hardness (DIN EN ISO 2039-1)	n.a.	252 MPa	–	–	–	–	–

The data given are taken from various brochures of different manufacturers. The test methods used may differ.

Behaviour of different framework materials under a load of 500 N and an inclination of 30°.

Traditionally with hard materials, the stress caused by the masticatory force accumulates selectively. In the case of Pekkton® ivory, the loads are distributed throughout the framework. As Pekkton® ivory is a comparatively «soft» material, it is essential to observe the minimum connector strengths described in detail in the instructions for use. (www.cmsa.ch/docs)



Mechanical properties.

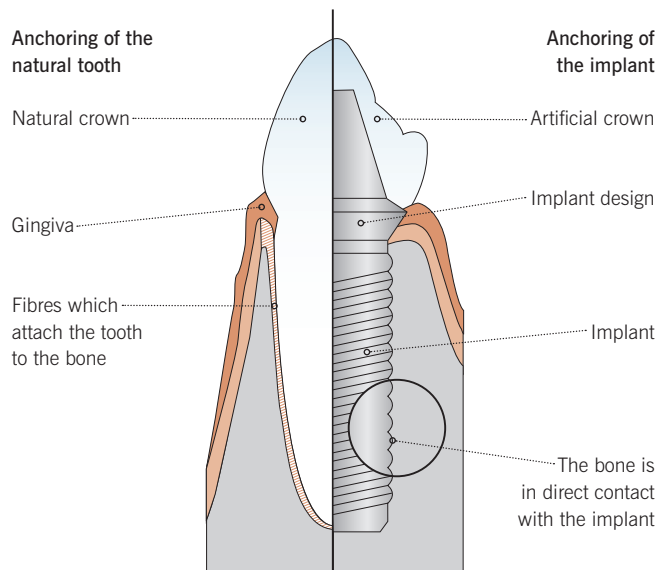
Shock absorption.

Masticatory force-absorbing behaviour

An interesting property of the Pekkton® ivory material is the masticatory force-absorbing behaviour. Natural teeth are anchored in the alveolus by Sharpey's fibres and allow masticatory forces to be absorbed in a natural way.

As implants are connected directly to the bone, this dampening property is not present. When conventional and hard materials are used for prosthetic solutions, masticatory force peaks can therefore no longer be dampened and can be transferred directly to the peri-implant bone tissue.

This can have a negative effect on osseointegration or the antagonist. Due to the E-modulus, which closely resembles that of natural tissue, and the compressive strength of Pekkton® ivory, the masticatory forces acting on the peri-implant bone tissue can be reduced significantly.



In cooperation with the University of Genoa (Italy) different materials were tested and compared with the values of ZrO₂.

Material	Type of material	Mean force [N] (SD)	Force difference to zirconium dioxide (%)
Procera ZrO ₂	Zirconium dioxide	641.8 (6.8)	--
Empress ₂	Glass ceramic	484.5 (5.5)	-24.51
Ney-Oro CM	Gold alloy	344.8 (5.7)	-46.28
Finesse	Glass ceramic	344.5 (3.5)	-46.32
TRINIA	Glass-fibre reinforced composite	250.2 (7.9)	-61.02
Adoro	Composite	236.0 (4.2)	-62.23
Veneered Pekkton	PAEK & composite	211.6 (12.4)	-68.03
Pekkton	PAEK	194.4 (10.5)	-69.71
Signum	Composite	187.4 (6.7)	-70.80

Examples of applications.

Pekkton® ivory in use.

Pekkton® ivory was developed as an alternative, metal-free framework material. The material can be used to fabricate classical crowns and bridges on natural teeth. Due to the masticatory force-absorbing properties of Pekkton® ivory, the material is also frequently used for implant-supported prostheses. For example, crowns, bridges or individual abutments bonded to titanium bases can be covered with Pekkton® ivory.

The high performance polymer can also be used for removable dentures. Examples for this are prosthesis bases on construction elements or prosthesis reinforcements.

Pekkton® ivory can be aesthetically veneered with flowable and/or modelling composites, acrylics, prefabricated denture teeth, veneers or all-ceramic crowns.

For detailed information on indications and contraindications, please consult the current instructions for use. (www.cmsa.ch/docs)

Veneering Pekkton® ivory

You can veneer Pekkton® ivory with composites, veneers, prefabricated teeth or ceramic crowns of your choice.



Veneering with composite.



Veneering with prefabricated veneers.



Veneering with ceramic crowns.

Processing.

Digital milling and pressing.

Digital milling

Pekkton® ivory can be milled digitally. The Cendres+Métaux milling centre would be pleased to assist you.



Pressing

You wish to process the new material, but do not have the opportunity to follow the digital approach? Keep value creation in your own laboratory and press your Pekkton® ivory framework.







Some interesting case studies with Pekkton® ivory are illustrated in the following. Pekkton® ivory is a reliable material of choice.

Clinical cases.

Case 1

Complete restoration: removable full denture in the maxilla reinforced with Pekkton® ivory. A Pekkton® ivory prosthesis on 5 implants in the mandible.



Clinician: Dr. med dent. N. Chirazi (Lenzerheide/Lai, CH)
Technician: Robert Arvai, Ardenta Dental Labor (Chur, CH)

Case 2

Removable prosthesis with a Pekkton® ivory reinforcement, supported on CM LOC.

Individual single crowns made of Livento® press and Soprano® 10.

This work received the «Golden Brush» award in 2018 from the Swiss Society for Reconstructive Dentistry (SSRD).



Clinician: Dr. med dent. Manrique Fonseca (University Berne, CH)
Technicians: Erwin Eitler and Gabriel Willauer, Zahnmanufaktur Zimmermann und Maeder (Berne, CH)

Case 3

Pekkton® ivory bridge on implants with cemented Livento® press and Soprano® 10 crowns.



Clinician: Dr. Abdelhadi (Amman, Jordan)

Technician: Amin Hassouneh SDL (Amman, Jordan)

Case 4

Pekkton® ivory complete restoration in the mandible and maxilla on implants.










Clinician: Dr. Al Tarawneh (Jordan)

Technician: Amin Hassouneh SDL (Amman, Jordan)

Portfolio.

The essence of success.

Image	Description	Art. No.
	Pekkton® ivory milling blank Ø 98.5/16 mm (with steps)	01060011
	Pekkton® ivory milling blank Ø 98.5/20 mm (with steps)	01060020
	Pekkton® ivory milling blank Ø 98.5/24 mm (with steps)	01060022
	Pekkton® ivory milling blank Ø 95/16 mm (compatible with Zirkozahn®)	01060028
	Pekkton® ivory milling blank Ø 95/20 mm (compatible with Zirkozahn®)	01060030
	Pekkton® ivory milling blank Ø 95/24 mm (compatible with Zirkozahn®)	01060032
	Pekkton® ivory – press ingots / 10 p.	01060003
	Disposable press-stamp (Ø 12 mm)/50 p.	08000626
	Disposable press-stamp (Ø 26 mm)/20 p.	08000627
	PEKKpress muffle former set 200 g	08000628
	PEKKpress muffle former set 600 g	08000629
	CM-20 investment (50 x 160 g)	083 872
	Liquid 1L	083 739
	PEKKpress – pressing unit	70202393
	PEKKtherm – temperature stabilisation and melting furnace	70202394