acs®
knee system
advanced coated system

implantcast

Product Portfolio

Content

ACS®- advanced coated system

History

The clinical experience for decades of years makes the ACS®-system to a worldwide proven knee joint replacement. Beginning with the introduction of the ceramic coated primary mobile-bearing system continuous design optimizations were carried out in collaboration with several clinical partners. The developments of the fixed bearing and the unicondylar knee joint replacement, manufactured from an established orthopaedic implant material, followed. Finally the system is complemented by multiple options for revision cases.

Flexibility

The ACS®-system offers an optimal solution individually for every patient, whether mobile- or fixed-bearing version, for primary interventions to the point of complex revision cases. The components are each available as cemented or cementless as well as coated or uncoated version. The same geometry of the articulating surface of the femoral component from uni to revision, as well as an identical inner contour of the femoral component from primary to revision allow for a high degree of intraoperative flexibility and for maximum preservation of bone stock. The instrumentation guarantees a simple, intuitive surgical technique.

Modularity

The ACS®-system -a flexible, versatile system- has various femoral and tibial sizes available for an excellent fit of the components and an optimal bone coverage. Due to its modularity the system offers manifold options. The primary mobile-bearing and fixed-bearing tibia allow for the use of stem extensions. For revision cases a specific mobile-bearing SC tibial component is available, whereas the identical fixed-bearing tibia can be used in primary as well as revision cases. For the compensation of bone defects, femoral as well as as tibial spacer of different thicknesses are available. Femorally and tibially it is possible to use stems of several lengths and different diameters as well as offsets via appropriate adapters.

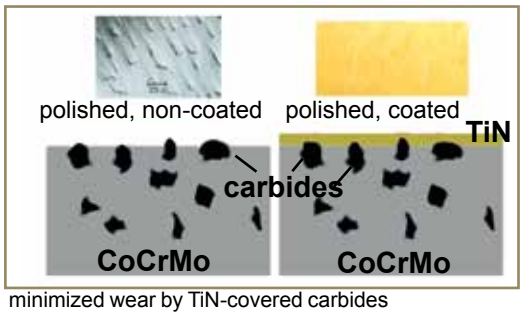
ACS®- from uni to revision

The ceramic TiN-coating

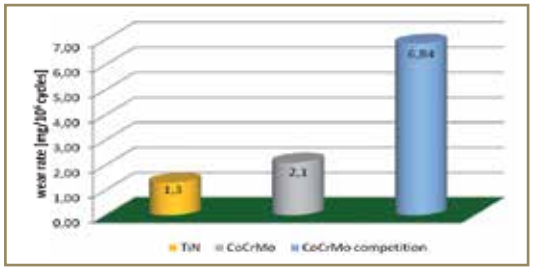
Due to several advantages the femoral and tibial components of the ACS®-system are offered by default coated with titanium nitride (TiN). That ceramic coating is applied to the implant components in high vacuum chambers using a specific arc vaporization technique, the PVD-process (physical vapour deposition). Thus the surface properties of the components are modified, but not the material properties and the biomechanical functionality of the component itself. The ceramic surface coating is wear reducing, allergy protective and biocompatible.

Wear reduction by TiN-coating

A limiting factor for the life time of a knee joint replacement is its motional and load dependent wear after implantation, which comes along with the release of wear debris. During the manufacturing of the cobalt-chromium alloy carbides develop. Carbides, characterized by a huge hardness, partly protrude from the surface and result in an increased wear of the articulating partner. Carbides at the implant surface are covered by the much harder TiN-coating. That results in a highly decreased wear of the articulating partner[1]. A high wettability of the component supports a low-friction articulation. The adhesive strength of the coating is that huge that even particles of bone cement are temporarily tolerated without problems in the tribological pairing. Extremely hard foreign particles merely scratch the surface, which however do not result in delamination of the coating[2].



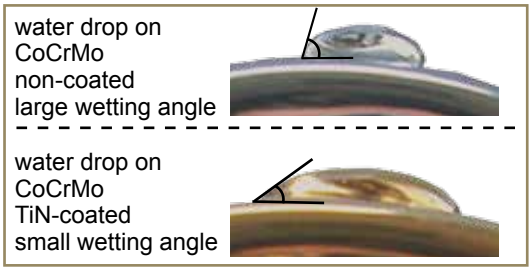
minimized wear by TiN-covered carbides



wear test according to DIN ISO 14243[6,7]

TiN-coating with metal allergy

The femoral and tibial components of the ACS®-system, manufactured from cobalt chromium alloy, show a low content of nickel. For patients with metal allergy nickel is one of the most frequently allergy provoking metals besides chromium. The potential release of allergy provoking ions from the components is highly minimized by the TiN-coating[3]. The ion release through that coating is below the limit of detectability[5]. Therefore the TiN-coating on implant components is especially suitable for patients with sensitization to nickel, chromium or cobalt.[4]

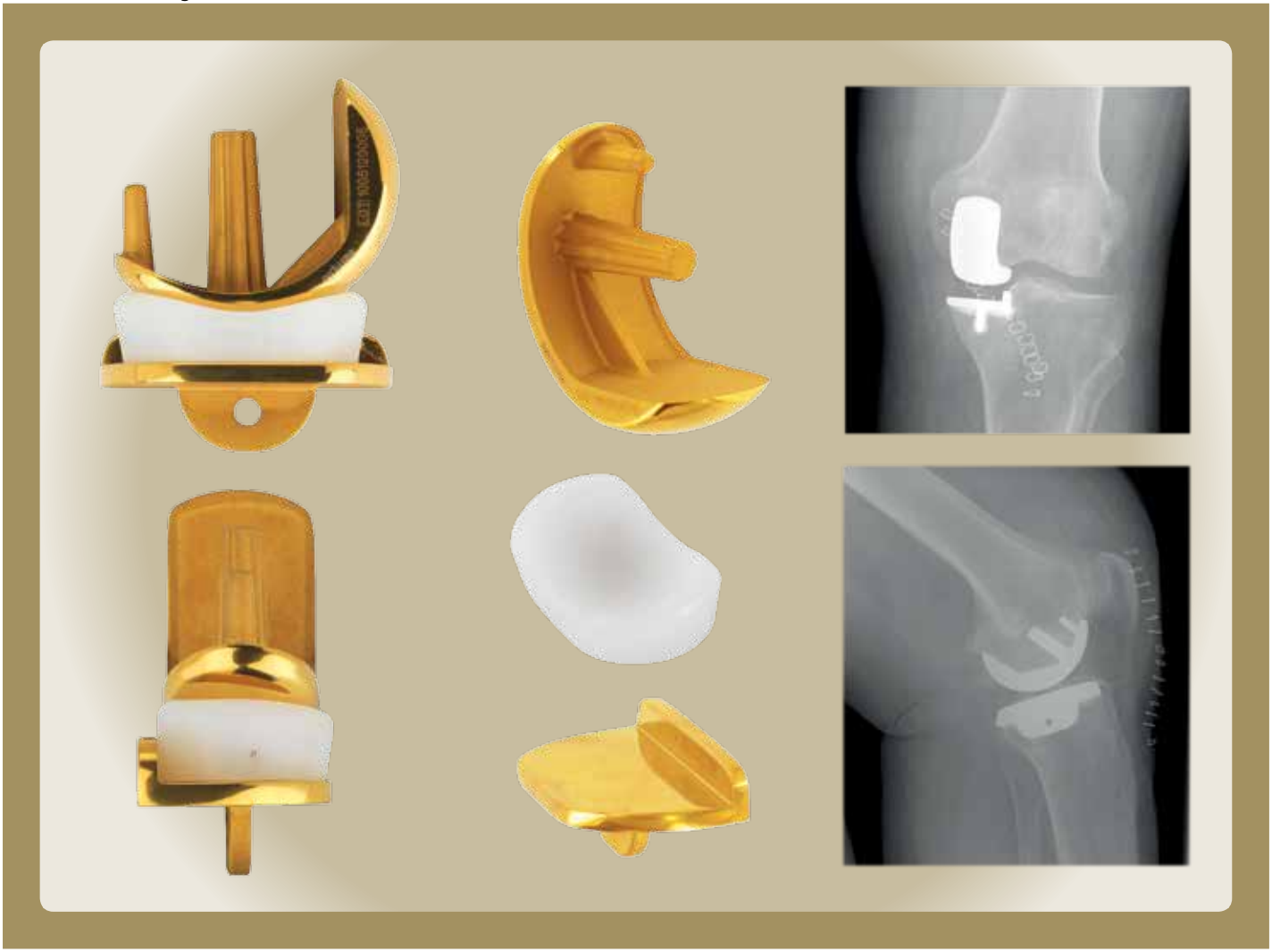


wettability of the ACS® femoral component

Characteristics of the TiN-coating

- excellent biocompatibility
- prevention for allergy patients
- 4-times increased hardness as cobalt-chromium alloy (degree of hardness >2400HV)
- high wettability with synovial fluid
- low-friction articulation
- chemical long-term stability
- extreme adhesion strength
- colour of coating: golden yellow
- thickness of coating: 5,5µm

ACS® Uni system



ACS® Uni

Description:
The *ACS® Uni* is a unicondylar knee system, which maintains near natural kinematics after perfect restoration of the joint line. The system is characterized by a high congruency between the femoral component and the mobile bearing polyethylene insert. The insert itself moves freely on the tibial component to retain natural kinematics of the knee joint.

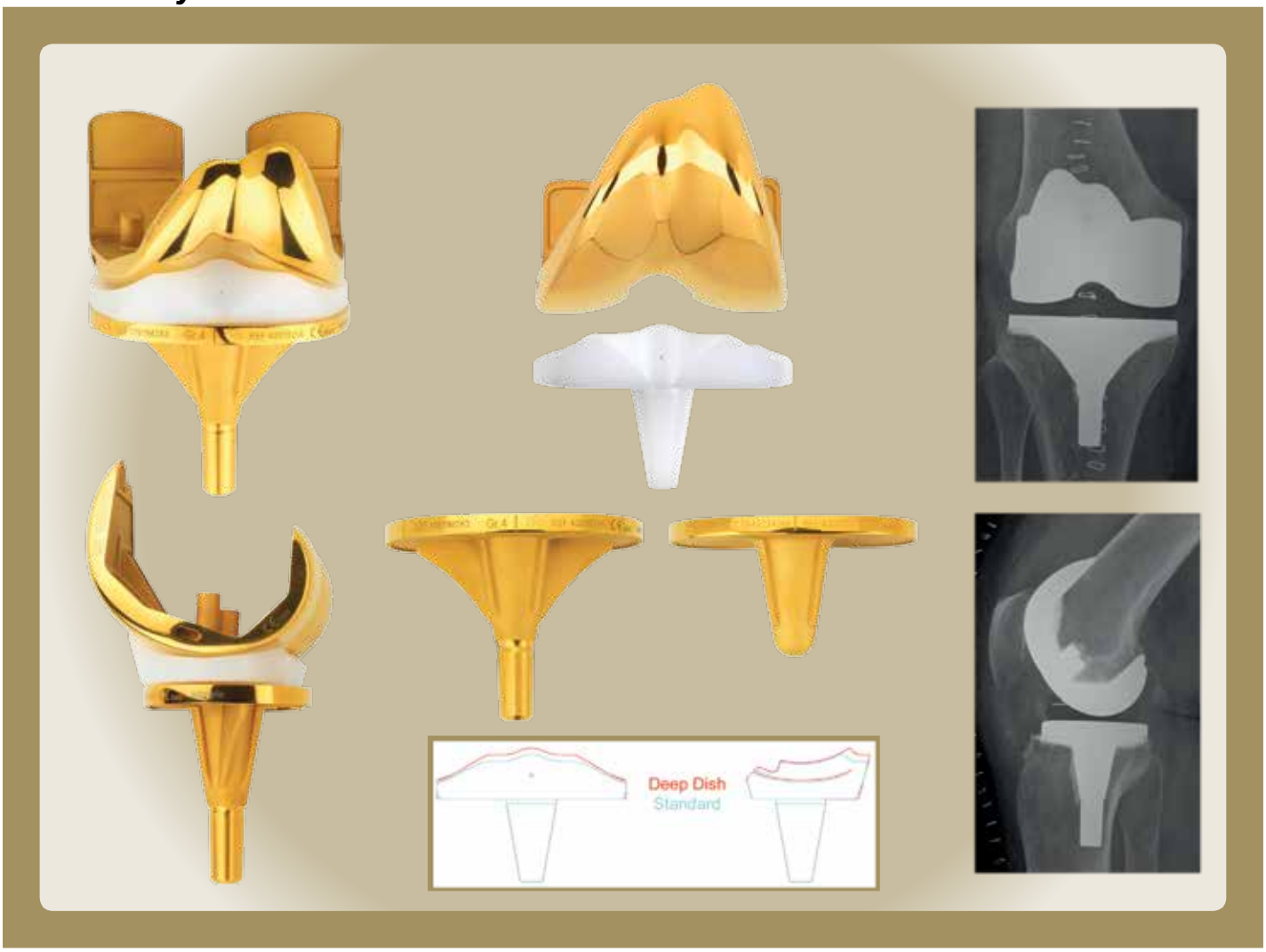
Indication:
unicompartmental osteoarthritis with the presence of intact ligaments

Product range:
cemented and cementless version
4 femoral sizes
4 sizes of PE-inserts in thicknesses from 4mm to 12mm
8 tibial sizes

Materials:
CoCrMo-alloy (femoral and tibial component)
UHMWPE (PE-insert)

Coating:
TiN-coating, cpTi-coating on inner part of cementless components

ACS® MB system



ACS® MB

Description:
The *primary ACS® MB system* is characterized by a large surface contact of the articulating components. The high congruency allows for optimal load distribution resulting in an increased longevity of the implant. There are PE-inserts of different congruency available, which can be combined with two different tibial components.

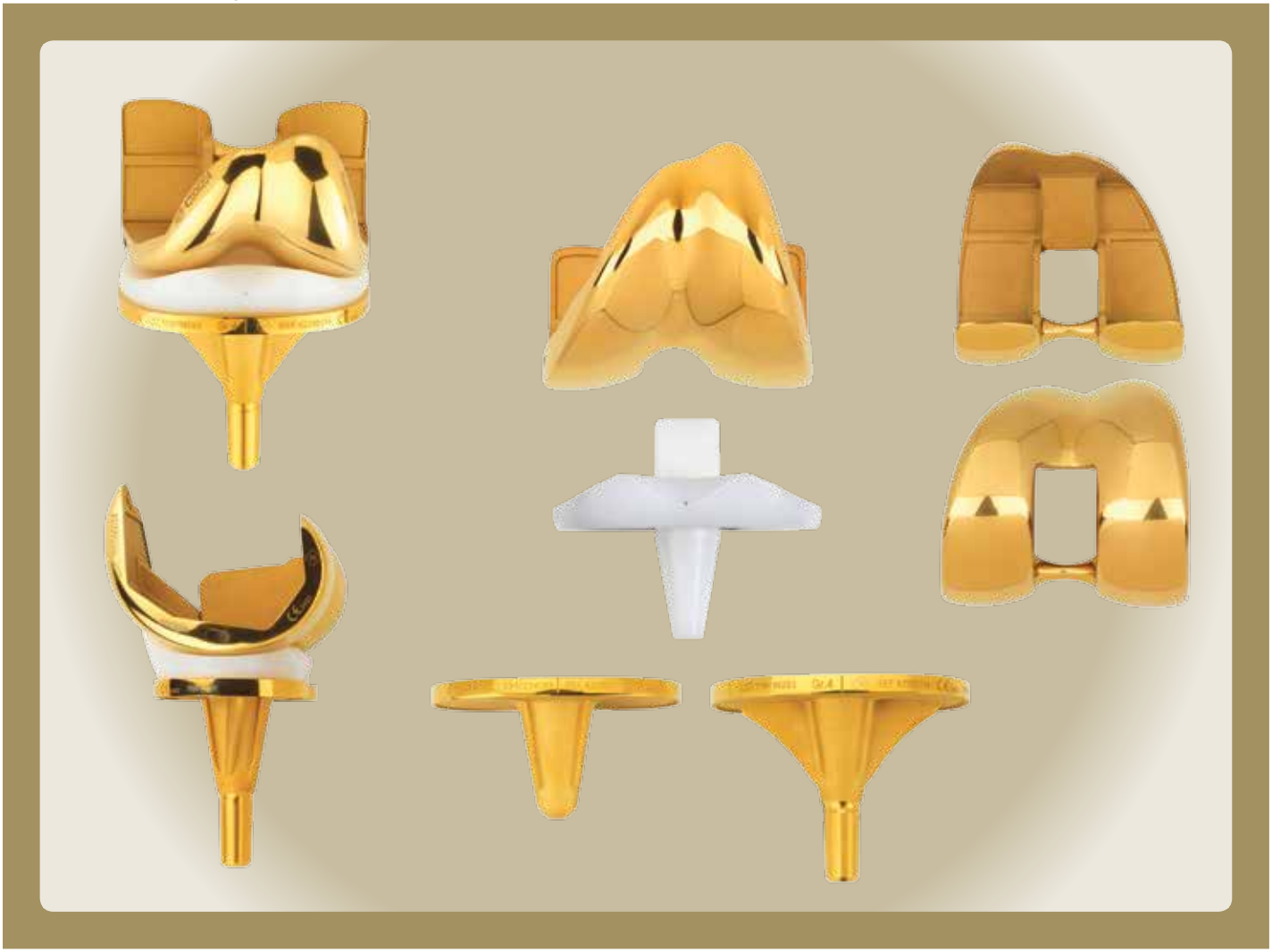
Indication:
bicompartmental osteoarthritis with concurrent loss/damage of the cruciate ligaments; preservation of the posterior cruciate ligament possible; intact collateral ligaments necessary.

Product range:
cemented and cementless version
12 femoral sizes
6 sizes of PE-inserts in thicknesses from 10mm to 20mm (two designs standard and deep dish
7 tibial sizes in designs standard and basic

Materials:
CoCrMo-alloy (femoral and tibial components)
UHMWPE (PE-inserts)

Coating:
TiN-coating, porous coating or cpTi/TCP-coating on surface of cementless components

ACS® MB PS system



ACS® MB PS

Description:
The *ACS® MB PS system* (PS - posterior stabilized) is used for the functional replacement of the posterior cruciate ligament. The presence of the femoral spindle and the PE-peg results in a posterior stabilization of the knee joint during articulation between femoral and tibial component. The PE-insert can be combined with both primary tibial components.

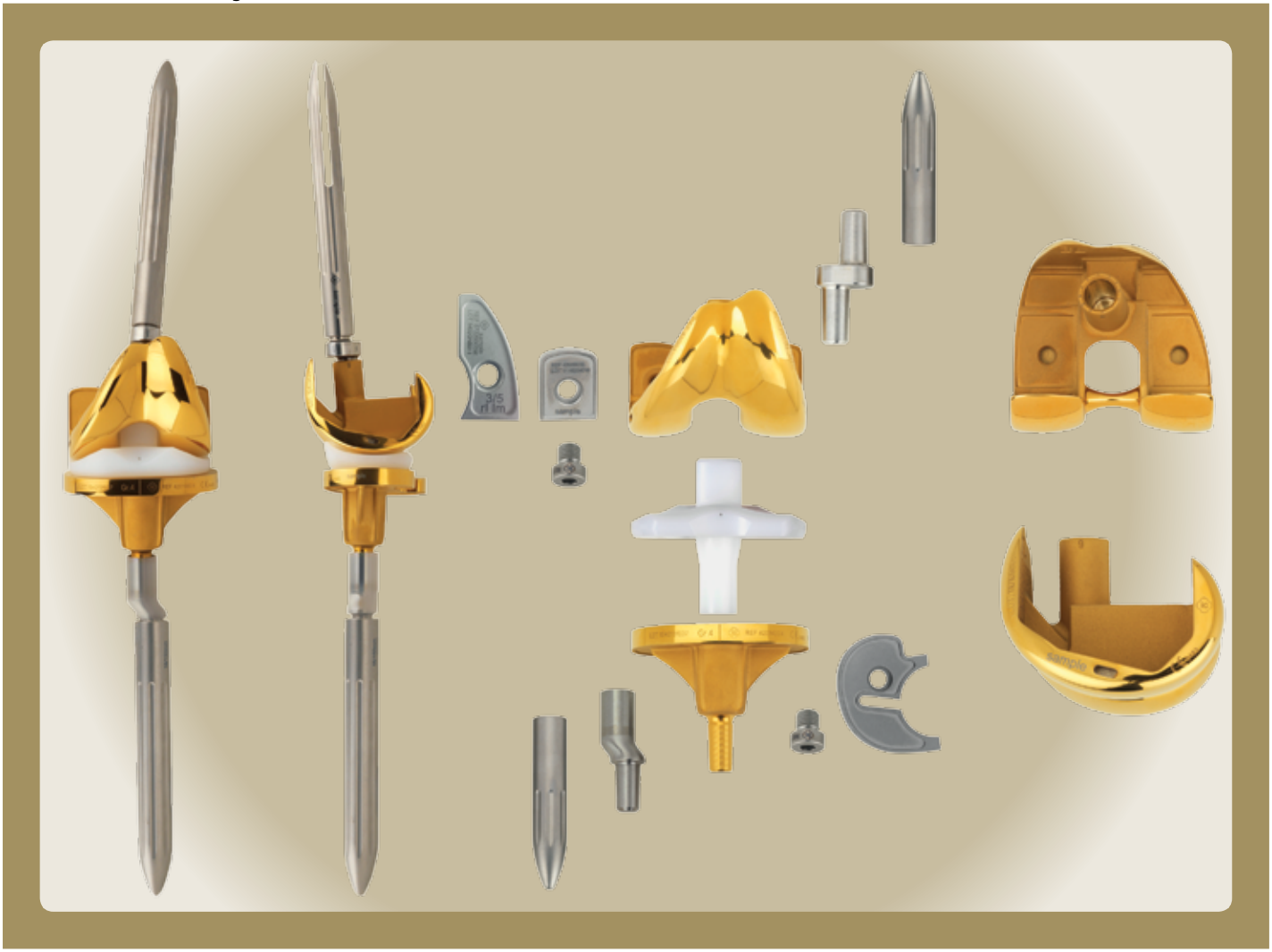
Indication:
bicompartmental osteoarthritis with concurrent loss/damage of both cruciate ligaments; intact collateral ligaments necessary.

Product range:
cemented and cementless version
11 femoral sizes
5 sizes of PE-inserts in thicknesses from 10mm to 20mm
7 tibial sizes in designs standard and basic

Materials:
CoCrMo-alloy (femoral and tibial components)
UHMWPE (PE-inserts)

Coating:
TiN-coating, porous coating on surface of cementless components

ACS® MB SC system



ACS® MB SC

Description:
The *ACS® MB SC system* (SC - semi-constrained) offers the possibility to connect stem extensions with the femoral and tibial component via offset adapters and to compensate for bone defects with spacers (augments). The PE-peg is guided in the femoral box and stabilized by the posterior femoral spindle during articulation between femoral and tibial component.

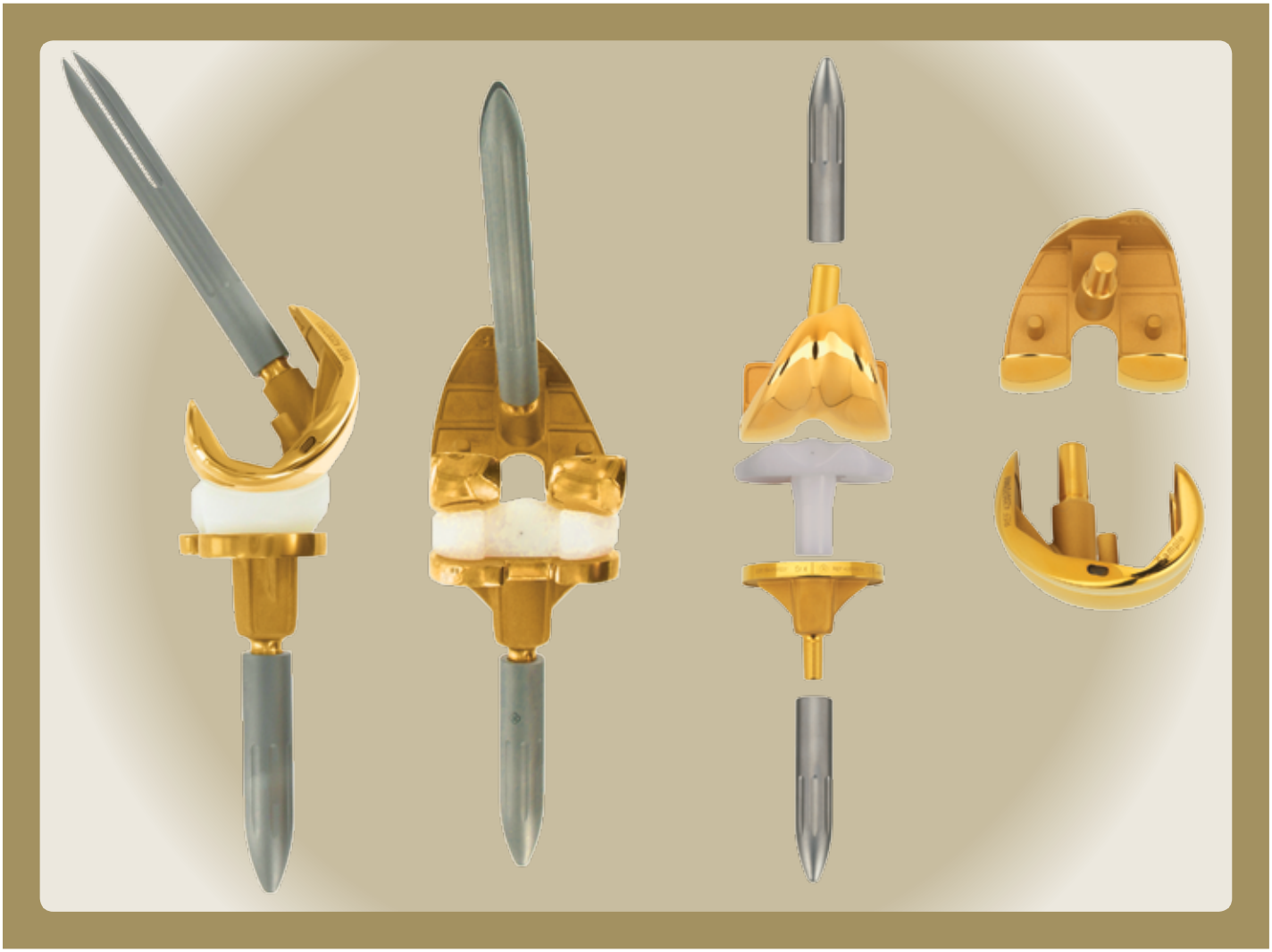
Indication:
revision of primary knee joint replacement with loss/damage of both cruciate ligaments and instability of the collateral ligaments with the presence of femoral and/or tibial bone defects.

Product range:
cemented and cementless version
6 femoral sizes
5 sizes PE-inserts in thicknesses from 10mm to 20mm
5 tibial sizes
offset adapter: femoral (0mm, 2mm, 4mm and 6mm); tibial (2mm and 4mm)
16 stems (Versions: uncoated and HA-coated); lengths: 100mm, 150mm and 200mm; Ø: 12-22mm
spacer: femoral (posterior and distal, 5mm and 10mm each); tibial (5mm and 10mm)

Materials:
CoCrMo-alloy (femoral and tibial components)
UHMWPE (PE-inserts)
$TiAl_6V_4$-alloy (stems, offset adapter and spacer)

Coating:
TiN-coating, porous coating on surface of cementless femoral and tibial components

ACS® LS femur and MB NC PE-insert



ACS® LS and MB NC PE-insert

Description:
The *ACS® LS femoral component* (LS - long stem) allows for the use of femoral stem extensions without additional stabilization of the knee joint. The femoral component can be combined with the primary MB PE-insert, the primary FB PE-insert as well as with the *MB NC PE-insert* (NC - non-constrained). The *MB NC PE-insert* can be used in cases of tibial revisions together with the MB SC tibial component.

Indication:
MB: bicompartmental osteoarthritis with loss/damage of both cruciate ligaments; intact collateral ligaments neccessary
FB: bicompartmental osteoarthritis with preservation of the posterior cruciate ligament (exception: PE-insert ultra also in case of loss/damage of the cruciate ligaments); intact collateral ligaments necessary

Product range:
LS: 4 femoral sizes (cemented version)
NC: 5 sizes PE-inserts in thicknesses from 10mm to 17,5mm

Materials:
CoCrMo-alloy (femoral component)
UHMWPE (PE-inserts)

Coating:
TiN-coating

ACS® FB system

ACS® FB

Description:
With the *primary ACS® FB system* the PE-insert is fixed to the tibial component via a snap-fit mechanism. There are PE-inserts of different congruency available, which allow for different mobility between femoral component and PE-insert.

Indication:
bicompartmental osteoarthritis with preservation of the posterior cruciate ligament (exception: PE-insert ultra also in case of loss/damage of the cruciate ligaments); intact collateral ligaments necessary

Product range:
cemented and cementless version
12 femoral sizes
5 sizes of PE-inserts in thicknesses from 10mm to 20mm (three designs: standard, hyperflex and ultra)
6 tibial sizes (cementless version with extension stem)

Materials:
CoCrMo-alloy (femoral and tibial components)
UHMWPE (PE-inserts)
crosslinked UHMWPE with vitamin E (PE-inserts)

Coating:
TiN-coating, porous coating on surface of cementless components

ACS® FB PS system

ACS® FB PS

Description:
The *ACS® FB PS system* (PS - posterior stabilized) is used for the functional replacement of the posterior cruciate ligament. The presence of the posterior femoral spindle and the PE-peg results in a posterior stabilization of the knee joint during articulation between femoral and tibial component.

Indication:
bicompartmental osteoarthritis with concurrent loss/damage of both cruciate ligaments; intact collateral ligaments necessary

Product range:
cemented and cementless version
11 femoral sizes
5 sizes of PE-inserts in thicknesses from 10mm to 20mm
6 tibial sizes (cementless version with extension stem)

Materials:
CoCrMo-alloy (femoral and tibial components)
UHMWPE (PE-inserts)
crosslinked UHMWPE with vitamin E (PE-inserts)

Coating:
TiN-coating, porous coating on surface of cementless components

ACS® FB SC system

ACS® FB SC

Description:
The *ACS® FB SC system* (SC - semi-constrained) offers the possibility to connect stem extensions with the femoral and tibial component via offset adapters and to compensate for bone defects with spacers (augments). The PE-peg is guided in the femoral box and stabilized by the posterior femoral spindle during articulation between femoral and tibial component.

Indication:
revision of primary knee joint replacement with loss/damage of both cruciate ligaments and instability of the collateral ligaments with the presence of femoral and/or tibial bone defects.

Product range:
cemented and cementless version
6 femoral sizes
5 sizes PE-inserts in thicknesses from 10mm to 20mm
5 tibial sizes
offset adapter: femoral (0mm, 2mm, 4mm and 6mm); tibial (2mm and 4mm)
16 stems (Versions: uncoated and HA-coated); lengths: 100mm, 150mm and 200mm; Ø: 12-22mm
spacer: femoral (posterior and distal, 5mm and 10mm each); tibial (5mm and 10mm)

Materials:
CoCrMo-alloy (femoral and tibial components)
UHMWPE (PE-inserts)
$TiAl_6V_4$-alloy (stems, offset adapter and spacer)

Coating:
TiN-coating, porous coating on surface of cementless femoral and tibial components

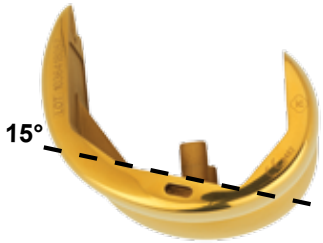
ACS®- Design Rationale

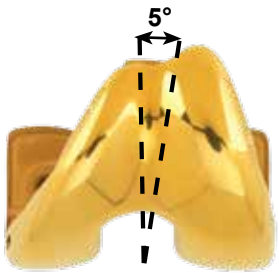
Femoral components

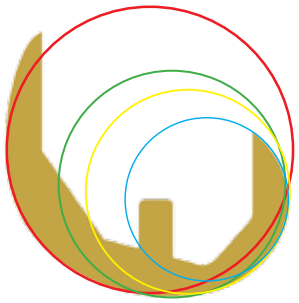
The ACS® femoral components are characterized by an asymmetric anatomically formed design to ensure an optimal fit of the component on the femoral bone. The lateral femoral flange is more prominent than the medial one. The anteriorly smooth tapered flange gives the femoral component a soft tissue friendly design.

The deep, by 5° inclined patella groove supports the patella alignment and a physiological patella tracking. The pressure on the patella tendon and the risk of a patella dislocation is reduced.

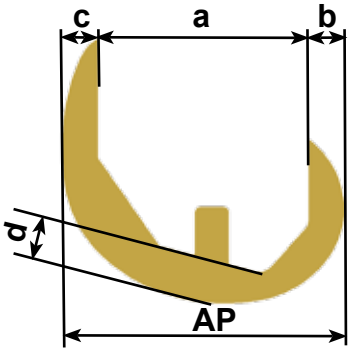
The inner contour of the femoral component is identical from the primary design to the revision component. The distal resection plane is inclined by 15° which contributes to a maximum preservation of bone stock.

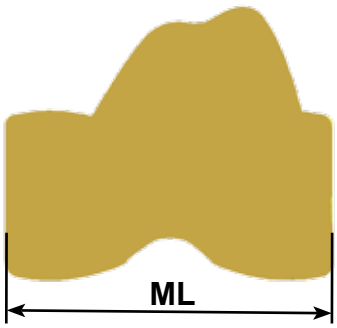






The articulating surfaces of the ACS® femoral components feature a multi-radius design (J-curve profile). This design gives the femoral component an antomical fit and allows a kinematic function of the knee joint, which is related to the physiological knee motion.





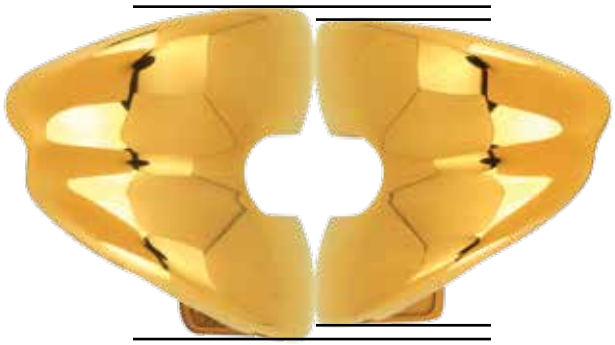
	size							
	1	2	2,5	3	4	5	6	7
AP [mm]	50	54	57,5	61	64,5	68	75	79
a (inner AP) [mm]	36	39,5	42,5	45,5	49	51,5	56	60
c (max. anterior thickness) [mm]	7	7	7,5	7,5	7,5	7,5	10	10
b (posterior thickness) [mm]	7	7,5	7,5	8	8	9	9	9
d (distal thickness) [mm]	8,5	8,5	8,5	9	9	9	10	10
ML [mm]	55	60	62,5	65	70	75	80	85

Femoral components primary

For an optimal bone coverage of anatomically different femoral bones the ACS® system offers a spectrum of 12 sizes of primary femoral components. Those include 8 sizes of the ACS® primary standard femoral components, as well as 4 sizes of the slim femoral components. The primary ACS® femoral components have two femoral pegs for an improved bone fixation.

Femoral components slim

The ACS® slim femoral components are suited especially for slim knee joints. The medio-lateral dimensions are smaller as with the ACS® femoral component. The antero-posterior dimensions are identical to the ACS® femoral component of the respective size.

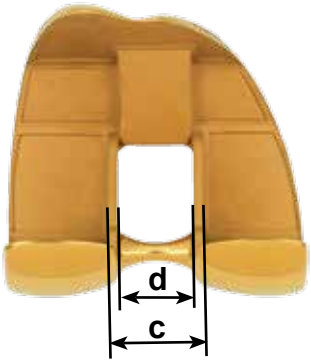


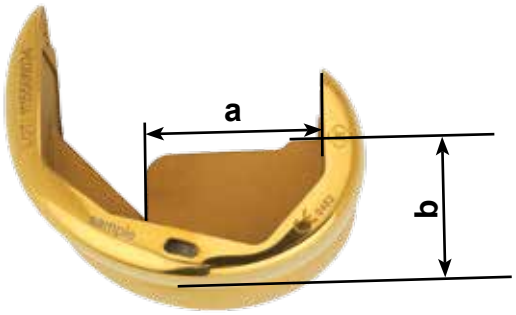
ACS® size 4 **ACS® slim size S4**

	size			
	S3	**S4**	**S5**	**S6**
AP [mm]	61	64,5	68	75
ML [mm]	60	65	70	75

PS femoral component

The ACS® PS femoral component is characterized by an open box and the femoral spindle, which interact with the peg of the PE-insert and thus contribute to the posterior stabilization of the knee joint. A size independent box width and height allow for flexibility with the selection of the size of the femoral component and simplify the bony preparation.





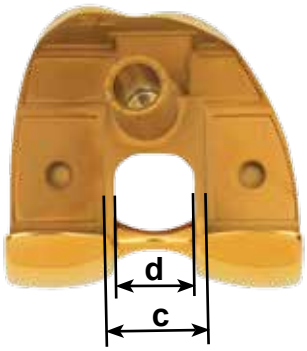
	size						
	1	**2**	**2,5**	**3**	**4**	**5**	**6**
a (box length) [mm]	25,5	26,5	30,5	30,5	32	32	32
b (box height) [mm]	27						
c (outer box width) [mm]	22,2						
d (inner box width) [mm]	17,2						

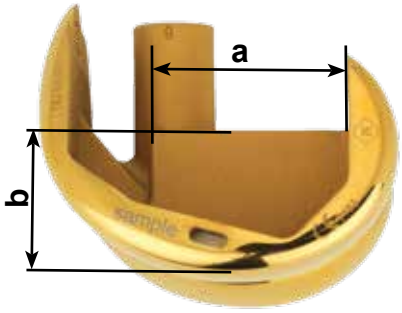
ACS® MB PS

ACS® FB PS

SC femoral component

The ACS® SC femoral component is, like the PS femoral component, characterized by an open box and the femoral spindle, which interact with the peg of the PE-insert and thus contribute to the stabilization of the knee joint. Also this component allows for flexibility with the selection of the femoral size due to a size independent box width and height. The box width and height is identical to the box of the PS femoral component.





	size					
	2	**2,5**	**3**	**4**	**5**	**6**
a (box length) [mm]	29,5	32	33,5	35	35,6	40
b (box height) [mm]	27					
c (outer box width) [mm]	22,2					
d (inner box width) [mm]	17,2					

Stem extensions can be used with the SC femoral component by a conical connection via an offset adapter. The femoral cone has an integrated valgus of 6°, which facilitates the implantation of components with stem extensions.
The cemented SC femoral component makes it possible to attach posterior and distal spacer (thicknesses of 5mm and 10mm) to compensate femoral defects. The spacers are fixed with a screw at the inner surface of the component.

PE-inserts MB

The symmetric ACS® MB PE-inserts are movable on the tibial component by permitting rotational movements. A deep anterior notch provides space for the patella ligament and surrounding soft tissue, even in deep flexion angles. The posterior notch allows for preservation of the posterior cruciate ligament. There are different PE-inserts available, which differentiate in design as follows:

MB PE standard

Highly concave formed bearing surfaces ensure a high congruency to the femoral component and thus high stability throughout the whole range of motion. Due to the conical peg, the MB PE standard can be combined with the MB tibial component basic and the tibial component standard.

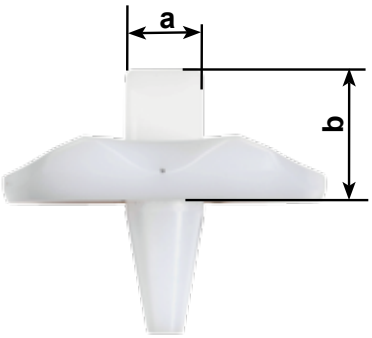
MB PE Deep Dish (DD)

The anteriorly raised design leads to an increased congruency between femoral component and PE-insert and thus to increased stability. Due to the conical peg, the MB PE standard can also be combined with the MB tibial component basic and the tibial component standard.

MB PS PE hyperflex

The PS PE-insert hyperflex is characterized by the central protruding peg. The bearing surfaces have the congruency of the hyperflex PE-insert. Due to the conical peg on the underside, the PE-insert is also used with the MB tibial components basic and standard.

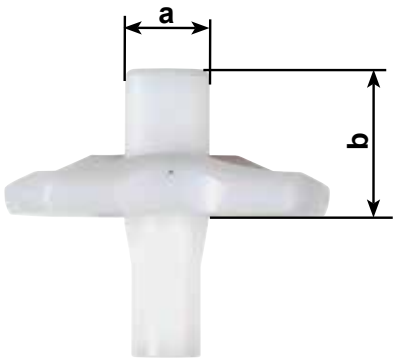
	Height				
	10mm	**12,5mm**	**15mm**	**17,5mm**	**20mm**
a (peg width) [mm]	16,9				
b (peg height) [mm]	29	31,5	34	36,5	39



MB SC PE hyperflex

The design of the SC PE-insert is very similar to the MB PS PE-insert. Due to the cylindrical peg on the underside , the PE-insert is used in combination with the MB SC tibial component.

	Height				
	10mm	**12,5mm**	**15mm**	**17,5mm**	**20mm**
a (peg width) [mm]	16,9				
b (peg height) [mm]	29	31,5	34	36,5	39



MB NC PE

The design of the bearing surfaces of the MB NC (non-constrained) PE-insert are consistent with those of the MB PE-insert deep dish. Due to the cylindrical peg on the underside, the PE-insert is combined with the MB SC tibial component and is therefore used for tibial revisions.

MB tibial component

The ACS® MB tibial components feature an asymmetric design, so that the components can be used for the left as well as for the right tibia. The posterior notch allows the preservation of the posterior cruciate ligament. There are three different versions available, which differ as follows:

MB tibial component-basic

The relatively short stem and a little pronounced fin design allow for a high degree of preservation of the tibial bone stock. The component features a conical portion for acceptance of the PE-insert.

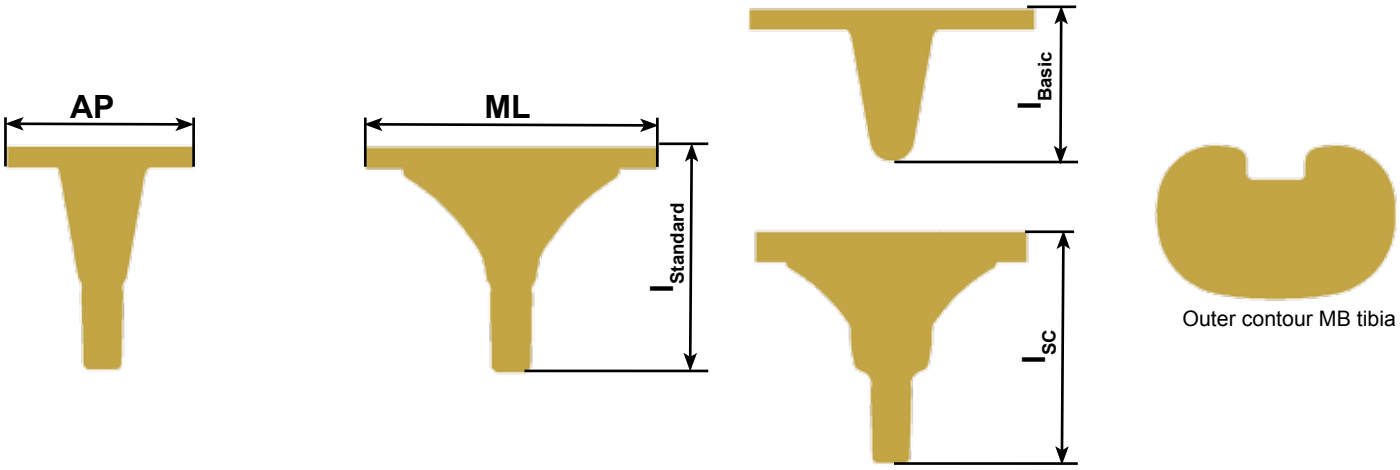
MB tibial component-standard

Pronounced fins ensure optimal rotational stability of the tibial component. The distal cone makes the use of stem extensions possible. The PE-inserts are accepted by the conical portion of the component.

MB SC tibial component

Fins provide for the rotational stability of the component. Stem extensions can be applied by the conical connection without offset or with offsets by use of the MB offset adapter. The cylindrical portion ensures a reliable acceptance of the PE-inserts in revision cases. Separated spacer for medial and lateral side can be attached with a screw on the underside of the cemented tibial component. The MB SC tibial component is 2,5mm thicker than the primary MB tibial components.

The anteroposterior and mediolateral dimensions are identical for all three designs.



	size						
	2	**3**	**3,5**	**4**	**5**	**6**	**7**
AP [mm]	38	42	43,5	45	48	52	55,5
ML [mm]	60	65	67,5	70	75	81	86
$l_{Standard}$ (length) [mm]	51	52	52	53	55	58	61
l_{Basic} (length) [mm]	33	36	36	38,5	41	44	47
l_{SC} (length) [mm]	55,5						

Compatibility matrix ACS® MB

The size of the PE-insert of the systems ACS® MB standard, Deep Dish, PS, SC and NC comply with the respective femoral size. Adjacent combinations are valid:

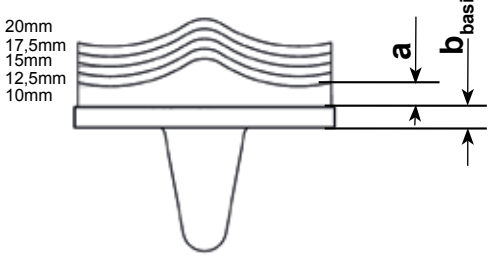
		femoral size						
		2	2,5	3 / S3	4 / S4	5 /S5	6 / S6	7
size PE-insert	2	■						
	3		■	■				
	4				■			
	5					■		
	6						■	■

The PE-inserts are combined with the different sizes of the tibial component according to the adjacent matrix:

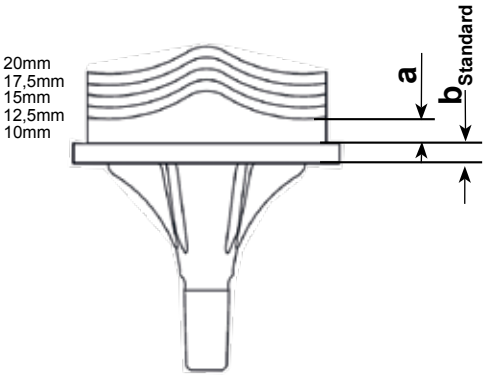
		size PE-insert				
		2	3	4	5	6
tibial size	2	■				
	3 / 3,5	■	■			
	4	■	■	■		
	5	■	■	■	■	
	6	■	■	■	■	■
	7	■	■	■	■	■

PE-Heights ACS® MB

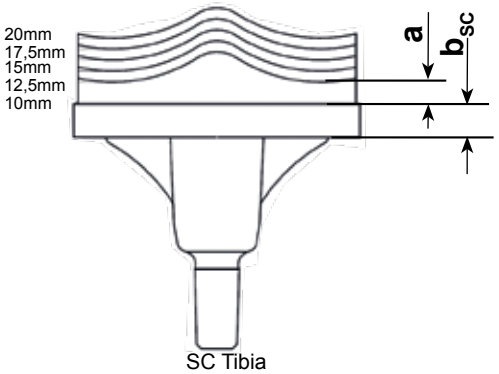
The description of the height of the PE-inserts is the sum of the thickness of the primary tibial component and the effective height of the PE-insert:



Basic Tibia



Standard Tibia



SC Tibia

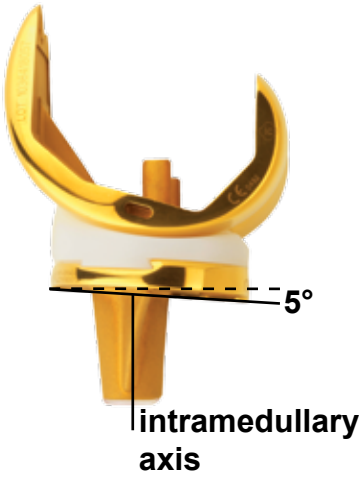
	Height				
	10mm	12,5mm	15mm	17,5mm	20mm
a (effective PE-height) [mm]	5	7,5	10	12,5	15
b_{basic} (thickness tibia) [mm]	5				
$b_{Standard}$ (thickness tibia) [mm]	5				
b_{SC} (thickness tibia) [mm]	7,5				

FB tibial component

The design of the FB tibial component allows the use for primary as well as revision cases of the knee joint.

The FB tibial component ensures an optimal bone coverage of the proximal tibia by an anatomic asymmetric design. Pronounced fins provide for rotational stability of the component. An inclination by 5° of the plateau compared to the axis of the stem (integrated posterior slope) facilitates the implantation of the component. Especially when using stem extensions, the stem will be aligned with the tibial intramedullary axis. Thus, in case of load-bearing situations a physiological load distribution happens.

The medialized stem of the tibial component comes with a cone, which makes the use of tibial stem extensions possible.



The holes in the plateau of the cemented tibial component are filled with PMMA-plugs. If required, the plugs can be removed to fix tibial spacer with a screw. Furthermore, the PMMA-plug of the cone can be removed if stem extensions are required.

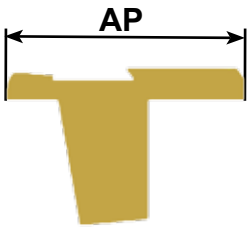

cemented FB Tibia

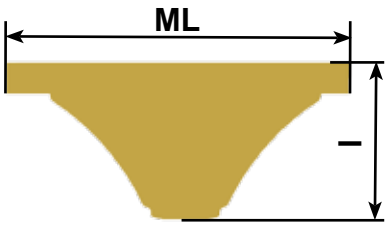
The cementless tibial component features four holes filled with titanium plugs. If required the plugs can be removed to fix the component with additional anchorage screws in the proximal tibia. For additional primary stability an extension stem (25mm) is pre-assembled to the cementless tibial component.


cementless FB Tibia


top side view FB Tibia


bottom side view FB Tibia





	size					
	2	**3**	**3,5**	**4**	**5**	**6**
AP [mm]	42	45	47	48	52	55,5
ML [mm]	60	65,5	69	70	75	81
l (length) [mm]	32					

PE-inserts FB

The symmetric ACS® FB PE-inserts are fixed to the tibial component via a snap-fit mechanism. There are different PE-inserts available, which differ in design as follows:

FB PE-standard

The medial and lateral bearing surface is characterized by a somewhat larger anteroposterior radius than the articulating femoral component. Thus there exists a congruency between both components, which allows for translational movements.

FB PE-hyperflex

An increased AP-radius compared to the femoral component results in increased translational movements between femoral component and PE-insert.

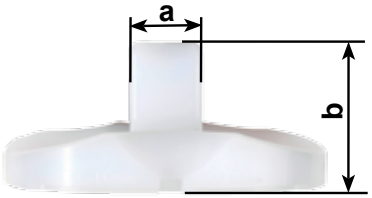
FB PE-ultra

The FB PE-insert ultra features a highly congruent articulation between femoral component and PE-insert. Thereby an increased stability is provided in flexion and extension.

FB PS PE-hyperflex

The PS PE-insert hyperflex is characterized by the central protruding peg. The bearing surfaces feature the same congruency as the PE-insert hyperflex.

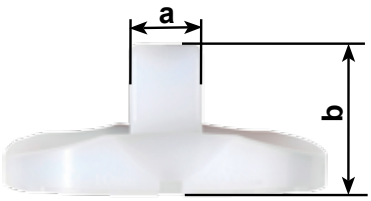
	Height				
	10mm	**12,5mm**	**15mm**	**17,5mm**	**20mm**
a (peg width) [mm]	15,5				
b (peg height) [mm]	30	32,5	35	37,5	40



FB SC PE

The SC PE-insert is very similar in design to the FB PS PE-insert. The central peg of the SC PE-insert is somewhat wider to ensure an increased guidance in the box of the SC femoral component.

	Height				
	10mm	**12,5mm**	**15mm**	**17,5mm**	**20mm**
a (peg width) [mm]	16,6				
b (peg height) [mm]	30	32,5	35	37,5	40



Compatibility matrix ACS® FB

The size of the ACS® FB PE-insert complies with the respective tibial size. Regarding the femoral size adjacent combinations with the PE-inserts standard, hyperflex, PS and SC are valid:

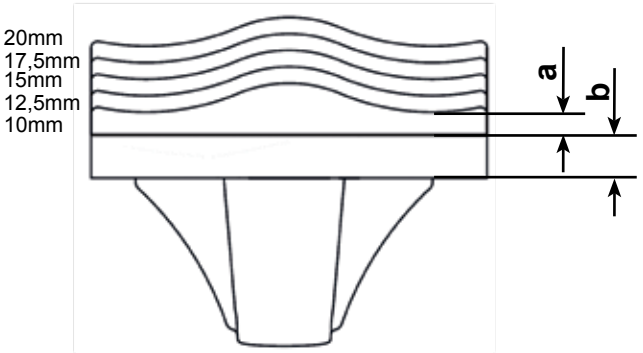
tibial size respectively PE-insert	femoral size 2	2,5	3 / S3	4 / S4	5 /S5	6 / S6	7
2	■	■	■				
3 / 3,5	■	■	■	■			
4		■	■	■	■		
5				■	■	■	■
6					■	■	■

Due to the increased congruency the FB PE ultra is combined according to the adjacent matrix:

tibial size respectively PE-insert	femoral size 2	2,5	3 / S3	4 / S4	5 /S5	6 / S6	7
2	■						
3 / 3,5	■	■	■				
4			■	■			
5				■	■		
6					■	■	■

PE-heights ACS® FB

The description of the PE-heights of the ACS® FB system are the sum of the thickness of the FB tibial component and the effective PE-height respectively.

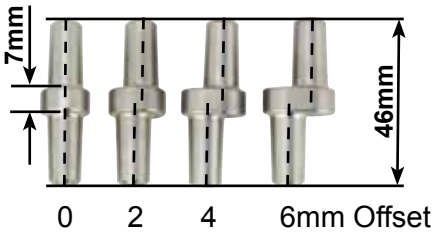


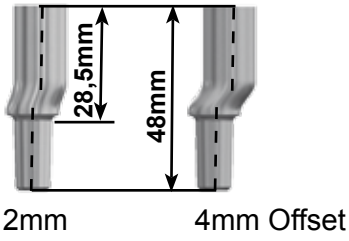
	Height 10mm	12,5mm	15mm	17,5mm	20mm
a (effective PE-height) [mm]	6	8,5	11	13,5	16
b (thickness tibia) [mm]	4				

ACS® offset adapter

With the ACS® SC System offset adapter are available as connection piece for the use of femoral and tibial stem extensions. Femorally as well as tibially (FB tibial component) it is possible to apply an offset of 0mm, 2mm, 4mm or 6mm, whereas the offset is freely adjustable within 360° in each case. The adapter feature a double cone design and the fixation of the offset position is achieved by pressing the cones between the stem and the tibial respectively the femoral component.

For the MB SC tibial components there are offset adapter with 2mm and 4mm offset available. For tibial stem extensions without offset the stems can be directly attached to the MB SC tibial component.



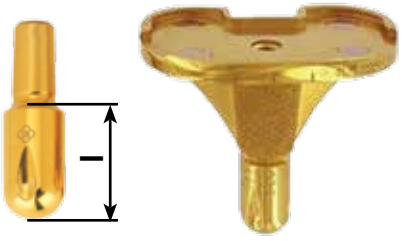


ACS® stems

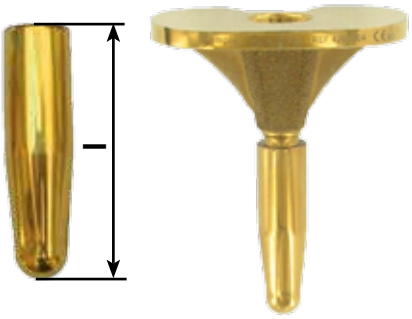
The ACS® stems can be used for femoral as well as for tibial stem extensions. The stems are available in lengths of 100mm, 150mm and 200mm and in diameters from 12mm to 22mm. The stems are attached to the offset adapter or directly to the femoral respectively the tibial component via the internal cone. A slotted design of the 150mm and 200mm long stems gives the stems elasticity. Thus selective tensions on the interface between stem tip and bone are avoided and loads are optimally transmitted and distributed.

Additionally, HA-coated stems are available for cementless implantation.

The extension stem male taper (diameter 14mm) is available in 3 lengths (length l = 25mm, 35mm or 50mm). It can be attached as short stem extension directly to the FB tibial component via the cone.



The ACS® extension stem (diameter 14mm) is available in 3 lengths (length l = 25mm, 50mm or 75mm). It can be directly attached to the primary MB tibial components via the internal cone.



ACS® spacer

femoral spacer

For compensation of femoral bone defects distal and/or posterior spacer (of 5mm and 10mm thickness respectively) can be used. The spacer are fixed to the cemented SC femoral component with a screw. The posterior spacer are intended to be used for both, the medial and the lateral side, whereas the distal spacer are side specific.

tibial spacer

Tibially there are dedicated half-sided spacer for the fixation on the cemented MB SC tibial component as well as half-sided spacer for the cemented FB tibial component available. The spacer exist in thicknesses of 5mm and 10mm.

spacer for MB SC tibial component

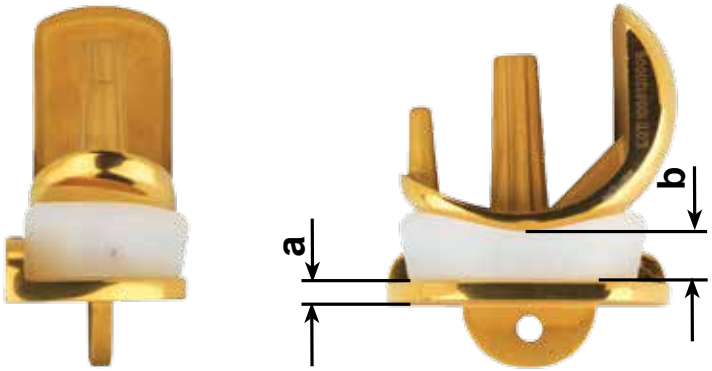
The spacer are fixed with a screw (the screw is identical to the screw for the femoral spacer) from the underside to the MB SC tibial component.

spacer for FB tibial component

The spacer are fixed with a dedicated countersunk screw, which is applied from the upper side of the FB tibial component.

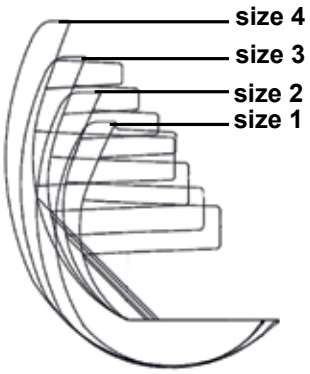
ACS® Uni

The ACS® Uni system is a unicondylar knee system, which is characterized by a mobile PE-insert and a highly congruent articulation between femoral component and PE-insert. The components feature a symmetric design, so that a both-sided use is possible. Two femoral pegs as well as a femoral and a tibial fin ensure high rotational stability.



The thickness a of the tibial component is for all sizes 2,7mm. The PE-inserts are available in height b from 4mm to 12mm (in 1mm steps).

Due to the contour of the femoral and tibial component an optimal bone coverage is achieved with a minimal amount of bone resection.



Due to high congruency the size of the PE-insert complies with the respective femoral size:

		femoral size			
		1	2	3	4
size PE-insert	1	■			
	2		■		
	3			■	
	4				■

Tibially the PE-inserts can be combined according to the following matrix:

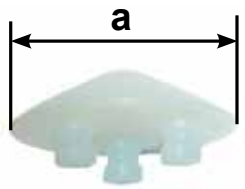
		size PE-insert			
		1	2	3	4
tibial size	1	■			
	2	■	■		
	3	■	■	■	
	4	■	■	■	■
	5	■	■	■	■
	6	■	■	■	■
	7	■	■	■	■
	8	■	■	■	■

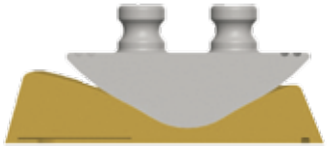
ACS® Patella

The ACS® femoral components are compatible to the following patella components:

ACS® PE Patella

The cemented PE-patella component features a symmetric design and is available in 4 diameters (diameter a = 26mm, 29mm, 32mm and 35mm) to ensure an optimal bone coverage of the patella. The patella component is fixed to the bone via three pegs. Due to the rotational symmetric tapered design an optimal contact surface in the deep patella groove of the femoral component is ensured in flexion as well as in extension. The PE-patella is compatible to every size of the ACS® femoral component.





cross-section patella-femoral component

ACS® rotating patella component

The asymmetric rotating patella component consists of a metallic base plate and a thereon rotating anatomically formed PE component. During the manufacturing process the PE-component is connected to the base plate.The component allows for rotations up to 75°. The base plate is available in a cemented and a cementless version, whereas the bone fixation is performed via three pegs. The rotating patella component is available in 6 sizes and is combined with the femoral component of the corresponding size.

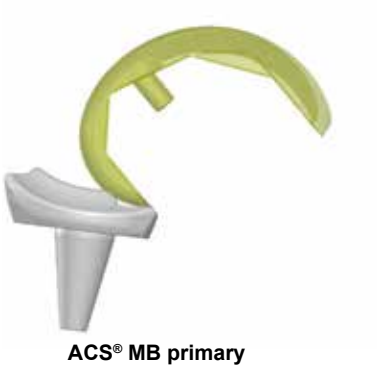
cross-section patella-femoral component

Range of motion ACS®

The ACS® system allows the shown range of motions. However clinically in practice the range of motion is often limited by the ligament situation, soft tissue and bone.

ACS® MB

The ACS® MB system allows for an hyperextension of 5° as well as a maximum flexion of 130°-140°. The initial contact between femoral spindle and PE-peg occurs at a flexion angle of 60°-70° for the ACS® MB PS system and the ACS® MB SC system.



ACS® MB primary

ACS® MB PS

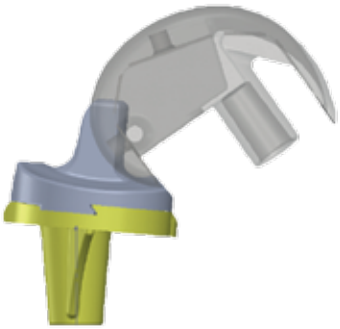
ACS® MB SC

ACS® FB

The ACS® FB system allows for an hyperextension of 5° as well as a maximum flexion of 140°-150°. The initial contact between femoral spindle and PE-peg occurs at a flexion angle of 60°-70° for the ACS® FB PS system and the ACS® FB SC system.

ACS® FB primary

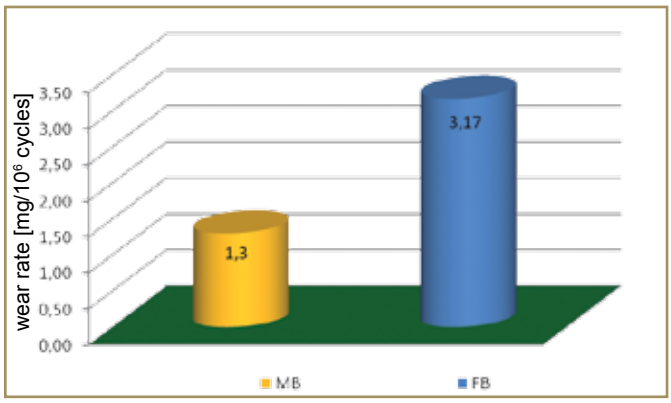
ACS® FB PS



ACS® FB SC

Wear ACS®

The mechanical safety of the components of the ACS® system was evaluated in several conducted tests. Amongst others, wear tests were performed in simulator studies according to ISO 14243. As a result the ACS® MB as well as the ACS® FB components showed low wear rates of the PE-inserts.



wear test according to DIN ISO 14243[6,8]

ACS® instruments

The instruments of the ACS® system are characterized by precision and simple handling. Amongst the standard instruments, GIS instruments (Gentle Instrument System) are available.The GIS-instruments allow for a less invasive surgical technique with smaller incisions and reduced blood loss. There is the possibility to use extra- or intramedullary alignment guides. Further, a surgical procedure according to the 4in1-technique (distal femur cut first) or according to the classic tibia cut first technique is possible. The slots of the resection blocks allow for optimal guidance of the saw blade to perform accurate resections.

Materials

implavit®

The ACS® femoral and tibial components are manufactured from a CoCrMo-cast alloy according to DIN ISO 5832-4. For that purpose the casting molds are fabricated from repeatable wax models, which are covered with ceramic layers in several steps. After melting the wax, liquid CoCrMo-cast alloy is filled in the hollow ceramic form. Afterwards after cooling, the removal of the ceramic layers from the rough casting is carried out. The components are checked for defects and are further machined. For finishing the components are grinded, polished and coated.

chemical composition:

element	cut-off grade % (weight percenet)
Chromium	26,5-30
Molybdenum	4,5-7
Nickel	max. 1,0
Iron	max. 1,0
Carbon	max. 0,35
Manganese	max. 1,0
Silicium	max. 1,0
Cobalt	rest

implatan®

$TiAl_6V_4$ according to DIN ISO 5832-3 is a titanium alloy, from which the spacer and spacer screws, offset adapter and stems of the ACS®-system are manufactured. The raw material is machined (predominantly milling and turning) and afterwards finished by polishing, grinding and coating if necessary.

chemical composition:

element	cut-off grade % (weight percent)
Aluminium	5,5-6,75
Vanadium	3,5-4,5
Iron	max. 0,3
Oxygen	max. 0,2
Carbon	max. 0,08
Nitrogen	max. 0,05
Hydrogen	max. 0,015
Titanium	rest

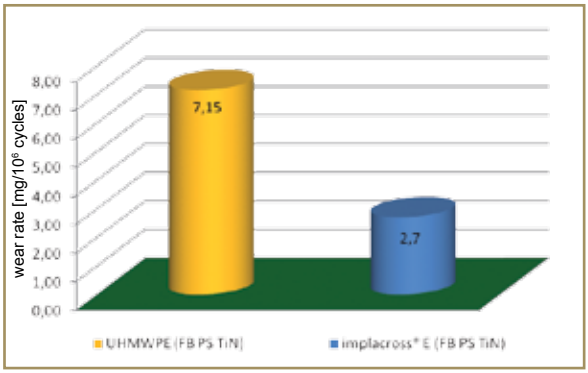
UHMWPE

The ACS® PE-insert and patella components are manufactured from ultra high molecular weight PE (UHMWPE) GUR1020 according to DIN ISO 5834-2. GUR1020 powder is sintered to plates (compression moulding), which are tempered and afterwards machined. The PE-components are stored in air in a gas permeable packaging and sterilized with ethylene oxid (EtO).

implacross® E

The raw material of the implacross® E PE-components is also GUR1020 according to DIN ISO 5834-1, which is endowed with vitamin E (1000 ppm vitamin E). After sintering (compression moulding) of the mixture to plates and following tempering the PE is crosslinked by gamma irradiation (dose 50kGy).

By cross-linking the wear resistance of the PE is increased. The addition of vitamin E increases the longevity of the cross-linked PE by linkage of free radicals developing during cross-linking. Thus an oxidative degradation of the polyethylene is prevented. The wear resistance was confirmed in wear simulator studies.



wear test according to DIN ISO 14243[8, 9]

Fixation cemented and cementless

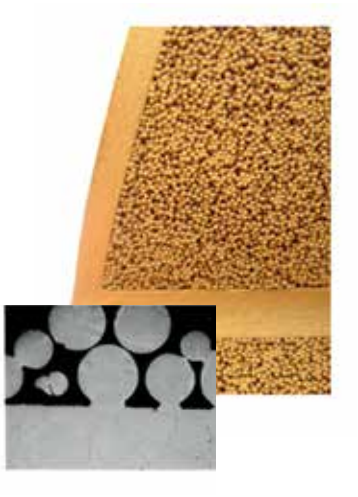
cemented

The cemented ACS® components feature 0,7mm deep cement pockets on the bone facing implant surface. That design optimally accepts the bone cement and ensures a reliable fixation of the components.

For the cementless fixation of the ACS® components in the bone there are two versions:

cementless porous coating (pc)

The coating consists of 3 layers of CoCrMo balls with 300µm in diameter, which are applied to the bone facing implant surface by sintering. The resulting porous surface thus promotes the osseointegration.



cementless cpTi/TCP

With that coating initially commercial pure titanium (cpTi) is applied to the bone facing implant surface to attain a rough and porous surface. Afterwards tricalcium phosphate (TCP), which is classified bioactive, is applied. Thus bone formation around the implant surface is accelerated. While the cpTi-coating is responsible for the mechanical anchorage of the bone, the TCP coating creates a fast contact osteogenesis.

References

1 Jones, V.C. et al. New materials for Mobile Bearing Knee Prosthesis - Titanium Nitride Counterface Coatings for Reduction in Polyethylene Wear. In: Hamelynck, K.J., Stiehl, L.B. LCS-Mobile-Bearing Knee Arthroplasty 25 Years of Wordlwide Experience ch 21. Springer. New York 2000

2 Baumann A. DOT GmbH Technischer Report. Die Haftfestigkeit von Titannitrid (TiN) – Schichten auf Implantatlegierungen. 2002. Data on file

3 Wisbey et al. Application of PVD TiN coating to Co-Cr-Mo based surgical implants. Biomaterials 1987, 11.

4 Baumann A. Keramische Beschichtungen in der KTEP Standardlösung für Allergiker. JATROS Orthopädie & Rheumatologie 2001, 6:16-17

5 Prof. Thomas LMU München Final Report Effect of a TiNbN or TiN surface coating on cobaltchromium-molyb denum and stainless steel test specimens regarding the release of nickel, chromium and cobalt: evaluation via eluate analysis and in-vitro cytokine release from peripheral human blood cells, Data on file

6 McEwen, H.M.J. et al. Wear of fixed bearing and rotating platform mobile bearing knees subjected to high levels of internal and external tibial rotation. Journal of Materials Science: Materials in Medicine. 12 (2001): 1049-1052

7 Test report A219/05.1 IMA Dresden. Data on file

8 Test report 59.080804.20.203 Endolab. Data on file

9 Test report 50/003/2011 FORBIOMIT. Data on file

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