

CeraNews

Stepping Ahead

A New Start in Ceramic Knee Arthroplasty

The use of a ceramic femoral component in total knee arthroplasty is currently the subject of a controlled, randomized study that began at the end of 2006. The femoral component essentially corresponds to that of a proven metal implant. It is used together with the corresponding metal tibia plateau and a modular polyethylene insert. The study is being carried out at a total of seven centers in Germany, Italy and Spain. CeraNews spoke with study leader Professor Wolfram Mittelmeier and co-investigator Professor Francesco Benazzo.

What is the study's basic design?

Prof. Mittelmeier: Twenty patients for whom total knee arthroplasty is indicated are to undergo surgery at each center. The study population is to include younger or more active patients, or patients with known allergies. The patients selected for the study must have normal ligaments and their posterior cruciate ligaments will be preserved. The implantation of a ceramic or metal femoral component will be randomized.

How far have you progressed?

Prof. Mittelmeier: We haven't yet reached full enrollment. But we're taking a very cautious approach, attempting to avoid patient risks and we want to make sure to examine all of the initial cases very carefully.

Why do we need a ceramic knee?

Prof. Benazzo: I was very enthusiastic when I was asked to work in this group because I have achieved very good results with the ceramic hip. Wear is an important issue in knee replacement, and ceramics seem to me to be the material with the lowest possible wear.



Prof. Francesco Benazzo is Director of the Orthopaedic and Traumatology Clinic at the University of Pavia in Italy.



Prof. Wolfram Mittelmeier is the Medical Director of the Rostock University Orthopaedic Clinic.

Prof. Mittelmeier: The bearing surface is made of the high quality alumina matrix composite BIOLOX[®]delta instead of a cobalt-chrome alloy. This offers enhanced material properties and enables one to significantly reduce polyethylene wear. Experience in hip replacement has shown the advantages of using ceramic materials. This includes the capacity to treat patients with metal allergies with a greater degree of safety. However, the ceramic femoral component is only a first step. Further steps will include the development of a ceramic tibia plateau and then – to the extent that it is technically feasible – a knee prosthesis made entirely of ceramic materials. And finally, we also need a cementless fixation system for the ceramic prosthesis, in particular with regard to allergic patients.

Prof. Oonishi used a ceramic tibial component for some time but abandoned this approach.

Prof. Benazzo: He used a fixed bearing knee while I think that with ceramics we have to start with a mobile bearing knee. Secondly, the quality of the ceramic of the Oonishi knee was completely different from the BIOLOX[®]delta that we are using. Design has also changed.

What else did you learn from the Japanese experience?

Prof. Benazzo: The Japanese colleagues started with a model sacrificing the posterior cruciate ligament and changed to cruciate retaining later. We have to move on in this direction because at the moment the cruciate retaining design is the only possible design if we want to avoid extreme edge loading. At the same time, it is a challenge for the future and for new engineering solutions to also create a cruciate sacrificing option. We also have to find an engineering solution for a tibial plate suitable to be used in conjunction with a ceramic liner. That is a challenge, but this is how all breakthroughs in our field happen. And finally, we learned that the right fixation of the implant in the bone is extremely important.

What is your vision of cementless fixation?

Prof. Mittelmeier: Cementless fixation systems are already in development. Here, we have joined forces with our biomechanics laboratory and industry

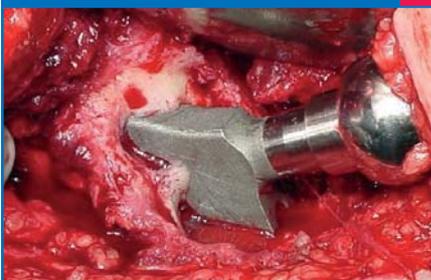
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Stem-Taper List

Website Offers Digest of Stem-Taper Combinations

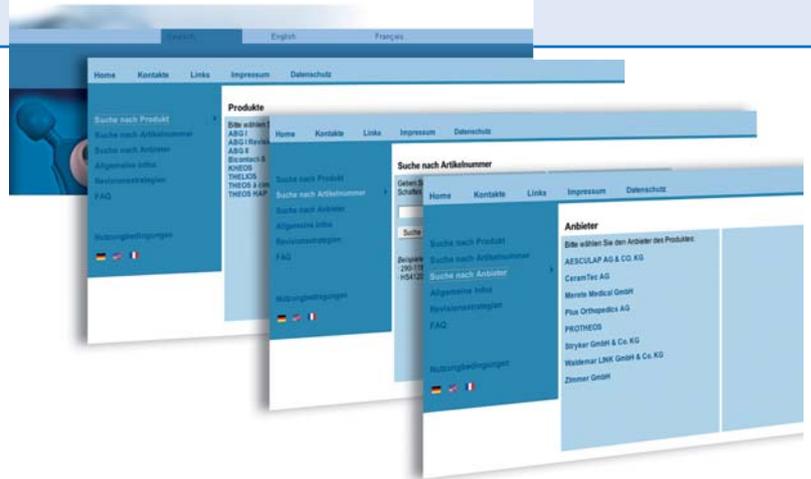
Around 40 different taper types are in use today throughout the world in the field of hip arthroplasty. This variety makes it necessary to use great care when performing a revision in which the stem is to remain in situ. The surgeon faces a serious challenge when product specifications and other implant data are no longer available for some of the implanted components. The website www.hiprevision.de can help to obtain the information needed in this situation.

If the product or catalog numbers are known, they can be used to determine the exact specifications of the taper. "However, given that these data are often not available, we have created several other ways of determining the exact details needed by the surgeon," explains Business Manager Heinrich Wecker who is responsible for creating and main-

taining the database. "One can also identify the implant in question step by step via the name of the manufacturer, the model name, the size, the CCD angle, or the offset." In addition to this, the site offers product illustrations and X-ray images for many models.

CeramTec offers the platform – the data used on this website are provided by the implant manufacturers. "In light of the continuously growing number of models, the database will always be a matter of work in progress," explains Heinrich Wecker. Nonetheless, the database will offer an enormous collection of data and concrete tips helpful in planning revisions by the time of its launch in summer 2007. Surgeons can also use the database to determine what stems can be used with the BIOLOX® OPTION ceramic revision ball head.

www.hiprevision.de



This ceramic femoral component is the subject of clinical testing.

Interview (continued)

partners to develop a material that has the right properties – in terms of biocompatibility and elasticity – to guarantee a safe and secure fixation of ceramic components in the bone. We obviously need to bridge the gap in the elasticity module between the very hard ceramic material and the considerably softer bone. Mechanical testing has already been carried out and the planning for the animal studies is complete.

Back to the present – what's your assessment of the handling of the cemented ceramic components used in the study?

Prof. Benazzo: The elasticity of metal is a little closer to bone than that of ceramics. Therefore metal is somewhat more forgiving, and a perfect fit of the implant is even more important with ceramics. So I check the quality of the cut very thoroughly and try to reduce interference between bone and implant by creating a very even cement interface, according to the surgical technique developed for the study. But that is the only difference. The implanted components behave exactly as the metal femoral components.

Prof. Mittelmeier: The cuts are the same as with metal components – only the instruments used to fix the implant are somewhat different. There are no essential differences in terms of handling and surgical technique.

Does that apply to the cementing as well?

Prof. Mittelmeier: Just as with metal, the evenness of the cement layer is crucial. Before beginning the study, we carried out a finite-element analysis to determine the properties of the cement between the various partners – bone and ceramics. To do this, we developed a model, which later won a research prize conferred by the German Society of Orthopaedics, to determine the optimal distribution and thickness of the cement layer.

How significant is the allergy problem?

Prof. Mittelmeier: We have to take it very seriously. We are not yet in a position to predict how individual patients will react to metal or cement in the body, but at the same time we are aware of a steady rise in the number of established allergies. While subcutaneous contact with metal, such as in the case of piercing, apparently plays a role here, it is also a matter of improved methods of allergy detection. Non-allergenic implants will be indispensable.

Prof. Benazzo: Today, we have some femoral component options for them but none on the tibial side. As long as we have no ceramic implant, the next logical step would be to have a full-poly tibial component. Until we have other alternative materials for the tibial component, the focus of implanting a ceramic femoral component should be on the low-wear solution for young patients.

Can we conclude that the development of the ceramic knee is geared to multiple targets?

Prof. Mittelmeier: In my view, it represents an essential step towards a broad line of product options in arthroplasty. However, the ceramic knee will have to be safe in terms of its application. In the long run, we'll also need ceramic revision implants. We are at the beginning of a whole series of developments. The establishment of a ceramic-specific design will represent a milestone.



D. Ing. Karl Billau has been head of the Medical Devices Division at CeramTec AG since August 2006. Before that, he was in charge of the Mechanical Systems Division.

Dear Readers,

I am delighted to have the opportunity to take the helm of a business division that has been as successful as the Medical Products Division at CeramTec. I am equally delighted to have an opportunity to meet the challenge of reinforcing and building upon the Division's success. The Division has grown rapidly in recent years as we have worked to expand our development and production capacities to meet the enormous market demands.

We are currently focusing on three areas of activity. Firstly, we would like to make our broad offer of hip implants even more comprehensive. Secondly, we will remain committed to going ahead at full speed with the development of our knee components. Thirdly, we will continue to up the pace of our R&D in the area of spine implants. As a physicist and an engineer, R&D is very close to my heart. Thanks to our intensive cooperation with universities, hospitals, and research institutes, we are also actively mobilizing external know-how for the development of our products.

The aim of our efforts is to improve our capacity to meet the needs of our customers, including physicians and implant manufacturers. We want to offer you an expanded range of options and make it easier for you to introduce the outstanding advantages of ceramic components to the patient. In doing so, it is especially important to us to maintain close contact with you. For this reason, I will be available to meet you in person – along with many other members of the CeramTec team – throughout the EFORT Congress. I'm looking forward to meeting you at our booth!

Yours sincerely,
Karl Billau

Burning issues

Highlights from the 2007 Academy Meeting in San Diego

14,000 physicians and allied health personnel attended this year's Annual Meeting of the American Academy of Orthopaedic Surgeons in San Diego, California. During the four days from February 14 to 17, 450 technical exhibits, 20 symposia and 1,260 papers, posters, and instructional courses were offered to the visitors.

The number of industry representatives exceeded 13,000. Overall, the meeting was once again the most important orthopaedic event world-wide. In the field of arthroplasty, the implant companies focused their exhibits on some key themes:

- implant reliability and longevity,
- gender specific implants,
- trabecular metal and porous titanium products,
- minimally invasive surgery, with the focus shifting from a small incision to the broader concept of minimizing trauma,
- computer assisted surgery,
- direct to consumer advertising.

These issues were also widely represented in the scientific sessions and symposia. Our report features some of the highlights.

Hip Resurfacing

The main supporter of this technology at the meeting was Dr. Thomas Schmalzried (Los Angeles). He presented a review showing a marked difference between specific groups of patients. The best results with hip resurfacing are generally achieved when it is performed on young large males with good quality bone. In addition to this, surgical technique and accurate placement of the implant (valgus orientation) are essential to ensure its longevity. These patients achieve a survival rate of 97% four years post-op. In patients not falling under these strict selection criteria hip resurfacing has a much lower survival rate of 87%.¹

Dr. Harry Rubash (Boston) cautioned that the surgical learning curve in hip replacement is very long and results during this phase are poor. His biggest concern was the high rate of femoral neck fracture, reported in the literature between 1.46% and 22%.² Dr. Rubash pointed out that complications are much higher than with conventional THR. Additionally, the increased diameter components could lead to an increase in metal ion levels in the body. The short term outcomes

Excellent results for ceramic/ceramic in FDA study

The poster presented the 2-to-8-year results of a U.S. Food and Drug Administration (FDA) Investigational Device Exemption (IDE) prospective study of 1,709 THAs performed by 22 different surgeons. All patients received alumina ceramic-ceramic bearings. Among the 1,709 THAs, there were 18 aseptic revisions for implant-related reasons (1%). Two hips were revised for acute instability; one for recurrent instability. Non-implant-related complications occurred in 21 patients. Researchers found no other cases of wear and no cases with osteolysis. The survivorship rate (based on 8-year Kaplan-Meier Survivorship) is 97%. **According to the presenters, these results demonstrate that alumina ceramic-ceramic total hip arthroplasty (THA) is a safe, reliable procedure with excellent long-term survival and a low incidence of component failure and instability.**

Ecker TM et al., Alumina Ceramic-Ceramic Total Hip Arthroplasty: The US-Experience from a FDA/IDE Multicenter Study, AAOS 2007 Annual Meeting Poster Presentations, Poster Exhibit P074

available in the medical literature do not show improved patient outcomes for this technology.³

Bearing Surfaces in Primary THR

The poor performance of conventional polyethylene is widely recognized which makes it a material of the past. It was only mentioned as a basis for comparison. Dr. William Hozack (Philadelphia) stated that ceramic ball heads are widely accepted as the best option from the standpoint of wear reduction, whether articulating against the new polys or against ceramic. He also discussed the development of new ceramic materials. He drew attention to the new revision ceramic ball heads made of BIOLOX®delta and the excellent reliability presented by today's high performance ceramics. Some concerns were raised about anecdotal reports of articulation noise as a condition that affects not only ceramics but all bearing combinations used in THR. Mainly US surgeons have been reporting about their experience with this phenomenon.



The new highly cross linked polyethylenes (XPE) combined with either a metal or a ceramic ball head were presented by Dr. William Maloney (San Francisco). He stated a substantial improvement in the short-term compared to conventional PE. However, the first generation XPEs are already developing some clinical degradation due to the presence of free radicals and clinical fractures of acetabular inserts due to their inferior mechanical properties. Limitation of insert sizes, warning on proper placement and the introduction of a second generation of highly crosslinked polys are some of the new developments in this field.

Dr. Thomas Schmalzried supported metal-on-metal bearings for reasons of low wear and flexibility of design. Nonetheless, metal sensitivity and concerns about long-term ion release make this bearing one that should to be used only selectively.



James H Beaty, President of the AAOS

In general it was recognized that all modern wear couples worked quite well if some key criteria were met, such as proper, patient-specific indication for each type of implant. Dr. Dan Berry (Rochester) summarized the patient/bearing issue:

Older, low demand patients	<ul style="list-style-type: none"> • Me/PE or • Me/XPE 	<ul style="list-style-type: none"> • No metal ion release risk • Low fracture risk • Lower cost
Older, medium or high demand patients	<ul style="list-style-type: none"> • Me/XPE 	<ul style="list-style-type: none"> • No metal ion release risk • Little fracture risk • Cost reasonable • Low wear
Young active female patients in child bearing years	<ul style="list-style-type: none"> • Ce/Ce or • Ce/XPE or • Me/XPE 	<ul style="list-style-type: none"> • Avoid Me/Me (ion release risk to fetus)
Young active patients with systemic/renal disease or metal sensitivity	<ul style="list-style-type: none"> • Ce/Ce or • Ce/XPE or • Me/XPE 	<ul style="list-style-type: none"> • Avoid Me/Me (due to metal ion release risk)
Young active male or female not in child bearing years without systemic or renal disease or metal sensitivities	<ul style="list-style-type: none"> • Me/Me or • Ce/Ce or • Ce/XPE or • Me/XPE 	<ul style="list-style-type: none"> • Me/Me offers largest head sizes (no fracture risk but metal ion release risk)

Dislocation after THR

It was interesting to note that an entire Symposium would be dedicated to this seemingly old subject. But clinical outcomes with reported incidence levels of up to 10% make post-arthroplasty dislocation a burning issue again. Perhaps the most critical factors are bone-to-bone and implant-to-implant impingement. It is therefore critical to carefully assess range of motion and implant stability. Other factors are: surgical approach (anterolateral and trans-trochanteric having a lower rate); previous surgery of the hip; incomplete capsular repair; female gender and obesity.

References:

1 Schmalzried, T.P., et. al. Optimizing patient selection and outcomes with total hip resurfacing. *Clin. Orthop.* 441:200–204, 2005.
 2 Mont, M.A., et. al. Outcomes of limited femoral resurfacing arthroplasty compared to total hip arthroplasty for osteonecrosis of the femoral head. *J. Arthroplasty* 16 (8 suppl. 1): 134–139, 2001.
 3 Willert, H.G., et. al. Metal-on-Metal bearings and hypersensitivity in patients with artificial hip joints. *J. Bone Joint Surg Am*, 87(1): 28–36, 2005.

Melting Bone

Metallosis Associated with Metal-on-Metal Bearings

While the discussion on the advantages and disadvantages of metal-on-metal bearings has grown in intensity since the advent of hip resurfacing, it has so far been marked more by confusing recommendations and cautious prognoses than by sound data. Professor Peter Bösch has now presented the results of a long-term study of second generation metal-on-metal bearings. He conducted follow-up investigations of 161 total hip arthroplasties with metal-on-metal bearings after an average period of 94.5 months (57–112 months). In more than one-fifth (20.8%) of all cases, he found clinical, histological, or radiological evidence of metallosis, with 11% requiring revision.

Your initial results with metal-on-metal bearings were good. How have things developed? The Harris Hip Score increased from 33 to 95. Hip function was therefore very good. The situation began to change after a considerable period of time. When it became necessary to perform revisions in a number of cases on account of pain, discolored discharge and the presumption of infection, we found large amounts of fluid in the joint. Initially, we were unable to detect anything in histological terms. It was only after we received help from Professor Lintner and Professor Willert that we discovered the perivascular, lymphocytic infiltrates showing the allergic reaction. We then examined a number of old McKee-Farrar samples from the archive and found the same signs.

Is it difficult to determine what really happened? Since then, the diagnosis of metallosis has become clear histologically. But one has to take a very careful look. In the case of polyethylene, we see macrophages and debris. In the case of titanium debris, the joint turns black. Here, it is nice and pink, sometimes velvety, although often with necroses, but also without foreign particles showing up in histology. Instead, the whole situation often looks very much like an infection.

How do you diagnose metallosis? You have to ask the patient the right questions, and be on the lookout for hidden signs, because many patients experience no pain despite the presence of major defects or discharges. Maybe they experience a delay when attempting to lift their leg or show slight



Osteolysis with a metal-on-metal bearing

swelling or bursitis in the groin. The symptoms are often less than dramatic and the X-ray images unremarkable. There is usually no gap formation between the implant and bone. Instead, the bone melts away, often behind the cup. This is often only detectable on the CT. The next diagnostic step is to tap the joint to rule out an infection. The CRP level may be excessively high. The needle aspiration itself might bring so much relief that the patient remains pain-free for one or two years and doesn't come back. In the case of lysis, however, I press for revision.

How do you proceed? Even in the case of considerable puss formation, we don't operate immediately. Instead, we carry out multiple aspirations and bacteriological investigations, and if it comes to surgery, then perhaps frozen sections. We perform the synovectomy, but if the joint is stable, we only replace the bearings.

Does it make a difference whether the alloy has a high or low carbon content? Our results are based on a low-carbon alloy. We don't have comparable data for high-carbon alloys. However, we know from our own experience, and that of colleagues, that metallosis, which does not differ histologically from that in the investigated cases, also occurs in cases of high-carbon alloys. This is also confirmed by Willert's publications.

Inferior production quality played a great role in the first-generation metal-on-metal bearings. I had the explanted bearings measured. The sphericity and play were perfect. Metallosis is certainly not caused by poor production quality. Moreover, numerous articles published in the meantime indicate increased levels of serum metal in all of the investigated patients with metal-on-metal bearings.



Prof. Peter Bösch is the Medical Director of Orthopaedic Surgery at the Wiener Neustadt Hospital in Austria.

Reference:
Metallosis in metal-on-metal PPF total hip arthroplasties, R. Legenstein, MD; W. Huber, MD; P. Bösch, MD
 The article was submitted in 2006 to the *Journal of Bone and Joint Surgery (British Volume)*.

High/low carbon?

Prof. Peter Bösch's results are based on bearings made of low-carbon alloys. Prof. Jean-Yves Lazennec (Paris) has obtained similar results with high-carbon bearings. He will be presenting them at the CeramTec Lunch Symposium at the EFORT Congress in Florence, Italy

13 May in Room 14 Vasari of Building F

Ever More

The Munich Registry for Implant Allergies

As a dermatologist, what is your interest in orthopaedic implants? Many people suffer from skin allergies and metals are among the most common causes. Allergies affect not only the skin but the entire human system. As an allergologist, I am naturally interested in the impact that metals and other substances have within the body.



Prof. Peter Thomas is the Director of the AllergoMat Working Group based in Munich.

How did your working group take shape? A steadily growing number of patients with problems associated with implants have been sent to us over the years. Given that we began to conduct basic research in this area years ago and have therefore been able to improve our testing methods, orthopaedic surgeons and implant manufacturers have been turning to us increasingly for professional advice. As the demand increased, we decided to establish a formal working group.

AllergoMat

After focusing on the subject of implant allergies for many years, the team headed by Prof. Peter Thomas established AllergoMat, a working group devoted to the investigation of allergenic and immunological aspects of implant materials. The working group is attached to the Allergy and Dermatology Clinic at the Munich-based Ludwig Maximilian University. One important focus of the group's activities is implant-related allergies, and in particular, metal allergies.

The group is an organizational member of the Implant Allergy Study Group of the German Society of Orthopaedics and is also associated with the Arbeitsgemeinschaft Endoprothetik. In addition to the establishment and maintenance of a registry of implant allergies, AllergoMat's work includes diagnosing patients with known or suspected (implant) allergies and consulting the physicians responsible for treating these patients. The AllergoMat website offers contact information, a compendium of implant allergy facts, bibliographical information and a registry form for reporting implant allergies. The website's contents are available in German and English.

<http://allergomat.klinikum.uni-muenchen.de/>

How would you describe your daily work? In the context of weekly meetings, we examine patients who are referred to us by colleagues at hospitals or general practitioners. We carry out allergy and blood tests on the patients. In addition to this, we offer consulting services for colleagues, usually from the fields of orthopaedics and traumatology, who are interested in obtaining data and the relevant literature, or who are seeking advice in concrete cases. Any physician who detects or suspects a problem with implant allergies can turn to us for assistance. We are also interested in fulfilling this advisory role because it converges with our research activities.

What does your work involve exactly? For one, we conduct basic research on the cellular and molecular-biological mechanisms of the allergic reaction, not least with regard to finding ways of avoiding allergic responses. We also gather and analyze clinical data in a register of implant allergies. For instance, we would like to use the data in the register for the early detection of broader allergy-related tendencies.

What are your plans for the register? We are gathering data in a systematic manner, and I would like to take the opportunity here to encourage my colleagues

Lunch Symposium in Florence

The "Impact of Materials Used in Hip and Knee Arthroplasty" is the subject of the CeramTec Lunch Symposium at this year's EFORT Congress. Prof. Francesco Benazzo, Dr. Thomas Pandorf, Prof. Wolfram Mittelmeier and Prof. Jean-Yves Lazennec will present various subjects relating to the use of ceramic components in arthroplasty. The symposium will take place on Sunday 13 May in Room 14 Vasari (Building F) at the congress location in the Fortezza da Basso in Florence.

BIOLOX® Symposium in Seoul

The 12th International BIOLOX® Symposium on the subject of "Bioceramics and Alternative Bearings in Joint Arthroplasty" will take place from 7–8 September in the Grand Hyatt Hotel in Seoul, South Korea. This will mark the first time that the Symposium is held in Asia. The main topics – with an entire session being devoted to each – include large bearings, hip revision and ceramic knee implants. A program preview will be available in June. Further information and a registration form are available at www.bioloxy-symposium.com.



to confer with us or make use of the register whenever they detect signs of implant allergies. We will be evaluating the data at regular intervals and publishing our results online, that is to say, in a password-protected area so as to avoid attempts to overly dramatize the subject of allergies.

Are you already in a position to draw conclusions?

Only in a preliminary sense – we will ultimately need more data, and our initial evaluations are still in progress. We have records of patients treated with various osteosynthetic and endoprosthetic materials. Our most comprehensive records involve patients showing intolerance to knee implants. In these patients, we see considerably increased rates of contact allergies, both to metals and bone cement components.

Permanent Seal

A Tribological Challenge in the Water Faucet

A mixing water faucet and an artificial joint have a lot in common. Each time you turn the water on or off, a bearing outfitted with seals is brought into action. As in the field of arthroplasty, the bearing is to be designed to cause as little wear as possible, because wear can lead to malfunctioning and unpleasant side effects. Moreover, the bearing is expected to last for many years or even decades, a feat that is only possible with high-performance ceramics.

The task of mixing cold and hot water to a desired temperature is handled today by modern fittings whose core is a so-called cartridge. This is where the hot and cold water pipes meet and where the water is mixed before being fed to the faucet. The seals involved ensure proper flow.

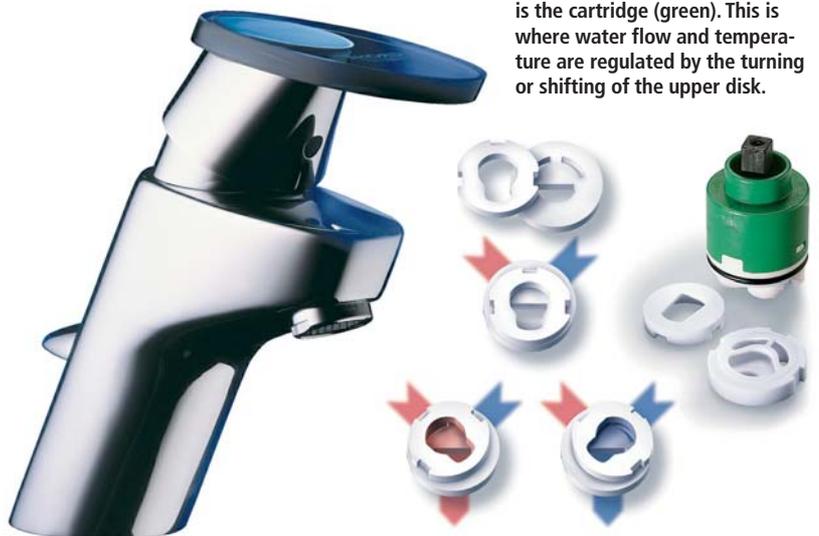
The principle is rather simple: two ceramic disks of varying geometries are pressed against one another in a way that permits the opening or closing of spaces through which the water can flow. Depending on the positioning of the disks, the water flow will be forceful or gentle, hot, cold, or lukewarm. Continuous friction, temperature fluctuations and calcium represent the most important challenges to this system, challenges that can only be lastingly and effectively mastered by ceramic seals despite unfavorable conditions which demand absolute precision and chemical neutrality. This is why such seals are also used in espresso machines, many industrial systems and in medical technology, for instance, in devices used for titration and blood transfusions.

Ceramic seals also offer ideal solutions in the field of transfusion medicine.



The secret behind the durable seal and proper functioning is largely a matter of surface quality. With a very high contact surface to pore ratio (70% to 30%), ceramic seals are extremely smooth and seal completely when they are pressed together at a defined pressure. Moreover, thanks to their hardness (similar to that of diamonds), foreign particles and calcium deposits are simply worn away and discharged with the flow of water. This enables one to rule out third-body wear.

Long before the ceramic seals show any signs of appreciable wear, the other parts of the cartridge will succumb to the onslaughts of time. Plastic parts become brittle and wear out, metal parts corrode. In contrast, ceramic materials remain functionally unchanged even after many years of service. By the way, the probability that you have already set a pair of CeramTec seals in motion while showering or washing your hands today is very high. As the global leader, CeramTec supplies these unassuming, but indispensable seals to all of the world's major fittings manufacturers.



The core of the faucet assembly is the cartridge (green). This is where water flow and temperature are regulated by the turning or shifting of the upper disk.

Theory and Practice

Training Programs in the Use of Ceramics

Providing advanced training for surgeons and support staff is one of the most important tasks handled by the CeramTec Service Team. Here, it is primarily a matter of giving instructions on the handling of ceramic components and explaining their unique material properties. "We develop our talks, presentations and exercise units to meet the specific needs and wishes of the hospital staff we visit," explains Sylvia Usbeck from CeramTec's scientific field service.

One such training program took place last February at the Department of Orthopaedics and Orthopaedic Surgery at the Protestant Hospital in Vienna, Austria, which is headed by Prof. Gerald Pflüger. Here, Sylvia Usbeck and Petra Burkhardt held their workshop directly at the surgical facility so that as many employees as possible could participate. The most important topics addressed in Vienna included permitted ceramic-component combinations, resterilization (allowed!) and instructions for the handling of ceramic components during surgery. "We always come equipped with samples to allow the staff members to gain a sense of proper usage."

At the end, the participants were given the opportunity to ask the two ceramic experts questions. The presentation, practical exercises and discussion were over in an hour. "This timeframe is usually sufficient to allow us to address all of the important subjects," explains Petra Burkhardt. If you are interested in arranging CeramTec training events at your medical center, please refer to the contact information below.



In action at the Protestant Hospital in Vienna, Austria:
Sylvia Usbeck (left) and Petra Burkhardt

■ **11 – 15 May**
EFORT
Florence, Italy

■ **20 – 23 May**
Current Concepts
Las Vegas, USA

■ **30 May – 1 June**
Congrès SO Grand Sud
Bordeaux, France

■ **June**
TJR Symposium
Shanghai – Ruijin Hospital, China

■ **14 – 16 June**
Norddeutscher Orthopädenkongress (NOK)
Hamburg, Germany

■ **21 – 23 June**
Société Orthopédique de l'Ouest (SOO)
Tours, France

■ **7 – 8 September**
12th International BIOLOX® Symposium
Seoul, Korea

■ **25 – 28 September**
British Orthopaedic Association (BOA)
Manchester, UK

■ **24 – 27 October**
Kongress Orthopädie und Unfallchirurgie
Berlin, Germany

■ **2 – 4 November**
Hip and Knee Society
USA

■ **5 – 8 November**
82ème Réunion Annuelle SOFCOT
Paris, France

■ **8 – 11 November**
Chinese Orthopedic Association (COA)
Zhengzhou, Henan, China

■ **9 – 10 November**
9. Update Orthopädie/Unfallchirurgie
Neuss, Germany

■ **11 – 15 November**
92° S.I.O.T.
Bologna, Italy

Imprint

Published by:

CeramTec AG
Innovative Ceramic Engineering
Medical Products Division
Fabrikstr. 23–29
D-73207 Plochingen, Germany
Phone: +49 / 7153 / 6 11-828
Fax: +49 / 7153 / 6 11 838
medical_products@ceramtec.de

Your contact:

Götz Griesmayr
Phone: +1 / 301 / 22 96 704
g.griesmayr@ceramtec.de
(for North America)
Paul Silberer
Phone: +49 / 71 53 / 611 522
p.silberer@ceramtec.de
(all other countries)

Text and Layout:

LoopKomm
Firmenzeitschriften
Terlaner Straße 8
D-79111 Freiburg i. Brsg.
Phone: +49 / 7634 / 55 19 46
Fax: +49 / 7634 / 55 19 47
mail@loopkomm.de
www.loopkomm.de

Concept and coordination:

Sylvia Usbeck
Heinrich Wecker

CeramTec
THE CERAMIC EXPERTS