EXACTECH | KNEE

Design Rationale

OPTETRAK LOGIC®

Comprehensive Revision System

Exactech® BIOLOGICS

Surgeon focused. Patient driven.™

OPTETRAK LOGIC®
Comprehensive Revision System

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Design Team

The design team for Logic CC is comprised of surgeons with vast experience in complex revision knee cases. The synergy of surgeons who were familiar with Exactech's proven knee lineage and surgeons who brought a new perspective created a well-built team that ensured differing approaches and techniques were incorporated into the revision system.

Daniel C. Allison, MD, is an Assistant Professor of Surgery and the Assistant Director of Orthopedic Oncology at Cedars-Sinai Medical Center, Associate Clinical Professor of Orthopedic Surgery at the University of Southern California, and the Co-Director of Pediatric Orthopedic Oncology at Children's Hospital of Los Angeles.

James Huddleston, MD, is associate professor at Stanford University Medical Center, and medical director for its Center for Joint Replacement. Dr. Huddleston completed his internship at Brigham and Women's Hospital, the Harvard Orthopaedic Residency Program at Massachusetts General Hospital, his fellowship in arthroplasty at Massachusetts General Hospital, and his undergraduate degree at Yale University.

Richard Parkinson, FRCS (Orth), is an orthopaedic surgeon at Spire Murrayfield Hospital in Merseyside, U.K. He competed his medical degree at University of Machester, U.K. and his fellowship in knee surgery at Austin Hospital in Melbourne, Australia. Mr. Parkinson serves as president of British Association of Surgery of the Knee, and is also a member of the British Orthopaedic Association and the British Medical Association.

Bernard Stulberg, MD, an orthopedic surgeon practicing in Ohio, earned his medical degree from the University of Michigan. He completed an internship at University of Chicago Hospital and his residency and fellowship at the Hospital for Special Surgery in New York. Dr. Stulberg is a design surgeon for Exactech Knee and ExactechGPS® systems. He is also a member of the American Association of Hip and Knee Surgeons Society.

Geoffrey Westrich, MD, practices at Hospital for Special Surgery and Weill Medical College at Cornell University. He completed his residencies at Hospital for Special Surgery and New York Hospital – Cornell Medical Center and fellowships in Switzerland and Hospital for Special Surgery.

Design Goals

Through shared collaboration and experiences, the design team's goal was to develop a comprehensive solution to offer improvements when addressing the complexities associated with knee revisions. The following design goals were the foundation for this new system:

- **Achieve reproducibility of outcomes by providing a comprehensive range of implants (augments, stems and variably constraining inserts) with an easy-to-use instrumentation approach;**
- **Develop intuitive instrumentation with visual, audible and tactile feedback that allows accurate assessment of the pre-revision condition, a simplified progressive technique to address bone and soft tissue deficiencies accurately and tools to assess the final outcome of the intervention;**
- **Provide a straightforward conversion technique when revision implants are required for complex primary arthroplasty;**
- **Provide easily visualized and accommodated 360-degree offset techniques with implants to improve the surgeon's ability to achieve the alignment and balancing goals necessary for a highly functional and durable arthroplasty.**

Revision total knee arthroplasty cases are expected to triple by 2020, due to the growing size of the aging population and the increasing number of primary total knee arthroplasty cases.[1] The increasing need for revision procedures has manifested itself as a substantial reconstructive challenge in the last decade.

Introduction

To meet the growing demands, Exactech collaborated with a team of revision specialists and engineers to develop a comprehensive platform that helps orthopaedic surgeons manage the wide variety of clinical challenges seen in revision cases.

The Logic CC Comprehensive Revision System delivers a high-performance portfolio of implants and instruments designed to provide reproducible results in a streamlined revision procedure. The comprehensive system offers the implant choices orthopaedic surgeons need to address the unique challenges in revision TKA. Intuitive instrumentation provides modularity and supports a streamlined technique to more quickly and efficiently prepare bone resections.

Reproducibility

Reproducibility is the most important factor to a surgeon when selecting a total knee system.[2] The Logic CC system features implants and instruments that work in concert to help the surgeon achieve consistent results, case after case.

Many of the design features in the Logic primary knee system are maintained in the Logic CC system, including:

- 0.96 femoral and tibial medial-lateral congruency
- One-up and one-down tibial sizing
- Optimized patella track design
- Proprietary net compression molded polyethylene
- Hi-flex spine and cam mechanism

There are a number of clinical factors surgeons consider during revision TKA. A comprehensive system of implants and instruments that performs consistently allows the surgeon to focus on the patient and not be concerned with the system effectiveness. To address the surgeon's needs, the Logic CC system offers a comprehensive range of implants, including augments, cones, stems and insert options designed to allow for easy implant adjustments to treat the needs of each patient.

Comprehensive range of implants, including augments, cones, stems and insert options

Femoral Component and Augments

Because of the vast array of defects encountered in a revision surgery, preserving remaining bone is important. The femoral components are designed with the same proportional cylindrical notch as Logic PS. The dimension of the femoral notch and tibial spine are proportional to the size of the femoral component, minimizing the bone resection for smaller sizes and increasing the jumping height for larger sizes. Additionally, the Logic CC system offers five sizes of asymmetric femurs with a 5-degree valgus angle.

To further help preserve good bone, the Logic CC femoral components feature stackable distal and posterior augments. The 5 and 10mm augments can be stacked with the use of special locking screws, up to 30mm–3x10mm blocks. Augments can be stacked either distally or posteriorly. In order to fill larger distal and posterior defects simultaneously, L-shaped augments are available for patients who require a 10mm distal/15mm posterior or 15mm distal/10mm posterior femoral augment.

CC Femoral Component

Distal Augment

Posterior Augment

L-shaped Augment

Constraint Options

Logic CC femoral components accept three constraint options: Logic PS, PSC and CC poly inserts. Compatibility with the PS and PSC tibial inserts offer surgeons the flexibility to stem the femur or add a femoral augment in cases of poor or absent femoral bone stock, when adequate collateral ligament stability is still present. The specifications for each insert are found below:

Table 1: Constraint Options

	Varus/Valgus Constraint	Internal/External Rotational Constraint	
Logic PS	N/A	N/A	
Logic PSC	+/-3°	+/-4°	
Logic CC	+/-1.5°	+/-2°	

Net Compression Molded Polyethylene

Logic CC incorporates the same net compression molded polyethylene as the Logic primary system. The manufacturing process is designed to yield consistent consolidation, resulting in uniform material properties and oxidation resistance. The resulting articular surface of the polyethylene is never machined, creating a smooth finish. Further, the NCM polyethylene inserts have demonstrated excellent wear characteristic without requiring the need for post-consolidation treatments.[3] By avoiding post-consolidation treatments and a high-level of cross-linking, Exactech's NCM poly retains oxidation resistance and fracture toughness associated with these processes.[4]

Logic CC tibial inserts are available in varying thicknesses up to 29mm to provide the surgeon enough flexibility to successfully manage their flexion/extension gaps.

Thickness	9mm	11mm	13mm	15mm	17mm	21mm	25mm	29mm

FIT Tibial Tray

5mm Augment

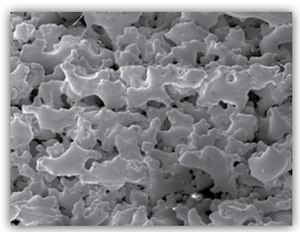
10mm Augment with 15-degree taper

Straight Stem

4mm Offset Coupler

Metaphyseal Cones

Metaphyseal Cones



InteGrip Technology

Tibial Components and Augments

A universal tray can be used in both Logic primary and Logic CC revision procedures, providing a straightforward conversion technique when revision implants are required for complex primary arthroplasty.

The FIT tibial tray accepts 5 and 10mm augments which are available in both 1/3 and 1/2 configurations. The tibial augments can be stacked up to 15mm if the defect requires a larger augment. The 5mm augments can be used on either side of the tray. The 10mm augments are side-specific due to the 15-degree taper designed to match the shape of the tibia and reduce overhang.

Stem Extensions

Both the Logic CC femur and FIT tray accept straight stem extensions with offset couplers (if needed). The system provides 2, 4, 6 or 8mm of 360-degree offset which aids the surgeon with achieving optimal bone coverage and managing their flexion/extension gap. To provide the appropriate level of fixation, Logic CC offers:

- Cemented Straight Stems with 25, 40, 80, 120, 160 and 200mm lengths with diameters ranging from 10-24mm
- Cemented Offset Couplers with 2, 4, 6, or 8mm of offset

Metaphyseal Cones

The objective of using metaphyseal cones is to achieve metaphyseal fixation in cases where bone stock is compromised. Femoral metaphyseal cones are available in four different sizes (small, medium, large, and x-large), and three different heights (32mm, 42mm, and 52mm) for a total of 12 femoral cone offerings. Tibial cones are available in 6 sizes (29, 32, 39, 48, 57, and 65mm), each with a constant height.

Both the femoral and tibial cones are manufactured from 3D printed titanium and have the same parameters as InteGrip®. Comprehensive testing qualifies InteGrip as a three-dimensional, porous ingrowth material. Pore size, count and porosity are optimized to enable adequate ingrowth and maximize material strength properties.[5]

The metaphyseal cones feature a line-to-line press-fit when prepared per the operative technique.

Efficiency

Intuitive Instrumentation

The Logic CC system offers intuitive instrumentation designed with the surgeon and O.R. staff in mind. The instrumentation features easy-to-read laser markings and is designed to provide surgeons with visual, audible and tactile feedback.

- Anything the surgeon needs to move or adjust during the procedure is black.
- Relevant laser markings, such as size or offset, are bold and easy-to-read for everyone involved in the surgical experience.
- The strong focus on aesthetics and ergonomics is designed to improve the overall user experience and increase O.R. efficiency.

Streamlined Technique

The streamlined technique reduces the number of surgical steps to simplify O.R. workflow. From the ergonomically designed modular trials to the intuitive instrument tray layouts, the system was designed with the user's needs in mind.

Modular trials support consistent bone preparation and efficiency. A femoral base trial with a stem extension trial can be used to assess the fit of the component prior to cutting the cylindrical notch.

The system provides multiple opportunities for femoral augment preparation and features resection slots for preparing both distal and posterior augments.

Modular tibial insert trials allow the surgeon to assess range of motion and stability prior to the femoral notch resection. Preparing the bone-conserving notch[6] is simple with the easy, one-step notch cutter and guide that attaches directly to the base femoral trial.

To easily remove both femoral and tibial trials, an extractor tool was integrated into the system. The instrument easily connects to any of the trials and allows simplified removal with a slap hammer.

Resection Slots in the Femoral Base Trial

Modular Insert Trial

Extractor Tool Removes Both Femoral and Tibial Trials

Modular Femoral Trial with Attachments

Alignment

A main principle of knee replacement is to ensure accurate alignment of the implants relative to the natural joint line or to the anatomical axis. The Logic CC system offers both implant and instrument options that are designed to assist with alignment.

Joint Line

The Logic CC system includes a Joint Line Reference Stylus designed to reference the existing joint line position prior to extraction of the implanted femoral component. This provides a reference to establish the joint line position for the revision component. The joint line reference stylus also allows the surgeon to adjust the distal cut depth up to 10mm with a simple turn of a knob if an adjustment to the joint line is desired.

Distal Femoral Resection Guide

Anatomical Axis

In revision surgery, the intramedullary canal is often the only reliable landmark for the placement of the instruments. The cutting guides in the Logic CC knee system use a Stem Extension Reamer placed in the IM canal as their reference point. This reamer, and subsequently the stem position in the IM canal, will determine the A/P and M/L positions of the implants.

Because revision implants must be aligned to the IM canal, the Logic CC system includes implant and instrument options to adjust the flexion and extension gaps while maintaining IM canal alignment. The 2, 4, 6 or 8mm offset couplers allow the surgeon to offset the femur in any direction for simple flexion/extension gap management. Additionally, the Logic CC femoral components are designed with a constant distance between the femoral boss and anterior flange, which provides the surgeon the ability to change the femoral component size and alter the flexion gap without affecting the fit of the component anteriorly.

Tibial Offset Determination

NOTES

References

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Revision cases can be complex and challenging. Exactech's latest revision products for hip, knee and shoulder are designed to deliver ease of use for surgeons and improved outcomes for patients. Whatever demands you face in the O.R., Exactech products can help you address them. **Complexity Simplified.**

Exactech is proud to have offices and distributors around the globe. For more information about Exactech products available in your country, please visit www.exac.com

For additional device information, refer to the Exactech Knee System–Instructions for Use for a device description, indications, contraindications, precautions and warnings. For further product information, please contact Customer Service, Exactech, Inc., 2320 NW 66th Court, Gainesville, Florida 32653-1630, USA. (352) 377-1140, (800) 392-2832 or FAX (352) 378-2617.

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