Faster healing. Stronger healing.
Locked plating constructs are creating a challenge for surgeons.

Three recent studies examining supracondylar femur fractures show concern for the high degree of stiffness of locked plating constructs and report nonunion rates as high as 23%.1,2,3

While it is true that a plating construct needs to be strong enough to support the damaged bone while the fracture heals, it is also true that too much stiffness forces the body to heal through osteonal or primary/direct healing.3

Primary healing requires nearly-perfect anatomic reduction and rigid compression for absolute stability, as well as a complex and unforgiving procedure.4

Figure 1 illustrates how locked plating constructs will bend to create motion and callus formation on the far cortex. This can lead to delayed union or nonunion issues if the fracture does not heal before the plate breaks.

MotionLoc Technology answers that challenge with controlled movement.

Zimmer is using far cortical locking technology as a strategy to reduce the stiffness of a locked plating construct without losing construct strength.

MotionLoc Technology generates parallel motion at the fracture site through elastic flexion of the screws to actively promote secondary bone healing circumferentially across the entire fracture gap.

Concept: MotionLoc screws lock in the plate and the far cortex of diaphyseal bone. MotionLoc screws have a reduced diameter mid-shaft to bypass the near cortex. Under load, the screw will elastically flex to create interfragmentary motion at the fracture site until the shaft of the screw contacts the near cortex for added support and load sharing.

Reduced Stiffness: MotionLoc screws provide flexible fixation by elastic bending of screw shafts. MotionLoc screws reduced the initial axial stiffness of a locked plating construct by up to 64%.

Bi-Phasic Stiffness: At elevated loading and flexion, the near cortex of the bone will support the flexing screw shaft to provide a stiffness increase and reinforce the strength of the loading curve of a locked plating construct.

Parallel Motion: The elastic deformation of the MotionLoc screws translates to nearly parallel micromotion at the fracture site. With a standard locking construct in a bridging technique, micromotion is only created at the far cortex.

Load Distribution: MotionLoc constructs provide evenly distributed load sharing among all MotionLoc screws. In contrast, the end-screw of a standard locked construct induces a stress riser, which reduces construct strength in bending and torsion.5


* Data on file at Zimmer. Please reference ZRR 2198-10-REV2
Observational study demonstrates faster and stronger healing with *MotionLoc* Technology.

Thirty-one consecutive patients with 33 distal fractures (AO/OTA types 33 A-C) were prospectively enrolled at three trauma centers. Thirty-one fractures were available for follow-up until union or revision. Patients were followed up for a minimum of 1 year with functional and radiographic assessment obtained at post-operative weeks 6, 12 and 24, including a computed topography scan at week 12.

In total, 125 *MotionLoc* screws were used in the study. None of them broke or lost fixation and only one of the patients displaced into varus.

Thirty of 31 fractures healed within 15.6 ± 6.2 weeks (Figure 7A). Seventy-four percent of fractures formed periostal callus that extended to the lateral cortex under the plate. This suggests a direct effect of dynamization with *MotionLoc* screws on callus distribution. 6

Compared to these historic control data of 66 distal femur fractures stabilized with locking plates using standard locking screws, dynamic fixation in the present study yielded an on average increase in periostal callus size of 48% at week 6 (p=0.12), 72% at week 12 (p=0.02), and 113% at week 24 (p=0.001).

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<th>Figure 5: Outcomes Data</th>
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<td>Parameter</td>
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Contact your Zimmer sales rep for the complete study results and analysis.

6. Clinicaltrials.gov, Identifier NCT01667887
**Figure 6:** Durability of fixation in presence of excessive weight-bearing in an ambulating patient with a body mass index of 56, weighing 157 kg.⁶

**Figure 7:** Periosteal callus assessment: A) Average size of projected periosteal callus area at the medial, anterior, and posterior aspects. B) Periosteal callus distribution, shown to scale for different time points and locations. Percentages refer to the distribution of callus at a specific time. For example, of the total periosteal callus at week 6, 35%, 30% and 35% was deposited at the posterior, anterior, and medial cortex, respectively. C) Circumferential periosteal callus included callus formation on the lateral aspect adjacent to the plate.⁶

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⁶ Clinicaltrials.gov, Identifier NCT01667887
Why *MotionLoc* Technology? Get your answer straight from these surgeons.

“I have continued to use *MotionLoc* because of the clinical results I have seen thus far. I have been impressed with the early callus formation, the overall rate of union, and patient satisfaction. I would recommend *MotionLoc* to other physicians as a valuable tool, if they are having difficulties in getting fractures of the distal femur to heal reliably or are experiencing issues with implant failure due to nonunion.”

– Chinedu Nwosa, MD
Des Moines, IA

“With *MotionLoc* I’m seeing healing not only at a faster rate, but also more consistent callus formation circumferentially around the fracture site. The amount of healing I’m seeing is significantly greater than the bone formation I’ve seen with other techniques.”

– Gregory Tennant, DO*
Fontana, CA

“Far Cortical Locking Technology has been extensively researched in lab and animal models with documentation of its improvement in the biomechanical aspects of fracture healing; much more than any other plating technology that has become available. When using the Zimmer adaptation of Far Cortical Locking Technology, or the *MotionLoc* screw, I have not had any fractures become nonunions. *MotionLoc* makes sense for the progression in fracture care where we have learned that providing a suitable biologic environment for healing is important. Adding a more suitable biomechanical environment to our current treatment, in my opinion, will reduce the number of nonunions in current practice.”

– Michael Tilley, MD*
Kansas City, KS

* Dr. Gregory Tennant and Dr. Michael Tilley are paid consultants for Zimmer, Inc.
Patient One Information

- 89-year-old female, 152 lbs.
- Ground Level fall
- Comminuted supracondylar periprosthetic femur fracture

She was treated with an NCB Periprosthetic Distal Femur Plate, NCB Cancellous screws, and MotionLoc screws. Follow up x-rays were taken at 24 weeks post-op and show circumferential callus bridging across the fracture site.

Patient Two Information

- 58-year-old male
- Motorcycle accident
- Multiple extremity injuries

The patient was treated with the NCB straight-narrow plate and MotionLoc screws. Follow-up x-rays were taken at 6 weeks post-op and show circumferential callus bridging around the fracture site.