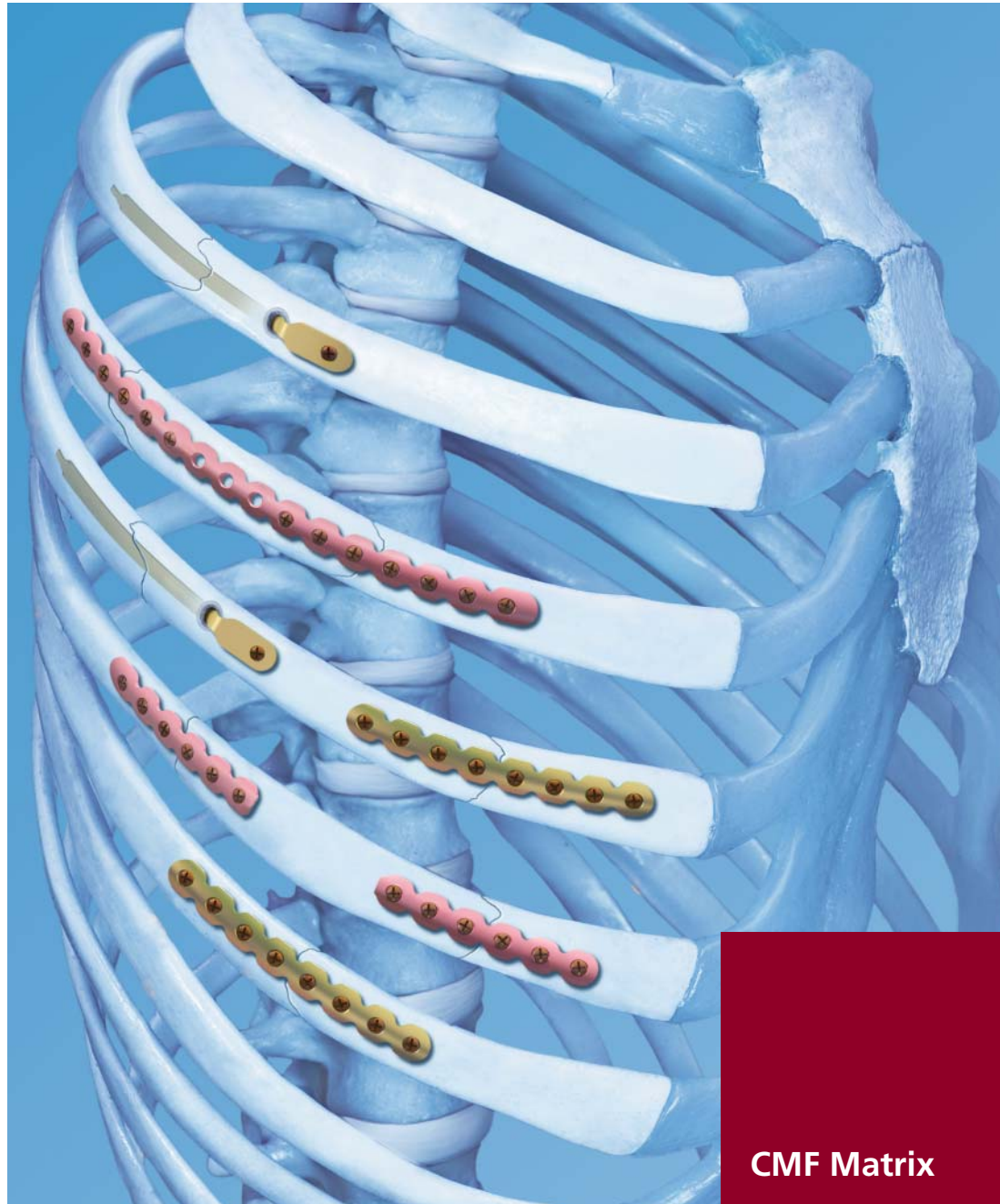


MatrixRIB. Stable fixation of normal and osteoporotic ribs.

Precontoured
plates

Minimally invasive

Stable fixation



CMF Matrix

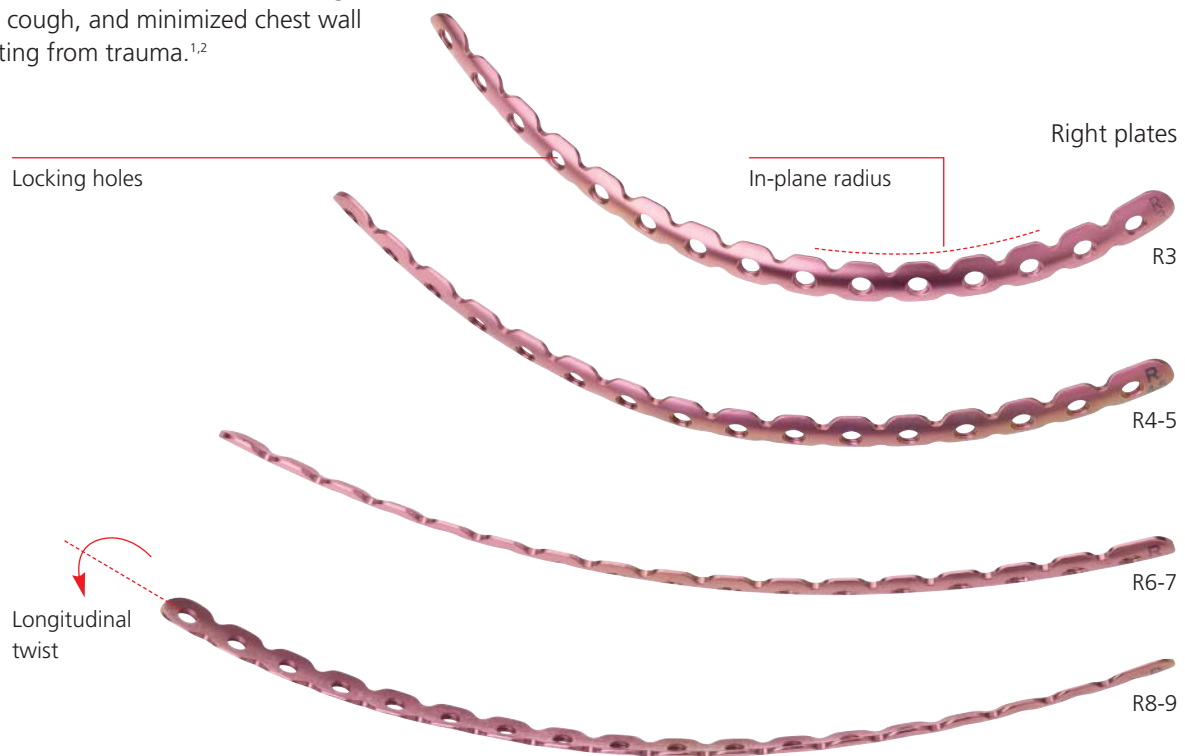
MatrixRIB

The Synthes MatrixRIB Fixation System consists of precontoured locking plates, locking screws, and intramedullary splints for the fixation and stabilization of ribs.

Although some rib fractures are treated with pain management and bracing, as well as endotracheal intubation and mechanical ventilation if necessary, some patients could benefit from surgical stabilization (osteosynthesis). Potential benefits of surgical stabilization of fractures include reduced duration of mechanical ventilation support, shortened ICU stays and hospitalization, better secretion management through efficient cough, and minimized chest wall deformities resulting from trauma.^{1,2}

Features

- Designed to be used without removing periosteum, to maximize blood supply to the bone
- All implants are manufactured from titanium alloy* for flexibility and strength
- Drill bit with stop to prevent over-drilling
- Self-retaining screwdriver blades



Indications†

The Synthes MatrixRIB Fixation System is indicated for the fixation and stabilization of rib fractures, fusions and osteotomies of normal and osteoporotic bone.

Locking screws

- Screws work with self-retaining screwdriver blades to reduce cam-out
- Locking design for increased stable fixation
- One screw diameter for use with all plates and splints

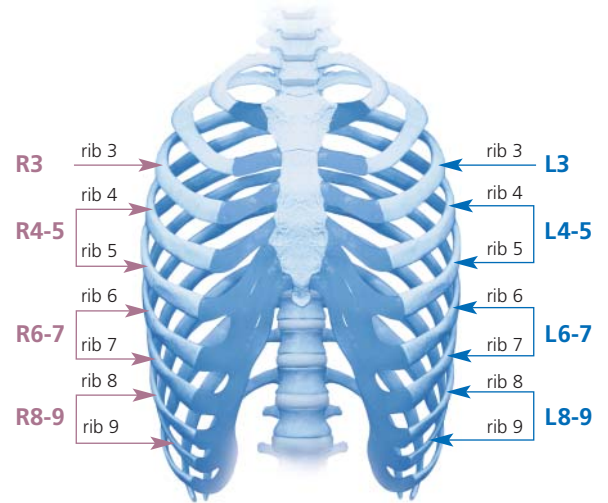


* Ti-6Al-7Nb

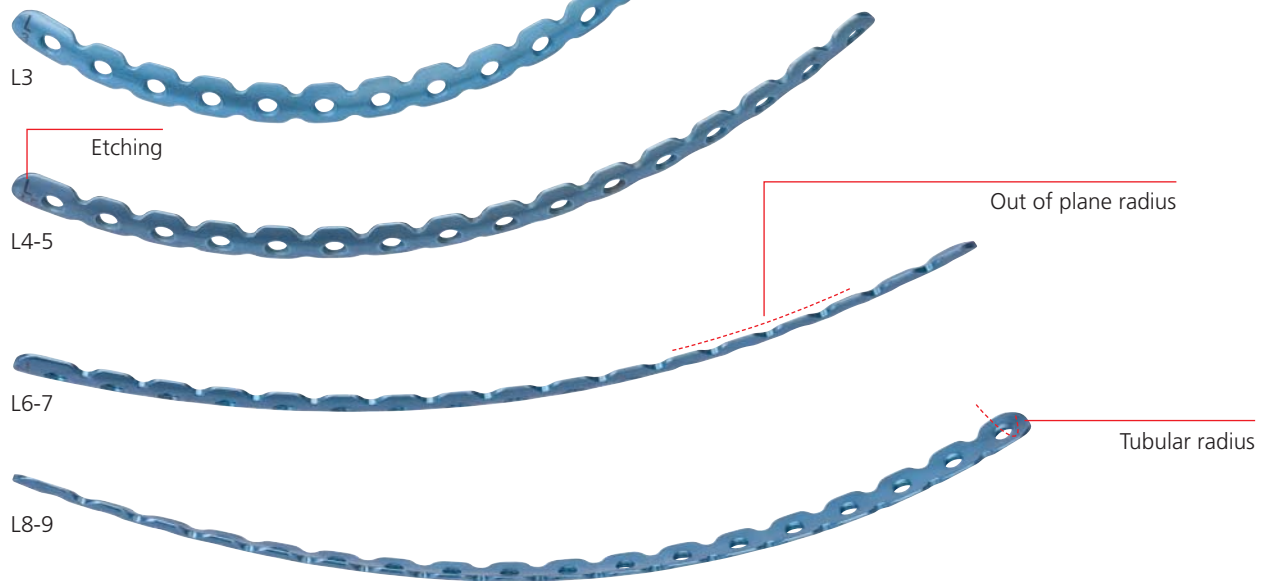
† Please see MatrixRIB Technique Guide for full list of warnings and cautions.

Locking plates

- Plates are precontoured to fit an average rib shape, which minimizes intraoperative bending³
- Locking plate construct provides stable fixation
- Low-profile 1.5 mm thick plates
- Plates are color-coded to distinguish left and right designs
- Plates are etched on medial end to indicate the corresponding rib curvature
- A universal plate with 8 holes is available

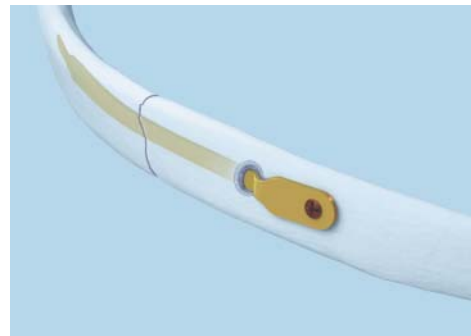


Left plates



Intramedullary splints

- Intramedullary splints allow minimally invasive procedures
- Three widths available (3 mm, 4 mm, 5 mm)
- Only one screw needed to secure splint



Biomechanical Testing*

The Synthes MatrixRIB Fixation System was tested in a cadaveric model to withstand five times higher-than-normal in vivo loads† for a duration representative of more than 2 weeks of fracture healing (360,000 cycles)‡. Furthermore, a second group of plates was mounted on plastic test blocks and subjected to 15 times higher-than-normal in vivo loads† for a duration representative of more than 6 weeks of fracture healing (1,000,000 cycles)‡.

Plate and splint construct testing on cadaveric rib model

Step 1

Static load-to-failure of native ribs to produce realistic fracture patterns



Step 2

Plate and splint constructs subjected to 5 times respiratory loading (200 Nmm) for 360,000 cycles



Step 3

Plate and splint constructs loaded statically to failure to determine residual construct strength

Figure 1: Overview of cadaveric bone testing model.



Figure 2: Cadaveric rib test setup.

† Rehm KE. Die Osteosynthese der Thoraxwandinstabilitäten. Hefte zur Unfallheilkunde 1986;175.

‡ The estimate for the amount of cycles representative of fracture healing is based on 14.1 breaths per minute.

Cadaveric rib plate and splint testing summary*

- Bending stiffness of plate testing constructs was comparable to unfractured cadaveric osteoporotic rib (Figure 3).
- All plate and splint constructs survived exaggerated dynamic loading (bending loads 5 times greater than respiration for 360,000 cycles) in a cadaveric model without construct failure.
- Plate and splint constructs retained sufficient strength after dynamic loading to support loads greater than respiration at an exaggerated level (Figure 4).
- Splint construct provided stable fixation during the dynamic loading with no observed implant migration.

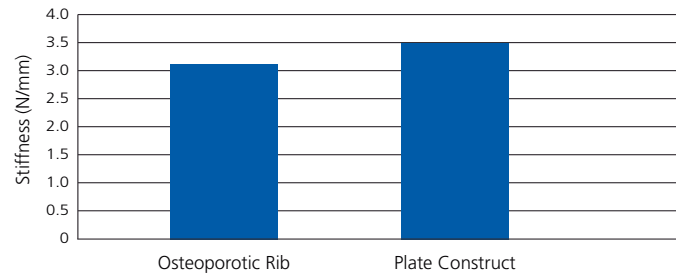


Figure 3: Bending stiffness of plate constructs is comparable to intact cadaveric osteoporotic rib.

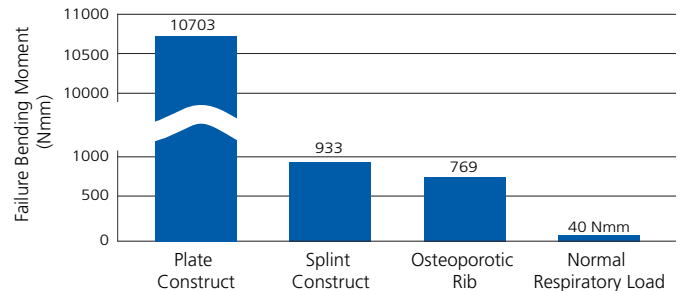


Figure 4: Plate and splint constructs support loads significantly greater than respiration loads following extended dynamic loading (200 Nmm for 360,000 cycles).

Bench testing on plastic blocks*

- Plates survived bending loads approximately 15 times greater than respiratory loading (600 Nmm) for 1,000,000 cycles.

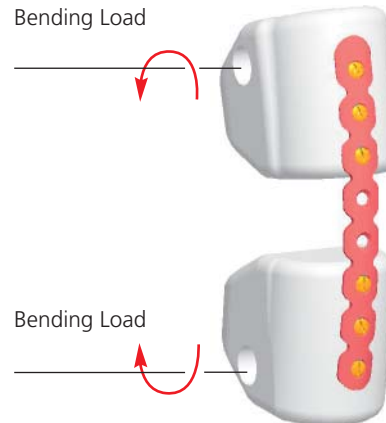


Figure 5: Illustration of test construct for bench testing on plastic blocks.

* Mechanical test results are not necessarily indicative of clinical performance. Synthes Test report number MT08-481 and MT08-161.

MatrixRIB Fixation System Set (01.501.005)

Graphic Case

- 60.501.001 Graphic Case with Lid for MatrixRIB Fixation System

Instruments

- 03.501.001 Depth Gauge for 2.7 mm and larger screws with zero offset
- 03.501.030 MatrixRIB Plate Holding Forceps, small, with ball tips, 2 ea.
- 03.501.031 MatrixRIB Plate Holding Forceps, large, with ball tips, 2 ea.
- 03.501.032 MatrixRIB Intramedullary Splint Driver
- 03.501.033 2.2 mm Threaded Drill Guide for MatrixRIB Locking Plates, 2 ea.
- 2.2 mm Drill Bits, Stryker J-latch, 135 mm, 2 ea.
- 03.501.036 with 6 mm stop
- 03.501.038 with 8 mm stop
- 03.501.040 with 10 mm stop
- 03.501.042 with 12 mm stop
- 03.501.044 with 14 mm stop
- 03.501.055 5.5 mm Drill Guide, for MatrixRIB Intramedullary Splints
- 03.501.061 MatrixRIB Intramedullary Splint Template, small
- 03.501.062 MatrixRIB Intramedullary Splint Template, medium
- 03.501.065 Caliper
- 03.501.066 Mallet, 200 g
- 03.501.070 5.5 mm Drill Bit with stop, Stryker J-latch, 125 mm, 2 ea.
- 03.501.071 MatrixRIB Plate Holding Forceps, small, 2 ea.
- 03.501.072 Bending Template, for MatrixRIB Locking Plates, 2 ea.
- 03.503.071 MatrixMANDIBLE/RIB Self-Retaining Screwdriver Blade, medium, 2 ea.
- 03.503.072 MatrixMANDIBLE/RIB Self-Retaining Screwdriver Blade, long, 2 ea.
- 311.023 Ratcheting Screwdriver Handle, 2 ea.
- 329.142 Combination Bending Pliers, for 2.0 mm–2.4 mm plates
- 391.990 Plate and Rod Cutter
- 398.40 Reduction Forceps with points, narrow, ratchet, 132 mm length, 2 ea.



Implants

	Titanium MatrixRIB Pre-Contoured Plates, 2 ea.
04.501.001	15 holes, for left rib 3
04.501.002	15 holes, for right rib 3
04.501.003	16 holes, for left ribs 4 and 5
04.501.004	16 holes, for right ribs 4 and 5
04.501.005	17 holes, for left ribs 6 and 7
04.501.006	17 holes, for right ribs 6 and 7
04.501.007	18 holes, for left ribs 8 and 9
04.501.008	18 holes, for right ribs 8 and 9
04.501.009	Titanium MatrixRIB Universal Plate, 8 holes, 4 ea.
	MatrixRIB Intramedullary Splints, 6 ea.
04.501.010	Small, 3 mm width
04.501.011	Medium, 4 mm width
04.501.012	Large, 5 mm width
	2.9 mm Titanium MatrixRIB Locking Screws, self-tapping, 5/pkg.
04.501.016.05	6 mm, 6 pkgs.
04.501.018.05	8 mm, 10 pkgs.
04.501.020.05	10 mm, 10 pkgs.
04.501.022.05	12 mm, 10 pkgs.
04.501.024.05	14 mm, 6 pkgs.
04.501.036.05	2.9 mm Titanium MatrixRIB Non-Locking Screw, self-tapping, 6 mm, 2 pkgs. of 5

Also Available

03.503.073	MatrixMANDIBLE/RIB Self-Retaining Fixed Handle Screwdriver
	2.9 mm Titanium MatrixRIB Locking Screws, self-tapping, 1/pkg.
04.501.016.01	6 mm
04.501.018.01	8 mm
04.501.020.01	10 mm
04.501.022.01	12 mm
04.501.024.01	14 mm
04.501.036.01	2.9 mm Titanium MatrixRIB Non-Locking Screw, self-tapping, 6 mm, 1/pkg.
05.000.007.01S	Battery Pack, sterile, for Battery Powered Driver
05.000.008	Hand Piece, for Battery Powered Driver

References

1. Z. Ahmed, Z. Mohyuddin. "Management of flail chest injury: internal fixation versus endotracheal intubation and ventilation." *J Thorac Cardiovasc Surg.* 1995 Dec; 110(6):1676-80.
2. H. Tanaka, T. Yukioka, Y. Yamaguti, S. Shimizu, H. Goto, H. Matsuda, S. Shimazaki. "Surgical stabilization of internal pneumatic stabilization. A prospective randomized study of management of severe flail chest patients." *J Trauma.* 2002;52(4):727-32; discussion 32.
3. M. Mohr, E. Abrams, C. Engel, W.B. Long, M. Bottlang. "Geometry of Human Ribs Pertinent to Orthopaedic Chest-Wall Reconstruction." *J Biomech.* 2007;40(6):1310-7.



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