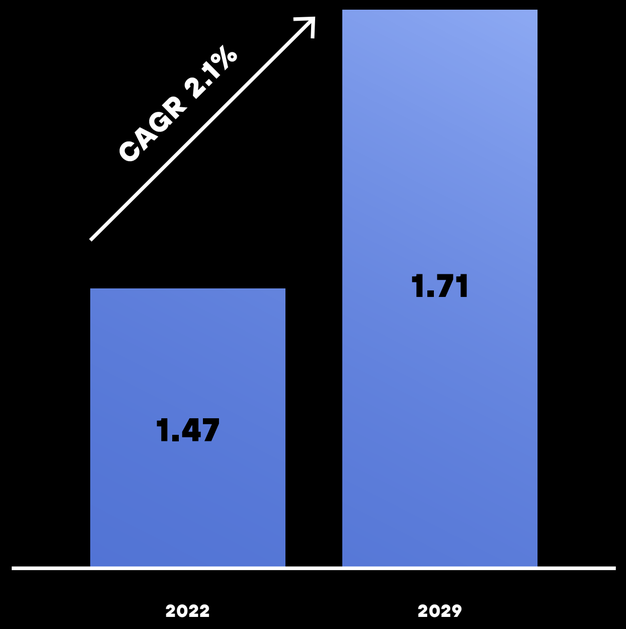
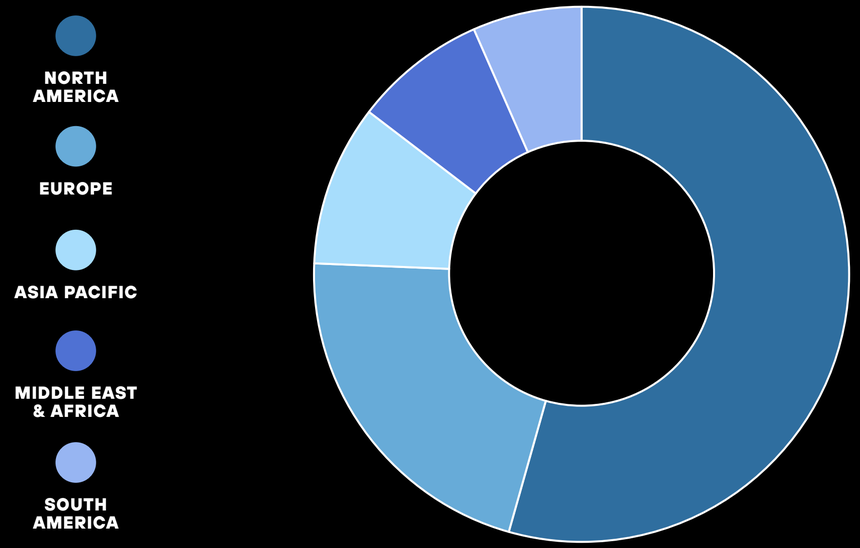

UnifiM.I.™
TRANSPORTATION, LLC
A FASTENER TECHNOLOGY COMPANY

INDUSTRY BREAKDOWN FOR RAILWAY FASTENERS

MARKET SIZE IN US$ BILLION



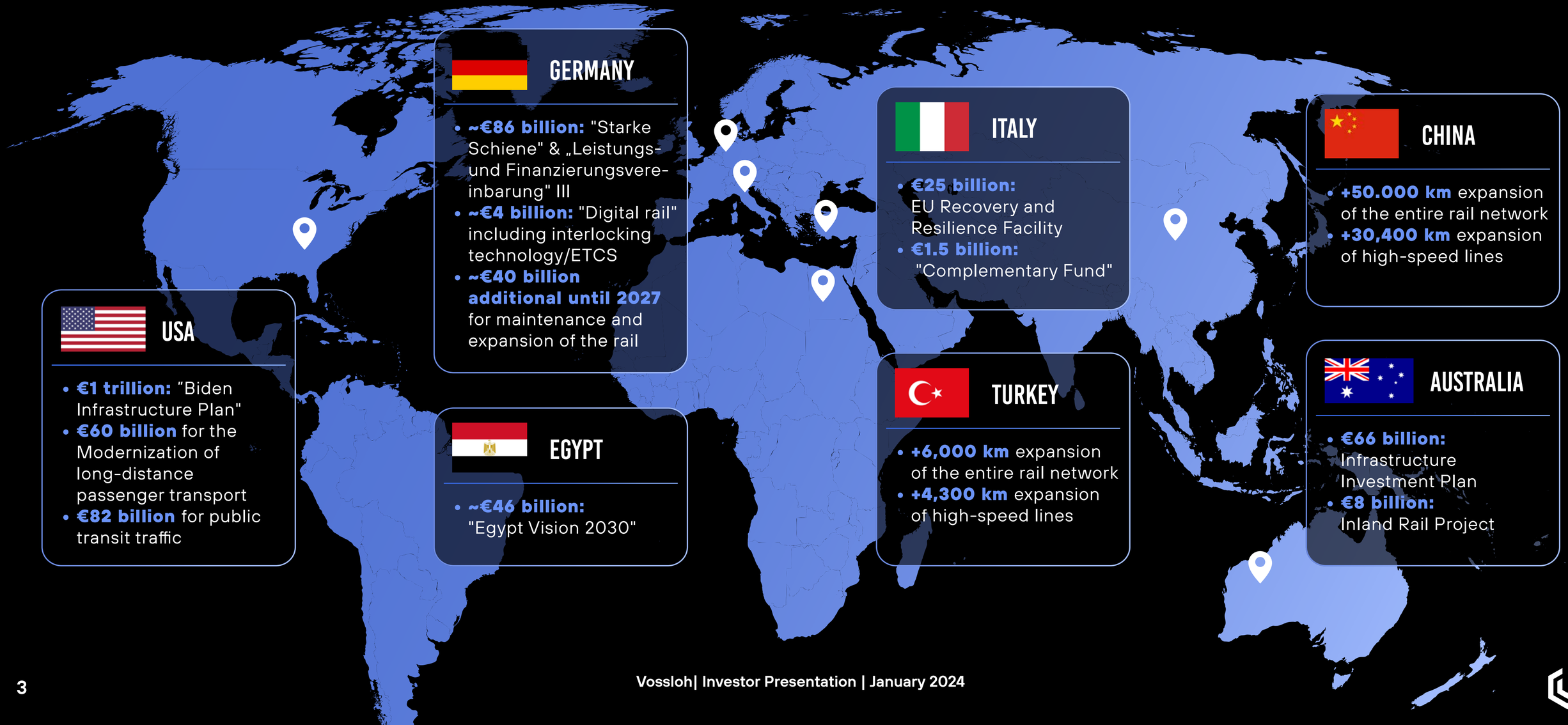
REGIONAL ANALYSIS IN 2022 (%)



Maximize Market Research | Rail Fastener Market – Global Industry Analysis and Forecast| July 2023

RAIL INVESTMENT PROGRAMS WORLDWIDE

MANY COUNTRIES HAVE RECOGNIZED THIS AND ARE COUNTERACTING



GERMANY

- **~€86 billion:** "Starke Schiene" & „Leistungs- und Finanzierungsvere-inbarung" III
- **~€4 billion:** "Digital rail" including interlocking technology/ETCS
- **~€40 billion additional until 2027** for maintenance and expansion of the rail

ITALY

- **€25 billion:** EU Recovery and Resilience Facility
- **€1.5 billion:** "Complementary Fund"

CHINA

- **+50.000 km** expansion of the entire rail network
- **+30,400 km** expansion of high-speed lines

USA

- **€1 trillion:** "Biden Infrastructure Plan"
- **€60 billion** for the Modernization of long-distance passenger transport
- **€82 billion** for public transit traffic

EGYPT

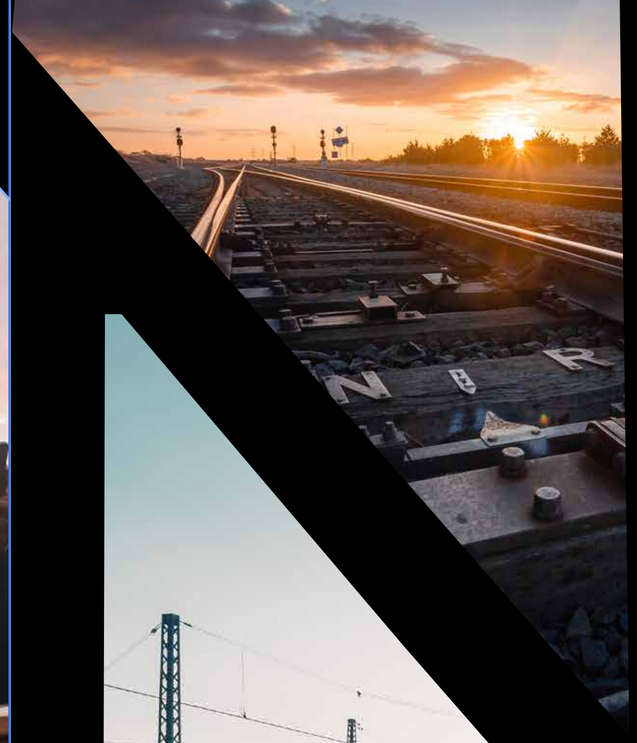
- **~€46 billion:** "Egypt Vision 2030"

TURKEY

- **+6,000 km** expansion of the entire rail network
- **+4,300 km** expansion of high-speed lines

AUSTRALIA

- **€66 billion:** Infrastructure Investment Plan
- **€8 billion:** Inland Rail Project



EXPERIENCE MATTERS

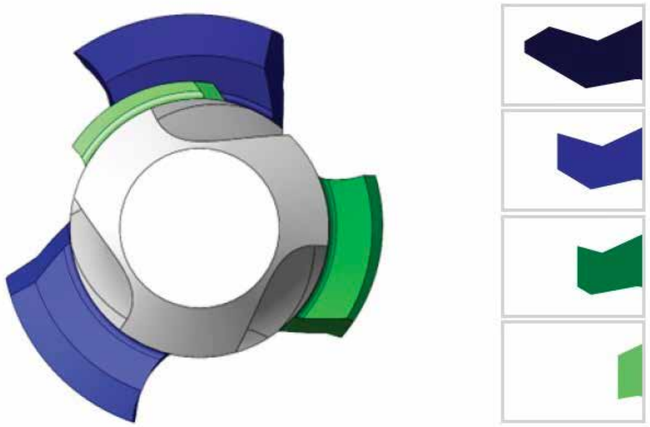
UNIFI*M.I.* FASTENER TECHNOLOGY TRANSFORMED THE MEDICAL DEVICE INDUSTRY.

UTILIZED DAILY BY EXPERT SURGEONS 100 UNIVERSITY HOSPITALS TO MAINTAIN IMPLANT STABILITY.

UNIFI*M.I.* PERFORMANCE CAPABILITIES

- PRESERVE THE SUBSTRATE
- INSTANTLY INTERLOCK TO THE PRESERVED SUBSTRATE
- MAINTAIN STABILITY OVER TIME

SUBSTRATE PRESERVING TAP



EXPERIENCE THE DIFFERENCE

CONVENTIONAL ‘BUTTRESS’ THREADS VS. UNIFIM.I. THREADS

INSERTION TEST

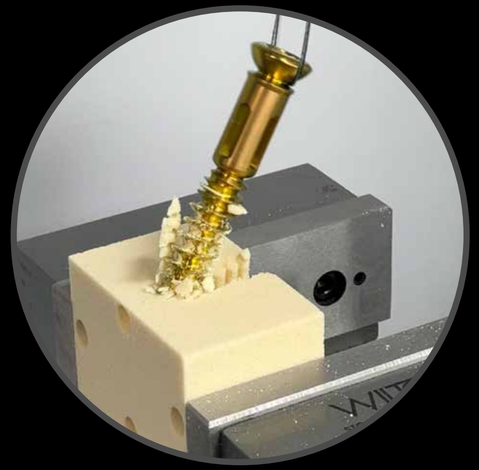
Conventional

- Crushes and plows during insertion
- Creates a damaged and unstable interface

Unifi*M.I.*

- Cleanly prepares and preserves during insertion
- Creates a stable and mechanically integrated interface

PULL TEST



Conventional

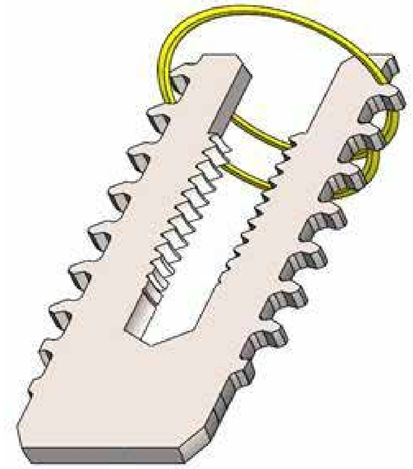
- Non-integrated
- Interface crushed and fractured
- Limited load resistance on tension side

Unifi*M.I.*

- Integrated circumferentially
- Interface preserved and maintained
- Full load resistance on tension side via MI

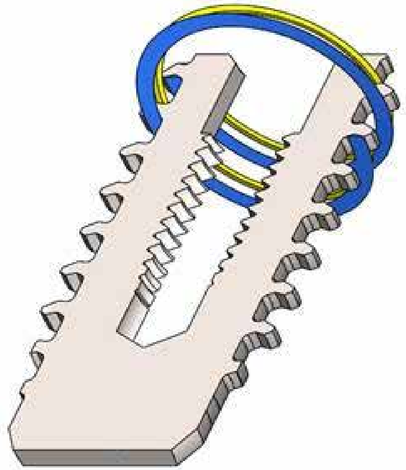
Unifi*M.I.* EXPLAINED

UNIQUE THREAD GEOMETRY: USING UNDERCUTS TO INTERLOCK WITH SUBSTRATE



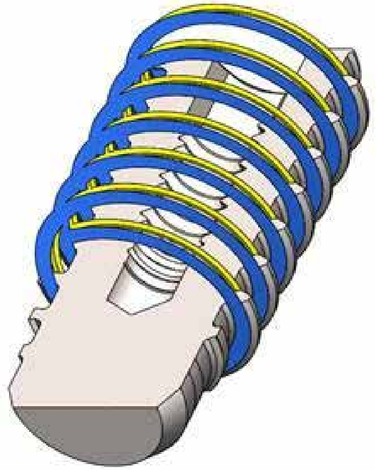
TRAILING UNDERCUT

Trailing undercut provides circumferential resistance to axial pull-out and toggle.



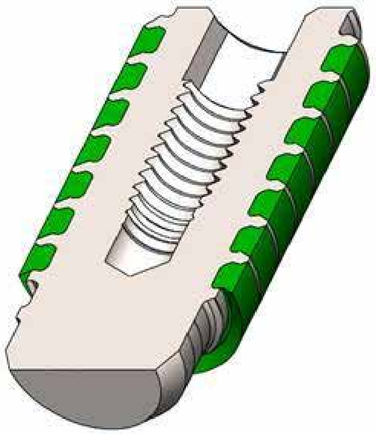
LEADING UNDERCUT

Leading undercut provides circumferential resistance to axial compression and toggle.



WORKING LENGTH

The unique undercut geometry resists loads and supports the insert within the substrate down the entire thread length.



SUBSTRATE CAPTURE

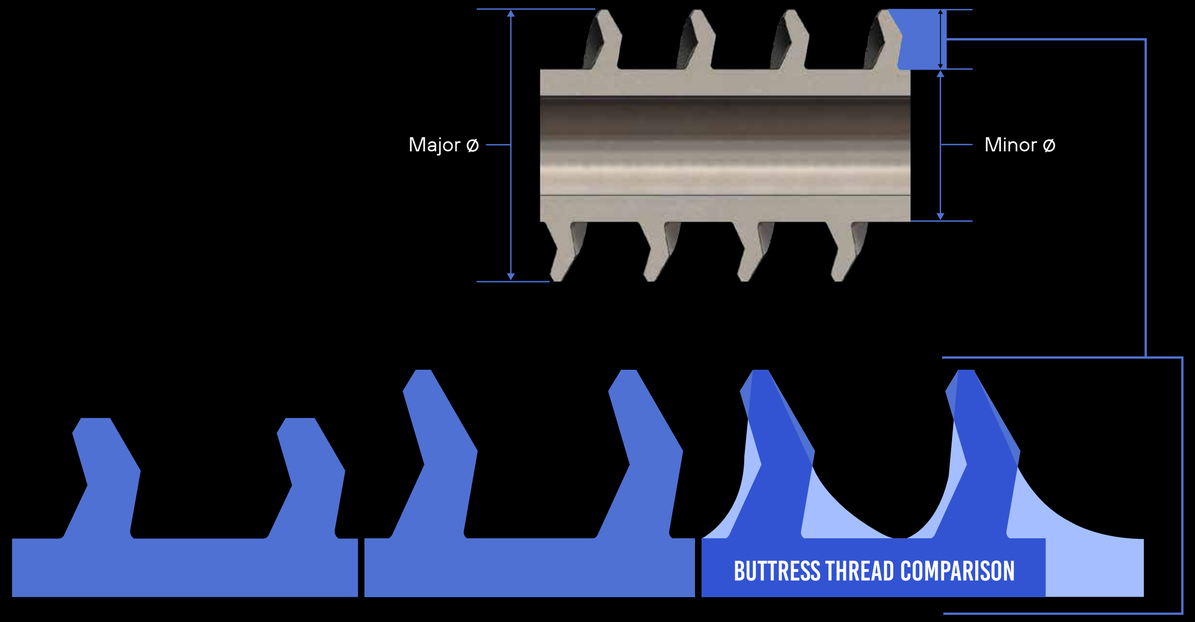
The result is the interlocking of significant substrate volume between threads--providing immediate and lasting stability by sharing loads and reducing stress concentrations.

ADAPTABLE CHARACTERISTICS

BY SUBSTRATE APPLICATION

Ability to control interface depending upon:

- Material Demands
- Application Needs



PERFORMANCE DRIVEN DESIGN

UNIFI*M.I.* THREAD FORM

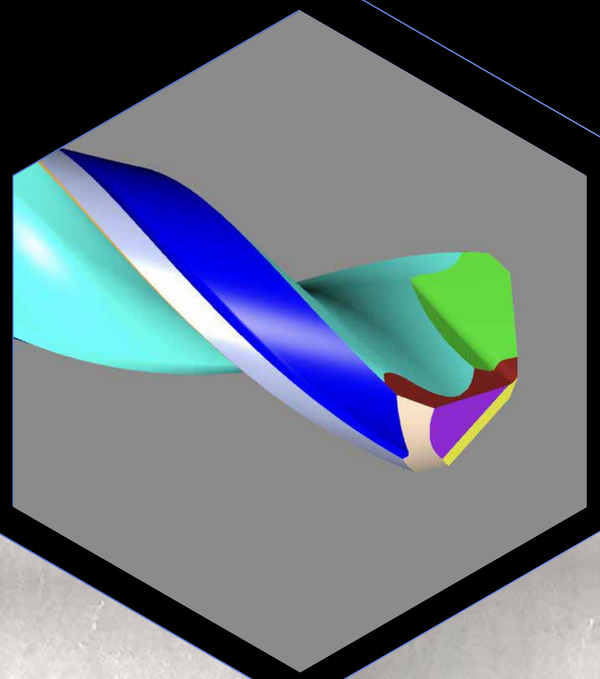
CONVENTIONAL ‘BUTTRESS’ THREAD FORM

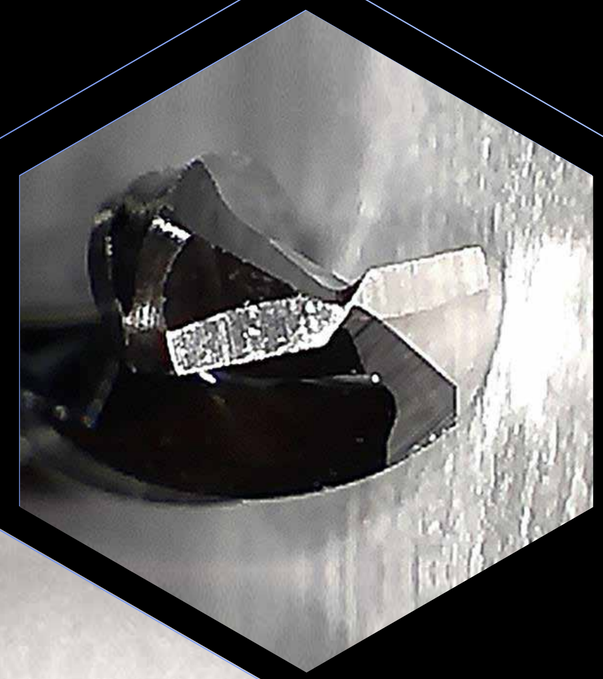
DRILL OPTIMIZATION

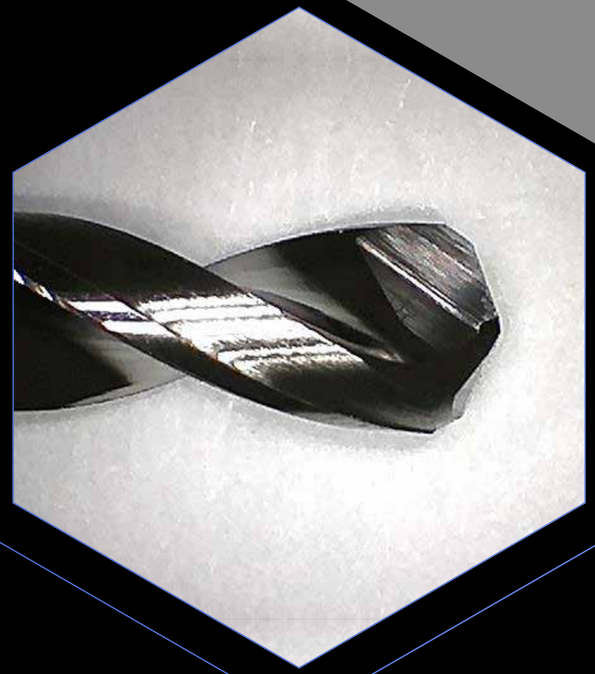
- TIP ANGLE
- SPLIT POINT
- PRIMARY & SECONDARY RELIEF
- CORNER CHAMFER
- FLUTE HELICAL ANGLE
- FLUTE EDGE BREAK
- FLUTE MARGIN

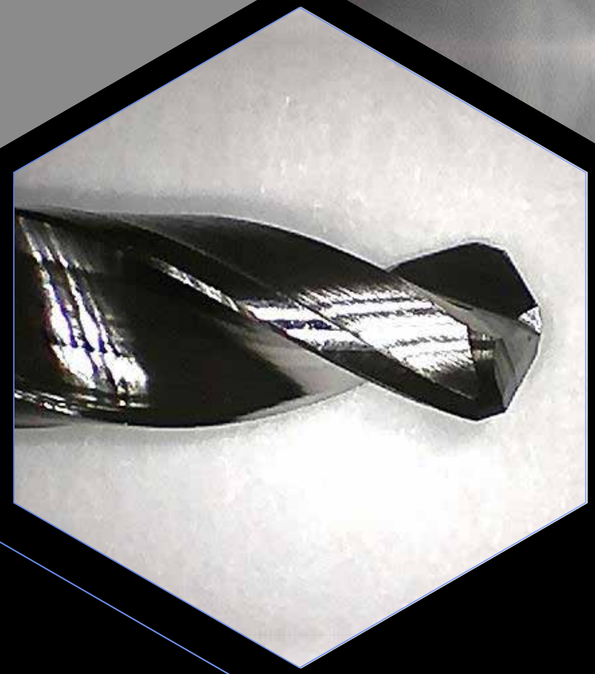
RESULTING IN

- MORE ACCURATE HOLE SIZE
- FASTER DRILLING SPEED
- LOWER HEAT GENERATION





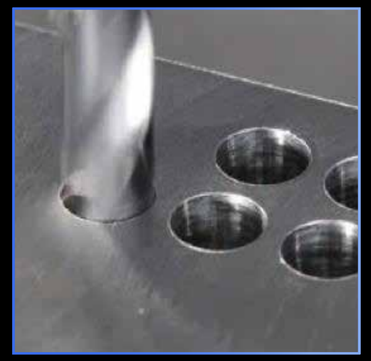




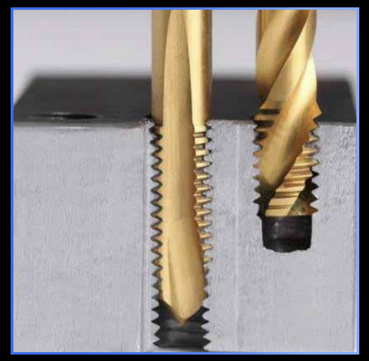
LEVERAGING KNOWLEDGE

APPLICATION OF INTELLECTUAL PROPERTY

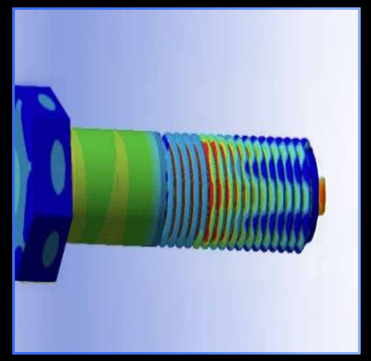
DRILLING



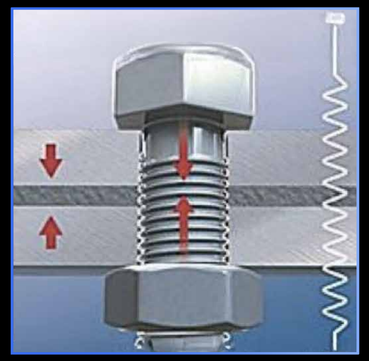
TAPPING



STRESS MANAGEMENT

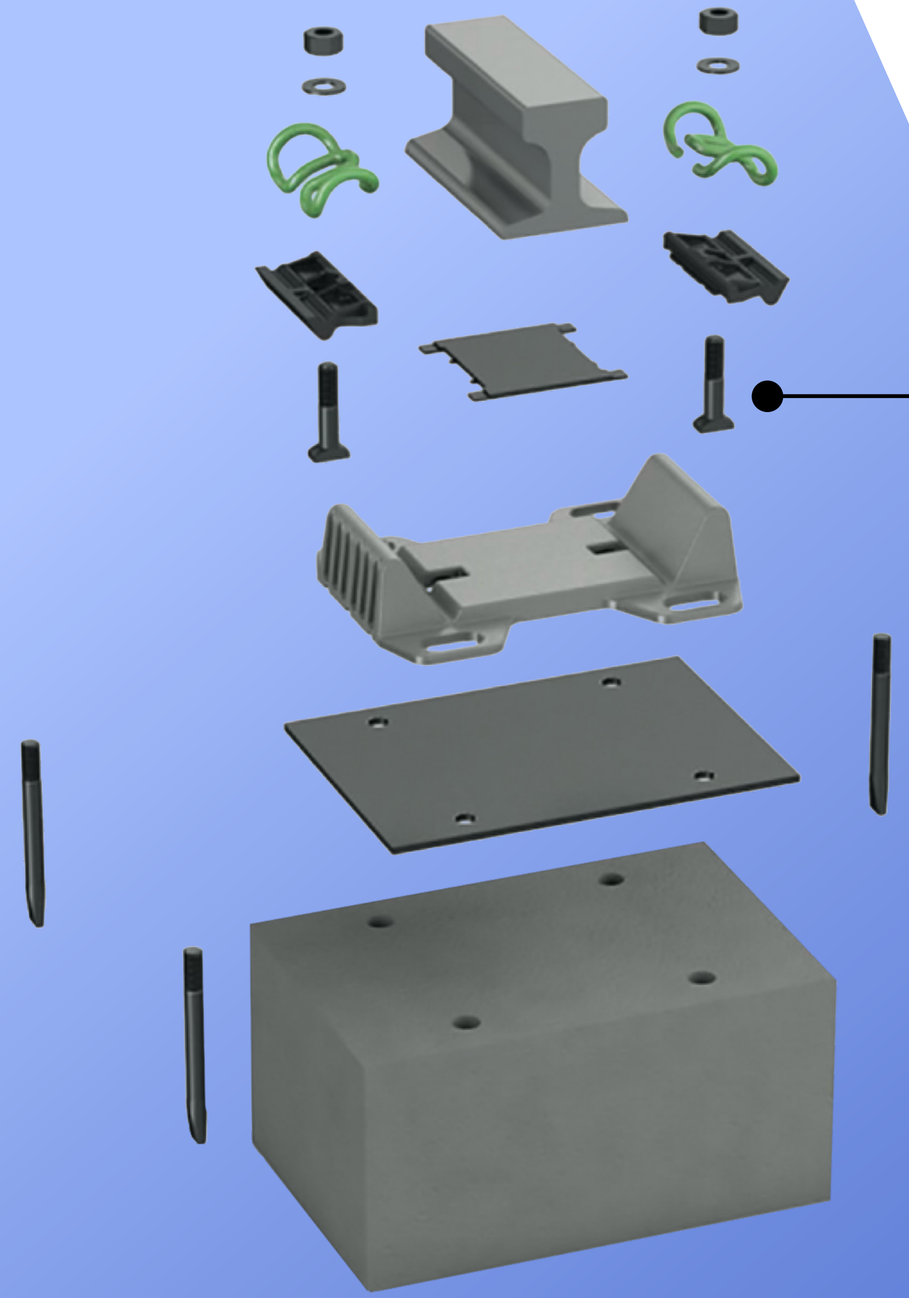


STABILITY



RAILWAY APPLICATION

AREAS OF FOCUS



Vibration stability,
off-axis loading of
t-bolt and nut

Substrate preservation,
vibration stability,
off-axis loading of
railway screw

LEVERAGING KNOWLEDGE

APPLICATION OF INTELLECTUAL PROPERTY

RBM FROGS

DIAMONDS

GAUGE PLATE

INSULATED JOINTS

SELF-GUARDED FROGS

SCREW SPIKES

RAILWAY APPLICATIONS

ADDRESSING KEY MARKET CHALLENGES

Unifi*M.I.*
FASTENER PLATFORM

ENGINEERED TO DISSIPATE VIBRATIONAL ENERGY & PROVIDE A LONG-TERM STABLE CONNECTION

OPTIMAL MECHANICAL, STRUCTURAL & FUNCTIONAL CONNECTION

REDUCE ASSEMBLY TIME, COST & WEIGHT

UTILIZE TRADITIONAL MANUFACTURING TECHNIQUES

TARGET PARTNERS

vossloh

$1.35B SALES

$609M

937

CORE COMPONENTS

Industrially manufactured series products, in high quantities for railroad infastructure projects

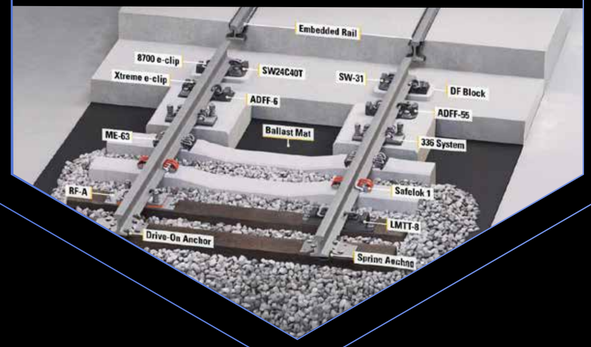
BUSINESS UNITS

Vossloh Fastening Systems (rail fastening systems)

Vossloh Tie Technologies (concrete ties)

Progress Rail
A Caterpillar Company

$2.9B SALES



LBFoster

$543M SALES

TRANSIT PRODUCTS

Fasteners, rail and track systems

ALLEGHENY RAIL PRODUCTS

Insulated rail joints & accessories

PANDROL

$571M SALES

Cooper & Turner

LEWIS BOLT & NUT COMPANY

TRACK BOLTS

SCREW SPIKES

SWITCH BOLTS

Unifi*M.I.* TRANSPORTATION ACTION PLAN

1. **Demonstrate** technology capabilities
   a. Tool developmentof dies, taps and drills
   b. Drilling and tapping of concrete, wood, and steelsubstrates
   c. Vibrational, axial and off-axis load fastener substrate testing

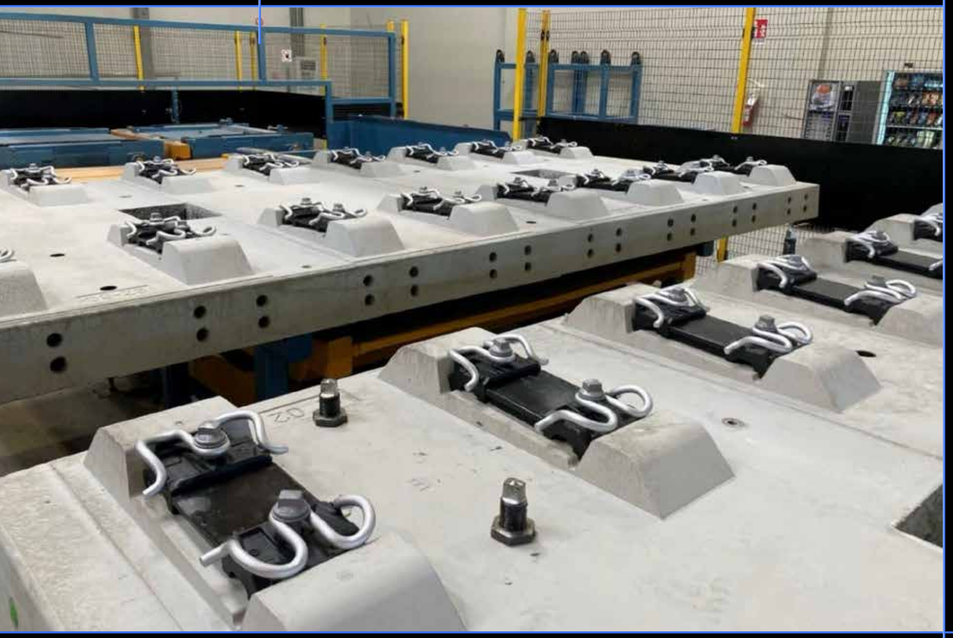
2. Top down **education** with bottom up preparation

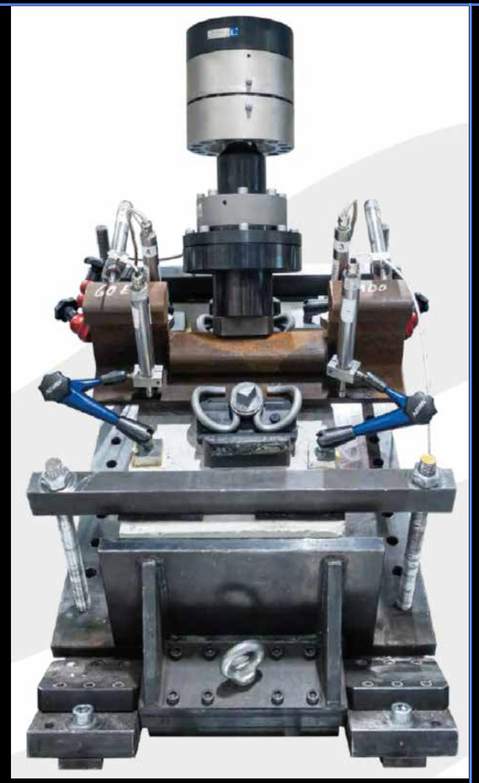
3. Execute **licensing** models

4. Bring **“killer app”** to market with partner

5. **Influence** design and specifications for next gen projects

Schwihag





Unifi*M.I.* TRANSPORTATION VALIDATION POINTS

STRUCTURAL & DYNAMIC
MECHANICAL TESTING


RESHAPING
THE FUTURE
UnifiM.I.™
TRANSPORTATION, LLC