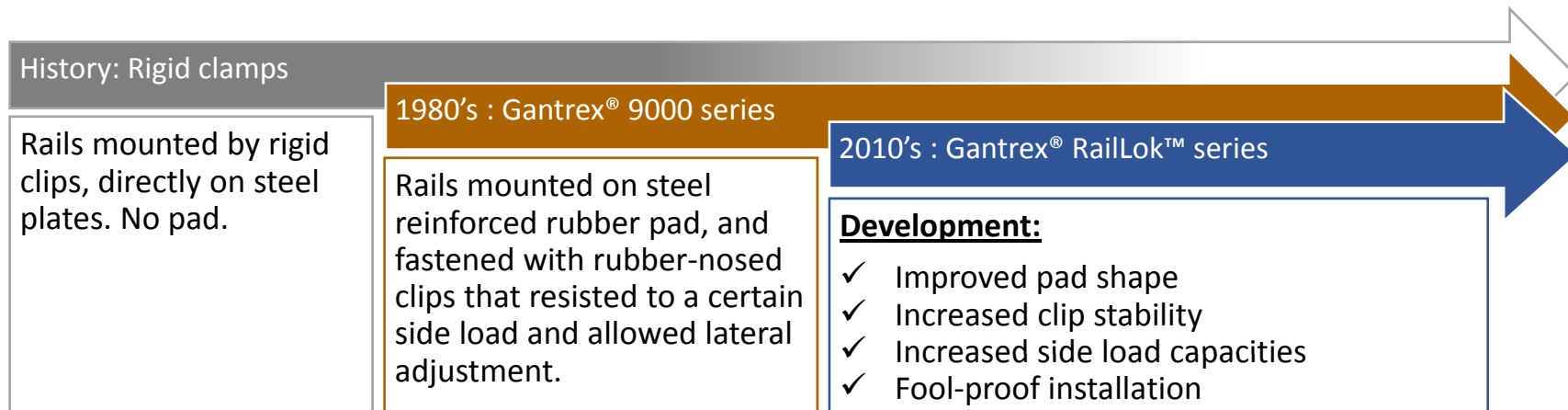# RailLok™ Series
by Gantrex®

the new generation in rail fastening systems

for port applications (STS, RMG)

Evolution of rail fastening

How have rail fastening systems evolved over time?

✓ Rail pad:
- Developed in 1970's
- No improvement until 2012

✓ Rail clips
- Rails fastened by rigid clips until end of 1970's
- Development of rubber-nosed clips in 1980's (patent 1976)
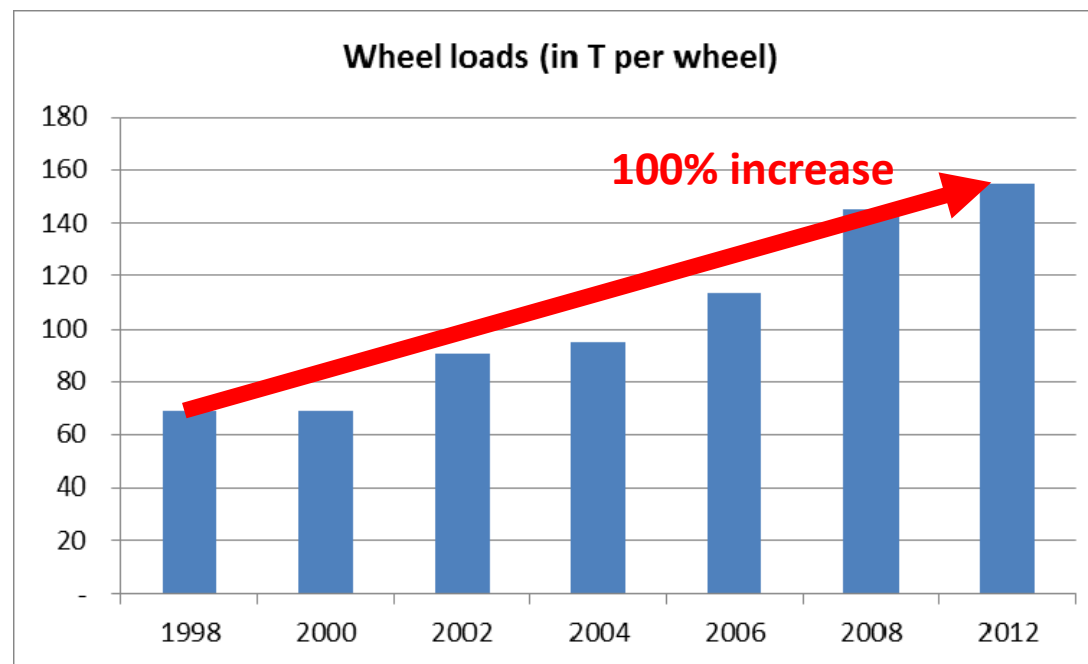- New generation of RailLok™ clips in 2012

History: Rigid clamps

Rails mounted by rigid clips, directly on steel plates. No pad.

1980's : Gantrex® 9000 series

Rails mounted on steel reinforced rubber pad, and fastened with rubber-nosed clips that resisted to a certain side load and allowed lateral adjustment.

2010's : Gantrex® RailLok™ series

Development:
✓ Improved pad shape
✓ Increased clip stability
✓ Increased side load capacities
✓ Fool-proof installation

GANTREX®

Evolution of cranes & loads

How have crane systems evolved over time?

✓ Significant increase in wheel loads

- 1998 : 60 – 80 T/wheel
- 2014 : Up to **150 T/wheel**

Wheel loads (in T per wheel)

100% increase

Year	Value
1998	~69
2000	~69
2002	~91
2004	~95
2006	~114
2008	~145
2012	~155

GANTREX ®

Evolution of cranes & loads

How have crane systems evolved over time?

✓ Crane structures have become more *flexible* than ever

✓ Crane vibrations imposing significant *cyclic loads* to the crane runway during loading and unloading operations.

✓ New loads & duty cycles produce *higher forces* on crane & supporting structure

GANTREX®
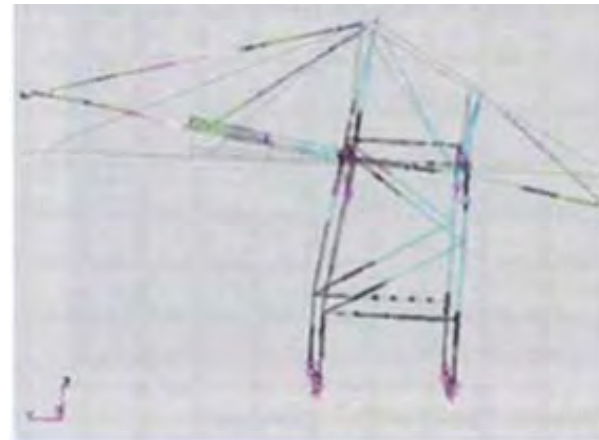
Traditional fastening systems

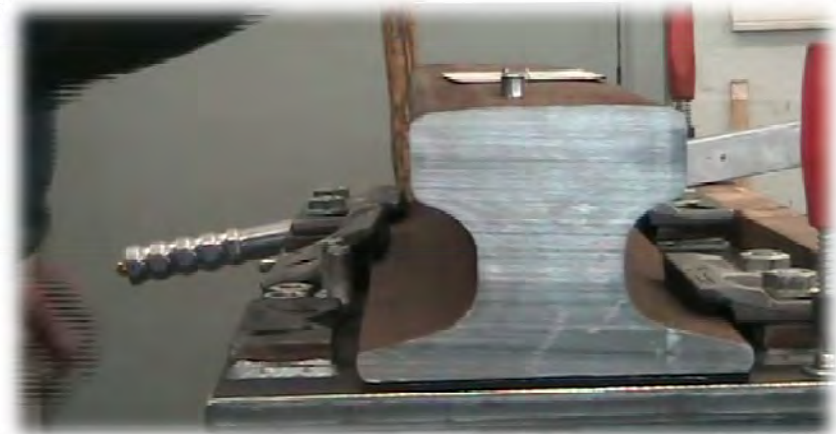**Result:** "Traditional" rail fastening systems cannot cope with new requirements

✓ Clip problems found <u>during installation</u>

- ▪ Clips are not installed properly, failing to "lock" the rail laterally
- ▪ Clips should be installed with hammer and torque wrench
- ▪ Often hammer is not used, and impact wrench causes upper clip to move during torqueing

Correct installation

✓ Pre-tightening with wrench
✓ Hammer push to ensure contact
✓ Final torque with torque wrench

RESULT: Perfect contact against rail

GANTREX®

Traditional fastening systems

Quality on Track ®

Result: "Traditional" rail fastening systems cannot cope with new requirements

✓ Clip problems found <u>during installation</u>

- Clips are not installed properly, failing to "lock" the rail laterally
- Clips should be installed with hammer and torque wrench
- Often hammer is not used, and impact wrench causes upper clip to move during torqueing

Wrong installation

✓ No pre-tightening
✓ No hammer push
✓ Torque with impact wrench (vibration)

RESULT: Lateral float up to 0.5 mm

GANTREX

Traditional fastening systems

✓ Clip problems found <u>during operation</u>

- Clip "stability" = movement due to extreme side loads

Clip stability vs side load *(double-bolted clips)*

GANTREX®
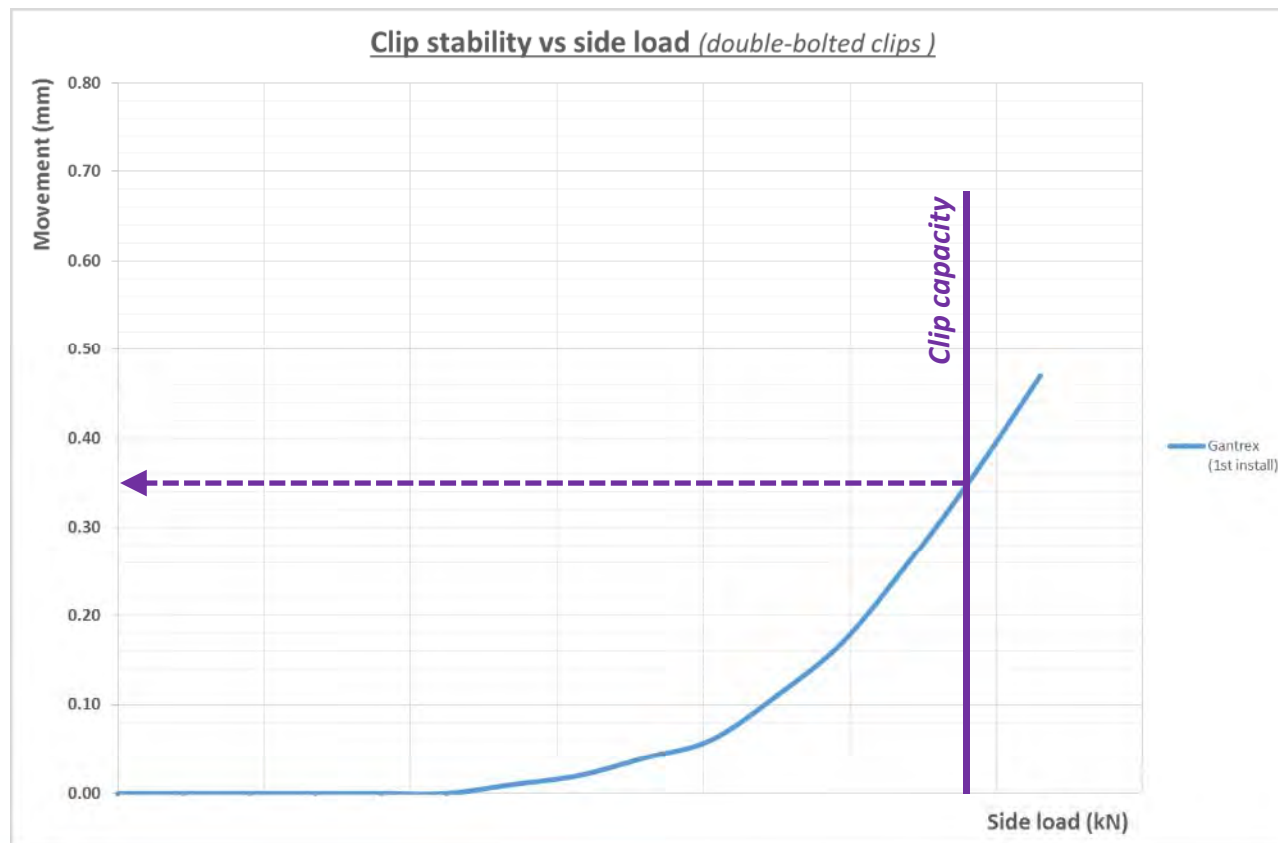
Traditional fastening systems

✓ Clip problems found <u>during operation</u>

- Due to high loads and cyclic behavior, clips had to be reinstalled after some months of operation

Traditional fastening systems

✓ Clip problems found <u>during operation</u>

 ▪ Some other "copycat" clips have been tested as well

GANTREX®

Traditional fastening systems

✓ Lateral clip movement, dirt ingress between rail & pad, in combination with higher loads and cyclic behavior lead to <u>pad migration</u>

➢ Steel reinforcement breaks due to combination of fatigue and dirt ingress

➢ Pad migrates from out of the rail

STS TRACK, HONG KONG

STS TRACK, DUBAI (UAE)
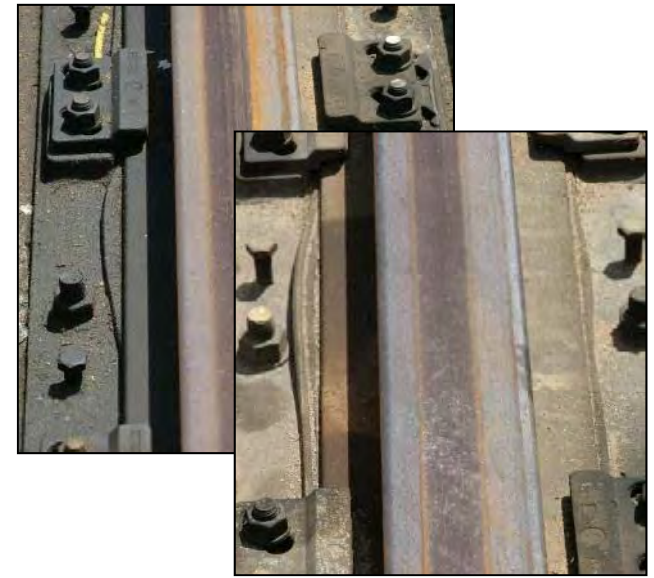
STS TRACK, HCMC (Vietnam)

New generation: RailLok™ series

Quality on Track ®

RailLok™ clip features

✓ All old features have been maintained

- Positive lateral rail adjustment of up to 20mm depending on clip type

Clip reference	Side load capacity	Lateral adjustment	Old references
RailLok™ W15	120 kN	12mm	9120/15 or 21/125
RailLok™ W20	165 kN	14mm	9216/08 or 22/130
RailLok™ W25	235 kN	20mm	9220/20 or 22/200

- Self-locking and self-tightening features through wedging action

- High resistance to lateral loads through careful selection of clip component materials

- Controlled vertical force applied to rail through synthetic rubber nose
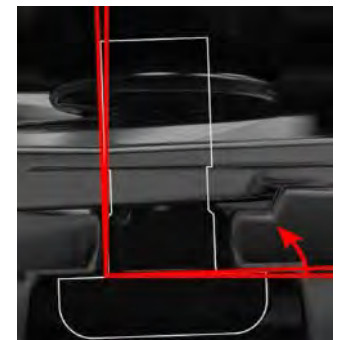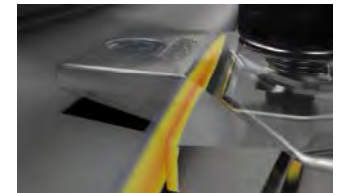
GANTREX

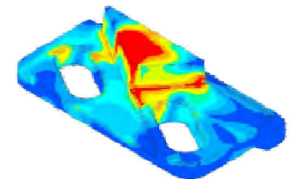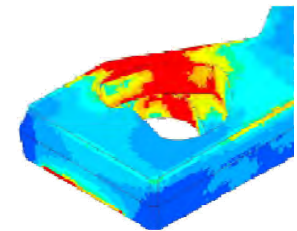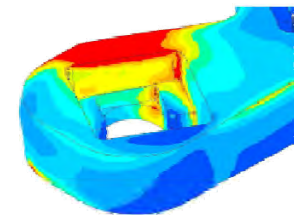# New generation: RailLok™ series

Quality on Track ®

RailLok™ clip NEW features & benefits

✓ FEATURE: Complete overhaul of clip design, based on

- Feedback from major ports
- Finite Element Analysis *(both elastic & plastic simulation)*

✓ BENEFITS:

1) Increased side load capacities

OLD CLIP	Side load cap.
9120/12	80 kN
9216/08	120 kN
9220/20	200 kN

NEW CLIP	Side load cap.
RailLok W15	120 kN
RailLok W20	165 kN
RailLok W25	235 kN
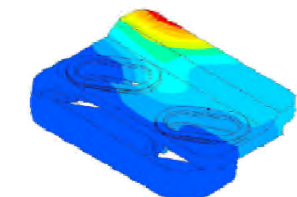
GANTREX

New generation: RailLok™ series

RailLok™ clip NEW features & benefits

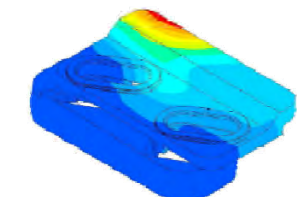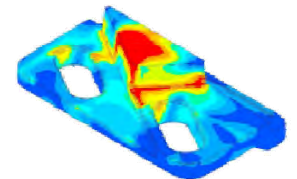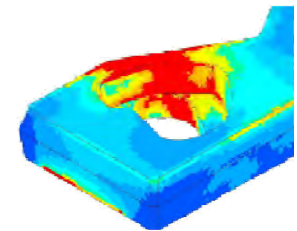✓ FEATURE: Complete overhaul of clip design
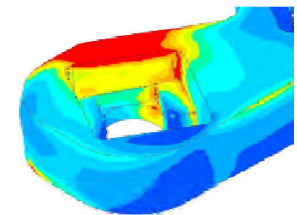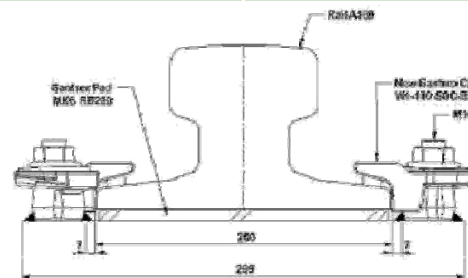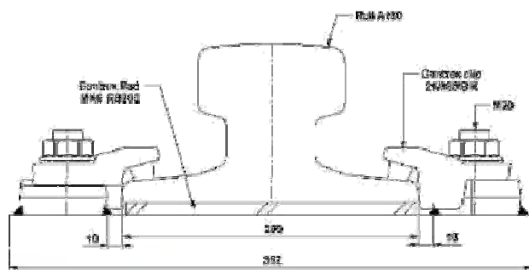
✓ BENEFITS:

   2) Designed for narrower supports

     ➔ Allows to narrow down the rail trench

     ➔ Ease crossing traffic and reduce tripping hazard

OLD CLIP	Plate width
9120/12	F + 152mm
9216/08	F + 100mm
9220/20	F + 165mm

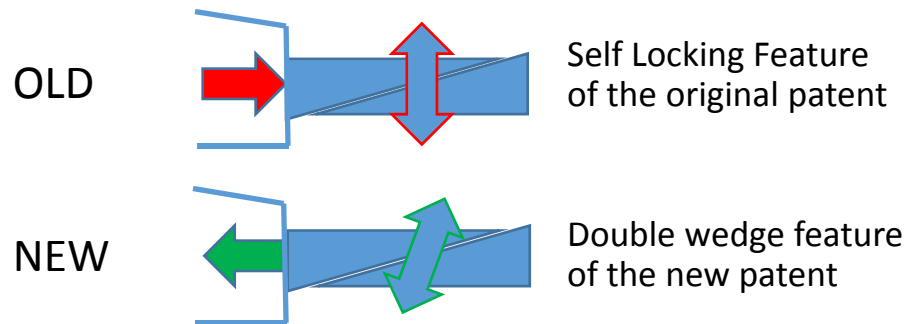| NEW CLIP	Plate width
RailLok W15	F + 100mm
RailLok W20	F + 100mm
RailLok W25	F + 150mm

GANTREX

New generation: RailLok™ series

Quality on Track ®

RailLok™ clip NEW features & benefits

✓ FEATURE : Double wedge design & inclined bolt *(Gantrex patent)*

OLD — Self Locking Feature of the original patent

NEW — Double wedge feature of the new patent

✓ BENEFITS:

1) Virtually fool-proof installation : No more hammer push required.
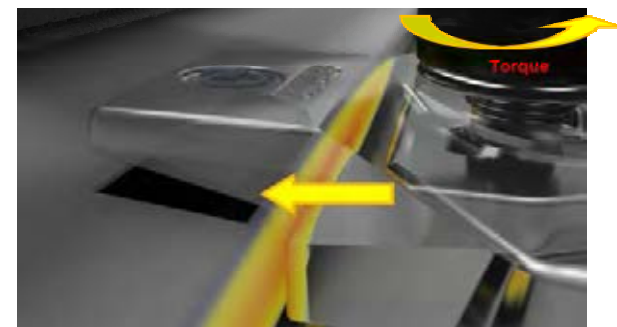
NO HAMMER BLOW REQUIRED

GANTREX

New generation: RailLok™ series

RailLok™ clip NEW features & benefits

✓ FEATURE : Double wedge design & inclined bolt *(Gantrex patent)*

✓ BENEFITS:

2) Improved contact between clips and rail during bolt tightening *(no gap during installation)*
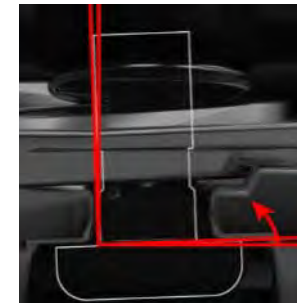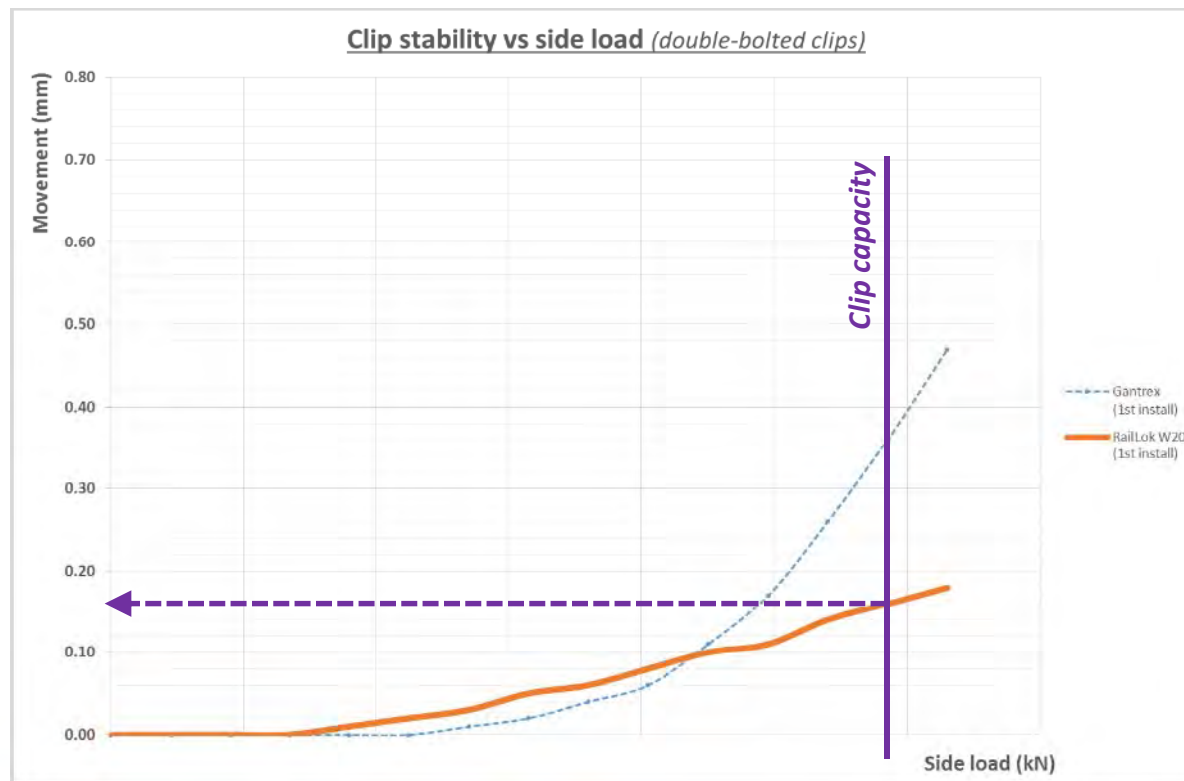
New generation: RailLok™ series

RailLok™ clip NEW features & benefits

✓ FEATURE : Double wedge design & inclined bolt *(Gantrex patent)*

✓ BENEFITS:

    3)   Improved clip stability *(during operation)*

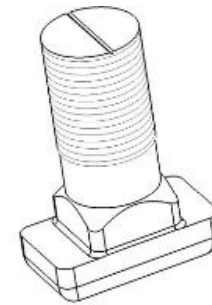# New generation: RailLok™ series

Quality on Track ®

RailLok™ clip NEW features & benefits

✓ FEATURE : Square shank bolts & flanged nuts with improved grip

✓ BENEFITS:

1) Impact wrench allowed

2) Increased installation speed (2x)

3) Clip bolts and flange nuts can be reused up to 10 times at 150% of recommended torque with no significant damage
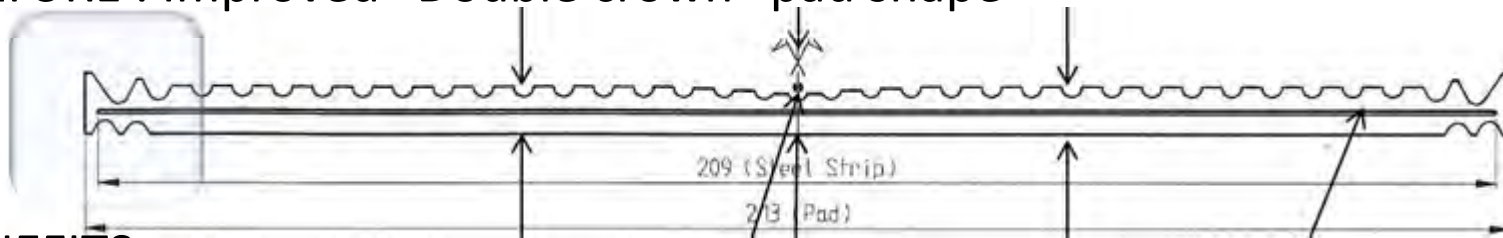

TORQUE WRENCH IS NO LONGER REQUIRED

**AIR IMPACT WRENCH CAN BE USED**

GANTREX®

New generation: RailLok™ series

Quality on Track ®

RailLok™ pad NEW features & features

✓ FEATURE : Improved "Double crown" pad shape

209 (Steel Strip)

213 (Pad)

✓ BENEFITS:

- Better load distribution & constant pad pressure under high loads distribute wheel load forces more uniformly

- Improved edge seal design & grooves provide better seal, preventing contaminants from getting between pad & rail (one of the root causes of pad migration)

- Optimized pad and clip nose compression keep pad in when the pressure from the rail is released

45°

GANTREX

New generation: RailLok™ series

Quality on Track ®
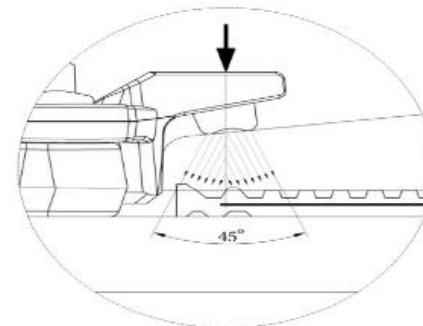
Summary of RailLok™ features & benefits

Features (NEW)	Benefits
Complete overhaul of design	✓ Higher side load capacities ✓ Allow narrower rail trench
Double-wedge design (patent)	✓ Enhanced contact between rail & clip (no gap) ✓ Improved clip stability during operation ✓ Foolproof installation (no hammer push)
Square-shank bolts	✓ Allows use of torque wrench ✓ Reduces installation time by 50%
"Double crown" pad shape	✓ More uniform load distribution ✓ Eliminate ingress of contaminants ✓ Prevents pad movement when pressure is released

GANTREX®

References

Some pictures of RailLok™ rail tracks in ports around the world

RMG track in Jubail, Saudi Arabia

ASC track in Brisbane, Australia

STS trolley track in Doualla

References

Some pictures of RailLok™ rail tracks in ports around the world

STS track installation in KAEC Port, Saudi Arabia
(A150 rails, RailLok W25 clips, 35m span)

GANTREX

References

RailLok series clips & pad have been installed, among others, in ports of :

Hong Kong, Singapore, Otago (New Zealand), Brisbane (Australia), Tanjung Pelapas (Malaysia), Bintulu (Malaysia), Ferrol (Spain), Tenerife (Spain), Vigo (Spain), Sagunto (Spain), Colón (Panama), Callao (Peru), Promar (Brazil), Jubail (Saudi Arabia), KAEC City (Saudi Arabia), Jeddah (Saudi Arabia), Dammam (Saudi Arabia), Nacala (Mozambique), Conakry (Guinea), Salalah (Oman), Sohar (Oman), Aqabah (Jordan), Doha (Qatar), Karachi (Pakistan), Douala (Cameroon), Abidjan (Ivory Coast), Lome (Togo), Port Said (Egypt) …

Our customers include:

Thank you for your attention

Any questions?