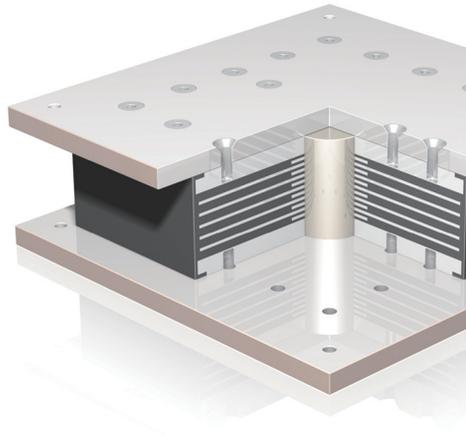
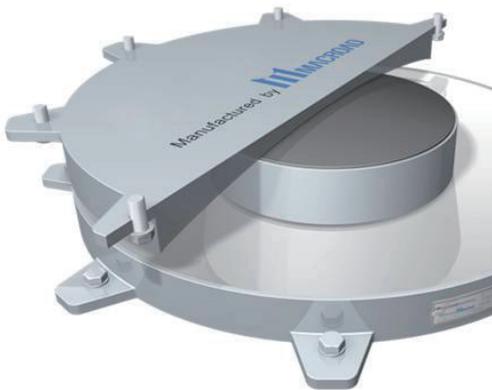


MACROAD

Bridge bearing · Expansion joint · Seismic retrofit for structure



Friction Isolation Pendulum
Lead Rubber Bearing
Waterproof Membrane Finger Joint

Greeting

Macroad Co., Ltd. Loving nature and considering safety

Macroad Co., Ltd. has developed and produced key products for new construction and maintenance of bridges and roads based on outstanding technologies as holding new construction technologies, performance certificates and over 70 patents.

Especially, 'Seismic retrofit integrated elastic bridge bearing' and 'Expansion joint replacement method for preserving concrete' have been developed by ourselves and received favorably on economic efficiency, safety and workability by customers, and recently we have commercialized friction pendulum system through technical tie-up with FIP in Italy.

Our Macroad Company possesses the technology of noise absorption for development-oriented industrial societies.

And with new technology as our background, we are trying to make harmonious and comfortable living environment through our super-wave noise barrier that has the highest noise absorption ability domestically, Transparent noise barrier that can disjoin, High performance reflective noise barrier that uses the reflection of noise and frequency phase in reducing noise and combination sound-proof tunnel that looks like an art sculpture while functioning as effective sound absorber. Even if Macroad Co., Ltd has been established on a small but strong rock based on passion and technology and now joined to medium-sized enterprises, and all of company members are doing their best. We will do our best to be the world best company jumping across our country and work as a company which puts customers first, achieves quality management and responsibility management and gives hope and vision to everyone.

Thank you.

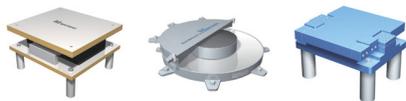
C.E.O. Eun Chul Choi

Eunchul, Choi

Company Information

Name	Macroad Co., Ltd.
CEO	Eun Chul Choi
Establishment	1 st July 2004
Sales	17,800,000,000 won (yr2016) (\$15,491,000)
Employees	73
Address	Headoffice Eoeun Bldg 5th Fl, Saemal-ro 125, Songpa-gu, Seoul, Korea 1 Factory 188-11, Odu-ri, Bogae-myeon, Anseong-si, Gyeonggi-do, Korea 2 Factory 129-45, Sinnam-ro 365beon-gil, Namyang-eup, Hwaseong-si, Gyeonggi-do, Korea
Award	Award from knowledge Economy Minister Award from the Korean Intellectual Property Office Award from Small and Medium Business Administration Award from Seoul Regional National Tax service

Business area



Bridge bearing



Expansion joint



Seismic retrofit for structure

History

- 2004 07 Company established
- 08 Obtained constructing expertise license (the field of facilities maintenance)
- 11 Rolled patent no.0427909 “CF-R (Concrete free finger joint replacing rail joint)”
- 12 Obtained constructing expertise license (the field of Steel structure & Windows)

- 2005 04 Registered in Venture Business (No. 051123031-1-00557)
- 04 Rolled patent No.0484564 “A.R.B (Aseismatic-Strengthened Rubber bearing)”
- 07 Selected as “Joint development consortium” held by the small & Medium Company Admin

- 2006 04 Acquired the Certificate of ISO9001, ISO14001
- 04 R&D center established
- 10 Rolled patent no.0643015 “Spherical Bearing that can be maintained”

- 2007 05 Participated at KINTEX “ROTREX international road show”
- 06 Technical license agreement with Softelec in Japan
- 07 Technical license agreement with Dongbang engineering
- 07 Registered in “A+ MEMBERS” by Kibo Technology Fund
- 08 Registered in “INNOBIZ Business(A-grade)” by the small & Medium Company Admin.
- 12 Completed Anseong Factory

- 2008 01 Received “Promising Company Accreditation” from Industrial Bank of Korea
- 04 Registered “NeT (New Excellence Technology)” from Government with “CF-R” Obtained patent of “Air-Cleaner” and launched
- 10 Won the prize of Minister by the Ministry of Knowledge Economy in the Entrepreneur Festival, Korea 2008
- 12 Registered “Performance Certification” with A.R.B from the Public Procurement Service

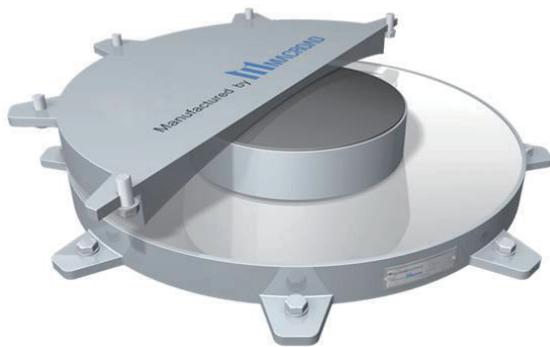
- 2009 03 Rolled patent no.0891464 “Replacement possible Soundproofing Wall”
- 05 Won the prize of Commissioner by the intellectual property office
- 06 Participated at COEX “International Environment show”
- 07 Obtained patent of “Non-Point Pollution Source” and launched
- 08 Participated at Songdo Convensia “Incheon International Environment show”
- 09 Registered “New technology” with A.R.B from the Korean Land & House Corporation
- 10 Won the prize of Commissioner by the small & Medium Company Admin. Registered “Excellent Product” with A.R.B from the Public Procurement Service

- 2010 04 Selected as “an information-oriented company“ by the small & medium Company Admin.
- 08 Received the first order of Launching Girder equipment (Honam High-speed railroad)
- 09 Registered “Industrial Design Firm” by Korea Institute of Design Promotion
- 10 Completed Hwaseong Factory

-
- 2011 01 “Procurement Purchasing Agreement” for A.R.B. with Public Procurement Service
01 “Manufacturing License Agreement & Royalty Agreement” with FIP INDUSTRIALE (Italy)
03 Won the prize of Commissioner by Seoul Regional tax Office on the 45th day of taxpayer
03 “Procurement Purchasing Agreement” for Safety barrier, Soundproof wall and Railings with Public Procurement Service
07 Rolled Patent No.10-1051439 “Lead Rubber Bearing Improved seismic Isolate capability”
08 “Aseismatic-strengthened Rubber Bearing (ARB)” KS Certification (KSA No.11-0465)
11 Registered “High-performance Spherical Bearing” by KOREA RAIL NETWORK
- 2012 01 Rolled Patent No. 10-0291214 “Bumpy style Soundproofwall.”
01 Rolled Patent No. 20-0228357 “Rotary transparent Soundproofwall.”
04 Rolled Patent No. 10-1131389 “Non-point source system use no - woven fabrics”
05 Rolled Patent No. 10-1152279 “Railway Spherical Bearing easily repaired”
05 Established Product facilities of Soundproofwall in 2nd factory
05 Rolled Patent No. 10-1152306 “Air cleaner for Public room”
06 Passed to “SB4” Vehicle collision Test From Expressway & transportation Research Institute
- 2013 02 Registered “Performance Certification” with Superwave sound proof wall from the Public Procurement Service
07 Rolled Patent no.10-1287510 Elastic rust-zero bridge bearing with using synthetic Public Procurement Service
07 Rolled Patent no.10-1287439 Movable expansion joint
- 2014 01 Rolled Patent no.10-1355905 Road sign with Solar power
07 Rolled Patent no.10-1423076 The external panel for bridges with magnetic nut locking device
- 2015 07 Acquire a performance certificate of “Railway Spherical Bearing easily repaired”
- 2016 02 Obtain Hi-seoul brand
03 Rolled Patent No.10-1604997 “e-co friendly soundproof tunnel system”
09 Rolled Patent No.10-1630633 “expansion joint for bridge”

Friction Isolation Pendulum

FIP



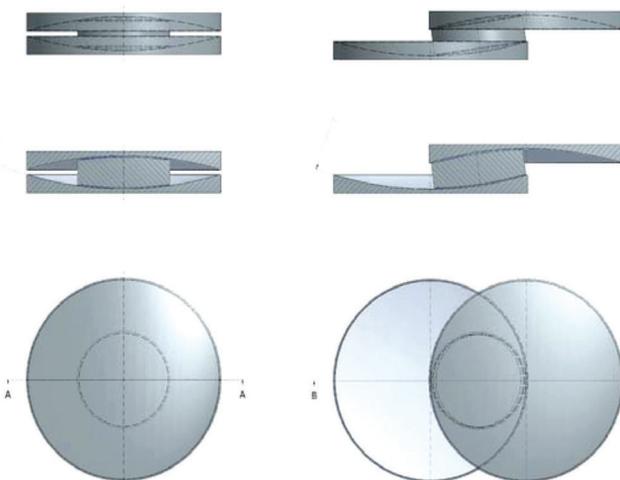
General

Bridge bearing that ball bearing system supporting the superstructure does pendulum motion on the smooth friction surface with constant curvature

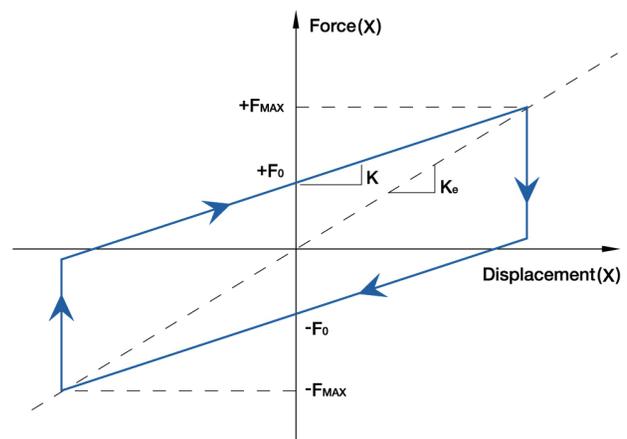
Engineering name is Self-centering seismic isolation system, of which product name is Friction Isolation Pendulum and defined as FIP using the initial letter

Features

- Important concept for earthquake resistance design to minimize after shock and secondary damages by self-restoration of original structures after earthquake
- Bridge bearing based on plastic strain energy according to yield strength of the material reduces restoration capability more as the energy dissipation capability is higher
- AASHTO 1991, UBC1997 submitted constraints with regard to minimum value of restoring force and cycle after yielding
- Recently Eurocode8- Design of structures for earthquake resistance
- Part2: Bridges prEN 1998-2:2005 submitted constraints with regard to minimum value of restoring force and displacement in restoration



FIP-D Series

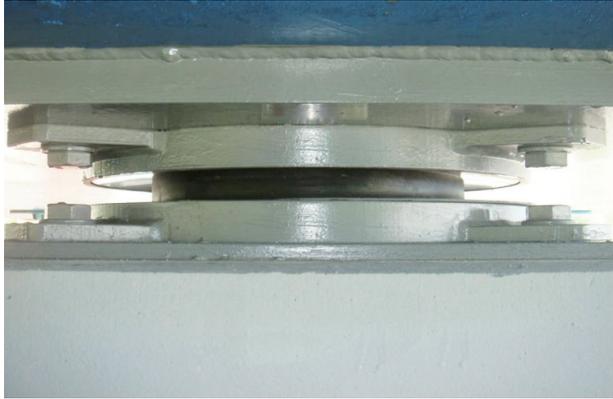


Bilinear Model of FIP®

Example of construction



Friction isolation pendulum - Korea expressway corporation



Construction of large bridges



Construction of large bridges



Construction of building base



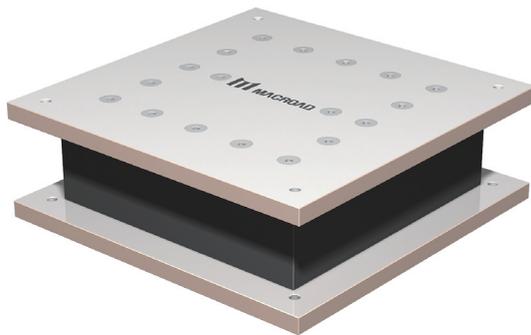
Construction of building base

Lead Rubber Bearing

LRB

General

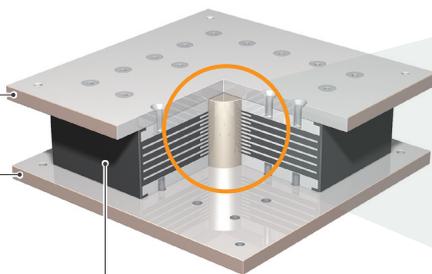
Lead Rubber Bearing(LRB) is a bridge bearing that inserts a lead core inside the bridge bearing to absorb and dissipate the horizontal energy generated during the earthquake, prevents the vertical force action and the bulging of lead in shear deformation by inserting lead prevention plate. also increases durability by control of peeling of elastic pad coating.



Upper plate

Lower plate

Rubber laminate



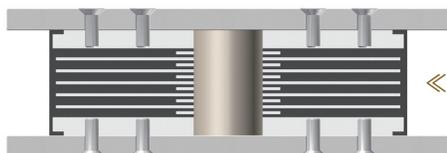
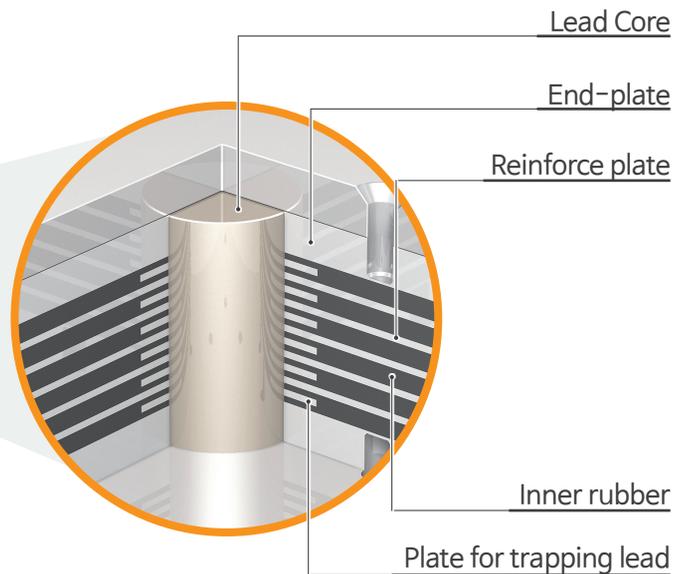
Lead Core

End-plate

Reinforce plate

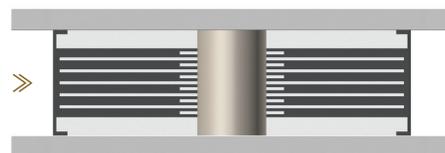
Inner rubber

Plate for trapping lead



- Bolting type -

Connection method



- Adhesive type -

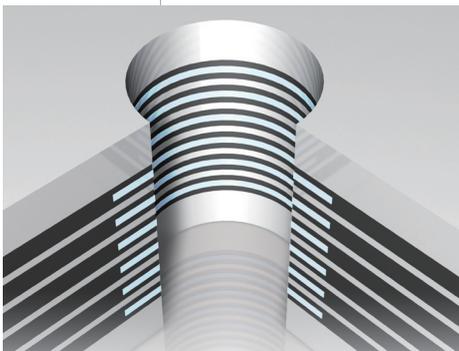
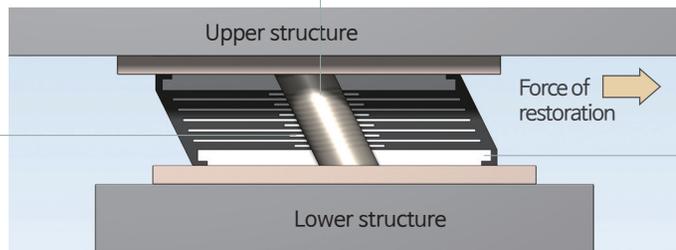
Features



Dissipate the earthquake energy [Lead core]

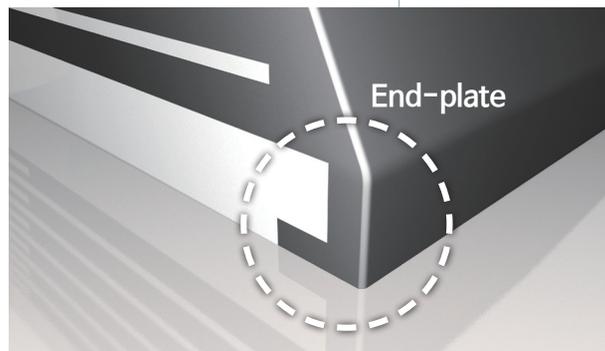
reduce seismic force and decrease displacement by inserting lead core in center of bridge bearing.

this product increases the usability of bridges and impose low longtime loading, because lead resistance to wind and braking loads with high rigidity.



Prevent lead bulging

put a plate around the lead core, improve the seismic function by preventing the vertical force action and the bulging of lead during shear deformation.



Prevent laminating disbondment

using a way of trapping rubber laminate, it can prevent exposure of the end plate, therefore suppressing rusting and improving durability.

Waterproof Membrane Finger Joint

WMF



General

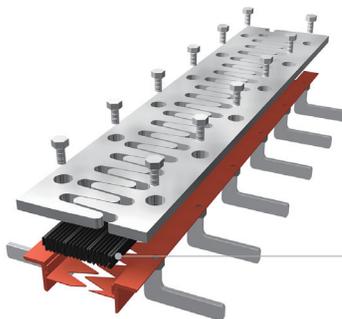
The method to get bridge surface waterproof treatment same as rail type of expansion joint unit by composing finger plate at the upper part (bridge surface) and waterproofing material support plate at the lower part, and assembling and installing porous waterproof seal in between them is called Waterproof Membrane Finger Joint (WMF)

Features

- No extra drain facilities are required same a rail joint.
- Unlike the existing finger joint, no extra maintenance is required because no foreign substances flow in through the gaps
- Easy to install and maintain it because finger plate and waterproofing material support plate are divided to be assembled
- Service life of the bridge is enhanced because the problem of damage to waterproofing material due to accumulation of foreign substances
- Applicable to all sizes regardless of expansion size
- Material with strong corrosion resistance is applied to expansion member support plate at the lower part



Details of product dissembling

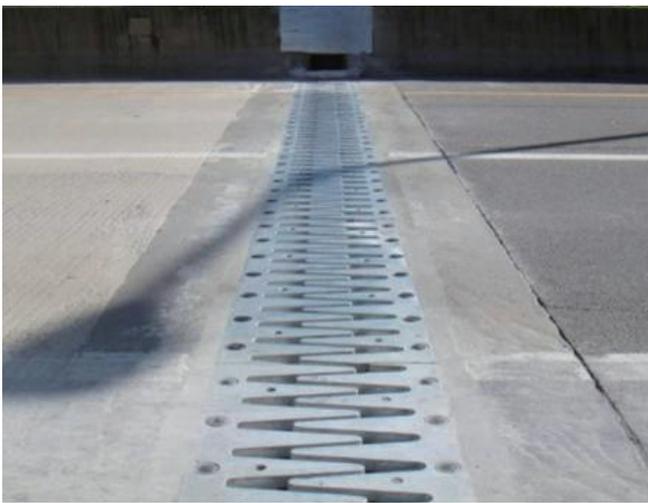


Details of product assembling



Waterproof rubber seal

Example of construction



Seochang Bridge



Pyeongtaek Bridge



Sinchon Bridge



Junju-kwang yang express way



Head office/Lab | Eoeun Bldg, 5th Fl, Samal-ro 125, Songpa-gu, Seoul, KOREA

1 Factory | 188-11, Odu-ri, Bogae-myeon, Anseong-se, Gyeonggi-do, KOREA

2 Factory | 129-45, Sinnam-ro 365beon-gil, Namyang-eup, Hwaseong-si, Gyeonggi-do, Korea

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