











### **History**

- 1999. 03 Established Ilwontech Co., Ltd.
- 1999. 04 Registered certificate for advanced construction business (facility maintenance work)
- 2001. 04 Obtained ISO 9001
- 2003. 03 Registered for professional safety examination institute (bridge and tunnel)
- 2007. 01 Certified affiliated lab establishment (Korea Industrial Technology Association)
- 2007. 05 Finalized registry of venture business (SMBA)
- 2007. 10 Certified for clean place of business (Korea Occupational Safety & Health Agency)
- 2008. 04 Certified for professional parts business (Ministry of Knowledge Economy)
- 2008. 10 Obtained ISO14001
- 2009. 10 Certified for INNOBIZ (SMBA)
- 2011. 06 Patent Registration No. 10-1045877
- 2014. 02 Trademark Registration of Re-Ascon
- 2014. 10 Patent Technical Evaluation "A Grade"
- 2015. 05 Selected as small hidden champion by Bucheon City
- 2015. 08 Evaluation of Site Application of Preventive Maintenance Method (Seoul Metropolitan Government)
- 2015. 09 Selected for the developer of University-industry technological cooperation
- 2016. 03 Patent Registration No. 10-1608840
- 2016. 04 Gyeonggi Governor Award
- 2017. 12 Received the award of the export tower of 1 million dollar and Presidential Award
- 2018. 02 National Transportation Technology Commercialization Support Project
- 2020. 03 Registration in Progress for the technology- market of Korea Expressway Corporation





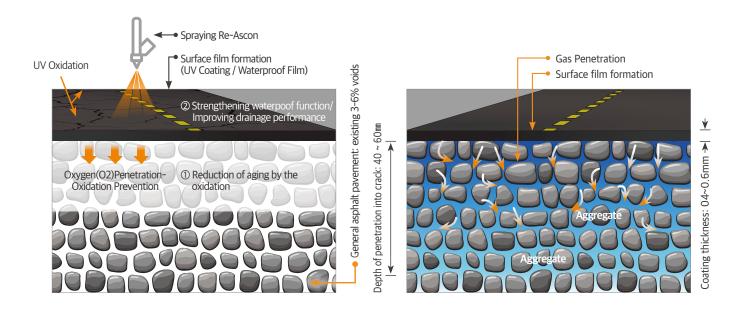


#### **Intellectual Properties**

- 26 domestic patents
- · 6 utility model registrations
- International patents (US, Japan, China)

#### **Preventive Maintenance**

Re-Ascon is a component of Micro-Bitumen Polymer. When it is applied on the surface of asphalt road, it forms a thin film to block the air on the outside within few min. while the paint film plays as a film that promotes chemical reaction to generate gas including regenerating materials. The gas penetrates up to 10mm under the surface, restoring and reclaiming the decrepit Bitumen.



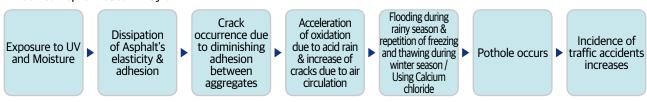
#### **Road Aging Process**

#### **Crack Progression of Asphalt Concrete**



#### **Timing of Preventive Maintenance**

- General Asphalt: about 3~4 yrs
- Modified Asphalt: about 7~8yrs



\* Calcium chloride, deicing chemical, promotes pothole occurrence

	Types of	RE-AS	CON	available upon request)
Model Use			Function	Remark
	RA-B01	Bridge	<ul> <li>Prevents potholes by securing the waterproof function of a bridge</li> <li>Prevents deterioration of concrete of slab due to winter calcium chloride</li> <li>Secures 70% waterproofing without the repair of waterproofing of bridge deck.</li> </ul>	Waterproofness and Adhesion strength are higher than RA- BO1N
	RA-B01N	Road	<ul><li>Entry level of Re-Ascon</li><li>Prevention of pothole</li><li>Extends lifetime of Ascon</li></ul>	-
	RA-B02S	Black Ice Prevention	<ul> <li>Prevention of freezing on surface</li> <li>Prevention of Black Ice</li> <li>Extends lifetime of Ascon</li> </ul>	Regular black ice occurrence section, bridge, entrance and exit of tunnel
	RA-R03	Road & Bridge	<ul> <li>School zones, bus lanes, bicycle paths</li> <li>Where color marking is required for speed control and Lanes.</li> <li>Extends lifetime of Ascon</li> </ul>	<del>-</del>

#### **Strengths of RE-ASCON**

- ① Simple construction and fast curing of 1-2 hours
- ② Restoration and regeneration of asphalt concrete by recovering elasticity & adhesion of bitumen
- 3 Prevents traffic accidents by minimizing pothole
- Prevents Black Ice during winter
- ⑤ Prevents deterioration of bridge structures from calcium chloride usage
- 6 Blocks the cause of damage, UV and moisture.
- ② Extends lifetime to 5~8 years
- Additional application is possible
- Reduces 50% or more of long-term maintenance costs
- 10 No occurrence of dust and waste ascon
- 1 Eco-friendly method without CO2 generation

#### **Application Procedure**



Before application



**Taping Lanes** 



Cleaning surface



Repairing Crack



Applying Re-Ascon



Completion of Application

#### **Status after Application**











#### **Follow up Survey**

#### Chujeom bridge 1 & 2

: Down Line of Jungbu Inland Expressway opened in December 2004. Re-Ascon was applied in Nov. 2010 for Chujeom bridge 1

#### Applied bridge (Chujoem bridge 1)

- **\*** Result of Follow up survey
- 1. Although the surface of aggregates contacting wheel is worn out, there was good adhesion between the aggregates ensuring waterproof.
- 2. The status of applied section on the shoulder is the same as initial construction without abrasion of aggregate's surface.
- 3. Found to be in good condition even after 7 yrs.

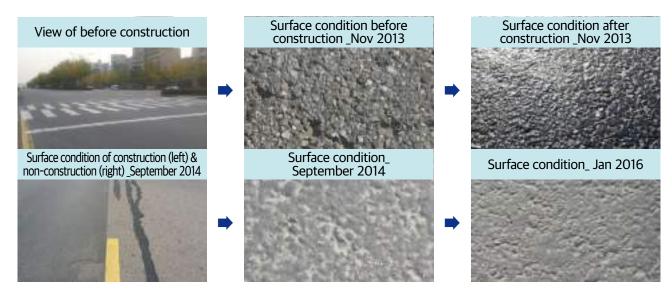
#### Un-applied bridge(Chujeom bridge 2)

- ※ Result of Follow up survey
- 1. Found dislodgement of aggregate due to bitumen deterioration in Oct. 2017.



#### Wiryeseonggil

- : Seoul Eastern Roads & Bridges Maintenance Office Boundary \_Nov. 2013
- ※ Result of Follow up survey
- 1. Found to be in good condition\_ Jan. 2016



#### **Frictional Force Test of RE-ASCON**

Classification		BPN		Avg.	Avg.Total
Before	49	45	45	46.3	45.95
Application	46	44	47	45.6	
After	49	44	49	47.3	46.3
Application	47	43	46	45.3	46.3

<sup>※</sup> Result of BPN (frictional resistance) shows no difference of sliding resistance for before and after application of Re-Ascon.



#### Waterproof Test of RE-ASCON < Source: Institute of Advanced Construction Materials of Kangwon National University >

Cl	assification	Porosity (%)	Penetration Velocity (sec)	Remark
Untreated (19mm)		7.0		
19mm	Before treatment	6.2	-	Indoor
19111111	After treatment	5.1	immeasurable	manufactured
13mm	Before treatment	7.5	-	Slab Test Piece
13111111	After treatment	6.2	immeasurable	
On Site	Before treatment	-	-	On Site
On Site	After treatment	-	-	On Site
To	est Method	KS F 2367	KS F 2394	



- ※ 1. Porosity: Porosity declines after Re-Ascon process
  - 2. Waterproofness: test piece without Re-Ascon process penetrates water, and processing Re-Ascon on test piece is proved to be waterproof because it is immeasurable.

#### **Performance test**

<Source: KOREA CONFORMITY LABORATORIES>

Items		Unit	Standard	Result	Method	Remark	
Drying time		-	3 hours or less	5 min	KS F 4932	Curing time	
Wa	Waterproofness		Abnormality	No Abnormality	KS F 4932	Waterproof	
Resistance to chemicals		coulomb	100 or less	94	KS F 4932	Resistance to calcium chloride	
Depth	Depth of Neutralization		0.1 or less	0	KS F 4936	Prevention of Deterioration	
	Untreated	N/mm²	0.8 or more	2.4			
Adhesion	After treatment of freeze-thaw	N/mm²	0.7 or more	2.2	KS F 3211	Adhesive Strength	
	Coating Condition	-	Abnormality	No Abnormality		Resistance to freeze- thaw	
VOCs Contents		g/L	400 or less	246	National Institute of Environmental Research Notification # 2016-7	Volatile Organic Compounds	



#### **Comparison with the Existing Asphalt Concrete Repairing Method**

Classification

Asphalt Overlay after cutting (repaving after plaining with surface crusher)

Re-Ascon Regeneration Method (Asphalt Regeneration Method)





Method

**Asphalt Plaining** 

**Roller Application (for Small quantity)** 





**Asphalt Re-pavement** 

**Auto Application (for Large quantity)** 

Equipment	Asphalt Distributors, Road Crushers, Loaders, 3 Finisher Rollers, Excavators, Dumpers, Sprinkler Trucks	Roller or Sprayer	
Advantage	Surface Smoothness	No environmental waste, Pothole Prevention, Easy Construction, Waterproofness	
Disadvantage	Pothole generation, Environmental waste generation, Traffic control	Difficult to adjust unevenness due to plastic deformation	
Lifetime	3~5 yrs	5~8 yrs	

#### **Comparison with Similar Products**

Classification	Re-Ascon	A Company	B Company	
Service Life	5~8yrs	3~5yrs	3~5yrs	
Traffic Resumption	1~2hours	24 hours	24 hours	
Restoration Ability	Yes, Infiltration	No	No	
UV Protection	UV Protection	-	-	
Method	Coating	Coating	Thin pavement	
Repeatability	Yes	No	No	

#### **Background of Development**

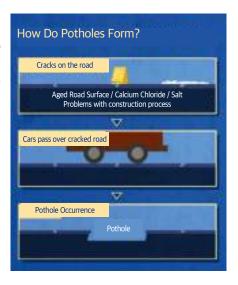
#### **Pothole Prevention**

- Application of RA-B01 or RA-B01N prevents potholes by preventing moisture from penetrating inside with forming a waterproof layer on the surface
- Prevents directly or indirectly the damage of asphalt mixture due to moisture with forming a waterproof layer

#### Compensation Status last 5yrs

200

Classification	Total	2015	2016	2017	2018	Aug. 2019
Number of compensation	1904	199	160	323	877	345
Compensation (KRW mn)	1429	153	141	215	595	325
1,000		_		<del></del>		f compensation
600 400					Compensa	tion (KRW mn)





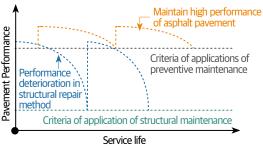
#### Snow Removal and Black Ice (Frozen Road Surface) Prevention

- RA-B02S added Anti-icing removes Snow and prevents Black Ice
- Excellent anti-icing effect on the surface treated section
- Applicable area: asphalt pavement surface of bridge, tunnel entrance & exit, shaded road, curved road, regular black ice occurrence area



#### What is Preventive Maintenance?

Preventive maintenance is a method that delays the occurrence of damage and maintains excellent performance by applying a low cost surface treatment method before the damage and breakage of a road.



#### **Problems with Existing Maintenance Methods**

- Performs a new pavement after removing the existing one or repairs damaged parts. At present, it is the main method of pavement maintenance of domestic road
- · A waste of maintenance budget occurs
- Does not fix the cause of cracks







Occurrence of primary

New asphalt overlay

Occurrence of secondary cracks

#### **Types of Preventive Maintenance**

#### Repair of Asphalt Pavement Surface

: A method of regenerating road surface by applying a thin sealing layer to the road surface to fill micro-cracks and voids

#### Crack repair

- : A method of preventing water penetration by sealing cracks with injecting crack repair material between asphalt cracks.
- : Beware of excessive input costs for repair when cracks occur in more than two rows in one lane





#### Why do you need Preventive Maintenance?

#### Resolution of mine pothole on the road

- : The fundamental solution of the pothole is a forming a waterproof layer on the surface of a pavement to prevent moisture from penetrating into the pavement. It is necessary to provide a smooth and safe road by minimizing the occurrence of potholes.
- An association between environment and road pavement
  - : 90% of total pavement is an asphalt pavement
  - : Produces 800,000 tons of CO2 annually during production and
  - : Waste ASCON generated from asphalt resurfacing accounts for 18.3% (2nd place) of total construction waste

#### Paris Climate Agreement (2015)

: With the launch of a new climate system, greenhouse gas emissions are required to reduce by 2030. The need for the development of low carbon and eco-friendly technology is greatly on the rise in all industries. Thus, in the field of road maintenance as well, an environmentally friendly method is needed instead of the existing repair method that generates environmental pollutants such as CO<sub>2</sub>.



Pothole occurs





Generates CO<sub>2</sub> emissions during asphalt pavement



due to re-pavement

#### The Expected Effects of Preventive Maintenance

- •Prevents traffic accidents by reducing potholes
- •The lifespan of asphalt pavement increases more than 200%
- •Reduces 50% of maintenance costs
- •Reduces CO2 emissions by 90% compared with conventional asphalt overlay
- No dust and waste ascon
- •No consumption of resources and fuel for asphalt repavement

#### The Factors to be considered in Product Selection

- Product with good adhesion to Asphalt
- Product that can repair surface without asphalt crack repair
- ·Product having regeneration effect on aged asphalt
- Product with a Service Life of 3 Years or
- Product with easy construction



#### **Construction Examples**

#### Pyeongtaek US Military Base-17-Korea- Repair Work of Road and Parking Lot (10.2018)







**Before Construction** 

Construction in Process

Completion of Construction

#### Asphalt Pavement Maintenance Work of Korea Expressway Corporation Changwon branch (11.2017)







**Before Construction** 

Construction in Process

Completion of Construction

#### Sagajeong-ro, in Seong-dong Roads & Bridges Maintenance Office Boundary (11.2015)







Before Construction

Construction in Process

Completion of Construction

#### Wiryeseong-gil, in Dongbu Roads & Bridges Maintenance Office Boundary (11.2013)







Before Construction

Construction in Process

Completion of Construction

#### Goyang IC Ramp Section of Seoul Outer Circular Road (10.2012)







Before Construction

Construction in Process

Completion of Construction



#### **Major Accomplishment**

	Product Name	Orderer	Year
1	Asphalt Maintenance for Yongjong 2 bridge of Seoul beltway	Korea Expressway Corporation Incheon Branch	2010
2	Asphalt Maintenance for Chujeom 1 bridge in Chungju branch of central inland highway	Korea Expressway Corporation Chungju branch	2010
3	Pavement repair in Gyeongnam branch (Namji IC)	Korea Expressway Corporation Gyeongnam branch	2010
4	Asphalt Maintenance for Yeongheung bridge, Ongjin-gun, Incheon	Incheon City	2012
5	Asphalt Maintenance for Goyang IC ramp of Seoul beltway	Seoul Expressway	2012
6	Preventive maintenance in Dongbu Roads & Bridges Maintenance Office	Dongbu Roads & Bridges Maintenance Office	2013
7	Preventive maintenance in Gangseo Roads & Bridges Maintenance Office	Gangseo Roads & Bridges Maintenance Office	2013
8	Preventive maintenance in Nambu Roads & Bridges Maintenance Office	Nambu Roads & Bridges Maintenance Office	2013
9	Preventive maintenance in Seong-dong Roads & Bridges Maintenance Office	Seong-dong Roads & Bridges Maintenance Office	2013
10	Road pavement in front of Jangsan Mujigae APT	Haeundae-gu Office	2013
11	Banpo Bridge Maintenance	Nambu Roads & Bridges Maintenance Office	2013
12	Jayang Highway Maintenance	Seong-dong Roads & Bridges Maintenance Office	2013
13	Asphalt Surface Treatment for Wiryeseong-gil	Dongbu Roads & Bridges Maintenance Office	2013
14	Preventive Maintenance for Sagajeong road	Seong-dong Roads & Bridges Maintenance Office	2015
15	Preventive Maintenance for Dongnam-ro	Dongbu Roads & Bridges Maintenance Office	2015
16	Maintenance for Dorimcheon (Shinrim 1 Bridge- left lane of Moonhwa Bridge)	Gwanak-gu Office	2016
17	Asphalt pavement for Gapyeong Hwaak Bridge of Route 387 and 5 other places	Gyeonggi Province	2016
18	Asphalt Pavement for downward to Pyeongtaek near Songsan-mado IC of Pyeongtaek- Siheung Expressway	2 <sup>nd</sup> Seohaean Expressway	2016
19	Pavement Improvement for US Airfield Runway in Pyeongtaek	US military base	2016
20	Bridge Deck Pavement for Goyeo Bridge in Daejeon City	Daejeon Metropolitan City	2017
21	Pavement Improvement for US Airfield Runway in Pyeongtaek	US military base	2017
22	Pavement Construction for US Military Base K6 Complex in Pyeongtaek	US military base K6	2017
23	Asphalt Pavement Maintenance for crack damage in Changwon Branch	Daejeon Metropolitan City	2017
24	Asphalt Surface Treatment for Namhae Line 1 ~ Dongma	Korea Expressway Corporation Busan Gyeongnam Headquarters	2017
25	Repair Work for Seongsan Bridge	Seobu Roads & Bridges Maintenance Office	2017
26	Pavement maintenance (annual unit price) in Gangneung branch	Korea Expressway Corporation Gangneung Branch	2018
27	Parking Lot Repair in Uijeongbu	Daedo Construction	2018
28	Road Repair Work for Gangneung-Yeoju in Korea Expressway Corporation	Korea Expressway Corporation Gangneung Branch	2018
29	Road repair for US military base in Pyeongtaek	US military base in Pyeongtaek (Daeseong construction)	2018
30	Road repair for US military base in Pyeongtaek	Pyeongtaek US military base (Daeseong pavement construction)	2018
31	Pavement (test) for Geumgang Rest Area in Korea Expressway Corporation	Safety and Disaster Management Division of Korea Expressway Corporation	2018
32	Road and Parking Lot Repair for 17-USFK	Ministry of National Defense United States Forces Korea base Relocation Office	2019
33	Pavement Repair for MANE Avenue Field	FINE Construction	2019
34	Road Repair in Donghae City	Donghae City	2019
35	Road repair work for US military base in Pyeongtaek	Pyeongtaek US Military Base	2019
36	Pavement maintenance (annual unit price) in Guri city	Guri City	2019
37	Pavement (test) for Waegwan Nakdong River Bridge of Gyeongbu Expressway Down Line	Korea Expressway Corporation	2019



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