AGC Solutions for Building & Construction

Super Durable Fluoro-polymer Coating of Lumiflon (since 1982)

LUMIFLON®

Pertubuhan Akitek *Malaysia* (*PAM*) Meeting on 19th Sept. 2015

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AGC Chemicals,
ASAHI GLASS CO.,LTD

Innovations for Sustainability

Contents

Super Durable Fluoro-Polymer Coating of Lumiflon

9:50-10:15

1. What's Lumiflon
2. Characteristics of Lumiflon
   a) High Gloss & Wide Color Range
   b) Durability
3. Lower Life Cycle Costs
4. Asia Pacific and Global Projects

11:30-12:00

Case study : Green Protecting Coating

Reduction of

1. VOC : Water and Powder
2. CO2 : Long Term Use
3. Energy : Reflecting Coating
4. Dirt Picking Up

Applications 1 (since 1982)

Architectures

Marunouchi 7years

Sonpo Japan > 20 years

Mistui 18 years

Ark Mori19 years

Carrot Tower 20 years

Tokyo Forum > 15 years

Land Mark Tower >16 years

Queens Square 12 years

Continental Hotel 13 years

Application 2 (since 1982)
Protective coating

Akashi Striate Bridge

Kurushima Bridge

Nagoya Express Road Bridge

Rainbow Bridge

Tokyo bay Aqua Line

Kiyosu Bridge

Application 3 (since 1982)

Vehicles

ANA over 100 planes

< Durability >

- -50℃ ~ R.T . Thermo Cycle
- Rain Erosion
- Plane Oil Resistance
- Strengthen UV ray

Polyurethane 4 years →

Fluoro Polymer paint ⇒ over 8 years

Shinkansen

FRP Ships

Auto Mobile

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General Characteristics of Fluoropolymers

➢ What are Fluoropolymers?

Fluorspar/Flourite

Positives

- Excellent Weather-ability
- Corrosion Resistant
- Low Surface Energy

Negatives

- Not Solvent Soluble
- Applied With Heat
- Limited Range of Gloss and Colors

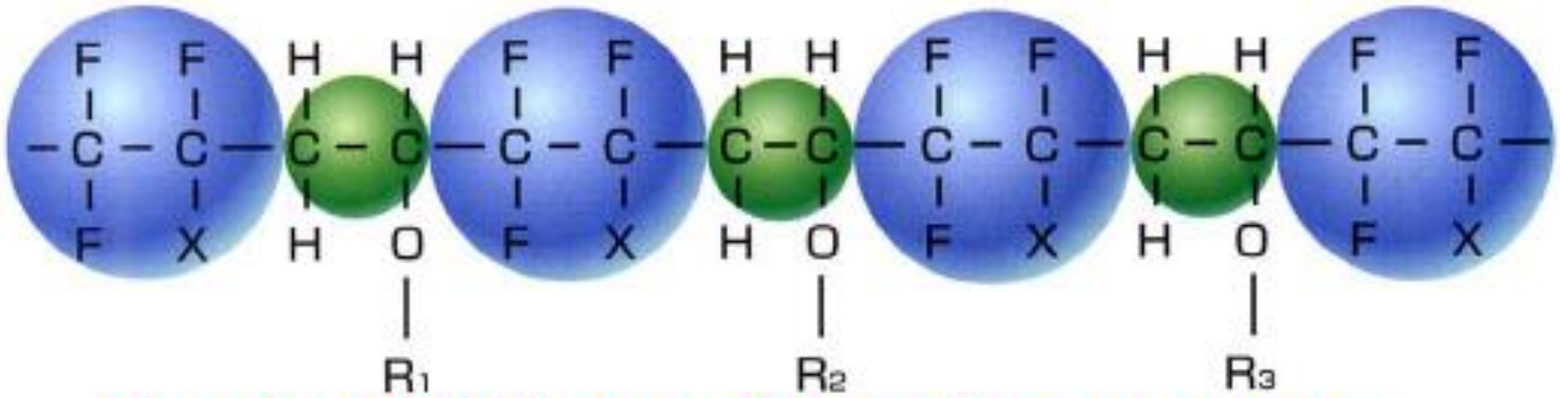
Chemical Structure of Lumiflon®

***LUMIFLON®* = *FEVE* (*F*luoro-*E*thylene / *V*inyl *E*ther copolymer)**

In 1982, Lumiflon was commercialsed the first solvent-soluble fluoro-polymer in the world.

Fluoro Ethylene

Vinyl Ether



Perfect Alternative Sequence

Fluoroethylene Segment

1. Weatherability
2. Durability
3. Chemical resistance

good pigment compatibility

Vinyl Ether Segments

R1 = Clarity, Gloss, Hardness

R2 = Flexibility

R3 = Crosslinking site (-OH)

Solubility

Now, We can supply Water Base and Powder Grade as same structure

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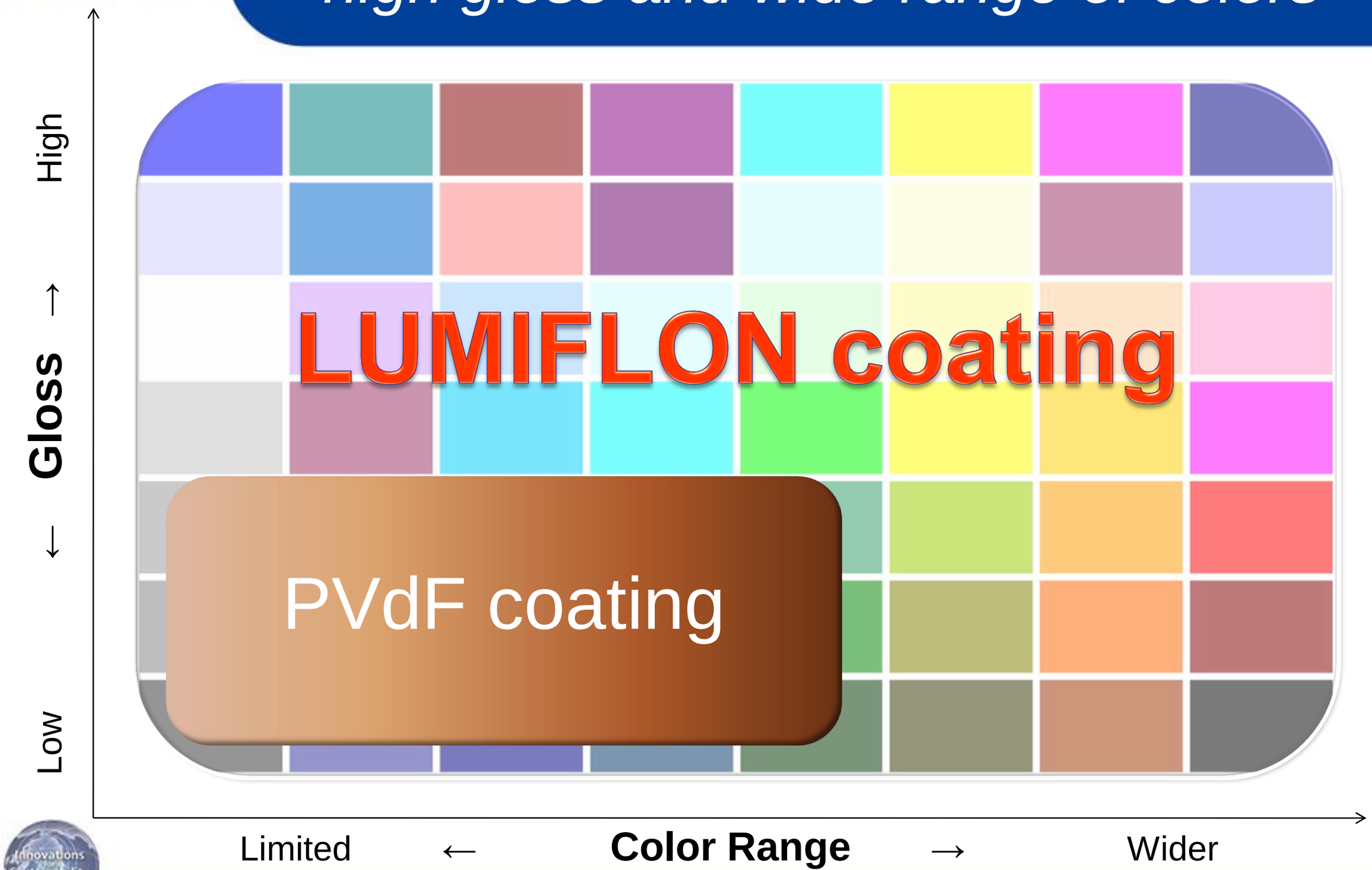
Aesthetics

LUMIFLON® makes world colorful

Comparison of Lumiflon® and PVdF coating

Brand Name	LUMIFLON®	-
Fluoro-polymer Type	FEVE (3F)	PVdF (2F)
Polymer Type	Thermo-set	Thermo-plastic
Appearance	Transparent (Solution)	Milky White (Dispersion)
Cure Temp.	Room Temp. to 230℃	>250℃
Gloss	15 to 80%	25 to 35%
Color Range	Wider	Limited
Re-Coatability	Excellent	Poor
Exposure Time (hr)	0➡1500 *QUV test	
Haze (%)	0.5➡2.9	13➡36
Yellow Index(-)	0.6→3.2	9.7→14

Lumiflon® coatings achieve high gloss and wide range of colors



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Lumiflon® coating protects undercoat as top coat

Paints/Coatings

Resins = Main Ingredient

Pigments

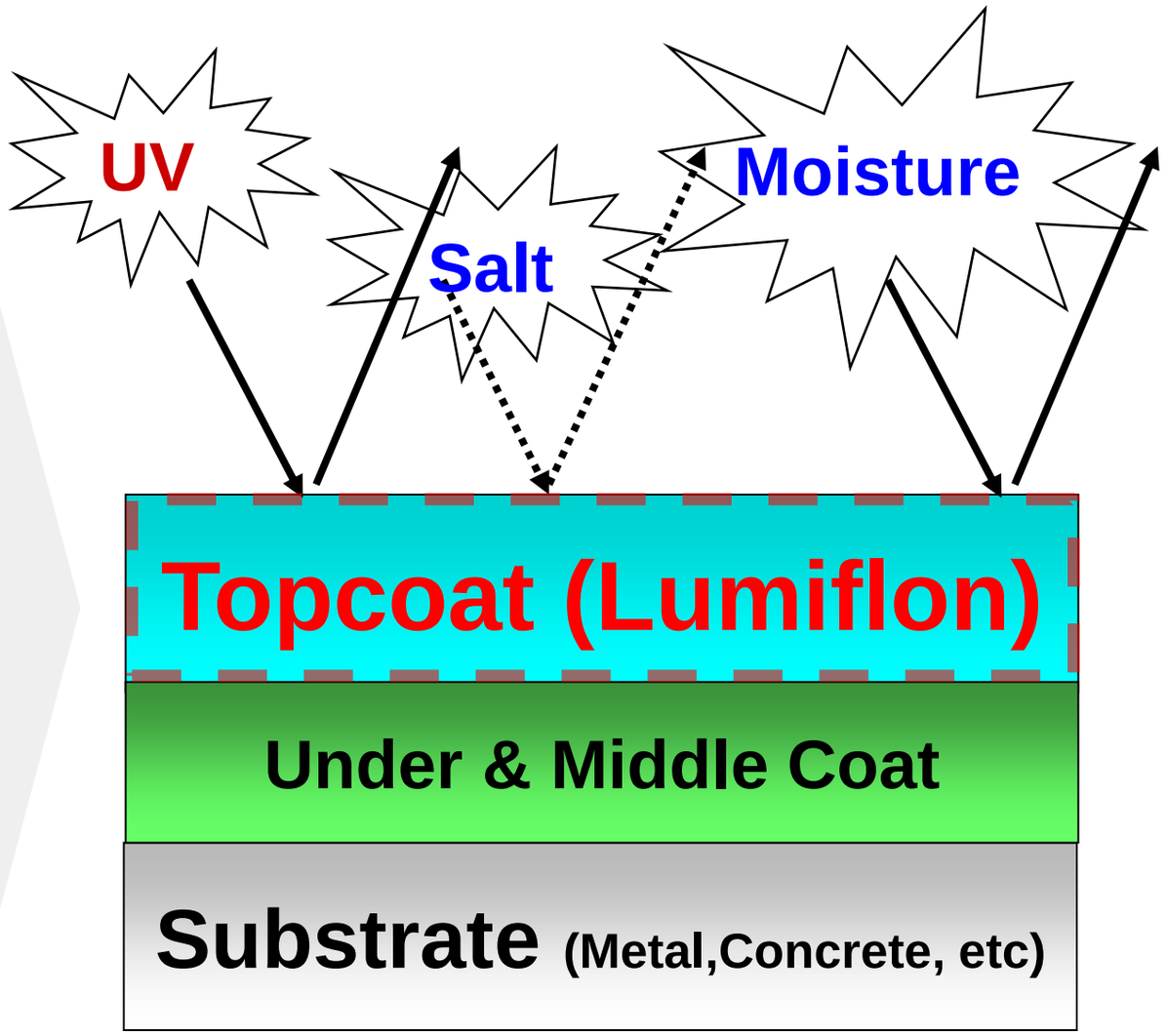
** Colorants*
** Extender Pigment*
** Metal Pigment*

Additives

** Dispersing Agent*
** Leveling Agent*
** Deformer Agent*
** Hardener*

Solvents

** Water*
** Xylene*
** Toluene*
** Mineral turpentine spirits*

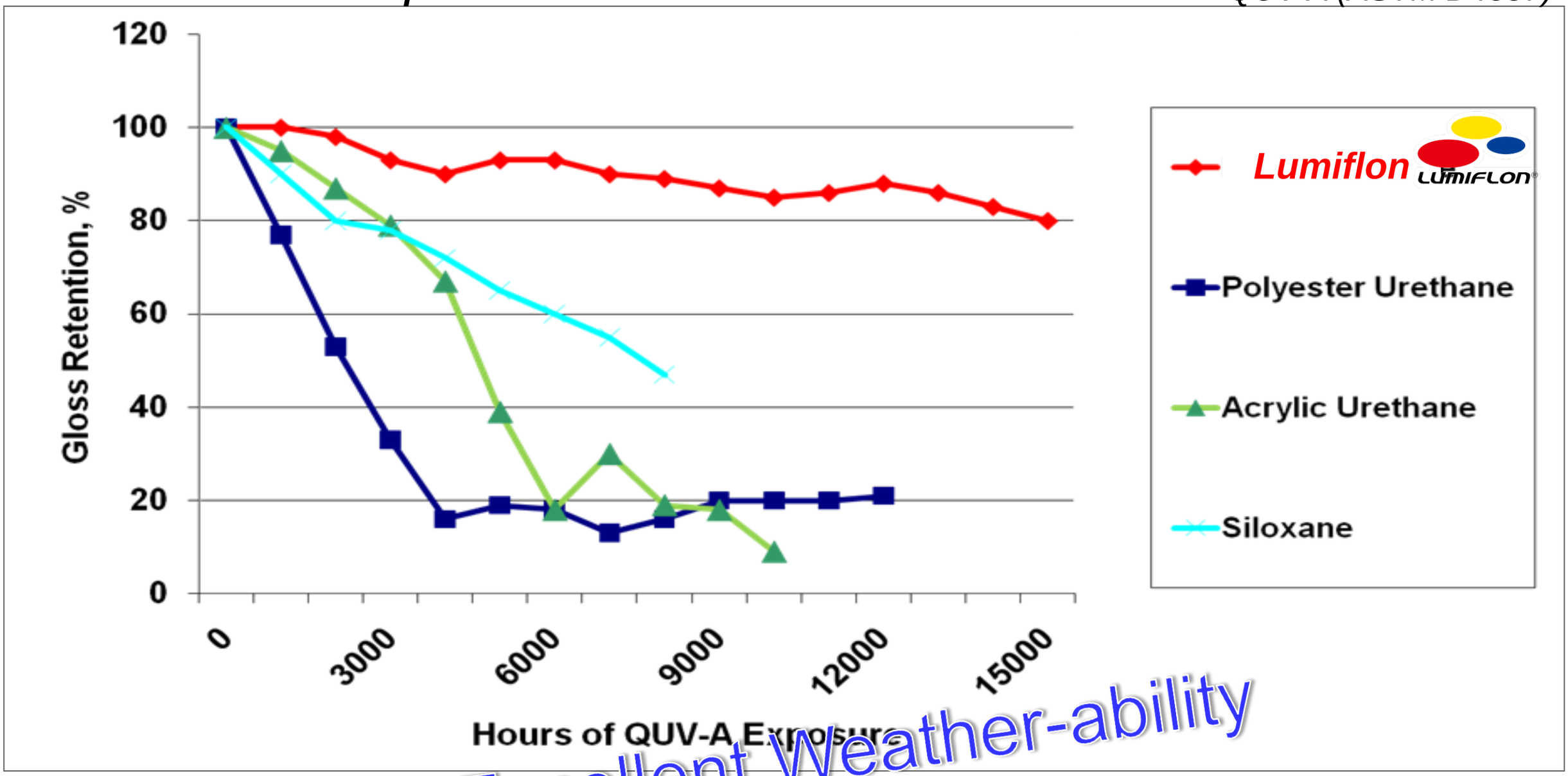


Lumiflon coating
⇒long lasting in harsh environment

Weather-ability of Lumiflon® Coatings

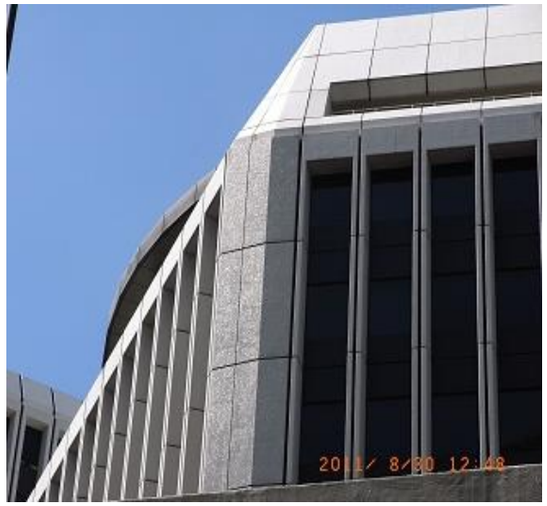
➢ *Accelerated Exposure Test*

QUV-A (ASTM D4587)



Excellent Weather-ability

Akasaka Twin Tower 1986 - 29 years



Concrete Panel

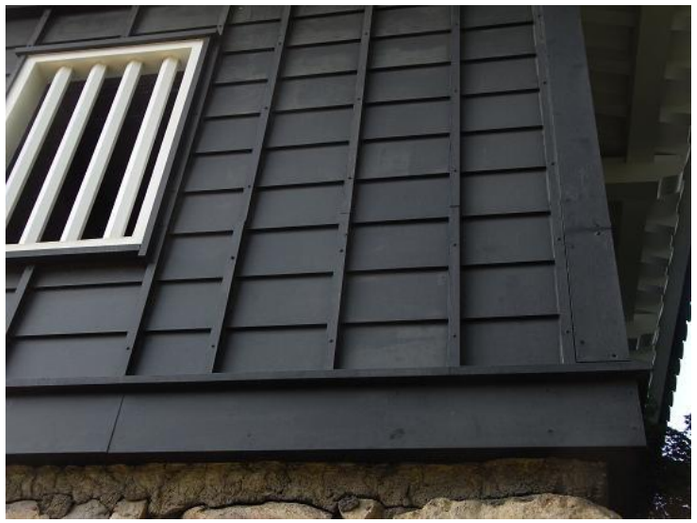
Excellent Weather-ability

Long Term Application over 15-25 years

National Library,
25y, 1986, Concrete

Yushima Shrine,
22y, 1989, Concrete

Okayama Castle, Water base,
15y, 1996, Concrete



Long Term Application over 22-32 years

Yellow metallic color without Clear top
28y, 1988, Concrete

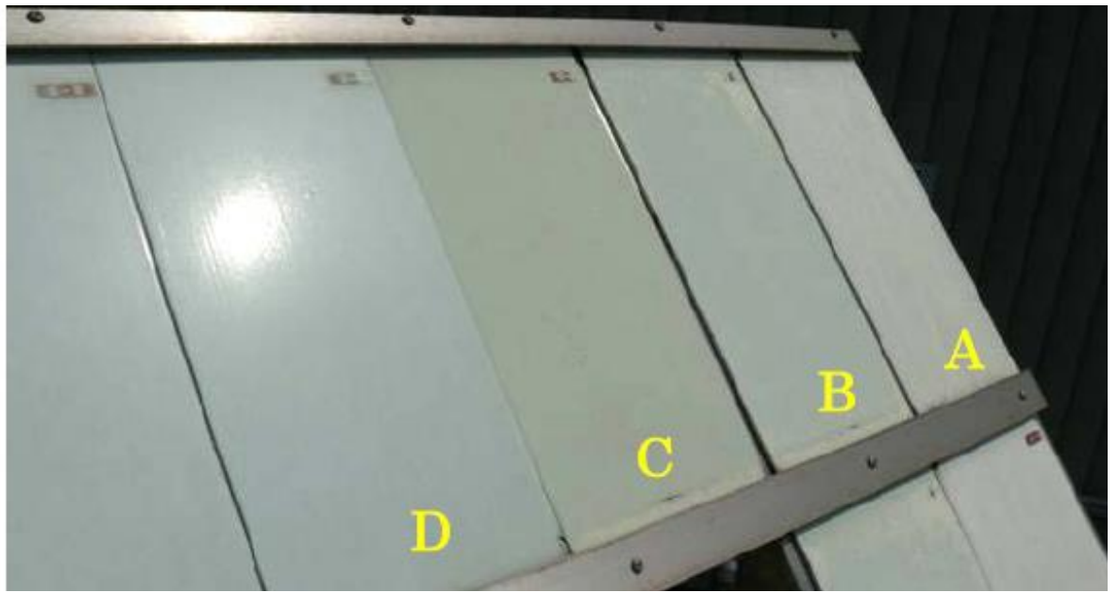
Rail Way Station
22y, 1989, Aluminum Panel

Blue Enamel**, 32y,** 1984, PC Panel

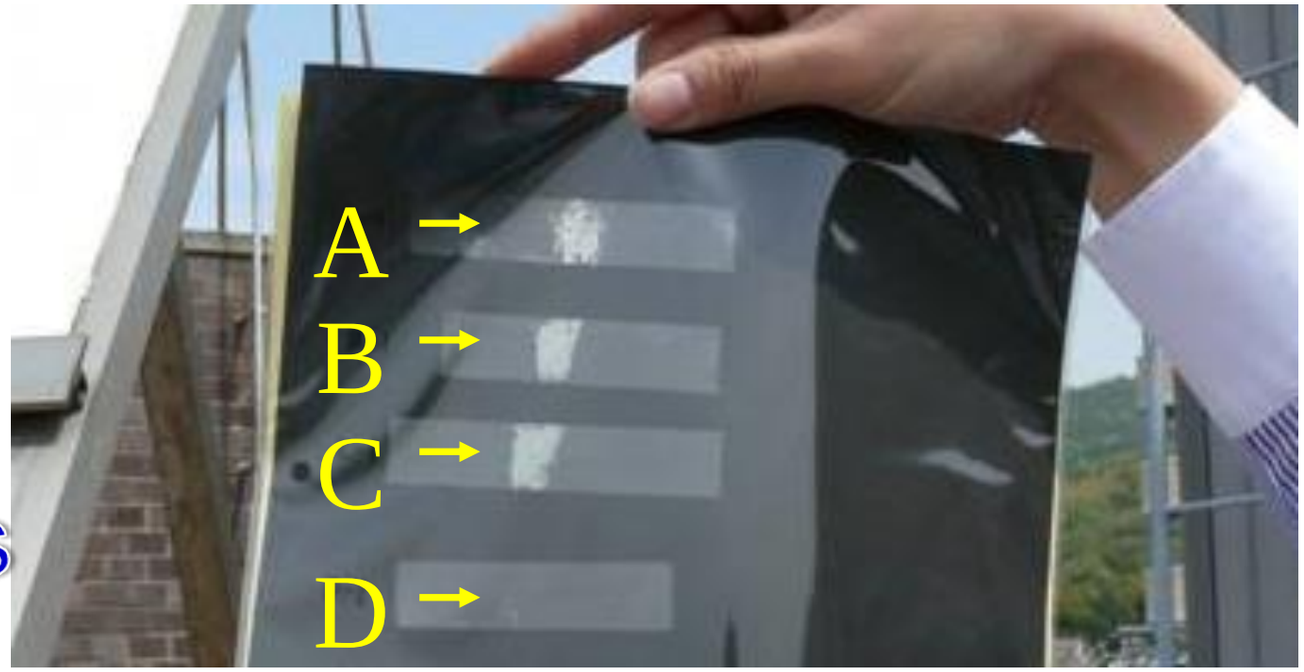
Metallic Blue with Clear top
23y, 1990, Aluminum Panel

Excellent Appearances

15y exposure samples at Hiroshima



A	Alkyd paints
B	Chlorinated Rubber pains
C	Polyurethane Paints
D	Fluoro-Polymer Paints



No Chalking for 15 years

D ： No chalking : Fluoro-Polymer paint film

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Preservation of color and gloss

➢ *Lumiflon® coated bridge over 27 years* *Tokiwa Bridge in Hiroshima, Japan*

In 2014

	Gloss Retention	Color Change
Washed Surface	100%	2.3 ΔE
Unwashed Surface	92%	3.5 ΔE

Outstanding Gloss & Color Retention

Innovations for a Sustainability

Durability and LCC comparison
of Fluoro-polymer paint and Chlorinated rubber

System	**Fluoro-polymer**	**Chlorinated rubber**	Cost Ratio
Top coat ($)	502	101	5.0
Paint cost ($)	1,724	278	6.2
Manpower cost ($)	3,696	2,796	1.3
Scaffolding cost ($)	3,957	3,297	1.2
Total repaint cost ($)	**9,377**	**6,371**	**1.5**
Durability (years)	**> 27**	**8**	>3.3(durability)
LCC: cost($) / year	347	796	< 0.43 **< 43 %**

LCC is below **1/2** during **27** years

Lifetime Estimation by the Japanese Authority

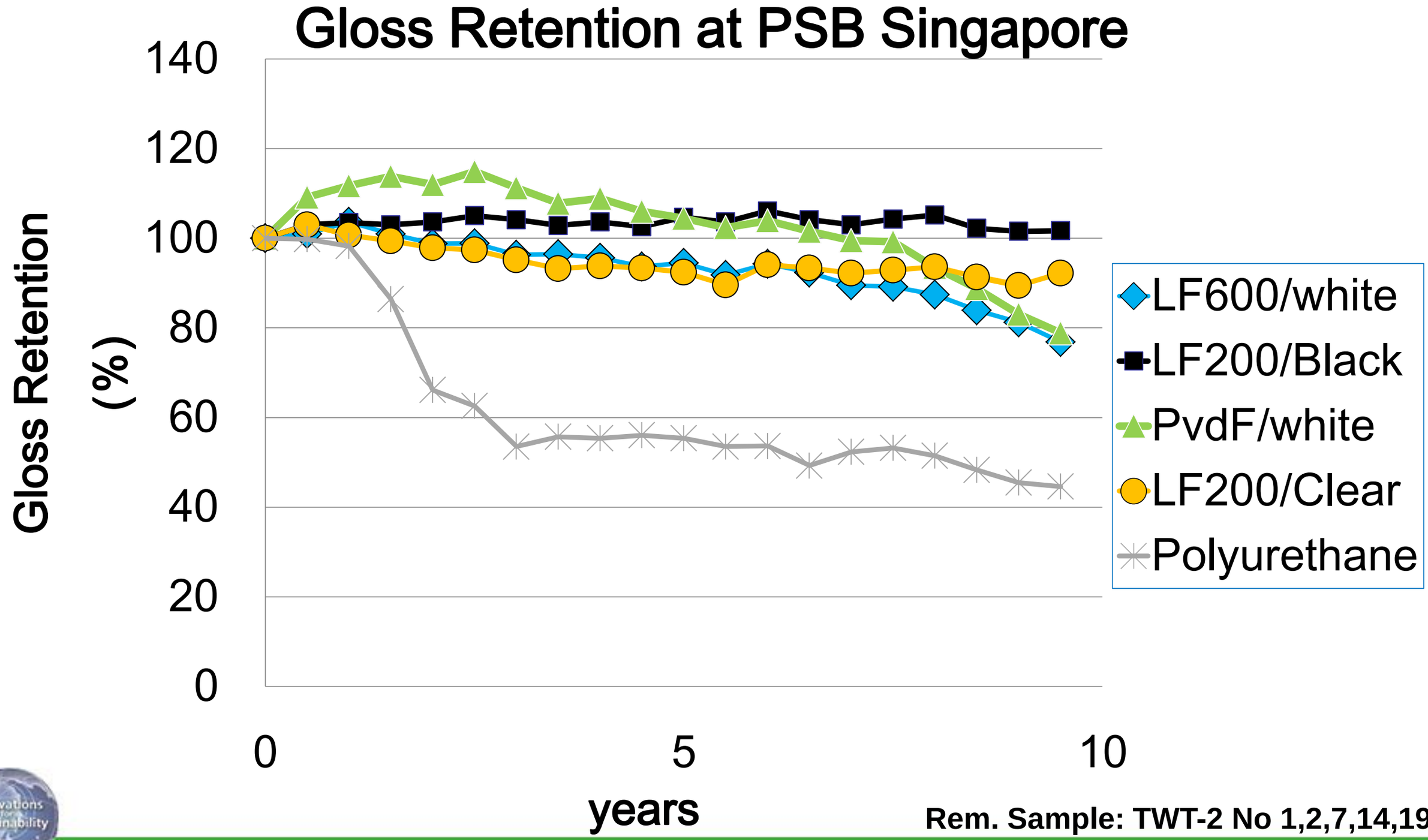
➢ *Estimated Lifetime by The Japanese Authorities*

Authority	***Fluoro-polymer Top system***	*Polyurethane Top system*
JPMA	*60 years*	*18 years*
JSSC	*50 years*	*30 years*
JCA	*60 years*	*40 years*

JPMA: *The Japan Paint Manufacturers Association*
JSSC: *The Japanese Society of Steel Construction*
JCA : *The Japan Bridge Association*

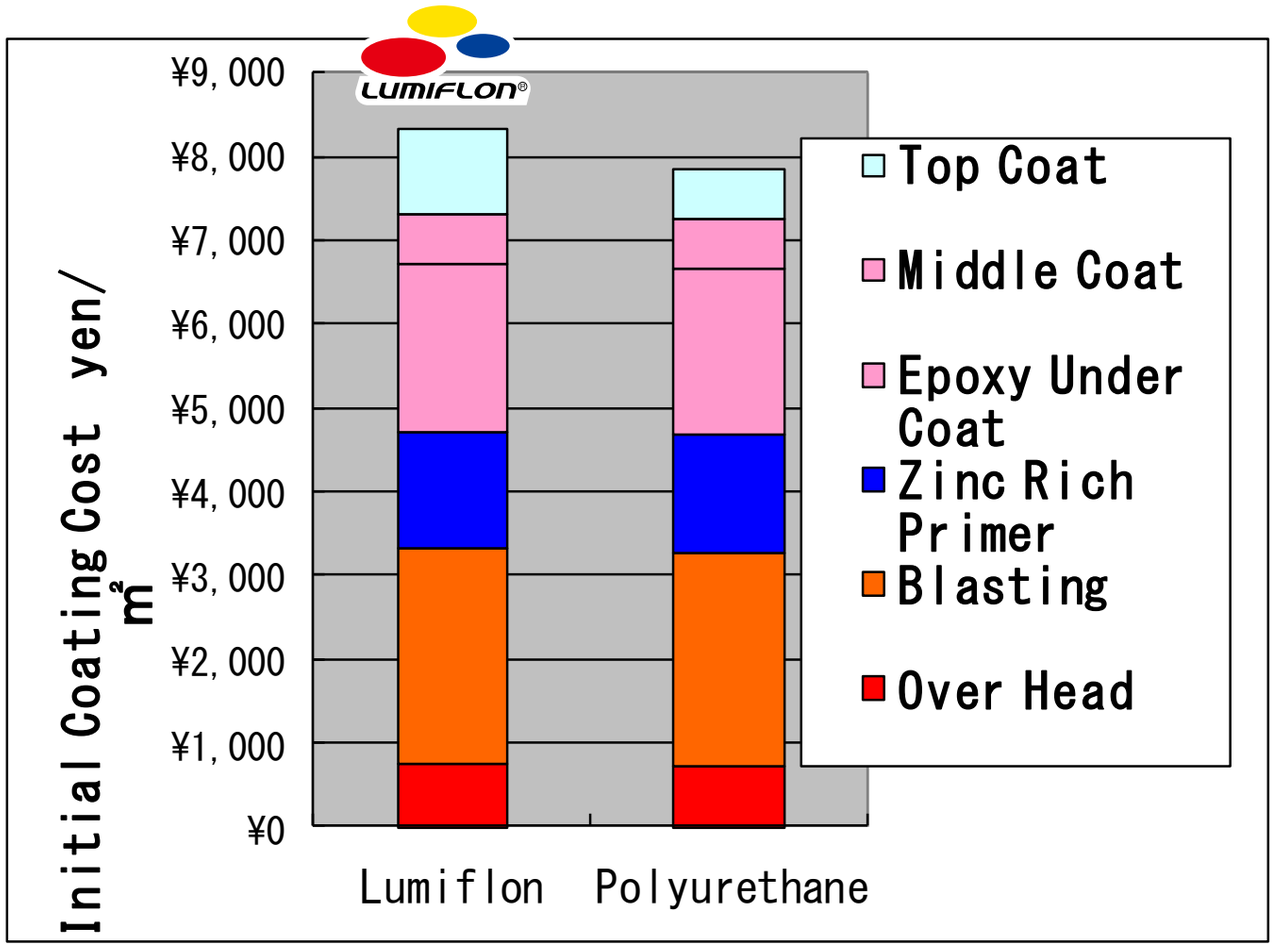
Proven Lumiflon Reliability in Japan

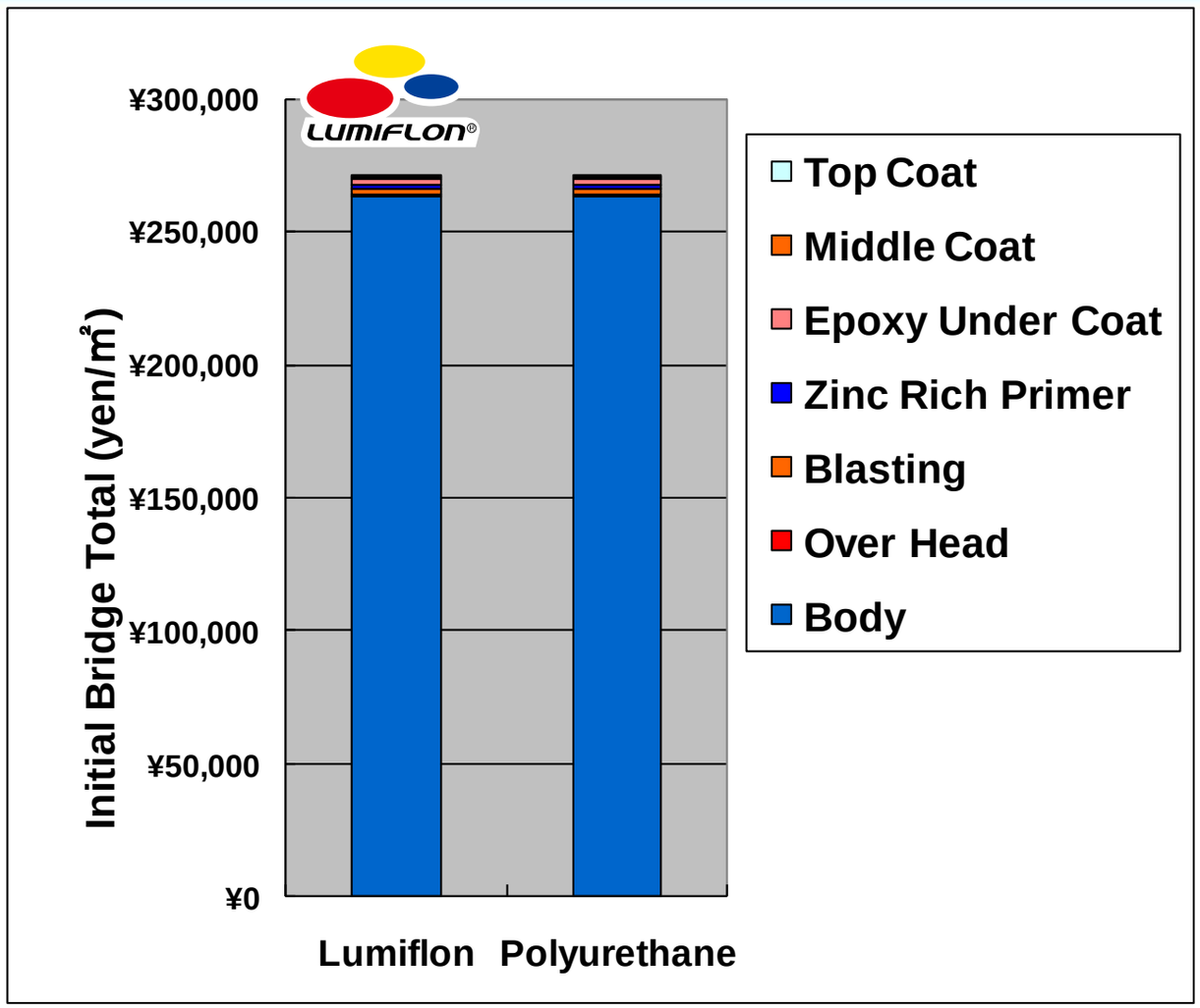
Durability Results in PSB Singapore



Rem. Sample: TWT-2 No 1,2,7,14,19

Initial Costs (Lumiflon® vs. Polyurethane)





Initial costs for coatings

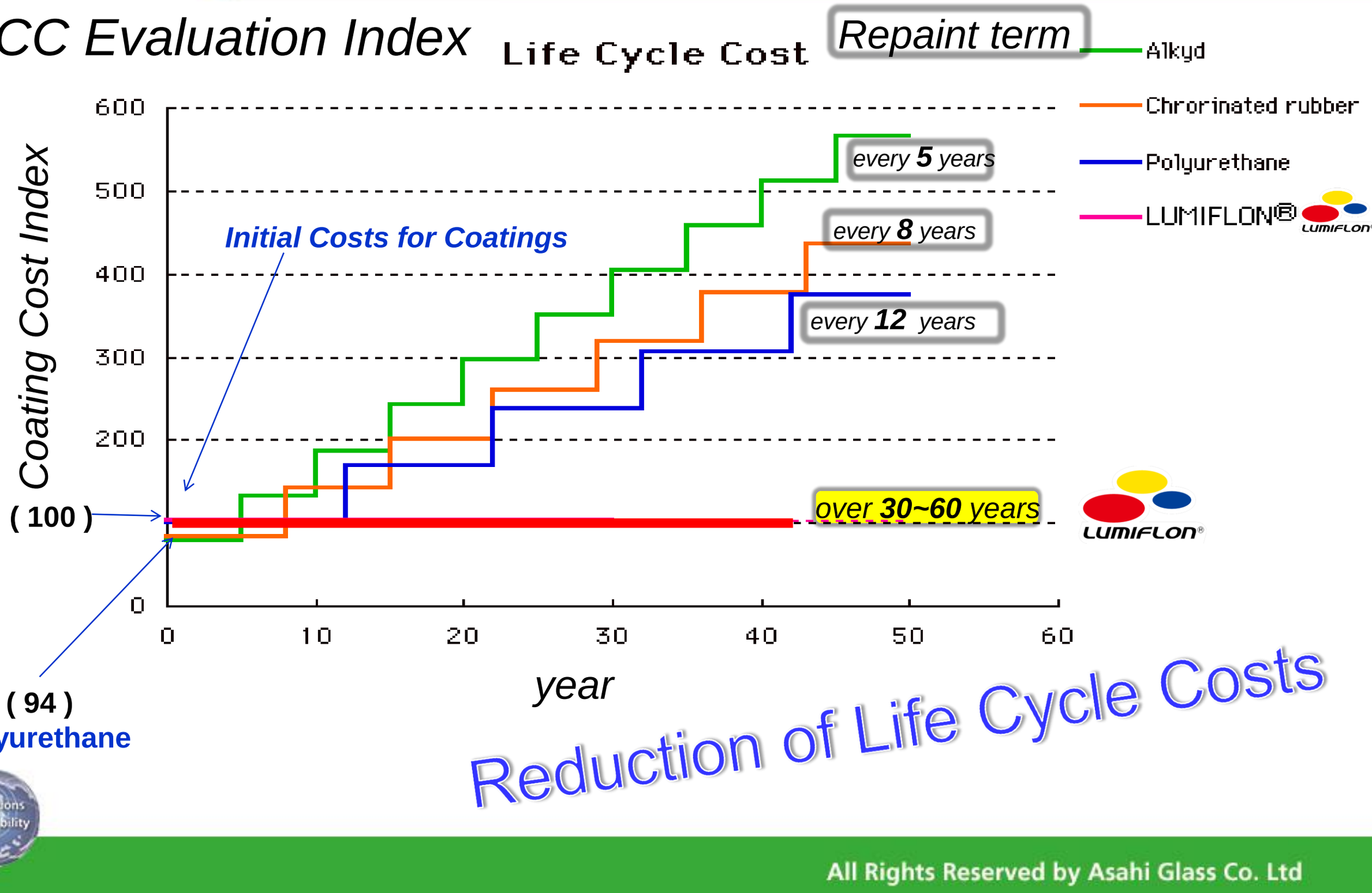
*Lumiflon is **6%** higher than polyurethane*

Initial costs for coatings&iron body

*Lumiflon is only **0.07%** higher than polyurethane*

Life Cycle Cost (LCC) Reduction

➢ *LCC Evaluation Index*



Reduction of Life Cycle Costs

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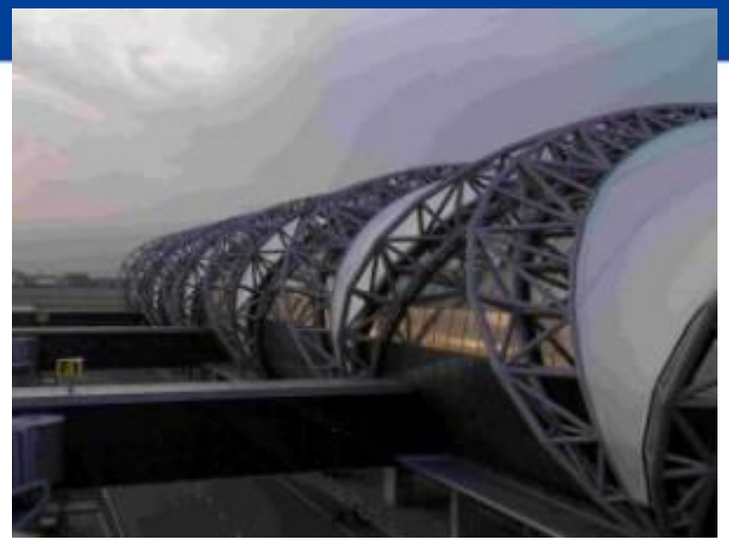
Lumiflon® based Coatings in Singapore

Lumiflon® based Coatings in Thailand

Software Park

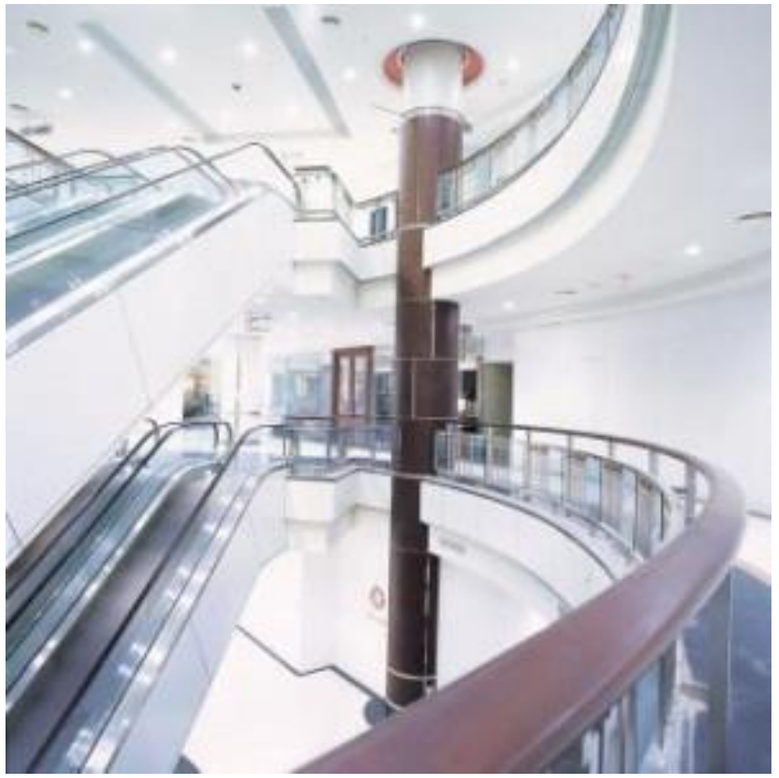


New Bangkok International Airport, Concourse Canopy

The Challenger Exhibition Center

Export Mart

Shinawatra Building



The Gallery (CRC Tower)

Lumiflon® based Coatings in Indonesia

Regent Four Seasons Apartment

Regatta

World Trade Center II

Lumiflon® based Coatings in Malaysia

Wisma Sanyan

Seravista

Balai Felda

Kuching International Airport

Damansara Mosque

Prince Court Medical Centre

Government Buildings at t
Federal Government
Administrative Center,
Putrajaya

Shangri-La Hotel

LKT Precision Engineering Factory

Motorola Factory

Innovations for Sustainability

[RELIGIOUS ARCH.]

A Mosque in Kuala Lumpur
Malaysia

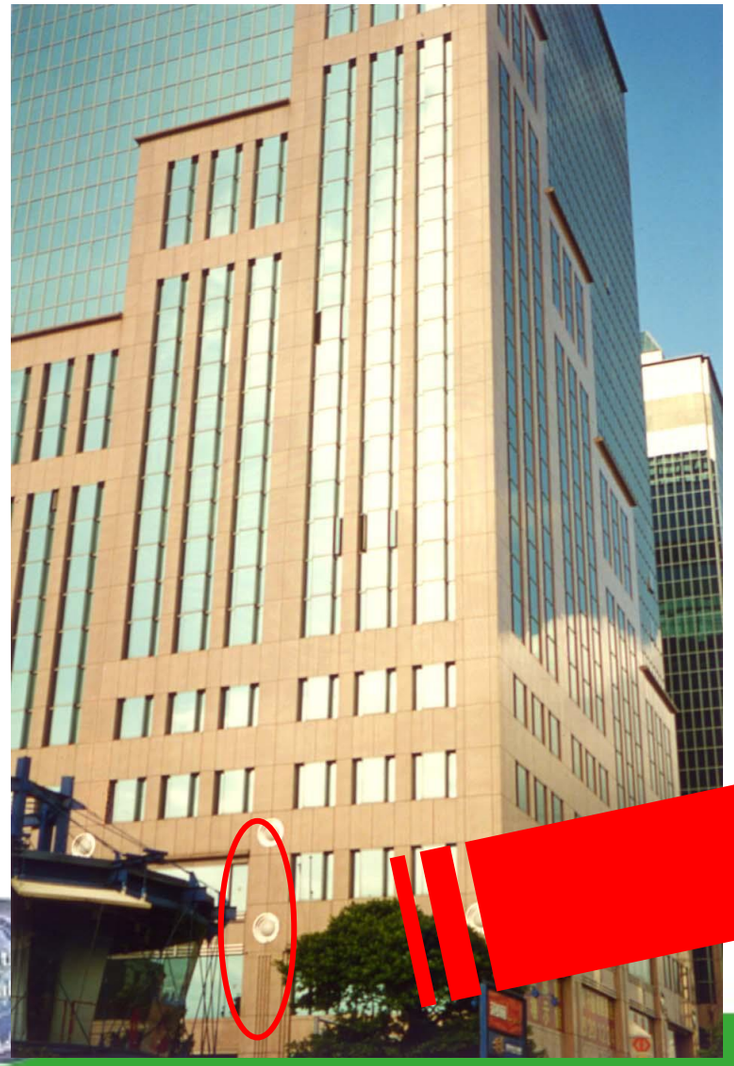
A Mosque in Istanbul
Turkey

[INTERIOR]

Software Park
Bangkok, Thailand

Shinjuku Railway Station
Tokyo, Japan

[STONE FINISH]



Far East World Center
Taipei, Taiwan

PETRON in Malaysia

PETRON

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TOKYO SKYTREE®

Worlds' tallest electric wave tower
634m high
Tokyo, Japan
Steel, Coated in 2011

TOBU TOWER SKYTREE CO., LTD.
- Anti-corrosion primer : Zinc-rich paint 75μm
- Undercoat : Epoxy resin paint 120μm
- Middle / topcoat : Thick-coating fluoropolymer paint 55μm

The largest indoor and first Ferrari theme park

Ferrari World (Yas Island, Abu Dhabi, U.A.E.)

Burj Al Arab (Dubai, U.A.E.) ALPOLIC®

Projects in Australia

1 **Lunar Park** (Sydney)
2 **National Australia Bank** (Melbourne)
3 **Qld Brisbane Head Office**

VITRAPANEL®

Victoria University, St Albans Campus (Melbourne, Australia)

VITRPANEL®

Fluoro-polymer Paint

Next 11:30-12:00

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⇩

Water Base Coating
&
Powder Coating

Water Base Coating

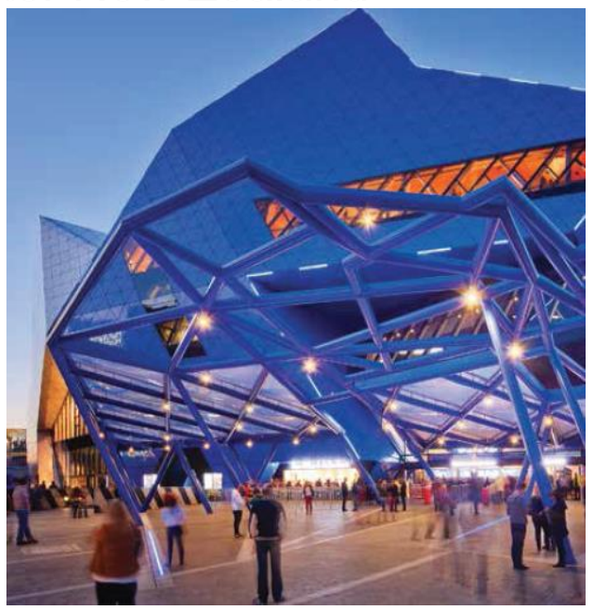
Okayama Castle (Okayama, Japan)

Powder Coating

Deloitte Center New Zealand

Pearl River

Aldar Headquaters, ABU DHABI



Perth Arena Australia

Royal Clock tower, Marakkah

The creative designs would not be possible without the use of fluoro-polymer protective coating

EQX Building

Questions?