

There is Zero Upside to Inviting a Lightning Strike

Avoid Inducing Lightning Whenever Possible

September 12, 2023

Toshio Matsumoto
Lightning Suppression Systems



株式会社 落雷抑制システムズ

Lightning Suppression Systems

Company Overview

Lightning Suppression Systems

Suppressing lightning as a form of contributing to society



PDCE-Magnum

The PDCE lightning rod makes it harder for lightning to strike

Wake not a sleeping lion
It's never a good idea to invite lightning



ALB (Anti Lightning Ball)

Company Overview

Address:

#4406, Yokohama Landmark Tower, 2-2-1
Minatomirai, Nishi-ku, Yokohama City

Established: March 2010

Capital: 25 million yen

Company motto: Protecting society from
lightning strikes

Intellectual property: 120 total, primarily
lightning-related

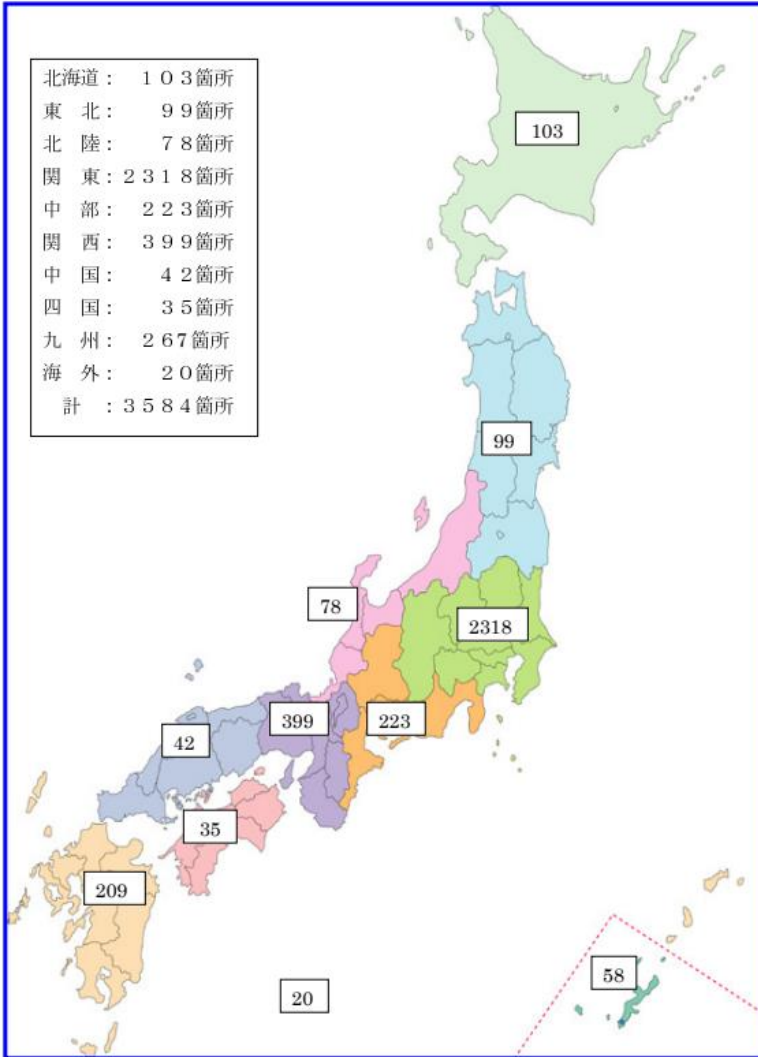


Track record: Over 3,600 units installed (Sept. 30, 2023)

2023年8月31日

PDCE (落雷抑制型避雷針) 納入実績 (アジア)

北海道	103箇所
東北	99箇所
北陸	78箇所
関東	2318箇所
中部	223箇所
関西	399箇所
中国	42箇所
四国	35箇所
九州	209箇所
海外	20箇所
計	3584箇所



2013:	Approx. 200 units
2014:	450 units
2015:	700 units
2016:	1062 units (Oct. 31)
2017:	1582 units (Dec. 30)
2018:	1920 units (Dec. 30)
2019:	2201 units (Nov. 30)
2020:	2706 units (Oct. 30)
2021:	3058 units (Sep. 30)
2022:	3448 units (Dec. 31)
2023:	3584 units (Aug. 31)
2023:	3655 units (Sep. 10)

End of 2023: 4000 units?

Major Clients in Railroad company

関東系私鉄大手

小田急電鉄 [0007]

3位

新宿を拠点に路線は神奈川、箱根方面を結ぶ。複々線化で利便性向上

売上高	5,230億円↓
営業利益	499億円↓
総営業距離	120km
旅客輸送人キロ	11,487↑
売上高に占める運賃事業の割合	32%

主要関係会社

運 輸 ● 小田急バス ● 指根登山鉄道
不動産 ● 小田急不動産
汽 車 ● 小田急自動車
送 達 ● 小田急百貨店 ● 小田急商事
その他 ● ホテル小田急

東武鉄道 [0001]

2位

関東系で路線最長。スカイツリー短。ホテルや観光列車を強化中

売上高	5,688億円↑
営業利益	683億円↑
総営業距離	463km
旅客輸送人キロ	12,616↑
売上高に占める運賃事業の割合	37%

主要関係会社

運 輸 ● 東武バス
不動産 ● 東武タウンプラザ
汽 車 ● 東武百貨店 ● 東武ストア
送 達 ● 東武グループ ● 東武ツアーサービス

東京メトロ

1位

正式社名は東京地下鉄。営業利益率は私鉄首位。政府と都が大株主で上場を目指す

売上高	4,154億円↑
営業利益	1,010億円↑
総営業距離	195km
旅客輸送人キロ	20,753↑
売上高に占める運賃事業の割合	89%

主要関係会社

不動産 ● 地下鉄ビルディング ● メトロプロパティーズ
汽 車 ● メトロコマース
送 達 ● メトロアドベンチャー

京王電鉄 [0003]

新宿(東京)と多摩(八王子)を結ぶ路線が主体。収益力安定

売上高	4,189億円↑
営業利益	379億円↑
総営業距離	84km
旅客輸送人キロ	7,630↑
売上高に占める運賃事業の割合	30%

主要関係会社

運 輸 ● 京王電鉄バス
不動産 ● 京王不動産
汽 車 ● 京王百貨店 ● 京王ストア
その他 ● 京王プラザホテル ● 京王フレッシュイン ● 京王建設

西武ホールディングス [0021]

傘下に西武鉄道、プリンスホテルなど。2014年に株式再上場

売上高	5,120億円↑
営業利益	624億円↓
総営業距離	268km
旅客輸送人キロ	8,741↑
売上高に占める運賃事業の割合	29%

主要関係会社

運 輸 ● 西武鉄道 ● 伊豆箱根鉄道 ● 江ノ島線
不動産 ● 西武プロパティーズ
その他 ● プリンスホテル ● 西武建設 ● 西武ライフ ● 西武百貨店

東京急行電鉄 [0005]

ブランド強く、グループ強大。渋谷周辺を開発

売上高	1兆1,173億円↑
営業利益	779億円↑
総営業距離	104km
旅客輸送人キロ	10,987↑
売上高に占める運賃事業の割合	18%

主要関係会社

運 輸 ● 伊豆急行 ● 東武バス
不動産 ● 東武不動産HD ● 東武コミュニティー
汽 車 ● 東武百貨店 ● 東武ストア
その他 ● 東武ホテルズ ● 東武エンジェンツ ● 東武建設 ● 東武不動産 ● 東武クリエイション

相鉄ホールディングス [0023]

神奈川地盤。JR、東急との相互直通を計画。ほとんど不動産会社。ホテル事業に注力

売上高	2,533億円↓
営業利益	305億円↓
総営業距離	38km
旅客輸送人キロ	2,554↑
売上高に占める運賃事業の割合	15%

主要関係会社

運 輸 ● 相模鉄道 ● 相模バス
不動産 ● 相鉄不動産 ● 相鉄アーバンクリエイツ
汽 車 ● 相鉄ローゼン
その他 ● 相鉄ホテル ● 相鉄イン ● サンプルート

京成電鉄 [0009]

成田空港アクセス路線に強み。オリエンタルランドの筆頭株主

売上高	2,458億円↑
営業利益	300億円↑
総営業距離	152km
旅客輸送人キロ	3,877↑
売上高に占める運賃事業の割合	58%

主要関係会社

運 輸 ● 京成バス
不動産 ● 京成不動産 ● 京成プロパティーズ
汽 車 ● 京成ストア
送 達 ● 京成建設 ● オリエンタルランド

京浜急行電鉄 [0004]

京浜、三浦半島地盤。羽田空港へのアクセスが強み。国際線拡張は追い風

売上高	3,098億円↓
営業利益	377億円↓
総営業距離	87km
旅客輸送人キロ	6,383↑
売上高に占める運賃事業の割合	38%

主要関係会社

運 輸 ● 京浜急行バス
不動産 ● 京浜不動産
汽 車 ● 京急百貨店 ● 京急ストア
その他 ● 京急開発 ● 京急建設

関西系私鉄大手

近鉄グループホールディングス [0041]

大阪-奈良間を柱に路線距離は私鉄最長。阿倍野橋に「あべのハルカス」を建設。15年4月HD化

売上高	1兆2,048億円↓
営業利益	648億円↑
総営業距離	501km
旅客輸送人キロ	10,920↑
売上高に占める運賃事業の割合	19%

主要関係会社

運 輸 ● 近鉄日本鉄道 ● 奈良交通 ● 近鉄バス
不動産 ● 近鉄不動産
汽 車 ● 近鉄百貨店
送 達 ● 近鉄百貨店
その他 ● 近鉄市街 ● KNT-CTホールディングス ● 近鉄ホテルズ ● 福山通運 ● 近鉄エクスプレス

阪急阪神ホールディングス [0002]

傘下に阪急電鉄、阪神電鉄。大阪-神戸間中心。利益率高い。梅田地区など大阪駅前の開発を推進

売上高	7,367億円↑
営業利益	1,040億円↓
総営業距離	192km
旅客輸送人キロ	11,349↑
売上高に占める運賃事業の割合	32%

主要関係会社

運 輸 ● 阪急電鉄 ● 阪神電気鉄道
不動産 ● 阪急不動産 ● 阪神不動産
汽 車 ● エキリテールサービス阪急阪神
送 達 ● エイチツーオー リテイリング
その他 ● 阪急阪神ホテルズ ● 阪急交通社 ● 阪神タイガース ● 東宝

南海電気鉄道 [0044]

大阪南部、和歌山が地盤。集客力強化へ、本島なんばを再開発

売上高	2,216億円↑
営業利益	318億円↓
総営業距離	154km
旅客輸送人キロ	3,881↑
売上高に占める運賃事業の割合	44%

主要関係会社

運 輸 ● 南海電気鉄道 ● 南海バス
不動産 ● 南海不動産
汽 車 ● 南海商事
その他 ● 南海銀行建設 ● 南海ビルサービス

京阪ホールディングス [0045]

路線は大阪-京都間が中心。08年に中之島新線が開通し、中之島地区の開発を推進

売上高	3,029億円↑
営業利益	323億円↑
総営業距離	91km
旅客輸送人キロ	4,086↑
売上高に占める運賃事業の割合	30%

主要関係会社

運 輸 ● 京阪電気鉄道 ● 京阪バス
不動産 ● 京阪不動産
汽 車 ● 京阪百貨店
送 達 ● 京阪百貨店
その他 ● 新リゾーツ ● 京阪アルビスリゾート

西日本鉄道 [0001]

九州北部に鉄道路線。ただ、主力は車両数全国首位級のバス事業

売上高	3,582億円↑
営業利益	193億円↓
総営業距離	106km
旅客輸送人キロ	1,561↑
売上高に占める運賃事業の割合	24%

主要関係会社

運 輸 ● 高鉄バス北九州 ● 西鉄観光バス
不動産 ● 西鉄不動産
汽 車 ● 西鉄ストア
送 達 ● 西鉄ストア
その他 ● 西鉄シティホテル ● 西鉄ホテルズ ● 西鉄旅行 ● 西鉄プロパティーズ

名古屋鉄道 [0018]

愛知地盤で路線距離は私鉄3位。リニア開業に備え名鉄名古屋駅前の再開発を推進

売上高	5,995億円↓
営業利益	441億円↓
総営業距離	444km
旅客輸送人キロ	6,927↑
売上高に占める運賃事業の割合	27%

主要関係会社

運 輸 ● 名鉄バス
不動産 ● 名鉄不動産 ● 名鉄プロパティーズ
汽 車 ● 名鉄百貨店
送 達 ● 名鉄ストア
その他 ● 名鉄レストラン ● 名鉄グランホテル ● 名鉄運輸 ● 矢作建設工業

PDCE Implementation by Private Rail: 12 of 15 Major Companies!

関東系私鉄大手

Odakyu Tobu

Keio Seibu Tokyu

Sotetsu Keisei Keikyu

東京メトロ 輸送人件口 1位

正式社名は東京地下鉄。営業利益率は私鉄首位。政府と都が大株主で上場を目指す

売上高 **4,154**億円 ↑

営業利益 **1,010**億円 →

経営距離 **195**km

旅客輸送人件口 **20,753** ↑

売上高に占める運輸事業の割合 **89%**

主要関連会社

不動産 ● 地下鉄ビルディング ● メトロプロパティーズ

高 速 ● メトロコマース

その他 ● メトロアドエージェンシー

関西系私鉄大手

近鉄グループ
ホールディングス (941)

大阪-奈良間を柱に路線距離は私鉄最長。阿倍野橋に「あべのハルカス」を建設。15年4月HD化

売上高 **1兆2,048**億円 ↓

営業利益 **648**億円 →

経営距離 **501**km

旅客輸送人件口 **10,920** ↑

売上高に占める運輸事業の割合 **19%**

主要関連会社

運 輸 ● 近畿日本鉄道 ● 奈良交通 ● 近鉄バス

不動産 ● 近鉄不動産

地 産 ● 近鉄百貨店

その他 ● 近鉄車庫 ● KNT-CTホールディングス ● 近鉄ホテルズ ● 福山通運 ● 近鉄エクスプレス

Hankyu
Hanshin

Nankai

Keihan

地方私鉄大手

西日本鉄道 (801)

九州北部に鉄道路線。ただ、主力は車両数全国首位級のバス事業

売上高 **3,582**億円 →

営業利益 **193**億円 ↓

経営距離 **106**km

旅客輸送人件口 **1,561** ↑

売上高に占める運輸事業の割合 **24%**

主要関連会社

運 輸 ● 近鉄バス北九州 ● 西鉄観光バス

不動産 ● 西鉄不動産

地 産 ● 西鉄ストア

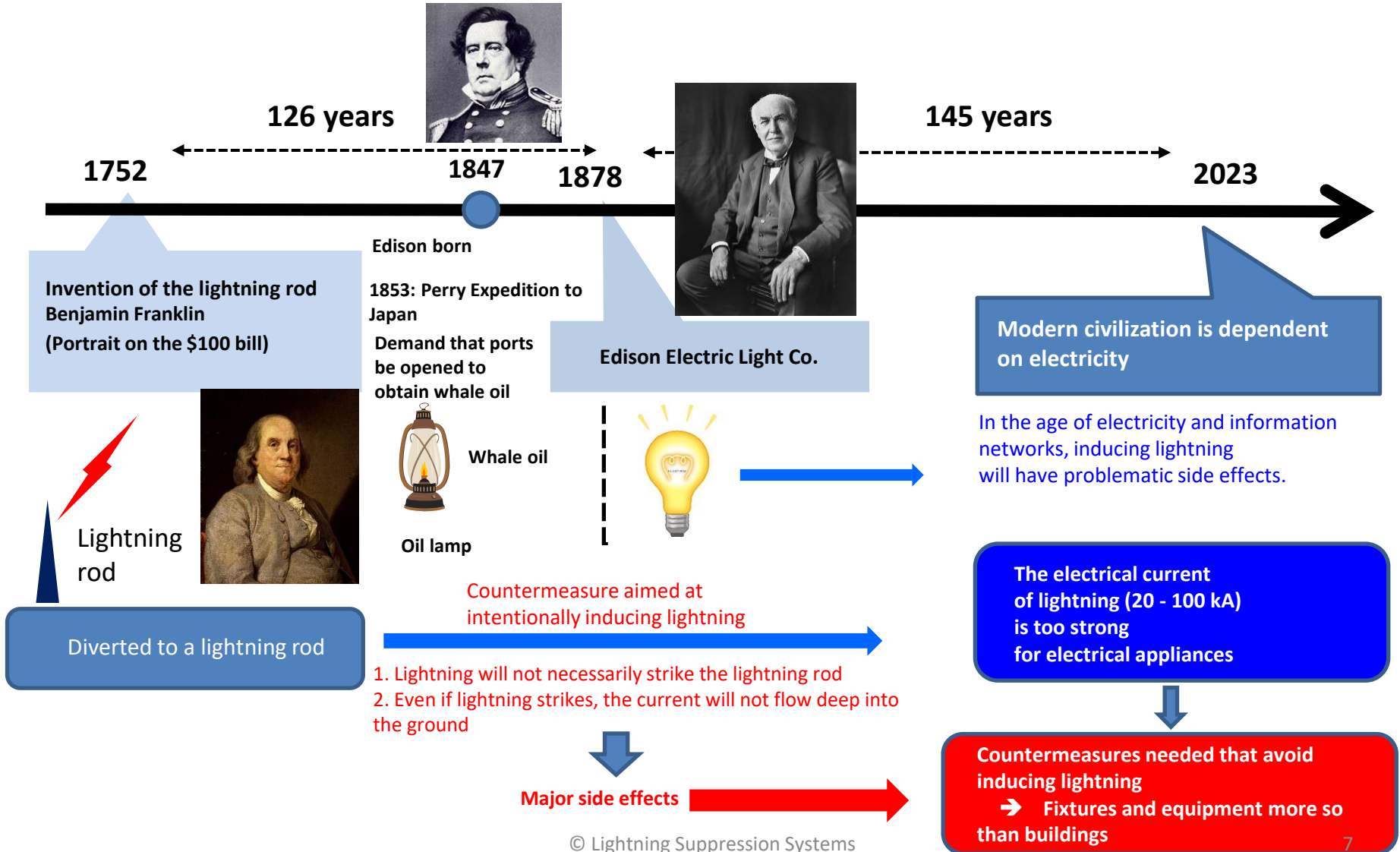
その他 ● 西鉄シティホテル ● 西鉄ホテルズ ● 西鉄旅行 ● 西鉄エージェンシー

Meitetsu

- Other
- Tsukuba Express
 - Tokyo Monorail
 - Tama Monorail
 - Enoshima Electric Railway
 - Hakone Ropeway
 - Sanyo Electric Railway
- (No particular order)

The Lightning Rod: Wrong for the Era?

Lightning and the lightning rod: History and problems - Two great U.S. inventors



PDCE/Anti Lightning Ball: How it differs from older lightning rods

Older lightning protection systems

Divert lightning with a focus on buildings



Damage caused by redirected lightning current



The best strategy is NOT to invite lightning



Modern and future protection systems

Suppress (repel) lightning with a focus on electrical facilities



Broadcasting



Rail



Electricity



Gas



Ships



Schools



Factories



Firefighting



Events



Agriculture



SDF



Historical cultural properties



Civil engineering



Bridges



Houses



Skyscrapers



Communications



Sports facilities



Energy facilities

Kurashiki, Mizushima, ENEOS Plant Fire: "Lightning strike causes tank combustion"

August 23, 2023. 2:52 PM. [Okayama Pref.](#)

On the afternoon of August 23, a fire broke out at an oil refinery tank in the Mizushima Industrial Area of Kurashiki, Okayama Pref., and firefighters were dispatched to the scene.

Suit with Straw Sandals?

Web2 CGM Web3 NFT Metaverse Blockchain
Cryptoeconomy DEFi DEX DApps
DAO DeSci Smart factory



IT, IoT, DX, Web2: This young man is riding the cutting edge of the era, but looking at his feet, he's wearing straw sandals from 270 years ago...

All apps should run on sound and stable infrastructure

Caught up in chasing app trends, we forget what sound infrastructure looks like

What's important is the lower body (infrastructure) supporting the upper body (app)

Lightning rod technology should not be left up to the construction industry, which is only concerned with inducing lightning

Instead, it should grow out of the technological expertise of telecommunications, which is actually threatened by the side effects of lightning

Two Modern Problems: Should countermeasures that invite lightning be used?

Global warming ⇒ More water vapor in the atmosphere

More extreme atmospheric trends

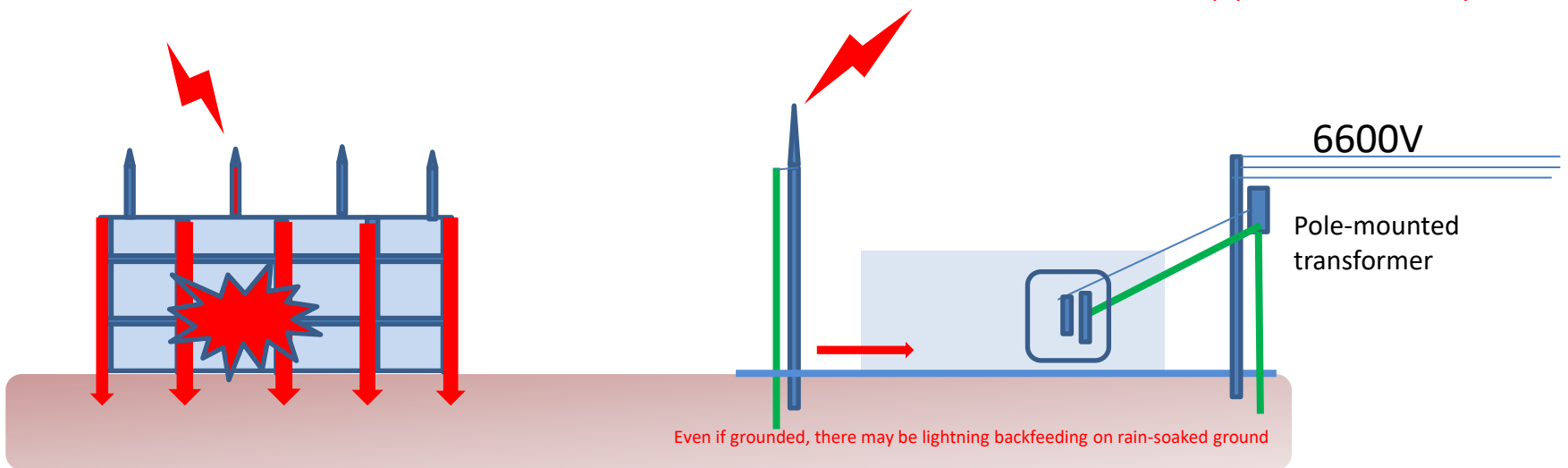
Increase in electronics and electrical devices

⇒ Importance of stable operation

Traditional lightning countermeasures ⇒ Reckless to invite lightning current at all

A lightning rod doesn't avoid lightning: it attracts lightning

In the IEC standards, it is simply "Air Termination System"



In terms of grounding resistance, the directly struck side (building) is a Type A grounding (10Ω), while the pole-mounted transformer's low-voltage side is a Type B grounding (around 30Ω).

If potential difference is 30 kA, then $30 \times 10\Omega = 300\text{ kV}$, so the insulation (10 kV) on a low-voltage power line will break and reverse flow will occur.

(A 20 kV power line can withstand 300 kV without reverse flow.)

Why are lightning countermeasures important?

Losses from devices destroyed by lightning current ⇒ Can be covered by non-life insurance

Insurance Company

- The first time, they will pay out
- What about the second time? They will ask whether essential countermeasures were taken
- By the third time, the insurance company may refuse coverage

Damage to equipment will have a larger impact on everyday life than what is covered by non-life insurance

Facility repair cost < Impact of facilities being offline

Do not expect too much from emergency power generators

Emergency power generator switches do break.

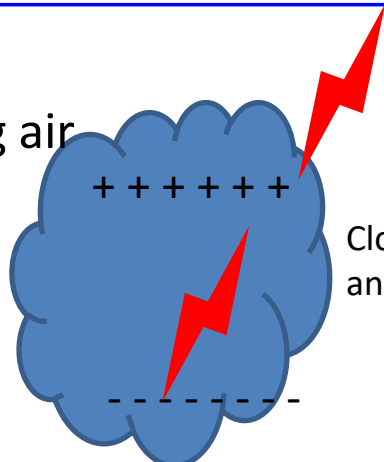
Industrial equipment repairs take time

It is also not easy to obtain replacements (it's not just semiconductors; there are shortages for all materials)

Lightning from cumulonimbus clouds (heat thunderstorm) and frontal thunderstorms (lightning associated with a moving front)

In the clouds, frictional electricity is generated between rising ice particles carried by ascending air currents and falling ice particles

The strength of the electrical field when lightning occurs rises to roughly 1,000 times that of normal



Electrical discharge to outer space (Sprite)

Cloud discharge [inside and between clouds]

A -10°C and below, hail forms

7000 m

Winter lightning (mix of positive and negative polarity) / Frontal storm

Summer lightning (primarily negative polarity)

Wind effects at low altitudes
1000m

Wind

Cold front

3000 m -18°C

Top of Mt. Fuji, mid-summer, 5°C

Positive lightning

Charge of the ground (Typically negative but may be induced to positive directly beneath a thundercloud)

Lightning cannot be prevented, but lightning strikes can (to some extent)

Lightning: Cannot be prevented because it is beyond human control

Earthquake
(tsunami)

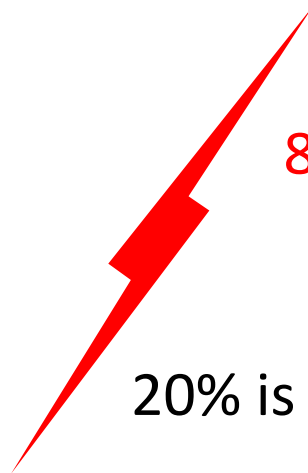
Typhoon

Lightning

Severe rain

Tornado

**Lightning
strike**



80% is discharged in the air

20% is discharged into the ground

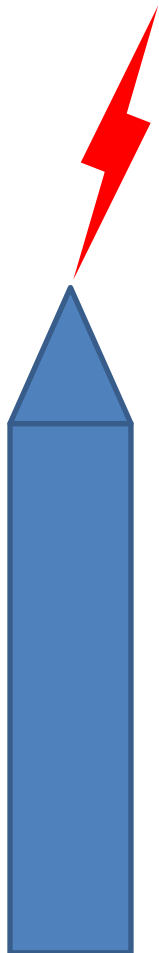
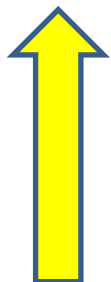
Since it occurs due to an interaction with the ground, it's through the ground that
it can be avoided

Traditional lightning protection systems

Quiz: Why is the lightning rod a rod?



Answer: Pointed ends are better at discharging electricity



The ground's positive charge is discharged towards the negatively charged bottom side of thunder clouds high up in the sky

Direction of discharge: Below to above

This connects with leaders, discharge from above, to form a path for the lightning and then calls down the charge from the thundercloud

Lightning rod Does not avoid lightning



Lightning rod Attracts lightning



Why does lightning strike lightning rods?

If the discharge distance is 100 m (100 x 1000 mm),

And if the surface area of the point of a lightning rod is 1 mm²,

Ratio of target size to distance = 1:100,000

Distance if the target's size is taken to be 1:

100,000

1 mm : 100 m (100 x 1000 mm) \Rightarrow 1 : 100,000

A master sniper shooting a 10 cm target from 2 km away (2 x 1000 x 100 cm)

20,000



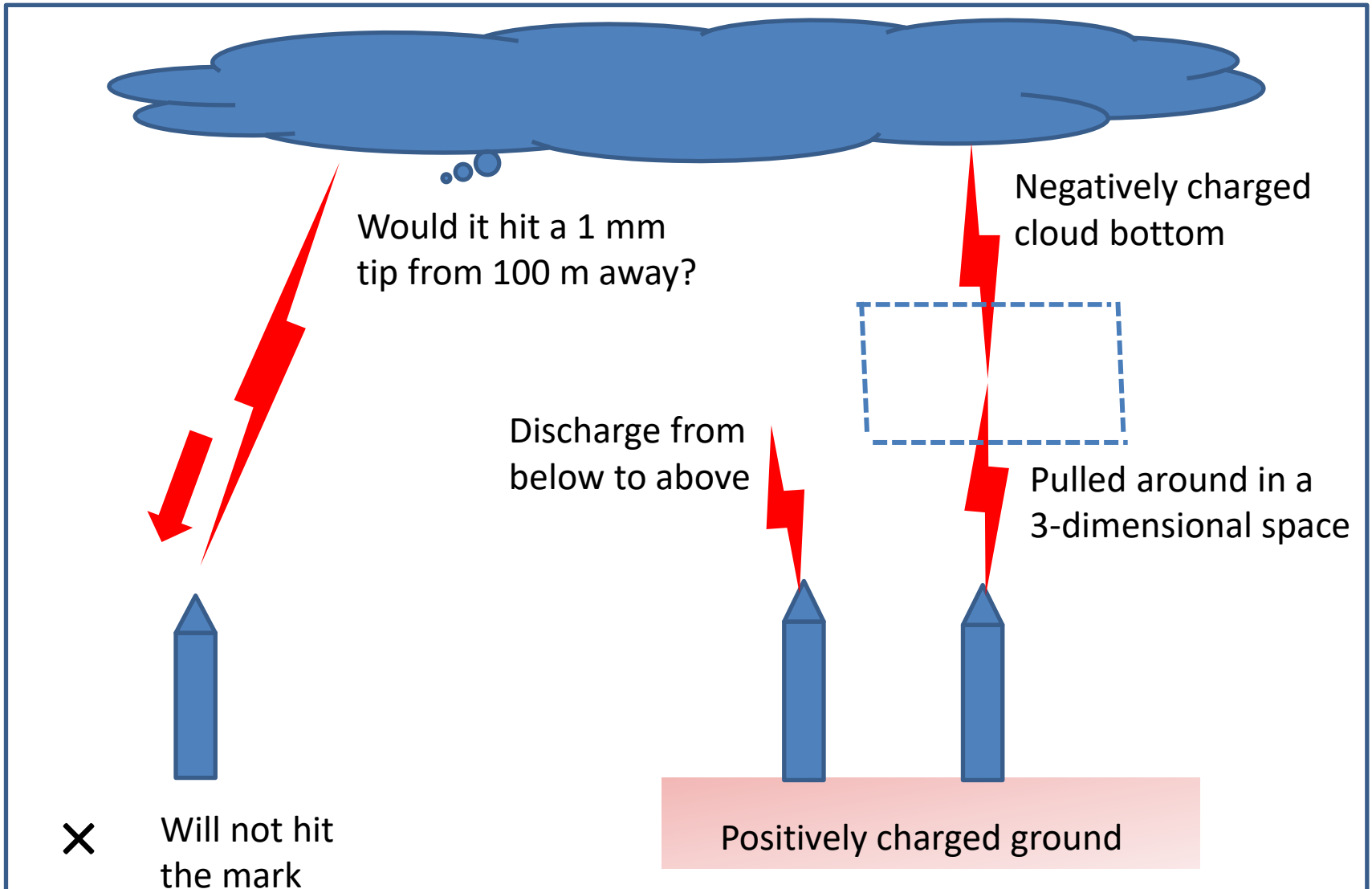
Anti-materiel rifle

10 cm : 2000 m (2000 x 100 cm) = 10 : 200,000 \Rightarrow 1 : 20,000

Is nature really that precise?

(If lightning simply came down unilaterally, it likely wouldn't hit the mark precisely)

Lightning does not simply come down unilaterally from the sky



Why is it easy for lightning to strike lightning rods?

Process leading to lightning strike

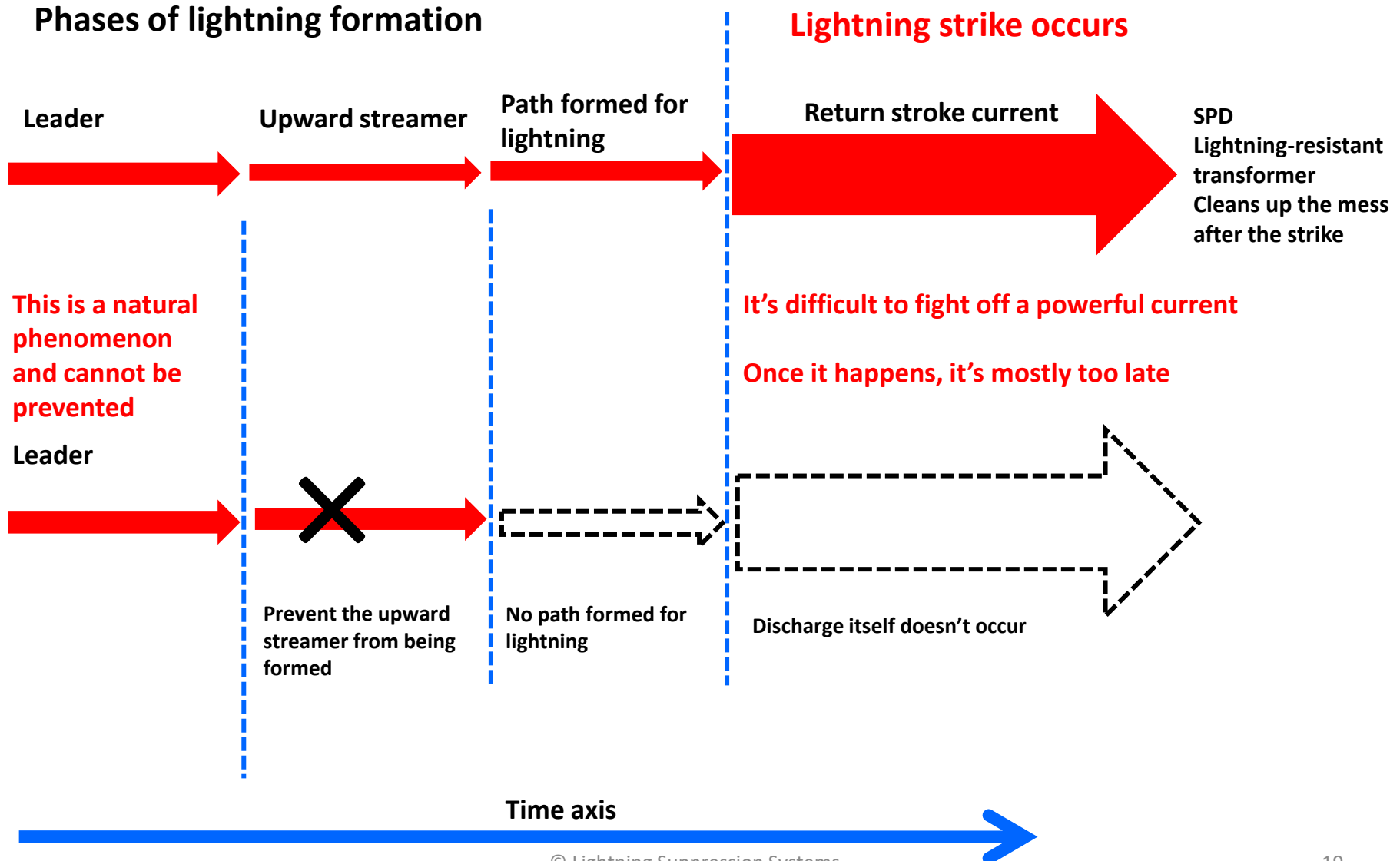
- 1) An upward streamer (positively charged) is emitted from the tip of the lightning rod that then is attracted to a leader (negatively charged) from the thundercloud in a three-dimensional space
- 2) The discharge from the ground and the discharge from the cloud meet and form a path for lightning
- 3) A large charge shoots along this path

There are many videos of upward streamers rising to connect with leaders



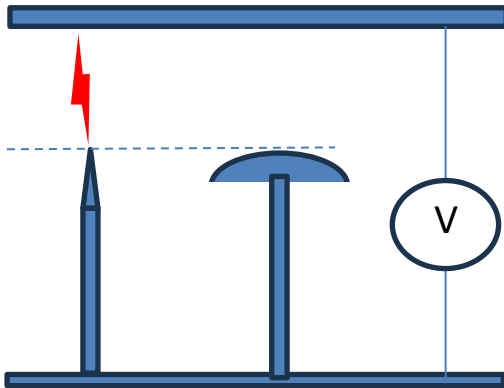
The key to preventing lightning strikes is to eliminate the upward streamer

How Lightning Suppression Works: Timeline



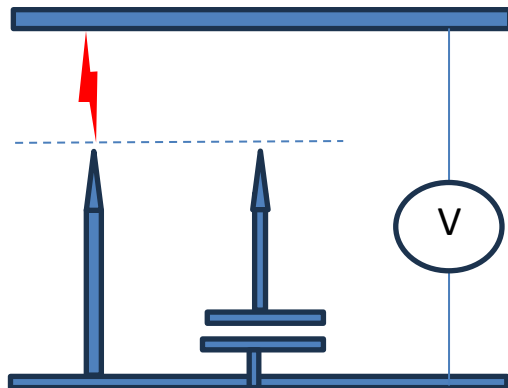
Complex reasons why making it difficult to discharge upward streamers

1. Electrode shape

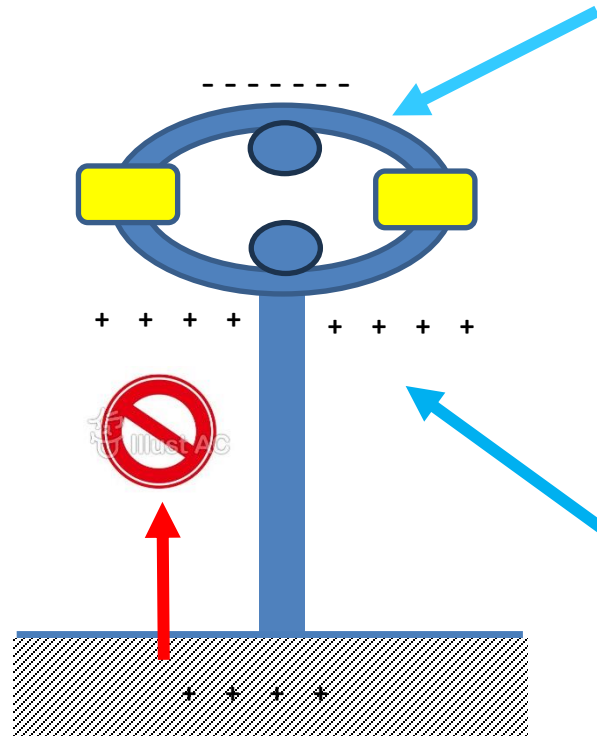


Discharges first

2. Suppresses as much current from the ground as possible



Discharges first



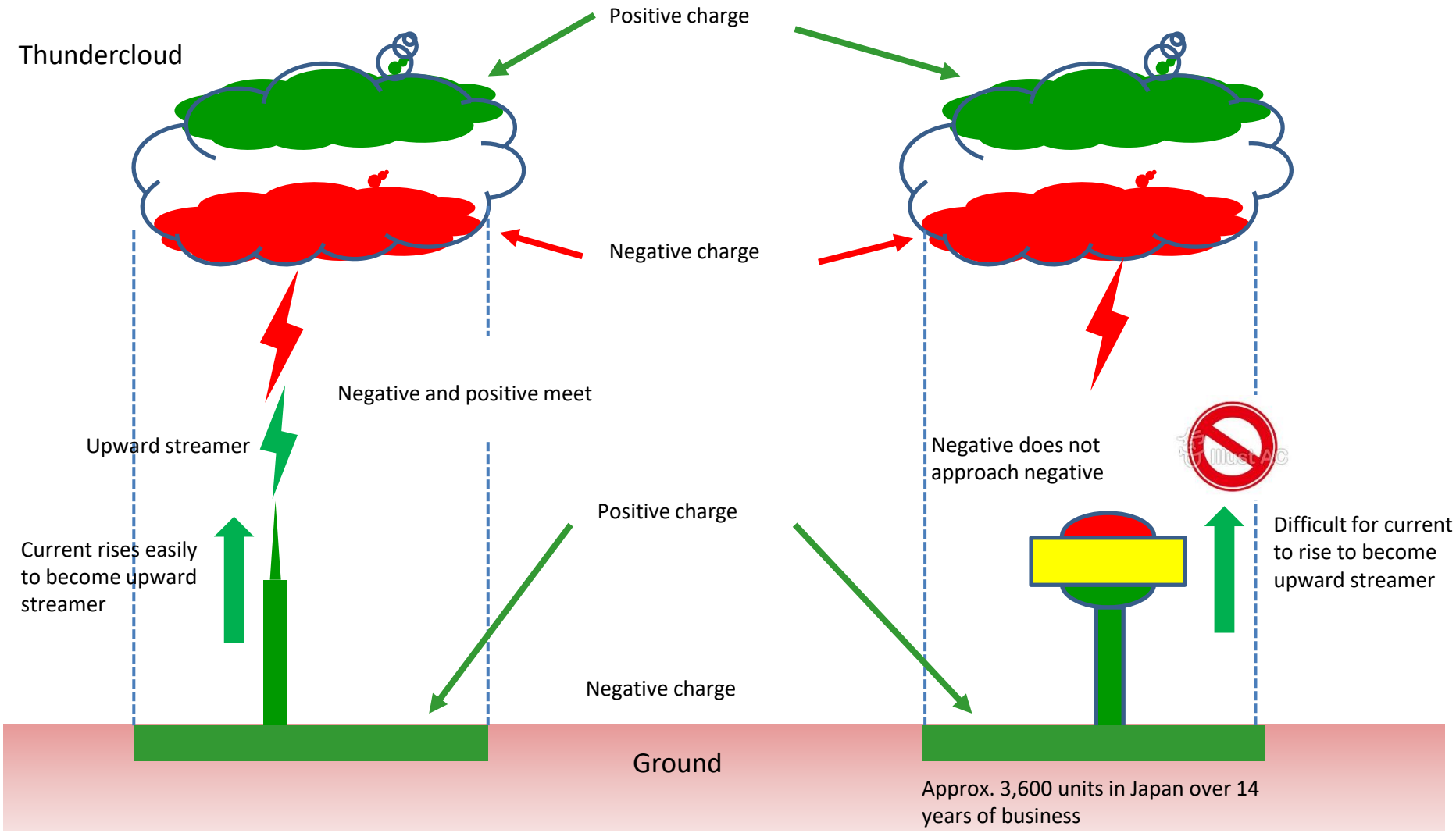
Top electrode: Few discharge craters



Bottom electrode: Many discharge craters



Real-world example following the same logic: Difference between a traditional lightning rod and PDCE lightning rod



Traditional lightning rod = Attracts lightning
Equipment intended to cause lightning

PDCE lightning rod = Truly avoids lightning
Intended to prevent lightning from occurring

Structures that suppress upward streamers

All are patented

Standard PDCE



3,600 units in Japan

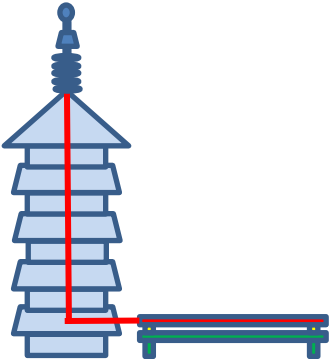
Heat resistant
Withstands temperatures of 300°C to 500°C

Material
Stainless steel (Inventory)
Bronze (Made-to-order)
For temples and shrines

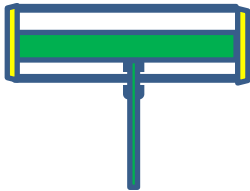
Capacity-type suppression system



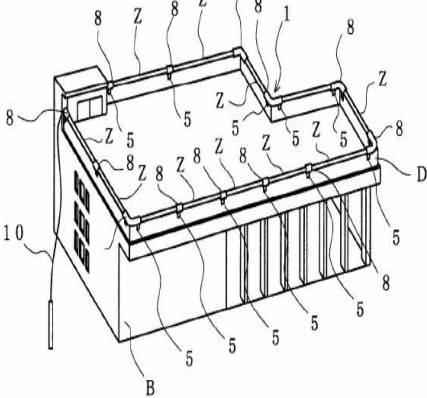
Makes use of existing lightning rods, such as those on tall five-storied pagodas, to make it more difficult for lightning to strike (made-to-order)



Horizontal PDCE



Placed around the rooftop of a building to prevent lightning from striking tall buildings (Made-to-order)



Anti Lightning Ball



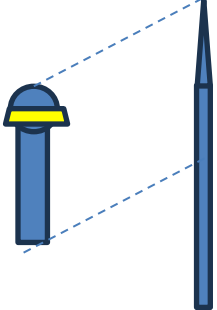
Even higher performance than PDCE in a highly effective shape for lightning suppression (Inventory)

Patented in Japan, USA, China, and Europe



Wind turbine blade tip type (Made-to-order)

Lightning rod converter



Attached to the top of a preexisting traditional lightning rod to immediately convert it into a suppression-type rod (Made-to-order)

Market Size Assessment and Conclusions (Summary)

Minato Mirai Patent Firm

Objective: Assessment of the market size for Lightning Suppression Systems lightning protection devices and related technologies.

Methodology: Categorized products into 8 groups (A to H) by product type and use, then assessed each group.

Area: Target market limited to countries in which Lightning Suppression Systems owns the relevant patents.

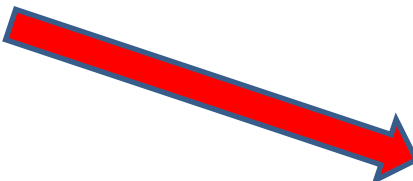
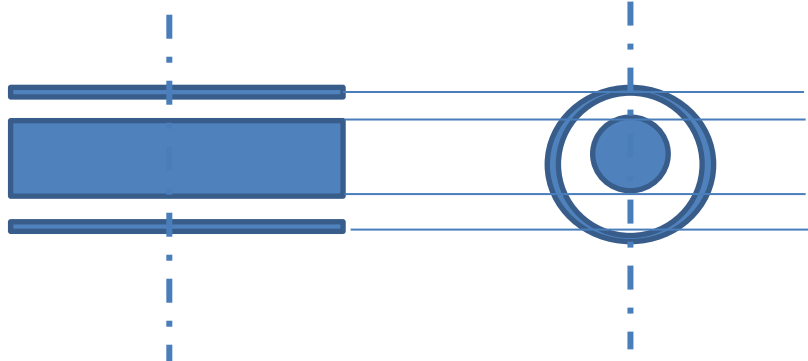
Assessment results:

	Product	Description	Valuation 3 years	Valuation 8 years
Product type				
A	Upper and lower electrode type	Upper and lower electrode-type lightning protection devices (Current model)	1.0 billion yen	-
B	Ball type	Ball-type lightning protection devices (New model)	12.8 billion yen	36.8 billion yen
C	Horizontal type	Linear lightning protection devices installed around the rooftop of a tall building	3.6 billion yen	21.0 billion yen
D	Large capacitor type	Lightning protection devices that utilize the exterior of an existing structure	3.0 billion yen	14.0 billion yen
E	Lightning rod converter	Devices that convert traditional lightning rods into Lightning Suppression Systems lightning protection devices	160.0 billion yen	800.0 billion yen
By use				
F	For wind turbines	To suppress lightning strikes over wind turbines	20.0 billion yen	100.0 billion yen
G	For traffic signals	To protect traffic signals using lightning protection devices	0.6 billion yen	10.0 billion yen
H	Mobile type	Moved to the place of use and then installed	2.3 billion yen	5.6 billion yen
Total			203.3 billion yen	987.4 billion yen

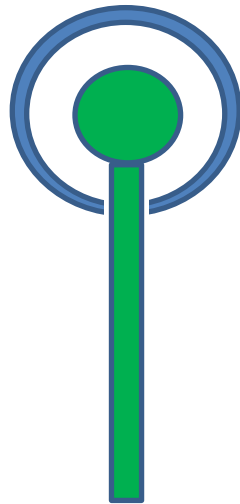
Two Approaches to New PDCEs and Ball-type PDCEs

1. Coaxial structure helps prevent lightning strikes (Verified in discharge testing)

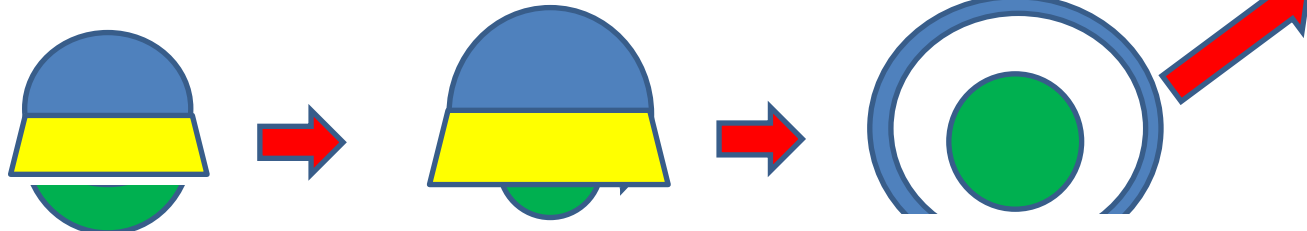
Rotated horizontally around vertical axis to achieve sphere



Ball-type PDCE



2. Modify upper electrode to be bigger and wrap around



New Model Performance

Tested at the University of Pau in France

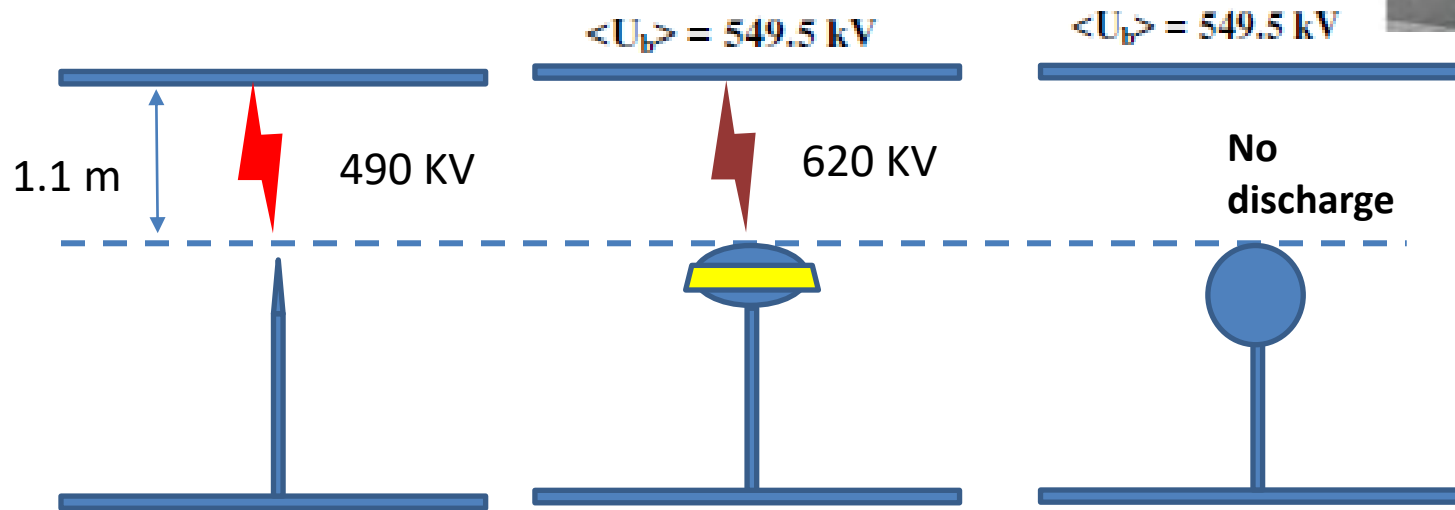
Standard lightning rod



Senior



Super Magnum



Interior of Anti Lightning Ball



Double ball structure

Outer: Insulated so no conduction to the outside

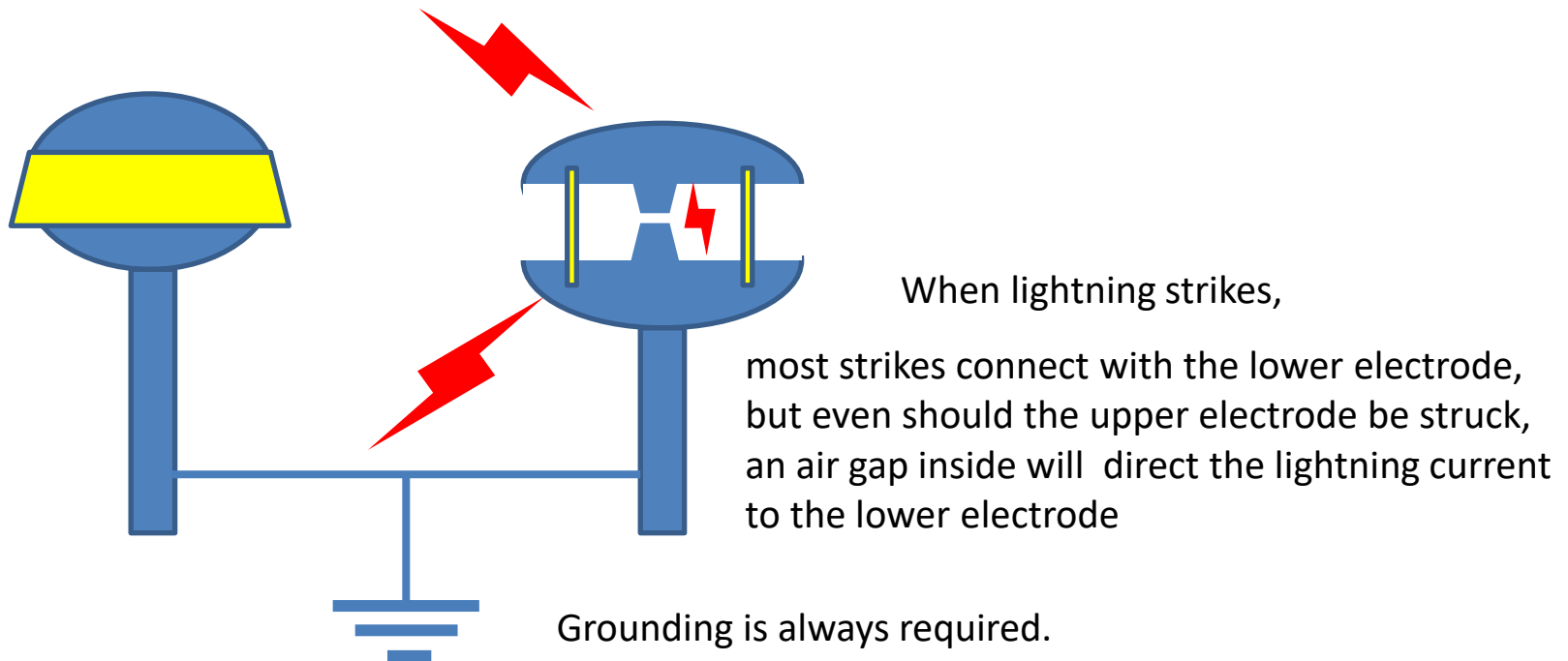
Inner: Grounded

Patented: Japan/ USA/Europe/China

Purpose of Lightning Protection Systems

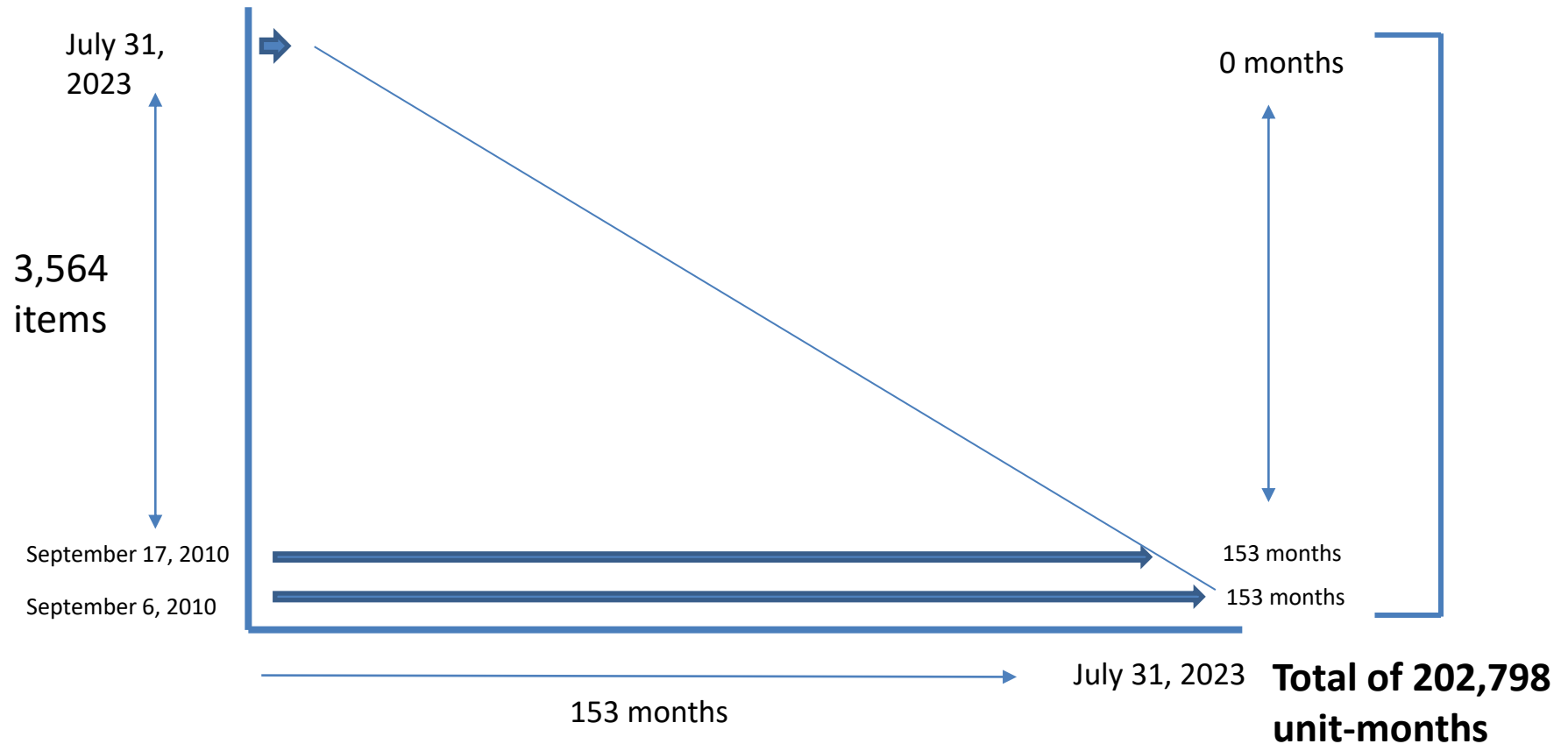
To safely diffuse lightning current into the ground in the event of a lightning strike

- 1) The lightning current will be sent to the ground regardless of whether the lightning strikes the upper or lower electrode
- 2) Made with material that is much thicker than the standard minimum cross-sectional area



Actual Figures Since First Product Launch

How many strikes for how many units? July 30, 2023



202,798 unit-months = 16,900 unit-years

Number of lightning strikes in this period: 9 times

⇒ Approx. 1 time every 1,877 unit-years

Figures current as of July 30, 2023.

Updated monthly.

INT Co.
(Andorra)

Angel Rodriguez

Father of PDCE



Introduced PDCE in 2005

Introduced PDCE in 2005

Visited for confirmation

Exclusive distribution rights

S Co.



Makoto Ishizaki

Adoptive parent

Begins selling in 2006

Developed improved models

LLS Lightning Suppression Systems

Distributor: 2010 - 2012
 Thereafter pursued independent development
Current IP: Approx. 120 total
 100% Made in Japan (Ibaraki Prefecture)

Strong pushback from industry

Business closed

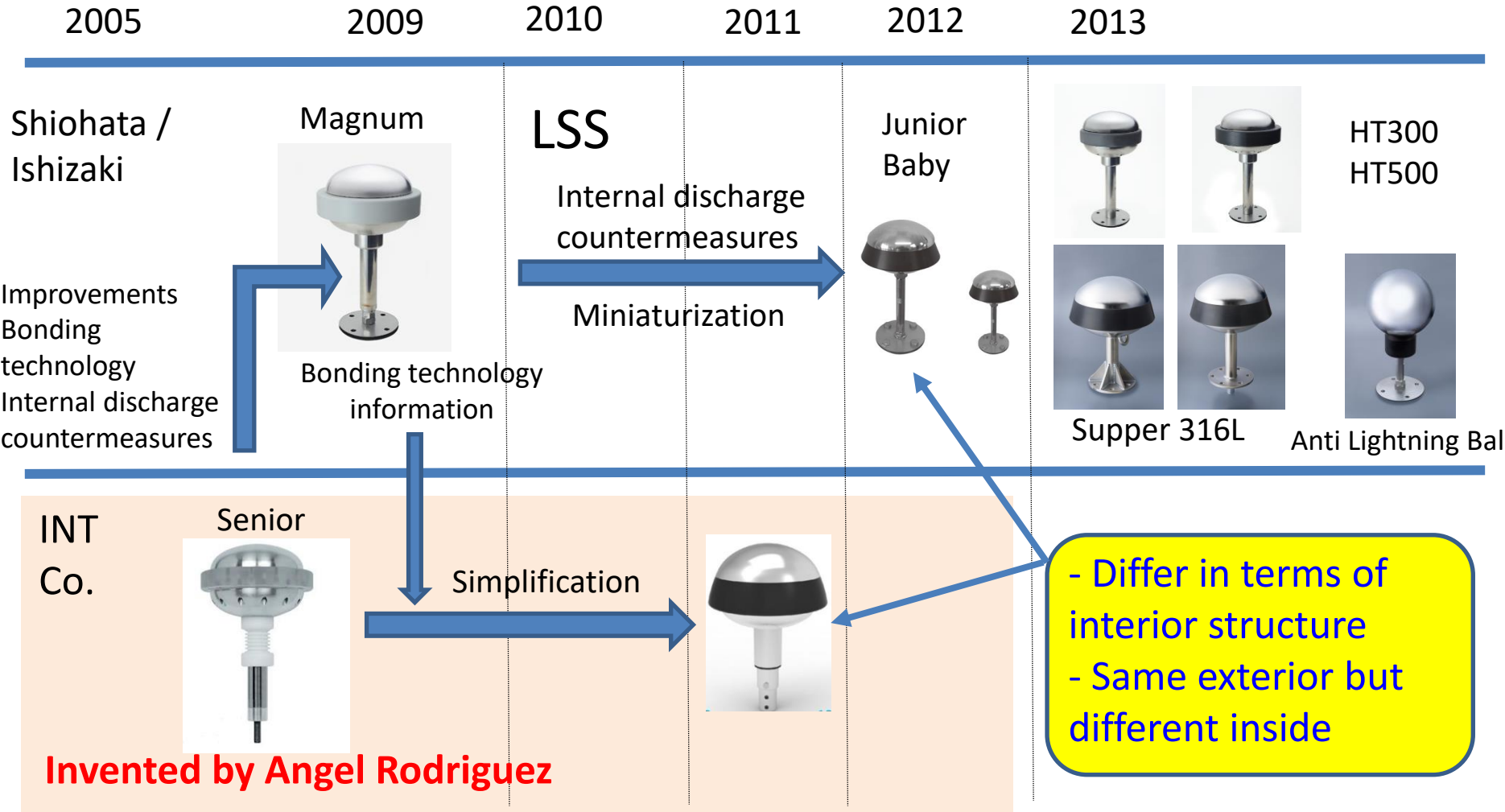
Joint patent applications

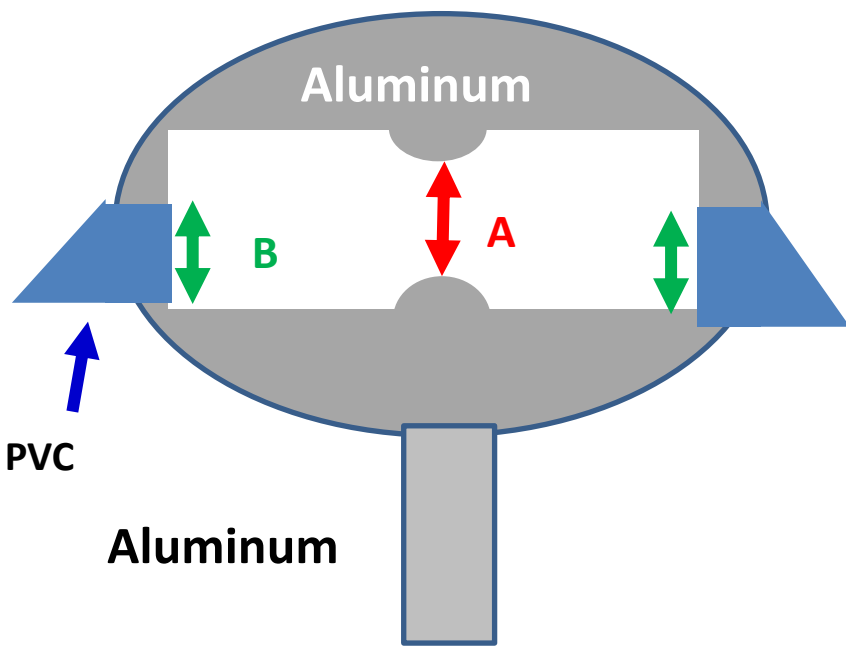
Unable to advance to the "Request for Examination"

Basic patent not obtained in Japan

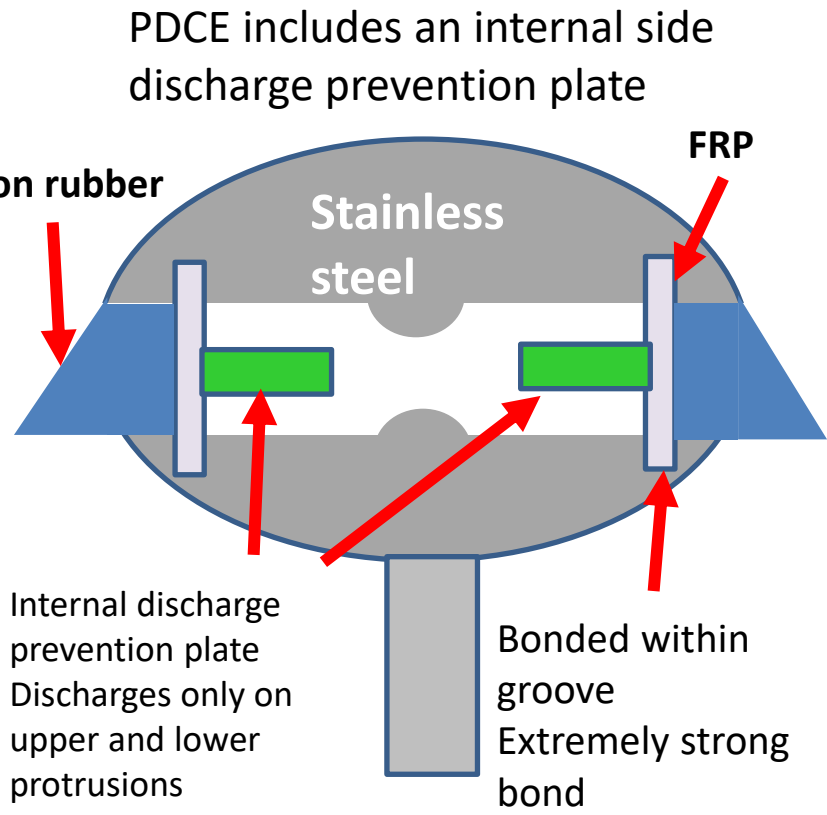
Published Unexamined Patent Applications: Application No. 2008-10241 became a matter of public knowledge and thus terminated
 Published Unexamined Patent Applications: Application No. 2008-34607 became a matter of public knowledge and thus terminated
 Published Unexamined Patent Applications: Application No. 2009-93936 became a matter of public knowledge and thus terminated

PDCE Lineage





The gap between upper and lower electrodes (red **A**) is larger than (green **B**), so discharges occur at the smaller circumference part (green **B**) and the insulated part is easily broken ($A > B$)




Difference: Similar appearance but different interior

Whether internal side discharge countermeasures have been taken

The internal discharge prevention plate is patented by LSS

INT Co.
Invented by
Angel Rodriguez

Senior



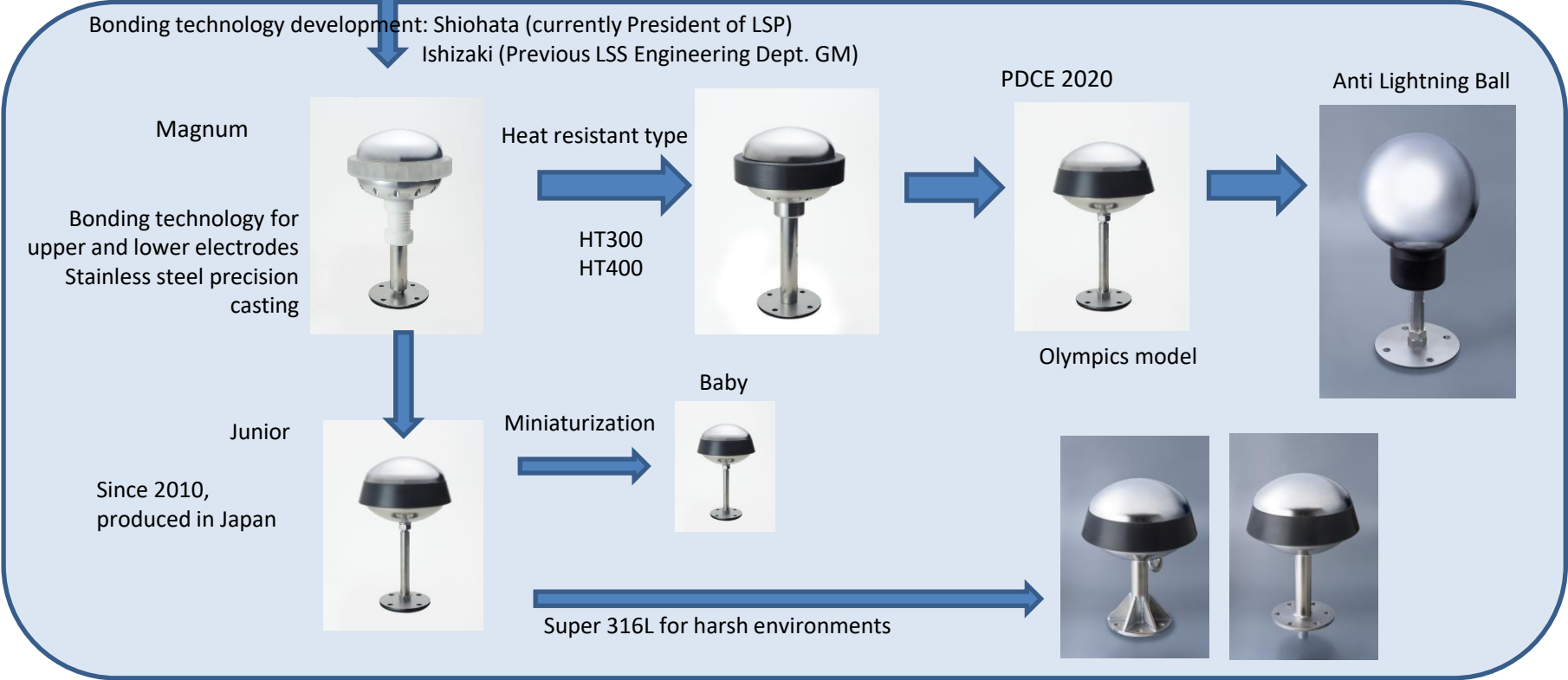
Machined aluminum
Screw-fastened

Lightning Suppression Systems

Approx. 120 IP in Japan including patents, designs, and registered trademarks

The Anti Lightning Ball is patented in Japan, the USA, Europe, and China

Produced at a JIS Q 9001-compliant dedicated PDCE plant





Lightning Suppression Products

Assembly plant in Naka City, Ibaraki Prefecture

Quality control
ISO 9001
JIS Q 9001-compliant plant

We rapidly perform
development /
prototyping / testing
assembly / inventory /
shipping

Products customizable to
suit the customer's needs

Tours available

Notes

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Direct questions regarding this document to:

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Toshio Matsumoto

Phone: 045-264-4110

matsumoto@rakurai-yokusei.jp

<http://www.rakurai-yokusei.jp>

Search for “Lightning Suppression Systems”
Check our Goo Blog: “Lightning Blog” (Updated daily).