

DIC.PPS – Shaping the future

New Applications for PPS

24.09.2025



Agenda

1. DIC / Sun Chemical
2. PPS-Properties
3. DIC.PPS & Primef® Product Portfolio
4. Drinking water / New Markets for Drinking water PPS-Grades
5. E-Mobility
6. Metal Plating (EMS)



DIC / Sun Chemical: About DIC Corporation



Company Name	DIC Corporation
Corporate Headquarters	DIC Building, 7-20, Nihonbashi 3-chome, Chuo-ku, Tokyo, Japan
Date of Foundation	February 15, 1908
Paid-in Capital	¥96.6 billion
Description of Business	Manufacture and sale of printing inks, organic pigments and synthetic resins
Number of Employees	Consolidated: 21,184 Nonconsolidated: 3,947 <small>(As of December 31, 2024)</small>
Number of Group Companies	171 (Domestic: 24, Overseas: 147) <small>(As of December 31, 2024)</small>
Consolidated Net Sales	1071.1 billion <small>(Fiscal year 2024)</small>
Consolidated Operating Income	44.5 billion <small>(Fiscal year 2024)</small>



Corporate Headquarters

Corporate Introduction Video



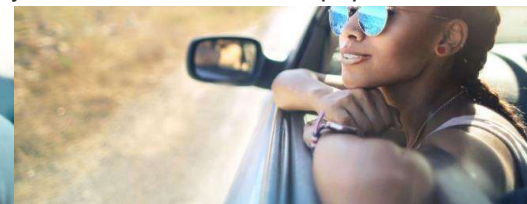
<https://www.dic-global.com/en/about/branding.html#dbv>



The DIC Group's Brand Slogan

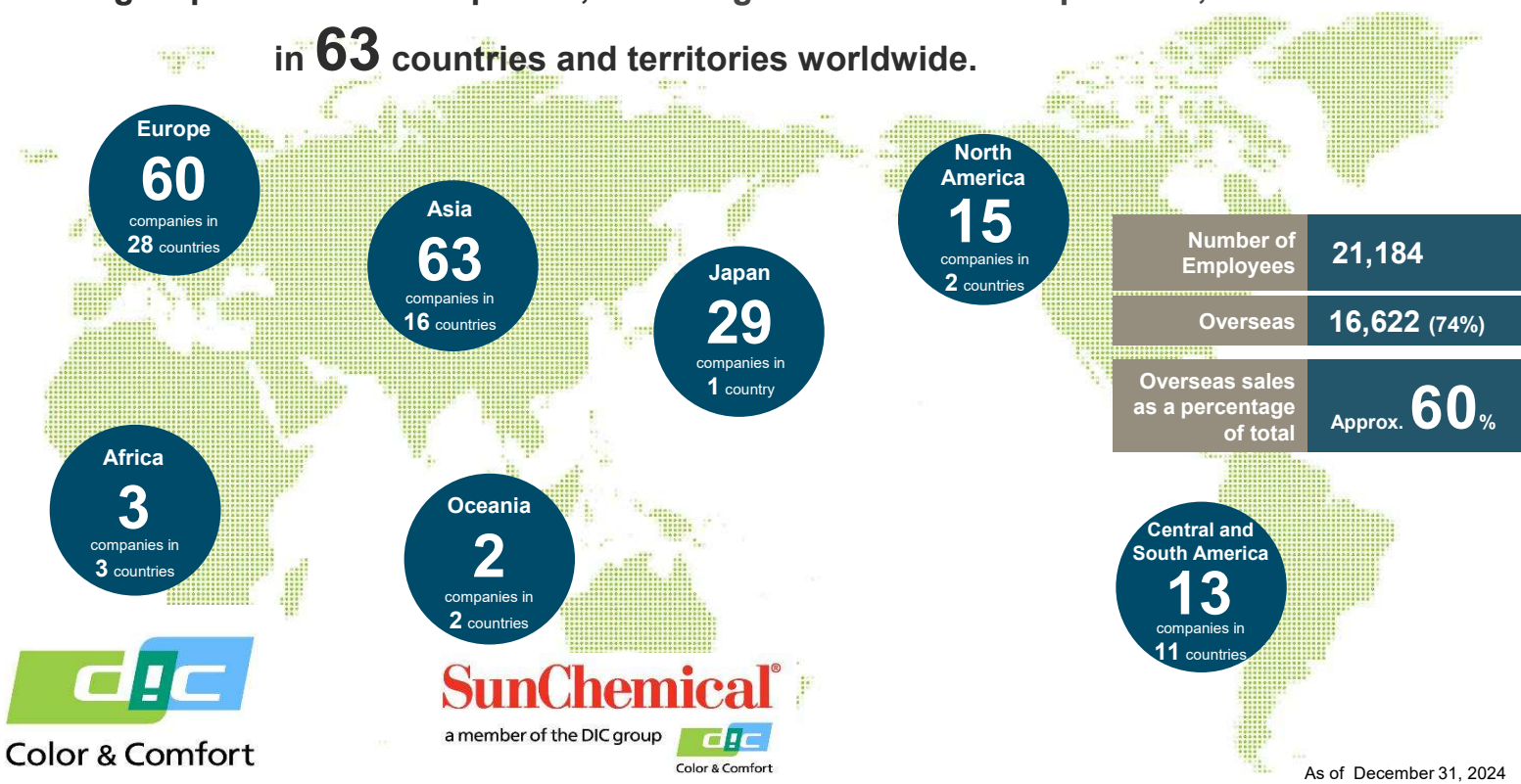
Color & Comfort

The DIC Group strives to help create a society that adds rich color and comfort to people's lives.



DIC / Sun Chemical: Extensive Global Network

DIC group has **171** companies, including Sun Chemical Corporation, in **63** countries and territories worldwide.



As of December 31, 2024

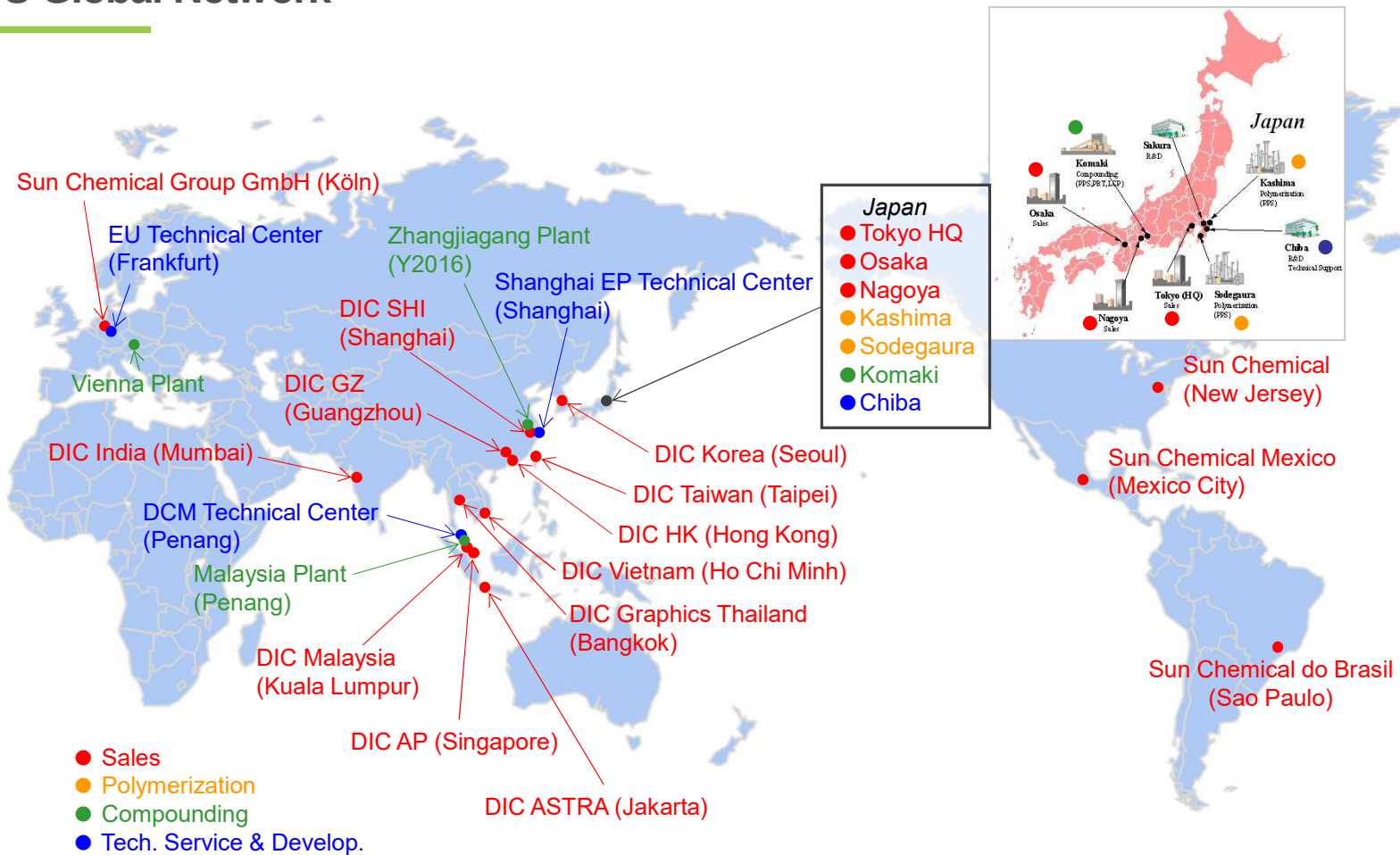
DIC / Sun Chemical: Top Share of Key Global Markets

DIC's printing inks, organic pigments, PPS compounds and other products are used in a wide range of industries in markets around the world.

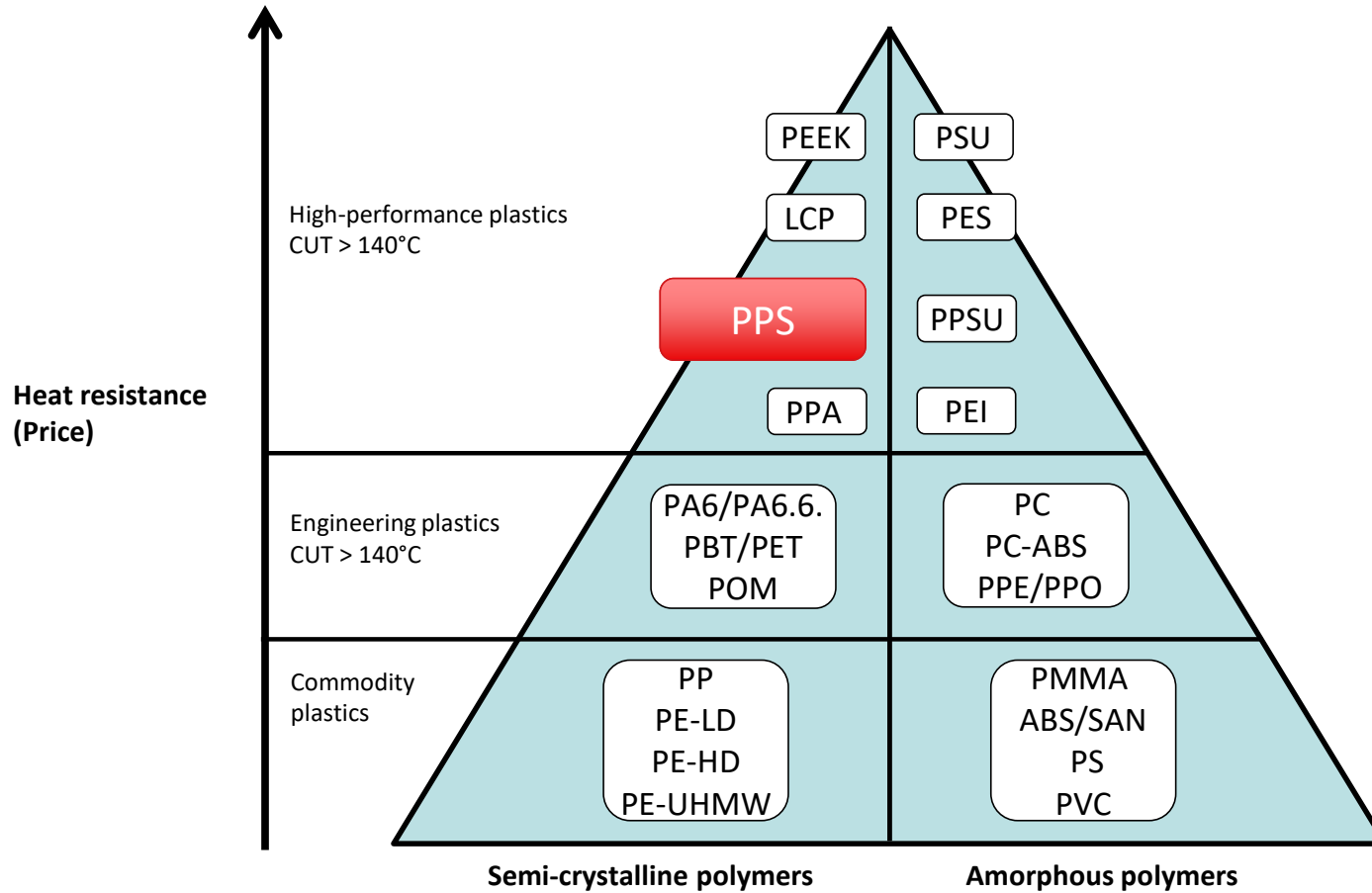


<https://www.dic-global.com/en/contents/5minutes/>

DIC.PPS Global Network



PPS-Properties: Pyramide of Plastics

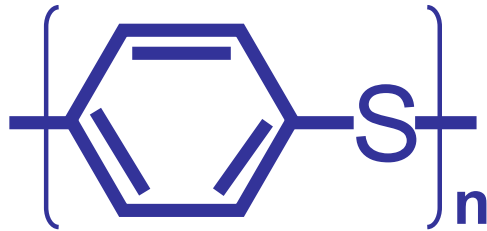


PPS-Properties: Characteristics & Uses of DIC.PPS & Primef®



Superior Properties

Heat resistance - long term service temperature up to 240°C
UL94 V-0 - flammability without flame retardant
Excellent Dimensional stability,
- low water absorption & low thermal expansion
Superior strength & modulus
Chemical resistance equal to PTFE



DIC.PPS & Primef® are compounds based on PPS resin (Polyphenylene sulfide)

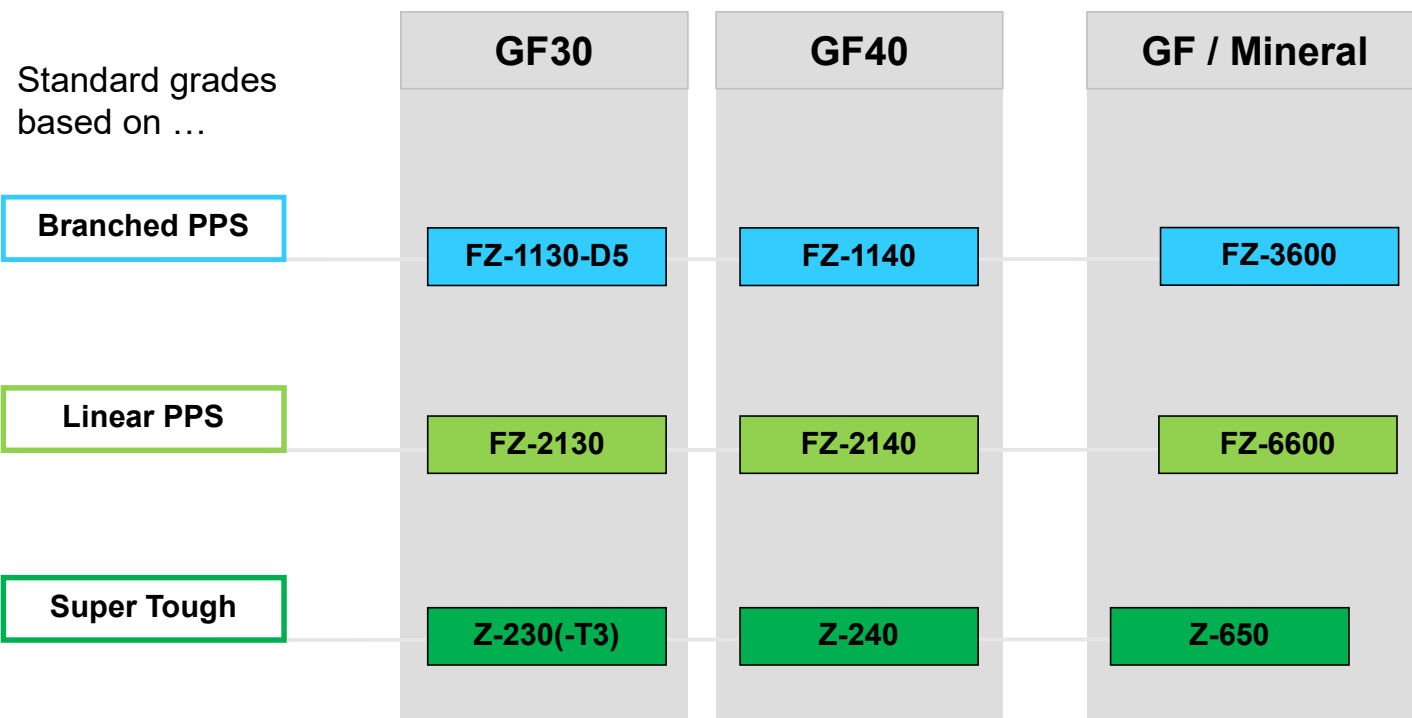
Target

Alternative to Metals
Alternative to Thermo-set resins

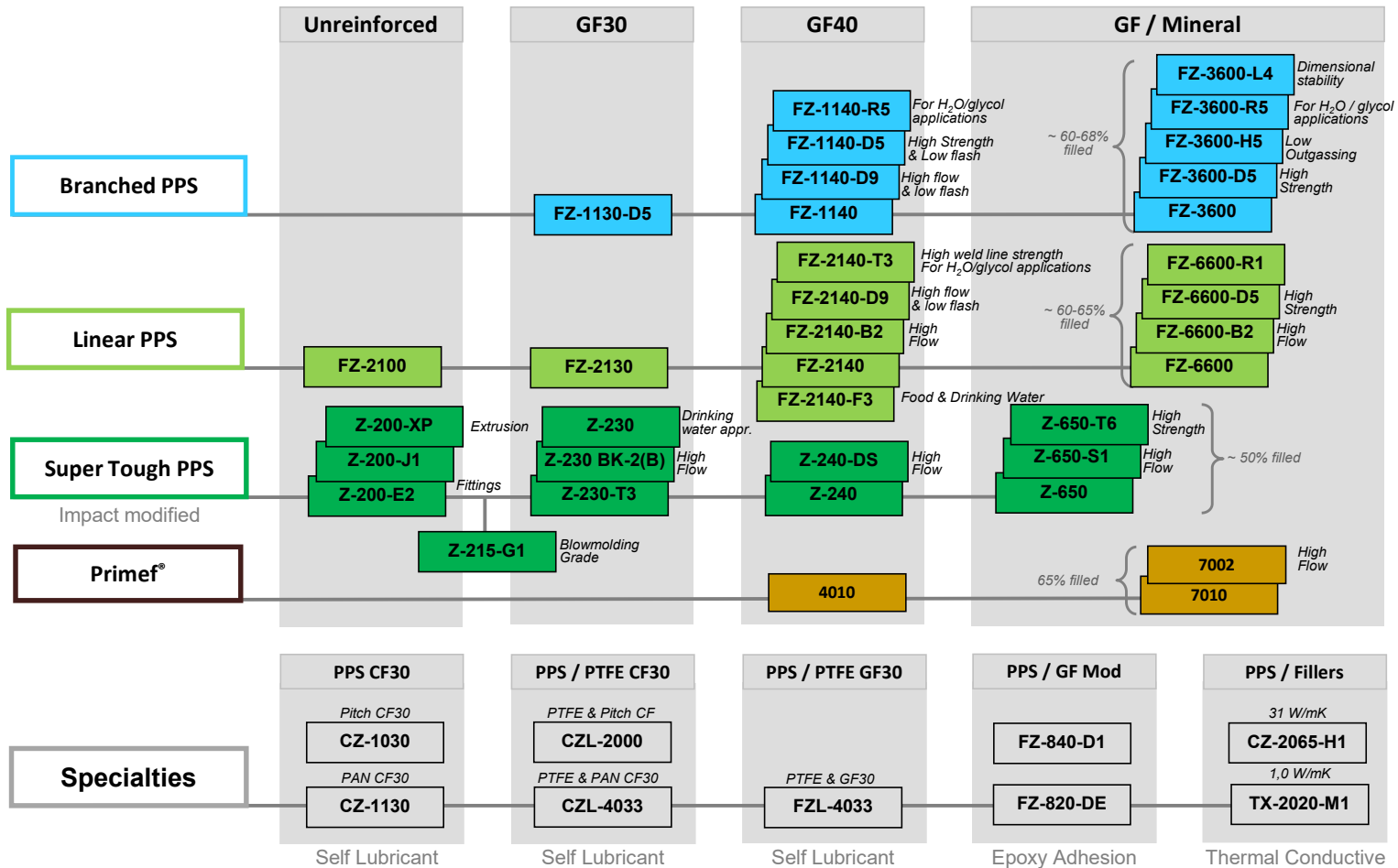
Used for

Automotive parts
E & E parts
Home appliances

DIC.PPS & Primef® Basic Variations of DIC.PPS



DIC.PPS & Primef® Detailed Product Portfolio



Drinking Water / New Markets for Drinking Water PPS-Grades

- **DIC.PPS Z-230 BLACK and FZ-2140-F3 BLACK**
 - Materials with drinking water and/or food contact approvals
- **Key Features**
 - Excellent hydrolysis and chemical resistance
 - Outstanding knitline strength
 - Extremely low moisture pick-up / Very good dimensional stability (as a key requirement for ultrasonic water meter housings)



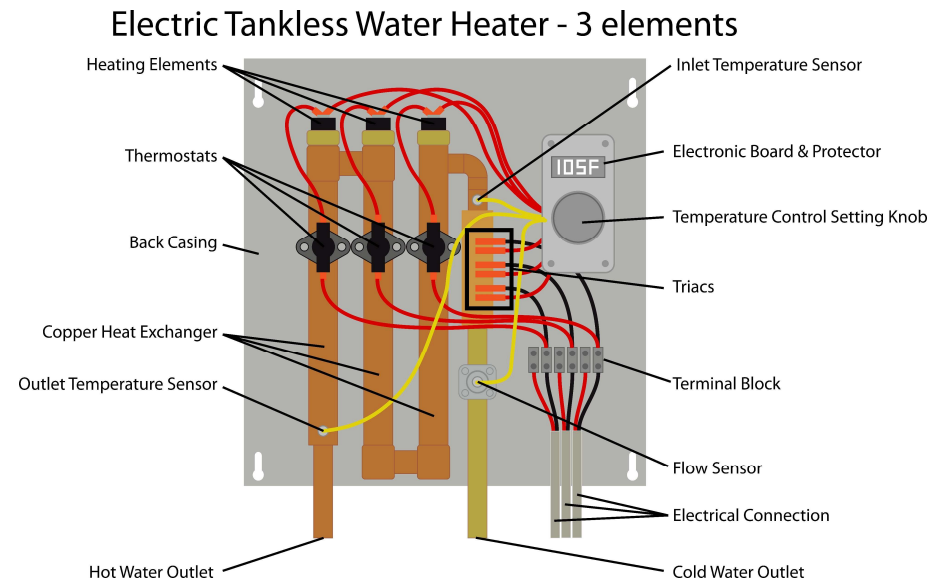
DIC.PPS provides excellent long-term hydrolysis resistance and outstanding knitline strength

New Markets for DW PPS-Grades: Heat Pumps / Electric Tankless Water Heater



- *Design freedom / Integration of functionalities*
- *Hydrolysis resistance*
- *Weldability*
- *Excellent burst pressure*

New Markets for DW PPS-Grades: Heat Pumps / Electric Tankless Water Heater

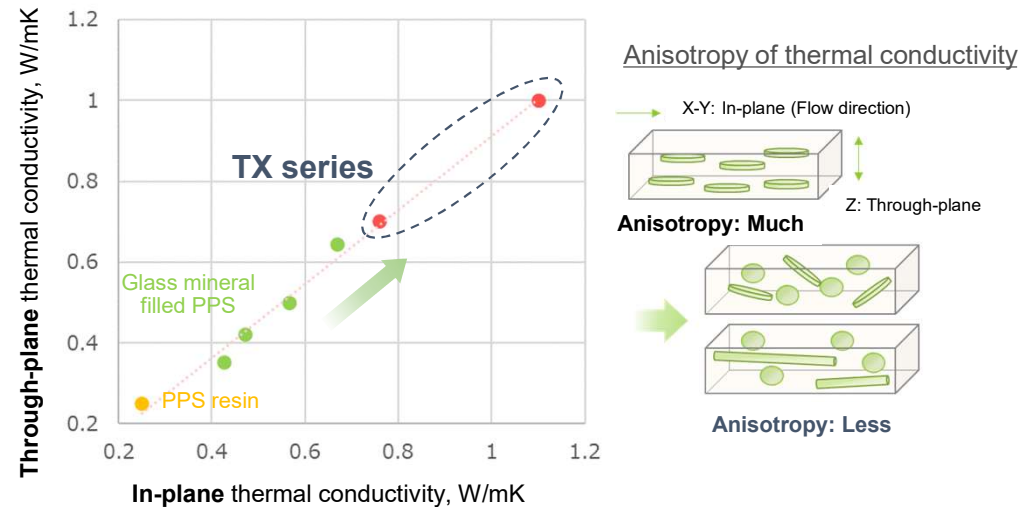


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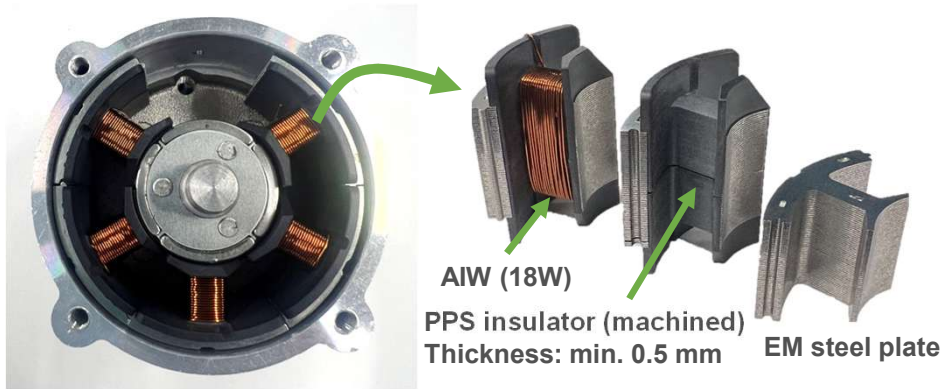
E-Mobility (Thermal conductive / electric insulative DIC-Grades)

DIC.PPS TX series

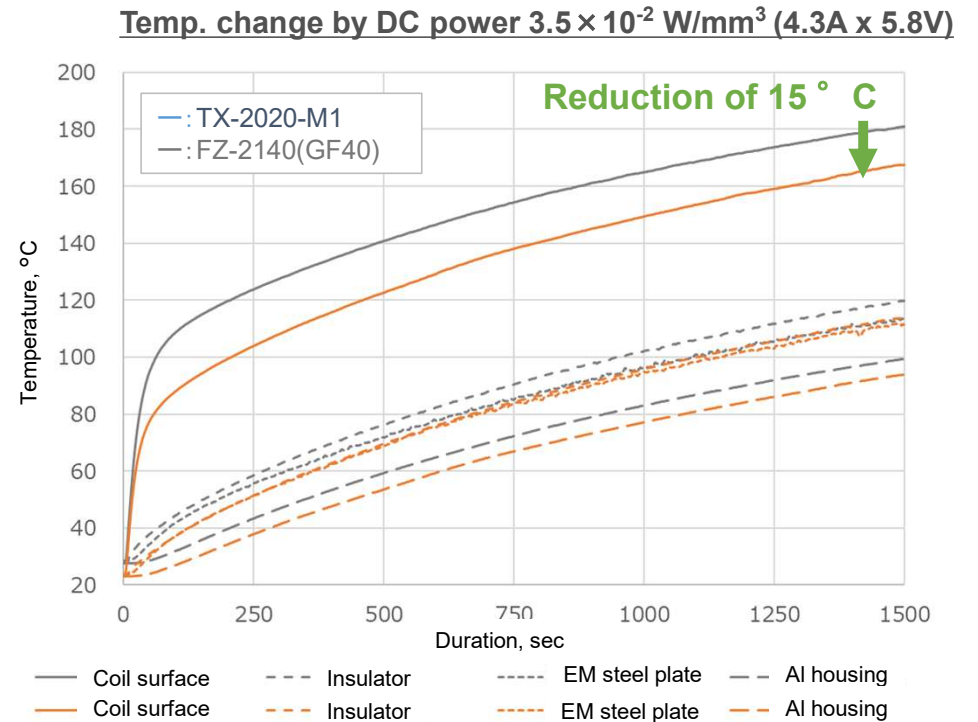
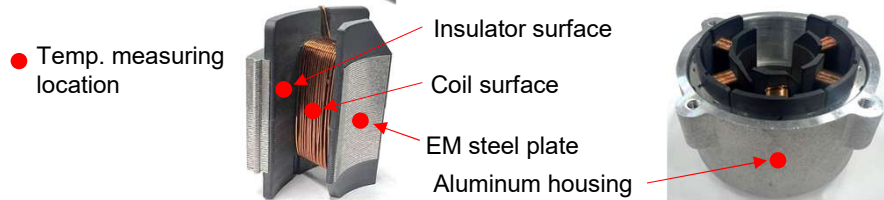
- Electric insulative & thermal conductive PPS compounds
- Designed to have higher **thermal conductivity with less anisotropy**
- And **practical mechanical properties** (knitline strength, etc.) and **processability**
- Commercially available



Heat dissipation test on a tear-down IMP radial gap motor

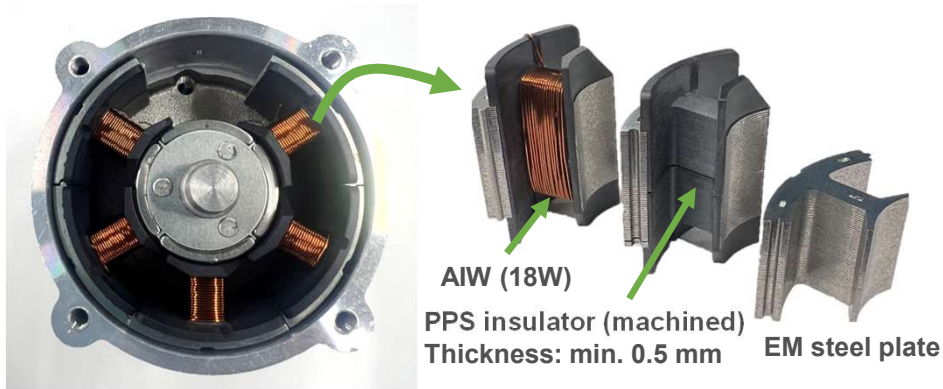


Material: DIC.PPS TX-2020-M1 (1 W/mK) Thermal conductive
 DIC.PPS FZ-2140 BLACK (0.4 W/mK) Std. PPS-GF40
 Wire: Copper, d: 0.4 mm, AIW (poly Amide Imide coated Wire)
 Setup: 5 circuits are connected in series after 18 windings (155 cm) on each insulator and powered by stabilized DC in the aluminum housing
 Temperature is measured at the red pointed positions below

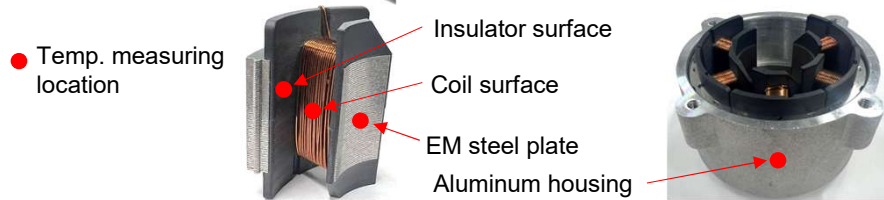


TX-2020-M1 demonstrates a significant reduction of coil surface temperature

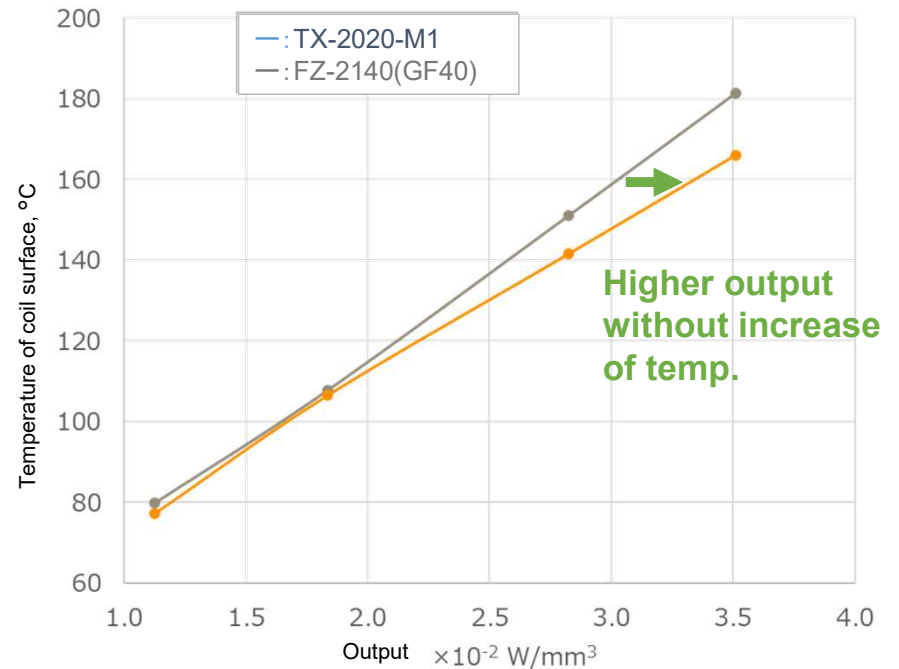
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Temperature of coil surface after 1,500 sec



Greater contribution to temperature reduction at coil surface when higher output

Moldflow analysis with TX-2020-M1

Filling study by Moldflow analysis

Software: Moldflow 2019

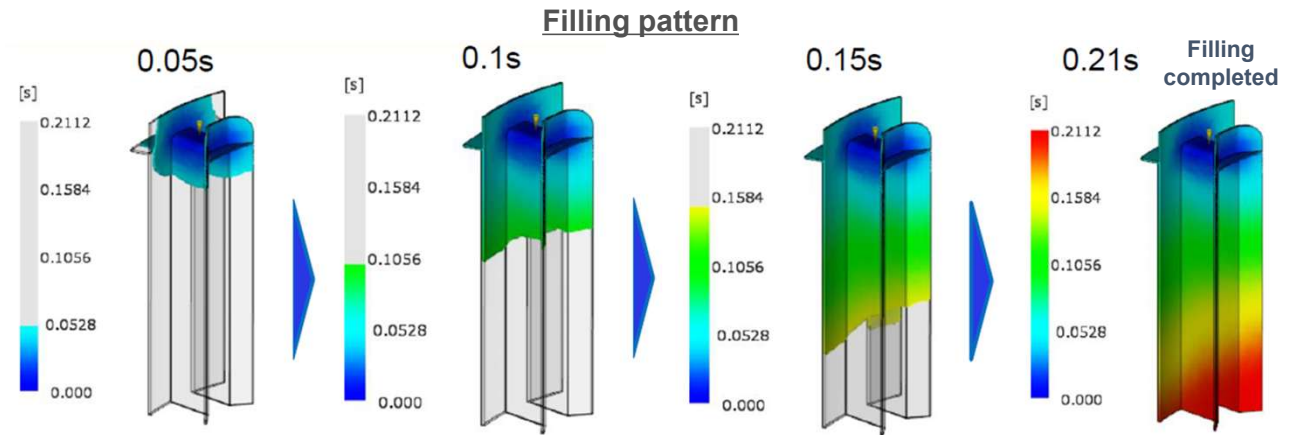
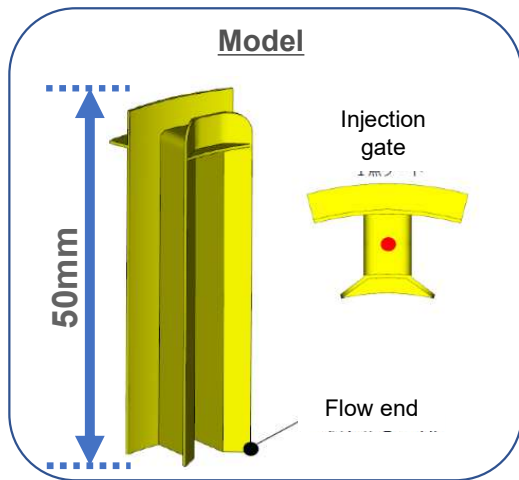
Material: **DIC.PPS TX-2020-M1 BLACK**

Temp.: Melt 325 ° C, Mold 140 ° C

Injection: Automatic, V/P switchover at 98 vol% fill

Inj. gate: d 2.0 mm, direct injection without sprue runners

	1.0 mm thickness	0.5 mm thickness	0.35 mm thickness
Injection time, sec	0.21	0.21	0.21
Max. injection pressure, MPa	39	145	176
Cavity pressure at the fill end, MPa	30	107	176



TX-2020-M1 has a practical flowability and could be filled even in thin-walled parts

Thermal conductive (electric insulative) series

Thermal conductive series

Reference

Property	Method	Unit	Thermal conductive series			Reference	
			TX-2020-M1 BLACK	TX-2010-A1 BLACK	FZ-3500 BLACK	FZ-3600 BLACK	Z-650-TS BLACK
Material composition	ISO 11469	-	PPS-(GF+MD)70	PPS-(GF+MD)60	PPS-(GF+MD)65	PPS-(GF+MD)65	PPS-I-(GF+MD)50
Density	ISO 1183-1	g/cm ³	2.10	1.95	2.02	1.98	1.71
Tensile strength	ISO 527-1,2	MPa	90	120	100	100	165
Tensile modulus	ISO 527-1,2	GPa	16	14	20	19	14.5
Tensile strain at break	ISO 527-1,2	%	0.7	1.2	0.6	1.0	2.0
Knitline strength	ISO 527-1,2	MPa	41	52	30	37	60
Strain at knitline	ISO 527-1,2	%	0.2	0.6	0.1	0.2	0.7
Charpy impact notched	ISO 179/1eA	kJ/m ²	4	5	4	6	10
Unnotched	ISO 179/1eU	kJ/m ²	15	25	10	21	50
Thermal conductivity In-plane	Hot disk	W/mK	1.0	0.7	0.7	0.6	0.4
Through-plane	XeF	W/mK	1.0	0.7	0.8	0.6	0.4
Volume resistivity	Double ring method IEC 62631-3-1	Ohm.cm	10 ¹⁵	10 ¹⁵	10 ¹⁶	10 ¹⁶	10 ¹⁶
Spiral flow	DIC	cm	32	39	24	35	43

Thermal conductive (electric conductive) series

Property	Method	Unit	Thermal conductive series		Reference
			CZ-2065-H1	CZ-2060-G1	CZ-1130
Material composition	ISO 11469	-	PPS-(CF+CD)65	PPS-(GF+CD+MD)60	PPS-CF30
Density	ISO 1183-1	g/cm ³	1.81	1.88	1.46
Tensile strength	ISO 527-1,2	MPa	75	100	215
Tensile modulus	ISO 527-1,2	GPa	43	21	30
Tensile strain at break	ISO 527-1,2	%	0.1	0.5	0.8
Charpy impact notched	ISO 179/1eA	kJ/m ²	1	6	5
Unnotched	ISO 179/1eU	kJ/m ²	3	10	32
Thermal conductivity, In-plane	Hot disk	W/mK	9.5	2.6	0.7
Through-plane	XeF	W/mK	2.9	1.6	0.4
Flow direction	XeF	W/mK	26	5.7	-
Volume resistivity	Double ring method IEC 62631-3-1	Ohm.cm	-	10 ⁴	-
Volume resistivity	Four probe method JIS K 7194	Ohm.cm	10 ⁻¹	10 ¹	10 ⁻¹
Spiral flow	DIC	cm	11	25	57

DIC.PPS MP-6060 BLACK: Platable PPS



DIC and Partners Develop DIC.PPS MP-6060 BLACK Platable PPS Compound

— Combining the newly developed PPS compound and plating technologies will facilitate the mass production of electroless & electro-plated PPS molded products on existing plastic-plating production lines —

Business & Product News Release

Jan. 10, 2024

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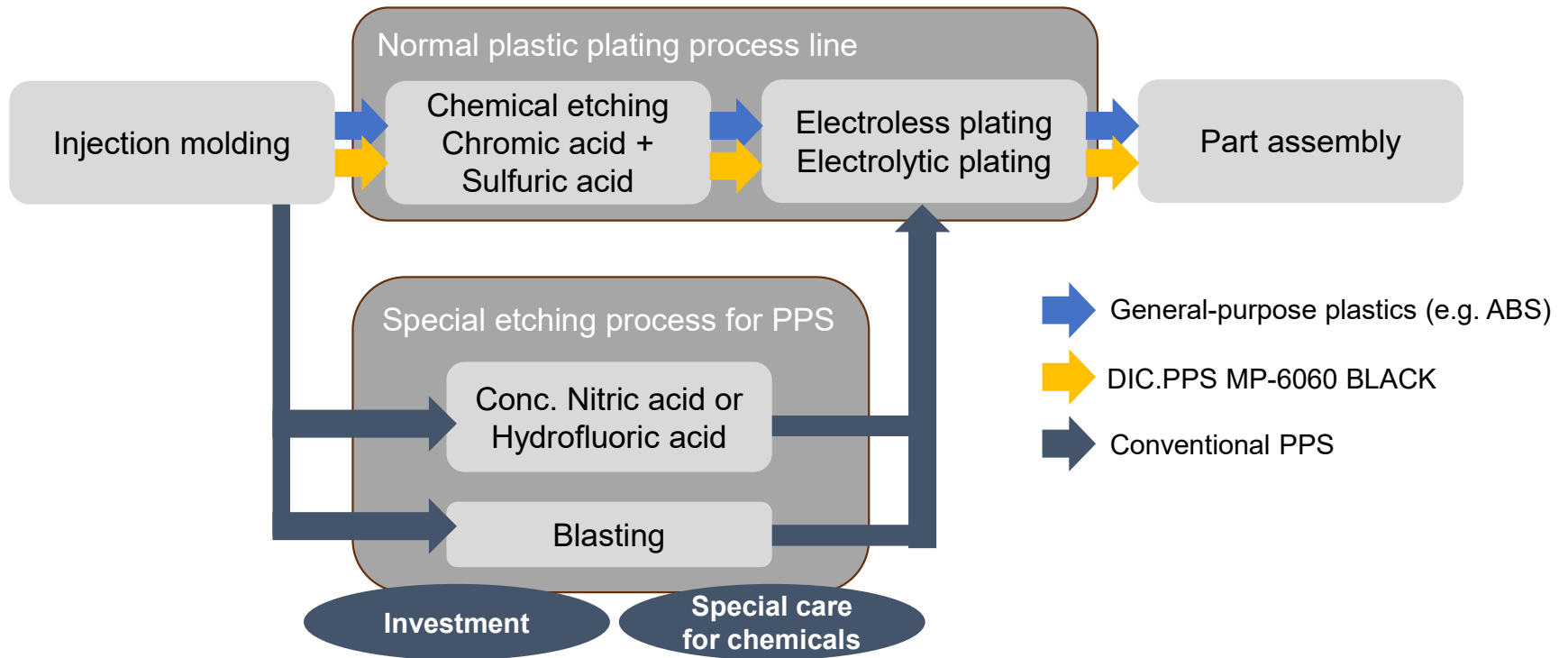
Tokyo, Japan - DIC Corporation today announced the development of DIC.PPS MP-6060 BLACK, a plateable polyphenylene sulfide (PPS) compound, in collaboration with Japanese firms Tsukada Riken Industry Co., Ltd., and Yoshino Denka Kogyo, Inc. Combining the newly developed compound with plating technologies will enable the mass production of electroless & electro-plated super engineering plastic PPS on existing plastic-plating production lines without the need for a special etching process.*

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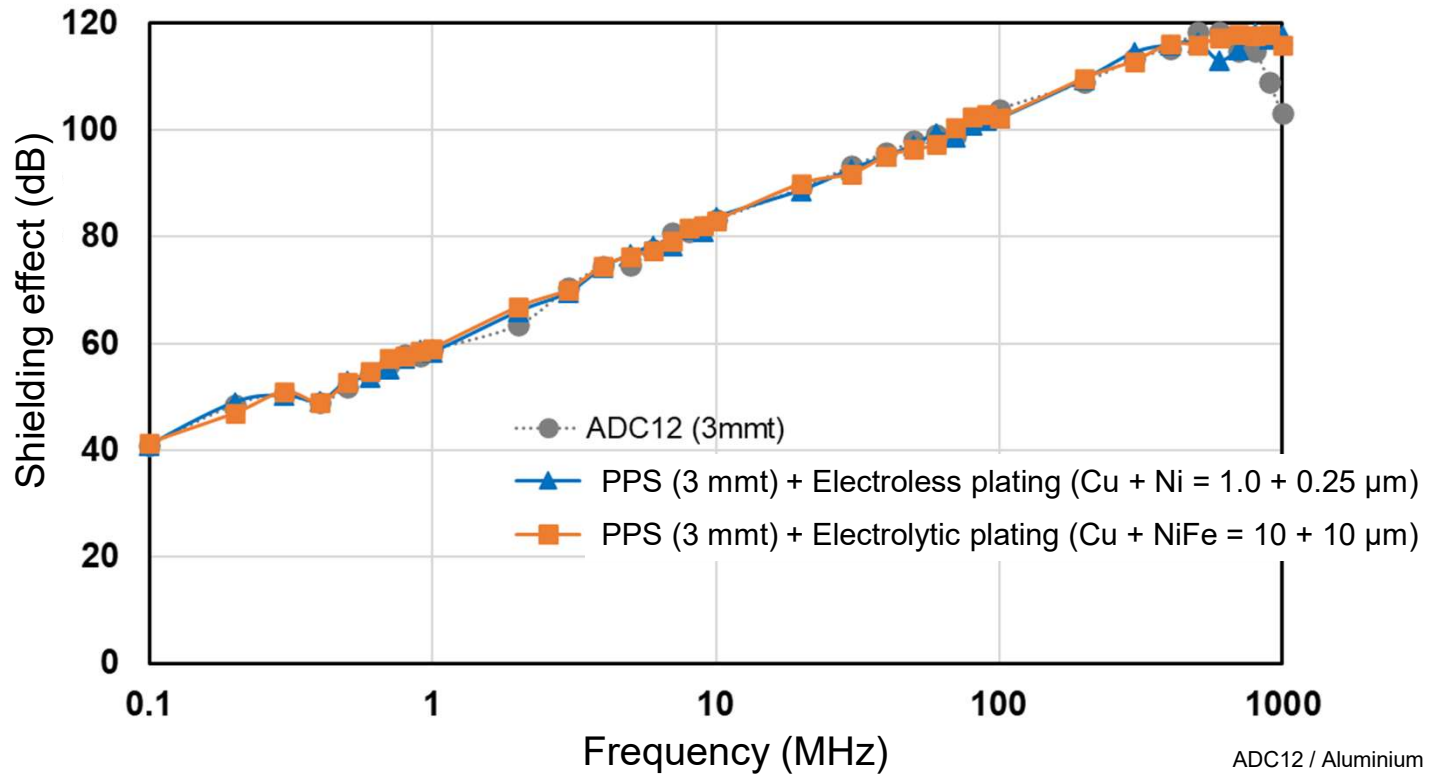
Plateable PPS makes it possible to use plastic instead of metal for applications necessitating durability—including electronic device housings, as well as connectors and other components—and provide electromagnetic interference (EMI) shielding. Of particular note, in the area of automotive components, the move toward electrification and autonomous driving is spurring the increased use of plastics for electronic control unit (ECU) and advanced driver assistance system (ADAS) housings, among others, with the aim of reducing vehicle weight, helping to enhance both performance and sustainability by improving fuel efficiency and cruising range. Going forward, DIC will aim to secure demand, mainly for use in materials for applications that demand durability, notably electric vehicles (EVs) and electronics equipment such as computers. DIC has set a goal for annual sales of this new product of ¥3.0 billion by fiscal year 2030.

Benefit of using MP-6060



Normally etching of PPS requires a dedicated process line due to its superior chemical resistance
MP-6060 can be etched in an existing bath for general-purpose plastics while retaining the inherent properties of PPS

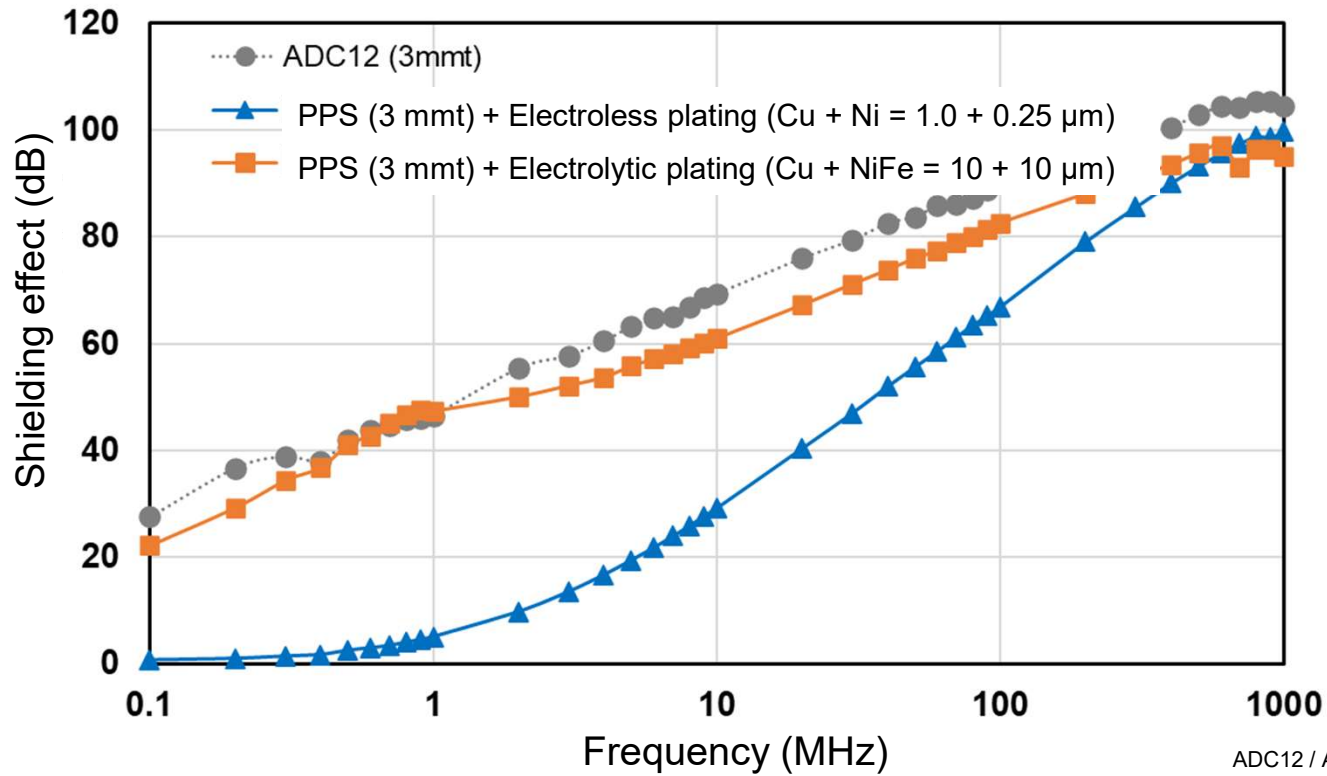
MP-6060 Electric field shield



ADC12 / Aluminium 46100 / A383 / Al-Si11Cu3

MP-6060 either with electroless and electrolytic plating exhibits electric field shielding at the level of measurement limit as same as Aluminium

MP-6060 Magnetic field shield





ADC12 / Aluminium 46100 / A383 / Al-Si11Cu3

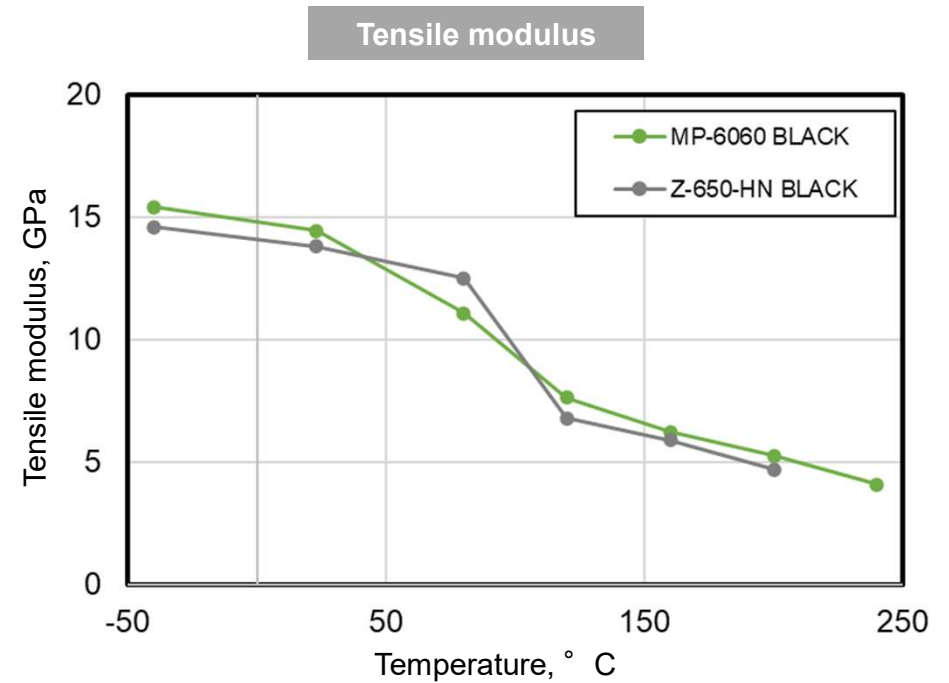
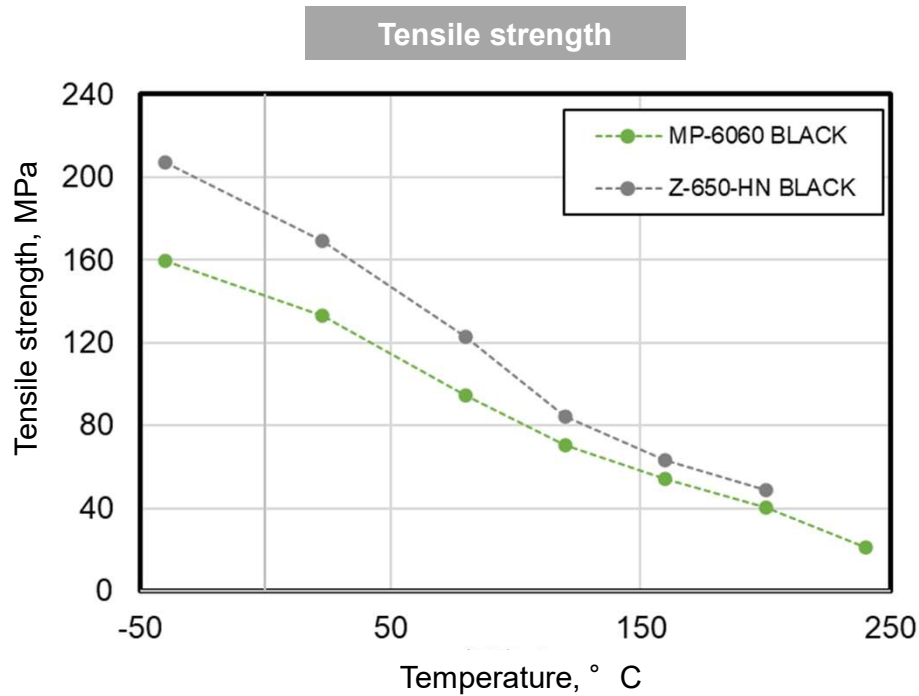
MP-6060 with electroless plating exhibits magnetic field shielding of 20 dB or more from 10 MHz to 1 GHz and from 100 kHz to 1 GHz with electrolytic plating

MP-6060 appearance after plating



	Electroless plating	Electroless plating + Electrolytic Plating
Appearance		
Plating thickness	A few μm	Several tens of μm

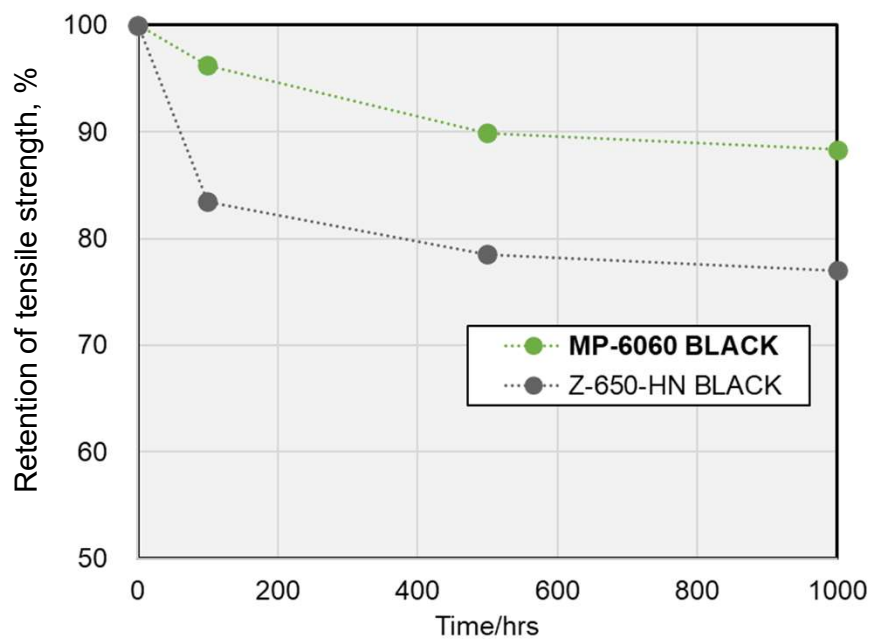
MP-6060: Tensile properties over temperature



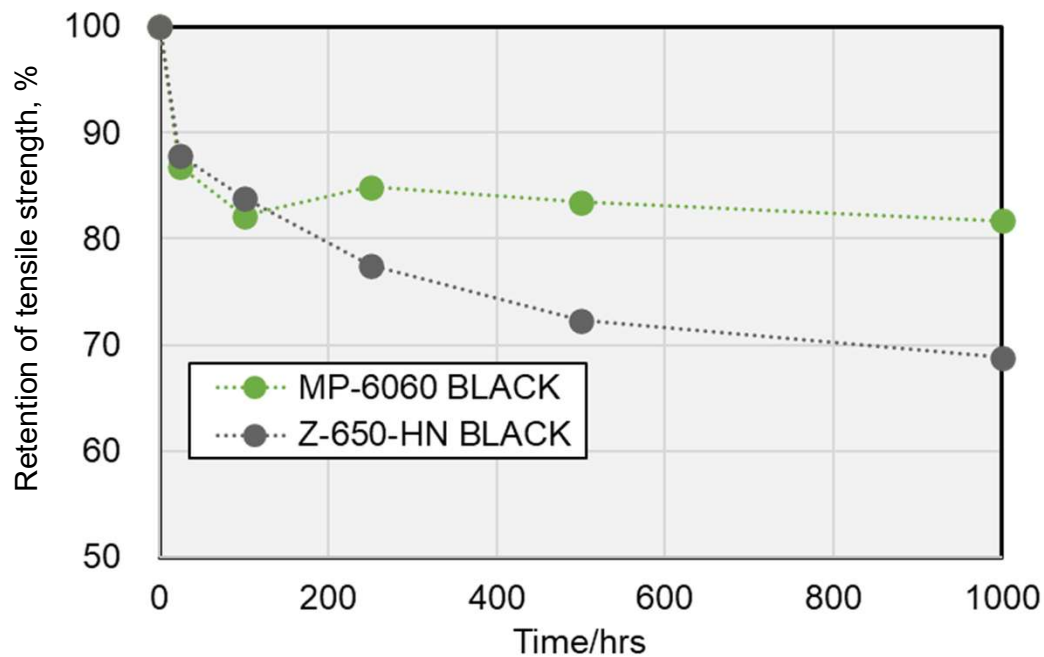
MP-6060: Retention of tensile strength after heat aging & pressure cooker aging



Heat aging test at 220 °C



Steam aging at 121 °C and 100 %RH



**Thank you very much
for your attention!**

